DESIGN AS ETHICS:

Developing Design Practices for Sensory Augmentation

By

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ABSTRACT

Commercial Sensory Augmentation technology enables us to purchase devices which augment our senses. Sensory Augmentation (SA) – 'the extension of the body's ability to sense aspects of the environment that are usually inaccessible to them' (author's definition) – can create new embodied experiences (Hayles, 1999) by expanding the perceptual range of the sensory modalities (Kaspar et al., 2014). However, as a sub-category of Human Enhancement technology (HEt), specific regulations haven't yet been developed (European Parliament, 2009; Jensen et al., 2018), without which potentially harmful devices may reach the market. This practice-led research explores how ethics is enacted through the design of SA and examines how these issues are shaped by, and shape, the design process of future devices (Tonkinwise, 2004; Verbeek, 2011). The aim is to empower SA creators to develop ethical devices in lieu of regulation. To do so this research asks:

How can participatory and speculative design methodologies be used to explore the impacts of Sensory Augmentation and support ethical decision-making in its design and use?

HEt and its consequences are analysed, while incorporating Posthumanist theory to expand considerations beyond the human (Braidotti, 2013; Ferrando, 2019). These ethical considerations are presented to publics (Dewey, 1927) during facilitated workshops to determine their perspectives on the technology, who as the future users have the right to be involved in its' development (Kensing and Bloomberg, 1998). Then, the creation of *Designing Senses* book uses Speculative Critical Design (Malpass, 2017) to explore future implications of ethical SA design in context, informed by academic and public insights, and framed by pillars-Post-Humanist/Dualist/Anthropocentric. Curated to engage SA creators, the book raises awareness about ethical issues, provoking reflection on their own work, while providing the *Lighthouse* Card Deck as a design tool for teams to identify and act on ethical considerations, supporting ethical decision-making in SA design.

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GLOSSARY

TERM	ACRONYM	DESCRIPTION
Accessibility		The design and provision of products, services, and environments to ensure they can be used effectively by all people, including those with disabilities
Anthropocentric		Philosophical viewpoint regarding humankind as the central or most important significant entities in the world, especially as opposed to God or animals
Binary		A division into two groups or classes that are considered diametrically opposite
Biohacking		The practice of using science, tech, and self-experimentation to enhance health, abilities, or performance
Body Modification	BM	Intentional alteration of the human body's appearance or function through practices such as tattooing, piercing, scarification, or implants, often for cultural, aesthetic, personal, or spiritual reasons
Cyborg		The term itself is a portmanteau of 'cybernetic' and 'organism' and thus can refer to all manner of combinations of biological and technological assemblages
Echolocation		A process for location objects in the environment by producing sound waves which echo back to the emitter when reflected off an object
Ethics		A situated, relational mode of responsibility that emerges through practices, behaviours, and socio-technical relations, guiding how humans and non-humans act, interact, and shape one another over time.
Haptics		A tactile or force-feedback technology that leverages a person's sense of touch by applying vibrations and/or motion to the user's skin
Human Enhancement technology	HEt	A modification aimed at improving human performance and brought about by the science-based and/or technology-based interventions in or on the human body
Participatory Design	PD	A collaborative methodology that engages relevant stakeholders in the design process to create solutions that are user-centred, contextually appropriate, and widely accepted by the intended audience.
Perception		The organization, identification, and interpretation of sensory information in order to represent and understand the presented information or environment

Posthumanism (Philosophy)		A philosophical perspective that challenges traditional human-centred views, exploring the implications of transcending biological, cognitive, and technological boundaries to rethink what it means to be human.
Proprioception		Also called kinaesthesia, is the body's ability to sense its location, movements, and actions
Sensory Augmentation	SA	The extension of the body's ability to sense aspects of the environment that are not normally perceivable by the body in its natural state
Sensory Substitution Device	SSD	Tools that translate information typically received through one sense (e.g., vision) into another sensory modality (e.g., touch or hearing) to help individuals perceive or interpret their environment
Speculative Critical Design	SCD	A design methodology that uses material and experiential provocations to critique present practices, explore alternative futures, and question the social, cultural, and ethical implications of design decisions.
Symbiotic		A close, prolonged association between two or more different organisms, be it mutualistic, communalistic, or parasitic

CHAPTER 1: INTRODUCTION

INTRODUCTION

This chapter introduces the foundation and rationale for the research, exploring the personal and academic journey that led to the focus on Sensory Augmentation (SA) and Human Enhancement (HEt). It outlines the methodologies employed – Speculative Critical Design (SCD) and Participatory Design (PD) – and discusses their relevance in addressing the research question: *How can participatory and speculative design methodologies be used to explore the impacts of Sensory Augmentation and support ethical decision-making in its design and use?* The chapter also defines the research aims and objectives, highlighting the evolution from an ethical design framework to actionable tools for SA creators, setting the stage for the subsequent chapters. This positions design not as a neutral process, but as an ethical practice enacted through the development of Sensory Augmentation technologies.

1.1. WHY *I* AM DOING THIS RESEARCH

My fascination with human augmentation originated in an interest in the body and movement. Through a bachelor's degree in special effects make-up design at the Institute of Art, Design and Technology, Dun Laoghaire, I revelled in designing silicone prosthetics that manipulated the body's form. I used the skin as a site to explore perceptions of the body, the person being viewed and therefore the person doing the viewing. Experimenting with materials, sculpting techniques and character design enabled me to envision and actualise tangible creations which, for example, embodied art movements and personified psychoanalytic theory.

This passion for learning and experimentation led me to embark on a master's degree in Materials Futures, at the University of the Arts London. Via research into temporal perception, I discovered the field of Sensory Augmentation, predominantly through the work of neuroscientist David Eagleman. His TED talk 'Can we create new senses for humans?' (2015) was a seminal point in my academic life, where my interest pivoted from the body to the

senses. While delving into the scientific research, I serendipitously encountered Madeline Schwartzman's book 'See Yourself Sensing: Redefining Human Perception' (2011), which served a buffet of whimsical and provocative artistic creations that played with the senses. This new research focus triggered a deluge of questions – What new senses could we obtain? How might it change how we live our daily lives? Communicate with one another? Eat? Dance? How would additional information about the environment around us, previously only accessible to animals, change how we perceive the world? What new practices, industries or artforms would it perpetuate?

My final MA project Anthropomorphic Sensory Augmentation questioned 'What if you could extend your sense of hearing so that you can hear your body, allowing you to have a more intuitive, real-time knowledge of your health and wellbeing?' (Daly, 2016). A network of implanted devices enhance your sense of hearing, using ultrasonic sound to communicate the health of your organs to an in-ear auditory device, similar to cochlear implants. Speculative Critical Design enabled me to utilize the practice skills acquired during my BA to make the intangible perceptual experiences tactile and immersive. For exhibition, silicone replica organs lay on surgical trays, connected to 'ear'phones[1] and screens which allowed the audience to experience the auditory signals and view the resulting behaviour changes. The aim was to explore the possibilities of Sensory Augmentation technology, to then question if this is a future worth driving towards. While I was immensely proud of this project, I felt that it lacked an outcome or impact beyond the graduation exhibition. Knowing that this technology is not merely speculative, but that there are artists and companies designing and implanting devices in the real world (see Chapter 2.6.) drove my desire to be part of this future-in-the-making.

This PhD research was a response to the perceived abrupt ending – a continuation of research to better understand the technology and how I could make an impact as a designer. Exploring how at this early stage of the SA industry I, and other designers, could bring our expertise to the table. Parallel to beginning this PhD I began working at CyborgNest, one of the only companies selling devices marketed as Human Enhancement (see Chapter 2.2. for definition and examples). Prior to my joining, the company had created *NorthSense*, a haptic device which was pierced to the wearer's chest, vibrating when they faced magnetic north – creating a new sense for the human (magnetoreception). It was here I learned the workings of a commercial technology company – working on real devices, for real people, with real

[1] The earpads of the headphones were made from silicone ears, meaning the audience needed to put their ears against the synthetic ones to hear the audio track. A somewhat unsettling experience for some.

consequences, responsibilities, financial/technological/legal limitations and public misconceptions. What I also found was a devoted team of creators, who truly believe in innovation and experimentation, and a loyal community who are eager to augment their bodies and minds with new technologies. This tension between the incredible possibilities of Sensory Augmentation and the challenges of developing technology in a capitalist market is where this research sits.

As a female designer in a male dominated technology industry this also brought with it the innate need to advocate for women and feminine experiences. Discovering Posthumanist theory through the PhD research bolstered my resolve and expanded my advocacy to also include 'others' – human and non-human – when designing and developing commercial sensory devices. Ethics was not originally the focus of the research, however, my life experiences and work in the Human Enhancement industry – due to the technology's inherent risks[2] – has naturally led to a championing of ethically driven design practice. Being lucky enough to conduct my PhD research in tandem (but separate to[3]) working in industry meant that both worlds could inform each other. This has made me a better academic researcher and design practitioner, therefore benefitting both this research and the work I do in industry.

In line with Posthumanist theory and practice, I am truly embedded and embodied in the research, as an academic, a designer and a woman in the technology field – that is to say that this PhD is inextricably linked to me and my experiences within and outside of this research. Therefore, I will also be reflecting upon my experience as an embodied practitioner throughout the thesis, discussing more personal impacts, alongside the critical reflections on the research. As well as becoming a better practitioner myself, I undertook this research aiming to positively impact the SA industry, by bringing my design skills to the table and enabling diverse creators to also enhance their practice. Doing so facilitates the construction sensorily enhanced futures that are built upon inclusive technologies, which benefit the people eager to use them and the planet.

[2] Explored in Chapters 3 and 4.

[3] This PhD was not done in collaboration with any company or other body.

1.2. METHODOLOGICAL APPROACH

As discussed in the introduction, this research was born from the work done during my master's degree, therefore coming into it the presumption was that I would continue with the same methodology. Speculative Critical Design was central to my practice as a means of exploring and embodying Sensory Augmentation technology's personal and societal impacts.

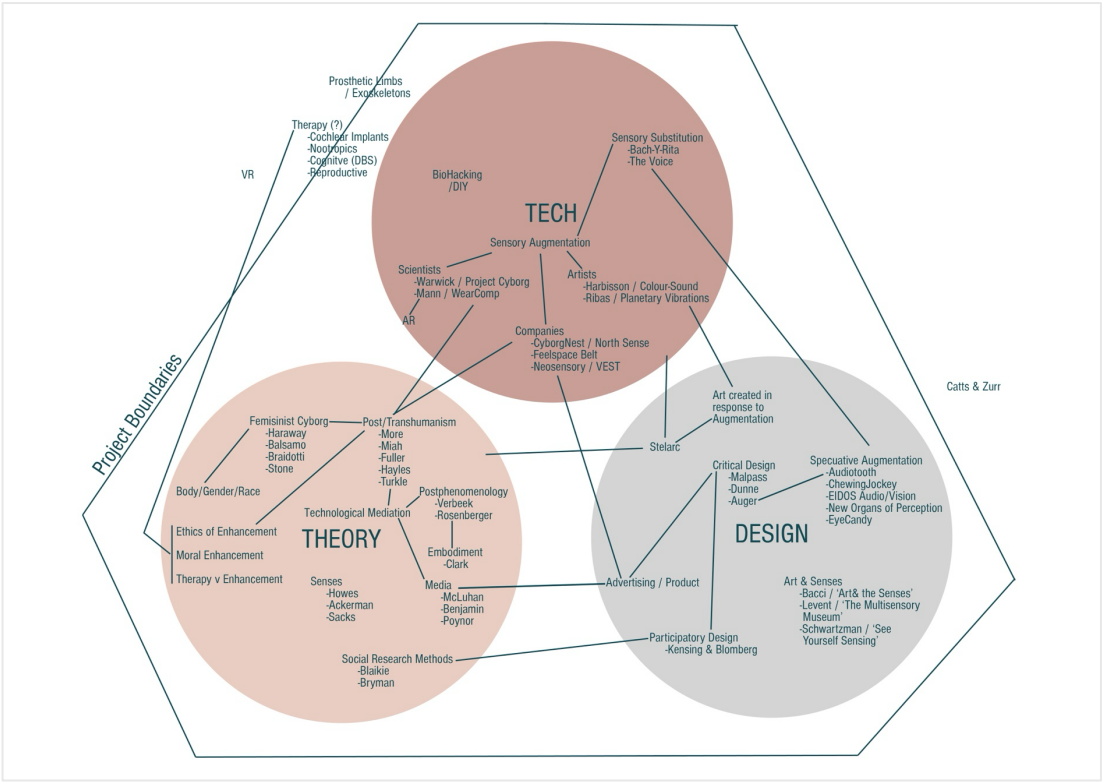


Figure 1 Original references and research boundaries mapping, Lesley-Ann Daly, 2017.

Figure 1 articulates my body of references at the beginning of this research, the majority of which was drawn from research during the masters. The references are largely secondary sources; books, theoretical reports, design project websites and articles written about companies and artists. What became apparent in the literature review was that there was a gap in the knowledge, which I couldn't access from secondary sources, and to enrich my understanding I needed to employ Participatory Design methods. Gathering insights by engaging with publics was key to contributing to a rich framework and informing subsequent SCD practice.

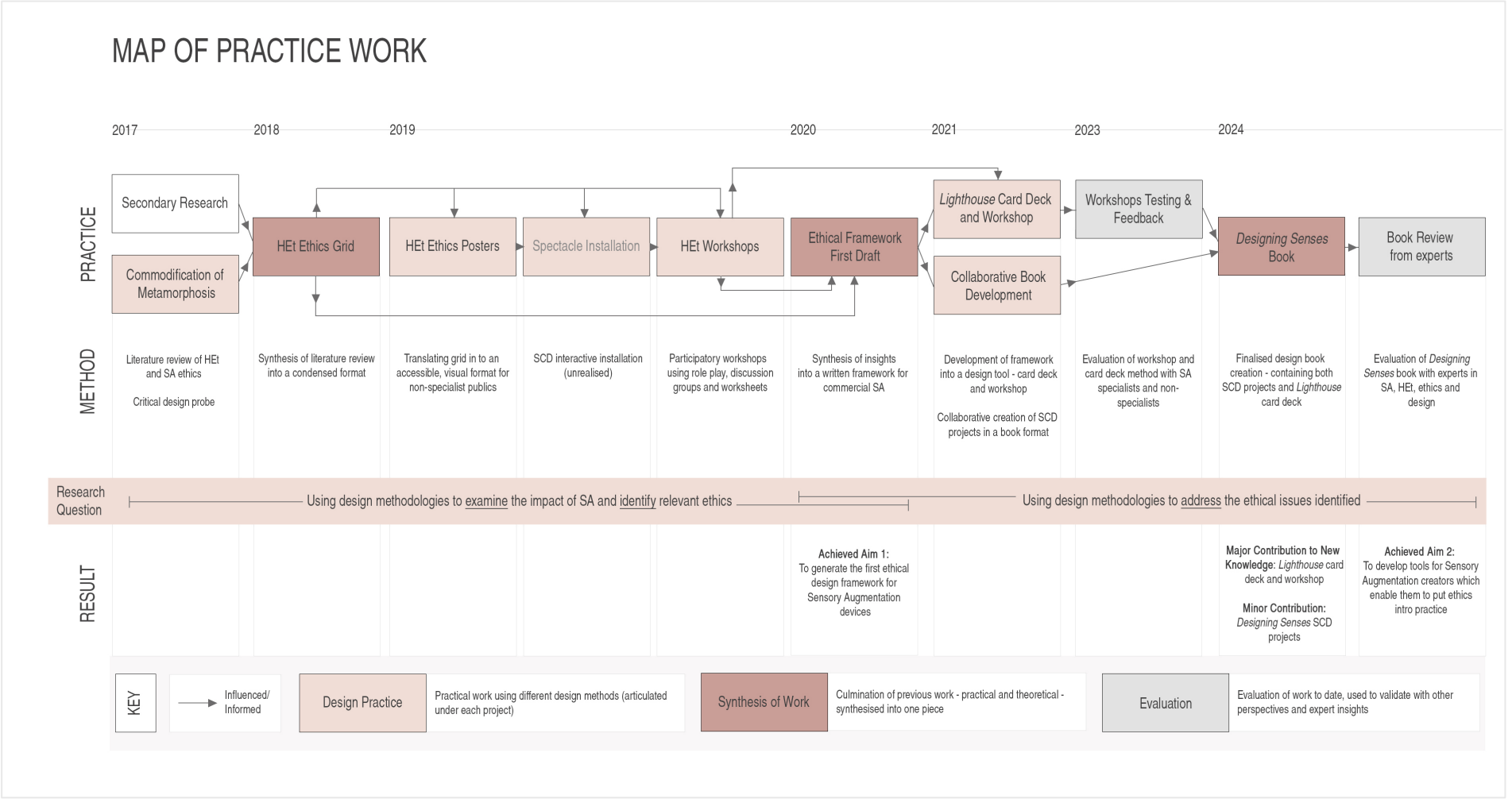


Figure 2 Map of Practice Work throughout the PhD, Lesley-Ann Daly, 2025.

Figure 2 provides an overview of the practice, illustrating how the practice-led research develops in an iterative fashion to address the research question: 'How can participatory and speculative design methodologies be used to explore the impacts of Sensory Augmentation and support ethical decision-making in its design and use?' The figure maps the practice work across the research timeline, using colour coding to distinguish design practice, the synthesis of prior work into a larger practice, and the evaluation of the work – each articulated underneath with the respective methods used. The research question spans the timeline, demonstrating how the practice addresses specific aspects of it. Finally, the results of the practice-led research are shown, indicating the achievement of Aims 1 and 2 and highlighting that the contribution to new knowledge is embodied in the *Lighthouse* card deck and workshop, and the *Designing Senses* book.

1.2.1. Speculative Critical Design

Defining SCD

Speculative Critical Design is fundamentally a method which challenges design through design. By constructing alternative presents and possible futures it questions the implications of design decisions made today, particularly how scientific and technological innovation impact social, political and cultural values, and vice versa (Malpass, 2017). It can be defined in opposition to 'affirmative' design[4], which 'reinforces how things are now, it conforms to cultural, social, technical and economic expectation' (Dunne & Raby, 2001, p. 58). Most design falls under affirmative design, whose general output is a product or service. Alternatively, Critical Design rejects normative assumptions, questioning the status quo, and produces knowledge rather than products.

The speculative futures are modelled in material and experiential forms (DiSalvo, 2015), using familiar imagery and concepts in unfamiliar ways to create an uncanny scenario which piques the reader's curiosity. SCD uses methods such as humour, narrative, ambiguity and para-functionality to show the design probe[5] in its' future context of use. This transports the reader, giving them a more embodied experience, enabling them to understand the technology and

[4] This binary opposition is not always clear cut, as argued by Bardzell & Bardzell (2013).

[5] The probe is often a speculative product as the practice has been largely influenced by the work of Dunne and Raby and their background in Industrial Design. However, as explored in Chapter 5 other interpretations of, and mediums for, SCD can be used- arguably more effectively- for similar intended outcomes.

its potential implications from within the future world. The scenarios are not neutral, they intend to critique design practice and provoke discussion, with the aim to affect change in design today. By reflecting upon the scenarios and considering how we got there, adjustments can be made in the present to drive towards more preferable futures.

SCD in this Research

In this research, Speculative Critical Design is employed as a supporting methodological approach, generating provocative artefacts and scenarios that make ethical tensions visible and tangible, thereby enabling meaningful participation and discussion within the Participatory Design activities (discussed below). Figure 2 shows a map of the design practice developed during this research, showing how SCD has been utilised throughout as a means of critiquing present and speculative SA devices. *Commodification of Metamorphosis* leveraged the uncanny to create unease around the implantation of commercial SA, making the experience of augmented senses tangible via a sculptural probe (Chapter 3.3.2.). The *Spectacle* installation, critiqued the commercialisation of SA and HEt, stringing up disembodied enhanced limbs which are put on display for the audience to peruse and purchase (Chapter 4.2.2). The dominant body of SCD work lies in the creation of the book *Designing Senses*, a probe in itself, which coalesces diverse visions of ethical and unethical SA futures (Chapter 5). A major output for the research, the book informs SA creators about the plethora of ethical issues related to their technology- showing the ethics in context- and provokes reflection on their own designs. Other speculative design practitioners exploring biotechnology and human enhancement are examined in Chapter 5.1.1, situating this research within the broader field.

Although all three practice pieces used SCD, some were more successful than others: first in articulating and embodying the ethics, then in the engagement of relevant audiences to provoke the intended discussion and action. A major factor affecting their success was my understanding of HEt and SA ethics, which required the employment of Participatory Design to broaden and deepen the frame of reference.

1.2.2. Participatory Design

Defining PD

Participatory Design is a collaborative methodology that engages with stakeholders, highlighting the importance of the publics' opinion, as they are the future users and could have critical, differing views on these disruptive technologies. In 1990s Scandinavia, PD began as a series of projects with workers advocating their right to be involved in the decision-making processes in their workplace. This was driven by the belief that those who are affected by a technology have reason to be involved in its' design (Kensing and Bloomberg, 1998). This meant creating a space where 'researchers, software enterprises, managers and end-users could meet, exchange ideas and learn from one another' (Smith et al. 2017, p. 65). By co-creating with participants (the workers in this case) it also gives them an added sense of ownership in the designs and a stake in the outcomes.

PD has evolved in design practice – known now also as co-design or user-centred design – to be understood as a method which includes the diverse perspectives of end-users to produce more effective and inclusive outcomes that resonate with the actual users' experiences and needs. Methods used for PD include workshops, co-design sessions, prototyping and scenario building. The focus is on the people using the technology, acknowledging them as experts in their own experience – experiences which may be different to, or not understood by the designer. Therefore, it is critical to understand the end user, their needs, issues, and aspirations in use in order to develop an outcome that is relevant for them and their lives. 'The people whose activity and experiences will ultimately be affected most directly by a design outcome ought to have a substantive say in what that outcome is' (Iversen *et al*., 2012, p. 87).

When addressing issues and their potential consequences a *public* is constructed (Dewey, 1927, DiSalvo, 2009). Publics are not abstract subjects, they are a coming together of people who are, or could be, affected by an issue. They are concrete, situated, and specific to the context of the issue, and one issue may produce multiple publics. Design contributes to the formation of publics by communicating the issues and their consequences – through PD methods – facilitating discussion and action[6]. Constructing, then engaging publics around an issue is not a straight-forward process as 'a public is not a vehicle of rationality and consensus, but rather, that it is a messy conglomerate of many stakeholders who might in other settings, around alternate issues, be add odds with one another' (Le Dantec and DiSalvo 2013, p. 244). The plurality and diversity within the public is crucial, as it enables the complexity of issues to be tackled taking multiple perspectives and situated implications into account.

[6] However, the actual 'action should be considered as a separate endeavor' (DiSalvo, 2015, p. 63).

While Participatory Design originated in Scandinavian workplace democracy and the right of workers to influence the technological systems that shape their lives (Ehn, 1988; Kensing and Greenbaum, 2013), the field has since expanded significantly. Contemporary Participatory Design retains its foundational commitments to democracy, empowerment, mutual learning, and the inclusion of those affected by design decisions (Simonsen and Robertson, 2013; Bødker et al., 2022), while increasingly engaging with complex socio-technical systems, diverse publics, more-than-human actors, and emerging technologies across multiple scales (Smith et al., 2025). This expanded understanding of Participatory Design is particularly relevant to this research and is developed further in Chapter 4 through workshops addressing the ethical implications of emerging Sensory Augmentation technologies.

PD in this Research

Like SCD, Participatory Design has been used throughout this research (see Figure 2), and is adopted as the primary methodological framework, as it enables ethical questions surrounding SA to be explored collectively by those who design, use, and are affected by the technology. The first major utilisation of PD can be seen in the workshops articulated in Chapter 4, which engage publics to explore the ethical issues of HEt and its potential consequences. Workshops in the Victoria and Albert Museum, Design Museum and at Brave New World Conference use provocative scenarios, projecting HEt's implications into the future so that participants can discuss their impacts. While the workshop at the Wellcome Collection traces the historical definitions of 'normal' so that participants can understand the formation of modern criticism of the term. The publics participating are the potential future user of these technologies and thus are key to involve in the discussion on, and development of, them as they will be the ones affected by their use. These workshops provide valuable insights into the ethical design and use of HEt, adding to the theoretical research, to inform the construction of the first ethical design framework for SA draft.

PD is re-engaged in the latter part of the research in the creation of design tools for SA creators. The *Lighthouse* card deck and workshop are designed as a means for diverse teams to collaboratively assess their device design and define actionable next steps towards more ethical technologies. As the creators of the technology, they are in the position to enact real change in their processes, and in the wider field, therefore learning and employing participatory methods themselves also has the potential to bolster the user-centred design practice across the industry.

This research is positioned primarily within Participatory Design, as the central methodological approach through which ethical reflection on Sensory Augmentation is generated, discussed, and operationalised in design practice. The primary outcome of the research – the Lighthouse card deck and facilitated workshop – requires collaborative engagement, collective sense-making, and shared responsibility among design teams, which are foundational principles of PD. Speculative Critical Design functions as a complementary and enabling methodology, used to surface, frame, and materialise ethical issues in ways that make them discussable within participatory settings.

What both PD and SCD have in common is the inclusion of diverse perspectives to question normative practices, facilitating the creation of more inclusive, preferable futures. Both do this through design methods, examining the impacts of technologies, in order to address the related ethical issues. Which is why these methodologies are used in this research to tackle the Research Question:

How can participatory and speculative design methodologies be used to explore the impacts of Sensory Augmentation and support ethical decision-making in its design and use?

1.2.3. Ethics as Ethos

This research adopts an understanding of ethics not as a regulatory or prescriptive framework, but as an ethos: a situated, relational, and practice-based mode of ethical engagement. Rather than framing ethics as a set of rules to be mandated, enforced, or treated as a procedural "checkbox" within design processes, ethics is understood here as an ongoing, contextual discussion that emerges through design practice and is oriented towards producing more responsible and preferable outcomes. This distinction is central to the thesis and informs both its theoretical framing and methodological approach.

A critical distinction is therefore made between moral ethics and ethics as ethos. Moral ethical frameworks – such as deontological, consequentialist, or virtue-based approaches – typically aim to define what is right or wrong according to universal or pre-established principles. While such frameworks offer valuable tools for analysis, they are limited in their capacity to respond to emerging technologies such as Sensory Augmentation, where impacts are distributed, relational, and deeply context dependent. In contrast, ethics as ethos foregrounds ethical responsibility as something that is enacted through behaviours, practices, and socio-technical

ecologies. Ethics, from this perspective, is not resolved in advance, but continually negotiated as technologies are designed, used, and integrated into everyday life.

This orientation aligns closely with Rosi Braidotti's posthuman ethics (explored in Chapter 2.8 and 3.1.3), which informs the primary ethical framework for this research. Braidotti rejects universalist moral claims in favour of an affirmative, materially grounded, and relational ethics that acknowledges the entanglement of human and non-human actors (Braidotti, 2013; 2019). Ethics, in this framing, emerges from the capacity to respond responsibly within complex assemblages of bodies, technologies, environments, and power relations. Rather than asking whether a technology is inherently good or bad, posthuman ethics asks how relations are configured, who is empowered or marginalised, and what forms of becoming are enabled or constrained.

Braidotti's position is complemented by the work of Francesca Ferrando, whose articulation of critical posthumanism similarly challenges anthropocentric and humanist assumptions about subjectivity, agency, and technological progress (Ferrando, 2019), and Peter-Paul Verbeek, whose philosophy of technology emphasises the mediating role of artefacts in shaping human experience, perception, and moral action (Verbeek, 2011). Together, these perspectives support an understanding of ethics as emergent, relational, and inseparable from design practice – particularly relevant in the context of Sensory Augmentation, where technologies actively reconfigure perception, embodiment, and agency.

In terms of positionality, this research adopts a critically Posthumanist stance that is broadly pro-enhancement, recognising the significant and potentially transformative possibilities that SA technologies can offer. At the same time, it acknowledges that such technologies carry inherent ethical risks, particularly in relation to unequal access, commodification of bodies, and the potential for social and material harm. This position is explicitly distinct from transhumanist perspectives, which are critiqued later in the thesis for their reliance on techno-solutionism and their narrow definitions of who qualifies as human. Rather than rejecting enhancement outright, this research seeks to interrogate how enhancement is imagined, designed, distributed, and governed.

This ethical positioning has direct implications for the structure of the thesis and the methodologies employed. Ethics is not treated as an external evaluative layer applied to completed designs, but as something that must be cultivated through participatory, reflective, and experimental design practices. The role of the designer is therefore not to prescribe ethical outcomes, but to facilitate ethical deliberation—creating conditions in which SA creators,

publics, and other stakeholders can engage critically with the implications of Sensory Augmentation and take responsibility for the futures they help to shape.

This understanding of ethics as situated and relational extends to the production of knowledge within this research. The selection of literature is not treated as neutral, but as part of the ethical and methodological positioning of the thesis. Drawing on posthuman philosophy, participatory design, speculative design, and design ethics, the citational practice of this research foregrounds critical, feminist, and posthuman perspectives that challenge dominant human-centred and techno-solutionist narratives. While this necessarily represents a partial view of the field, it is a deliberate one, aligned with the research aim of developing more ethically reflective approaches to SA design.

1.2.4. Experimentation as Method

Following the understanding of ethics as an ethos outlined in Chapter 1.2.3, experimentation in this research functions not only as a means of inquiry, but as a mode of ethical engagement, through which ethical questions are surfaced, negotiated, and responded to in practice. This research adopts experimentation and iteration as core methodological strategies, consistent with practice-led design research in which knowledge is generated through the act of making and doing.

Rather than treating design outcomes as final artefacts, this research understands them as experimental propositions through which ethical questions surrounding SA are explored, tested, and reconfigured over time. Design artefacts are approached as epistemic objects that produce knowledge through their material form, context of use, and the discussions they provoke. In this sense, experimentation is not directed towards optimisation or resolution, but towards the articulation of ethical tensions and the opening up of spaces for reflection and dialogue.

The practice in this research operates as a form of argument, not only advancing conceptual claims, but also staging ethical positions and tensions for collective reflection. As Ruecker argues, prototypes do not simply illustrate ideas but actively advance claims through their material and experiential qualities, shaping how issues are encountered, interpreted, and debated (Ruecker, 2015). Design artefacts such as *Commodification of Metamorphosis*, the *HEt Ethics Posters*, and the early development of the *Spectacle* installation functioned as speculative arguments about the commercialisation, embodiment, and visibility of human

enhancement technologies. These artefacts were intentionally provocative, designed to make abstract ethical concerns tangible and discussable rather than to propose fixed solutions.

Iteration across the research was driven by critical reflection on the ethical and methodological effectiveness of each experiment. For example, the decision not to fully actualise the *Spectacle* installation marked a significant turning point in the research. This moment of abandonment is understood as an ethical as well as methodological insight, revealing the limitations of spectacle-driven speculative critique in facilitating sustained, inclusive ethical dialogue, and highlighting how certain forms of representation can constrain participation. This insight directly informed the subsequent shift towards facilitated workshops with publics, where participatory methods enabled more situated, dialogic, and reflexive engagement with ethical issues.

Knowledge production in this research therefore emerges through a cumulative and iterative process in which each piece of practice informs the next. Experimentation functions as a connective methodology, linking speculative inquiry, public engagement, and the development of actionable design tools. In this way, experimentation operates as a practical expression of ethics as ethos, embedding ethical responsibility within ongoing processes of making, participation, and reflection rather than treating ethics as an external evaluative layer applied to completed designs. This methodological orientation supports the development of the *Lighthouse* card deck and workshop as practice-based contributions that enable design teams to actively engage with the ethical implications of Sensory Augmentation within their own design practice. This methodological approach underpins the design explorations, workshops, and artefacts presented in Chapters 4–6.

1.3. AIMS & OBJECTIVES

Below are the aims for this research and their associated objectives.

Aim 1

To generate the first ethical design framework for Sensory Augmentation devices.

Objectives:

- To review existing literature on Human Enhancement technology ethics.

- To conduct participatory design workshops to assess public perception of Sensory Augmentation & Human Enhancement technology.
- To explore Posthumanism as a means to expand the discussion beyond humans.
- To synthesise ethical issues relating to Sensory Augmentation technology development into a framework for creators of devices.

Aim 2

To develop tools for Sensory Augmentation creators which enable them to put ethics into practice.

Objectives:

- To use Speculative Critical Design to raise awareness about ethics relevant to Sensory Augmentation.
- To create design tools which make the ethics actionable in Sensory Augmentation device design and development.
- To engage Sensory Augmentation creators in evaluating the tools to ensure that they work in real-world device development.

First, the research focuses on the creation of an ethical framework that synthesises the ethics that are relevant to designing SA devices, achieving Aim 1. Then uses the insights from Aim 1 to inform the creation of the *Designing Senses* book which uses SCD to raise awareness about SA ethics in context. The book also contains the *Lighthouse* card deck and workshop- the development of the ethical framework into a participatory tool- which enables SA teams to put ethics into practice, thus achieving Aim 2.

1.4. SUMMARY OF THESIS CONTENT

This section will give an overview of each chapter and its contribution to the research.

Chapter 2

This chapter situates the research within Human Enhancement (HEt), Sensory Augmentation (SA), and Posthumanism, establishing key concepts and terminology foundational to the thesis. It explores body modification, biohacking, and current efforts to integrate technology with the body, envisioning futures for the enhanced, or post-, human. The chapter addresses the motivations behind augmenting human perception and examines both the extraordinary potential and ethical dilemmas of enhancement. Drawing on Posthumanism, it contextualizes SA technology within HEt ethics, considering the impacts on individuals, society, and the planet, underscoring the need for ethical foresight in designing future SA technology. It also examines how posthuman theory has been taken up within contemporary design practice, situating SA within more-than-human design discourse.

Chapter 3

The chapter begins by establishing key ethical positions on Human Enhancement, situating the research within a critically posthuman framework. This chapter examines the ethical and regulatory challenges in commercializing HEt and SA devices. It explores the blurred boundary between therapeutic and enhancement technologies, complicating regulation, and addresses how dystopian media representations of HEt hinder public acceptance. By analysing ethical dilemmas and regulatory gaps, the chapter advocates for an ethical design framework for SA devices. It also discusses ethics in design, biases in the tech industry, and the requirements for designing for "cyborgs," presenting a call for collective action to ensure safe, beneficial use of these technologies.

Chapter 4

This chapter presents methodologies for engaging the public in ethical discussions on HEt, emphasizing visual and participatory methods. It introduces an HEt Ethics Grid, developed from academic and government sources, to map issues in HEt's widespread use and guide public engagement efforts. By understanding public concerns and aspirations, the chapter enriches existing literature, examining perceptions, desires, and barriers related to HEt, situating this engagement within contemporary PD discourse. Through insights from four workshops, it emphasizes the value of diverse perspectives and participatory design, culminating in the first draft of an ethical design framework for SA devices.

Chapter 5

This chapter details the creation of a book aimed at raising awareness of SA ethics and providing actionable tools for SA creators. It explains the rationale for a book, its target audience, and design processes – positioning it in relation to existing SCD practice – incorporating workshop insights and the draft ethical framework from prior chapters. The book – *Designing Senses* – uses Posthumanism to organize complex ethical issues and employs Speculative Critical Design for provocative engagement. Beyond raising awareness, it includes a new participatory design tool- the *Lighthouse* card deck- to encourage active involvement, while the book itself embodies values of sustainability and inclusivity, demonstrating design ethics in practice.

Chapter 6

This chapter presents feedback from workshops testing the *Lighthouse* card deck and reviews of the *Designing Senses* book, evaluating their effectiveness in achieving their aims. It details insights from workshops with SA experts, students, and designers, refining the workshop methodology for inclusion in the book. Expert reviewers in SA, Human Enhancement ethics, and Speculative Critical Design provide feedback on the book's goals, assessing its potential to guide SA creators in ethical development. These insights validate the research methodologies, confirming the impact of Participatory and Speculative Critical Design methods in fostering ethical frameworks for SA in industry, academia, and education.

Chapter 7

This concluding chapter synthesizes the research findings, demonstrating how the integration of literature, public engagement, and design methods addressed complex ethical challenges and fulfilled the research aims. It outlines the major contribution to new knowledge: the *Lighthouse* card deck- a comprehensive set of ethics-related questions for SA development- and its accompanying workshop, which enables teams to collaboratively generate ethical, actionable outcomes. It also presents the *Designing Senses* book as a minor contribution, providing essential context for engaging with the tools. Finally, the chapter articulates next steps for the research and offers concluding reflections on its application to adjacent emerging technologies.

CONCLUSION

This chapter establishes the context for the research, detailing the personal motivations, academic grounding, and methodological approaches that underpin the study. By defining the research aims and objectives, it sets a clear trajectory for the exploration of SA ethics. The use of SCD, PD, ethics as ethos, and experimentation as method are justified as critical methods for engaging with ethical issues and generating actionable insights. This foundational chapter situates the research within the emerging SA landscape, adopting a critically Posthumanist stance that is broadly pro-enhancement, and positions the thesis to contribute meaningfully to ethical design practices in this evolving field.

CHAPTER 2: DESIGNING YOUR SENSES

INTRODUCTION

This chapter provides a comprehensive context for the research, situating it within the fields of Human Enhancement (HEt), Sensory Augmentation (SA), and Posthumanism. This chapter supports the thesis by introducing the reader to key concepts and terminology which are the backbone of the research.

It sets the stage by discussing body modification and biohacking, documents current efforts to merge the body with technology, and explores future visions for the enhanced, or post-, human. The chapter aims to establish an understanding of why people seek to augment their bodies and minds, focusing on the perception altering abilities of both real and speculative SA technologies. It introduces the tension between the extraordinary potential benefits of enhancement and its intrinsic ethical issues, while also employing Posthumanism to bring an expanded frame of reference to the discussion. The chapter also examines how posthuman theory has been translated into contemporary design practice, identifying a gap in relation to embodied Sensory Augmentation technologies.

The inherent and ongoing human desire to push beyond biological limits, alongside the prospective harm caused by enhancement technology- on an individual, societal, planetary and temporal scale- justify the need to explore the future design of SA technology as situated within the context of HEt ethics and Posthumanist theory.

2.1. MODIFYING THE BODY

The desire to modify the human body is not new; it has deep historical roots in practices that challenge societal norms and explore identity. From body modification subcultures to contemporary biohacking, these movements represent a continuum of human efforts to reshape the body in defiance of external constraints. This chapter explores these practices as

precursors to modern human enhancement technologies, revealing a persistent drive toward self-determination and innovation.

2.1.1. Challenging Identity Through Modification

The body is inherently political. It has been described as "a 'tomb' (Plato), a 'temple' (Saint Paul), a 'machine' (Descartes), and the self ('I am my body' – Sartre)" (Synnott, 1993). Our body represents identity, embodying our past, race, gender, and status, and acting as a symbol of society. Yet, the way bodies are viewed and categorized is often beyond the control of the individual. Many of these definitions are imposed by systems of power, shaping what is considered 'normal'[7] or socially acceptable. These standards depend on the time, place, and inherent characteristics of one's body (e.g., male/female, white/non-white, able-bodied/disabled).

Body Modification (BM) technologies and practices have emerged as tools to resist these imposed definitions. By altering their physical forms, individuals and communities can create identities closer to their self-perception. The 20th century saw a rise in (particularly Western) BM practices such as piercing, tattooing, scarring, and technological augmentation. Examples include Anarchist Punks of the 1970s adopting the Native American 'mohawk' and piercing their skin with safety pins, and the Modern Primitivism movement's embrace of indigenous practices like scarification and neo-tribal tattoos. Feminists challenged patriarchal control with pro-sex fetish practices, while queer communities experimented with S&M (sadomasochism), transgender expression, and genital piercings. Cyberpunks further disrupted norms by merging their bodies with technology or envisioning entirely digital existences in cyberspace (Pitts-Taylor, 2003).

These movements shared a rebellion against normative Western ideals, using aesthetic enhancements to challenge gender/sexuality norms, binary separations of 'us' and 'other,' and restrictive identities. By forming subcultures, participants claimed autonomy over their bodies and meanings, frequently describing them as a 'work-in-progress' (Pitts-Taylor, 2003, p. 153). This notion reflects a state of constant change and becoming, a rejection of static, externally imposed identities.

7 The concept of 'normal' will be explored throughout the thesis. It will be addressed in more detail and challenged in Chapter 4.3. and 4.4. in workshops with publics.

Modern Primitivism, however, has sparked controversy. By adopting practices from non-Western cultures, it has been criticized for fetishizing 'primitive' rituals to articulate dissatisfaction with Western culture (Klesse, 2000). Additionally, BM practices have appropriated modern medical technologies—such as needles and surgical tools—to reimagine and reconstruct flesh in innovative ways. Though often perceived as radical or rebellious, body modifications are not immune to the assimilative power of popular culture. Tattoos and piercings, once symbols of deviance, have become mainstream. While more experimental and invasive practices remain subcultural, time may erode their radical edge, rendering them 'cool' and widely accepted (Featherstone, 2000, p. 53).

2.1.2. The Body & Technology

Building on the legacy of body modification, biohackers similarly defy societal norms. This movement champions non-institutional science and technology, democratizing innovation by empowering citizen scientists (Pearlman, 2017; Sovijärvi *et al.,* 2019). By implanting magnets, RFID chips, and other devices beneath the skin, they merge physical and digital functionalities (Dangerous Things, n.d.). This DIY approach emphasizes open-source technology and community sharing, enabling individuals to experiment and collectively advance the field.

Still in its infancy, biohacking presents risks due to its reliance on two 'imperfect technologies': the body and the devices themselves (Gordon, 2001). Both are prone to failure and require constant maintenance. However, through communal experimentation and shared knowledge, the biohacking community aims to refine these practices, potentially driving exponential growth under the broader umbrella of Human Enhancement. Donna Haraway's 'A Cyborg Manifesto' (1991) offers a critical lens through which to view biohacking. Haraway envisions the cyborg as a figure liberated from traditional categorizations—male/female, black/white, human/animal, human/machine. This vision challenges restrictive systems of power, proposing a posthuman future unbound by natural or social constraints.

Yet, despite their subversive intentions, BM and biohacking practices are not entirely removed from existing power structures. Instead, they create new hierarchies within subcultures. Access to these technologies—and the privilege to augment without severe repercussions—remains limited. For many, such acts of rebellion carry significant physical and social risks. Nonetheless, individuals who modify their bodies symbolize broader societal shifts. They form connected networks that challenge norms and advocate for diverse identities. Their actions

transcend personal expression, representing a collective push toward a world more accepting of varied bodies and experiences.

2.2. HUMAN ENHANCEMENT TECHNOLOGY

2.2.1. Defining Enhancement

The rapid pace of scientific and technological innovation has brought about a plethora of new possibilities for humans to augment themselves, body and mind, to gain new abilities- known as Human Enhancement (HEt). A recent state-of-the-art review, commissioned by the EU, defines HEt as 'a modification aimed at improving human performance and brought about by science-based and/or technology-based interventions in or on the human body' (Jensen *et al.*, 2017, p. 5) which is a slight adaption of a previous definition by the European Parliament (Coenen *et al.*, 2009). However, there is no standardised definition due to difficulties categorizing which technologies do, or do not, qualify as enhancements (addressed here), which is further complicated by how a 'normal' human is defined (addressed in detail in Chapter 4.4). In more everyday usage, HEt is understood as the merging of new technology with the body, resulting in new or enhanced abilities, beyond that of the 'normal' human.

HEt can be subcategorized into six interventions: cognitive – which improves brain functions; affective – which improves or provides greater control over mood and emotion; moral – which improves or controls one's ethical behaviours; physical – which improves or introduces new physical abilities; cosmetic – which improves aesthetic traits; and longevity – which extends a humans' lifetime (Jensen *et al.*, 2017). Methods for obtaining HEt fall broadly under three areas: biomedical/pharmaceutical enhancements – such as neurostimulation, plastic surgery and performance enhancing drugs (known as 'doping' in sport); machine-based augmentations- Brain-Computer Interfaces (BCI), prosthetic limbs, and Sensory Augmentation devices; and genetic interventions – genetic engineering (CRISPR cas-9) and reproductive interventions ('designer babies').

Biohacking is an ongoing example of how the body's boundaries can be challenged via non-institutional scientific and technological means, while BM can be considered as a precursor to enhancement practices due to its relatively low-tech tools. Figure 3 shows a non-exhaustive timeline of HEt and SA technologies, documenting key technological developments and relevant regulations, developed by the author in 2017. Here we can see the intertwined history of BM practices, biohacking and HET. For example, sub-dermal implantations techniques

(appropriated from medicine) were used by a piercer in the mid-1990s for the first magnetic implant- which is considered as enhancement as it gives the person implanted a, somewhat weak, magnetic sense. Biohackers use the same techniques to implant RFIDs, inspired and emboldened by pioneers such as Kevin Warwick and Stelarc. However, as the risk increases, due to the technology or complexity of implantation, the process veers towards the use of medical practitioners rather than body modification specialists, e.g., Neil Harbisson uses a surgeon to implant his eyeborg. Key moments, people and regulations on this timeline will be referenced throughout this chapter and beyond. To note, although the history of enhancement can be said to date back to humans first use of a stick as a tool, the choice was made for this timeline to begin after WW2, when Nazi doctors unethically experimented on prisoners. Though hugely problematic, one must also acknowledge that their research during the war has informed subsequent advances, after which relevant technologies have been rapidly progressing. This period also led to the development of ethical guidelines to protect people from human experimentation and formed the basis for medical ethics, which will become relevant below.

The development of many, if not all, enhancement technologies come from medical research or the appropriation of medical technologies for enhancement purposes, some of which are already in use today and some are speculations for future use. For example, methylphenidate (more commonly known as Ritalin™), a pharmaceutical prescribed to ADHD patients, is used by students and professionals as a 'study-aid' or cognitive enhancer to boost concentration (Nicholson *et al*., 2015; Royal Society, 2012). Prosthetic devices have been developed to give the subject increased abilities, e.g. strength, beyond that of a 'normal' human.

It is worth noting that, although these technologies generally come from medical research, much development comes from the military due to their large research budgets and interest in use during combat. Institutions such as DARPA (Defence Advanced Research Projects Agency) research and develop emerging technologies which could potentially give soldiers an added advantage in combat situations and operate outside of stringent medical regulations which can slow research (BBC, 2020; Emanuel *et al*., 2020; UK Ministry of Defence, 2021). Much military research into HEt is veiled under the guise of medical innovation for the treatment of wounded soldiers, to avoid public scrutiny from the ethical implications of developing human war machines, known as 'Super Soldiers' (Henschke, 2017). However, military enhancement still comes under inquiry for potentially violating the human rights of soldiers who cannot necessarily refuse an enhancement if ordered to (restricting their agency), and for the obscurity around how legal frameworks for military technology deal with

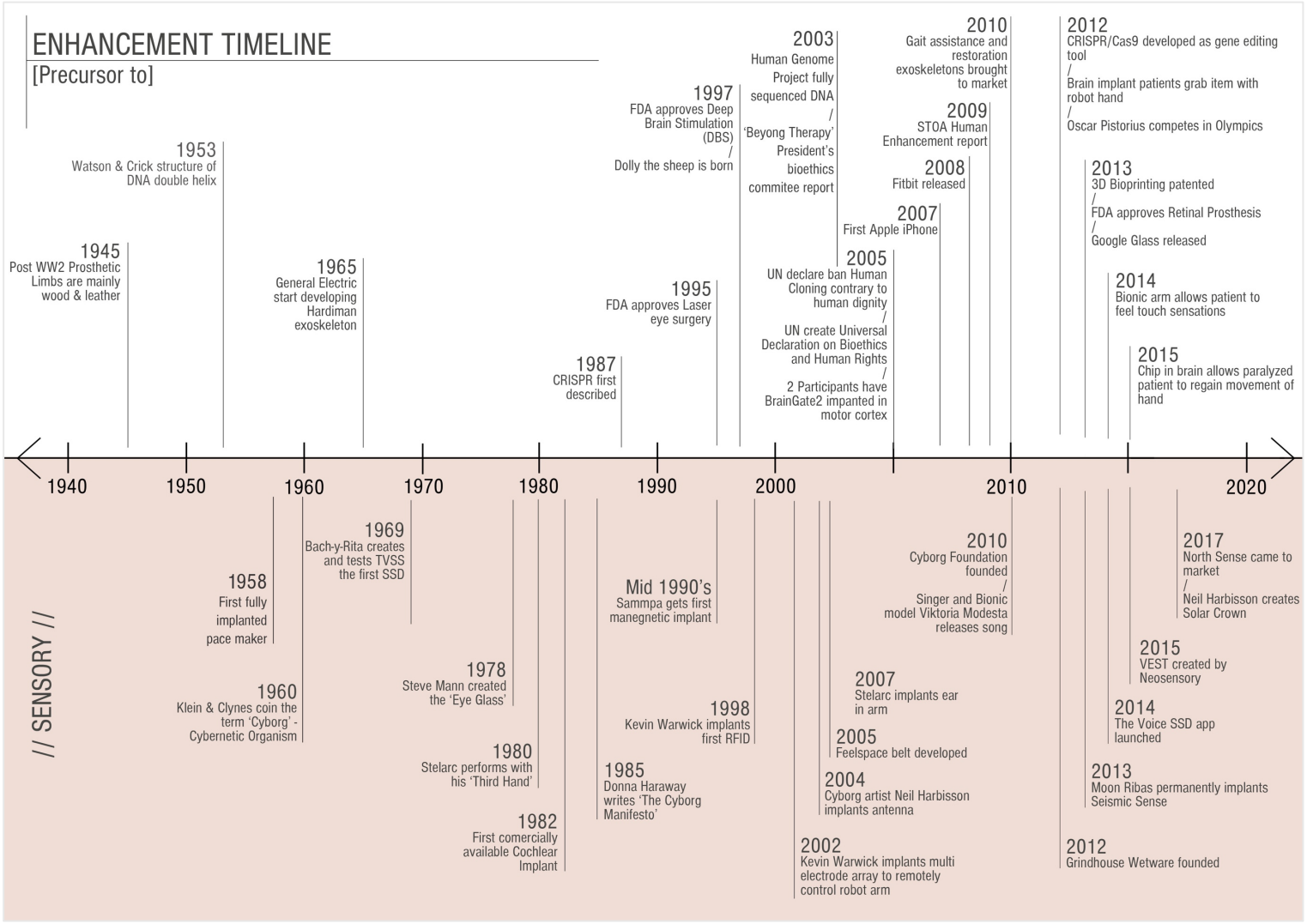


Figure 3 Non-exhaustive timeline of HEt, SA and key regulatory moments. Lesley-Ann Daly, 2017.

accountability (Harrison & Kleffner, 2017). Here we can already see how ethics is central to the discussion on HEt. Though still somewhat opaque on its current development and use of enhancement technology, the US Army Combat Capabilities Command Chemical Biological Centre (CCDC CBC) published a report titled 'Cyborg Soldier 2050' (Emanuel *et al.*, 2020) detailing HEt use in the military over the next 30years. Technologies for 'ocular enhancements', 'muscle control', 'auditory enhancements' and 'direct neural data transfers' were examined for their potential benefit to the military and their wider implications.[8]

2.3. SENSORY AUGMENTATION TECHNOLOGY

2.3.1. Sensory Substitution

We perceive the world by interpreting information from our senses, the five most identifiable senses being sight, hearing, touch, taste, and smell. Other less well-known senses include: proprioception – sense of the body's position in space; nociception – sense of pain; interoception – sense of one's internal organs; and temporal perception- sense of time passing (Hansson, 2015, p. 786). The brain is unaware of which sensory modality it is receiving information from, it interprets the incoming electrical signals and conveys them to the subject as a perception (Eagleman, 2015). The brains' ability to interpret new information as a sensory perception is what allows Sensory Augmentation (SA) devices to create new sensory experiences for the subject. This research will focus on SA, as a sub-set of HEt, and the ethical issues which are relevant to its design and use.

As with other HEt, SA technology has developed from a medical technology field called Sensory Substitution. Sensory Substitution Devices (SSDs) are non-invasive human-machine interfaces which receive information from one sensory modality, transform it into another modality and then transmits this to the subject, whose brain interprets it as a new sensory perception. Put more simply, SSDs are therapeutic devices which use one sense to compensate for another impaired sense. For example, Bach-y-Rita's Tactile Visual Sensory Substitution (TVSS) device receives visual information through a camera – such as the shape, size, and orientation of an object - and transforms it into patterned vibrations. This is then transmitted to a visually

[8] Within the years 2019-2021 several reports have been published examining the role of human enhancement in the military: for the USA (Emanuel *et al.*, 2020); Europe (Euro-Isme & Crec Caint-Cyr, 2019); and the UK (UK Ministry of Defence, 2021). France has announced it is beginning research (BBC, 2020) and the US Director of National Intelligence has accused China of researching genetically engineering soldiers (Ratcliffe, 2020) – to my knowledge, at time of writing, this accusation has not been confirmed.

impaired subject via a vibrotactile stimulus array on their back (Bach-Y-Rita *et al.*, 1969). The subject interprets the vibrations (tactile stimulus) as the visual perception of the object in front of them. Though one could not claim that the SSD was restoring the subjects' vision,

> if 'seeing' is defined as the ability to create a mental representation of the shape, surface properties, and location of surrounding objects and to interact with them in a manner comparable to a normally sighted person, then SSDs indeed enable the blind to "see" (Maidenbaum *et al.*, 2014, p. 5).

Whether the information received is interpreted as the modality the information comes from (visual information from the camera), the modality it is received as (tactile information from the vibrations), a new sensory modality, or a combination of the three is contested (Auvray & Myin, 2009, p. 1052; Macpherson, 2018, pp. 17–21). No conclusion has yet (at time of writing) been determined due to the intangible nature of sensory perception which relies on the subjective accounts of those perceiving the information and how they communicate the experience to others.

2.3.2. From Substitution to Augmentation

While these devices showed great promise for assisting people with sensory impairments, there are several key reasons why SSDs are not in widespread use now, 50years after they were created: devices can be expensive and cumbersome; the devices are not accurate enough for everyday use (the do not compensate well enough for the impaired sense); some people are reluctant to try new devices; and the biggest restriction is the length of time it takes to train with a device to achieve adequate sensing capabilities (Maidenbaum *et al.*, 2014, pp. 5–6).

Though there has been limited success with widespread therapeutic use of SSDs, appropriation of the technology has shown potential for enhancing sensory perceptions. Sensory Substitution principles are used to create technologies which can: enhance a particular sense, e.g., hyperspectral vision or ultra-sonic hearing; give the perception of a new sense e.g., animal senses such as magnetoreception or echolocation; or use an existing sense to convey novel information e.g., haptic perception of the stock market. Figure 4 below shows different methods of Sensory Augmentation when using technological intervention or genetic modification, and Figure 5 further breaks down the possibilities relevant to each sense. This is known as Sensory Augmentation, which for the purposes of this thesis, shall be defined as: the

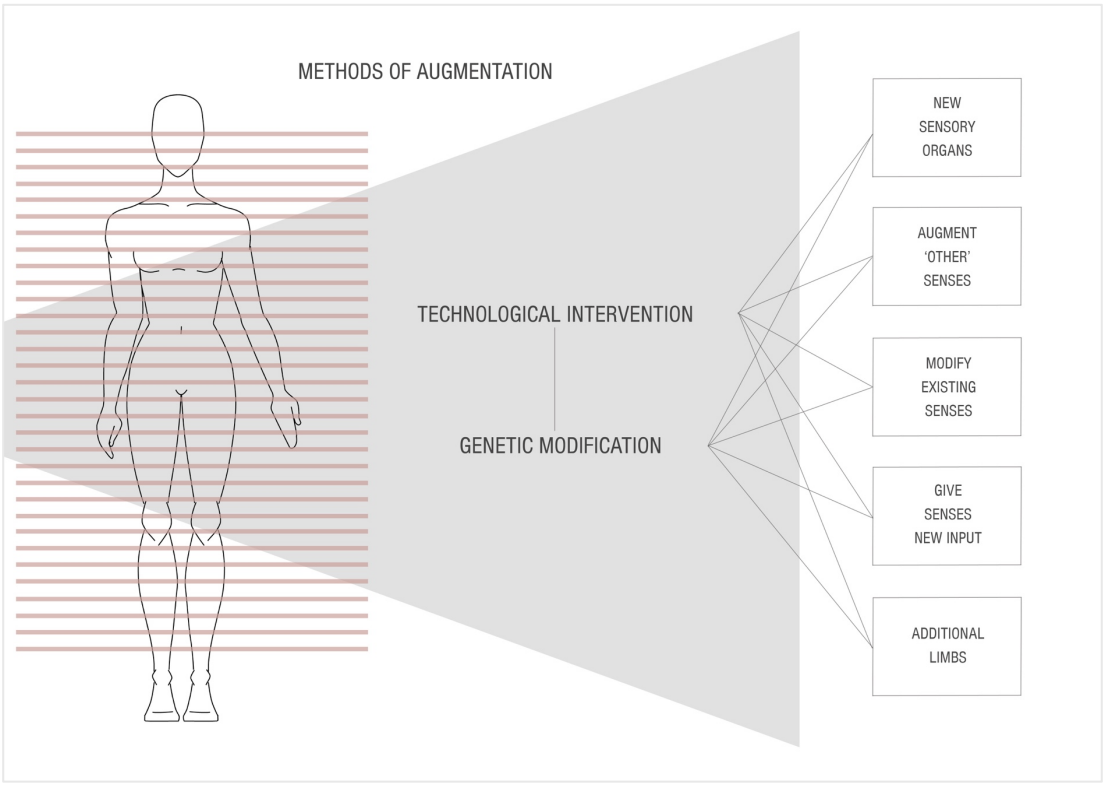


Figure 4 Methods of Augmentation. Lesley-Ann Daly, 2017.

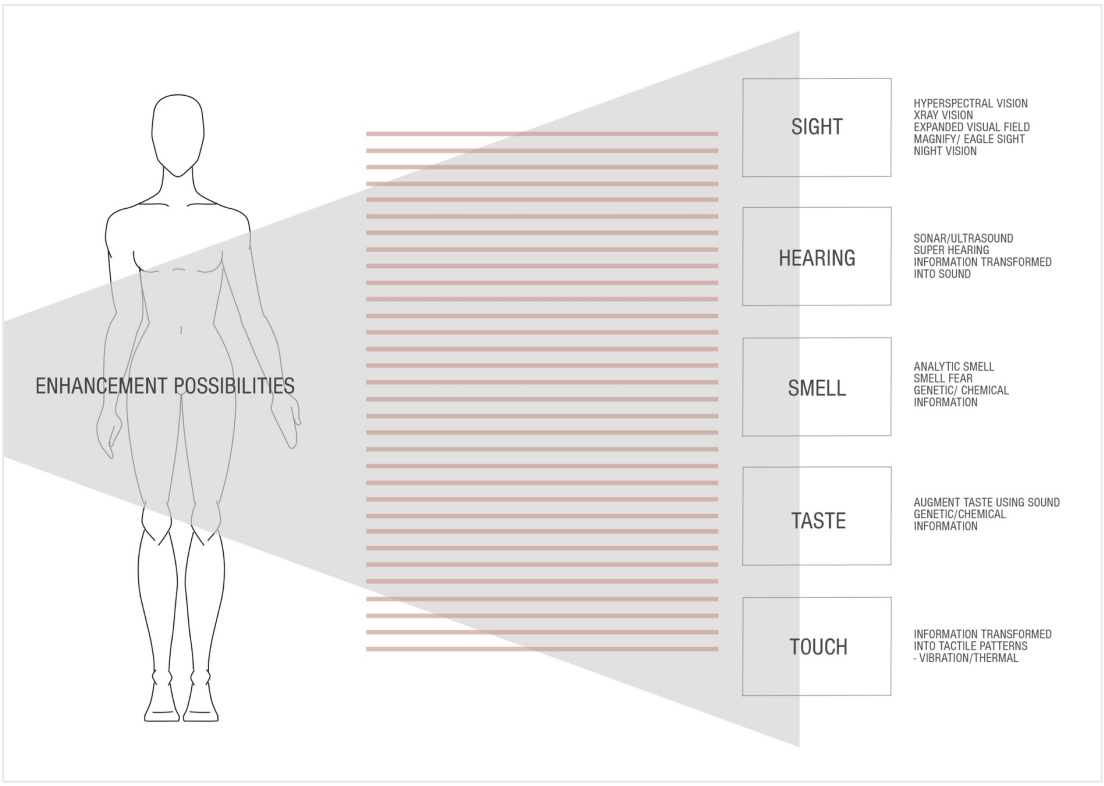


Figure 5 Enhancement Possibilities of the 'basic' five senses. Lesley-Ann Daly, 2017.

extension of the subject's ability to sense aspects of the environment that are usually inaccessible to them[9].

SA has not been formally defined in academic literature, to my knowledge (at the time of writing), and is generally described as an extension of Sensory Substitution for enhancement purposes (Kaspar *et al*., 2014, p. 2). Therefore, I have constructed this definition from descriptions in SA literature which are referenced throughout this thesis. As SA is a sub-category of HEt, this definition should be understood in relation to HEt – as 'science-based and/or technology-based interventions in or on the human body' (Jensen *et al*., 2017, p. 5). In doing so, certain technologies are regarded as outside the field of SA: e.g., those that are not used over prolonged periods of time or are not (semi-)permanently attached to the body. For example, a microscope or telescope can give the subject temporary enhanced vision, where they can see very small or very distant objects which they could not otherwise perceive. These devices allow us to perceive the sensory quality, but do not give us the sensory quality, i.e. they do not directly change how we perceive the world (Jebari, 2015, p. 828). Also excluded, as with HEt, are devices which restore our senses to a therapeutically 'normal' level, such as eyeglasses and hearing aids[10]. SA is sometimes referred to as 'Sensory Enhancement', however I have chosen to use SA as it better conveys the use of the technology to not simply enhance existing senses but also add new senses or change the input to novel (instead of sensory) information.

In 2015, neuroscientists Scott Novich and David Eagleman developed the VEST (Vestibular Extra-Sensory Transducer) which transforms auditory information into patterned vibrations on a subjects' back (Novich & Eagleman, 2015). Originally an SSD, VEST allowed those with auditory impairments to perceive words, sentences, and music via the haptic device. Subsequently, real-time stock information or Twitter posts (now X) were inputted allowing the subject to perceive the information through touch, as seen in Eagleman's (2015) TED talk. The VEST became an SA device, proving that the wearer can learn to interpret non-sensory information via an existing sensory modality. Similarly, the feelSpace belt developed by Peter König (2021), and NorthSense by CyborgNest (2021), allow the wearer to perceive the

[9] This definition originally included the term 'body' in place of 'subject' – in line with other definitions of SA. However, due to the dualistic connotation of the augmentation happening to the 'body' and not to the 'mind', the term was changed to reflect the entanglement of the subject's body and mind, in being and in sensing. The term 'human' was excluded as: SA could also potentially be experienced by non-humans; and due to who has historically been considered to be 'human' (for dualisms and definitions of 'human' see Chapter 2.8. below on Posthumanism). Also excluded were terms such as 'normally perceive' and in the body's 'natural state' due to the ambiguity of what constitutes 'normal' or 'natural' in relation to human(s).

[10] Also, as with HEt, technologies that provide both a therapeutic and enhancing effect are included, for example, a hearing aid which allows the wearer to Wi-Fi signals (see Chapter 2.6.5.).

direction of the magnetic north by interpreting haptic stimulations. This new sensory information is known as magnetoreception, a sense which some animals (such as birds and turtles) have to aid them in navigation. Magnetoreception has not been proven to exist in humans (Hand, 2016) making it novel information for the wearer, and has been shown to augment feelSpace belt wearers' perception of space (Kaspar *et al.*, 2014; Nagel *et al.*, 2005), See Figure 6 below for SA devices in use (before 2017 when this diagram was created) their body placement and abilities.

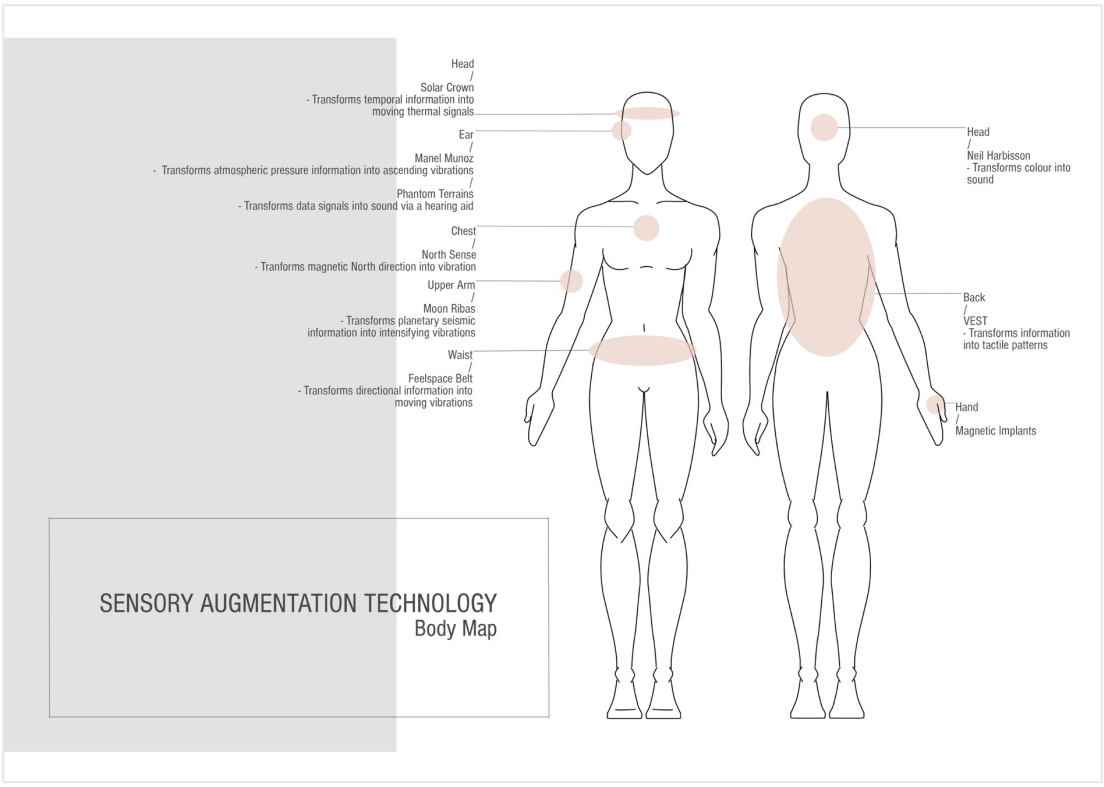


Figure 6 Body map of existing SA technology. Lesley-Ann Daly, 2017.

2.4. SENSES AS MULTIPLICITIES

The impacts of the senses span much further than the biological perceptual abilities that they provide. The senses, and associated sensory organs, have been given meaning across cultures and communities, impacting our language, body modification practices and symbolic associations. This section will examine how the senses inform societal views and traditions, and how differing sensory abilities affect the meaning imbued by the alternative perceptions.

2.4.1. Understanding Alternative Modes of Being

Alternative modes of sensing can be seen not just between cultures but in those who have sensory impairments or augmentations. For example, when John Hull lost his sight, he experienced a gradual loss of visual imagery and memory. In Notes on Blindness (2017) he explains how he lost the very idea of 'seeing'. Concepts like 'here' and 'there' lost their meaning, as did the importance of appearance. Instead, he became a 'whole body seer' — shifting his sensorium away from sight to other senses. The sound of rain could delineate a whole landscape, delicate nuances in speech would denote subtle emotive states, and he began to recognise people by their smell. For him this was not 'compensation' for visual loss, it was a whole new mode of being.

The change in meaning of what you are perceiving when it is through an alternative sense also applies to what is perceived when using Sensory Substitution devices. If one is to haptically perceive a picture of their wife, it would not evoke the same emotion as seeing the picture. This is because 'emotions are not intrinsic to objects themselves but rather arise from the various ways perception of each object leads us to act' (Auvray & Myin, 2009). It is a perceptual learning process; the smell of our favourite childhood meal creates connections in the brain between the sensory perception and the emotion – if the information comes from a different sense, it will not necessarily link to the same emotion. This learning process is not static however, as our brains are plastic, we are able to learn new associations and create new connections throughout our lifetimes. Similarly, if one loses a sensory modality, such as hearing, the brain reorganises, taking the now vacant neural real estate and constructing new pathways as you learn to compensate with your other senses (Rabinowitch *et al.,* 2016).

2.4.2. Social and Symbolic Senses

The acknowledgement of non-normative, non-human or non-Western sensory experience also informs Sensory Augmentation research by introducing other ways of being. As we all perceive and understand our world through our senses they have taken on more intangible or metaphorical associations beyond their physical abilities. Our senses determine not just how we perceive reality functionally but also how we understand and interact with it socially and symbolically. First, we must be aware of our sensory bias, in the West there is a hierarchy of the senses, ordered by Aristotle from the noble human senses (sight & hearing) which are

civilised and cultured, to the lesser, animal senses (taste, smell & touch) which are inferior and therefore associated with women, workers and 'primitives' (Howes, 2006).

Our culture and media in the West are primarily visual, the highest of the Aristotelian senses- books, television, media, the internet, and so on, all communicate information primarily via visual stimuli (although in more recent years better legislation around accessibility and disability, and advances in assistive and haptic technologies are making the world more inclusive for those with different sensory, physical, and neurological abilities). We have established sight as our paradigm of belief, which we can 'see' in the terminology and phrases that proliferate our language – 'seeing is believing', 'I'll believe it when I see it' – and therefore we equate it with knowledge. If I can see it, it must be true, and if I can't then there is no concrete proof of its existence beyond 'blind faith'.

Famously, for Foucault (1991) seeing is control: 'our society is not one of spectacle, but of surveillance…we are neither in the amphitheatre, nor on the stage, but in the panoptic machine'. Surveillance is a means for controlling unwanted behaviours, shaming people into compliance and holding people accountable for their actions — whether right or wrong. Nosey neighbours replace God as a guarantor of social morality; people fear the watching eye and the hidden camera. With the rise in social media and camera-ready phones this has never been truer. In the West, it is generally accepted that 'the eye is all seeing, both literally and metaphorically. It sees all and is all. A fit metaphor for God, society and the I' (Synnott, 1993). Most other senses play a secondary or supporting role to sight – hearing when it comes to communication and touch in intimacy, whereas smell and taste are generally not considered outside of cooking and perfumery.[11]

However, when we look at other cultures, particularly outside of the West, we can see how other senses play key roles in their traditions, language, and artefacts. The Shipibo-Conibo Indians of Peru use visual, auditory, and olfactory senses in their healing rituals 'synaesthetically combined to form a therapy of beauty, cultural reverence and sophistication.' (Gebhart-Sayer, cited in Howes & Classen, 1991). The Quecha, aboriginal people of South America, have many different verbs for how something smells, this large vocabulary implies a smell has a high importance for them. While Western art is generally there to be seen and not touched, the Navajo Indians create sand paintings, which they situate themselves within, which have a tactile healing dimension (Howes & Classen, 1991). Like body modification (or as

[11] There are exceptions to these generalisations, but on the grand scale sight is the predominant centre of Western cultural practices and objects.

a precursor to some body modifications) the way in which cultures decorate and adorn the body can tell us about their sensory order. For example, the Brazilian Suya use ear discs to emphasis the cultural importance of hearing and moral behaviour. The senses can also be associated with a culture's fundamental values, for example in the Yanoama tribe in the Amazon rainforest, where women are not allowed to speak louder than men. The women must undergo a ritual during their puberty of three-week silence while locked in a cage, after which their ears and lips are pierced to mark the 'correct' socialisation of female hearing and speech (Biocca, cited in Howes & Classen, 1991).[12]

When thinking about designing senses we must value the experience of others, acknowledging that it is different to our own – neither better-than nor inferior-to. Understanding the multiplicity of experiences of sensing is vital to constructing new senses as we cannot assume that our experience is universal and so impose it on others through SA technology. This can be seen in the repeated development and failure of 'smart gloves' which aim to translate the hand movements of sign-language into real-time text or speech. For the d/Deaf community these devices 'overlook the intricacies of the language, as well as the needs of signers', fuelled by the preconceptions and needs of the hearing world (Erard, 2017). By learning from the sensory experiences of the marginalised and excluded – non-Western cultures, people with sensory impairments and even animals with non-human senses – combined with our own subjective experiences, we can see how Sensory Augmentation technology may potentially progress, affecting us physically (body and mind), perceptually, and culturally. As we learn and experience a new sense, we will create a new set of behaviours, link it to emotions and social interactions, and envision new artforms and practices around it – creating a new culture of the enhanced senses.

2.5. MIND ENHANCING TOOLS

2.5.1. Extended Cognition

Cognition does not reside solely in the brain; our body and our world are also part of the cognitive process. While some actions are purely pragmatic and functional, such as switching a light on, 'epistemic actions' alter the world in order to aid our cognitive processes (Clark & Chalmers, 1998), for example rotating a puzzle piece to determine how it will fit or drawing

[12] For more information on the role of the senses across cultures see Howes & Classen, 1991 cited above.

out a mind map to brainstorm ideas. There is a two-way action – brain informs-> action which informs-> brain. We are extending our thought processes into the world through these actions and objects; in the field of design this is called 'thinking through making' — wherein the action of making informs your thinking. The knowledge created is situated and embodied, meaning it could only arise in that time and place and through those sets of actions performed by your body, a different situation may yield different results.

This highlights not only the importance of the contextual nature of cognition and knowledge production, but also the coupling system between our bodies, minds, and objects. What can be called Mind Enhancing Tools (Clark, 2003) expand our cognition in ways that would not be possible without them — for example, a walking stick informs a blind person about the terrain around them, and a pencil and notepad extend our memory. Initially we are very aware of these tools e.g., when you first try to play tennis you are very aware of how you wield the racket. But after continual use and training these tools become 'transparent', meaning you are no longer aware of the manipulation of the tool but are 'immersed in the task allowed the tool' (Auvray & Myin, 2009, p. 1052). For example, when writing you are more aware of the marks that you are making on the page than you are of gripping the pencil. The tool becomes embodied. Your perception is extended down through the pencil to the page with the pencil becoming an extension of your arm and your brain.

This transparency not only happens on an individual level but can also be said to happen societally. New technologies are at first very visible. When mobile phones were initially used people were very aware of their presence but now they are a ubiquitous part of our society. Once a technology has become fully socially accepted it disappears, the focus is no longer on the device itself but 'the perceptual world it opens up to its community of users' (Auvray & Myin, 2009, pp. 1049–1050) — i.e., what it allows us to do.

2.5.2. Extended Sensory Perception

In terms of sensory technology, Sensory Substitution Devices (SSDs) have also been shown to become transparent and extend the cognition of wearers through the device and into the world. Initially the devices seem artificial and 'tool-like' until wearers learn to integrate them into their consciousness. For example, Auvray & Myin (2009) tested the TVSS device by Bach-y-Rita (1969) with several blindfolded participants. The device converts visual imagery into patterned vibrations on the wearer's back — using touch to substitute sight. After training the

participants found that they could identify the objects from the haptic vibrations, however they no longer felt the vibrations on their back, instead they directly perceiving the object in front of them. The SSD had become embodied and transparent, and the perception was situated out in front of them and not on their backs. One participant stated that it was easy to master the sensory device as "we are used to extending our bodies through machines, exactly as when we learn how to drive or how to use a computer" (Auvrey *et al.*, 2007, p. 427). This SSD created a new form of perception that the authors say could not be reduced to the natural senses involved (sight and touch), but it creates a novel form of sensory perception that allowed new forms of interaction with the environment.

What this means is that when we merge with technology, we will extend our cognition through the device so that it is part of our bodies and minds. These new embodied technologies will enable us to have new experiences, potentially have a novel sensory modality (such as an orientation sense) and interact with our environment and each other in new ways. With technology that adapts to its' wearers, there won't be a dissonance between us and the device. We won't feel like we have to actively engage with it like we do tools, but instead it will be part of us, and we will have a new sense.[13]

2.6. PEOPLE WITH SENSORY AUGMENTATIONS

Here examples of those who have already augmented their senses are explored, looking at the technologies used, senses altered and new perceptions they aim to tap into. Additionally recognised is how it has changed their behaviours, giving a glimpse into how SA could uniquely change the everyday lives of those who choose to enhance.

2.6.1. Neil Harbisson

A well-known user of SA is artist Neil Harbisson, who was the first person to be recognised legally as a 'cyborg' (Stix, 2016). Harbisson has achromatopsia, or colour blindness, driving him to develop the *eyeborg* which allows him to hear colours. Inspired by biohacking techniques Harbisson, with product designer and cybernetics expert Adam Montagnon, created a device which uses a camera and microcomputer to code electromagnetic light waves into sound

[13] According to Auvray & Myin, 2009, 'just like our sensory organs, seen as "organic tools", have led to our natural sensory modalities, SSDs might give rise to what could be called a novel sensory modality'. Following this line of thinking, the use of SA technology may also lead to a novel sensory modality, or sense.

frequencies (musical notes). An anonymous surgeon (who does not wish to be named due to the bioethical implications of the procedure) attached the device to his skull, enabling the sound to be transmitted through bone conduction, with an antenna that can be directed towards the desired input source. The input range of the device is expanded to include wavelengths of light that are outside of a humans' visual spectrum, allowing Harbisson to perceive infrared and ultraviolet light, and can also receive information directly via the internet.

Harbisson's work is particularly interesting for his documentation of the perceptual effects of having the *eyeborg* over an extended period of time. In his TED talk 'I listen to colour' (2012) and other interviews (Jeffries, 2014) Harbisson explains how it has changed his perceptions and behaviours, such as: comparing the experience of supermarkets to nightclubs which are full of sound; dressing himself not by what 'looks good' but by what 'sounds good'; arranging his food to eat his favourite song; and defining beauty by who he thinks sounds beautiful. Conversely to hearing colours, he can also give colour to everyday sounds, e.g., a phone ringing is green, which he has developed into the artistic practice of painting soundscapes which are visually translated from music tracks and speeches (Jeffries, 2014).

2.6.2. Liviu Babitz

Liviu Babitz is the co-founder and CEO of CyborgNest, a neurotech sensory enhancement company that creates technology which expands our sensory experience of the world. In 2017, Babitz pioneered the company's ground-breaking device, NorthSense, a miniaturized circuit board with over 200 components, which was permanently anchored to the body and connected the wearer to the magnetic field of the planet (2021). The device vibrates when he faces magnetic north giving him a sense that some animals have – magnetoreception – enhancing Babitz sense of orientation and adding new sensory information to his experiences (Albeck-Ripka, 2017; Thaddeus-Johns, 2017). Babitz states "having new senses is going to be as regular as having a smartphone or going outside with clothes on" (Wright, 2021).

The added sense created more complex mental maps of the areas Babitz travelled, allowing him to connect the direction of his desk at home with the walk to his son's school. BBC put his new navigational abilities to the test by blindfolding him, spinning him around and asking him to return to his place of origin, with great success. As well as improving navigation the device gave Babitz and other wearers surprising effects such as making memories more vivid when

the device is vibrating and enhancing the experience of other tasks such as piano playing (Frost, 2018). The device sold out within months.

2.6.3. Moon Ribas

Moon Ribas is a Catalonian dancer and cyborg artist who had implants in her feet which allowed her to feel earthquakes anywhere in the world- a 'seismic sense'. As a dancer she creates performances to the real-time earthquakes she feels in her body, as a 'duet between the earth and myself, the earth is the choreographer and I am just interpreting the data she gives me' (Ribas, 2018). Her seismic sense also extends into space allowing her to feel moonquakes. After seven years of having the implants, she decided to take them out so that she can experiment with other connections. Having had the sense for so long she is now experiencing what it's like to lose a sense, or a limb, worrying that now she might be a 'phantom cyborg' – 'I've started to experience how it feels to lack a cybernetic sense and I'm now feeling phantom earthquakes. How long will these last?' (Ribas, 2019).

Ribas and Harbisson have also been experimenting with other body augmentations such as their 'Transcendental communication system'. By clicking their teeth together in morse code they can communicate with each other, thanks to implanted teeth which transfers the messages via Bluetooth- a 'Bluetooth tooth'. With all these modifications Ribas says that in becoming cyborg she doesn't feel closer to machines or robots, but to nature and animals who have similar senses – 'I feel like I have two heartbeats now, my own and the earth beat' (Ribas, 2018). As avid promoters of Sensory Augmentation and Human Enhancement Harbisson and fellow cyborg artist Moon Ribas created the Cyborg Foundation (Foundation, n.d.) to promote the development of technologies which expand our senses.

2.6.4. Manel Munoz

Manel Munoz- a founder of the Transpecies Society (with Ribas and Harbisson) implanted two 'fins' on his head which allows him to 'hear' the weather (Smithers, 2020). The chip inside sends him the sound of weather- atmospheric pressure, humidity, and changes in temperature - via bone conduction through his skull. The Artificial Sense (AS) gives him the atmospheric information which his brain then learns to interpret to forecast the weather – when weather is intense his brain is intense, when it is calm, he is calm. Although this implanted augmentation

is physically dangerous, he says that risk is also true for some sports and that “this is an art that has a risk” but designing himself is more exciting than the dangers.

For Munoz these artificial senses allow him to perceive a Revealed Reality (RR)- as opposed to an Augmented Reality (AR) or Virtual Reality (VR)- as they reveal aspects of the environment that are always there but that our biology restricts us from experiencing. Munoz advocates for trans-species identities saying that he does not feel 100% human. He feels his new sense brings him closer to nature and aims to show the world that people and the planet are the same thing with an inextricable bond (Financial Fox, 2019). He hopes that popping the ‘anthropocentric bubble’ will remove humans from the top of the natural hierarchy and hopefully increases empathy for the world around us.

2.6.5. Frank Swain

Frank Swain is a science writer who, in 2014, partnered with sound artist Daniel Jones to create a hearing aid which allowed him to hear Wi-Fi (Swain, 2014). Swain has been going deaf since his 20’s so took this as an opportunity to open up his auditory perception to include new information. Wi-Fi signals surround us and enable our hyper-connected daily life – though they are pervasive they are usually invisible. The pair translated the router name, signal strength, encryption and distance in sonic parameters in order to create a soundscape which overlays Swain's current auditory perception. This needed to be complex enough to mimic the extensive digital infrastructure, but unobtrusive enough not to be a distraction- ‘distant signals click and pop like hits on a Geiger counter, while the strongest bleat their network ID in a looped melody’ (Swain, 2014).

Phantom Terrains maps and visualises Swain’s paths through the environment, showing Wi-Fi sources, their strength and even the blocking effects of large buildings (Phantom Terrains, n.d.). The project can be seen as a critical piece, exposing the ubiquitous nature of the digital world around us but it can also provide inspiration for future sensory technologies. What other information could he receive? As a networked tool could this work similar to a Google-Glass, providing the wearer with continuous information that could reshape how we interact with the world.

Notably absent from these examples of SA is any rhetoric of human supremacy, defiance of death, or advancement beyond others. These artists and entrepreneurs are primarily interested in experimentation and the discovery of novel modes of being, not necessarily in

monetary gain or competitive advantage. Their distinct focus lies in connecting with nature, enhancing everyday experiences, and developing new practices from their expanded sensory perceptions. Therefore, while concerns about merging body and mind with technology persist, the pioneers of these SA devices demonstrate an awareness of the human condition and a drive for connection rather than division. This establishes an ethical foundation for the field which is markedly dissimilar to technologies associated with Transhumanism (discussed in Chapter 2.8.1).

2.7. SPECULATIVE SENSORY AUGMENTATION DEVICES

Beyond the limited[14] but inspiring real-life use of SA, designers and artists have been speculating on what new types of augmentation might be possible and the potential personal and societal implications of that technology in the future (see Figure 7). Below are examples of speculative sensory devices which transcend the limits of today's technology, seeking to find new applications with a view to how they might shape behaviours and industries in the future.

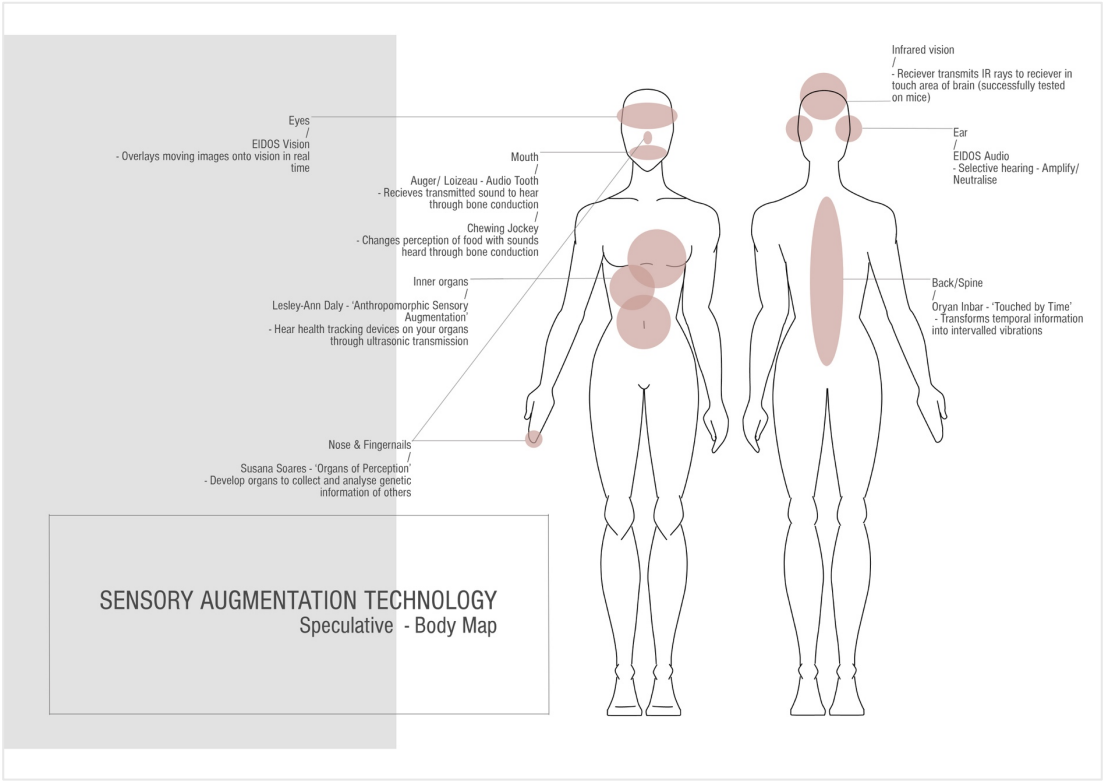


Figure 7 Body map of speculative SA technologies. Lesley-Ann Daly, 2017.

[14] Due to currently available technologies, access to skilled developers, and budget, for example.

2.7.1. Anthropomorphic Sensory Augmentation

This project was where I began my research into SA during my master's degree in Material Futures at Central Saint Martins, 2016. For this practice I explored – 'What if you could extend your sense of hearing so that you can hear your body, allowing you to have a more intuitive, real-time knowledge of your health and wellbeing?' (Daly, 2016; Tucker, 2016). A network of implanted devices enhances your sense of hearing, using ultrasonic sound to communicate the health of your organs to an in-ear auditory device, similar to cochlear implants (Figures 8 and 9). The Anthropomorphic Sensory Augmentation collection features an implanted cardiac monitor (heart), nutrition tracker (stomach) and toxicity evaluator (liver)- if you are giving your body good nutrients or are damaging your health your organs will literally tell you. The project builds on current wearable health tracking technology, but instead of using visual infographics on an app, it appropriates the intuitive qualities of sound- creating a more visceral connection to the health information and therefore the body.

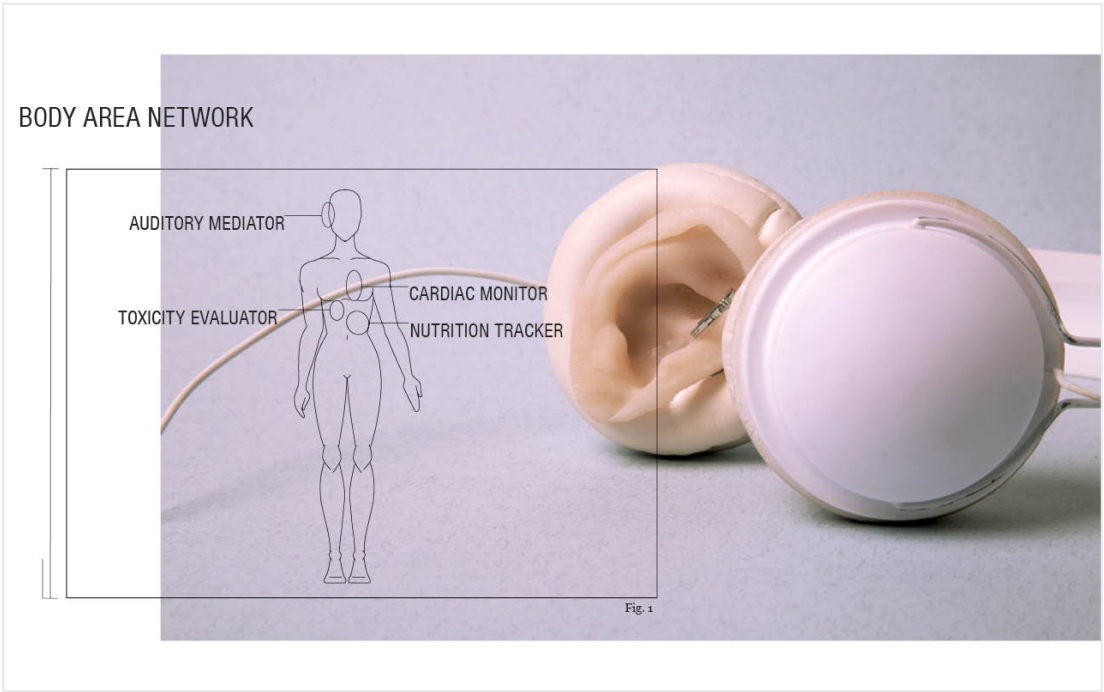


Figure 8 Image of the Body Area Network. Lesley-Ann Daly, Anthropomorphic Sensory Augmentation, 2016.

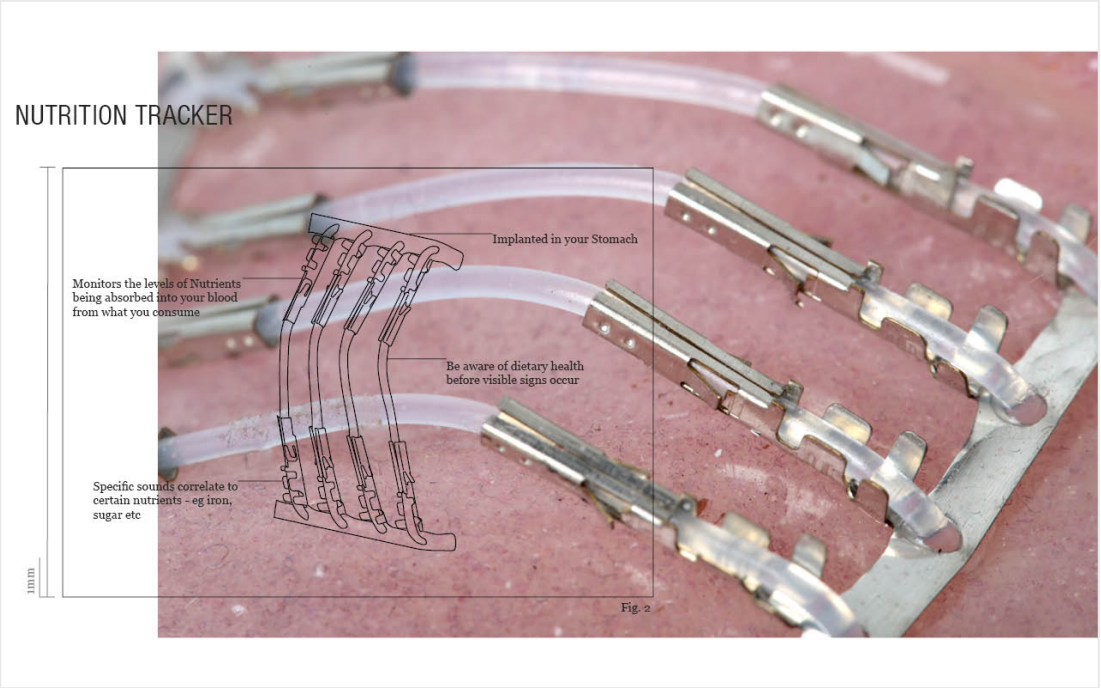


Figure 9 Image of the Nutrition Tracker schematic. Lesley-Ann Daly, Anthropomorphic Sensory Augmentation, 2016.

The project speculates on how knowing your health in real-time could change the person's behaviours, perceptions of food and their own body. Will this enhance how we exercise, knowing when to stop and when to push harder? Will we start to design food that 'sounds' tasty? Or will we try to subvert the information and drown out 'unhealthy' sounding alcohol consumption so that we can continue without the guilt?

2.7.2. EIDOS

In 2016 a group of RCA students (Tim Bouckley, Millie Clive-Smith, Mi Eun Kim and Yuta Sugawara), created EIDOS to question – 'What if we had control over our senses?' (Clive-Smith, 2016). The project posits: We are used to controlling the world around us, finding the settings that suit us best, but if we could adjust our sensory information live what new experiences could this make possible?

EIDOS comprises of two head pieces which tune into specific visual and auditory information and give the wearer the power to adjust them, augmenting reality in real-time. The eyepiece records visual information and slows it down so you can see traces of movement – like long-exposure photography. The second piece fits over the mouth and ears and can capture, isolate and amplify sound so you can focus in, for example, on people talking or drown out background

noise. The team sees speculative applications for enhancing live performances, improving focus and attention in class and helping people with auditory impairments[15].

2.7.3. Audio Tooth

James Auger and Jimmy Loizeau created the Audio Tooth, in 2001, as a 'radical new concept in personal communication' (Auger Loizeau, 2001). The device would be implanted in your tooth at a routine dentist appointment, and would allow you to receive audio, via a connected phone receiver, hearing it in your inner ear through bone conduction. The tooth allows discrete communication in social situations where it would otherwise be infeasible and builds upon the trend towards miniature implanted biotechnology.

Following the public release of the project, it was taken up by numerous mainstream UK newspapers and TV shows, believing the speculative device was in fact real - with TIME magazine calling it one of the best inventions of 2002. This provoked mixed reactions - some people were fervently against the technology being put in their bodies despite its minimal invasiveness and potential social benefits. While there are no plans to make this technology, the project highlights pertinent issues around the public's acceptance of future implanted devices, and the merger of the body with technology.

2.7.4. Genetic Trace

In 2007, Susana Soares explored the future of genetic technology for social interaction and partner selection by creating a selection of extension 'organs' (Soares, 2007). These speculative organs 'act as perception enhancers, allowing them [the wearer] to collect genetic material during interpersonal encounters.' The organ pictured will allow the woman to smell genetic differences in potential partners, collecting information which tells her if they are a good future mate. Other extensions include bristly nails which will scrape DNA during handshakes, and eyebrow whiskers that will pick up signals in the environment.

With advances in biotechnology, genetic engineering, and nanotechnology it is speculated that we will become less dependent on natural selection and able to direct our evolution, creating technologies that will change how we perceive the world. However, if we are to take this route,

[15] While speculative at the time, many technologies or phone applications have been commercially developed since which focus sound.

these smell augmentations will need to become acceptable both as technologies and as social practices. The extensions would redefine the acceptability of facial hair and openly smelling people when interacting with them.

2.7.5. Touched By Time

Oryan Inbar states 'I have no sense of time. My thesis is an experiment to see if I can develop one'- to do so, in 2016, he created a haptic temporal device (Oryan, 2016). The interface maps time down his spine and relays it to him through vibrations throughout the day, using his skin as an interface. Not meant as a consumer product, the device was a behavioural experiment to explore how time is perceived and whether it could eventually be changed. After learning to haptically sense time, Inbar would then slow down or speed up the vibrations frequency to explore if it would cause him to perceive time as moving faster or slower. Questioning how augmenting our sense of time could change how we structure our days, weeks and years?

Following this project Inbar went on to work with Neil Harbisson on his Time Sense a similar experiment around temporal perception (Liu, 2016; Time Sense, 2016). They designed the 'Solar Crown', a headpiece which relayed time to the wearer as heat sensations around the circumference of the head- however no further research has been published on its results.

These projects provoke the audience to imagine if we all had these sensory enhancement devices, and how it could change how we go about our daily lives. Just as the ability to smell enabled the development of perfumes and hearing led to music, novel forms of sensory perception could lead to the development of new practices and modes of expression – 'the extension of any one sense alters the way that we think and act – the way that we perceive the world. When these ratios change, men change' (McLuhan and Fiore, 1971, p. 41).

These speculative technologies offer a glimpse into future SA devices, exploring potential perceptual and behavioural changes, and the necessary societal shifts for their acceptance. Notably, unlike existing SA examples (Chapter 2.6), these projects directly address broader ethical concerns, moving beyond individual augmentation to consider societal impact. This includes the potential for misleading representations and the critical need for scientific, regulatory, and social progress to ensure responsible development.

2.8. POSTHUMANISM

This section begins by outlining Transhumanist theory, the dominant philosophical movement associated with Human Enhancement, detailing its objectives, related technologies, and distinctly humanist values. It then introduces Posthumanism, which shares some similarities with Transhumanism but diverges significantly, particularly in its understanding of the current human condition and its vision for future humans and the planet. These differences make Posthumanism a core foundation for this research.

2.8.1. Transhumanism

When it comes to Human Enhancement the most common rhetoric is around Transhumanism. Originally outlined by English philosopher Max More (1990), Transhumanism in defined on the Humanity+ website as[16]:

> The intellectual and cultural movement that affirms the possibility and desirability of fundamentally improving the human condition through applied reason, especially by developing and making widely available technologies to eliminate aging and to greatly enhance human intellectual, physical, and psychological capacities. (Humanity+, n.d.b).

The focus is on the use of technology to improve the human condition beyond what is currently possible, such as radically extending life by curing disease, transferring consciousness into a digital or synthetic medium, or preserving the mind through cryogenics until such a time as technology advances enough to restore the person (or pet) to healthy life. However there is an issue, not with the technology, but with transhumanists' aim to 'increase human performance outside the realms of what is considered to be "normal" for humans' (Humanity+, n.d.a). Here again we see the term 'normal' and again question what does 'normal' mean? Normal for whom? Transhumanism starts from the present and looks forward to a possible future posthuman but is not critical of who has historically been considered to be 'human'.

Transhumanism is inherently Humanist, it is focused on the perfecting of the (normal) 'human', historically recognised as the 'man of reason' – the white, European, straight, educated, able-bodied, land-owning man. Recently a new term, TESCREAL, has been coined in 2023 by transhumanist critic Emile Torres and AI bias researcher Timnit Gebru, an acronym used to

[16] Due to the variety of perspectives on Transhumanism since 1990, there are variations on this definition, but there is a consensus on the defining themes and values which are identified in this definition.

group Transhumanist-aligned ideas: Transhumanism, Extropianism, Singularitarianism, Cosmism, Rationalism, Effective Altruism, and Longtermism (Torres, 2023). The compendium of ideologies has been highly criticised as techno-solutionist, eugenic and racist with an authoritarian "ends justify the means" mindset (People of Color in Tech, 2023; Troy, 2023). Torres describes the members vast influence as the most worrying aspect:

> Together, these ideologies have given rise to a normative worldview — essentially, a "religion" for atheists — built around a deeply impoverished utopianism crafted almost entirely by affluent white men at elite universities and in Silicon Valley, who now want to impose this vision on the rest of humanity — and they're succeeding. This is why TESCREALism needs to be named, called out and criticized. (2023)

With the combination of these ideologies and the power of its most affluent and influential members, technologies and industries will, and are, being directed towards futures that are undesirable for those outside the circle. Laura Forlano anticipates that designers may have to work on projects where these approaches are engaged, therefore arguing that:

> Knowing the history of transhumanism and how it is situated within discussion of the posthuman will allow the designers and design scholars to better evaluate their participation in—or rejection of—these projects. (2017, p. 25)

Understanding the Transhumanist objectives is key to mitigating their influence and redirecting designs to more ethical, Posthumanist outcomes (explored below). The need for, and power of, the designers' intervention in developing new technologies is a core element to this thesis and will drive the creation of an ethical framework for designing SA devices.

2.8.2. Post – Humanist/Dualist/Anthropocentric

Posthumanism is a critical intervention in the Transhumanist vision. Unlike Transhumanism, Posthumanism recognises that 'human' and 'humanity' are not neutral terms, but ones that have been used to exclude those considered to be less-than-human, such as those who have been 'sexualised, racialised and naturalised' (Braidotti, 2013, p.15). It takes a post-humanist approach, recognising that as human(s) we are heterogeneous and cannot be reduced to one body or set of experiences, such as the aforementioned Vitruvian European ideal. It recognises the body as a multiplicity, in a constant state of change and becoming with multiple pasts, presents and futures. In relation to HEt this means that there is not just one universal type of human which needs transforming to become 'better' – the superhuman – but many humans and many possibilities. It questions what 'we' 'need' to change, considering what attributes are more worthy than others, who decides, and who will have access to these augmentations.

It is about recognising and uplifting our differences and complexities, healing the divides created by hierarchies of power, and working together to create a present and future(s) that are radically inclusive: “we can interpret Posthumanism as both a reflection on what has been omitted from the notion of the human and a speculation about the possible developments of the species” (Ferrando, 2019, p. 23).

Posthumanism is also post-dualist[17], rejecting the separation of ‘us’ and ‘others’, both human and non-human. Rigid binary concepts such as mind/body, male/female and human/animal are challenged, believing that in becoming ‘cyborgs’ (Clynes & Kline, 1960) we will leave the need for these static and restrictive categorizations in the past (Haraway, 1991). The dichotomies represent a hierarchy as defined by those in the position of power, e.g., the male in male/female binary and the human in the human/animal binary. Although binaries are generally seen as negative, Deleuze and Guattari highlight their positive potential in how opposing forces are interdependent and productive, fostering relational becoming and creating spaces for transformation and multiplicity (Deleuze & Guattari, 1987). Similarly, other perspectives, such as Taoism's yin-yang or systems thinking, emphasize balance and dynamic equilibrium, viewing dualisms as essential contrasts that generate harmony, creativity, and meaning. From a Posthumanist perspective, binaries can serve as starting points to imagine networks and continuums that decentre human hierarchies and emphasize interconnectivity beyond rigid divides. Informed by radical epistemologies such as feminism, critical race theory, post-colonial, indigenous and disability studies, it recognises the bodies constant struggle with power and advocates for the knowledge which comes from exclusion and marginalisation. As a society we need to overcome this sexism, racism, and anthropocentrism and the rigid dualist mindset that constructed them, otherwise ‘new forms of discrimination will emerge, such as portraying robots as the new “others”’ (Ferrando, 2019, p. 60).

The inclusion of ‘other’ actants and knowledges extends beyond the human to non-human others such as animals, the environment, and technologies (hardware and software) – the zoe/geo/techno assemblages. Post-anthropocentrism refers to the decentring of the human, “considering humans not as master’s, or even protectors of, but as participants in the web of Earth’s living beings” (Puig de la Bellacasa, 2017, p. 129). Also acknowledging the negative impacts we have on the planet and the urgency to halt damaging the ecosystem which, in doing so, also negatively affects humans. “Where transhumanism is grounded in human

[17] Ferrando adds ‘post-dualist’ to Braidotti’s ‘post-humanist’ and ‘post-anthropocentric’ definition of Posthumanism. For this research I will structure my work around all three attributes.

exceptionalism, Posthumanist tradition emphasises the entangled nature of the human and non-human systems, be they technological or biological in nature" (Mäki-Reinikka, 2020). We are made of the same matter as our zoe/geo/techno co-inhabitants – we are cells, microbes, wires, and water. Technologies should not be thought of as separate either, they are made of minerals and metals which come from the earth, they are eco-technologies. Posthumanist theory contests that human knowledge is not the only knowledge which exists, we need to be open to learn from the wisdom of non-humans.

2.8.3. It's Happening Now

Posthumanism research is situated at a pivotal moment in history, marked by the convergence of the Fourth Industrial Revolution – characterised by rapid technological advancement beginning in the late 2000s and early 2010s – and the Sixth Mass Extinction, which began thousands of years ago due to human activity and has accelerated dramatically since the 1800s, particularly following industrialisation and the post-World War II 'Great Acceleration', when biodiversity loss and climate pressures intensified. There is a rapid explosion in the development of technology, heralding new possibilities in HEt, AI and space travel, alongside the recognition of humanity's impact on the planet, with species becoming extinct, the atmosphere warming and catastrophic natural disasters becoming common place. Even if we can limit global warming by the Intergovernmental Panel on Climate Changes (IPCC, 2000) most conservative scenario of a 1.5degree temperature rise by 2050, there will still be extreme and widespread impacts. Being on this planet together, we affect and are affected by each other, and we are all affected by the climate crisis. As humans we are not outside of this, we are part of the problem and the solution, but to affect change we need to decentre ourselves as the focus of inquiry and benefit. In the words of Rosi Braidotti 'We are in this together but we are not one and the same' (2020).

Unlike Transhumanism, Posthumanism believes that we are already posthuman and have been since we first used a rock as tool. We are already so entangled with and mediated by technology we cannot separate our biological selves from the non-human actants and environment we live in. We[18] are all materially embodied and embedded- naturally, culturally, and technologically mediated- full of potential and part of a complex, rhizomatic (Deleuze & Guattari, 1987) network of human and non-human others. New Materialism is a core

[18] 'We' is inclusive of humans and non-humans.

foundation for Posthumanism grounding the theory in real places, real people, and real materials. In doing so we can address pressing, complex issues by creating transversal communities who can actualise new possibilities through an ethics of affirmation. Affirmation does not deny pain and suffering but instead processes and reworks it. By acknowledging that our interdependence with the world is a strength and not a weakness we are mutually empowered to affect real change through action.

The posthuman subject is 'grounded in embodied actuality rather than disembodied information' (Hayles, 1999, p. 287). Cognition and experience are specific to the embodied form experiencing it and, in changing the medium, one changes the nature of consciousness or the conscious experience. This contradicts the information/matter duality which stems from early cybernetics research (Moravec, 1988), which equates the functioning of the mind with a computer's binary code. Though this may have originally been intended as metaphor, mind uploading presumes that neural information is the same as computer code and therefore can be transferred from one medium to another without significant transformation, allowing the consciousness to live on unchanged in a machine. For Posthumanism change is a constant and the idea that a transformation in material composition would not affect a change in 'being' is untenable. To merge with technology is acknowledge the agency and subjectivity of that which we are merging with – the computer, the prosthetic, the data – and the new embodied and embedded experience that you are now situated in.

It can be difficult to speak about Human Enhancement and not no focus on the human element, as it is inherently anthropocentric, particularly though a Transhumanist perspective as mentioned above. Even when trying to avoid anthropocentric positions and consider the 'other' we are still 'communicating specific and situated humans understandings in a human language to other human beings' (Ferrando, 2019, p. 23). What is needed is an awareness of our subjectivity and privilege while avoiding placing ourselves atop of any hierarchies. Through the thesis and research, I acknowledge that in augmenting the human(s) it affects more than just humans but has complex and far-reaching implications for other humans and non-humans.

> It is important to ask how emergent design practices, including those that might decenter the human, might simultaneously support equality and justice for humans and nonhumans alike. (Forlano, 2017, p. 29)

By basing this research in Posthumanism I ground it an ethics that supports real futures for all, not speculative possibilities for a select few. Doing so necessitates getting into the weeds of the problems, and tackling them face on, rather than relying on technology to provide to the solution to our world's problems. How the technologies are constructed, by whom, with what,

where, when, for what aim, and the ensuing ongoing repercussions need to be critically examined in a relational way, by heterogenous assemblages, to create a mutually beneficial future.

2.8.4. Posthuman and More-than-Human Design Practice

Recent years have seen a significant uptake of posthuman and more-than-human thinking within design research, marking a shift away from human-centred paradigms towards relational, situated, and ecologically entangled approaches to design. While posthumanism has long been established within philosophy, its translation into design has resulted in a growing body of work that reconsiders who or what design is for, and how ethical responsibility is distributed across human and non-human actors.

Within design, this shift is often articulated through the concept of more-than-human design, which challenges the centrality of the human user and instead positions humans as participants within broader socio-technical and ecological systems. Giaccardi and Redström (2020) argue that design must move beyond the notion of discrete users and objects, towards understanding design as the shaping of ongoing relations between heterogeneous actors. Similarly, Wakkary (2021) frames design as a practice of designing-with, emphasising care, maintenance, and long-term entanglement between humans, technologies, and environments.

This orientation is further developed in the work of Light and Akama (2014), who foreground participation as a relational and ongoing process rather than a bounded method, and Frauenberger (2019), who calls for participatory practices that extend beyond human stakeholders to include diverse forms of agency and experience. Galloway (2018) and Forlano (2017) similarly advocate for design approaches that recognise the political and ethical implications of more-than-human relations, particularly in the context of emerging technologies and infrastructures. Across these approaches, the human is no longer positioned as the primary subject of design, but as one actor among many within dynamic, interdependent systems.

Across this body of work, ethics is no longer understood as an external framework applied to design outcomes, but as something that emerges through design practice itself. Puig de la Bellacasa's (2017) notion of "matters of care" has been particularly influential in reframing ethics as an ongoing, situated practice of attentiveness and responsibility within complex

assemblages of human and non-human actors. This aligns closely with posthuman ethics as articulated by Braidotti (2013; 2019), in which ethical responsibility arises from relational entanglement rather than universal moral principles.

While much of this work has been developed through academic discourse, it has also been explored through practice. Researchers such as Giaccardi and Wakkary (2015; 2021) have produced design experiments and artefacts that foreground everyday human–non-human relations, often through connected objects and situated interventions that reveal the agency of materials, environments, and systems. Similarly, Galloway (2018) explores how design research can engage with distributed forms of agency, examining how design might operate beyond strictly human-centred concerns. These practices are typically process-driven, focusing on relationships, interactions, and lived experience rather than discrete products or outcomes.

At the same time, many of the most visible explorations of posthuman embodiment and technological integration are situated within artistic and speculative contexts, where designers and artists use exhibitions, installations, and speculative artefacts to materialise alternative relations between bodies, technologies, and environments. This overlap between design and art reflects the experimental and exploratory nature of posthuman inquiry but also highlights a tendency for such work to remain within discursive or cultural spaces rather than translating into everyday design practice or commercial development.

However, while more-than-human design has expanded the scope of ethical consideration within design, much of this work has focused on external relations – such as environmental systems, multispecies interactions, and distributed technological infrastructures. In contrast, Human Enhancement and Sensory Augmentation technologies introduce a more intimate and immediate form of entanglement, in which technology does not simply mediate relations but becomes integrated into perception, cognition, and embodiment.

This distinction is significant. Where more-than-human design often explores how humans relate to non-human others, SA technologies reconfigure how humans are constituted as sensing subjects, collapsing boundaries between body, technology, and environment. As such, the ethical challenges associated with these technologies are not only relational but also embodied, raising questions about identity, agency, responsibility, and experience at the level of perception itself.

This research builds on more-than-human design by extending its ethical and relational concerns into the domain of embodied technological integration. While aligning with its

emphasis on care, participation, and decentring the human, the research addresses a relative gap in the field by focusing on technologies that fundamentally alter sensory experience and subjectivity. In doing so, it positions SA as a critical site through which posthuman design can engage more directly with questions of embodiment, perception, and the ethics of becoming.

CONCLUSION

This chapter provides a historical and cultural background to the fields of Human Enhancement, Sensory Augmentation, and Posthumanism, which are relevant for this research. It has shown how the human desire to augment has materialized into practices of body modification and human enhancement, using techniques such as gene editing, device implantation, and pharmaceuticals to expand biologically prescribed abilities.

It has introduced key terminology and concepts which proliferate the research and provided relevant examples of actors and technologies within the field of SA, showing the plethora of possibilities that the technology mediates. By looking beyond the technology to how our senses inform our everyday lives, it shows the profound implications augmenting our senses will have on our behaviours, creativity and interactions with one another. Therefore, supporting the need to ethically design SA devices for and with the diverse humans with which the technology will merge, while also considering the wider network of 'others' – the zeo/geo/techno assemblages – who will also be impacted.

By giving an overview of HEt, the chapter traces the technologies origins in medicine, and subsequent appropriation for non-therapeutic purposes. Similarly showing SAs progression from devices which were used to compensate for an impaired sense, to those designed to gain heightened senses or those akin to animals. Articulating this transition, from the medical realm into wider use, sets the stage for the next chapter where the ethical and legal implications of developing commercial HEt will be further explored. It also highlights a gap in current design practice, where posthuman approaches have yet to fully engage with the embodied and perceptual implications of Sensory Augmentation technologies.

CHAPTER 3: ETHICS OF HEt COMMERCIALISATION

INTRODUCTION

This chapter delves into the ethical considerations and regulatory challenges of commercialising Human Enhancement technology, and subsequently SA devices. The chapter first establishes the ethical positions that shape contemporary debates on Human Enhancement, distinguishing between moral, regulatory, and posthuman approaches to ethics, and situating this research within a critically Posthumanist framework. It then discusses the blurred lines between therapeutic and enhancement technologies, leading to issues categorizing and therefore regulating devices. Also explored are negative representations of HEt in the media, with dystopic science-fiction visions of cyborgs hindering the public's acceptance of the technology.

This chapter aims to dissect the ethical dilemmas created by unregulated HEt and the media's representation of the technology. By addressing these ethical issues and the regulatory landscape the chapter strengthens the argument for ethical consideration in SA development, proposing the creation of an ethical design framework for SA devices. To do so, the chapter also explores the role of ethics in design practice, including the systemic and inherent bias in the design and technology industries. Alongside this is an exploration of what is needed to design for cyborgs, considering both the human and technology as actors.

This chapter details the gaps in the design and technology industries which will be addressed through the ethical design framework, positioned as a form of situated, practice-led ethical action rather than a regulatory or prescriptive solution. It demonstrates the importance of collective affirmative action to ensure safe and beneficial use of these technologies.

3.1. ETHICAL POSITIONS ON HUMAN ENHANCEMENT TECHNOLOGY

Ethical debates surrounding HEt are both extensive and deeply contested. As enhancement technologies increasingly move from speculative possibility into medical, military, and commercial contexts, questions about their legitimacy, desirability, and potential harms have become urgent. However, ethical disagreement in this domain is not simply about whether enhancement should or should not occur, but about how ethics itself is understood: whether it is conceived as a set of universal moral rules, as a matter of individual autonomy, or as an emergent, relational practice shaped through socio-technical systems.

This section establishes a critical distinction between moral ethics and ethics as ethos, and situates key ethical positions on HEt within this distinction. It examines bioconservative moral critiques of enhancement, approaches grounded in the philosophy of technological mediation, and posthuman ethical frameworks that foreground relationality, embodiment, and becoming. Through this comparative positioning, the section clarifies the ethical orientation of this research and articulates its stance in relation to dominant debates on human enhancement.

3.1.1. Moral and Bioconservative Approaches to Enhancement

Much of the early ethical debate on Human Enhancement is grounded in moral and bioconservative frameworks, which evaluate enhancement technologies according to predefined normative principles such as human dignity, autonomy, and the preservation of a shared human essence. Within this tradition, enhancement is often framed as ethically problematic because it is perceived to threaten what it means to be human, destabilise moral equality, or undermine the conditions for responsible agency.

A prominent figure in this debate is Jürgen Habermas, whose critique of enhancement is rooted in concerns about autonomy and moral agency. Habermas argues that interventions such as genetic enhancement risk undermining an individual's capacity to understand themselves as the autonomous author of their own life. By altering fundamental traits prior to consent, enhancement technologies may create asymmetrical relationships between designers, parents, or institutions and the enhanced subject, thereby compromising the conditions for moral responsibility (Habermas, 2003). In this view, enhancement is ethically

troubling not because it is technologically invasive per se, but because it disrupts the moral framework through which individuals recognise themselves and others as free and equal agents.

Similar concerns appear in the work of bioconservative thinkers such as Leon Kass, whose report Beyond Therapy frames enhancement as a transgression of natural limits and a potential erosion of human dignity (Kass, 2003). Here, the ethical line is drawn between therapy – understood as restoring normal function – and enhancement, which is seen as exceeding or violating an implicit norm of human nature. These arguments often rely on a distinction between the natural and the artificial, positioning enhancement as an overreach of human control and a source of moral hubris.

While such moral frameworks have played an important role in drawing attention to the risks of enhancement, they are limited in several respects. First, they tend to rely on fixed and universal notions of the human, which obscure the historical and political processes through which such norms have been constructed and enforced. Second, they position ethics primarily as a regulatory or prohibitive force, concerned with drawing boundaries around acceptable action rather than engaging with the situated realities of technological development and use. Finally, they struggle to account for forms of enhancement that emerge through practice, adaptation, and lived experience – particularly in cases where enhancement is embraced by disabled communities or used to challenge normative standards of ability.

As a result, while moral and bioconservative ethics provide important cautionary perspectives, they are insufficient on their own for addressing the complex, relational, and practice-based ethical challenges posed by contemporary enhancement technologies.

3.1.2. Technological Mediation and Ethics in Practice

An alternative approach to ethics in HEt emerges from the philosophy of technology, particularly through accounts of technological mediation. Rather than treating technologies as neutral tools or external threats to human values, this tradition emphasises the ways in which technologies actively shape perception, action, and moral experience.

Don Ihde's work on human–technology relations provides a foundational account of how technologies mediate human experience through embodiment, hermeneutic, alterity, and background relations (Ihde, 1990). From this perspective, technologies are not simply used by

humans, but become incorporated into bodily and perceptual processes, shaping how the world is encountered and acted upon. This insight is particularly relevant to enhancement technologies, which often operate at the level of perception, cognition, and embodiment.

Building on Ihde's work, Peter-Paul Verbeek develops a framework in which technologies are understood as morally mediating artefacts. In What Things Do (2005) and Moralizing Technology (2011), Verbeek argues that technologies actively participate in moral situations by shaping human intentions, decisions, and responsibilities. Ethics, in this view, cannot be separated from design practice, because design decisions inevitably script certain forms of action and exclude others.

Verbeek's concept of cyborg intentionality is especially pertinent to Human Enhancement technologies. When technologies are not merely used but become fused with the body – as in implanted or continuously worn enhancement devices – the distinction between human intention and technological mediation becomes blurred. Ethical responsibility is no longer located solely in the human subject or the technological artefact but emerges through their entanglement. This challenges traditional moral frameworks that assume a clear separation between agent and tool.

Importantly, this approach shifts ethics away from abstract moral judgement and towards ethical engagement in practice. Designers, engineers, and users are implicated in shaping the moral landscape of enhancement technologies through their decisions, assumptions, and practices. However, while mediation theory offers a powerful account of how ethics operates through technology, it remains relatively anthropocentric in its focus on human experience and agency.

A related but distinct perspective is offered by Bernard Stiegler, whose work frames technology (technics) as constitutive of human existence rather than external to it. Stiegler argues that human evolution is always already technological, with memory, knowledge, and culture mediated through technical systems (Stiegler, 1998). From this perspective, Human Enhancement is not a radical departure from the human condition, but an intensification of an ongoing process of co-evolution between humans and technology. However, Stiegler also warns of the risks of industrial and commercial technological systems shaping subjectivity in ways that diminish individual and collective agency. This introduces a critical dimension to enhancement debates, foregrounding the need to consider not only how technologies mediate action, but how they structure attention, desire, and long-term cultural and ethical development.

3.1.3. Posthuman Ethics and Affirmative Enhancement

Posthuman ethics offers a more radical departure from moral and humanist frameworks by challenging the centrality of the human as the primary ethical subject. Rather than asking whether enhancement threatens humanity, posthumanism interrogates who has historically been included in the category of the human, and how technological practices reinforce or disrupt existing hierarchies of power.

Rosi Braidotti's work provides the primary ethical framework for this research. In The Posthuman (2013) and Posthuman Knowledge (2019), Braidotti articulates an affirmative, relational ethics grounded in materialist and feminist philosophy. Ethics, in this account, is not a matter of applying universal norms, but of cultivating responsible relations within complex assemblages of human and non-human actors. The ethical subject is not a sovereign individual, but a materially embedded, relational being shaped by historical, technological, ecological, and social forces.

Braidotti's posthuman ethics is explicitly anti-humanist but not anti-human. It rejects the universal figure of "Man" as the measure of all things, while affirming the multiplicity of embodied, situated forms of life. This position stands in contrast to both bioconservative ethics, which seek to preserve a stable human essence, and transhumanist ideologies, which often reproduce humanist hierarchies under the guise of technological progress.

Francesca Ferrando's articulation of critical posthumanism further supports this orientation by emphasising posthumanism as a philosophical stance that is post-humanist, post-anthropocentric, and post-dualist (Ferrando, 2019). Ferrando highlights the ethical necessity of decentring the human while remaining attentive to issues of justice, difference, and responsibility. From this perspective, enhancement technologies must be evaluated not only in terms of individual benefit or risk, but in relation to their broader socio-political and ecological implications.

Posthuman ethics also diverges from more extreme anti-human positions, such as those articulated by Patricia MacCormack, whose work advocates for ethical frameworks centred on human extinction and radical withdrawal (MacCormack, 2020). While MacCormack's critique of anthropocentrism is influential, her rejection of affirmative engagement offers limited guidance for design practice in contexts where technologies are already being developed and deployed. In contrast, Braidotti's ethics of affirmation supports engaged, situated responses that seek to transform existing conditions rather than retreat from them.

Within this framework, Human Enhancement is not inherently unethical. Rather, its ethical significance depends on how it is imagined, designed, distributed, and governed, and on whose bodies, lives, and futures are prioritised in the process.

3.1.4. Positioning This Research

This research adopts a critically Posthumanist position that is broadly pro-enhancement, recognising the significant potential of Sensory Augmentation technologies to expand perception, create new modes of being, and challenge normative assumptions about ability and embodiment. At the same time, it maintains a critical stance towards unregulated commercialisation, techno-solutionism, and transhumanist ideologies that frame enhancement as a means of human optimisation or supremacy.

Ethics, in this research, is understood as an ethos rather than a rule-based system. It is not conceived as a set of mandates to be enforced through regulation alone, nor as a checklist to be applied retrospectively to finished technologies. Instead, ethics is approached as a situated, relational practice that emerges through design processes, public engagement, and material experimentation.

This positioning has direct implications for how ethical questions are addressed throughout the thesis. Rather than seeking to resolve ethical debates through abstract judgement, the research foregrounds participatory and practice-led methods that enable ethical reflection to occur in context. The focus is not on determining whether enhancement should exist, but on creating conditions in which designers, users, and publics can engage critically with its implications and take responsibility for the futures they help to shape.

By situating itself within posthuman ethics and design practice, this research contributes an alternative to dominant moral and regulatory approaches to Human Enhancement. It argues that ethical responsibility in this domain cannot be outsourced to policy alone, nor resolved through universal moral claims, but must be actively cultivated through inclusive, reflective, and affirmative design practices.

3.2. REGULATING ENHANCEMENT

3.2.1. Therapy or Enhancement?

Due to HEt's medical beginnings, numerous possibilities for development, and wide range of use cases, it is difficult for academics and regulators to define what is, and is not, HEt. To regulate the technology a line must be drawn between what is a medical device, used for therapeutic reasons and therefore regulated under the Medical Device Regulation (2017), and a what is an HEt device, used for enhancement and therefore in need of new regulation. The European Parliament report (Coenen *et al.*, 2009, p. 19) on HEt offers a method of categorisation which (when simplified) separates the technologies into three categories: not enhancement (therapy) – treatment of a disease or injury to bring a person back to their normal health; therapeutic enhancement – treatment as before but with unintended effects exceeding restoration, or the modification or removal of a congenital condition which is deemed harmful; and non-therapeutic enhancement – removal of a congenital condition which is undesirable, the use of therapeutic methods for non-therapeutic enhancement, and the use of non-medical methods for enhancement.

However, defining these binary categories may be academic and not useful outside of regulation where this definitive line may not correspond to the publics' actual use and understanding of HEt (addressed in Chapter 4.3). Even with these categories the blurred line of 'normal' (abilities, health, use) means that it is difficult to define when a device moves from therapeutic use to enhancement. For example, if a person with ADHD takes Ritalin™ both for their condition and as a cognitive enhancer, does it count as therapy or enhancement? What about an injured athlete taking pharmaceuticals to speed up recovery time, or improving the cognitive abilities of the elderly? Where is the line between therapy and enhancement, and how does the ethics of the technology change when it is not for therapeutic use? Are making these distinctions pertinent when it comes to the design of, and publics use of, the technology?

3.2.2. Are We Ready for It?

Certain ethical conundrums around the mass use of HEt, particularly in genetic technologies, have already been tested in real world scenarios. The ethical debate was brought to the fore in recent times when biotechnologies such as cloning and gene editing became viable possibilities (Jensen *et al.*, 2017, p. 11), with the media covering cases which have sparked world-wide interest in their potential use and misuse. For example, Dolly the cloned sheep was

introduced to the world in 1997 (BBC) amid controversary and within a decade the UN worked to produce a 'Universal Declaration on Bioethics and Human Rights' (UNESCO, 2005) declaring a ban on human cloning which it deemed to be unethical and contrary to human dignity (see Figure 3 for a brief timeline of key HEt events). In the US, The President's Council on Bioethics produced a report titled 'Beyond Therapy' (Bioethics & Kass, 2003) which examined biotechnology for HEt purposes, defining the technology, its potential positive and negative outcomes, and the ethical issues that may arise. Following this the European Parliament released its own 'Human Enhancement Study' (Coenen *et al*., 2009) with a similar structure, addressing all technologies which could be deemed as enhancement, real and speculative.[19]

These documents were intended not only to explore the possibilities of HEt but also to inform their respective regulatory bodies on how HEt should be regulated (or at least what issues should be considered when developing regulations) when or if it comes into widespread use. HEt is making its way through medical bodies, and military research agencies, to commercial companies, with the 'Cyborg Soldier 2050' report predicting that by 2050 HEt will be widely available 'largely driven by civilian demand and a robust bio-economy that is at its earliest stages of development in today's global market' (Emanuel *et al*., 2020, p. v). This shows the impending need for consideration of the impact of these technologies when available commercially, how they will affect the people using it and society as a whole.

3.3. COMMERCIALISATION OF SA AND HEt WITHOUT REGULATION

3.3.1. From medical to commercial enhancement technologies

Here I begin to look at examples of therapeutic technologies that have transitioned to enhancement and the resulting issues, such as: subpar testing, illegal procurement, and issues around consent. In 2008 the FDA approved the Neurostar TMS (Transcranial Magnetic Stimulation) device for commercial sale, to be used therapeutically for neurological disorders (Ways, 2008). However, numerous studies show the enhancing effects of non-invasive brain stimulation devices, such as TMS and tDCS (transcranial Direct Current Stimulators), claiming 'better perceptual discrimination and motor learning, faster eye movements, and speeded

[19] Due to differences in terminology and language barriers, potential areas of HEt development (such as technologies created in Japan, in Human Computer Interaction (HCI) and ones that are not specifically labelled 'enhancement' but whose use would fall under the definition) are not included in the primarily Western documents mentioned here.

visual search and object identification, as well as superior performance on tasks involved in attention, memory, and language' (Luber & Lisanby, 2014, p. 3). Consequently, since TMS's approval, a number of commercial brain stimulation devices have come to market, advertising both therapeutic and enhancing capabilities (Maslen *et al*., 2014). This shows how easily devices can go from therapeutic to enhancement, then rapidly proliferate the market.

The use of 'smart drugs' has been widely discussed over the past few decades, most notably Ritalin™ and Modafinil™, with particular attention drawn to students in the US acquiring the prescription medication illicitly for use as a study aid (Nicholson *et al*., 2015). Though the brands mentioned are not available to buy legally without prescription, there are many other over-the-counter options available, advertised as 'nootropics', 'cognitive enhancers' and 'brain supplements' (Smith, 2015). These cognitive enhancement drugs have a potentially huge future market of students and professionals, providing motive for big pharma to create more readily available alternatives to prescription medications.

One would presume that these medical technologies would have at least been thoroughly tested and therefore safe for use[20]. However, Netflix documentary *The Bleeding Edge* is an 'eye-opening look at the fast-growing medical device industry reveal[ing] how the rush to innovate can lead to devastating consequences for patients' (2018). The documentary follows the lives of patients who have been implanted with medical devices which have not undergone proper testing, but had been approved by the FDA regardless[21], causing horrific, life-changing conditions.[22] It illustrates the destructive effect that un-tested, inadequate technologies can have on a patient, even with stringent regulations and testing procedures in place. As medical technology is developed into HEt, what might happen to people using commercial HEt if governing bodies across the world have not put regulations into place to ensure (or at least attempt to ensure) their safe, and ethical, development and use?

With HEt transitioning from the medical world to the commercial (sometimes with an intermediary stop in biohacking), we can see the importance of informed consent, as it presents itself differently in each context (O'Neill, 2002). Informed consent involves an accurate and understandable description of the device/procedure, the risks versus benefits,

[20] For medical purposes.

[21] The FDA's Premarket Notification 510(k) process allows medical devices to pass if they are substantially equivalent to a legally marketed device (U.S. Food and Drug Administration, n.d.).

[22] This documentary is situated in the USA and pertains to FDA regulated medical devices. The documentary points out that some of the featured technologies were not approved, or were banned, in other regions such as Europe where the regulation is more stringent.

potential alternatives, its potential outcomes and (in medicine) is enacted by the signing of a consent form under the subjects own free will (autonomously). Those who are not 'in the maturity of their faculties' (Mills 1859, p. 135, cited in O'Neill, 2002, p. 40) and therefore unable to give informed consent – due to disability or trauma for example – allocate an advocate who decides for them. In both cases consent is arrived at under the presumption that the doctor is acting in the patients' best interest and is recommending a procedure where the benefits outweigh the risks. In the commercial world the company takes on the role of the doctor, with whom the customer must place their trust, assuming that the information provided about a product is truthful and that it is fit for the intended use – with the action of buying becoming the act of consenting[23]. It is the right and responsibility of the consumer to then judge the risk, exploring the personal benefits the product could provide and whether these outweigh the potential risk to the individual. One would not choose to buy or use something knowing that it may damage their health or that it may not work as intended (unless they see an overwhelming potential to benefit them in other ways). Regulation will be needed to ensure companies creating these technologies meet ethical standards for informed consent. What kind of frameworks will we need to put in place to ensure that the technology is used responsibly when the medical practitioner is no longer there to inform and mediate decision making?

3.3.2. Commodification of Metamorphosis

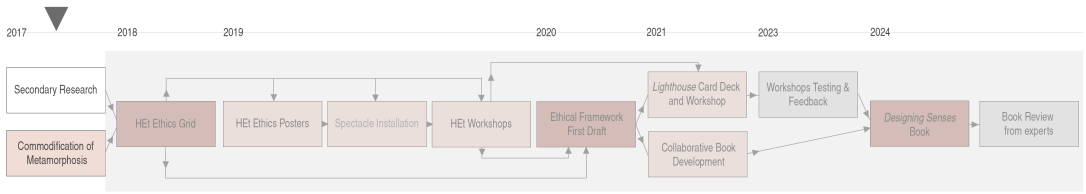


Figure 10 Practice work status – continued literature review and design probe creation, Lesley-Ann Daly, 2025.

[23] Here I am referring to mainly non-invasive commercial HEt or SA products which would be available for the public to buy in stores or online. A medical professional or trained body modification artist may still need to be present for more invasive procedures, such an implants and surgical interventions, where they may provide advice and require written consent. As non-therapeutic technologies there would also need to be HEt regulation for those providing these services. (This is explored further in Chapter 4.6 in the first draft of the framework.)

In 2017, *NorthSense* by CyborgNest, a non-medical, semi-invasive SA device, became commercially available. The device is worn over prolonged periods of time[24], vibrating when the wearer faces magnetic north, and claims to give the wearer a 'new sense' – magnetoreception (Frost, 2018). While part of a research team, based at Ravensbourne College London, I examined the production of *NorthSense* and interviewed early adopters of the device. During this research, our team discovered that the device did not have to undergo any HEt specific regulated testing, other than for General Product Safety Guidelines (2005), as no regulation for HEt or SA devices then existed. Considering HEt's and SA's origins in medical technologies, it was surprising that it would not have to undergo any of the rigorous testing which medical devices do. Although HEt can be similar, if not the same as, medical devices (e.g. technologies may be implanted, attached to the body, chemically or genetically alter the body and/or mind of the subject) as they are not categorized as medical devices they do not legally have to be tested under the Medical Device Regulation (2017), as discussed above. The lack of regulation we can attribute partly to the term 'enhancement' not being defined yet, signifying no 'enhancement' regulation having been constructed, or clear distinction when this regulation should be followed and not MDR. As the majority of the technology still remains speculative or undefined the need for such regulation is not perceived to be pressing. As yet (at time of writing), no controversial use[25] of SA technology has spurred governing bodies to address this gap with any urgency.[26]

The *NorthSense's* commercial availability provoked my research into the design of SA devices. Central to this research as a whole is the question: 'How can I, as a designer and researcher, explore how design can influence the ethical development of the technology?' To address this inquiry, I created a piece for the 2018 UAL PhD design showcase, which would mark the start of my practice-based research, using design to explore SA ethics. It was necessary to bring physicality to the device's intangible capabilities in order to provide myself, and others, with a material understanding of SA by creating *Commodification of Metamorphosis* (Figures 11 and 12). The sculpture sought to make visible the *NorthSense's* ability to sense the magnetic north - which is conveyed to the subject via a haptic stimulus (vibration) on their chest. An arrow denotes the navigational aspect, with disembodied fingers curling inwards toward the device

[24] Not regularly taken on and off like a watch or wearable device.

[25] Comparable to Dolly the Sheep.

[26] As aforementioned, numerous HEt reports have been created by governmental and research bodies and the military which include SA technologies, however, at time of writing, to my knowledge no legal legislation has been implemented.



Figure 11 'Commodification of Metamorphosis' sculpture. Lesley-Ann Daly, 2018.



Figure 12 'Commodification of Metamorphosis' sculpture, close up. Lesley-Ann Daly, 2018.

illustrating the tactile nature of the stimulus. A mannequin torso is used both to show the device's intended body placement and that it is a commercial product. The artificiality of the white torso is juxtaposed with the soft, fleshy fabric, which is stripped back from it, but also surrounding it, signifying both the separation and integration of technology and the body.

The sculpture is intended to have a quiet beauty and allure corresponding to the desire to obtain new senses commercially but also create a sense of unease through the fragmented body parts. This reflects my own uncertainty, at the beginning of my research, around the complex issues that the commercialisation of enhancement may entail, with the aim to provoke these thoughts within viewers of the piece. However, as a static piece, within a window exhibition, it did not allow for interaction or feedback from viewers. On reflection, the focus was on the functional capability of the device and not the experience of augmentation, making it informational but not necessarily relatable. This critical reflection informed the design of subsequent works where the interaction was considered and designed-in, to drive the research (explored in Chapter 4.2.2).

This work marked the beginning of my practice-based research, as an attempt to situate myself, my practice, and my ethics in an ongoing debate currently dominated by philosophers and other theorists. This sculpture allowed me to bring my voice to the discussion, as a designer who wants to see SA grow but is already aware of the issues facing it – highlighting these issues through materiality so that they can be talked about and addressed. While my viewpoint is informed by the literature it is also distinct, due to my experience as a designer researching and working in the field – situated knowledge, embodied in a sculpture. Also informing my viewpoint and aesthetic are the depictions of HEt in the science fiction films, series and books that I have engaged with since a young age, which have no doubt contributed to my interest in the field. However, these media representations of future technologies and cyborgs are generally dystopic meaning they can, and do, negatively impact wider public acceptance of emerging enhancement technologies. The current influence of fictitious enhancements will be explored next.

3.4. HET PERCEPTIONS IN THE MEDIA

3.4.1. Dystopias

Having well-devised, effective regulations for devices in a commercial context only partly contributes to the acceptance of the technology as trustworthy. Although a device or

procedure is deemed safe by a governing body, the publics' perception may take a different view, which is often influenced by depictions in the media. The concept of free speech can be manipulated by journalists, and other media representatives, who mix 'reporting with sensationalism, sentimentality and misrepresentation' (O'Neill, 2002, p. 179). Headlines such as 'Here's the Pentagon's Terrifying Plan for Cyborg Supersoldiers' (Gault, 2019) exaggerate reports ('Cyborg Soldier 2050') by inserting emotive language, creating 'click-bait' to gain more views.

Alongside journalism's (mis)representation of HEt, its ethics have been debated within science fiction for over 100 years. Writers such as Aldous Huxley in *Brave New World* (1932), and George Orwell in *1984* (1949) (among many others) have explored the impact of advanced enhancement technologies on everyday life, speculating on new worlds and behaviours which are born of their widespread use. In film, movies such as *The Island* (Bay, 2005), *Gattaca* (Niccol, 1997) and *Ghost in the Shell* (Oshii, 1995) portray fictional future worlds where cloning, genetic editing and cybernetically enhanced humans (respectively) are the norm. However, due to their dystopian nature these media representations have caused a negative veil to be cast over HEt, making publics wary and sometimes adverse to the development of such technologies in the real world (explored in Chapter 4.3).

3.4.2. Cyborgs

The negative representation of enhancement can particularly be seen in the figure of the cyborg in science fiction who, as is stereotypically recognised, follows the trope of the hyper-masculine, military-machine, or occasionally the overly sexualised female. The part-human, part-machine character is often portrayed in quite a reductionist way, with a lack of humanity and all-encompassing mission objective, which is why transhumanist Max More chooses to avoid the term when speaking about enhancement:

> Generally, cyborgs like the *Terminator* are generally subhuman. I mean, they can be very physically powerful, but they're very narrow, you know, they have a very narrow focus. Punch and destroy, react in certain ways. So that's why we really don't like to use that term. It's actually nothing really wrong with the term inherently, but it's got this very bad connotation now of being controlled by the outside and programmed. (Robert Mason, 2021).

While the *Robocop* (Verhoeven, 1987) or *Terminator* (Cameron, 1984) style character is the dominant representation in media, the term 'cyborg' itself is a portmanteau of 'cybernetic' and 'organism' and thus can refer to all manner of combinations of biological and technological

assemblages. The first cyborg, as recognised in the paper which coined the term (Clynes & Kline, 1960), was a rat called Rose- named after the osmotic pressure pump developed by S. Rose, which injects biochemicals into the rat (or person) to regulate the body's functions in space.

People with disabilities — who rely on technology for their everyday lives — generally get overlooked but are arguably the pioneer cyborgs (Fahn, 2020; Kafer, 2013), a position later articulated and politicised by disability scholars such as Jillian Weise (see section 3.4.4). Insulin pumps, cochlear implants and Deep Brain Stimulation implants (for Parkinson's) are all technologies that have long been merged with the body to augment the abilities of the wearer, and their users represent a much larger demographic than any self-identified 'enhanced' cyborgs or fictious cyborgs. If we take the term 'cyborg' to include those who permanently rely on technology but are not necessarily physically merged with technology, wheelchair and cane users (among others) expand this group again. With most cutting-edge technology being developed for medical uses (as we see with HEt), our next wave of cyborgs will come from, for example, amputees who are getting prosthetics which are wired to their nervous systems. Or people like scientist Peter Scott-Morgan who uses radical robotics, AI, and surgery to turn himself into a cyborg to overcome the debilitating, and ultimately fatal effects of Motor Neurone Disease (Durlacher, 2020).

Other organisms such as animals and plants can theoretically also be categorised as cyborgs. Such as the 'hacked mussels' which help scientists detect pollution in the water (Lawrence, 2021), or the spinach plants which send an email when they detect explosives in the soil (Trafton, 2016). However, these non-human examples raise ethical uncertainty around the consent of and benefit to the non-humans being made cyborg.[27]

Although, all of the above examples could be considered cyborgs – and are relatively harmless, non-threatening subjects – the proliferation of jacked-up meatsuits in the media creates an aversion to term and the multiplicities of future possible augmentations. Whether sensory technologies are used for therapeutic or enhancing ends the majority of those augmented fall

[27] Is this augmentation benefiting the organism's life in anyway? (Welfarist enhancement) or are they being used as a resource by scientists to detect and correct harmful pollutants in the environment to benefit humans (functionalist enhancement). This could also be seen in humans who have, for example, enhanced strength- who would be more proficient in carrying heavy weights in a factory or during war, making this task more efficient, but may not necessarily gain any enhancement to their own life. For a functionalist vs welfarist review of enhancement see (Earp *et al*., 2014)

within the 'cyborg' category- as they are physically merged with technologies[28]- and therefor are (or risk being) tarnished with the same brush.

3.4.3. Updating Representations

As new technologies develop in the presents' social and political climate, the discourses around them are being shaped by historical, fictional visions of HEt which are not necessarily appropriate for our time (Coenen *et al*., 2009, p. 11), including the under-representation of minoritised ethnic communities and people with disabilities (Kafer, 2013; Schalk, 2018). Though some of these future visions may still be possible, they are not probable as their context is now outdated, and therefor attention must be directed towards the more probable outcomes of HEt based on our current and future societies. For HEt to gain enough trust to come into widespread use, publics must have a way of 'judging matters for themselves' (O'Neill, 2002, p. 191), with accurate, non-deceptive information from companies and the media. Understanding how to navigate the public perspective will be vital to the development of HEt, with contemporary research into ethical considerations and the real-world future consequences.

An example of challenging negative depictions is Channel 4's award winning campaigns 'Meet the Superhumans' and 'We're Superhumans' for the 2012 UK Paralympics and the 2016 Rio Paralympics, respectively, which celebrated the incredible achievements of Paralympians in a joyful and empowering way (CampaignLive, 2016). These highly successful campaigns show that we can rethink stereotypes of ability and rebrand towards more positive and accurate representations (Fahn, 2020) – a rebranding that, I argue, HEt needs. Rather than speaking about a devices' ability to normalise or enhance an ability, perpetuating the binaries of natural/technological, we need to see the cyborgs as 'partial identities and contradictory standpoints' (Haraway, 2004, p. 154) who are interesting not despite their differences, but because of them. Who in being dynamic hybrids that see from multiple perspectives, can break down boundaries forming 'flexible coalitions to achieve shared goals' (Kafer, 2013, p. 106), rather than merely reifying gender and ability tropes – "This emphasis on multiple possible

[28] In the future more sensory technologies may be developed through, for example, gene editing which may or may not be categorized as 'cyborg' technologies.

futures – messy, complex, and in friction with one another – rather than singular, universal truths is a key feature of cyborg culture" (Forlano and Glabau, 2024, p. 82).

3.4.4. Cyborg Identity, Disability, and Enhancement

The widespread use of the term cyborg in Human Enhancement discourse has been critically challenged by disability activist and scholar Jillian Weise, who argues that cyborg identity is grounded in material dependence on technology rather than elective enhancement (Weise, 2018). Weise contends that disabled people who rely on prosthetics, implants, and assistive technologies are the original cyborgs, for whom technological integration is a necessity rather than a choice.

Weise's critique is directed at transhumanist and techno-utopian narratives that aestheticise or universalise cyborg identity while neglecting the lived realities of disability, structural inequality, and unequal access to technology. When non-disabled subjects claim cyborg identity through elective enhancement, she argues, this risks appropriating disability experience and obscuring the political and economic conditions that shape who must live with technological mediation and who can opt into it.

This research takes Weise's argument as a crucial ethical intervention and aligns with her insistence that cyborg identity cannot be separated from questions of power, access, and necessity. At the same time, it situates her critique within a critically Posthumanist framework that recognises a plurality of technologically mediated subjectivities. Rather than framing cyborg identity as a fixed category, this research understands it as a spectrum of embodied relations to technology, shaped by context, dependency, and design.

From this perspective, the ethical question is not who is entitled to claim cyborg identity, but how different forms of human–technology integration are designed, valued, and governed, and whose knowledge is prioritised in these processes. Weise's critique therefore reinforces the central argument of this thesis: that ethical engagement with Sensory Augmentation must be grounded in participatory, situated design practices that recognise disabled people not as edge cases, but as critical experts in living with technological mediation.

3.5. DESIGN IS ETHICS

This section articulates the inextricable link between design and ethics, showing how the designer constructs and shapes the ethics of a device through the act of designing, whether intentional or not. Understanding the role of ethics in design practice is key to being able to direct HEt and SA development, informing how to navigate already bias industries and designing for hybrid subjects.

3.5.1. Ethics in Design Practice: Values, Justice, and Responsibility

There is a substantial and growing body of scholarship that positions ethics as integral to design practice rather than as an external evaluative concern. Across this literature, ethics is understood as something that is embedded in technologies, systems, and design processes, shaping social relations, power dynamics, and lived experience. This research builds on and extends this work, situating Sensory Augmentation within existing debates on values, justice, and responsibility in design, while also identifying the limitations of current frameworks when applied to emerging human–technology assemblages.

One influential approach is Value Sensitive Design (VSD), developed by Batya Friedman and colleagues and later articulated by Helen Nissenbaum and others. VSD seeks to account for human values throughout the design process by identifying stakeholders, anticipating value tensions, and embedding ethical considerations into technical and organisational decisions (Nissenbaum, 2001; Friedman et al., 2013). This approach has been particularly valuable in highlighting that technologies are never neutral, and that values such as privacy, autonomy, and fairness are routinely inscribed into design choices.

However, VSD has also been critiqued for its tendency to stabilise values as identifiable and knowable in advance, often privileging dominant cultural norms and institutional perspectives. In the context of HEt and SA, where technologies reshape perception, embodiment, and agency in unpredictable ways, values cannot always be anticipated or resolved at the design stage. This research therefore aligns with critiques that argue for a more situated and iterative understanding of values, one that recognises ethical questions as emerging through use, practice, and lived experience rather than being fully specifiable upfront.

Katie Shilton's work advances this perspective by focusing on values in practice, demonstrating how ethical commitments are enacted through everyday design decisions rather than formal

principles alone. Shilton introduces the concept of “value levers” — moments within design processes where values are negotiated, reinforced, or compromised (Shilton, 2013). This framing is particularly relevant to the development of enhancement technologies, where seemingly technical decisions about interfaces, data flows, embodiment, or accessibility can have profound ethical consequences. Shilton’s work supports the view that ethics must be actively cultivated within design teams and workflows, rather than delegated to guidelines or compliance mechanisms.

Questions of power, participation, and justice are further foregrounded in Design Justice scholarship, most notably articulated by Sasha Costanza-Chock. Design Justice explicitly challenges the assumption that design serves a neutral or universal public, instead arguing that design often reproduces existing social inequalities unless marginalised communities are meaningfully involved in decision-making (Costanza-Chock, 2020). This framework emphasises accountability, collective authorship, and the redistribution of design power, aligning strongly with Participatory Design traditions.

While Design Justice offers a critical corrective to exclusionary design practices, it remains largely human-centred in its ethical scope. In the context of Sensory Augmentation, where technologies entangle humans with non-human actors, infrastructures, and environments, ethical responsibility extends beyond human stakeholders alone. This research therefore builds on Design Justice while extending it through a posthuman ethical lens, recognising that enhancement technologies operate within broader socio-technical and ecological assemblages that must also be considered in ethical deliberation.

Together, these strands of scholarship affirm the central claim that design is an ethical practice. However, they also reveal a gap in existing frameworks when applied to Human Enhancement technologies: namely, the lack of tools that support ongoing, collective ethical engagement in contexts where technologies actively reshape what bodies can sense, perceive, and become. Rather than proposing another set of prescriptive guidelines, this research responds to this gap by developing participatory design tools that enable teams to surface ethical tensions, reflect on values in context, and take responsibility for their design decisions over time.

In doing so, the research positions ethics not as a problem to be solved or a constraint to be managed, but as a practice of care, reflection, and accountability embedded within design processes themselves. This orientation complements existing design-ethics scholarship while extending it to address the unique ethical challenges posed by SA and other emerging HEt.

3.5.2. Ethics in Design Practice

Technology mediates how we experience the world, impacting how we interpret information, form perceptions, behave and act (Verbeek, 2005). Building on the account of technological mediation introduced earlier in this chapter, Verbeek argues that technology (like design) is not neutral, it is morally charged, and so the act of designing technology is, in fact, doing ethics (Verbeek, 2011). The designer is actively engaged in shaping the impact that the technology has, and so designers must understand and implement ethical practices in the design process. The 'due diligence' of designers generally falls into two concerns: professional conduct – correct treatment of employees, clients and publics; and social, legal and environmental design constraints – and following health and safety guidelines, consumer rights and environmental regulations (Fry, 2004). However, these cover the bare minimum of ethical consideration and can be over-ruled by the client (unless violating a law), leaving the designer with little responsibility for the resulting design and outcome of the product or service. Fry argues that this is not adequate for how we design today, and that we need to consider the impacts of our work through 'educated ethical judgement' (Fry, 2004). Similarity, Colman advocates for 'ethical activism' which goes far beyond the bare minimum of responsibility:

> An ethical activism is one committed to a genuine ethics of care, the critique of unethical forms of agency on the infrastructural organisation of matter, and a desire to see diversity flourish (Colman, 2020).

For example, the London College of Communications' (LCC) Responsible Design Framework (2019) translates more thoughtful ethical inquiry into practical recommendations for designers to guide their practice. It enables designers to enact the ethics through analysing, anticipating and designing mediations while situating the process in a wider network of relations. By actively engaging with ethics, designers create impact in two ways: first the design process becomes ethical, e.g., by not harming animals, the environment or discriminating against certain communities. Second, the resulting technology can have an ethical impact on the subject and society (whether intentionally or not) through its moral agency, e.g., road bumps are designed to discourage speeding (Verbeek, 2011).

This second way is called 'scripted' design, which intentionally steers the actions of the person/s using the technology. The physical design of a technology can mediate the interaction, as can the information that is provided which informs the subject, and the infrastructure around the technology (University of Twente, n.d.). The extent to which the design 'nudges' the subject can be controversial: when there is an explicit nudge towards

moral behaviour the subject has the 'freedom' to opt out, whereas a more hidden moralising can be seen as coercive. The strength of a script, as defined by Jelsma (2010), 'depends on the extent to which it constrains the relevant action(s) of the user', where a 'weak' script allows voluntary participation, whereas a 'strong' script 'leaves the user less or no room to escape' (Jelsma, 2010, p. 109). There is a danger with 'strong' scripts to impose the values of the designer onto the subject, a form of paternalism by technology. This mismatch becomes more acute in a cross-culture context where values differ - 'the imposition of values, through embedded values in technology can be regarded as a form of technological imperialism' (Wong & Wang, 2021, p. 5).

As mentioned above, technology and design are never neutral, they always mediate actions, so can one ever be 'free' from influence? Or, according to Foucault, is 'freedom' the ability to engage critically? And therefore, by providing the material, information, and infrastructure for subjects to behave ethically can designers script non-coercive ethical actions?[29]: 'If we are dependent on what we design to live, and what we have designed is ethical, that is, designs ethical ways of being, then we are consequently ethical in how we live'. (Tonkinwise, 2004, p. 7). Can designers choose to enact ethical doings as standard, as an ethos, instead of seeing it as a tick box exercise? Rather than risk management, can SA designers and creators come to understand ethics as a practice of care, so that "In caring, the ethos creates its ethics, rather than the other way around". (Puig de la Bellacasa, 2017, p. 154).

3.5.3. Designing for Cyborg Intentionality

In the case of HEt and SA technologies there is a new hybrid fusion of human and technology. More intimate than Idhe's 'embodiment relation' (1990), the technology is not just embodied but fused with the biology, creating a cyborg. Perceptions and behaviours are now mediated not between the human and technology but together as a hybrid subject, with 'cyborg intentionality' (Verbeek, 2008). As described in Chapter 2.5., when SA devices merge with the human body our cognition will extend through the device, transparently mediating our thought and behaviours. The device will not be 'other', we will not be 'using' it, perceptually

[29] This will become relevant in Chapter 4.6. on the SA framework – which intends not to prescribe a checklist of rules for designers and developers, but to create a space for conversation and 'educated ethical judgement' in the context of their device.

we will not know where the human ends and the machine begins, or who is accountable for the decisions we make.

What guides our choices – our desires, values, and needs – will be derived from both the human and the technology, and it is therefore important to design devices accordingly to avoid dissonance. For example, if I, as a moral subject, am ethically opposed to discrimination it is critical that the technology I bind with, which mediates my (enhanced) experiences, is not inherently discriminatory (from the subject's perspective) by design, or by lack of conscious design. Though with the diversity and fluidity of what is considered to be ethical – by whom, where, and when – can the creator begin to understand their own ethical stance, let alone that of the people using the device?

3.5.4. Recognising the Designers Bias

'Ethics' can be daunting. Personally, before I began this research, I found the term loaded with connotations of moral superiority and a presumed 'correct' academic position that I should know. And therefore, a resulting fear that I would be outed when others inevitably realised that I didn't understand all the diverse, complex, historical and philosophical particularities, viewpoints, and counter-positions. I did not want to be seen by 'real' academics as a designer appropriating the term to give my work a perceived gravitas and depth. The more I researched and engaged with the subject the more complex it became, but in a way that made it easier to find my way. The deeply contextual and situational nature of ethics revealed that there is no one right or wrong ethics (to an extent), but rather an ethics unique to a particular person and situation, leading the research to adopt an understanding of ethics as ethos rather than as a morally prescriptive framework. Getting it wrong is not a be-all and end-all[30], but a chance for learning and further discovery, as long as you are aware of your misjudgement and are open to continued improvement.

This search for understanding begins with looking at oneself and considering your own bias – deeply reviewing and interrogating what you think and why you think it. What values have my family passed on? How have my experiences of being a white, able-bodied female contributed? How has the media shaped me? How might it change as I change? And how does it impact how I design? Am I designing for myself, embedding my biases under the presumption

[30] Here I am speaking on a personal basis about miscalculated ethical decisions in my own life. If your un/ethical decisions cause impacts to wider publics, e.g., when creating commercial technologies, this is a different situation.

that others are like me? How do other people's bias affect me? How does systemic or culturally ingrained bias affect us?

One example where we can see this bias clearly is in the societal perception of those who are differently abled. The perception is that in the mismatch between them and the world, they are what doesn't fit, they are not 'normal', so it understandable that they cannot interact with the world like others do. This is the medical model of disability which states that people are disabled by their impairment and differences. However, as skilfully shown by Kat Holmes in her book *Mismatch* (2018), it is the world that is not designed to match all the people living in it. This social model of disability shows that people are instead disabled by how society is organised. That people with disabilities could live 'normally' in the world, but the world is not designed for them, making simple actions far more difficult, if not impossible. The world is exclusionary by design.

However, there is a spectrum of permanent, temporary, and situational 'mismatches' – one person may have one arm, another an arm in a sling, and another carrying a child with one arm (Holmes, 2018, p. 107). All will have similar troubles interacting with a world designed with a bias towards people having two arms. Challenging this (personal or societal) bias, designing 'with' and not 'for' them[31], and adapting our design practices is a way of both learning about ethics and putting it into practice. A textbook will not tell you the 'correct' way to be ethical in every individual scenario, but an openness to self-reflection, learning and choosing to do better, can be much less daunting and far more effective.

3.5.5. Diversity in the Design and Technology Industries

People buy technology not because of what it can do, but what it can do for them. What personal connection it has (Innovate UK, 2015, p. 6) and how that person interacts with the technology plays a key role in defining its meaning (Verganti, 2009, p. 28). This insight is key to the development of technology because it must consider the human interaction with the product, which is (generally)[32] the role of the designer. Technology companies, epitomised by the Silicon Valley start-up, traditionally focused 'almost single-mindedly on an organization's

[31] Not seeing oneself as the 'expert' designer, helping 'unfortunate' people, but designing with them as they are experts in their own experience (Hamraie & Fritz, 2019)

[32] This research argues that that consideration for the people using the technology should go beyond just the designer in the team.

technical prowess', consisting almost solely of engineers (Vasallo, 2017). However, even the most innovative technology can fail if the consumer does not understand its use or benefit to them (Innovate UK, 2015. p. 6). This has driven the growing trend to involve designers in the development process which has repeatedly proven to increase a technology's success and lead to a rise in profit for the company (Design Council, 2014; Innovate UK, 2015; InVision, 2019; European Commission, 2009).

It is most effective when designers are involved from the earliest stages conducting contextual research, aiding concept development, prototyping and developing solutions which provide the best experience for the consumer. 'When design starts to play a more strategic role, it is capable of getting everyone in the organisation to think differently and challenging existing paradigms' (Design Council and Warwick Business School, 2014, p. 21). Rather than considering a technology successful when it is working as intended, designers consider it successful when it works for someone, in a way that is beneficial for them. This is contrary to the traditional use of design which came at the end stages of development to provide a pleasing aesthetic e.g., for packaging. While the trend is growing, in 2018 only 10% of businesses in the UK used design as strategy, compared to 24% in the development process, 26% for aesthetics and 40% did not use design at all (Design Council, 2018)[33]. The utilisation of design as strategy is highest in Europe, the Middle East, Africa, and North America (4-6%), followed by Asia Pacific (3%) and lastly Latin America (1%), showing that strategic design implementation has enormous room for expansion globally (InVision, 2019).

Alongside strategic design increasing a technology's success, having diverse people in the industry is also proven to result in better products, systems and policies that address the needs of wider publics, and not just the 'default male' stereotype. This is thoroughly proven through numerous case studies in Caroline Criado Perez's' book *Invisible Women* (2019). This award-winning book confronts the data gap which results from women and other minorities not being considered, or included, in various contexts, such as health care, tool design, city planning, policy development and business structures. It repeatedly demonstrates the profound, negative impact the lack of diversity in industry has on everyday life and advocates the need for diverse voices in every industry.

Assessing the diversity of the technology and design industries in the UK, statistics show that both sectors are dominated by white, able-bodied males. In 2020 only 17% of the technology

[33] This metric was not revisited in their 2022 report; therefore, I cannot provide an updated comparative.

workforce were female[34] (Little, 2020), with an increase to 29% identifying as female by 2024 (Tech Talent Charter, 2024). In design, in 2018 22% of people were female (Design Council, 2018), which decreased to 21% by 2022 (Design Council, 2022). In 2020 16% of the technology workforce were ethnic minorities (Tech Talent Charter, 2020), rising to 25% in 2024 (Tech Talent Charter, 2024). Only 13% of those in design were ethnic minorities in 2018 (Design Council, 2018), raising to 24% by 2022 (Design Council, 2022). In 2020, 15% of design workers identified as having a disability (Design Council, 2022), and in 2024 in technology they represent only 6% of employees (Tech Talent Charter, 2024).

The statistics and case studies above show that there are huge gaps in the diversity of the technology and design industries. By involving a higher percentage of diverse design and technology employees, companies could significantly benefit from the resultant development of technologies which better understand and represent their consumers. As a new industry, commercial Sensory Augmentation is no different- the combination of skills and diverse life experiences would produce innovative concepts which are both desirable and useful to the consumer and consequently benefit the company.

3.6. ADDRESSING THE NEED FOR DESIGN AND ETHICS IN SA DEVELOPMENT

3.6.1. Ethical Design Framework

As we have seen throughout this chapter there are many areas in design and technology development that need careful consideration for the inherent ethical issues – the gaps- and in many cases the need to analyse and reconstitute outdated practices and thought processes. This includes considering more diverse publics when designing, with a more inclusive team, who provide accurate, non-sensationalised information, combatting misrepresentations and aiding informed consumer consent. While many of these examples are from the wider design, technology, and HEt fields these are all issues that will affect the development of SA and should be considered going forward. But with a plethora of technologies, stakeholders, cultures and budgets, how can a design solution accommodate the diverse contexts and needs?

[34] I am reflecting the terminology used in each report, for example, some split gender by male and female – thus I use the term 'female'- while newer reports split by those who 'identify as' female, male or non-binary – thus I use the term 'identify as female'.

Taking inspiration from work like the aforementioned LCC Responsible Design Framework (2019), the next aim for my practice will be to create an ethical design framework for SA technologies. As a method the creation of a framework enables the organisation and synthesis of ethical issues related to the technology, which can be shared with SA stakeholders in an accessible format. From one-page visuals to 40-page documents, the structure of a framework is adaptable to its content and target audience. This will enable relevant content to be presented in a relevant manner to SA creators specifically, aiding its consumption and adoption in practice.

Creating a framework draws on the contextual nature of ethics, which asks for reflection and discussion by posing questions. Whereas for example, creating guidelines to be conformed to can be more rigid, focusing on checking boxes and not necessarily critical assessment but the following of predetermined rules[35]. The framework as a method also aligns more closely with the intended audience for this research, the SA creator. Creating suggested regulations for SA would target the policy makers and government agencies[36], with the intention of informing new law, which as mentioned can take an extended period of time. Whereas a framework for SA creators, is intended to be used today, in lieu of regulation, as a bottom up means of self-regulation and embedded ethical design practices in existing industry.

The framework can be structured to include a multitude of different topics ensuring that it addresses as wide a range of SA creators as possible. For example, synthesising issues raised in HEt literature such as how enhancement is defined, its risks vs benefits, wider societal impacts and consideration for the impacts far into the future (see Chapter 4.1).

3.6.2. Together We Are Stronger

What has become clear through the research thus far is the need for the engagement and participation of diverse people in design. While the initial intention was to create a tool to aid the designer in an SA team, to act as an ethical advocate and guide others, what will be more effective is the creation of a tool for the whole team. Together teams can create change,

[35] Guidelines are a useful tool in the right context, particularly where there is a well-defined correct and incorrect way to do something.

[36] Research and practices that engage with policy makers to influence the regulation on emerging technologies is critical and there are others working more directly in this area with much greater knowledge and experience with policy design. However, this is not the area of focus for this research.

leveraging their diverse knowledge to tackle the framework questions and collectively devise and carry out affirmative actions to benefit the technology production and use.

Coming from a design perspective, the framework will inherently have some design bias, but to create one that is all encompassing of every issue relevant to every discipline would be far outside the limits of this PhD, and assuredly unnecessarily large. Though it should be diverse enough to trigger discussion and allow participants to think from other perspectives or through another subject. Some sense of unfamiliarity may be beneficial as it necessitates exploration of the issue to understand its relevance to their discipline and the technology. Though it will not solely be made for the designer, they can act as a facilitator, organising the team and leading a structured discussion.

Including diverse team members will also help to identify gaps and bias in the participants and development process, seeing who or what has not been included. This can also extend to consideration of non-humans, identifying systems of power and acting as advocates for those without a voice. Adding the aforementioned understanding of alternative sensory abilities and the meanings attributed to the senses across cultures (see Chapter 2.4), will greatly expand the frame of reference for conceptualising SA devices, which address a plethora of audiences.

CONCLUSION

This chapter identifies the gaps relevant to the commercialisation of HEt and SA, including the lack of specific regulation, negative public perceptions of enhancement, inherent bias in design practice, and the lack of diversity in the design and technology industries. These gaps are shown to arise not only from regulatory absence, but from deeper ethical tensions in how enhancement technologies are imagined, designed, and socially positioned. By understanding these issues, this research can begin to address them through the development of an ethical design framework for SA devices. By documenting the growing examples of commercial HEt and the sometimes-flawed regulatory system, this chapter shows the importance of such a framework to ensure safe development and use of the technologies.

This chapter also shows the intrinsic link between ethics and design practice, with designers as a core driver of more beneficial and trustworthy technology. This separation of top-down change through regulation, and bottom-up ethical practice enacted through design is key to situating the research. The focus going forward is not on influencing policy for HEt, instead it centres on the use of design practice as research and an advocate for change.

The next chapter delves into the use of design methods to gather the diverse knowledge and opinions of the publics who may be impacted by the technologies development, to expand academic and industry knowledge on enhancement. This will inform the framework which aims to guide how SA creators develop ethical technology in-lieu of regulation.

CHAPTER 4: DESIGN EXPLORATION WITH PUBLICS

INTRODUCTION

This chapter outlines methodologies for engaging the public in discussions about the ethics of HEt, including visual and participatory approaches. This phase of the research builds on the experimental and iterative methodological approach outlined in Chapter 1, where design artefacts and participatory engagements function as sites of ethical inquiry and knowledge production. It begins with the creation of a *HEt Ethics Grid* which maps the plethora of issues associated with its widespread use, informed by academic and governmental reports. This grid then acts as a key reference for different methods of design engagement with publics, used to provoke discussion on HEt and gain feedback.

The chapter seeks to understand public concerns and aspirations regarding HEt and SA technologies, to enrich the insights in the existing literature. It aims to collect and analyse the current perceptions of the technology, what has informed these perspectives, what HEt publics find desirable and what they perceive as the main barriers to acceptance. It highlights the importance of diverse perspectives when tackling complex problems and reinforces the argument for Participatory Design methods, grounded in both foundational and contemporary PD discourse, as a means to facilitate thoughtful discussions.

The chapter demonstrates research through design, gathering insights from four key workshops to inform the development of the framework. This chapter marks a significant stage of the thesis with the creation of the first draft of the ethical design framework for SA devices, as a culmination of the research to date.

4.1. *HEt ETHICS GRID*

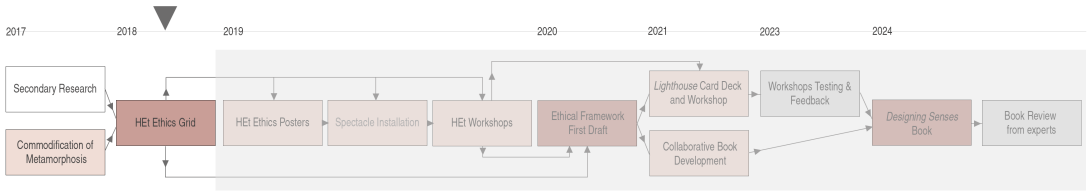


Figure 13 Practice work status – HEt Ethics Grid creation, Lesley-Ann Daly, 2025.

4.1.1. Methodology

The first step towards creating the ethical design framework for SA is to review and synthesise academic literature on the ethics of HEt, leveraging the knowledge and insights of those who have been researching the field already. To generate a thorough analysis and documentation of HEt ethical issues a number of documents are examined, including: 'Human Enhancement Study' (European Parliament, 2009), 'Beyond Therapy' (The President's Council on Bioethics, 2003), 'State-of-the-art Review on Human Enhancement' (Jensen *et al*., 2018), 'Universal Declaration on Bioethics and Human Rights' (UNESCO, 2005), 'Ethics in Public Policy Making: The Case of Human Enhancement' (European Commission, 2012), and 'Mind Machines: The Regulation of Cognitive Enhancement Devices' (Maslen, 2014). Literature specifically on SA technologies, their regulation and ethical considerations are so far limited, therefore a wider analysis of HEt literature is first needed.

The method for choosing which ethical issues are pertinent to the framework is centred around the impact on the subject and their interaction with the technology. This is informed by: Posthumanism – considering the effects on the subjects' life, including effects on non-human subjects such as the environment; design perspectives – which issues can/are affected by how the technology is designed and therefore can be altered by design intervention; and human rights. Effects to wider systems beyond the direct interaction of the subject, such as businesses and the economy, were not included. Each document was thoroughly reviewed resulting in the *HEt Ethics Grid* (Figure 14) which has the added benefit of enabling the consolidation of the range of issues in one glance, rather than dispersed through multiple documents, adding to my own comprehension of the field.

TITLE & DEFINITIONS	**THERAPY vs ENHANCEMENT** **Therapy - treatment intended to relieve or heal a disorder, physical or psychological**	**REGULATORY CONSIDERATIONS** **-rules made by a government or other authority in order to control the way something is done**	**HUMAN RIGHTS** **-are the basic rights and freedoms that belong to every person in the world**	**HUMAN AGENCY/ ACCOUNTABILITY** **- the capacity of individuals to act independently and to make their own free choices.**	**SOCIOCULTURAL IMPACT** **-related to the different groups of people in society and their habits, traditions, and beliefs**
EXAMPLES	WHAT IS 'NORMAL'? Some 'disabled' communities, for example Dwarfs & the Deaf, want to be able to choose not to genetically remove this 'disability' from their children – opting to preserve their communities' culture and heritage. This is their 'normal'	GLOBAL CONSENSUS Global solidarity is needed on how the technology is regulated. Uneven regulation across countries, and cultures, may force people to seek 'treatment' abroad or procure technologies illegally - adding risks from counterfeit devices.	BENEFIT THE INDIVIDUAL The interests and welfare of the individual should have priority over the sole interest of science or society. Primarily the enhancement must benefit the enhanced individual and not put them at risk in order to achieve a wider gain.	MILITARY A soldier is required to enhance to increase probability of mission success. Due to the hierarchical structure of the military could it be considered that they are giving their consent freely? Who will be accountable if it malfunctions?	LIFE EXTENSION Longer life changes our perception of time and will give people the physical and mental ability to stay in jobs longer. By leaving less room for young, fresh ideas this will slow innovation. Young bodies - old outlook.
ISSUES	How do you define 'enhancement'?	There needs to be a global consensus on regulation of HE technology	Treat everyone equally	If all experience is mediated by technology, how does it affect our decisions?	Would longer lives mean reduced fear of death, less drive & commitment?
	How do you define 'normal'?	Need to increase awareness so that the public and relevant professionals can be involved in regulation committees	Respect cultural diversity	If our experience is already mediated anyway, will the addition of the enhancement matter?	Would extended life mean extended time in decay? Increasing interest in assisted suicide?
	How do you define 'disability'?	Must take non-Western views into account	Ensure it doesn't generate discrimination against a group or individual for their culture, gender or income	If the tech becomes a moral actor, who is controlling your actions, you or the device?	Will some enhancements be detrimental to other aspects of health, creating unknown side effects in the long term?
	What genetic traits are acceptable/ favourable?	Need to consider feminist views, queer/gender politics, and the other	Ensure having the device doesn't interfere with the fundamental rights of others	Do we want the technology to make moral judgements for us?	Who are enhancements accessible to? To what extent is it covered by the health system?
	What are the implications of choosing to keep a 'disability'?	Must share benefits & advancements globally, and promote work in developing countries	Ensure everyone has freedom of choice – Morphological freedom	If enhancement makes learning easy, taking away the time and effort normally involved, how will this affect self-development?	If enhancement is only for the rich will this create greater socio-economic disparity?
	How does genetic legacy change when editing out a family trait/disability?	Need to be regulated on a case by case approach and create risk evaluation levels	Respect others choice to or not to enhance	If we rely on enhancement to control emotion – how will we/children learn to master our impulses?	If all those around you are enhanced will you feel pressured into doing it yourself?
	How does family legacy change when adding in a new trait?	Need to regulate according to the devices' actual effects on the user, not by how the manufacturer claims it will work	Ensure using the device doesn't impair our rationality or restrict the breadth of human desire	Will changing our temperament, emotions, desires change our identity?	Will the enhanced gain greater social status, causing a negative social effect on the unenhanced?
	Do unselected embryos deserve to live?	Potentially consider how the device interacts with the body as defining factor e.g. attached to skin, implanted, neural	Give clear guidance and safety information before choice is made	If our memories and experiences define our personalities, will augmenting our memory change who we are?	In a narcissistic society will each person acting for their own betterment detriment society?
	Does 'normal' change when many people enhance?	Must consider long term effects and benefits, not short-term solutions	Make sure benefits outweigh the risks	As medical practitioners only claim to do the best practise, what happens when results are not what we asked for?	Will increased popularity in enhancing boost its acceptance?
	Will those who don't enhance become 'subnormal'?	Need to find a way to quantifiably measure risks vs benefits when the affect is not yet clear	Ensure the individual interests are greater than societal interests	As consumers, how might buying enhancements promote the commercialisation of the body?	Is it justifiable to ask certain professions, such as doctors & pilots & teachers, to enhance for the greater good?
	Do we risk perceiving the whole human condition as 'disabled' and in need of enhancement?	Understand that desirability will increase when clear benefits are proven	Must decide for the best interests of those without the ability to choose/consent. Protect the vulnerable	Should a piercer providing enhancement services be held to the same standards as a medical professional?	What privacy & security measures should be put in place? Who will have (authorised) access to your data?
	Does raising the physical & mental performance of the aging count as therapy?	Must consider that what is good for one is not necessarily good for all	Be conscious to safeguard future generations	Will medical professionals essentially become service providers?	What if employers and/or the government had control over your enhancements? With or without your knowledge?
	Does a treatment that allows an athlete to heal faster count as enhancement?	Need more thorough regulated testing on devices made for children	Protect/ do not harm the environment, biosphere and biodiversity	Who is responsible for the outcome of a malfunctioning enhancement?	If children become a product of their parents desire, will this change attitudes about control in parenting?
	Should the less naturally gifted be allowed to enhance to even the playing field? – who decides?	Consider having criminal sanctions for using devices on children without proper training	Know what to leave alone, and not to neglect what we already have	Should parents liable for misusing enhancements on their children? How much is the child choice?	Will children be burdened by the idea that they must live up to what they were 'designed for'?

Figure 14 HEt Ethics grid. Lesley-Ann Daly, 2017.

4.1.2. Grid Composition

The ethical issues, or questions, identified in the literature review are grouped using affinity mapping (see Appendix 2) under five headings: Therapy vs Enhancement; Regulatory Considerations; Human Rights; Agency & Accountability; and Sociocultural Impacts, which aim to encapsulate the range of issues documented. The columns in the grid (Figure 14) include the list of issues relevant for each heading and an example situation to aid in the reader's comprehension. The context for each of the five headings is articulated below, with references to the questions or statements within each column.

Therapy vs Enhancement

The issues identified in this column predominantly deal with the blurred line between therapy and enhancement, as articulated in Chapter 3.1. Initially questioning how to define terms such as 'enhancement', 'normal' and 'disability' and considering what technology lies within the borders of those definitions: 'does raising the physical and mental performance of the aging count as therapy?' (European Parliament, 2009, p. 19). Questions also centre around the redefinition of the concept of health (European Parliament, 2009, p. 59): 'what genetic traits are acceptable/favourable'; 'do we risk seeing the whole human condition as 'disabled' and in need of enhancement?' (The President's Council on Bioethics, 2003, p. 305); and 'what are the implications of choosing to keep a 'disability'? or not wanting to remove it from your child? (European Parliament, 2009, p. 75).

Many of these questions link to other columns particularly around agency, the right to choose to enhance, and regulatory considerations, where these definitions will inform the policy made for the technology. This column aims not just to question what society determines is the answer to each question posed, but also your own perspectives and consideration for others whose experience are different to our own.

Regulatory Considerations

This column focuses on areas which have been regulated for other technologies, such as medical technologies and products, taking inspiration from how they are regulated and consideration that this will not be a one-size-fits-all solution (Maslen, 2014, p. 26). To regulate necessitates a measurement of impact and a 'need to find a way to quantifiably measure risk

vs benefits when the effect is not yet clear', taking into account the long-term effects and seeing 'the devices' actual effect on the user' as opposed the manufacturer claims.

Notably, alongside considerations for other perspectives such as non-Western and feminist, a suggestion that extra care and 'more thorough regulated testing on devices made for children' so that the risk can be justified (Maslen, 2014, p. 27). Additionally, a need for global consensus on these regulations to avoid black market sale, harmful technology use, steering away from the 'China will do it anyway' mindset (European Parliament, 2009, p. 42).

Human Rights

Human Rights are crucial to the future of HEt as they protect each individual and 'ensure everyone has freedom of choice – 'Morphological freedom' when it comes to enhancement (European Parliament, 2009, p. 42). This includes not discriminating against others, respecting others' choice to enhance, or not enhance, and respecting other attributes such as cultural diversity (UNESCO, 2005, Article 12).

Protection is also a common theme; 'be conscious to safeguard future generations' (UNESCO, 2005, Article 16); 'protect/ do not harm the environment, biosphere or biodiversity' (UNESCO, 2005, Article 17); and making sure to 'decide for the best interests of those without the ability to choose/consent. Protect the vulnerable' (UNESCO, 2005, Article 7). While we have the right to choose, and to be provided the information to give informed consent, we should take the same care and consideration for others, human and non-human, present and future.

Human Agency & Accountability

This column follows on from the previous by looking at our own choices, but considers the implications that these choices may have on us and others when we have chosen to enhance: 'how does it affect our decision making?'; 'will changing our temperament, emotions and desires change our identity?'; and 'do we want the technology to make moral judgements for us?' (The President's Council on Bioethics, 2003, p. 88).

Alongside the outcomes of merging with the technology it also considers who is accountable for those impacts, whether desirable or unintended. This can be understood clearly in the example of the soldier, if they are required to (ordered to) enhance for a mission 'could it be considered that they are giving their consent freely?' And 'who is responsible for the outcome

of a malfunctioning enhancement?' – the soldier, the captain, the government, the device maker- which in the context of war could literally be deadly? (Jensen *et al.,* 2018, p. 59).

Sociocultural Impacts

This column looks at the wider societal impacts of enhancement particularly when done on a mass scale. It articulates potential long-term impacts to society when people live longer and therefore do not leave their positions for younger generations 'leaving less room for young, fresh ideas this will slow innovation' (The President's Council on Bioethics, 2003, p. 300) and whether it will result in 'the enhanced gaining greater social status, causing a negative social effect on the unenhanced?'

Contrary to other areas where the right to choose and morphological freedom are highlighted, here is the consideration for whether some professions should be encouraged or required to enhance, 'is it justifiable to ask certain professions, such as doctors, pilots and teachers, to enhance for the greater good?' (The President's Council on Bioethics, 2003, p. 149). This moves away from the focus on the individual benefits and towards societal interests- is this a case where the benefits for the many outweigh the risks of the few? Additionally, 'if all those around you enhance, will you feel pressured into doing it yourself?', potentially needing to in order to keep up with others at work (Jensen *et al.,* 2018, pp. 54-56).

These five columns illustrate the complex ethical landscape of HEt, encompassing the rights of unborn children, parents, workers, enthusiasts, leaders, governments, and communities—both present and future. Given the multifaceted issues and consequences associated with a broad range of HEt, it's understandable that careful consideration is necessary for their regulation. However, considering the potential negative impacts on individuals and nations alike, it's perplexing that these technologies aren't a more common topic of discussion among the general public. This may be partly due to the aforementioned disconnect between the academic nature of relevant reports and the public's awareness and ability to discern their personal relevance.

4.2. VISUALISING HEt ETHICS

4.2.1. Impacts of HEt Posters

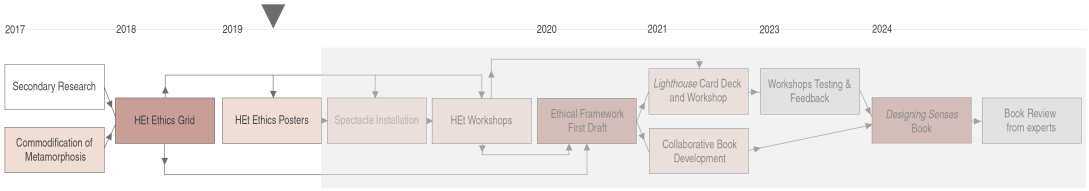


Figure 15 Practice work status – HEt Ethics Posters creation, Lesley-Ann Daly, 2025.

The importance of public participation in the discussion on HEt development was identified in the documents used to construct the *HEt Ethics Grid* (above). However, these documents are long (some around 300 pages), dense (covering many fields and technologies), use academic language and are not designed to be read by a non-specialist audience. To facilitate accessibility, I created six visual posters about HEt ethics, aiming to make the information more accessible, understandable, and appealing (than a block of text).

The six A1 sized posters were created in collaboration with graphic designer Dr Gill Brown (at the time a fellow PhD student) whose research specifically explored the visualising scientific concepts (2019). The posters followed the structure of the *HEt Ethics Grid*, with each heading constituting its own poster, e.g. 'Therapy vs Enhancement', and a separate poster defining HEt (Figures 16-21). To make the posters accessible and understandable: headings with specific terminology were given definitions, e.g., 'agency'; any other academic jargon was removed; and each poster displayed an example scenario, e.g., longer life could lead to less jobs for the young. To make the posters more appealing large images were created for each, which visualise aspects addressed in the poster (see Appendix 3). To steer away from the 'masculine' aesthetics of HEt, which is portrayed, for example, using dark blues, metal and circuit boards, the colour palette was deliberately made what may be traditionally perceived as 'feminine' (soft, skin tones, pink). This decision was made to juxtapose the prevailing perceptions (and reality) of HEt as a male dominated field, and to attract more female/feminine interest in the information presented. The intention was to both make a statement as a female designer working in the field and to provoke discussion about the gendered perception of HEt – "Feminist actions continually strive for representation at the table" (Colman, 2020, p. 4). Although gender studies and feminist theory have not directly been a focus in my research,

they both contribute to Posthumanist theory and therefore permeate my research, particularly around the aesthetics and accessibility of HEt.

These posters function as informational pieces which use design to convey complex information to a non-specialist audience, both in an exhibition setting and in conference presentations. However, although a higher level of interaction was achieved than with the *Commodification of Metamorphosis* sculpture, again the potential for feedback was limited to one-on-one, unrecorded discussions. While they are beneficial to my research as a means to map and explain HEt, other forms of design practice are needed to construct a space for recorded dialogue. On reflection, as a woman and a female designer, my understanding of feminism—through personal exploration and its use as a tool for provocation—is evolving throughout my research. As my feminist exploration has predominantly come from personal experience outside of the PhD (as opposed to theoretical research on feminism in technology) at this stage it was not clear what role it will take in my future PhD work. However, it warrants further consideration, particularly in relation to the non-binary nature of the Posthumanist framework for this research.

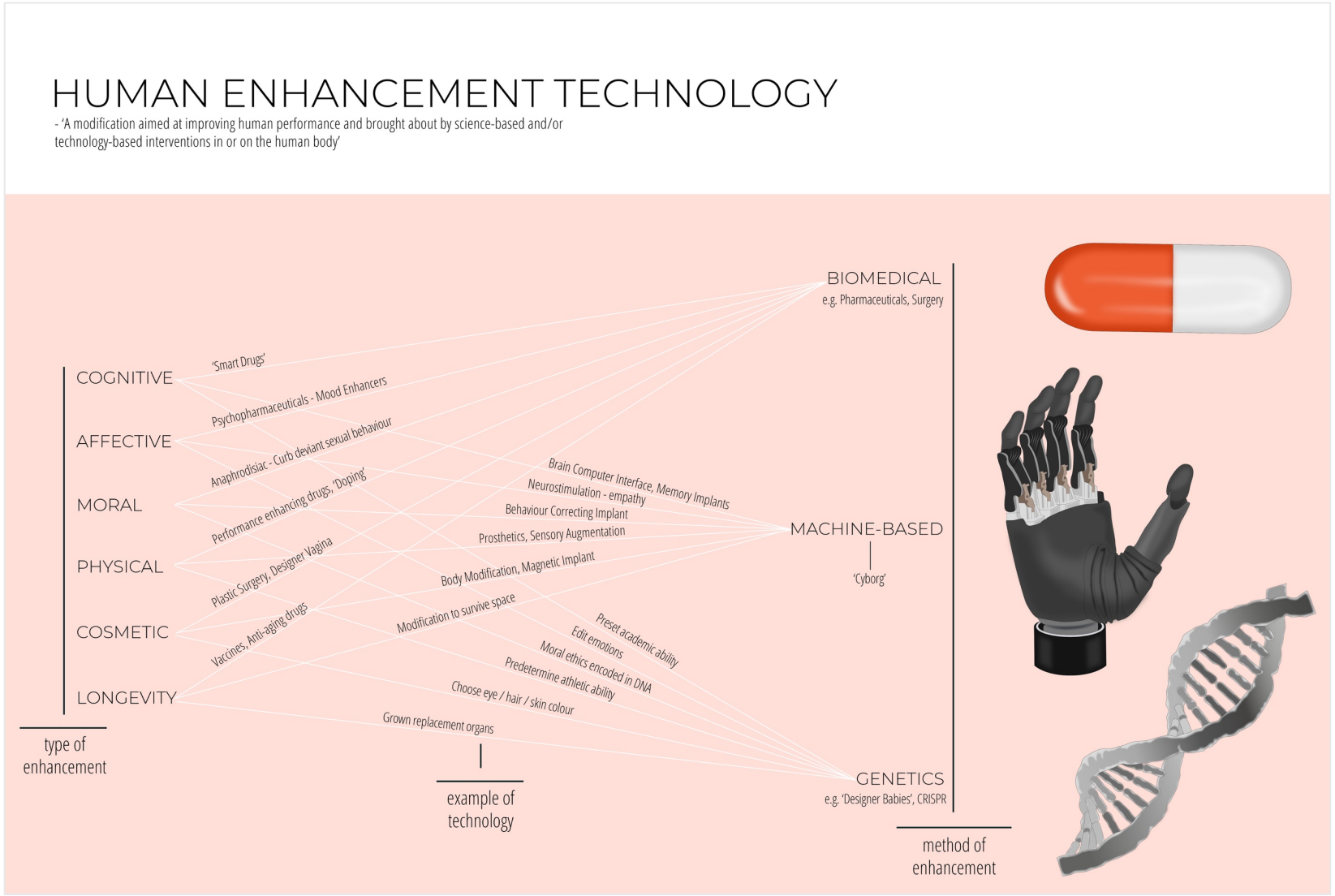


Figure 16 'Human Enhancement technology' poster. Illustrations Dr Gill Brown, curated by Lesley-Ann Daly, 2019.

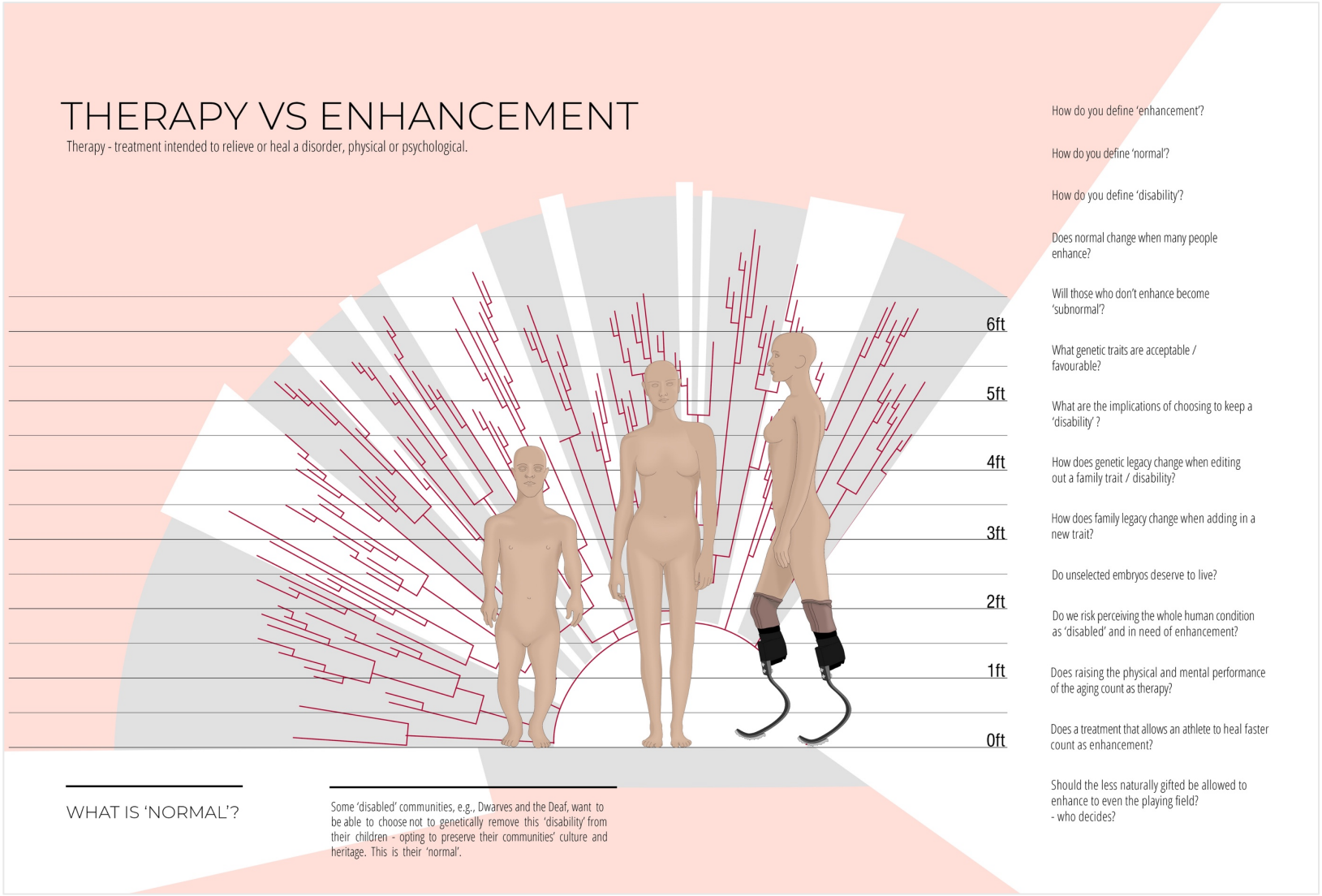


Figure 17 'Therapy vs Enhancement' poster. Illustrations by Dr Gill Brown, curated by Lesley-Ann Daly, 2019.

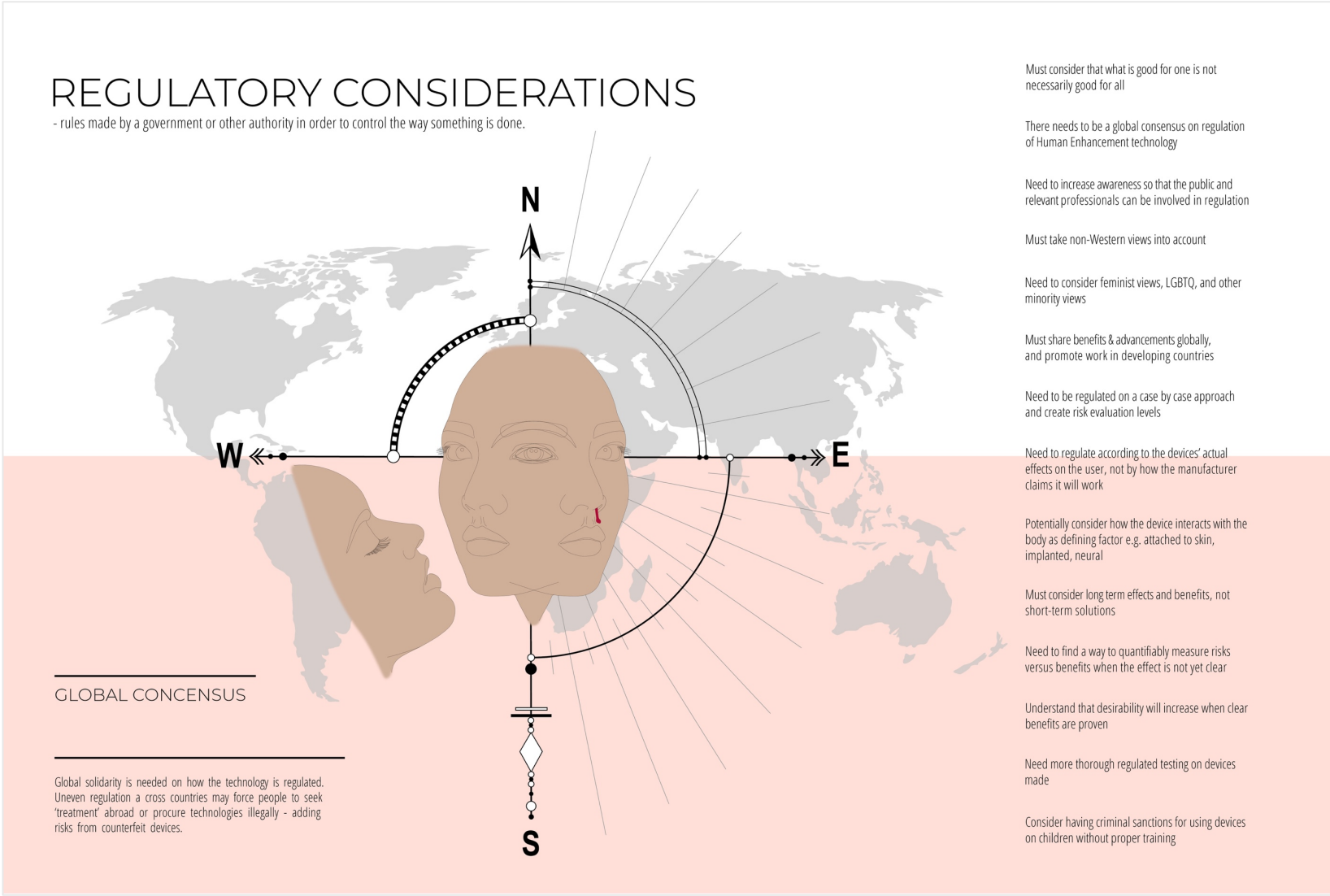


Figure 18 'Regulatory Considerations' poster. Illustrations by Dr Gill Brown, curated by Lesley-Ann Daly, 2019.

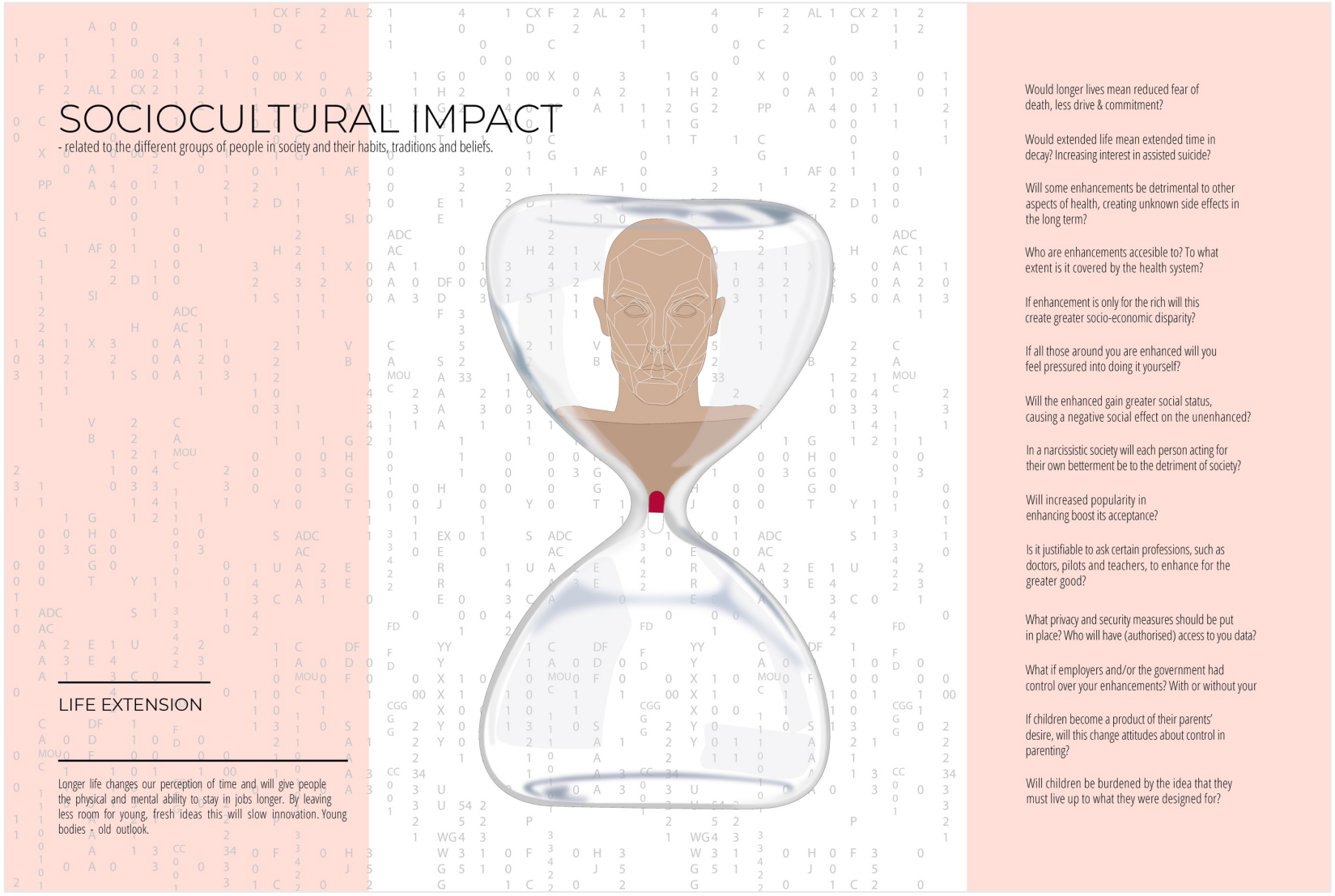


Figure 19 Sociocultural Impacts' poster. Illustrations by Dr Gill Brown, curated by Lesley-Ann Daly, 2019.

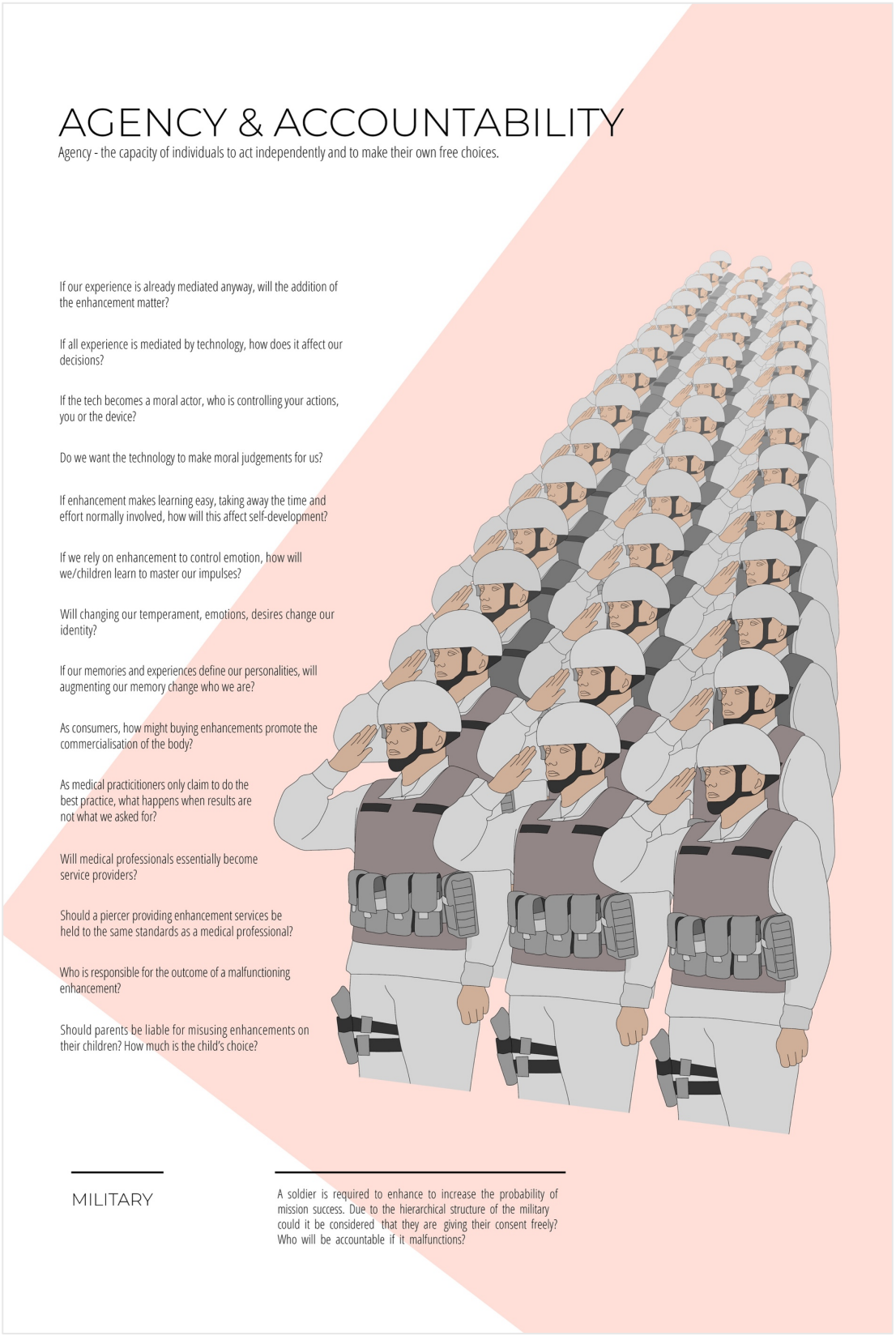


Figure 20 'Agency and Accountability' poster. Illustrations by Dr Gill Brown, curated by Lesley-Ann Daly, 2019.

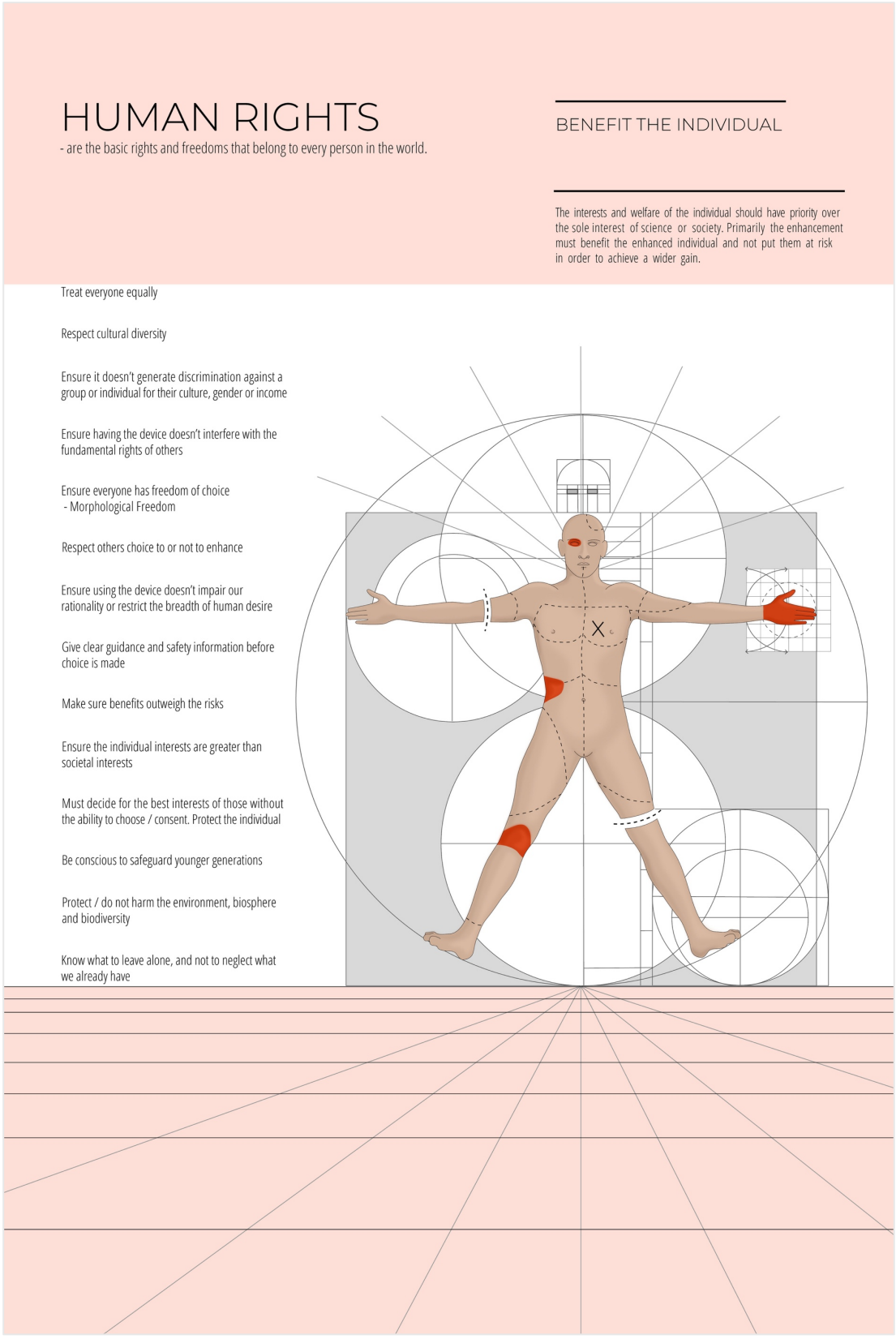


Figure 21 'Human Rights' poster. Illustrations by Dr Gill Brown, curated by Lesley-Ann Daly, 2019.

4.2.2. *Spectacle* Installation

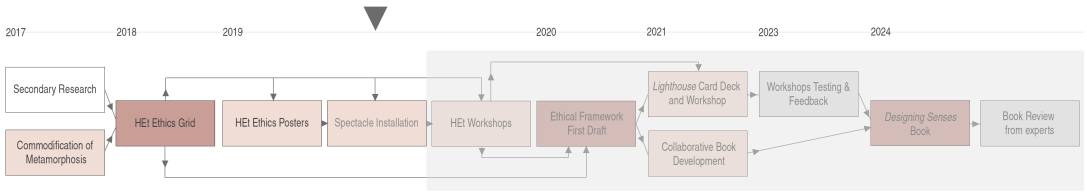


Figure 22 Practice work status – Spectacle Installation ideation, Lesley-Ann Daly, 2025.

Moving away from the informational design of the poster, the next iteration of my practice focused on creating a provocative, interactive piece where feedback mechanisms were built in – the *Spectacle* installation. The aim of this installation was to explore what kinds of HEt members of the public might speculatively like to purchase in the future and why. The intention was to create a life-sized installation of dismembered body parts in a frame, as a store display of different HEt (the practice piece was given Post-Registration Ethics Approval, Appendix 4.2). Each body part correlates to a different technology found in HEt literature and practice (Figure 23 maps these to inform the installation) and the audience would interact with the piece via a mediating online platform. Through a smart device e.g., a phone or tablet, one could browse information on each technology and answer specific questions about their chosen purchase, such as how much they would pay and why they want it (for draft questionnaire see Appendix 4.1).

The installation concept aligns with Posthumanist thought by breaking away from binary concepts of the ideal body of the late twentieth century, epitomised by the Vitruvian man sketch by Da Vinci (reflected also in Figure 19, the poster on 'Human Rights'), which is used as a visual reference point to emphasise this distinction. The growing body positivity movement is projected forward in parallel with the technological advancements, challenging the future 'normal' with each body part representing diverse body shapes, sizes, races, and gender identities. The respectful practice of life casting and gaining consent from the models became a central aspect to the piece as it involves intimate body parts being cast and put on public display. Therefore, documents explaining proper body casting techniques were created (Appendix 4.2.), and special attention was paid to creating a safe space when casting and ensuring anonymity.

Experimental, small-scale prototypes were made which explored the aesthetics of the floating body parts (Figure 24 and Appendix 4.1), such as replicating a wide variety of skin tones, testing

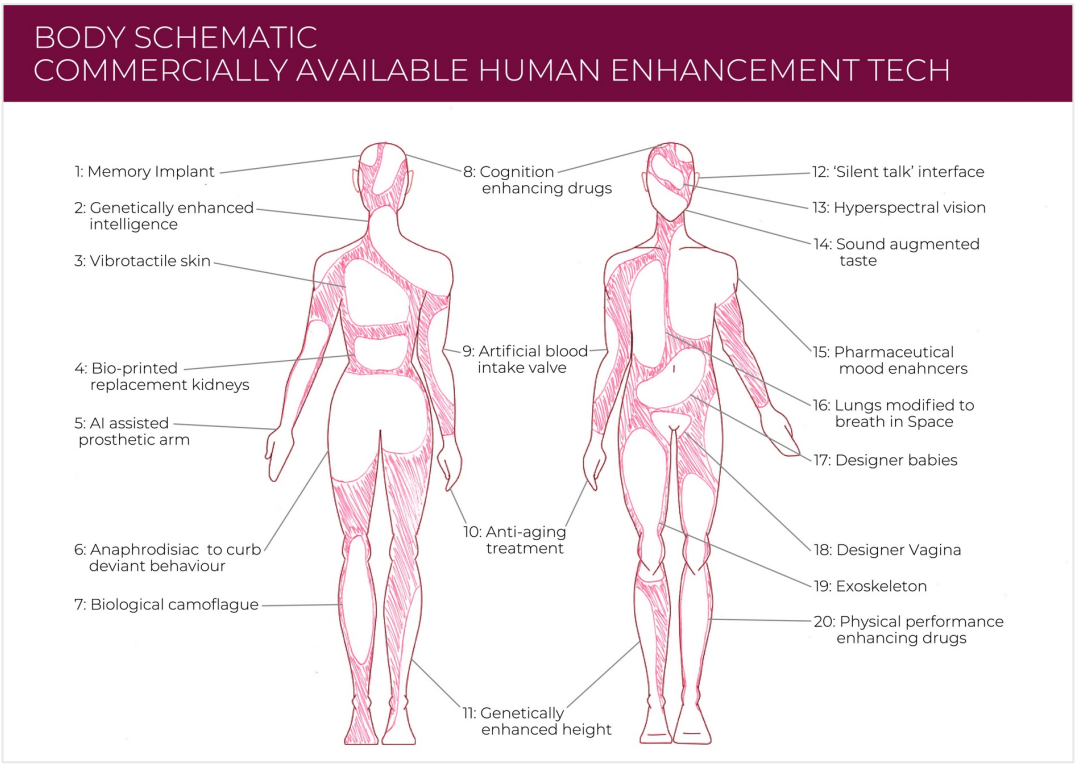


Figure 23 'Body schematic: Commercially available Human Enhancement tech', mapping sketch for the Spectacle installation. Lesley-Ann Daly, 2019.

edge finishing techniques and suspension methods. This material exploration elicited questions around the intended impact of the piece – specifically whether it should be visually appealing or not. The strung-up patchwork of body pieces with sewn edges easily evokes a Frankenstein like quality, projecting a DIY biohacker future scenario. Whereas a more sleek, future minimalist treatment of each body part would evoke a clinical, luxurious feeling. As a 'spectacle' (Debord, 1967) the piece was intended to draw attention and provoke a strong reaction, but what kind of reaction became unclear. Was it meant to be desirable, a warning, or absurdly monstrous? This highlighted the importance of the semantics of commercial HEt, and how current perceptions (explored in Chapter 3.4. on sci-fi) could be curated to promote widespread adoption, which warrants further exploration.

Through the process of writing the ethical approval documents and experimenting with prototypes, it became clear that there was not enough existing information on the publics perspective of HEt to inform the aesthetics for any intended impact. Creating a large scale, expensive and time-consuming installation would not be the most effective way to gain this information, other more appropriate methods would need to be utilised, therefore this installation was not fully realised.

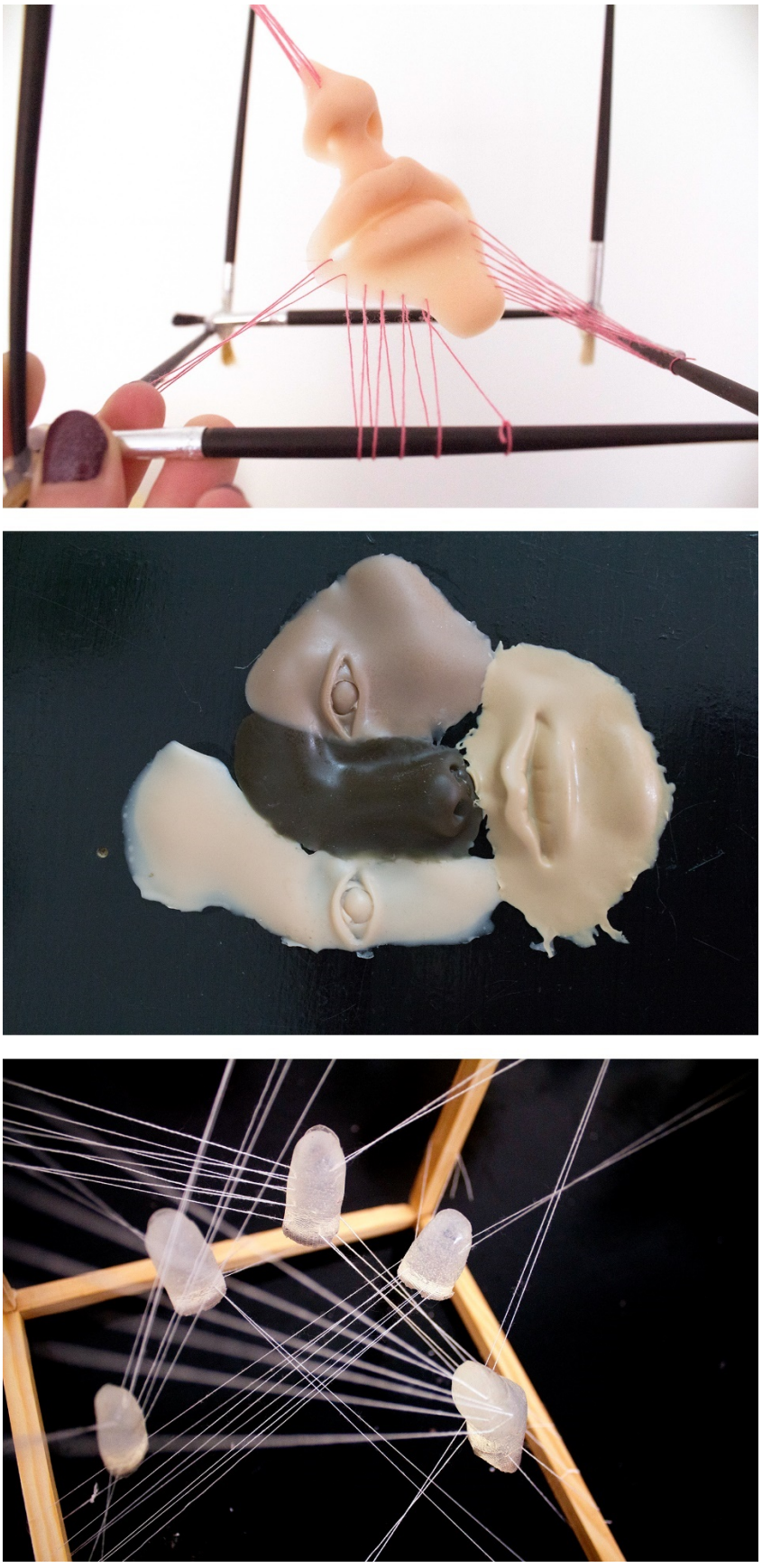


Figure 24 Prototype test for the Spectacle installation. Lesley-Ann Daly, 2019.

4.3. WORKSHOPS WITH PUBLICS

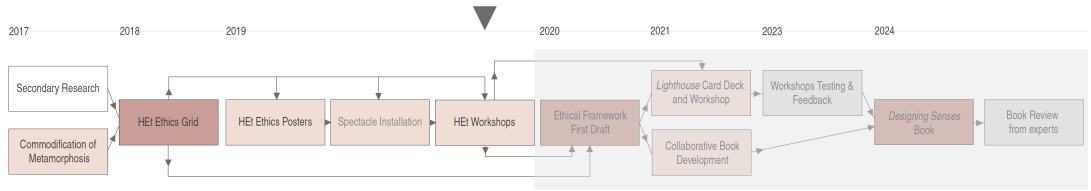


Figure 25 Practice work status – HEt Workshops with publics, Lesley-Ann Daly, 2025.

4.3.1. Public Discussion on Complex Topics

While designing and creating the posters and installation it became clear that the intention was not just to inform the public but also to include them in the conversation around the development of HEt. However, although the posters did serve as means to inform viewers and create discourse, they did not set up an environment where this conversation could be recorded and later developed. The installation had a method for feedback designed in but lacked the primary research to inform its intention and construction. And while the theoretical investigations raise pertinent questions- in academic and policy circles- around what HEt will mean for humankind in the Post/Transhuman future and considers what kinds of enhancements publics will actually want (Haraway, 1991; Savulescu & Persson, 2011), the authors also highlight the importance of the publics' opinion, as they are the future users and could have critical, differing views on these disruptive technologies.

Therefore, Participatory Design (Iversen *et al.,* 2012) was used to inform the creation of facilitated workshops which are an agile, low-tech means to interact with diverse publics, exploring their perspectives on HEt (described below). The choice of method was inspired by the Irish Citizens Assembly, which shows how 'a people-led discussion and understanding of an issue' (Bannock, 2019) can explore complex societal issues, ultimately giving recommendations to government. Most notably the Assembly debated equal marriage rights and the repeal of eighth amendment on abortion, which were later voted in favour of and repealed, respectively, by the Irish public. This utilization of cognitive diversity (Paulus & Nijstad, 2003) has rapidly made Ireland, which was previously quite conservative politically, more progressive in a short space of time.

Participatory Design was selected not only as a practical workshop method, but because its core commitments align with the aims of this research. Emerging from Scandinavian traditions of workplace democracy, PD is grounded in the principle that those affected by a technological

system should have the opportunity to influence its development (Ehn, 1988; Kensing and Greenbaum, 2013). It has also been defined through processes of mutual learning and collective reflection-in-action, in which designers and participants jointly explore possible futures and the conditions of their realisation (Simonsen and Robertson, 2013). These foundational commitments remain important here, as the publics engaged in this chapter are not passive audiences but future users, affected stakeholders, and situated knowers whose perspectives are necessary to the ethical exploration of Human Enhancement technologies.

Contemporary PD has, however, moved beyond its original workplace setting. Recent scholarship highlights how the field now engages issues of power, inequality, distributed publics, more-than-human relations, and complex socio-technical systems across multiple scales (Bødker et al., 2022; Smith et al., 2025). In particular, current work on PD and emerging technologies argues that traditional forms of participation must evolve in response to technologies that are pervasive, uncertain, and increasingly agential in shaping social realities (Frauenberger et al., 2024). Within this context, the workshops in this research extend PD beyond co-designing products or services, instead using participatory and design-led methods to collectively explore ethical questions, surface diverse perspectives, and enable situated reflection on emerging Sensory Augmentation technologies.

In line with this expanded understanding of PD, each session needed to be curated to explore complex issues such as, the diversity of technologies, its applications, and wider implications. To do so involves leveraging Participatory Design methodologies (Bryman, 2008; Kensing and Blomberg, 1998; Smith, Bossen, and Kanstrup, 2017), such as workshops, which use methods such as role-play, group discussion and material prompts. These tools can act as a means to communicate information about the complexities of HEt development, the technology's implications, provoke discussion and document the responses.

4.3.2. Facilitated Workshops Methodology

The four design-led facilitated workshops were developed in response to ethical issues identified in theoretical documents on HEt and subsequently mapped into the *HEt Ethics Grid.* The ethical issues chosen were ones that directly affect the person using the technology (e.g., impacting agency, identity, and social interactions) so that the participant can consider the issue in relation to their own lives. The technologies used as examples in each workshop were taken from those on the *Spectacle* Body Map in Figure 23. The workshops were designed to

inform the audience about HEt ethics, provide scenarios or questions to provoke thought, and have built in methods for feedback documentation. This structured use of PD allows for the generation of educated public opinions, identifying issues in HEt's practical use that may not have been included in the theoretical literature. In this sense, the workshops respond to contemporary PD challenges of engaging with emerging technologies, where participation must address uncertainty, distributed impacts, and socio-technical complexity rather than simply support the development of a predefined product or service (Frauenberger et al., 2024).

The workshops were uniquely designed for each event, including their materials, such as worksheets and role play cards (Figures 27–39). The structure of the workshop was made clear from the beginning, to do so either a verbal description was provided by myself (Design Museum and Wellcome collection) or an explanation was included in the materials (V&A and Brave New World). A challenge across the workshops was to ensure that the information provided was clear and concise, therefor easily understandable to a non-specialist audience. Similarly to the posters this entailed using jargon free language and explanation of technical terms. A decision on tone was made for each workshop, for example the V&A worksheets were deliberately unbiased (language was tested prior to the workshop with colleagues) to not influence the responses. However, the Design Museum vignette used deliberately provocative language and concepts (such as the device being permanently attached to the skull) to elicit discussion on a particular topic. Below is an overview of the workshops, then an analysis of the workshops overall with key insights drawn out.

4.3.3. Workshops Overview

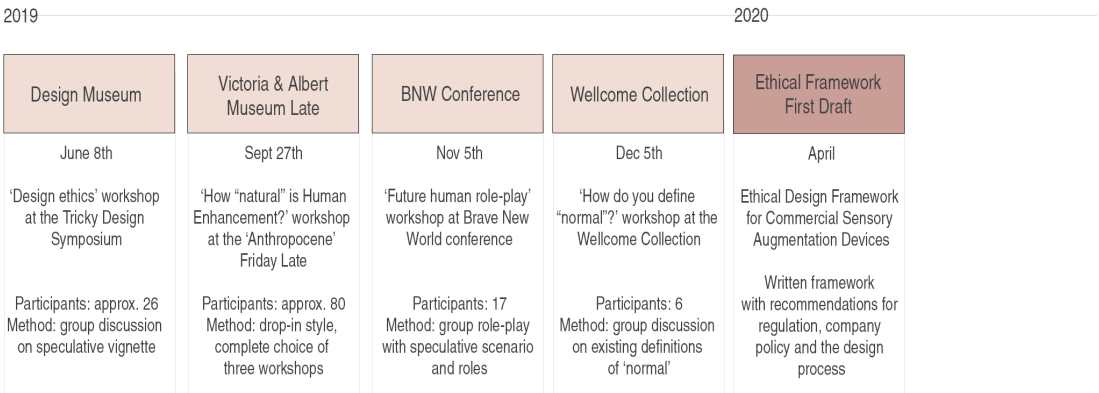


Figure 26 Timeline of Workshops on Human Enhancement ethics by Lesley-Ann Daly, 2019-2020.

'Design ethics' workshop at 'Tricky Design' symposium

This first workshop was run at the Design Museum in London, UK, on June 8th, 2019. This two-day symposium brings together leading designers, academics, journalists, and theorists to discuss ethical approaches for design in response to some of today's most urgent challenges. This symposium builds on the publication of Tricky Design: The Ethics of Things (Fisher and Gamman, 2019) and is a collaboration between University of the Arts London, the Design Research Society and the Design Museum.

Four groups of six or seven participants (designers and design-related professionals) were given 10 minutes to discuss a speculative scenario, with myself as the moderator. The vignette (Figure 27) asked participants to consider the ethical implications of designing a speculative Brain Computer Interface (which corresponds to number *12. 'Silent talk' Interface* on the Body Schematic in Figure 23) which allowed silent communication from human-to-human and human-to-machine, and how this would affect the design process. Having anticipated that there would be issues with understanding the pragmatic workings of most HEt I chose to be more descriptive on the devices function (silent communication) rather than its technical specifications (the materials and neuro-connectivity) so as not to distract from ethics.

To begin each workshop round I reiterated the need for ethical consent to use the responses for my PhD research and gained verbal consent from everyone participating. One participant during each of the four rounds was asked to take notes and document the discussion points, while all participants were able to note ideas on post its which were collected at the end of each round (for a full description of this workshop design see Appendix 5.1.).



Figure 27 Photographs at the Design Museum of room and table layout for workshop. Lesley-Ann Daly, 2019.

'How "natural" is Human Enhancement?' workshop at the 'Anthropocene' Friday Late

The second workshop ran as part of the Victoria and Albert Museums Friday late series, on September 27th, 2019. The theme of this event is the 'Anthropocene' - thoughts around 'nature' and 'naturalness' in a technology driven era. This event was open to the public for the evening, with the general demographic consisting of 18-35year olds[37].

As a drop-in style workshop, participants (approx. 80)[38] were given the choice of three worksheets (Figures 30-34) questioning their perspectives on comparative technologies – one considered HEt and one not. The question presented was – How 'natural' is Human Enhancement technology? (Figure 30) This was split into three relevant fields: Anti-Ageing (*no. 17* on Figure 23); Birth Control (*no. 10* on Figure 23); and Physical Enhancement in Sport (*no. 20* on Figure 23). The intention was to understand whether some seemingly more 'natural' technologies (such as exercise, contraception and beauty creams) are perceived to be more acceptable as a means of enhancement than more modern, seemingly synthetic technologies (such as performance enhancing drugs, gene-editing [designer babies], and radical life extension technologies).

The questions and scenarios were defined as neutral and objectively as possible, so as not to assume that participants were accepting of the more 'natural' technologies. The worksheets also questioned why they have these perspectives, who they think it effects, and how they think the topic could be thought about differently. The format was explained clearly on the sheet (with no physical interaction by a facilitator) and collection of responses was by way of collecting the completed sheets. Each sheet included a check box for consent to use responses as part of my PhD research (for full description see Appendix 5.2.).

[37] These demographics were provided by the V&A, however at the event I encountered participants outside of this age bracket (which can be seen in Figures 28 and 29).

[38] This number is approximate as some worksheets were completed in pairs or groups, with additional members joining or leaving part way through.



Figure 28 Photos taken during workshop at the V&A Friday Late, 2019.



Figure 29 Photos taken during workshop at the V&A Friday Late, 2019.

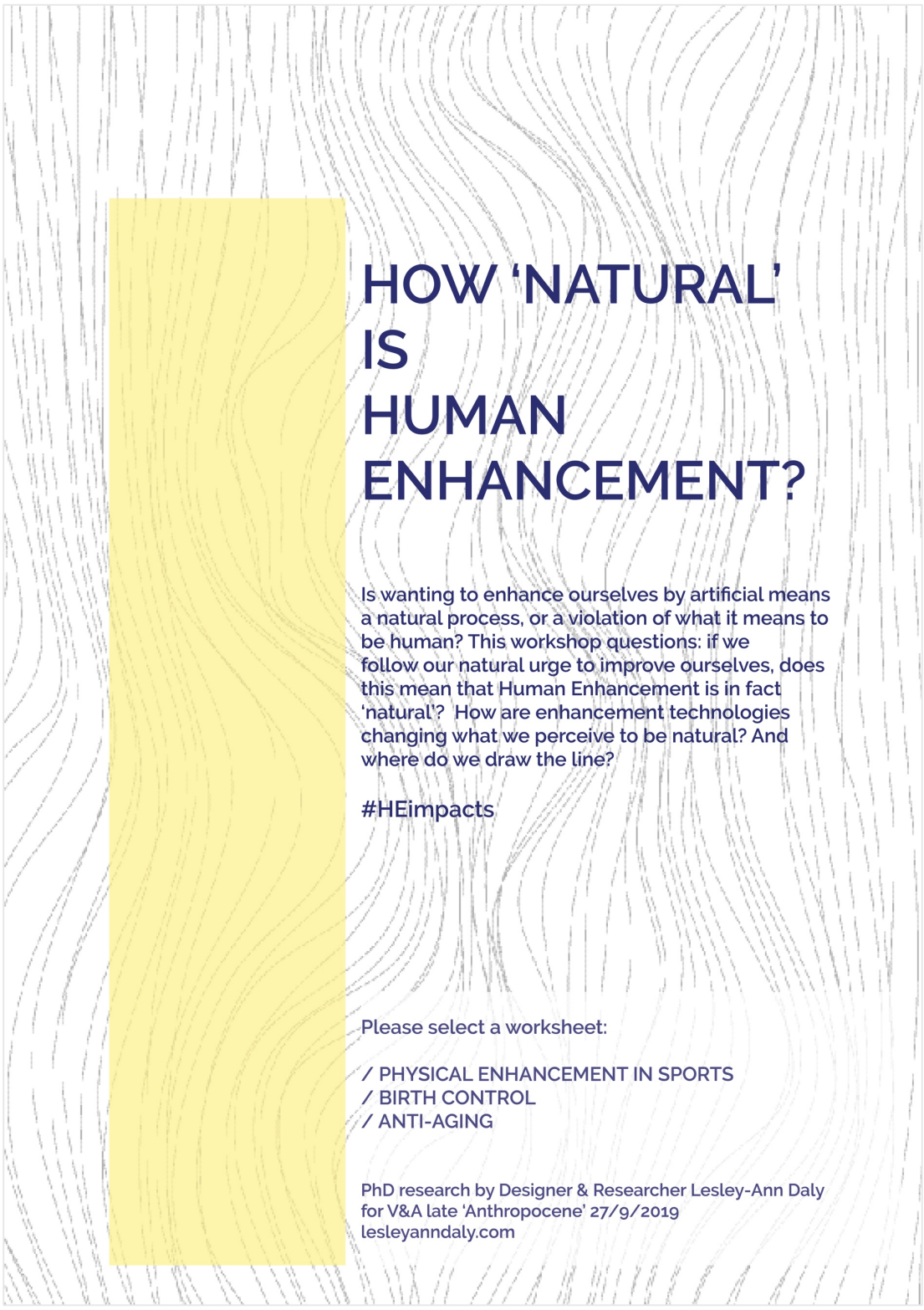


Figure 30 Poster for V&A workshop. Lesley-Ann Daly, 2019.

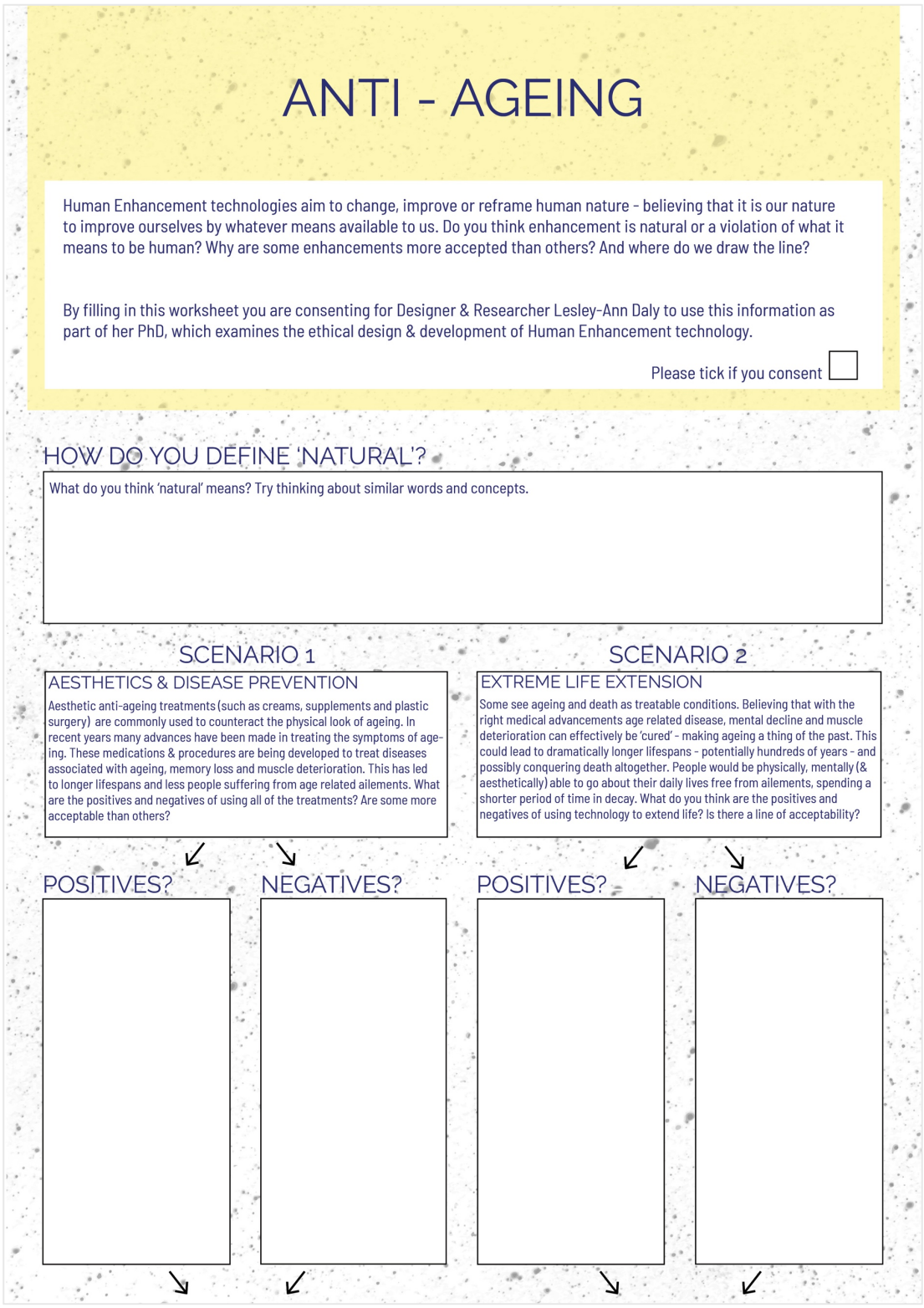


Figure 31 A3 size Anti-Aging worksheet front side. Lesley-Ann Daly, 2019.



Figure 32 A3 size Anti-Aging worksheet back side. NB: all worksheets have the same questions on the back side of the sheet. Lesley-Ann Daly, 2019.

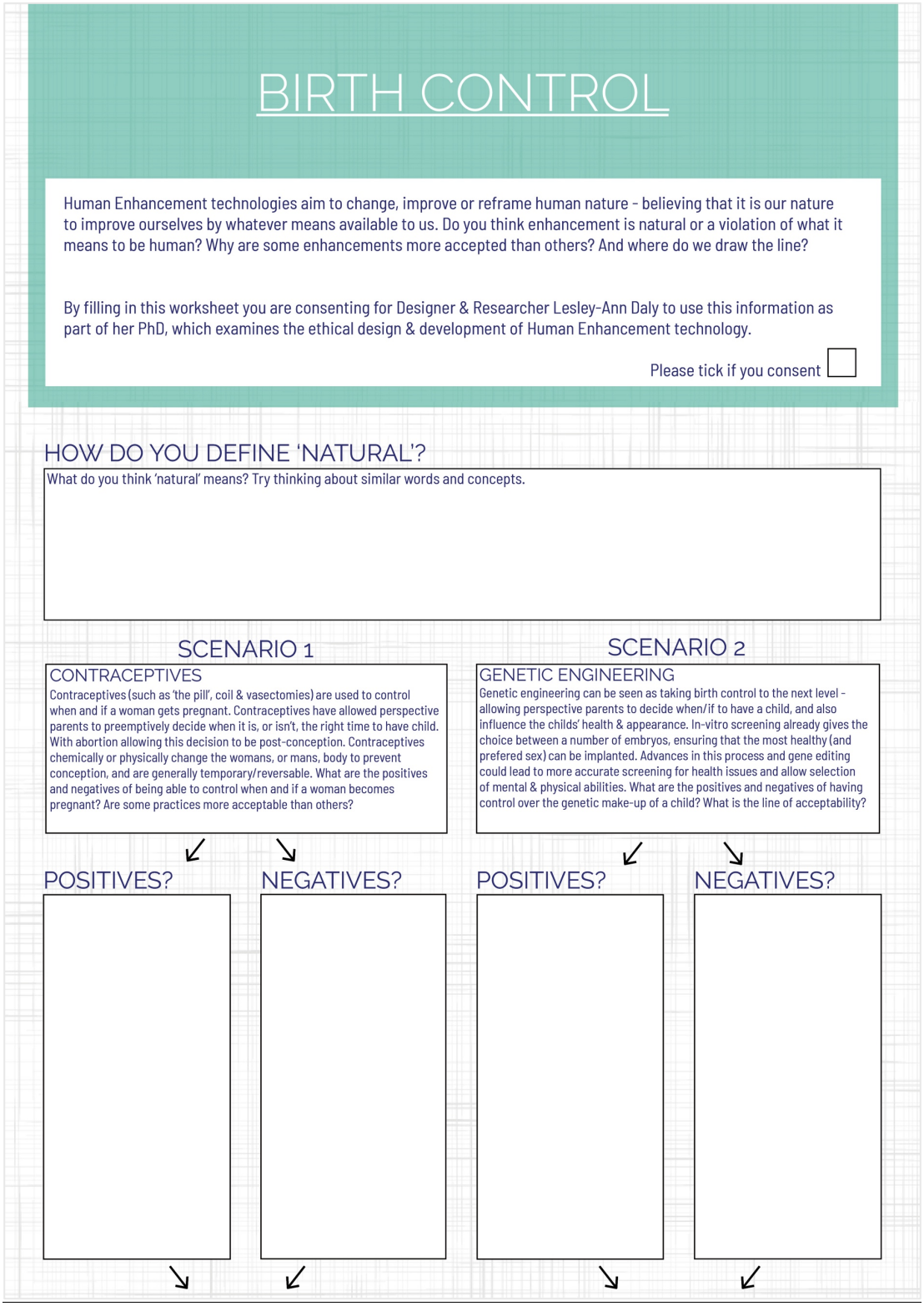


Figure 33 A3 size Birth Control worksheet front side. Lesley-Ann Daly, 2019.

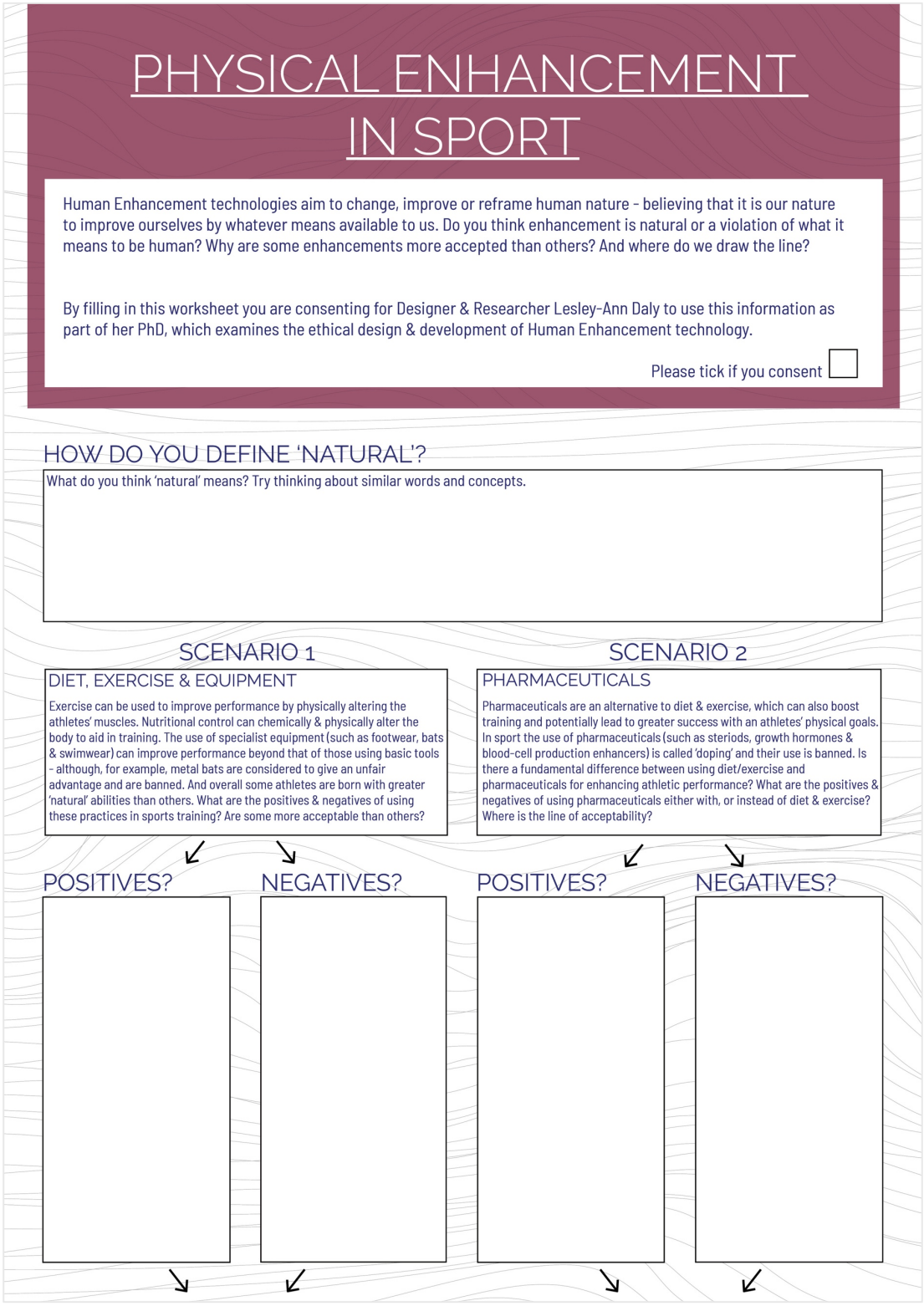


Figure 34 A3 size Anti-Aging worksheet front side. Lesley-Ann Daly, 2019.

'Future human role-play' workshop at the Brave New World conference

The third workshop ran during the future technology focused conference in Leiden, The Netherlands, on November 5th, 2019. Brave New World is an annual conference for people who want to know what the future holds in store and how this will affect their business, policies, and life. The conference looks at how future technologies may impact human life, with this years' theme being the 'Future of Species' and the 'Future of Consciousness'.

Three sessions ran concurrently, lasting 40 minutes with either five or six participants in each group. Participants were given role play cards with either an enhancement technology on, or an 'unenhanced' card (Figure 37). Corresponding with the conference themes the enhancement technologies are: brain modulation via neuro-implant (*no. 2* on Figure 23); biological camouflage via genetic modification *(no. 7* on Figure 23); and temporary performance enhancement via pharmaceuticals and neuro-stimulation (*no. 8* on Figure 23). This workshop allowed participants to actively inhabit the role of a future enhanced citizen. As a group they discussed a future scenario where the earth is dying and only two people from the group can be chosen to go to an off-world colony, as outlined on the group scenario sheet (Figure 38).

Participants are encouraged to develop their own opinions by investigating interactions that would be personal to them and their future life, exploring the social and ethical impacts in a more tangible, salient way. Group conversations were recorded so the audio could be analysed after (for full description see Appendix 5.3.).



Figure 35 Photographs taken during the workshop at Brave New World conference, 2019.



Figure 36 Photographs taken during the workshop at Brave New World conference, 2019.



Figure 37 Role-play cards for Brave New World workshop. Lesley-Ann Daly, 2019.

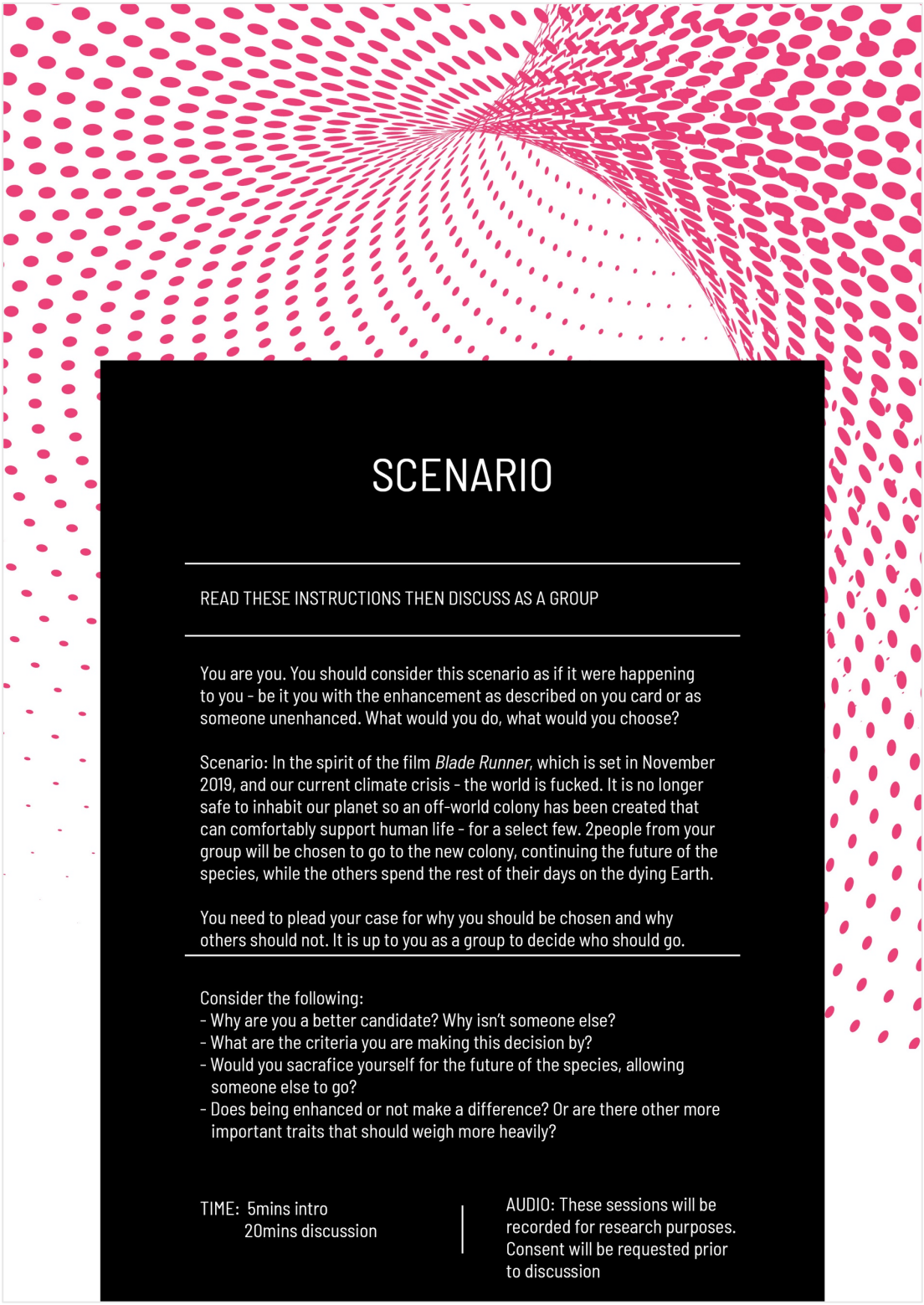


Figure 38 Speculative scenario card given to participants for Brave New World workshop. Lesley-Ann Daly, 2019.

'How do you define "normal"?' workshop at the Wellcome Collection

The fourth workshop ran at the Open Platform in the Wellcome Collection in London, UK, on December 5th, 2019. Open Platform is an event series where the content comes from Wellcome Collection's audience, so that voices other than Wellcome's can respond to the Reading Room's themes. Themes include the body, medicine, and education, among others.

As explored in Chapter 3.2., in order to define 'enhancement' you need to define both 'normal' and 'therapy'– therapy already having been defined relatively universally as a treatment intended to relieve or heal a disorder. Six participants were shown multiple definitions of 'normal' including definitions from the dictionary and medical, social, psychological, and urban resources (Figure 39). They were invited to openly discuss these definitions, write down their thoughts on post its, annotate the pages and add their own definitions. Post-its worked on a traffic light basis: red (pink) for disagree; green for agree; amber (yellow) for unsure or needs further thought. The workshop format allowed participants to explore their perception of 'normal', consider why they define it as such, potentially open themselves to new definitions, and see which (if any) existing definitions adequately define the concept.

The workshop lasted for just over 1 hour and each participant gave verbal consent for me to use the responses documented on the sheets for my research. Due to time constraints, we did not address how these definitions related to enhancement (for full description see Appendix 5.4.).



Figure 39 Photographs of workshop layout in the Reading Room at the Wellcome collection. Lesley-Ann Daly, 2019.

4.4. WORKSHOP ANALYSIS

4.4.1. Analysis method

Firstly, each workshop was analysed individually predominantly using affinity mapping. This involved noting responses by participants onto colour-coded Post-its (coded by group or by participant) and grouping similar responses, which were then given a group label, e.g. 'Consent', 'Money', 'Environment'. Insights can then be drawn from the grouped responses by analysing how they relate to other responses within their group, how it relates to the overall workshop and to the academic literature. Due to the high volume of participants for the V&A workshop different responses to each question were listed, grouped under their theme (Anti-aging, Birth Control, or Physical Enhancement – being treated as three separate workshops from here on) and noted quantitatively how many participants shared the same responses (see Appendix 5.2.). Similar to affinity mapping, this was then analysed to draw insights from the most frequent responses (for full analysis see Appendix 5.5.).

Secondly, the analysis of the workshops was coded by highlighting the particular responses which appeared frequently across all workshops. For instance, the concept of 'inequality' came up repeatedly within workshops and across the workshops. These repeated concepts - regardless of workshop style, theme, or audience demographic - can be seen as what the participants, or these publics, presently consider most important in relation to Human Enhancement ('presently' refers to the consideration that these views are influenced by particular current events – see *Media Influence* section – and may change in the future). Subjects include: economic inequality; other instances of inequality; perceived purity of unenhanced persons; perceived benefits of HEt; health and/or therapeutic use of the technologies; influence from the media; questioning existing/old ways; permanence; and the environment (Table 1). The responses to these concepts are sometimes contradictory as they come from numerous participants, and are sometimes intertwined, so will appear within other concepts in the analysis below.

The insights below represent the perspectives of participants and not necessarily the author, or HEt literature. Due to workshops being conducted at art/science themed events, in a Western setting, consideration must be made for how this limited participant diversity and biases perspectives. Insights have been grouped into four over-arching themes: 'inequality'; 'understanding "enhancement"'; 'benefits of being enhanced'; and 'future sustainability'. Each section also includes a brief discussion on how participant insights relate to relevant literature, events, and HEt development.

	Brave New World	Design Museum	Wellcome Collection	V&A Birth Control	V&A Enh in Sport	V&A Anti-Aging	Total
Economic Inequality	✓			✓	✓	✓	4/6
Inequality other	✓	✓	✓	✓	✓	✓	6/6
Unenhanced purity	✓		n/a	✓	✓	✓	4/5
Benefits of HE	✓	✓	n/a	✓	✓	✓	5/5
Health & therapeutic use	✓		✓	✓	✓	✓	5/6
Questioning old ways	✓	✓	✓	✓		✓	5/6
Media Influence	✓	✓	✓	✓	✓	✓	6/6
Permanence	✓	✓					2/6
Environment	✓					✓	2/6

Table 1 Workshop Insights Table. Lesley-Ann Daly, 2019.

4.4.2. Inequality

Concern for inequalities caused by HEt arose most frequently in all workshops, particularly how divergent socio-economic factors influence access to the technology. Participants felt that being more affluent provided access to better resources (such as genetic engineering and life extending technologies), giving them an advantage. Those without the financial capability to afford these technologies (lower income publics in the West or those from developing countries), or are otherwise restricted access, are left not just without the added benefits, but actively disadvantaged. Those with the 'advantage' (enhanced, non-disabled, affluent, male) were generally seen as the perpetrators of this inequality, with the power to impose 'correct' or 'preferable' behaviours and abilities standards on others. The 'rich' were thought to have questionable morals and are therefore responsible for technologies which are knowingly harmful to humans and the planet.

Participants identified that in general people seen as 'other', 'different' or 'not normal' are, and will be, discriminated against. For example: people who are disabled; the early adopters of HEt (biohackers and those with body modifications); or, when HEt is in widespread use, those who are unenhanced who may now be seen as disabled (as their abilities are below the

new ‘normal’). Participants questioned how to prevent ableist and sexist discrimination being perpetuated through HEt use – including prejudices against those with diverse embodiments who don’t meet beauty norms. Though no consensus was reached, participants denounced the use of terms like ‘normal’, as it is contextual and subjective, and suggested that an increased awareness of different experiences could increase understanding of ‘others’.

4.4.3. Understanding ‘Enhancement’

Many HEts mentioned in the workshops (and otherwise) are similar to, if not the same as, therapeutic technologies and therefor can have both therapeutic and enhancing benefits. However, across the workshops, participants showed to have little knowledge of what ‘enhancement’ means – not knowing the different types of HEt, their applications, and benefits. Many participants expressed the view that these technologies should be solely used for therapeutic (health) reasons, where benefits are known, and non-therapeutic enhancements should be banned. This viewpoint corresponds to SIENNA’s survey on HEt (Kantar, Nagel, and Jensen, 2019) which found that participants didn’t understand the term ‘human enhancement’, merging it with therapeutic technologies, preferring healthcare applications. They were more aware of physical enhancements (prosthetics and performance enhancing drugs) due to their current use in society; and were less aware of cognitive enhancers and their potential applications. Similarly, recent quantitative surveys by SIENNA (Prudhomme *et al*., 2019), Kaspersky (2020) and the AARP (Whitman *et al.,* 2018) also found that publics are more favourable of therapeutic-enhancements and less willing to approve of, or use, non-therapeutic enhancement technology. However, these quantitative reports did not explore why this preference exists.

Participants considered aesthetic enhancement for children and anti-aging purposes unacceptable, believing it would contribute to unhealthy beauty standards. However, while participants rejected all non-therapeutic enhancement of children, they generally accepted using enhancements to improve the quality of a radically extended life. This disparity may be due to participants being able to imagine the extended life that they would like to lead, but not the life of a speculative child.

V&A workshop participants where specifically asked ‘why’ they responded in a particular way, mostly provoking the responses: it’s ‘their opinion’; it’s from their own experience or that of someone close to them; and that they were influenced by the media. Participants identified the media influencing their opinions on: data privacy (Lapowsky, 2019); genetic engineering

technologies (Normile, 2018); 'doping' for performance enhancement (Wilson, 2013); and radical life extension - either through Transhumanism (Humanity+, n.d.a) or from science fiction productions, e.g. Altered Carbon (Kalogridis, 2018), Ghost in the Shell (Oshii, 1995) and Gattaca (Niccol, 1997). Some participants identified that the sensationalised or dystopic nature of these media representations has made them wary of, and sometimes adverse to, the development of such technologies in the real world.

4.4.4. Benefits of Being Enhanced

Participants identified potential benefits of HEt mainly on a case-by-case basis, which was specific to the technology addressed in each workshop, as opposed to any wider benefits of enhancement. Perceived benefits specific to an enhancement include: having biological camouflage (being able to change your skins appearance) would allow you to adapt to different social situations; increased memory capacity could lead to a better imagination – possibly for solving problems; contraceptives give women control over life choices and sexual empowerment; 'doping' could dramatically push personal performance boundaries; radical life extension (with disease eradication) could lead to a longer, better quality life with more time for enjoyable activities, and also give researchers more time to positively impact the world. These benefits, importantly, don't include therapeutic benefits (as discussed above). They are all associated with the lifestyle of the enhanced individual, showing there is some openness to purely enhancing technologies – even though many explicitly expressed otherwise. Some benefits were context specific (creating an off-world colony), whereas others purely benefitted the individual's life goals (delaying procreation or advancing sporting careers). However, statistically more negatives were identified than positives – many of which were related to inequality. This again may be due to participants' lack of knowledge about the potential uses and benefits of the technology, but awareness of dystopic fictional scenarios. Like contraceptive technologies[39] it may take HEt to become more widely accessible for publics, and creators, to discover the breadth of benefits it may provide.

Participants generally perceived unenhanced persons as 'purer' than the enhanced, repeatedly characterising them as 'natural' and 'original'. Brave New World participants described the unenhanced as a 'baseline' or 'control' subject for humanity, who will keep our

[39] Contraceptive technologies are an example of an HEt that gained approval as it became more accessible to a wider public. First used to control the procreation of lower economic classes, it became a way for women to take control of their lives, to choose when and if to have children, and empower female sexual liberation.

values and history. V&A participants expressed: a desire for more 'natural' contraceptive methods, believing they're better than technological interventions on the body; a disapproval for 'doping', seeing it as a form of cheating which undermines 'the spirit of sport'; and a rejection of anti-aging treatments in favour of accepting and valuing the 'natural' aging process. Some participants questioned this presumption of unenhanced purity, asking why those who are 'altered' should be perceived differently. These participants questioned why 'original' humans should be held sacred in the future – expressing that having a 'primitive brain', or other undesirable human traits, may prove detrimental, whereas enhancements may give the opportunity to build better human traits.

Throughout the workshop's participants did not label the technology as inherently 'good' or 'bad' - any negative perceptions generally derived from the misuse of the technology. Participants determined that enhancements would amplify a person's negative traits (strengthening a narcissist's perceived 'power') and vice versa for positive traits (morality with enhanced intelligence would be beneficial). Through speculative role-playing in the Brave New World workshop, participants concluded that, although the technology is not neutral, the use of it (by whom and how) greatly determines the outcome.

4.4.5. Future Thinking

Issues about technologies' permanence and its environmental effects were raised less frequently than previous concepts, however both issues are timely and note-worthy. Participants generally deemed human intervention into the natural world and the 'natural' body as detrimental- in the present and the future. Predominantly discussed were the negative environmental impacts of an increased global population, due to radical life extension. The implications of permanent enhancements were also questioned: should it be forced onto your children?; should it be reversible?; what about upgrades and policy change throughout the life of the technology?[40]; and how will obsolescent technologies be disposed of or recycled?

A key takeaway is that the participants are thinking about the future from the perspective of the present, rather than considering how else society may have changed alongside the development of HEt. For example, participants projected the current aversion to valuing beauty, over other personal traits, into the future where genetic editing would be possible.

[40] We already see the impacts of device obsolescence in prosthetics for limb replacement, which need to be altered and replaced as a person grows and technology progresses (Mohney, 2013).

Participants were overwhelmingly against technology for aesthetic enhancement, however in the future this may no longer be an issue as society may have become more accepting of diverse bodies. This shows the value of Speculative Critical Design as a means to transport the audience into a future scenario, allowing a more immersive and thorough understanding of the speculative issues with the technology. This design method will be revisited after the creation of the draft framework, specifically to engage and immerse SA creators- as opposed to non-specialist publics- in the ethics and provoke reflection on their own practices (see Chapter 5).

4.5. HEt RESEARCH ENGAGING PUBLICS

Subsequent to the creation of the *HEt Ethics Grid* and conduction of the workshops a number of research reports were published which surveyed public opinions on HEt which are worth noting. Here we can see some parallels in the responses to HEt, from audiences outside of the UK and Netherlands, and also the differences in insights due to the differing methodologies.

4.5.1. Quantitative Engagement

Three quantitative reports have been identified, these are: ''US public Opinion and Interest on Human Enhancement technology' by the AARP, was conducted online with approximately 2,000 Americans, and focused on therapeutic technologies that could have enhancing benefits, including visual and cognitive enhancers (Whitman *et al.,* 2018); 'Public views of human enhancement technologies in 11 EU and non-EU countries' survey conducted by SIENNA (Stakeholder-Informed Ethics for New technologies with high socio-economic and human rights impact) with 11,000 participants over the phone, examining views on types of HEt, age limits, responsibility for safe use and reversibility (Prudhomme *et al*., 2019); and 'The Future of Human Augmentation 2020' report by Kaspersky, who canvassed 14,500 people across Europe and Northern Africa which examined what publics considered 'acceptable reasons to enhance', the cost, and security (Kaspersky, 2020).

The reports give valuable insight into public views by country – although the surveys do not represent publics globally, they do indicate differences particularly between Northern (US) and Southern (Brazil) America, Northern Europe and Southern Europe, and North (Morocco) and South Africa. There is generally a more favourable perspective towards enhancement in more southerly regions (Greece, Italy, Brazil, Morocco and South Africa) and more scepticism in

northern regions (US, UK, The Netherlands) – although explanation for this tendency is not given. Also, across the three reports, publics seem to be more favourable to therapeutic technologies which have health benefits (which don't necessarily provide enhancement) and less willing to approve of or use technology specifically for enhancement (for more detailed insights see the respective reports cited).

Widespread quantitative information gained can provide insight for creators and companies into where their technologies are more likely to be adopted as the landscape currently stands. However, in order to develop technologies for less keen publics, qualitative research is needed for contextual insight into the perceptions of a particular technology, adoption barriers and potentials features which could better connect with the customer.

4.5.2. Qualitative Engagement

SIENNA have also produced the report 'Qualitative research exploring public attitudes to human enhancement technologies' which 'explore[s] citizen views and concerns about the following types of enhancement: physical, cognitive, emotional and longevity enhancement' through workshops conducted in five EU countries, run by Kantar (Kantar, Nagel and Jensen, 2019). The longer format of engagement allowed diverse participants to be introduced to HEt and enabled discussion about the complex, sensitive or contentious topics, informing their views.

Though this approach is not without limitations (in this case, not being representative of country wide perspectives due to the small number of participants – n=253) it provided several key insights: (similar to the quantitative surveys and my workshops) the participants did not understand the term 'human enhancement', merging it with therapeutic technologies – consequently participants also preferred healthcare applications; participants were more aware of physical enhancements (prosthetics, performance enhancing drugs) due to their current use in society; and less aware of cognitive enhancement or its potential applications; and participants raised concerns which roughly split into two categories 1. individual risk (physical and psychological), 2. societal risk (unequal access and creation of a 'superhuman' race).

The use of qualitative research methods provides more insight into *why* individuals perceive the technology a particular way, which was not accessible through quantitative surveys. As can be seen in the SIENNA report reference and Irish Citizens' Assembly, by allowing time to inform

the participants of the subject area and giving space for discussion, complex issues can be explored, consequences speculated upon, and outcomes discerned – providing rich insight. Although this workshop provided valuable insights for the development of HEt, one limitation indicated in the report could have been mitigated by the use of design methodologies, namely: for technologies that are not used in some form in the present 'participants struggled to understand how other applications would work in practice', for example 'in all countries, the concept of cognitive enhancement technology felt abstract'. Here we can again see the potential value of Speculative Critical Design to onboard and immerse publics on the unfamiliar and complex topic of HEt, leading to more informed insights.

4.6. FRAMEWORK FIRST DRAFT

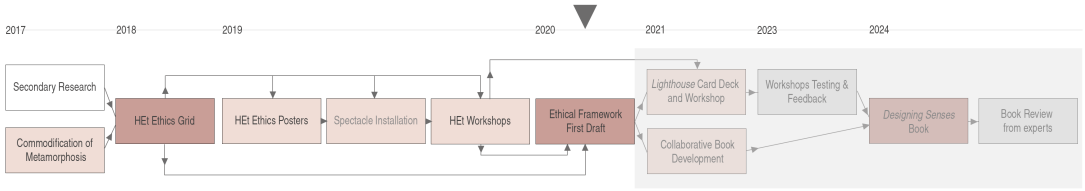


Figure 40 Practice work status – Ethical Framework First Draft, Lesley-Ann Daly, 2025.

4.6.1. Framework Methodology

Having conducted primary and secondary research, the ethical framework specific to SA technology design will be generated through the convergence of these research methods[41]. Insights from the *HEt Ethics Grid* are combined with the analysis of public perspectives on HEt from the workshops. Other relevant frameworks and guidelines also contribute the framework development, such as: 'Five Principles for the Regulation of Human Enhancement' (Brownsword, 2012); 'Human by Design: An Ethical Framework for Human Augmentation' (Oertelt *et al*., 2016); 'Ethical Implications of Sensory Prosthesis' (Hansson, 2015); and 'The Privacy, Ethical and Social Impact Assessment' (VIRT-EU Project, 2019). These insights are analysed against SA technologies, using my practical knowledge as a designer working with SA, to determine what is relevant to the technology. Doing so combines academic and SA industry knowledge with public perspectives and is situated within Posthumanist theory, to create a thorough and comprehensive view of SA design ethics. Elements include practical

[41] This does not include the aforementioned quantitative and qualitative reports explored in Chapter 4.5 as these were read post the creation of the draft framework.

considerations and moral questions relating to both current and speculative technologies which may be in widespread use in the near future. For the purposes of this research the framework is directed at machine-based technologies which represent the majority of real and speculative SA devices.[42]

4.6.2. Creating the Framework

By combining insights from sources articulated above, a first draft of the ethical design framework for commercial SA technology is created. The framework is intended to be used by designers creating SA devices, either for a company, research team or as an individual venture. The first draft (Figures 41-47) is a set of recommendations for ethical design practices, with initial exploration into making the framework more visual. Generating the initial draft has highlighted a key point for any design framework, that these ethical considerations exist within a wider context. The designer operates within a system where the designers' moral values and structural pressures (funding, investor demands, supplier availability) must be negotiated. The designer needs to consider how, if possible, the ethics are prioritized. The constraints exist both on a company, and a regulatory level, where in order for the designer to operate (within their own constraints) wider frameworks need to be in place. This is reflected in the first draft of the framework which is segmented into 'Regulation', 'Company' and 'Designer'. As SA technology already exists in, and between, several existing regulations (GDPR, MDR, GPSR), the framework suggests how SA technologies could be categorized to utilise the existing rules and testing procedures in lieu of creating new regulations. Although, as we have seen, definitive categorisation is still contentious, this would allow near future SA to be regulated by how invasive the device is. This would ensure the use of body-safe materials and specialised application of the device, whether by a trained body modification artist or medical professional.

Insights from the workshops particularly come into play in the designers' considerations, which address inequalities by building in methods for ensuring diversity in the research and testing of SA devices. Recommendations are also made for payment methods which could widen the socio-economic accessibility of the technology. Here we also see considerations for non-

[42] Therefore, will not include considerations specific to genetic interventions or pharmaceuticals. This would require further in-depth research into the biological sciences and a view to far future developments, which do not fall in the remit of this PhD.

human subjects by ensuring sustainable manufacturing and ethical testing procedures (for mapping of insights see Appendix 6.).

The framework should not be seen as a once-off checklist but a tool for continued ethical reasoning, which 'requires reflection, discussion [and] deliberation' (Shklovski *et al*., 2019, p. 4) throughout the development and lifetime of the device. It is not meant as a system to 'regularize' the act of enhancing (Foucault, 2003, p. 246) or 'discipline' the behaviours of the enhanced subject (Foucault, 1991) but allow Sensory Augmentation to be experienced unhindered by harmful or ethically troubling processes. Further consideration needs to be made: for devices which are not physically invasive but may affect the subject in other harmful ways, e.g., psychologically; for which devices need a medical professional and who decides this; and which, if any, devices fall outside of all existing regulation and therefore need new regulation.

ETHICAL DESIGN FRAMEWORK FOR COMMERCIAL SENSORY AUGMENTATION DEVICES

The purpose of this framework is to provide designers of SA technologies with guidelines which can be considered in relation to the development of their specific product. As this exists within a wider context of company demands and constraints, and regulatory structures the framework has been split into: Recommendations for SA Regulation; Recommendation for Company Policy; and Design Process Considerations. Each section works under the presumption that the recommendations in the previous section are being followed. The framework is intended to be used as a method to consider the ethical implications of developing SA devices in lieu of formal regulation specific to Human Enhancement or Sensory Augmentation technology.

The framework mainly addresses machine-based SA devices, not genetic or pharmaceutical interventions. It is intended for use with devices that will become commercially available, not for therapeutic use or use by the military. As commercial devices there will be an inherent cost aspect to the selling of devices, and entails certain grey/subjective areas when it comes to the perceived benefits of the device compared to the risk - which will need to be determined by the consumer. It is non-exhaustive and should not be used a checklist at a particular point in production. The framework is a means to create discussion, reflection and debate on the ethical practices of designers and device production, and therefore should be used throughout the entire development process.



Figure 41 Page 1/7 First draft of framework as semi-designed text. Lesley-Ann Daly, 2020.

RECOMMENDATIONS FOR SA REGULATION

This section looks at how SA devices can be regulated in line with existing frameworks. To do so devices will need to be categorized in a three-tier system depending on the invasiveness and therefor ability to cause physical harm. Further consideration needs to be made for: devices which are not necessarily physically harmful but may cause harm in other ways e.g. psychologically; and what the criteria are/who decides which category devices are placed in.

GDPR: All companies, devices and accompanying software, e.g. apps, must comply with the General Data Protection Regulations.

THREE-TIERED SYSTEM

1. Non-Invasive

Attachment: These devices do not break the skin barrier but instead are intended to be worn on the body for long periods of time. They represent the least physically harmful devices.
Regulation: These devices will need to follow the General Product Safety Regulations (GPSR) and testing before reaching the market. This includes the testing of any materials which may cause skin reactions or damage with prolonged skin contact e.g. adhesives.
Consent: The devices can be used without the consultations of a professional (see below), unless deemed to be harmful in other ways.

2. Low-risk Invasive

Attachment: These devices require the skin barrier to be broken e.g. piercings or small implants. The attachment needs to be carried out by a trained body modification artist (e.g. piercer), or medical professional.
Regulation: Products must adhere to GPSR. Any materials that break the skin barrier must be/have been tested under Medical Device Regulation (MDR), or by other relevant testing bodies such as American Society for Testing and Materials (ASTM) or International Organisation for Standardisation ISO), to ensure it can safety be worn inside the body e.g. metals, silicone casing.
Consent: As with piercings the person must consent to the attachment of the device by signing a consent form for the relevant professional. To do so the professional must provide all relevant safety information and care instructions before signing, additional to any information provided by the manufacturer. The person must be 16 or older, or accompanied by an adult. The professional has the right to refuse attachment should they choose to.

Figure 42 Page 2/7 first draft of framework. Lesley-Ann Daly, 2020.

3. High-risk Invasive

Attachment: These devices require surgical intervention in order to attach or implant the device and therefore require a trained medical professional.
Regulation: Products must adhere to GPSR. All implanted devices must be/have been tested under Medical Device Regulation (MDR) to ensure they are safe inside the body. Any materials that are part of an attached external device must be tested as above.
Consent: As these devices require a medical professional for attachment medical informed consent practices apply. As with plastic surgery the person is required to attend a consult with the medical professional who will provide all relevant risks, safety and after care information. If the procedure is deemed to be safe, or not disproportionately harmful compared to the benefits, consent documents will need to be signed. Vulnerable persons, or persons under the age of 16 will need a proxy/parent present to confirm consent. The medical professional has the right to refuse to carry out the attachment should they choose to.

PROFESSIONAL RESPONSIBILITY

Professionals attaching the device must have adequate training to do so, such as:
- Accredited medical training
- Body modification training - which generally consists of on-the-job training to gain experience, learn correct practices and duties of care, as opposed to institutional training and accreditation.

THE RIGHT TO ENHANCE

The following are overarching principles which, like human rights, ensure fair treatment.

Consumer Consent: When adequately informed of all the potential risks and benefits it is the customer's right to decide whether the benefit outweighs the risk for them personally. By purchasing and/or freely consenting to the attachment of the device they accept risks involved.
Morphological Freedom: Everyone has the right to choose to enhance or not without discrimination. Unless by enhancing it causes harm to others.
Agency: Persons cannot be forced or coerced to enhance, for fear of negative consequences should they refuse (e.g. for work).



Figure 43 Page 3/7 first draft of framework. Lesley-Ann Daly, 2020.

RECOMMENDATIONS FOR COMPANY POLICY

This section looks at recommendations for ethical policies and practices which the company can put in place.

TRUST & TRANSPARENCY

Be transparent about device production
- E.g. manufacturing process, material sourcing, testing process/criteria

Share research to foster worldwide progression of the field
- E.g. journal articles on new sustainable production methods

Share success stories to promote trust in the device, company and the field
- E.g. social media posts on customer experiences

Share the logic of sensory data processing
- E.g. how has the sensory/novel information been transformed before reaching the user
- Be clear about any bias that this may cause

ACCOUNTABILITY

The company has the responsibility for malfunctioning devices due to productions errors
- E.g. pay for repairs, replacement and/or medical costs
- Misuse or hacking of the devices by customers will not be covered

DATA ETHICS

(additional to GDPR)

Must provide adequate safety measures against hacking or unauthorised access to data

User has the rights over their own data (not the company) and it is their right to sell it
- The company has access to the data for monitoring and development processes

3rd party data collected by the device will be used solely for the proper functioning of the device and will not belong to the company or the user

Figure 44 Page 4/7 first draft of framework. Lesley-Ann Daly, 2020.

DESIGN PROCESS CONSIDERATIONS

This section presumes that the recommendations in the previous sections are being followed. These are considerations for the designer/s to reflect upon, in order to inform design elements and changes throughout the production of the device. With consideration to the full lifetime of the device and its' effect on non-human actors such as the environment, to ensure sustainable practices.

SHOULD WE MAKE THIS?

Is it ethical for us (the company) to make this? (not just because we can)
Do I, as a designer/person/moral actor, think it is ethical to make this?
- If the two above are different answers - how, if possible, can this be reconciled?

What external influences affect the design?
- E.g. funding, investor demands, component restrictions etc
- How, if possible, can these constraints be mitigated?

What other considerations affect the device design that aren't in this framework?

DO NO HARM

Will this device do (intentional or unintentional) harm?
Could the device interfere with or limit the 'normal' functionality of the user's body?
- E.g. restricting mobility, or restricting sensory data normally perceived
- Could this cause a safety risk to the subject? (e.g. AR overlay obscuring an oncoming car)

Could the added information received cause mental overload and/or distract the subject potentially causing them harm?
Will the device reduce the subjects' ability to make their own decisions, restricting free will?
What is the worst-case scenario?
What side-effects could potentially harm the user?

VALUES FOR EQUALITY

Respect potential users as individuals and as part of a larger community – with specific values, traditions etc
Do not design for only particular communities where it restricts use for others

Figure 45 Page 5/7 first draft of framework. Lesley-Ann Daly, 2020.

Do not design to intentionally give an unfair advantage to some communities over others, or use this as a promotion tool
Question what societal 'norms' the creation of the device plays into (beauty, ability), and whether it should.
Do not price to exclude certain peoples – where possible provide payment plans to reduce financial restrictions

ESTABLISH A DIVERSE KNOWLEDGE BASE

Employ team members from diverse backgrounds, for diverse perspectives
Do your team have the knowledge needed for device development?
- Is additional training needed?
- Do you need to source knowledge from experts outside the company (including for ethics)?

Have you sought expertise from other communities and prospective users to inform a design which takes into consideration different lifestyles and needs?
Have feedback methods been created to obtain responses from users after launch?

DESIGN FOR DIVERSITY

Has it been designed for diverse bodies, not just the 'normative male body'?
Has the device been tested on diverse people?
- E.g. Male/Female/Other, BAME, differently abled

Do the risks or benefits disproportionately affect certain communities?
Has use by those with sensory impairments been considered?
Has body placements for non-normative bodies been considered?
- Have adjustments/modifications for diverse body types been designed?

How does the type of intervention (non-invasive, implanted) affect the functionality of the device?
- What design elements are key to non-invasive or invasive devices?

Is the device suitable for children? How does this change the design?

DEVICE LIFETIME/ PERMANENCE

What design considerations need to be addressed for changes over a devices' lifetime?
- E.g. policy change, software updates, material degradation, body changes

Can/how will the device be removed?
- Has information for safe removal been provided?

Can the device be turned off?
What systems are needed to provide repairs/updates?
Are good customer service systems in place?
How can a device be safely disposed of? Or reused/upcycled?

Figure 46 Page 6/7 first draft of framework. Lesley-Ann Daly, 2020.

PSYCHOLOGICAL EFFECTS

What effects could the device have psychologically/on well-being?
What perceptual effects are known to occur and how does this affect the design?
Do these effects change depending on the invasiveness and/or permanence of the device?

EXISTING PERCEPTIONS

How do current public perceptions of this type of technology (from media, Sci-fi etc) affect the device and its' promotion?
Is the technology perceived as inherently good or bad?

PROTECTION OF NON-HUMANS

Are sustainable materials and production processes being used where possible?
If animal testing is used are the 3 R's principles being followed?
- Reduce no.'s of animals tested, Replace animals where possible, Refinement of techniques to reduce harm

INFORMATION

Has clear, jargon free information on the device been provided?
- E.g. Instructions for use, safety advice, health warnings, potential risks and benefits

Does the information make any medical claims?
- this will change regulation requirements

Does the description exaggerate features or give unrealistic expectations?
Has access to research been provided for claimed features?
- e.g. Research reports, journal articles, customer testimonials

Has a user interface been designed to give the user the knowledge and control of their data?
Has the company taken an active role in promoting ethical Sensory Augmentation technology production practices?

Figure 47 Page 7/7 first draft of framework. Lesley-Ann Daly, 2020.

To make the framework more appealing for designers, the visual design was explored so that the framework would seem less word heavy and therefore more engaging. Using the 'Should We Make This?' section, visual experimentations compared a digital vs hand drawn aesthetic (Figure 48), feminine vs masculine (Figure 49), and a more graphic layout (Figure 50). Along with a chaotic vs organised image for the framework cover (Figure 51). The purpose of this was to test dichotomous aesthetics to analysis which, if any, visually embodied the ethics within the framework. Particularly with Figure 49 the aesthetic was deliberately pushed to stereotypical gender norms predominantly using blue and pink, and human vs machine visuals, to show the absurdity of constricting a diverse field like ethics to gender.

4.6.3. Framework Next Steps

Although the framework marks a key point in the research inquiry, as a convergence of the research to date, viewing it as a consolidated piece solidified the understanding that it has a long way to go before being usable in the intended context. Firstly, it is too dense in terms of text and so needs to be broken down to become more digestible and less intimidating to diverse SA creators. The visual experiments were a first attempt to manage this, however simply illustrating each section individually is not an adequate means to fully convey the complex ethical significance of the content. Additionally, insights from the workshops show the need to educate the audience about HEt and the ethics relevant to SA before one can properly engage with the framework in a meaningful way. Lastly, having journeyed from the visually engaging *Commodification of Metamorphosis* sculpture, to the informative *HEt Posters,* to the participatory workshops – refining the engagement process along the way – creating a framework document for SA creators to navigate themselves feels like a step backward and counterintuitive.



Figure 48 Tests for single pages - focusing on 'should we make this?'. Digital vs hand drawn. Lesley-Ann Daly, 2020.

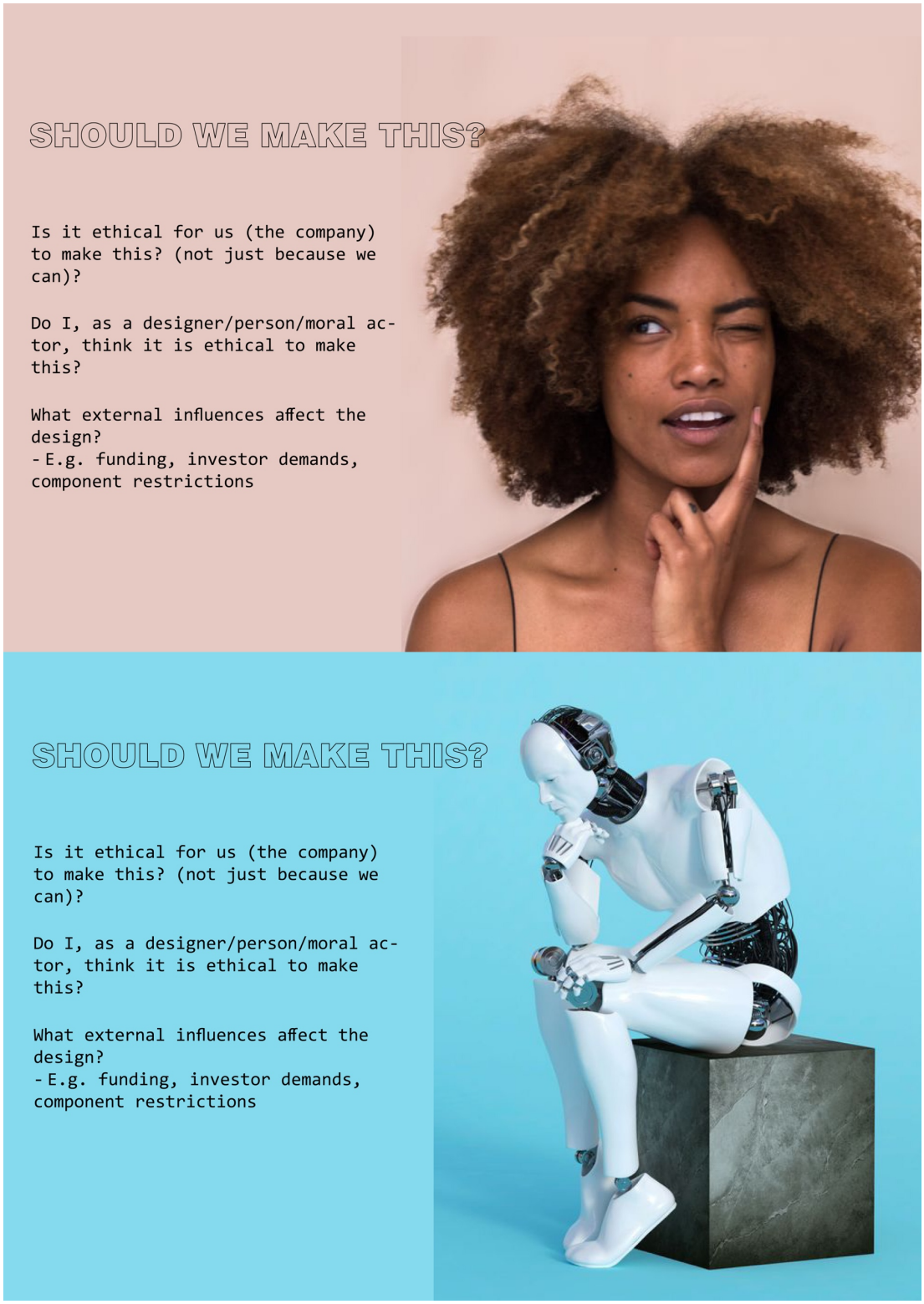


Figure 49 Test layout for single pages - focusing on 'should we make this?' - 'Feminine' vs 'Masculine'. Lesley-Ann Daly, 2020.

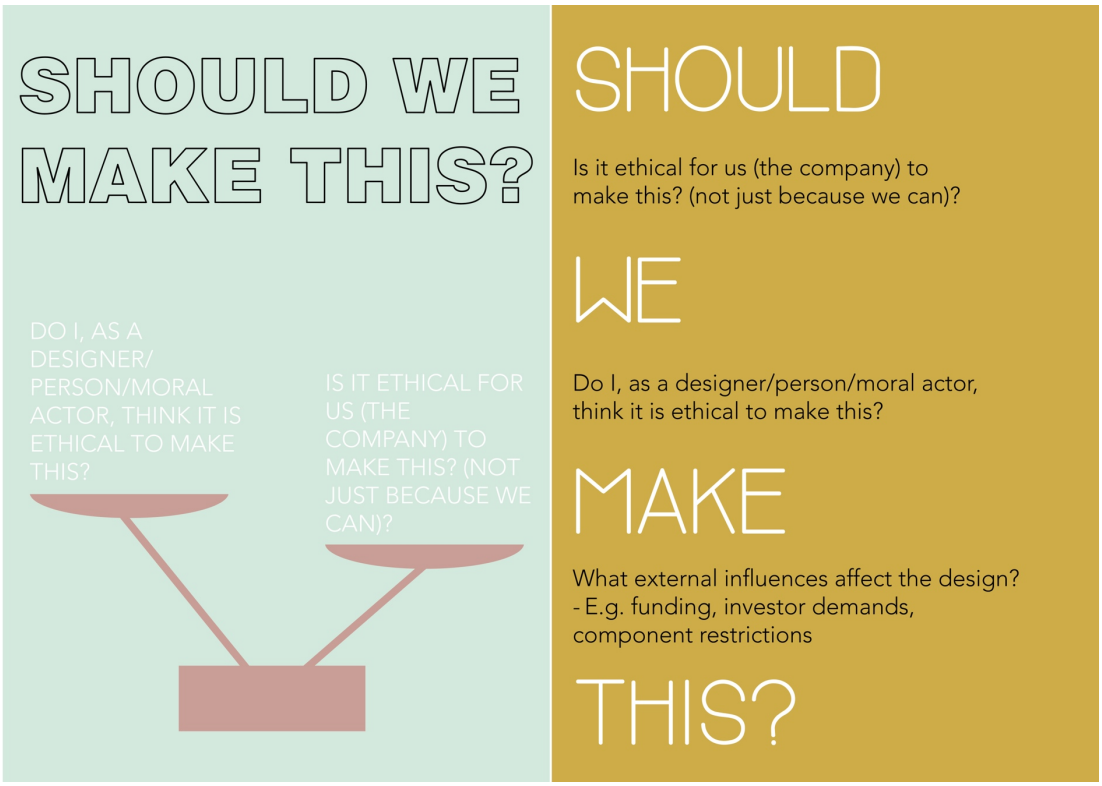


Figure 50 Test layout for single pages - focusing on 'should we make this?' Lesley-Ann Daly, 2020.

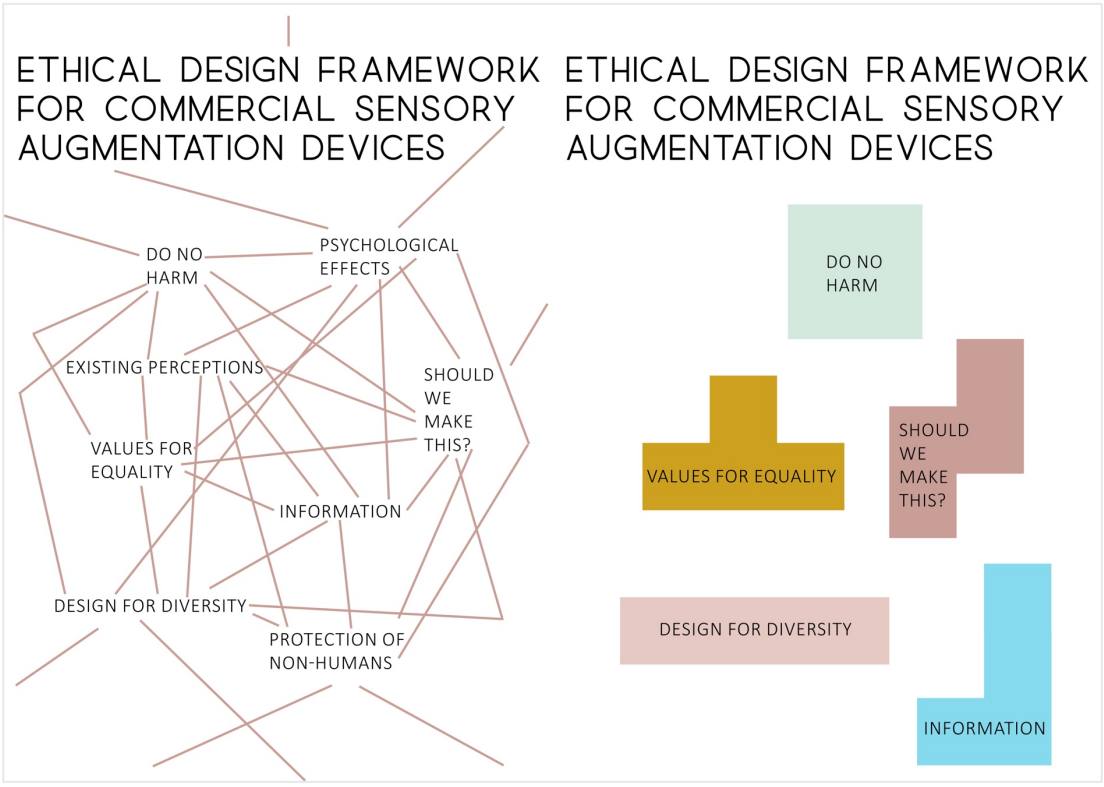


Figure 51 Test layout for overall look at framework as connected subjects. Lesley-Ann Daly, 2020.

Moving forward I will draw up design methods which will more adequately support the aims of creating an ethical framework that is relevant for SA creators. This will entail utilising Speculative Critical Design to both make the ethics relatable to the audience and immerse them in the future scenarios so that they can reflect upon their own practice. Secondly, Participatory Design will again be used, however this time to enable SA creators to collectively engage with the ethical framework and come away with actionable insights that they can apply to their technology development. This will be explored in the next chapter.

CONCLUSION

This chapter achieves two of the main objectives for this thesis: to conduct Participatory Design workshops to assess public perceptions of SA and HEt; and to synthesize ethical issues relating to SA technology. It has shown how engaging with the public provides a broader view of the ethical landscape and demonstrates the necessity of including diverse voices in the development of SA technologies. The chapter also reinforces the argument for Participatory Design as a means to address ethical concerns about emerging technologies, through collective and situated engagement, a method that will be further utilized in the following chapters for SA creator engagement with the framework.

This chapter has marked a key stage of the research where insights from primary and secondary research have culminated in the first draft of the ethical design framework for SA devices. This framework is unique in that it not only draws on existing HEt ethical discourse but also includes input from diverse publics and is situated within Posthumanism, expanding the conversation to also consider human and non-human others.

Additionally, through running the workshops and consulting other quantitative and qualitative HEt studies, this chapter has highlighted a considerable issue. That is that audiences need to first understand a complex subject, such as HEt or SA ethics, before they can meaningfully engage with it and make an informed contribution to discussions on it. The next chapter will explore the use of Speculative Critical Design as a method to demonstrate the ethics in context, informing SA creators about relevant ethics so that they reflect upon their own technology, and use Participatory Design tools to work towards more ethical outcomes.

CHAPTER 5: *DESIGNING SENSES* BOOK

INTRODUCTION

This chapter discusses the creation of a book that raises awareness about SA ethics and provides tools for action. It outlines the rationale for making a book in the context of this research, the target audiences, and design processes. The *Designing Senses* book emerges from the cumulative experimental process, reflecting the insights gained in the previous chapters and leverages the draft ethical design framework to tackle the lack of SA ethics understanding by showing these ethics in context. It also situates the work within the broader field of speculative and critical design and identifies a shift from speculative provocation towards tools that support ethical action in practice.

This chapter aims to show the need for a tangible, accessible medium (a book) to disseminate information and engage relevant audiences in the ethical discourse on SA. It discusses the design book as an audience-friendly means to articulate the plethora of interconnected ethics involved, using pillars of Posthumanism to provide structure to an otherwise multifarious domain. This chapter demonstrates how design can bridge the gap between complex ethical issues, reader understanding and resulting actions, using the narrative and provocative attributes of Speculative Critical Design and Participatory Design.

Beyond awareness, the chapter looks at the use of, previously utilised, Participatory Design methods to create a card deck and workshop, bringing the reader from passive to active engagement with the books' ethics – aiming to produce tangible steps towards positive changes in SA development. The chapter also explores how the development of the book is informed by the ethics within its pages, embodying values of sustainability and inclusivity, which further supports the thesis by showing the successful use of design ethics in practice.

5.1. THE MEDIUM

Designing Senses is a significant piece of practice that embodies this research and accompanies the thesis. It is designed in two halves: the front side which follows the structure of a design

book containing projects from multiple designers, around a specific topic – SA ethical design: and the 'flipside'[43] which contains the theoretical underpinnings for the books' creation and the *Lighthouse* card deck and workshop – tools I have created to make the ethics actionable. Below is an exploration of related SCD practice, the reasoning for why a book format was chosen and the intended audiences.

5.1.1. Speculative Critical Design in Biotechnological and Enhancement Futures

Speculative Critical Design has become a key approach for exploring the implications of emerging technologies, particularly in domains such as biotechnology and Human Enhancement where future applications remain uncertain and ethically complex. As outlined in Chapter 1, Speculative Critical Design operates not as a predictive or solution-driven practice, but as a reflective and critical mode of inquiry that uses artefacts and scenarios to interrogate possible futures and their implications in the present (Malpass, 2017).

The foundations of this approach are closely associated with the work of Dunne and Raby (2001; 2013), who positioned design as a medium for critique rather than problem-solving. Through the creation of fictional artefacts and alternative presents, their work challenged dominant narratives of technological progress and opened up space for debate around social, cultural, and ethical issues. While highly influential in establishing speculative design as a field, their approach has also been critiqued for its limited engagement with participation, power, and accountability, as well as its tendency to operate within gallery and institutional contexts (explored further below). These critiques have informed subsequent developments in speculative practice, which increasingly seek to engage more directly with publics and situated contexts.

Within the domain of biotechnology and HEt, a number of designers and artists have used speculative methods to explore the future of the body, perception, and identity. Lucy McRae's work investigates human adaptation and enhancement through biotechnological and environmental scenarios, often employing immersive installations, wearable artefacts, and cinematic narratives to explore how bodies might evolve in response to changing conditions (2014). Her projects foreground the aesthetic and experiential dimensions of enhancement,

[43] The second half of the book will be referred to as the 'flipside' throughout the thesis.

raising questions about intimacy, vulnerability, and desirability in technologically mediated futures.

Similarly, Agi Haines engages directly with biomedical ethics through speculative artefacts that appropriate the forms and materials of medical devices. Her work interrogates issues of care, consent, and intervention, deliberately blurring the boundary between therapeutic and harmful technologies (2016). By situating these artefacts within exhibition contexts, Haines exposes the ethical ambiguity embedded within medical and enhancement practices, inviting critical reflection on the power structures that underpin them.

Other practitioners working at the intersection of SCD and HEt include Auger and Loizeau (2001), whose Audio Tooth project explored implanted communication technologies, and Soares (2007), whose Genetic Trace proposed sensory extensions for detecting genetic compatibility. As discussed in Chapter 2, these projects exemplify a broader speculative trend in which sensory and biological augmentation are used to interrogate social norms, relationships, and future behaviours. Similarly, Inbar (2016) explores the augmentation of temporal perception through wearable sensory devices, raising questions about how altered sensory experiences might reshape everyday life.

Although not positioned within design research, the performance artist Stelarc has been highly influential in shaping imaginaries of technological embodiment. His work on bodily extension and obsolescence (Stelarc, 1991; 2012) has contributed to a cultural understanding of the body as modifiable and technologically open, influencing subsequent speculative practices concerned with enhancement and posthuman futures.

Taken together, these practitioners represent a diverse landscape of speculative engagement with biotechnology and Human Enhancement. Their work raises critical questions about embodiment, identity, autonomy, and the limits of the human, often through artefacts that make abstract futures experientially accessible. However, these practices are typically situated within cultural and exhibition contexts, prioritising provocation and reflection over direct engagement with design processes or industry application.

This limitation is particularly significant for this research. While SCD effectively surfaces ethical issues and expands the space of possibility, they often stop short of supporting sustained ethical engagement within real-world design practice. As such, the question for this research is not only how to visualise or provoke ethical futures of Sensory Augmentation, but how to translate these reflections into forms that can be engaged with by designers, developers, and stakeholders during the design process itself.

The choice of medium therefore becomes critical. Rather than remaining within the gallery or exhibition space, this research seeks a format that can both communicate speculative futures and enable ongoing reflection, discussion, and action within design practice. This consideration directly informs the development of the *Designing Senses* book, explored in the following section.

5.1.2. Why a Book?

A crucial function of SCD is to envision different tomorrows in order to inform design decisions today – eliciting "not only generative responses from audiences, but also then critical reflection and discourse" (Tonkinwise, 2014, p. 178). However, SCD has been critiqued as being design for designers, with speculative objects created to sit in a gallery, to be admired by other designers, and collect online reviews – loosely bolstered with a narrative of provocation. The context in which they are shown- the gallery- is not a conducive forum for wider audiences to discuss the work, preventing it from affecting change. While SCD is "trapped in museums" (Tonkinwise, 2014, p. 179) ethical practice is trapped in paperwork. It is generally not considered a particularly exciting or motivating practice, conjuring visions of checklists, rules, and added workloads. A dense task for a niche audience of ethicists and those deemed necessary to the implementation - making ethics (like SCD) difficult to discuss with non-specialist audiences[44].

The choice to create an SCD book to explore SA ethics, was made with the awareness of the pitfalls of ethics and SCD practices, as noted above. By combining these fields in a new medium, a design book, it aims to draw on the knowledge of each practice for a mutually beneficial outcome. The design book as a medium – rather than the gallery or checklist – democratises ethics, enabling readers to explore the speculative scenarios and understand the need for ethics in SA. Readers from diverse disciplines can draw parallels with how ethics relates to their own work, rather than see it as something that is separate or an add on implemented by someone else. The book provides space to reinforce the creative provocations with theoretical text, and then also provides design tools for the readers, both within the book and in linked openly accessible digital files (see Chapter 5.5.5.). While also open to the general

[44] For other important critiques of SCD, particularly in relation to its colonial and privileged practice see Oliveira, P. (2019) 'Cheat sheet for a non- or less-colonialist speculative design. And Martins, L.P. de O. (2014). Privilege and Oppression: Towards a Feminist Speculative Design.

public the book is designed for targeted readers, those with a vested interest in the development of SA, those who can carry the conversation forward to their teams and affect real change today.

As a book it also alleviates other barriers to access, such as the need to travel to an exhibition space, how accessible that space is, and the time taken to do so. A book can be read wherever you are and in your own time, it can be shared or enjoyed by oneself. While it may lack some of the frenetic energy one gets from visiting a busy gallery space, unlike the ephemeral nature of exhibitions, its medium means it can be kept and revisited at any time.

5.1.3. What is a Book?

To begin such an extensive undertaking that is creating a book it first requires understanding what a book is, or can be, so that a basic skeleton can be devised. Mapping the different types of books (Figure 52) highlighted the plethora of possibilities for subject matter (e.g., fantasy novels, food recipes, historical records), the variety of structures (e.g., illustrated comics, sticker books, technical manuals) and different materialities (e.g., print, digital). Narrowing down the potential formats can be done so by considering several key factors such as the topic (e.g., design, cars, philosophy), who the intended audience are and their level of literacy (e.g., children, professionals, enthusiasts), and what the author intends the physically to evoke (e.g., a cherished item to treasure, or an ephemeral item to be used and discarded). What can also be considered is the social role that a book can play. Depending on a books cultural and historical context it can be a reflection of society at that time, provoke a change in prevailing norms, be propaganda or enlightenment, a targeted critique or pure entertainment.

Taking these aspects into consideration I choose to create a design book, a style that would suit the topic, audience, intended materiality and wider impact desired (as explained earlier in the chapter). This style of book incorporates my skills as both a designer and researcher, leveraging my practical expertise and critical thinking. Research into other similar style books, for example *See Yourself Sensing* by Madeline Schwartzman (2011) and *Bio Design* by William Myers (2014), revealed common structural elements – beginning with a content page and introduction, with projects split into sections under a defined theme, and ending with acknowledgements and references (Figure 53). Visual similarities include a dominance of project imagery with minimal text, and a consistent graphical style throughout. In general, the imagery was showcased and allowed to do most of the talking, while text was limited to concise contextual support for projects and chapter definitions.

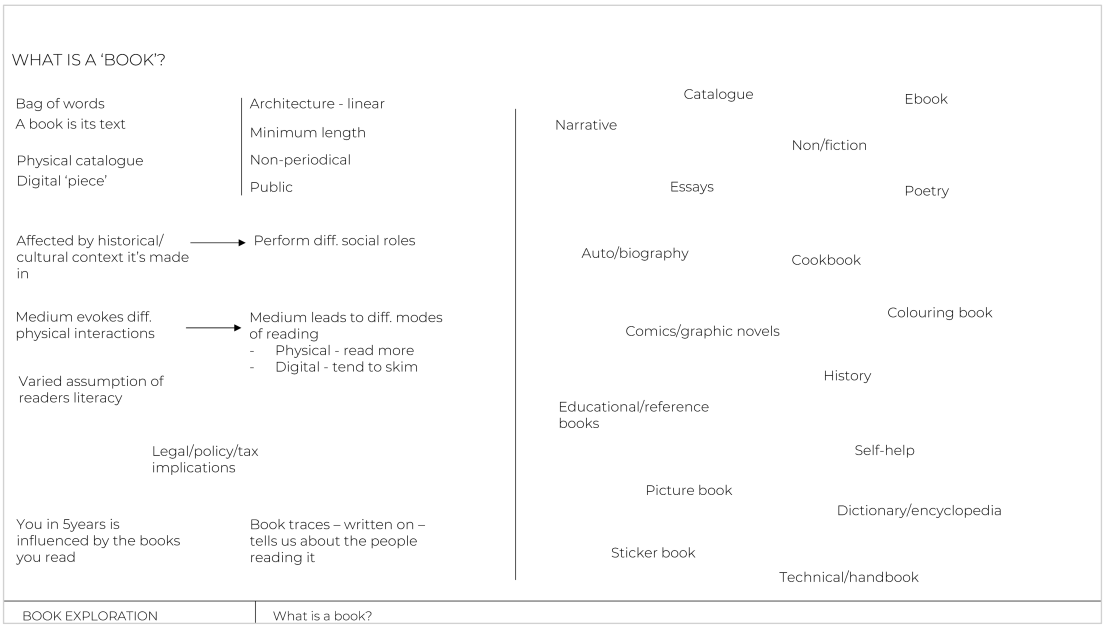


Figure 52 Mapping of concepts related to books to explore their different topics and meanings. For full document see Appendix 7.1. Lesley-Ann Daly, 2022.

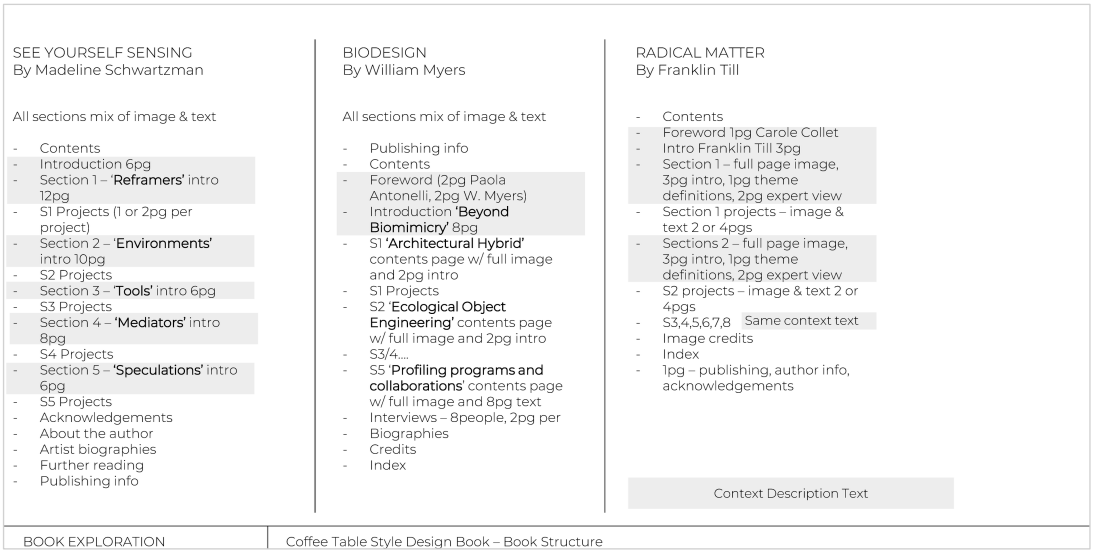


Figure 53 Analysing the content structure of design books. For full document see Appendix 7.1. Lesley-Ann Daly, 2022.

5.1.4. Ethics of Deception

An identifiable aspect of a design book is that it predominantly consists of projects by different contributors, such as artists and designers, carefully compiled and curated by the editor/s. In order for *Designing Senses* to have the appearance of a book of this style it required mimicking this composition, rather than attributing each project to me. To do so each project was attributed to a fictional creator, with their name loosely connected to the collaborators on each project.[45] In doing so I almost fully concealed myself as the lead creator of the projects, so that it could be more plausible as a design book rather than seen as a portfolio of my own work.

In SCD it is common practice for probes to strive for plausibility, or the appearance of being real. They leverage familiar concepts, signs, and signals, so that the audience can suspend their disbelief and envision themselves in the world, interacting with the speculative probe. As a design probe in itself the book is inherently deceptive – it intentionally deceives the readers into believing that it is a 'real' design book with multiple contributors. This poses the question of whether this act of deception is problematic, or unethical, when used for a book on ethics. To answer this, we can look at the use of deception in other fields of research and examine cases where SCD projects have been taken as real (intentionally or unintentionally).

As noted by Coulten *et al*. (2016, p. 13) in creating design fictions "The search for plausibility can (and frequently does) lead to deception." Deception is seen unethical when used in research for fields such as psychology, where providing false information or deliberately withholding information may cause undue physical or psychological distress for the subject. However, there are other fields where deceit is acceptable. For example, in Human Computer Interface (HCI) 'Wizard of Oz' style experiments subjects are led to believe that they are interacting with a computer system but are in fact interacting with a researcher through said system. The deception is deemed acceptable as it causes negligible harm and is revealed to the subject afterwards. While inherently deceptive, SCD (like HCI research) can also be considered to cause negligible harm, partially because audiences tend to have an awareness of the practice when engaging with it. By being aware of the unreality presented to them, they willingly suspending their disbelief, and are therefore complicit in the deceit.

There are some more extreme cases where SCD projects have been taken literally and have caused distress, though these are few and far between. For example, some people thought

[45] Some fictional names had similarities to the collaborators' name e.g., Erin became Eleanor. While others were more abstractly related e.g., Pip Sparks was derived from Daniel Coules being an electrician, or 'sparky'.

that the 'Pure Human' (2016) project by designer Tina Gorjanc was 'real' due to its misrepresentation in the media, resulting in online hate directed towards the designer. The project explored the idea of using bioengineering to 3D print skin, creating human leather which could be used for luxury items instead of animal leather. The project critiqued the legal loopholes around genetic ownership, and the commodification of tissue engineering in the luxury industry. Unfortunately, online articles (now removed or amended) misrepresented the research as real and not speculative, leading trolls to send messages likening her to the Nazis and threatening her physically[46].

What instigated, or contributed greatly, to the assumed reality of 'Pure Human' and also Auger-Loizeau's 'Audio Tooth' (2001) was their appearance in the media, rather than being encountered in a gallery or exhibition setting. "Misunderstandings and incorrectly interpreting a piece of design fiction as truth generally result from the format in which the design fiction is presented being familiar to the audience, this familiarity appears to lead to ambiguity" (Coulten *et al*., 2016, p. 7). Audiences had no reason to believe that the articles were untruthful - through the intentions of the media in Gorjanc's case, and the intentions of the designers in Auger-Loizeau's (Lacayo, 2006). Outside of the context of SCD they were no longer obviously fictional, and therefore they were taken as truth, leading to potentially harmful consequences for the designers.

Designing Senses is intentionally presented as a design book, a familiar format not generally associated with deception, but explicitly contains SCD projects which are. To maintain the illusion the book contains two double bluffs: firstly, the book openly presents the projects *within* as SCD as described in the foreword by Nova Vanguard (also fictional), and secondly by the inclusion of a single project *I am Cyborg(s)* by myself (Figure 54). The book plays on the audiences' assumptions that the other eight designers are other real designers and artists, and that only the projects within are probes, not also the book in its entirety. Is the book deceptive? Yes. Is it unethical? No. As with the aforementioned HCI research, the untruth is revealed in the end, with full acknowledgment of those who collaborated, and there is no reason to believe that anything beyond negligible harm will be caused[47].

[46] Tina Gorjanc is a close friend who has given me permission to write about the online abuse here. Though she provided me with images of the messages I have chosen not to include them due to the content and to protect identities.

[47] This theory will be explored with the questions asked to reviewers of the book (Chapter 6.4.).



Figure 54 Double page spread showing the project I Am Cyborg(s). Lesley-Ann Daly, Designing Senses, pp. 27-28, 2024.

5.2. AUDIENCE

5.2.1. SA Creators

Originally this research was designed to target the designer in the team of SA creators – the creative, the strategist, the conceptual thinker, there to fly to the flag for ethical design. I was essentially designing it for myself, or versions of myself which I hoped existed across the field. Through the process of creating the book, working with the collaborators, and working in the SA industry, the importance of each person who contributes to the development of a project became more glaringly obvious. Alongside an understanding that for success to be achieved, it would require multiple team members to the buy into the idea, rather than one aspirational designer with specialised knowledge, attempting to herd their colleagues into a workshop. The knowledge, the intention, the effort, and the outcomes would need to be explored, built, and shared by the team – therefore this book and the card deck are for anyone creating or researching SA technologies, regardless of role or discipline, in industry, academia and other.

Teams are active participants in deciding how the technologies are made – who they are made for, what they are made with, what they aim to do and how they impact humans and the planet in the long-term. Therefore, these teams have the power and responsibility to critically look at why they are creating them and actively strive to make ethical decisions. Alongside the value

in having diverse perspectives in the process (as articulated above), decisions on device development are not made by one person, but by many. Teams are made up of people with expert knowledge in specific areas, for example, specific materials, specific typefaces, specific coding safety, or specific understanding of markets. Therefore, it takes people from many disciplines to identify practical, relevant next steps – ensuring that the ethical discussion does not remain in the realm of the abstract but leads to actionable outcomes which will truly impact the direction of the device development.

Having said this, there is still a specific role for the designer in the team. Designers are generally not just taught technical skills, such as graphic design techniques or product design, but also how to facilitate the design process with others. Designers learn how to take a step back, to critically look at the process and all the wheels in motion, in order to have the long and wide view of the project. These skills enable the designer to bring the team together, facilitate the workshop, create an implementation strategy, ensure alignment between teams, and also advocate for the value of ethical design practices with internal and external stakeholders.

5.2.2. Academia

While the core audience for the book and card deck is the creators of SA technology, it can also be beneficial for universities and students learning about ethical design. It can be used in bachelors and master's programs to teach students ethics at an early stage of career development, giving them an understanding of their power to influence how products and services are designed in the industry. By giving students the knowledge and tools to practice ethical design it builds a skill set that they can carry throughout their whole career, regardless of what industry they work in. As emerging advocates, they are able to implement and spread ethical design, imparting their training to others who may not have benefitted from ethical teaching in their degree or work experience.

Additionally, although the book and card deck are focused on SA, the majority of concepts and questions posed could apply to numerous emerging technologies, particularly those that interface with the body such as wearables. SA can initially be used as an example technology through which the methodology is learned, and then principles can be transferred to other areas. The flexibility of the workshop methodology leaves room for lecturers, and others, to adapt the workshop to the needs of their class, while maintaining its core objectives. For example, this workshop was run with an MA Service Design class (see Chapter 6.2.1.) during a

module on ethical Artificial Intelligence (AI). Though the workshop was run with a speculative SA technology, there are numerous commonalities with AI ethics, such as the need for regulation, transparency, and consideration for human agency in the human-technology interactions. Both the ethical concepts and workshop methodology could then be applied to their AI ethics research.

5.3. SHOWING THE NEED FOR ETHICS IN SA

Research to date has identified numerous issues regarding the application of ethical design in SA technology, beginning with a lack of awareness of what ethics are relevant to SA. This section will articulate the aims for the book, including showing SA ethics in context, enabling teams to make tangible change through design tools, and championing ethical design by embodying the values that it preaches. By establishing how these aims drive the book concept and design, it will contextualise following sections which explore why the book as a medium was chosen and how the aims inform the development of the book.

5.3.1. Raising Awareness

The first aim of this book is to show the importance of, and need for, ethics in the development of SA technologies – and therefore the value of the tools I have designed. Having worked in the industry and spoken about ethics to other creators of SA, it has been clear that they generally do think that ethics are important, but do not necessarily understand the wide range of issues that are relevant to their work[48], an issue reflected in the workshops. As devices in industry are made for commercial (not medical) use they do not fall under Medical Device Regulation (2017), and while regulations for product and data safety are imposed, the stringency of these vary globally and there is no clear guidance beyond them (as described in Chapter 2.2). Even when considering the proposed ethical guidelines outlined in the aforementioned reports, as human enhancement is an inherently anthropocentric field, considerations beyond the human are rarely, if ever, included. To my knowledge, at time of writing, the only considerable concern for sustainability in HEt literature is the over-

[48] Having worked as a design strategist at CyborgNest for three years, and having run a series of symposiums called ‘re:making senses’, I have had conversations with numerous SA creators about the ethics and/or lack of ethics in SA design (and emerging technology design in general). These were not necessarily in relation to this PhD; therefore, these conversations were not documented, and this insight is from my own anecdotal experience.

consumption of planetary resources and the climate impact of an (even more) overpopulated world, stemming from radical life extension. While markets, particularly environmentally conscious Millennials and Gen Z consumers, push towards sustainable products and services there is a gap in SA (and HEt) development. Therefore, the point of this book is not just to illustrate and reiterate existing HEt ethics literature (as shown in the HEt *Ethics Grid* created in Chapter 4.1) but to include and connect ethical considerations from many spheres, some of which may not initially seem pertinent to SA. Taking knowledge from the edges, from adjacent fields and even from SA creators in different disciplines (e.g. neuroscientists taking inspiration from the perspectives of artists, and vice versa) makes the opportunity for learning more rich, encompassing, and inclusive.

This book is made to raise awareness to the varied issues which could affect SA design and use – for devices with varied capabilities, embeddedness, and permanence. This awareness extends beyond the acknowledgement that an issue exists, to how it could drastically affect those using the technology, society, and the planet- both positively and negatively. There is a question whether companies and investors will make genuine efforts towards embedding ethical practices, particularly when it may not be financially beneficial. Or whether they will merely engage to avoid losses due to malfunctions, lawsuits and the resulting damage to their reputation. Some companies don an appearance of caring about ethics – known as 'greenwashing' in sustainability (United Nations, n.d.) – to avoid such costly eventualities, placate buyers and maximise profits. The optimists' take is that creators (from the bottom of the ladder all the way up to the top) have the power to actively build a better, more sensorially diverse future, should they choose to do so. This book represents a line in the sand, creating a precedent for more ethical technology design that will inspire (or force) others to adopt, in order to meet market expectations.

5.3.2. Visualising SA Ethics in Context

The methodology connecting the projects is Speculative Critical Design (Chapter 1.2.1.), an intrinsically provocative practice used here to prompt the reader into considering the importance of ethics. SCD is predominantly a visual medium, with minimal text, utilised here to widen the accessibility of ethical literature, diverging from the normative text heavy, dense articles. The projects are *Speculative* in nature as they imagine future worlds where the technology exists, envisioning various contexts of use. They are modelled in material and experiential forms (DiSalvo, 2015), using familiar imagery and concepts in unfamiliar ways to

create an uncanny scenario to pique the reader's curiosity. The scenarios are designed to transport the reader into the future scenario to give them a more embodied experience, enabling them to understand the device from *within* the future world, as opposed to viewing it from a present[49] (or fictional past[50]) perspective. This allows the future socio-cultural context to also be taken into consideration, such as: the future political landscape, environmental status, changing traditions, and how the device interacts with other technologies that exist at the time – old and new.

The projects are also *Critical* in nature because they are not neutral depictions of the technology's future, instead they use Critical Design methodologies to critique how SA is designed and interrogate its impacts (Malpass, 2017). The critical scenarios analyse the ethical design of these devices, exploring: what may happen when ethics are not considered – such as the exploitation of intentionally bias technology; what happens when old dualisms are perpetuated through new technologies – such as discriminating against those who are not considered to be 'human'; and what happens when ethics are made a crucial part of the process – such as celebrating inclusivity through technology design.

Each project considers first 'what if?' and 'then what?' For example, 'what if' the long-term effects of changing policy, material degradation and technology obsolescence isn't considered when making SA devices available for the public? 'Then what' happens to the people years after having implanted these devices? 'What if' articulates the ethical issue, and 'then what' explores the story, the people, the real-world impact – this is the part which connects to the reader, confronting them with the potential outcomes of their actions (or lack of action). At the end of each chapter the reader is presented with the questions from the card deck (discussed below), which could have been considered in each speculative scenario (Figure 55). The book does not just include dystopic scenarios, many preferable futures are also explored. For these the questions serve to illustrate how ethics can lead to positive design outcomes, and that it can do so without stifling creativity or innovation. Additionally, as human enhancement is inherently viewed as dystopic- predominantly due to its depiction in science fiction (as discussed in Chapter 3.3.) – this book intentionally explores positive HEt and SA futures to provoke readers to understand and challenge prevailing narratives around the field.

[49] An issue identified in the workshops in Chapter 4.

[50] As discussed in Chapter 3.3. views of HEt are informed by old depictions of the future from science fiction which are not appropriate for today or newer visions of the future.

5.3.3. From Position to Plurality in the Book

This research adopts a clear positional stance, which differs from the deliberately plural and open structure of the *Designing Senses* book. The thesis is grounded in a critically Posthumanist perspective that is broadly supportive of Sensory Augmentation, while remaining attentive to the ethical risks associated with its development, including issues of inequality, power, and potential harm. It rejects the notion of ethics as a fixed set of rules or regulatory checklists, instead framing ethics as a situated and relational practice that emerges through design processes, behaviours, and socio-technical contexts.

In contrast, the *Designing Senses* book is intentionally constructed to present multiple perspectives on SA, without privileging a single authoritative position. This plurality is a deliberate design decision, reflecting the contested and contextual nature of ethical judgement, and enabling readers to engage in their own processes of reflection and decision-making. The role of the researcher is therefore not to prescribe ethical outcomes within the book, but to structure conditions through which ethical deliberation can occur. In this sense, the thesis provides the theoretical and ethical grounding for the research, while the book operationalises this position through an open, participatory, and practice-oriented format.

CHAPTER 1
ANALYSIS

In the introduction I asked you to 'consider what future would you like to come to fruition and why?' Having read the projects in this chapter, do you consider the scenarios to be desirable or not? Why? And desirable for who?

While these scenarios 'are designed to embody critical discourse' (12), provoking contemplation by the reader, I would like to give some additional food for thought. At the end of each chapter, I have provided a set of ethical questions relating to the projects as a means for the reader to reflect (or re-reflect) upon them. In light of the questions on the page across, consider: what aspects of the speculative designs have led to their resulting impacts? - positive or negative; would altering the designs lead to alternative outcomes?; and what changes would you make for more desirable outcomes?

'Enhancing Akansha' acts as a useful example here. In the first version Studio Helios sees the task as technical, and rather than considering (or asking) the client about her needs and abilities they dive into technological solutionism – strap this arm on and you're good to go. This option is rejected as it doesn't identify the core problem – what good is the device if she is too scared to swim in the first place – also the device is undesirable for her – she does not think her prosthetic arm is what needs enhancing. In version two, Omni Studio works with Akansha to design a process through which she can address her fear of swimming, practically learn to swim, and then enhance her swimming experience with the breathing device. The projects show how different levels of engagement with ethical design have led to the creation of two different futures. Though the context in which we make things may not change, how we decide to act can.

Post-Enhancement Support Network

SAFETY/REGULATION
What regulations and guidelines should you be following? e.g. Product safety, GDPR, Medical Device Regulation, EU sustainability goals, and material testing.

TEMPORALITY
What might affect the device use over time? e.g. policy changes, material degredation, software updates, bodily changes?

HYBRID BODY
Could the device interfere with or limit the functionality of the body? e.g. restricting mobility or interfering with other sensory data.

Can the device be turned off or removed? by whom? and what are the potential effects of removal?

Aging [dis] Gracefully

CHALLENGING NORMS
What are the existing perceptions of the technology in society and the media?

What societal norms does the technology embody? e.g. beauty, race, gender, ability, age, human superiority?

RISK VS BENEFIT
Have you considered alternative uses? e.g. creative, deviant/misuse, hacking, and other unintended uses.

PLURALITY OF HUMANS
How does the design or experience change depending on the community or individual person?

Who does it exclude from use and how? e.g. price, accessibility.

Enhancing Akansha

DIVERSE BODIES
Has the device been designed for diverse body types and abilities?

What adjustments can be made for different bodies?

PLURALITY OF HUMANS
How are your publics intersectional? e.g. as individuals and as part of wider communities with particular needs, values, traditions and means?

TEMPORALITY
How might the device experience change over time? and is training needed to facilitate this?

KNOWLEDGE BASE
Does your team have diverse knowledge & perspectives?

Do you need additional training or to source expert knowledge from outside? e.g. from other disciplines or relevant publics?

Figure 55 Double page spread showing Chapter 1 Analysis and associated ethics for projects. Lesley-Ann Daly, Designing Senses, pp. 23-24, 2024.

5.4. TOOLS FOR ACTION

5.4.1. Passive to Active Engagement

This leads on to the second aim for the book – to give creators of SA the tools to analyse their devices and take active steps towards making them more ethical. When reflecting on the initial thesis objective- '*How can design methodologies be used to examine the impact of Sensory Augmentation, and assess ethical issues related to the design and use of the technology?*' - I concluded that 'assess' was too passive a term. Design emphasises experiential learning and the production of knowledge through active making and reflective doing. It is a situated and embodied practice of experimentation, iteration, collaboration, and knowledge acquisition. To conclude my research inquiry by 'assessing' the ethics did not fulfil the desire to actively change the industry and create better futures. This shift is reflected in the refinement of the research question, moving from 'assessing ethical issues' to 'supporting ethical decision-making in practice' to reflect design as an experiential practice which affects change through action. To follow this drive for action, the framework- initially envisioned to be presented visually – also fell into this well of passivity. While it is key for creators to learn about ethics and reflect on their practice "Knowledge [alone] does not hold some type of solution to present problems "in the future"" (Colman, 2014). According to theorist Felicity Colman what is needed is a deeper examination into the 'micro-details' in order to "produce, generate, join and integrate into something different, something positive for feminist bodies" (2014). The teams creating SA devices are uniquely situated to delve into the minutia and complexities of their work, then enact the changes in mindsets and processes needed to create these different and positive outcomes.

Having spent the first half of the PhD practice developing workshops and carefully crafting the supporting materials, it was logical to come full circle and develop the framework into an interactive workshop (explained below). The card deck and worksheets become an active way for SA teams to both critically analyse the technology that they are developing and identify relevant next steps – to then act upon. These cards are made to be seen, held, and discussed (even smell if you like), as a tangible means to reflect upon the specific technology. Akin to the SCD projects, the card deck and workshop aim to make the understanding and application of ethics more accessible and tangible. The projects raise awareness of SA ethics, which then enables teams to analyse their own practice through the workshop, making both halves of the book inextricably linked.

5.4.2. *Lighthouse Card Deck* & Workshop

To provide space for the participatory framework, the book was split into two sections. The front side contains the SCD projects, and the flipside describes the card deck and workshop. The flipside of the book explains the reasoning for, and methodology of, the workshop and gives the reader the first full view of the ethics in the card deck. The projects, card deck and workshop methodology all take principles from Posthumanism, such as seeking knowledge from the edges and beyond human-centred thinking, in order to expand siloed industry perspectives. The cards utilise the diverse knowledges and resources that went into creating the *HEt Ethics Grid* (the secondary research and public workshops described in Chapter 4) and the first draft of the framework (Chapter 4.6), becoming the final set of topics and questions in the card deck (see example of two cards in Figure 56). While the workshops also capitalise on the diverse perspectives of the people taking part.

It takes many disciplines to create any type of technology – from designers, to engineers, coders, and neuroscientists – all with their own expert knowledge from their practices and their own unique life experiences. Designing the workshop as an open discussion allows all team members the space and opportunity to voice their thoughts, concerns, and ideas, contributing to the development. Though the cards cover a wide variety of ethical issues, I am aware that they cannot be fully comprehensive and cover all situations, technologies, and publics, to do so (if even achievable) would take a lot more time and a much larger card deck. The workshop also opens up the discussion to the personal ethics and values of the individuals on the team- from their cultures, experiences, and beliefs. Through the 'You in the Process' card (Figure 56) asking what their values are and how they can contribute to the development, it gives the process a sense of inclusivity and team members ownership over the aspired outcome.

The cards are tools which facilitate conversations around what is already being done, what teams need to be aware or cautious of, and what they aspire to achieve. Crucially it also provides the physical (or digital[51]) space to articulate and document how they are going to achieve the intended outcomes. Asking for concrete next steps to take post-workshop brings the reader from a reflective position to that of action and change. The outcome of the card workshop is relevant, situated, and contextual actions, decided by the team, which aid their

[51] A digital version of the workshop was created in figma, an online collaborative whiteboard space where many people can work together simultaneously on one 'board', mimicking a physical whiteboard. The workshop was laid out with the instructions first, and each card and its corresponding worksheet next to it. While the worksheets are locked, text can be added by anyone to document responses to the questions and sections.

specific process. As the creators of the technology, they are in the unique position to drive that change, and the workshop provides them with the tools to make that change an ethical one. Workshops with the *Lighthouse Card Deck* will be explained and analysed in Chapter 6.



Figure 56 Two cards from the Lighthouse Card Deck – 'You in the Process' and 'Plurality of Humans'. Lesley-Ann Daly, Designing Senses, pp. 9-10 of the Flipside, 2024.

5.5. EMBODYING ETHICS

Just as the creators of SA are in a position to create change, so am I. Therefore, it was important for this book to embody the ethics that it preaches, my ethics – to lead by example through what I create. "The methods of research are not separate from its theoretical endeavours, Posthumanism is a praxis; its perspectives should be embedded into its methodologies" (Ferrando, 2019, p. 76) The SCD projects within this book portray ethics in practice, and this book is a design probe in itself, also portraying ethics in practice – as a Posthumanist object. But what is a Posthumanist book? What are key elements which overlap Posthumanism, my personal ethics as a designer and the objectives of my PhD? Without articulating the full 15 ethical areas that are in the card deck, below are five broad areas which I felt were vital to achieving a successful Posthumanist book on Sensory Augmentation design ethics, which contributes to knowledge and aligns with my PhD aims.

5.5.1. Diverse

The first way that it does this is by ensuring that it covers the wide-ranging ethics of HEt and Posthumanism, such as: considering who is included in the process; any bias in design and use of devices; and the consideration of impacts not just to humans, but also non-humans and the planet. To do so I have borrowed from philosophers Rosi Braidotti and Francesca Ferrando, and their subdivision of Posthumanism (see Chapter 2.8.), using this to create three-chapter topics. Braidotti defines Posthumanism as being: Post-Humanist (Chapter 1 in *Designing Senses*)- recognising that humans cannot be defined as one thing, but as multiplicities, constantly changing with no one 'ideal' or 'normal' human; and Post-Anthropocentric (Chapter 3 in *Designing Senses*) – decentring the human to include knowledge from animals, the environment, and technologies (hardware and software). Furthermore, Ferrando adds Post-Dualist (Chapter 2 in *Designing Senses*) – a rejection of binary categorizations and their implied hierarchy, for example man/woman, human/animal, white/black and able/disabled (Figure 57). This demarcation allowed me to map the design projects as I created them, making sure that many bases were covered across the three topics.

Although these projects are split into three categories, each project is complex, and most address ethical issues from at least one of the other chapters. Therefore, ascribing a specific chapter to each was difficult. To follow a more Posthumanist ethos the projects could have remained ungrouped, relating to each other in a rhizomatic, non-hierarchical way. However, to stop the book from becoming overly abstract, organising the book into three chapters also enables the reader to understand the projects in each chapter in relation to one another, giving a logic to the network of ideas presented.

5.5.2. Inclusive

The book is also designed to be inclusive- of minds and bodies. I have already articulated above how the workshops are designed to include diverse perspectives in order to enrich the output. This is also reflected in the practice of making of the book and the projects within it, each of which has input from different experts. Although the book appears to be a collection of work from other practitioners, I am the concept designer of all nine projects within the book, as well as the curator (discussed further in 5.1.4.). Crucially however, for each project I have collaborated with a specialist/s to inform and illustrate the concepts addressed. I could not have created this book without the amazing team of people who helped me. Collaborating was



Figure 57 Double page spread showing Chapter 2: Post-dualist definition. Lesley-Ann Daly, Designing Senses, pp 25-26, 2024.

an important element in the process so that diverse perspectives on ethics could be included. Even the foreword was developed in collaboration with a non-human actor – ChatGPT – an AI tool which I prompted to write a short text about the application of Speculative Critical Design today, which I then refined to be used in this book (see Appendix 7.3.). Each of the human & non-human actors greatly contributed to my awareness of particular issues, gave insight into pragmatic considerations, and grew my understanding of the people designing and using the technology. By collaborating with them it also makes the issues and scenarios in the book more wide-ranging and able to connect to different technologies and audiences. Utilising my skills as a critical designer to coherently communicate the research, and their valuable inputs, to the readers.

5.5.3. Accessible

I have also tried to be inclusive of those with diverse sensory, physical, or cognitive abilities. To make the book more accessible QR codes have been added to the bottom left of each spread, linking to a webpage which holds the book text and alt text for every image. Doing this enables those with low vision to activate a screen reader through which they can audibly read the book. This also allows people to enlarge the text size or navigate the pages using assistive technologies linked to their device – such as eye tracking cameras, an adapted mouse or controller, and voice commands, among others.

Several apps for scanning and articulating (usually vocally) the physical environment was tested as alternatives to the QR codes. Apps such as Seeing AI (2023) and Be My Eyes (2024) are developed particularly for those with low vision, enabling them to read text documents, identify objects around them, or scan food items via the camera on their smart phone – consuming the visual information through speech. While these are affective in day-to-day life, they were not designed to scan, understand, and articulate abstract concepts portrayed in the SCD projects within the book – where describing literally what is in the imagine would not necessarily capture the concept being shown – even if it was able to describe such complex imagery. Therefore, it was more advantageous for the reader to be able to access alternative text that I have written with them in mind. I convey the tone of the images through my

descriptions and relate them to one another within a project, providing greater context to the projects as a whole (Daly, 2024a).[52]

5.5.4. Sustainable

Along with the content being ethical, the materiality needed to follow suit. As the research is based on the senses and how they affect human experience, it was preferable for the book to be a physical one and not just digital. This means that the reader can interact with the physicality of the book – it's size, page texture, smell, weight, and the sound of page turning. It has even been shown that how we consume information differs between physical or digital sources, where the latter leads readers to skim the text and not take it in as deeply (Delgado *et al.*, 2018).

However, anything physical implies a need for materials, which need to be sourced, processed, and ultimately discarded or recycled at their end of life (or perceived end of usefulness). To keep the sensory experience but not contribute to global material and energy waste, a sustainable printing company was chosen to produce the small batch of books. Rapidity is a local (to me) eco-friendly printing company who apply sustainable practices such as: only using paper from FSC certified sources, using printing techniques which cause little waste (any of which is recycled), powering their factory with 100% renewable energy, having zero carbon impact, using electric delivery vehicles, and always advising customers to choose materials that are better for the environment (Rapidity, n.d.). The World Land Trust and the FSC logo are printed in the book to show the commitment to these practices.

The book was designed to be large, something that reader will need both hands to hold, giving it presence and a need for careful handling. While also designed to remain within particular printing dimensions, leading to minimal cut offs and avoiding the need to switch to a larger, more resource heavy printer. Additionally, only 20 were printed to cover copies for the reviewers, assessors, my supervisors and myself- an optimised amount with the aim that none will go to waste.

[52] For full text go to https://www.lesleyanndaly.com/qrcontentspage. All QR codes within the book link to my website, where people can navigate internally between pages and use, for example, screen readers.

5.5.5. Sharing knowledge

The book is a medium to share knowledge – knowledge from my research, knowledge from the collaborators of the projects, and knowledge between those engaging with it. It aims to foster new thinking and practices in the field of SA and wider technology and design communities. The workshop, articulated in the flip side of the book, is designed to be open-source and adaptable to different audiences. The materials are available through links online (Daly, 2024b), where they can be printed or used in a digital space, such as figma, removing boundaries such as distance and time. This particularly benefits post-pandemic workplaces where employees work remotely, often in different countries, and therefore do not have the opportunity to meet in person to run a physical workshop.

Being transparent about the deceptive tactics used for the book (described in Chapter 5.1.4.) was key to the ethics of this book, choosing full disclosure by revealing its methodology and purpose in the flip side 'Book Analysis'. Additionally, this section denotes some of the key ethical questions from the card deck which have been followed in the book's creation (as articulate above), as an example of how I have implemented ethics in my own practice. This includes considering my own ethics, having diverse inputs, sharing research to foster community knowledge, being transparent about the production, and creating accessible information.

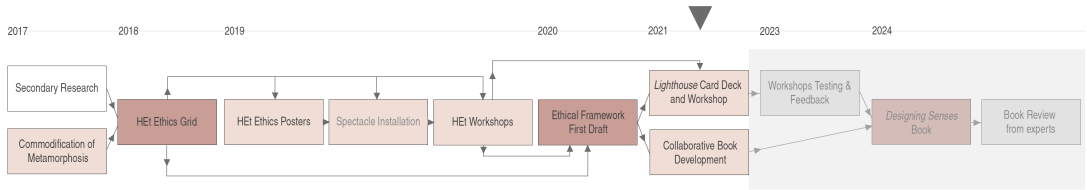


Figure 58 Practice work status – Creation of design book and card deck, Lesley-Ann Daly, 2025.

5.6. BOOK DEVELOPMENT

5.6.1. Book in the Making

To create the skeleton for the book I split it into three chapters based on different aspects of Posthumanism – Post-Humanist/Dualist/Anthropocentric (see Chapter 2.8.2.). This is an effective way to both showcase the importance of Posthumanist theory in my research, and as a means to convey the philosophy to the audience in a piecemeal way, so as not overwhelm

them with complex theory. To define the chapters I began by attributing keywords to each and then linked these to concepts from the draft ethical framework (see Chapter 4.6.). For example, for the 'Post-Anthropocentric' chapter keywords or concepts included 'non-human actors' and 'decentring the human', which linked to ethics around 'sustainability' and 'interconnectedness' (Figure 46). From there I could begin exploring ideas for each project within a framework of Posthumanist theory and ethical concepts, centred around speculative HEt or SA technologies (the development of each project will be explored in Chapter 5.7.).

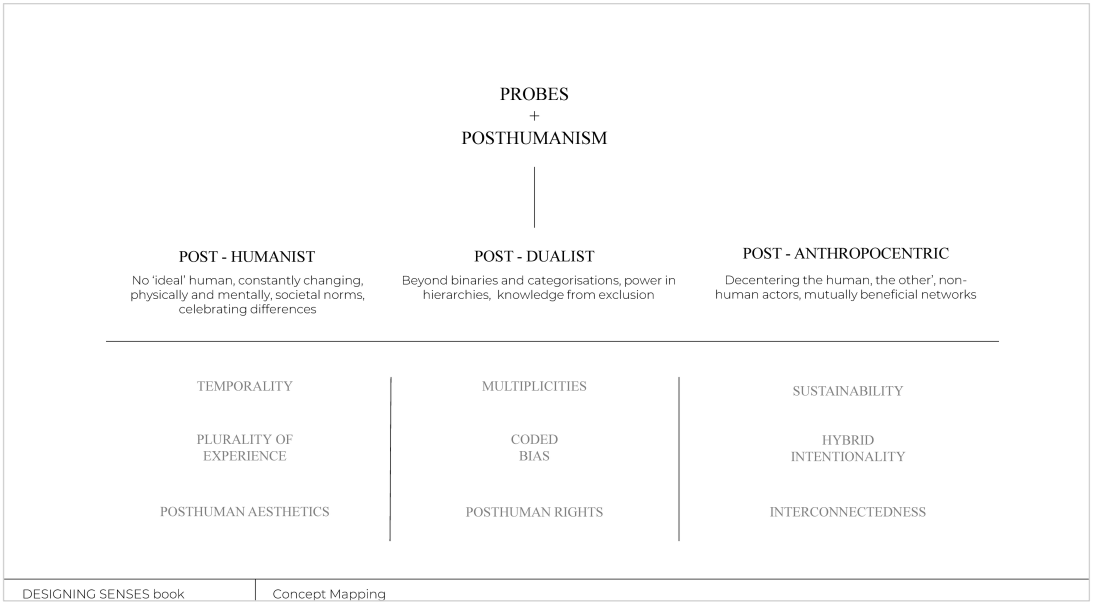


Figure 59 Mapping the three areas of Posthumanism. For the full document on the Project Development see Appendix 7.2. Lesley-Ann Daly, 2022.

For the general book structure and aesthetic, I began with an InDesign template where I could organise imagery and text as I generated it (Figure 60-62 showing early style exploration with content). The template aided greatly in organising the work and giving coherence to the disparate project elements. Including the contents pages, publishing details and references added to the verisimilitude of the piece, giving what was initially design exploration an appearance of professionalism and the authority of a 'real' book. Collaborating with art director Tabitha Dunne on the book style, a decision was made to move away from the initial template as it suggested a design report on technology more than a book of design projects. Blocky elements and the 'techy' font were removed in lieu of a more minimalist, classic approach which allows the focus to be on the content rather than the graphical style (Figure 62).

The order of the projects changed throughout the months of development, as projects changed during the making process. The final arrangement keeps to the chapter themes while also seeking to have an overall narrative flow, taking the reader on a journey. The projects intentionally have a mix of more utopic or dystopic themes in order to make the narrative dynamic and keep it from becoming monotonous and desensitising the reader e.g., with a string of dystopian futures. I choose to end the book on a positive note with the project *When Lights Stole the Night* which showcases the possibility to design for mutually beneficial futures. This message of hope and the power of creators sets the reader up for the flip side, in which they are called to action, and given the tools to be the catalyst for positive change.



Figure 60 Early book layout exploration using an Adobe template, showing a chapter introduction page. Lesley-Ann Daly, Designing Senses, 2022.



Figure 61 Early book layout exploration using an Adobe template, showing the project Aging [Dis]Gracefully. Lesley-Ann Daly, Designing Senses, 2022.



Figure 62 Early book layout exploration using an Adobe template, showing the project Feel the Truth. Lesley-Ann Daly, 2022.

5.6.2. The Flipside

To move from the SCD projects to the workshop section of the book the reader must flip the book around. This form of engagement is inspired by a habit I have formed in my notebooks, where I utilise the two sides for different functions. The front side of the notebook is for the core notes e.g., practice ideation, notes from articles or exhibitions. The back section (working up-side-down towards the middle of the book) is for ideas or analysis that is tangent to front section but nevertheless needs documenting in relation to it e.g., ideas for other related practice or notes from supervision meetings. Particularly in the case of supervision notes, the back side is a more reflective and strategic space, taking a wider perspective on the content of the front. From a purely practical perspective rotating the book 180 degrees means that when the sides meet you can differentiate what text belongs to each section. I have found that the action of rotating the book to access the back section works to put me in a different frame of mind, taking a step back mentally to consider my overall practice away from the 'weeds' of the front content. I am sure this is not a unique habit and that I am not the first nor the last to adopt a similar technique. Choosing to do this in the book was strategic in several ways, to simply separate the different content in the front and back, to trigger the reader to physically and mentally change perspectives, and to provide a space to reveal the purpose of the book away from the 'fictional' content in the front (Figure 63).

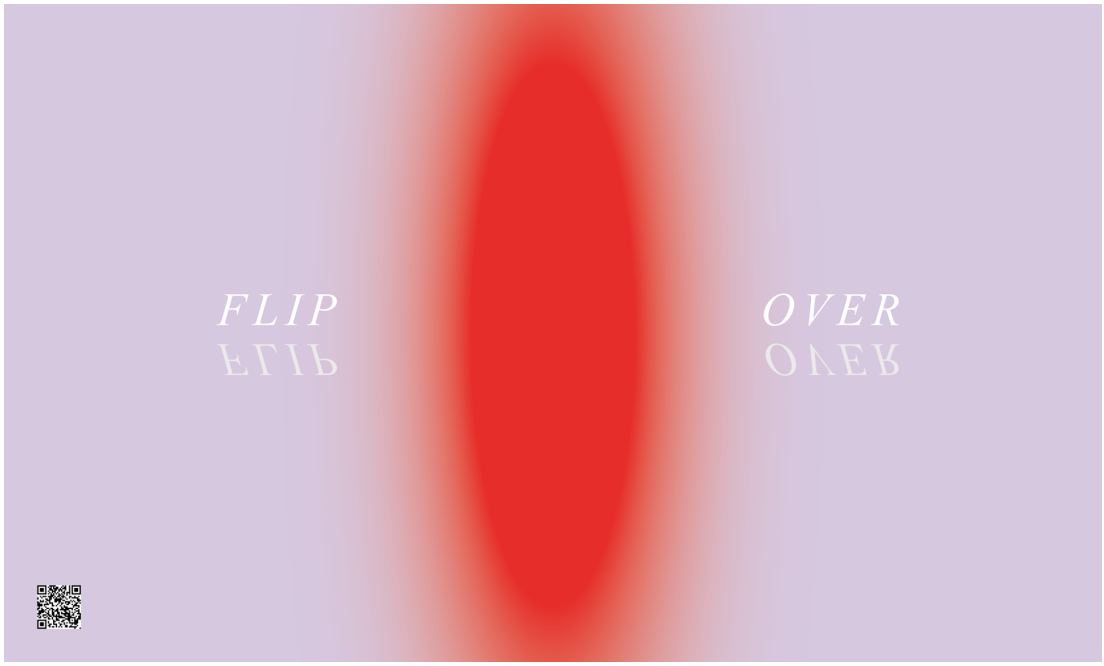


Figure 63 Double spread showing the turning point in the book. Lesley-Ann Daly, Designing Senses, 2024.



Figure 64 Front cover of Designing Senses. Lesley-Ann Daly, 2024.

The flip side generally mirrors the visual style of the front side however it is dominated by the colour of the Lighthouse card deck – lilac and red. This links to cover of the book (Figure 64) which is an inverse of the colours and pattern on the cards. The book cover title and the titles for the analysis sections are part mirrored, or flipped[53], as a subtle nod the flip section and

[53] On the cover the word 'senses' is flipped upside down, or mirrored, compared to the orientation of 'designing' (Figure 55).

need to change perspectives to read on. The analysis sections at the end of each chapter were added later in the book development process as an additional way to link the projects to the ethics that inspired them, as articulated in the flip side. They also serve to give the reader glimpses of the full repertoire of ethical considerations before fully revealing the card deck. Though each project is created to stand alone as a Speculative Critical Design probe – which generally allow the viewer to interpret the probes in their own way – it was important to be more blatant about the ethics addressed in each project in order to achieve the books aims. The book is designed to show ethics in context so that readers can link it to their own practice, and to not assume a level of ethical knowledge in my audience, the clear attribution of ethical inquiry to each project was necessary. Therefore, moving away from normative SCD practice of allowing innumerable differing and unchallenged interpretations, was a considered decision to optimise the overall impression and impact of the book.

5.7. PROJECT DEVELOPMENT

5.7.1. Project Structure

Having outlined the books' aims, format and style, a structure is needed for the projects themselves to ensure coherence throughout. To keep the book relatively evenly weighted I gave each chapter three projects, giving each a 300-word description, title, byline, and 3-4 images each, generally covering two double-page spreads – referencing the layouts of the aforementioned design books.

Brainstorming was used to initiate the ideation of each project, exploring each of the key concepts, e.g., coded bias and interconnectedness, creating a mind map of related concepts, references, design ideas and potential mediums. The most pertinent or interesting ideas were extracted for further exploration. The next steps included visual exploration, further reading, sketching, prototyping (physically and digitally) and engaging with collaborators- with skills or knowledge specific to that project. The order of these activities varied by project- often becoming cyclical as ideas were revised, discarded, augmented, and consolidated, with some solidifying more quickly than others.

5.7.2. Example Process

Here I will take one project as an example to show the development process (for full documentation of project development see Appendix 7.2.). *Enhancing Akansha* was triggered by the concepts of diverse embodiment (the need to design for different body types and abilities) and plurality of experience (that human experience is different for everyone so individual wants and needs must be considered). Akansha, a former colleague, and I met to discuss the kinds of enhancement she would ideally like to have (Figure 65-66). She explained her inability to swim, having grown up in inland India away from the sea, and the wish to have an augmentation that would enhance the experience of swimming underwater. For context Akansha was born with a partial arm on one side and wears a prosthetic day to day. Asking if she specifically would want her prosthetic to be adapted for this purpose she said 'no', the desired activity and fear of swimming are not related to her prosthetic. Separately she would like her prosthetic to be made of a more durable, lightweight material and aesthetically resemble the work of an artist she likes but otherwise she is content.

This conversation inspired a plural approach to this topic, creating two parallel projects, showing different speculative devices based on different approaches to the design challenge. For this the 'what if' statement (see Figure 65) was dissected into two parallel scenarios: 1. 'what if an enhancement was created that was co-designed with Akansha' – generally known as human-centred design; 2. 'what if an enhancement was created which solely uses technological solutionism i.e., that belief that technology is the answer to all problems?' 'Then what' is the design outputs from each studio: 1. discovers her fear of swimming and devises a program of training to address both her fear of and inability to swim, alongside designing a device which enables her to breathe underwater and augment the experience through sound; 2. ploughs ahead with designing a cumbersome propellor prosthetic that only addresses part of the issue, integrated with a large screen which actually obscures the wildlife around her rather than enhancing her experience. In this version the technological development takes centre stage and not the persons needs or experience.

I also collaborated with product designer, Felix Hundertmark, to co-design and visualise the proposed products from each scenario. After briefing him on the project and book concept, we iterated the design ideas, with Felix using his technical skills to digitally draw up schematics (see Figure 81), while I worked on the design system (see Figure 82). Without the life experiences of Akansha and the technical expertise of Felix this project would not have the depth of content or skill in presentation that it does.

Though this is just one example of the design process, each project was unique with collaborators bringing different skills and knowledge at different points in the process. Oftentimes, the knowledge contributed to more than one design, crossing the permeable boundaries of projects, or caused a change in direction entirely.

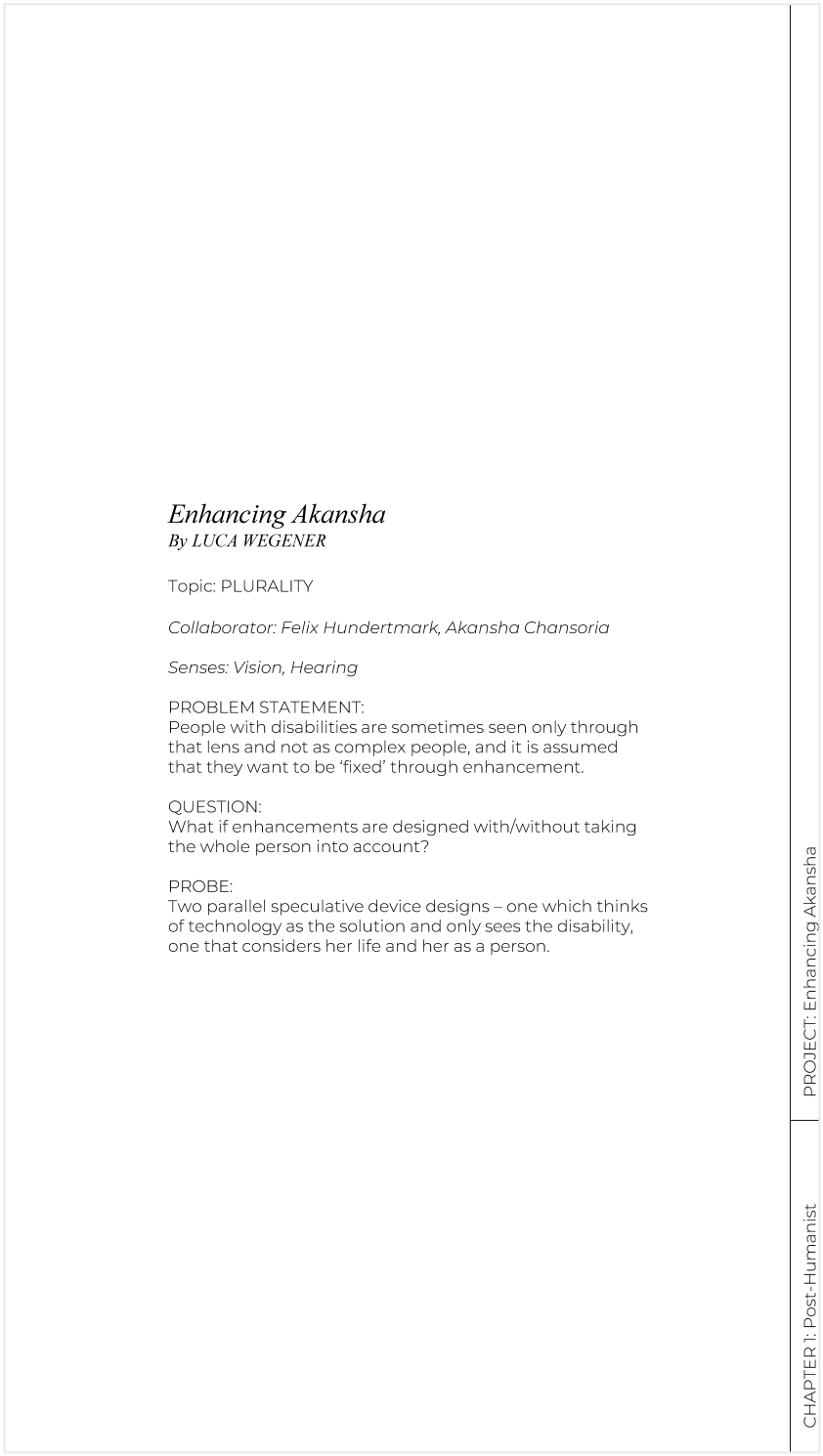
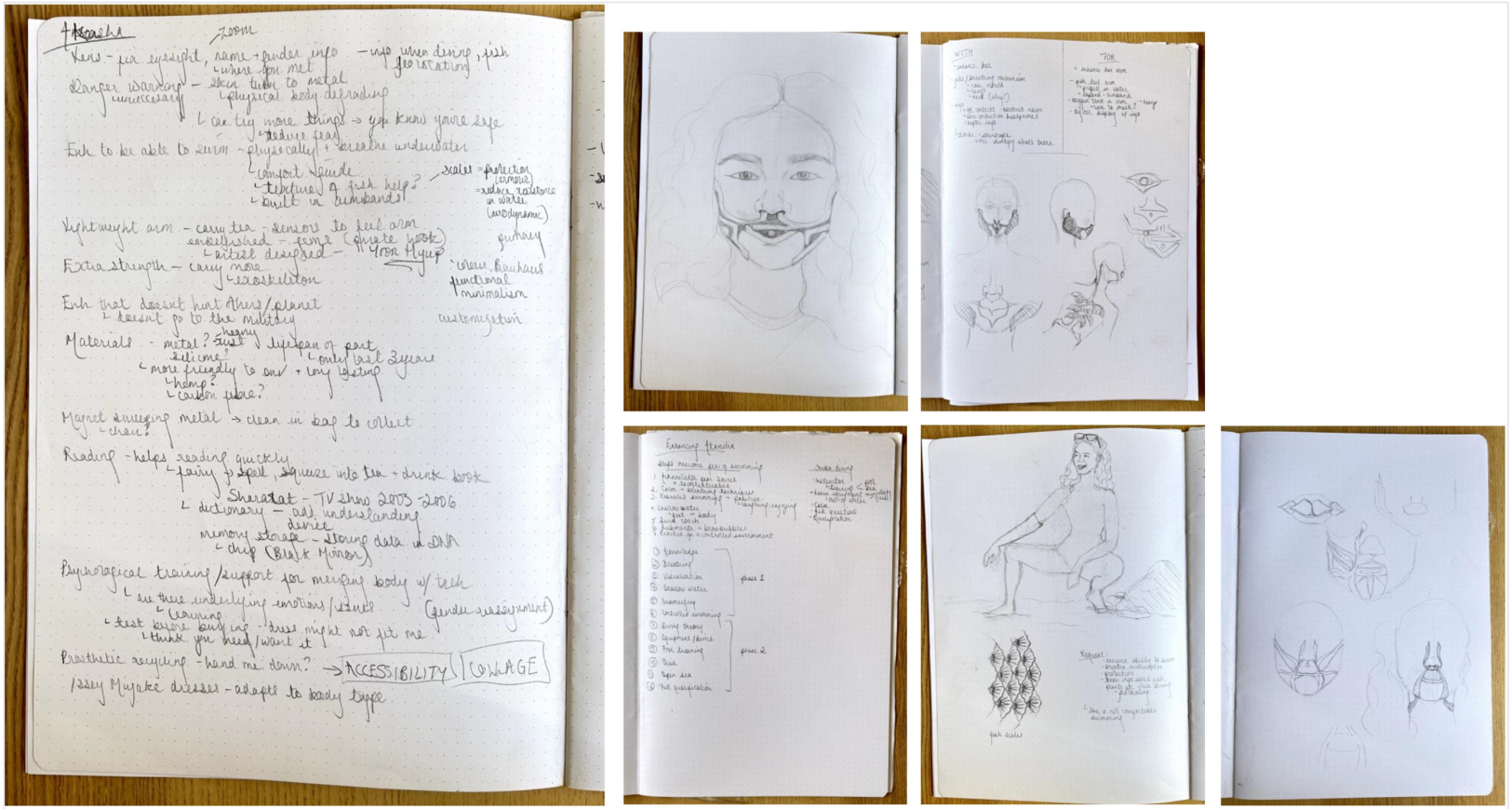


Figure 65 Enhancing Akansha: Problem statement, question and probe. Lesley-Ann Daly, 2022.



CHAPTER 1: Post-Humanist	PROJECT: Enhancing Akansha

Figure 66 Notes from conversation with Akansha and initial sketches, Lesley-Ann Daly, 2022.

5.7.3. Design Styles

One of the major challenges in creating the projects was emulating different fictional designers and aesthetic styles to bolster the verisimilitude of the book. Beyond the visual style, I also needed to ensure that each had its own perspective and did not appear to come from a singular person's views. Collaborating with others aided greatly in this task, with some providing new knowledge and alternative points of view, while others provided design skills which made the presentation of each unique. On projects where I led the visuals, I took inspiration from other designers, artists, or media to create differentiation from my own identifiable style - seen most predominantly in *I am Cyborg(s)* (Figure 67) and *Aging [dis]Gracefully* (Figure 68) where I utilise my background in prosthetic make-up design (Figure 69).

While challenging (and considerably more time consuming than creating nine projects in my own style from my own perspective) I learnt a lot through the process and grew as a practitioner and theorist. It forced me to consider differently how to present and convey ideas, taking more time to consider alternative representations and how they would be read by the audience. As a creative working on a long-term practice (i.e. the PhD) the variety also added the sustained enthusiasm for the research, as I felt like I was continually learning something new – whether that be new skills or new knowledge from others.

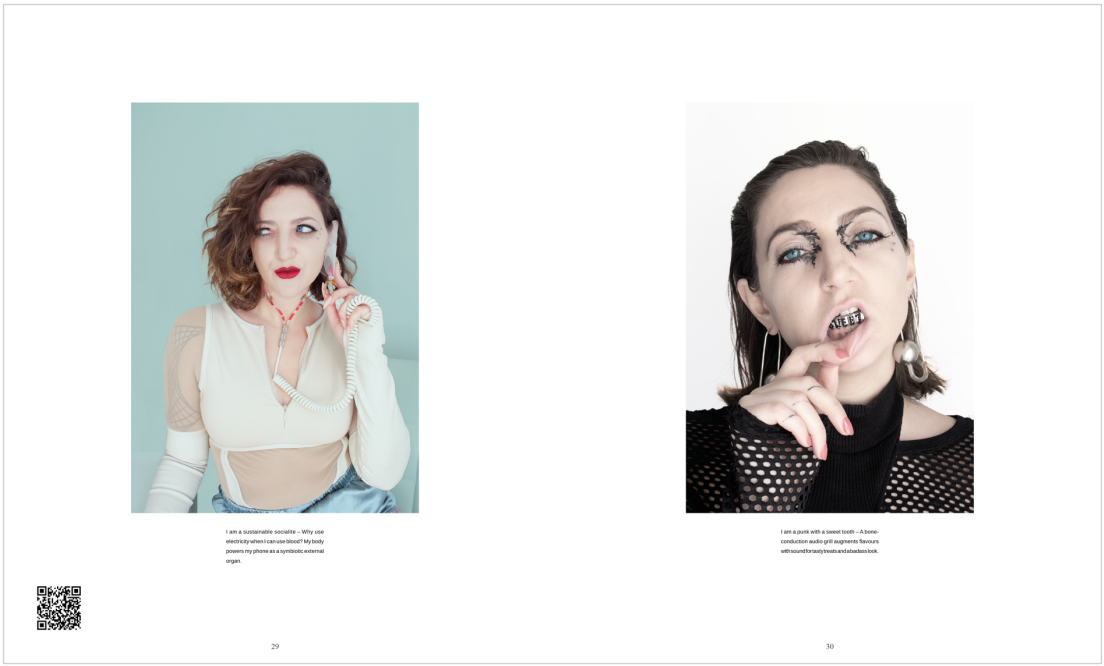


Figure 67 Double page spread showing the project I am Cyborg(s). Lesley-Ann Daly, Designing Senses, pp. 29-30, 2024.



Figure 68 Double page spread showing the project Aging [Dis]Gracefully. Lesley-Ann Daly, Designing Senses, pp. 11-12, 2024.



Figure 69 Prosthetic bat ear creation for Aging [Dis]gracefully. Lesley-Ann Daly, 2022.

5.8. REFLECTIONS ON THE PRINTED BOOK

Seeing the book printed in its entirety was a defining moment for both me and my practice. It marks a milestone in my research as an accumulation of all the work I have done to date (Figure 61) and is a logical merging of my theoretical and practical knowledge in a format that is genuinely new to me as a designer. It looks like a 'real' book, it feels like 'real' book, it is a real book. Reviewing the proof copy cemented its reality in my mind, but also pragmatically allowed me to check for mistakes or adjustments before the full printing run. This included checking font sizes, bleeds, image corrections and overall formatting, which could not be judged to scale on computer screen. The size is key to the perception of the book, it is large and weighty enough to need two hands to hold, focusing the reader's attention solely on it. The internal textured page also worked to heighten the tactility of the book, alluding to the sensory themed content within.

An aspect that needed testing with the physical copy was the moment of the flip, where the reader would move from the SCD projects in the front to the reveal and workshop. Would people understand what to do? Does the text need changing to be more explicit? Should arrows be added as direction? Having tested the transition with numerous design colleagues a pattern formed, becoming clear that almost everyone did something different when they reached that spread. Some rotated it 180 degrees, some closed it, others flipped it over to the cover pages. Subsequently, it was hit or miss whether people turned the page backwards or forwards i.e. towards the new content or back to the references in the front section. The randomness of the resulting actions, and the extra time taken to navigate the new mode of interaction was an unexpected moment of joy. As no clear winning method arose, I chose to leave the spread as is, simply saying 'flip over', embracing the unpredictability. In every instance the reader paused and explored different ways to physically augment the book, breaking the flow and setting them up to discover an alternate reality for the book in the next section.



Figure 70 Image of printed Designing Senses book. Lesley-Ann Daly, 2024.

CONCLUSION

This chapter explored the theory behind making the *Designing Senses* book and the *Lighthouse card deck*, as a culmination of and response to the research so far. The chapter articulates the book's aims of highlighting relevant SA ethics, using SCD as a provocateur for readers, and providing a participatory tool for teams to make tangible, positive changes to their SA development. This chapter underscores the importance of making ethical considerations public and accessible and demonstrates how design can bridge the gap between complex ethical issues and wider understanding.

The chapter shows how Posthumanism aided in structuring the book's complex topics, ensured that diverse voices were included, and that projects considered the plurality of humans and non-humans, and the multiplicity of futures. By tracing an example project development, the chapter revealed the integral impact that the contributors made to the diversity of the projects, complementing the knowledge I have gathered thus far to give added depth to each narrative. Specific attention was drawn to the use and ethics of deception, a device used to conceal my role as the curator and creator of all the projects, aiding the books' verisimilitude. It concluded that while unethical in some contexts, as an inherent part of SCD it does not pose a significant enough ethical risk to warrant changing the deceptive nature of the book design.

The next chapter will evaluate the effectiveness of the book – both the SCD projects and the workshop tools – understanding if it has achieved its aims. To do so experts will be engaged across SA, HEt, and SCD to review the book content, and test the workshop format.

CHAPTER 6: FEEDBACK & INSIGHTS

INTRODUCTION

This chapter presents feedback and insights from workshops testing the *Lighthouse card deck* and from reviews of the *Designing Senses* book. It aims to evaluate the effectiveness of the book and workshop in raising awareness and engaging participants in ethical discussions about SA. It reflects the iterative and experimental methodology where prototypes and tools are refined through feedback and use.

The chapter first discusses testing the *Lighthouse* card deck through workshops conducted with SA specialists, students and design practitioners. It articulates feedback on the methodology from differing perspectives, levels of familiarity with SA ethics and team dynamics, culminating in an optimised workshop methodology to be included in the subsequently printed *Designing Senses* book. Next the chapter identifies reviewers in the fields of Sensory Augmentation technology, Human Enhancement ethics and Speculative Critical Design whose expert knowledge provide valuable feedback on the book. Review questions were crafted to interrogate the aims of the book as articulated in the previous chapter, ultimately verifying whether the book and workshop will fulfil the research aim of enabling SA creators to develop more ethical devices.

The feedback and insights validate the approaches and methodologies proposed throughout the thesis, including the use of SCD to immerse readers in SA ethics and the use of PD to enable actionable next steps. They provide evidence of the impact and relevance of the research in industry and academia, as well as in teaching, reinforcing the argument for the need of ethical design frameworks in SA.

6.1. CARD DECK WORKSHOPS

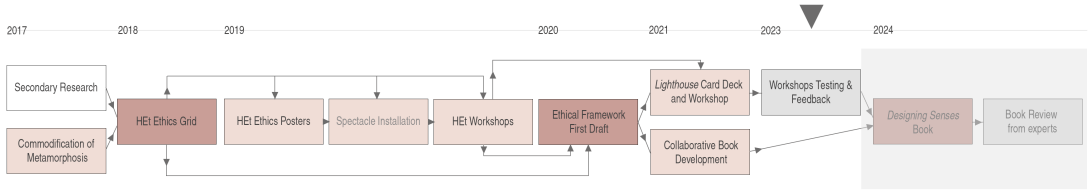


Figure 71 Practice work status – Lighthouse Workshop Testing and Feedback, Lesley-Ann Daly, 2025.

This section will articulate the initially defined instructions for the workshops and identify the relevant workshop participants, document and analyse their feedback, which is ultimately used to optimise the tools and process. Assessing the *Lighthouse* card deck first was necessary so that the augmented workshop could then be included in the book, which could then be printed. This also aimed to save time and materials by avoiding the need to reprint the book with an updated flip side.

6.1.1. Workshop Instructions V1

As described in Chapter 5.4.2. the workshop is designed to be run with a group of participants, therefore the first step is to arrange a suitable time and place for the team to meet. For those running the workshop in person, pick an area with a table large enough for everyone to sit around and for the A3 worksheets to be seen. Those running the workshop online should ensure that all the team has access to the figma board and know the basic functions of the platform – such as adding text and navigating the space[54].

The designer, acting as facilitator[55], will read out the topic of, and questions on, any chosen card (except the 'Wild Card' which should be left until last). For example, if the 'Knowledge Base' card was chosen, the facilitator would read out questions such as 'Do you need additional training or to source expert knowledge from outside? E.g., from other disciplines or relevant publics?' These questions can then be discussed by participants in relation to the sensory

[54] Unfortunately, figma does not allow the downloading or screenshotting of good quality images of its whiteboard area without a paid account so images of the overall set up could not be included here. Images of each worksheet in as high quality as possible are in Appendix 8.2-8.6 for each workshop. To see the final figma layout for the workshop, as linked in the book, see this web address:

https://www.figma.com/board/dghuMg1mLpMrowAYjJ78By/Designing-Senses%3A-Lighthouse-workshop?node-id=0-1&t=uJhElqDaFlQl1cnT-1

[55] This can be any other nominated team member if preferred, or if there is not a designer on the team.

device that they are designing, considering the following areas denoted on the worksheets (Figure 72): 'Current' – how the questions raised on the card are already being addressed by the team e.g., the team has been built with diverse skills and perspectives; 'Opportunities' – ideas, aspirations and new research areas that could be explored relating to the topic e.g., having diverse testers will deepen our understanding of its use in reality; and 'Hazards' – key risks or blockers that might hinder the progress e.g., some demographics of testers may be considered 'vulnerable'. Throughout the discussion a dedicated notetaker should fill out a worksheet with what is being discussed; however, all participants are free to add notes.

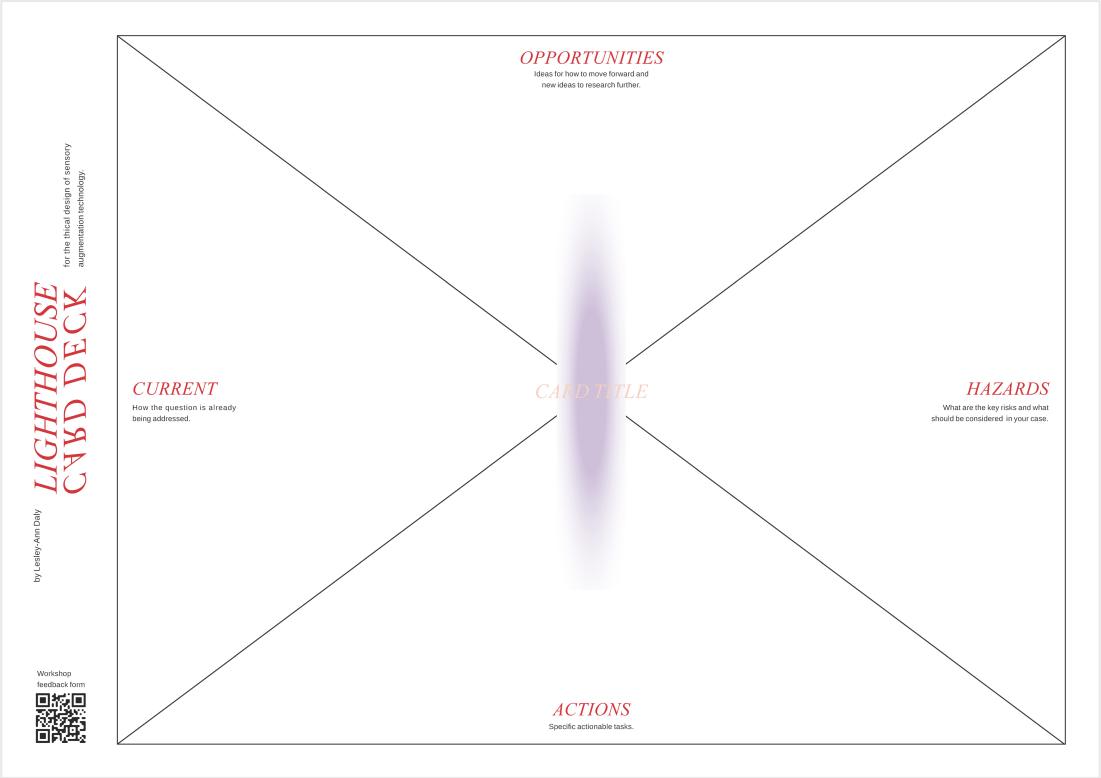


Figure 72 Original version of the worksheet used in the Lighthouse Card Deck workshop. Lesley-Ann Daly, 2023.

Once the three sections have been completed, attention should be drawn to the 'Actions' section on the worksheet. The participants should discuss and decide upon specific, actionable tasks for the team to perform to make this area of development more ethical e.g., research how to work with 'vulnerable' participants, potentially recruiting a specialised researcher, to ensure that they are safe and supported throughout the testing process. These actions should consider the work already being done, the opportunities and hazards identified, and who/m on the team is responsible or best placed to do the task, e.g., if it is related to their discipline

or workstream. There is no specific time limit for the workshop, it is flexible, depending on the team's availability and focus. However, it is advised that someone keep an eye on the time, e.g., giving 15minutes per card, to ensure that the session doesn't run too long and to encourage decision making in order to move on to the next card.

After repeating the same process for all the desired cards, the final 'Wild Card' should be completed. This card is relatively open and asks if there is anything else that should be considered that hasn't been discussed yet. This gives participants the opportunity to bring any additional ideas or concerns that they have to the group. This card is crucial to the process as the multitude of devices, team structures, intended purposes and technologies used, cannot be predicted nor accounted for – this card enables the teams, i.e. the specialists, to highlight their specific concerns related to their unique process.

Post workshop a team member, potentially the facilitator, can gather the worksheets (physically or digitally) and document the outcomes in a format, or program, that the team is familiar with e.g. Google spreadsheet, Jira work tickets, or another task planner. Each team member can be associated to their relevant 'actions', enabling them to track progress of the task. This can also act as a record for the overall status of the ethical development and can be periodically revisited by the team to check the progress, or if there is a need to adjust tasks due to new developments in the work. This workshop can be repeated throughout the development of the device and even after release to explore updates, redesigns or new concepts.

6.1.2. Workshop Participants

SA Specialists

The primary audience for this work is people or teams who are creating SA devices, whether in industry or academia (see Chapter 5.2.), therefore I sought these out to participate in testing the workshop methodology. Through my work in the SA field, I have made several contacts whom I reached out to participate or, if unable to, provide suggestions of others who they think it would be beneficial for and are potentially willing to dedicate the time.

As specialists in the field, these participants would have extensive knowledge of the device which they are working on, and some contextual knowledge of the field of SA, related to their own disciplines. For these workshops they were presented a short overview of my research to contextualise the session, and an explanation of the instructions. Additionally, they were each

LIGHTHOUSE
CARD DECK



METHOD

SET-UP

Gather your team, or representatives from each discipline e.g. someone from product design, software, neuroscience. The designer will act as the facilitator and you will also need a dedicated note taker for the discussion section. Sit around a large table or floor space with the deck and worksheets in the middle. This workshop can also be conducted online using a platform such as miro.

TOOLS:

- Lighthouse card deck
- Worksheet for each card
- Post-its & pens

SYSTEM:

- Designer shows first card (any apart from the wild card) and reads the questions.
- Team members each write down their response to questions on post- its, whether related to their domain or not - this ensures that everyone has the opportunity to contribute their knowledge and ideas.
- Cover at least one of the following:
  - o CURRENT: How the question is already being addressed.
  - o HAZARDS: What key risks are associated with the questions, what should be considered in your case.
  - o OPPORTUNITIES: Ideas for how to move forward and new ideas to research further.
- Post-its from all team members are placed on the worksheet in the relevant sections, where everyone can see.
- The designer now leads the discussion on what has been identified, e.g., common responses, thoughts for next steps, has anything not been covered?
  (The note taker should be taking notes throughout the discussion and adding post-its with new ideas to the worksheet).
- Conclude this card by writing down specific actionable tasks e.g., adjust the UI for X, change material Y, or research further into Z.
- Move on to next card.
- Discuss the wild card last.

NIGHT VISION

THIS DEVICE

- Inspired by animals who have night vision
- Surgically augment the eye so that it can take in extra light at night - allowing humans to see in the dark (as well as daylight)

IMPACTS

- Made so that humans don't need to use artificial light at night
- Lowers use of earths resources
- Lowers light pollution - (light pollution negatively affects nocturnal animals, birds fly into windows as they are blinded by the light reflection, sea turtles walk towards bright cities inside of in the ocean/towards the moon)

WORKSHOP FEEDBACK FORM

<---- PLEASE FILL THIS IN!

Any questions please contact Lesley-Ann Daly
email: l.daly@arts.ac.uk

Figure 73 Original workshop instructions for non-specialists. Lesley-Ann Daly, 2023.

given the option for me to act as the facilitator, rather than an internal member of their team – the companies Sensae and Valence Vibrations both opted for myself as the facilitator, whereas academic researcher Dr Giles Hamilton-Fletcher choose to do the workshop solo. When facilitating I explained that I was not there to contribute per se, or validate the correctness of their ideas, instead I was there to guide the process, answer questions and keep the timing on track[56].

Non-Specialists

As students are the secondary audience for the work, I also reached out to a master's course that I have previously taught on to test the suitably for this audience. Additionally, I opted to run the workshop with design practitioners to test the workshop methodology as piece of design practice in itself.

Due to these audiences being non-specialists in SA, and therefore not already having a device to reflect upon, the format required adjustments and the topic given contextualisation. To do so, I created a speculative company and SA device – based on the project *When Lights Stole the Night* – to give the participants information about the technology which they would be reflecting upon (Figure 73). Participants were asked to read this thoroughly first and assign themselves roles within the company – related to their own expertise – to use as a base for the rest of the activity. As with the specialists, I introduced my research and the instructions for the workshop, however I did not give the option for me to facilitate – this was mainly due to there being multiple groups working at once and therefore I could not be part of all discussions. However, I was present to advise on the process and answer questions throughout.

6.2. WORKSHOPS OVERVIEW & FEEDBACK

For the purposes of this research a QR code was provided, either physically or digitally, with the workshop materials so that the participants could provide feedback on the workshop. The linked Google form (see Appendix 8.1.) asked for: basic information about the participants; an overview of the SA device (real or speculative); their feedback on the workshop method and

[56] As I do not know the devices or companies in detail it was not my place to offer suggestions or judgement upon their practices, this was for the team to discuss as they are the specialists for that device. However, I would draw attention to questions or topics that were not explored while discussing a particular card.

questions posed on the cards; whether it resulted in useful actionable steps; whether they would use the workshop again; and any other observations that they made.

Additionally, I made notes during the workshops (with the exclusion of Dr Hamilton-Fletchers as he ran it solo), observing how the participants engaged with the method and any issues that arose. Below, I have first given context on each workshop and its participants, then detailed my observations and any next steps needed- the workshops are documented chronologically as some adjustments to the method were made incrementally after each session. Next, I provide an overview of the feedback gathered from the Google form, and finally specify any adjustments made to the method ready for inclusion in the book. (For full overview and analysis of each workshop see Appendix 8.2. – 8.6.).

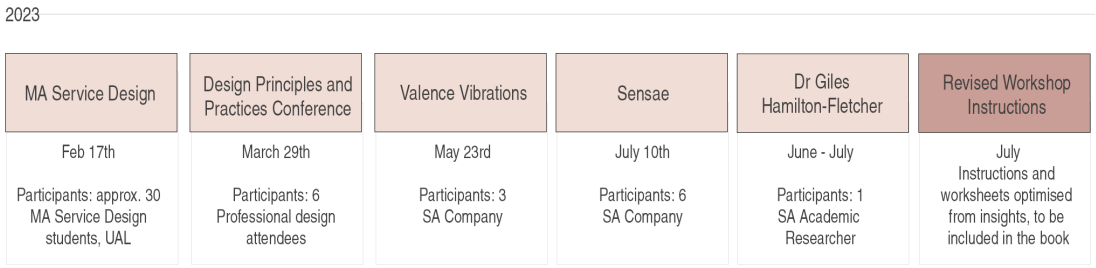


Figure 74 Timeline of workshops to test the Lighthouse card deck and workshop, by Lesley-Ann Daly, 2023.

6.2.1. MA Service Design, UAL

Context

MA Service Design, UAL, is a course that is focused on human-centred design, teaching students to work in participatory and qualitative manner with stakeholders to design public and private sector services. In 2023, the course ran a module on AI Ethics and the creation of design tools for its assessment, led by lecturer Maria Lujan Escalante. As part of this module visiting practitioners were invited to share knowledge from their experience through presentations and workshops. Having also been a visiting lecturer for their Global Futures module- as an expert on Speculative Critical Design – the team reached out to me to run this workshop during the module and talk the students through my own design process when creating ethical design tools. As non-specialists, the workshop was formatted to include information on the speculative company, based on the project *When Lights Stole the Night*

(Figure 73). The workshop ran for an hour and a half, with 30 participants, split into groups of three to six (aligned to their course groups).

Observations during the workshop

It became clear almost immediately that more information was needed about the speculative sensory device being analysed e.g., more technical details, context on the device development, company information and how they (the participants) exist within this. Many groups needed more clarification on these topics before being able to begin with the cards and worksheets.

As the cards and workshop are specifically designed for company's creating SA devices this need for clarification is understandable as the students are not experts in SA technology and are not developing the device themselves and therefore don't know the technology and device development in detail. This confusion was reflected in the Google form responses, for example in response to the question 'Did it result in useful/ actionable next steps?' one group responded:

> Yes! The questions are our starting point to look at the current ways of addressing. It's a bit hard to imagine the next steps because the device is a new technology, if this workshop is conducted in a company, it should work better. (Appendix 8.2.).

Adjustments for the next workshop

For future workshops that are run with non-expert participants the information about the device will need to be expanded to include company information, a longer device description, process progress, and space for participants to identify their expertise and therefore, role in the speculative company (see Figure 75). Based on the feedback regarding the terminology used, adjustments to language are made, e.g., changing the title 'Hazards' to 'Challenges', and clarification of the difference between 'Opportunities' and 'Actions' (see Figure 76).



NIGHT VISION

COMPANY: Overmann Tech Ltd.

COMPANY INFORMATION:
OTL is an up and coming sensory technology development company. The startup has recieved several investments and hope to use this large (but not unlimited) funding to allow them to create this innovative technology. The company believes that technology can help tackle global challenges such as climate change and sustainability, at the same time as creating new experiences for all humans.

EMPLOYEE ROLES:
(Please identify what disciplines each of your group comes from.)

THIS DEVICE:
Purpose: OTL are developing a technology which gives the wearer night vision. The device is inspired by animals who can see at night, and allows humans to see in the dark as well as in daylight.
Technology: The company is creating a set of contact lenses which can augment the amount of light which enters the wearers eyes - taking in more light in dark conditions, and less in brighter conditions. They are intended to be worn for long periods of time without irritating the eyes.

INTENDED IMPACTS:
- Made so that humans don't need to use artificial light at night and therefore lowers the use of earths resources for electricity consumption.
- Lowers light pollution at night which negatively affects nocturnal animals - e.g., light pollution can throw off animals circadian rhythms, birds fly into windows as they are blinded by the light reflection, and baby sea turtles walk towards bright cities instead of into the ocean/towards the moon.

PROGRESS:
Technical: The contact lenses have been designed, and are technically possible - i.e. the technology inside the contact lenses can augment the amount of light that enters the eyes, allowing people to see in darker conditions.
Testing: The contact lenses have not yet been tested with participants over a long period of time. Research needs to be done into the real world impacts of wearing the lenses and being able to see at night.

METHOD

SYSTEM:
- Choose 1 card and read the questions on it.
- Discuss the questions and fill in the worksheet in the following order:

1. CURRENT: How is the company/team already addressing the issues that the card poses?

2. HAZARDS and OPPORTUNITIES: What are the key risks, and what are potential areas for positive development?

3. ACTIONS: Considering what you have put in the previous sections what can you do next? Do you need to do more research in a particular area, find an expert, redesign etc?

- Move on to the next card. Give yourselves approx. 10mins per card.

POST WORKSHOP
(not part of this workshop)
The intention is that the companys' team come out of the workshop with a set of actions/next steps which are relevant to their specific device and team. These actions can guide the ethical development of their technology, and can be referred back to throughout the research, production, dissemination and aftercare phases.

WORKSHOP FEEDBACK FORM

<---- PLEASE FILL THIS IN!

Any questions please contact Lesley-Ann Daly
email: l.daly@arts.ac.uk
website: lesleyanndaly.com

Figure 75 Updated workshop instructions for non-specialists. Lesley-Ann Daly, 2023.

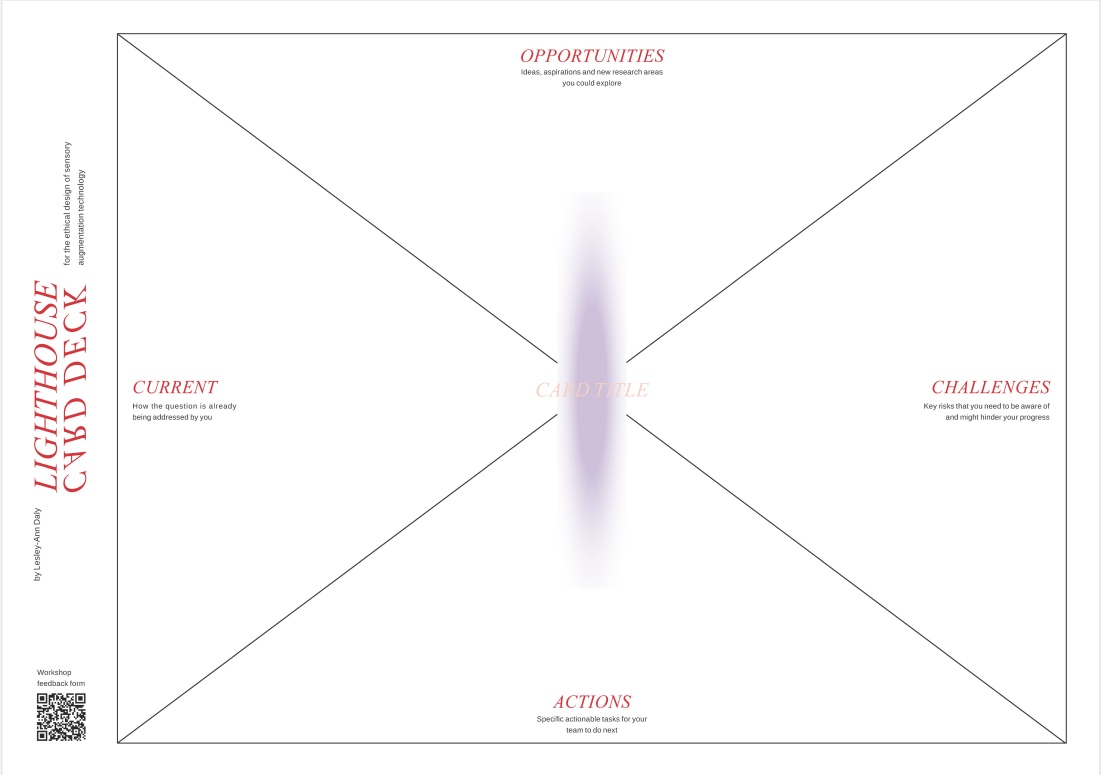


Figure 76 Updated worksheet with adjustments to titles and descriptions. Lesley-Ann Daly, 2023.

6.2.2. Design Principles & Practices Conference

Context

The annual Design Principles & Practices conference, held in Lisbon in 2023, had a special focus on 'New Agendas for Design: Principles of Scale, Practices of Inclusion' and how 'The designer plays a critical role as a constitutive element of our cultural and material reality' (Design Principles & Practices Research Network, 2023). My submission to run the workshop here was reviewed by their panel and accepted in January 2023.

The conference is aimed at design practitioners and therefore the attendance and resulting workshop participants fell in this bracket – none of which were presumed to have specific knowledge of SA, and therefore the workshop was formatted for non-specialists, with the aforementioned adjustments from the first workshop. The workshop ran for one hour, with six participants split into two equal groups.

Observations from the workshop

Having spoken to the participants after the workshop, most were design practitioners or academics who were working on their own design tools and workshops, some of which are also around ethics. Therefore, there was a high literacy in design tools and methodologies. Participants seemed comfortable with the instructions and didn't ask many clarifying questions (unlike during the previous MASD workshop), showing that the added information helped with the clarity.

Reviewing the physical worksheets showed that some of them were filled out with general information about the device, rather than information specific to the card being addressed. This is potentially because they only have the contextual information that is provided on the instruction sheet and not further information that they would have from actually designing the device.

Next steps

The adjustments after the previous workshop seemed to work well to clarify the device information and workshop process, therefore no further adjustments are needed at this stage for non-SA expert audiences considering this particular SA device. There is potential to try the workshop analysing a non-SA device, e.g., a technology from another industry with participants from that industry, to determine its relevance for other technologies however this is not planned as part of this research.

6.2.3. Valence Vibrations

Context

Valence Vibrations are a company who have created an app for the Apple watch which 'analyses tonal data from your wearable device's microphone to classify emotions' (n.d.). By listening to vocal tone (of the wearer or others around them) the app uses AI to classify a speaker's emotions in real-time and convey it back to the wearer through coded vibration patterns – informing the wearer of the emotional state of the speaker. The company focuses on people with different neurotypes to help them better interpret emotions and improve communication. The company began as a participant, and runner up, in Neosensory's first hackathon in 2020, where teams were challenged to come up with new application ideas for the Neosensory *Buzz* (Neosensory, 2020).

The company's CEO Chloe Duckworth was contacted via email to propose their involvement. The workshop aims and process were explained via a video call, after which the workshop date was set. All three team members signed Consent forms (Appendix 8.5.), and I signed an NDA prior to the workshop[57]. As SA specialists no additional formatting was needed, and as remote participants the three-hour workshop was conducted online using the figma digital whiteboard.

Observations during the workshop

The first card and associated worksheet became an 'idea dump' for all the risks and opportunities associated with their technology. Subsequently, by card two or three, the participants got into the flow of the workshop and sections became more specific to each ethical area. While this is not necessarily an issue, it's worth considering starting with a card that is more general to get all these ideas down, rather than overwhelming a more specific worksheet.

As the workshop progressed the 'Opportunities' section was frequently addressed less, as these ideas went straight into the 'Actions' section. Again, this is not necessarily an issue as the 'Opportunities' section is designed for participants to think about positive next steps. In general, the worksheets became less densely filled as time went on as ideas began to overlap with previous sheets and therefore did not need to be repeatedly noted. The technology being discussed is an app as opposed to a physical device (it works on an Apple watch which they don't have control over), therefore material issues were not as relevant.

Generally, the team are very ethically aware and already use their personal ethics around inclusivity and helping others to guide their technology creation – making the workshop less about discovery and more about having those conversations as a group. The participants verbally stated that the workshop was helpful in reaffirming and consolidating conversations on ethics that they had previously had.

[57] With all participants it was made clear that the filled in worksheets were intended to be documented in thesis. However, as some company information discussed may be confidential, it was suggested that they could avoid sensitive topics on the sheets (though this was not advised as the workshop format should allow them to speak openly to discuss all relevant topics). They would also be given the opportunity post workshop to identify any worksheets with confidential information, which I agreed to omit from the thesis. Additionally, I offered to sign NDAs to assure them that I would not speak about confidential information outside of the workshop.

Next steps

Due to the 'idea dumping' on the first worksheet, for subsequent workshops I will ensure that one of the more general cards are addressed first. While it was reassuring to see a company with such a strong ethical drive, it will be valuable to see the workshop being done by a team who are less ethically aware and so may discover new ideas and actions.

6.2.4. Sensae

Context

Sensae are a Denmark based company that creates technology to aid people with stress management and improve mental wellbeing, via smart haptic biofeedback and personalised coaching (Nozomi Studio, n.d.). The smart wearable monitors physiology and provides feedback via haptics. The data collected is analysed by a coach who works with the wearer to understand the readings and supports techniques for managing stress in the long term.

Both the CEO and CTO of Sensae previously worked at CyborgNest, where we were colleagues working on another haptic wearable device – *Sentero* (Indiegogo, 2020). They were contacted via email to invite the team to participate in the workshop. The workshop aims and process were explained via a video call, after which the workshop date was set. All six team members signed Consent forms (Appendix 8.6.), and I signed an NDA prior to the workshop. As SA specialists no additional formatting was needed, and as remote participants the three-hour workshop was conducted online using the figma digital whiteboard.

Observations during the workshop

Early on in the workshop the participants self-identified as a team of introverts, flagging up that they may be quieter than other groups. This reflected throughout the workshop where it took more encouragement to get them talking and answering the questions. I took the time to reassure them that they are not there to tell me the 'correct' answer, but it is a discussion between them. I also employed the technique of allowing room for silence, which encourages someone to start talking to fill the pause, which I believe helped. However, when the team started on a topic the conversation became much more fluid, and they frequently went in depth. Additionally, they were reluctant to be the one who typed in the worksheets, so some insights may have been undocumented.

Due to the depth that the team went into, the time on each worksheet was much longer – with only five worksheets completed in the first two hours. After a short break the team identified several worksheets that they wanted to complete, or thought would be the most useful, so we spent the last hour completing these. Overall, nine out of fifteen worksheets were completed.

Though there was a marked drop in energy towards the end, the team expressed thanks and confirmed that it was useful. The CTO also asked if we could do a follow up session in approximately six months to check if they have been actioning the next steps identified in this workshop and update with any developments.

Next steps

The length of the workshop has come up repeatedly, partially due to the number of cards. As Dr Giles Hamilton-Fletcher is running his workshop concurrently I awaited his feedback before considering changes.

6.2.5. Dr Giles Hamilton-Fletcher

Context

Dr Hamilton-Fletcher is a Postdoctoral Researcher at NYU Langone Health working on a project which aims to represent visual information with sound. The *SoundSight* app (n.d.) uses the phone camera to scan the area it is directed at and transforms visual information of objects- such as the shape, depth, colour, location, and movement – into pleasant sounds chosen by the user – such as vocals, instruments, rainfall, and music. *SoundSight* is a sensory substitution technology which aims to be a practical tool for the visually impaired, enabling them to receive real-time information about the space around them through soundscapes.

Dr Hamilton-Fletcher spoke about his project as part of a talk series that I co-ran on Sensory Augmentation (Caradt, 2021b), he was contacted via email to invite him to participate in the workshop. The workshop aims and process were explained via a video call, during which he chose to run the workshop solo in his own time via the figma whiteboard. As I was not involved in the workshop I cannot provide observations from the process. See the signed Consent form in Appendix 8.4.

Next steps

Having completed several workshops with SA industry specialists (Dr Hamilton-Fletcher, Valence Vibrations, and Sensae) the length of the workshop and high number of cards has been a common issue. Each have suggested being able to select cards which are more relevant, or could be more helpful, rather than having to complete the full set. This has been taken into consideration for the adjustments, which are outline below.

6.2.6. Written Feedback from Participants

The feedback received from participants via the Google forms link has been analysed and key themes have been identified per question below. For the full feedback sheet see Appendix 8.2. – 8.6.

Question: Feedback on the workshop process - How was the method, participation etc? What worked or didn't?

The feedback was generally positive, with comments on how engaging it was and that it was helpful in identifying and discussing relevant questions- "I think the process was super helpful in helping us identify areas of focus and planning effectively" Sensae participant (Appendix 8.6.). "Exploring questions with respect to the App was useful and sparked new thoughts or reminded me of thoughts I have had over the course of the App's development. So, it works in terms of expanding thoughts and refreshing them" Dr Hamilton-Fletcher (Appendix 8.4.).

However, there was mixed feedback from non-specialists around the limited information provided about the speculative device, with one participant from the Design Conference asking, “would storytelling be a complementary method for less experienced teams?" (Appendix 8.3.), which may make it, as described by an MASD participant, less “dry” (Appendix 7.2.).

Question: Feedback on the cards and questions - Were the topic areas and questions helpful/relevant?

Participants noted how relevant, comprehensive, and thought-provoking the selection of questions are, with an MASD participant stating that "The questions were well thought out, they greatly helped in framing the discussions" (Appendix 8.2.), and a Sensae participant

noting, "The cards were comprehensive and I think the questions were thorough" (Appendix 8.6.).

However, it was noted by both MASD and Valence Vibrations that questions could become "repetitive" (Appendix 8.2. & 8.5.).

Question: Did it result in useful actionable next steps? Did the questions generate a helpful discussion and identify next steps? Please describe.

Participants all responded with 'yes', with many finding the cards helpful in generating discussion and actionable items. A Sensae participant said "Yes, we have added multiple action items from the discussion" (Appendix 8.6.), while Dr Hamilton-Fletcher went more specific saying "The consideration of the risks and benefits of sensory coding applications provided actionable next steps" (Appendix 8.4.).

Question: Would you use the cards again? and why?

All participants showed a consensus on the workshop's reusability, with appreciation for its simplicity, visual appeal, and adaptability- "Yes, they are fairly simple and look good. It's a good way to generate ideas" Design Conference participant (Appendix 8.3.). As noted above Sensae participants expressed that they would like to run it again "It would be interesting to repeat this activity after our next round of fundraising and see what has changed" (Appendix 8.6.) and MASD participants also identified that it would be beneficial to do regularly, "Sure! It prompted us to think practically, and we can apply this regularly" (Appendix 8.2.).

Question: Any other feedback or observations?

Participants used this space to give praise for the workshops and card sets, with no further feedback. Dr Hamilton-Fletcher additionally advised that "Lowering the effort barrier is probably the most important aspect to change. I would like to engage with this in terms of a shorter conversational format" or "If possible, turn the instruction into visualized formats might be helpful for participants to understand. For example, a short video, images, or illustrations" (Appendix 8.4.).

6.2.7. Changes to the Workshop Methodology

After having reviewed the observations from the workshops and feedback from participants, several adaptations have been made for the final workshop method (Figure 77). To overcome issues with the length of the workshop and perceived relevance of cards, the format has been changed so that initially only four cards will be addressed – 'You in the Process', 'Knowledge Base', 'Plurality of Humans', or 'Sensory Coding'. These were chosen as they would be relevant to all types of company, creator, or sensory device, addressing the participants personal ethics, the diversity of the team, understanding of their audience and specific sensory aspects of their device. Afterwards, the teams are encouraged to choose as many other cards as they deem relevant to work on, so as not to overwhelm them with superfluous questions. The team is encouraged to pick topics that they are not as well acquainted with e.g., if there is already a solid understanding of regulations related to the device then the 'Safety/Regulation' card can be put aside in favour of e.g., the 'Challenging Norms' card, so that new discussions can be had collectively. Lastly, they are asked to address the 'Wild Card' which leaves space open for them to identify and discuss issues that may not be featured in the cards but are, or could be, relevant to their work. Making these adjustments to the method allows teams to still cover all the relevant topics, while not overburdening them. No further changes have been made to the method for non-specialists.

METHOD

Set-Up
Gather your team, choose someone to facilitate the sesssion (ask the questions, keep time etc), and choose someone/s to be a dedicated notetaker so that key discussions are documented. If conducted in person, sit around a large table or floor space with the card deck and worksheets in the middle. If done virtually, ensure everyone has access to the digital workspace (figma).

In person tools:
- Lighthouse card deck
- Worksheet for each card
- Post-its & pens

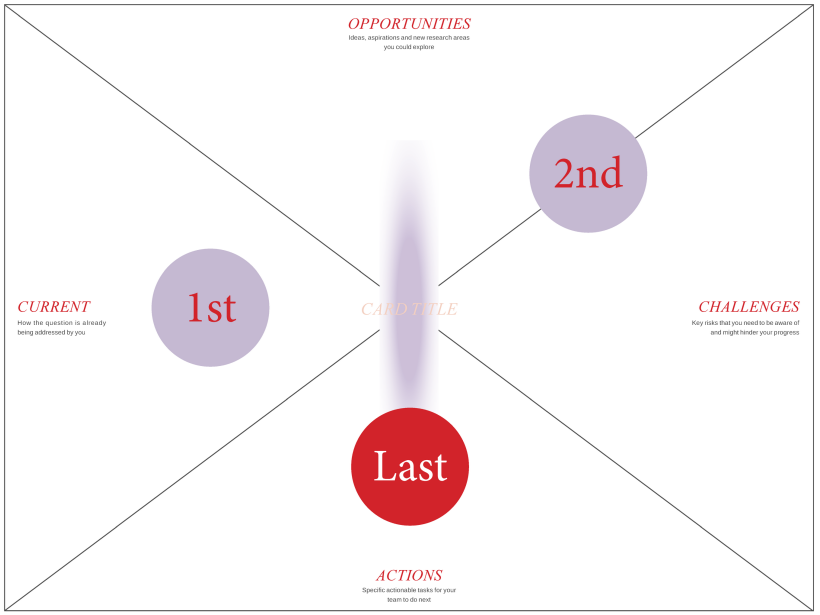
Process:

1.
- Start with the first 4 mandatory cards: ***'You in the Process', 'Knowledge Base', 'Plurality of Humans',*** and ***'Sensory Coding'.***
- The facillitator will read the questions on the first card. Discuss the questions as a team, considering the following:
  - ***CURRENT:*** How the question is already being addressed by you
  - ***OPPORTUNITIES:*** Ideas, aspirations and new research areas you could explore
  - ***CHALLENGES:*** Key risks that you need to be aware of and might hinder your progress
- The note taker should be taking notes throughout the discussion and adding post-its with new ideas to the worksheet.
- Conclude each card by writing down specific ***ACTIONS*** e.g., adjust the UI for X, change material Y, or research further into Z.
- Move on to next card.

2.
- Once the first 4 cards are complete, take a few minutes to look at the remaining 10 cards (minus the 'Wild Card') and choose as many as you would like to address.
- Tip: *don't pick topics that you are well acquainted with, challenge your thinking with topics that you may not have considered before.*
- Repeat the same process as above for the cards that you have choosen.

3.
- Finally, finish off the session by doing the ***'Wild Card'*** which gives your team the opportunity to raise any other issues that they think might be relevant.

NB: There is no specific time limit as discussion length will vary depending on the relevance of a card. However it's recommended that the facilitator give time warnings e.g., after 15minutes.



POST-WORKSHOP

- One team member collects the worksheets and consolidates the outcomes into a shareable document or workflow planning system, in a format already used by the team for easy access e.g., google spreadsheet, airtable grid, jira work tickets.
- This document sums up the workshop, however its main goal is to show the actionable tasks identified for each team so that they can be addressed by the relevant people.
- This record can be used as an ongoing reference source for the team. Progress can be checked at regular intervals, new ideas can be added or tasks adjusting during the R&D process.

Figure 77 Updated workshop method after workshops. Lesley-Ann Daly, 2023.

6.3. *DESIGNING SENSES* REVIEW REQUEST

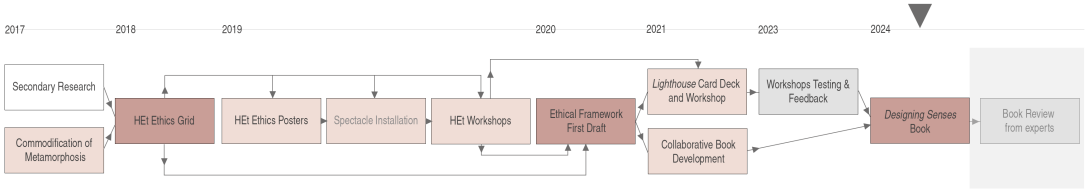


Figure 78 Practice work status – Printing finalised Designing Senses book including updated Lighthouse card deck and workshop, Lesley-Ann Daly, 2025.

Having tested the workshop methodology with SA specialists and non-specialists, the card deck, worksheets and instructions have been optimised in response to the feedback. The updated tools were added into the flip side of *Designing Senses,* with links to any materials online, including the figma board and pdf files of the cards and worksheets for printing. With the book content completed it was sent for printing so that book reviewers could be given physical copies to read. Below are the review questions which were constructed to analyse whether the book achieved its aims, an overview of reviewers and their work relevant to this research, and an analysis of the feedback received from them.

6.3.1. Crafting the Review

As with the design of the book itself, the review request was crafted to appear like a real request, for a real book, awaiting publishing. This meant ensuring that the content was both representative of requests that the reviewers may have received for other publications, while also ensuring that the feedback contributes to the research. Questions were developed so that the feedback from each can measure whether the book has successfully achieved its aims (as explained in Chapter 5.3., 5.4. and 5.5.) and understand why it has or has not done so.

The success criteria, and therefore the questions, include: that the book explores relevant ethics of SA; that SCD is a valid method for provoking reflection on the topic; the content is visually pleasing and understandable; that the work highlights the creators responsibility in technology development; that the book has the potential to impact both academic and industry practices; that it embodies Posthumanist ethical practice, including accessibility and inclusivity; and that it is a unique contribution to the field. The use of deception in the book was not outright asked, so as not to highlight this reveal before reviewers had engaged with the book, allowing them to discover it for themselves (or not).

Below are the seven questions posed to reviewers:

1. Ethical Exploration: How effectively do the projects explore the ethical implications of Sensory Augmentation technologies on humans, society, and the world? Are there specific projects that stand out for their relevance and deep ethical inquiry?

2.Speculative Elements: How are speculative elements used to explore possible futures of Sensory Augmentation? How do Speculative Critical Design methodologies, such as the use of the uncanny, deception and provocation, contribute to the overall impact of the book?

3. Visual and Narrative Clarity: Are the concepts and ethical implications of Sensory Augmentation presented in a way that is both visually engaging and easy to understand? How does the book structure contribute to the narrative?

4. Creators' Responsibility: How does the book reflect on the creator's responsibility in creating Sensory Augmentation technologies? Are there sections or projects that highlight responsible design practices?

5. Academic and Industry Impacts: What potential impact do you envision this book having within academia and industry, particularly in terms of influencing the design and development of SA technologies? How might it shape ethical discussions and consideration for real-world implications?

- How might it impact your own practice?

6. Accessibility and Diversity: How accessible is the book's content to its intended audience, which includes designers, ethicists, and technologists? Does it incorporate diverse, interdisciplinary perspectives to enrich the discussion?

7. Comparative Analysis: How does this work compare with existing literature in your field, what unique contributions does it make, and are there areas in the book that could benefit from further development?

6.3.2. Criteria for Reviewers

Taking into account the aims for the book, and the seven review questions, potential reviewers were considered in relation to each criterion to ensure that all aspects could receive relevant, expert feedback. Experts were identified in the fields of SA, HEt, ethics and SCD, from disciplines such as design, philosophy, engineering, and science communication. Care was taken to include the voices of women who are generally less represented in the fields of technology, and also to ensure perspectives came from both industry and academia. There are reviewers from diverse locations such as the UK, US, Hungary, Slovenia and Australia, however, it is acknowledged that these are predominantly Western areas and viewpoints from places such as Africa, Asia, and the Middle East are lacking[58].

Several of the reviewers I have met through colleagues in the industry, through employment or at events related to design and technology[59]. For example I participated in a SpeculativeEdu workshop ran by Sara Bozanic and James Auger (SpeculativeEdu, 2019); Dr Matt Hayler has spoken on my previous company's podcast (Babitz, 2022), and I have presented early research to his students; I contributed to the SIENNA project on human enhancement that Dr Yasemin J Erden co-led (SIENNA Project, n.d.); I have worked with Imre Bard as part of the Hack the Senses collective (2017), we have conducted research together and co-ran (with others) an SA talk series which Scott Novich also spoke at (Caradt, 2021a); and I have also conducted freelance research for Katherine Templar-Lewis.

The potential reviewers were contacted through email or LinkedIn with a request to review the book. The request included a short introduction to who I am, the PhD topic, and an overview of the book, as well as why they were chosen (their relevant experience), where the feedback would be used, the feedback method (written or video interview[60]) and a timeline. Also

[58] While these voices may not be represented in the reviews, some of the contributors for the book content are from non-western regions, including India and China.

[59] I do not and have never employed any of the reviewers.

[60] The option to do the review via video interview was given to allow those without an academic leaning a less formal method to provide feedback, and also to instigate a more personal contact with each reviewer. As relevant experts in my field this could also lead to deeper discussions on the research and potential links beneficial to my career.

attached were the book abstract, contents list, and the seven review questions for added context. The reviewers who agreed to take part were each sent a physical copy of the book to read and were asked to sign a consent form, outlining their consent to be named and the use of the reviews for the thesis and further publications (see Appendix. for 9.1. for the request email and attachments). The reviewers are listed in the next section chronologically by the date they provided the review. Their bios[61], in the next section, focus on work that is relevant to SA, HEt, ethics, and SCD, articulating their expert knowledge and experience in the fields, and therefore showing why they were chosen to review the book.

6.3.3. Reviewer Bios

Alex Pearlman

Alex Pearlman is a science communicator and a bioethicist, her reporting and commentary on emerging issues in research, health policy, and biotechnology has appeared in international media outlets, including *Stat, New Scientist, MIT Technology Review*, and *Vice*. She also pursues independent scholarship on pressing bioethical issues, such as human enhancement, genome editing, distributive justice and access in health care, and do-it-yourself medicine (Pearlman, n.d.) Alex has collaborated on ethics oversight systems in the "biohacking" movement and is a Research Affiliate with the Community Biotechnology Initiative at the MIT Media Lab.

Scott Novich, PhD

In 2013, Scott Novich created the VEST, a Sensory Substitution Device (SSD), for his PhD with supervisor David Eagleman (Keller, 2018), which led to the Co-Founding of Neosensory, where he is the CTO. Scott argues that non-invasive sensory augmentation – using touch in particular – is a nascent field with massive, untapped potential. To realise its potential, he believes that it needs focus on low-power highly scalable systems which directly interface with our sensory receptors. Now Co-Founder & COO of Simbryo (n.d.), Scott runs product, operations, quality, and finance at the venture-backed startup, who are building a novel laboratory test for people considering or undergoing IVF.

[61] Reviewers were asked to send a bio which I edited for use in thesis. No major adjustments were made, word count was limited, and a focus was put on work relevant to this research.

Dr Matt Hayler

Dr Matt Hayler is associate professor in contemporary literature and digital cultures at the University of Birmingham. His research and teaching explore human embodiment and our entanglement with technological artefacts and other non-human actors, drawing on the cognitive and digital humanities, 4E cognitive science, critical posthumanism, and (post-) phenomenology. He is currently working on the ethics of human enhancement and the implications of Posthumanist philosophy for real-world practices, e.g., artistic creation, legal systems, scientific and technological progress, ecology, teaching, and daily ethics. Alongside Dr Danielle Sands and Professor Christine Daigle, Matt edits the Bloomsbury Academic series *Posthumanism in Practice* (Hayler & Daigle, 2024).

Dr Yasemin J Erden

Dr Y. J. Erden is an Associate Professor in Philosophy at the University of Twente. Her research covers minds and brains, philosophy of technology, AI, and human enhancement. For the latter, she co-authored ethics guidelines on human enhancement that were adopted by the European Commission and published in *Science* (Erden & Brey, 2022). She is on the committee for the Society for the Study of Artificial Intelligence and Simulation of Behaviour (AISB) and is a council member of the Royal Institute of Philosophy.

Keith Kirkland

Keith Kirkland is a mechanical engineer, accessories designer, and industrial designer turned haptics enthusiast, professor and futurist. He is co-founder of WearWorks (HapticWorks, n.d.) whose first product, *WAYBAND*, is a wearable haptic device that communicates navigation information to the blind and visually impaired using only the sense of touch. He is inspired by the accessibility of touch, equitable business models and wearable tech and is currently the Leonard Pryor Fellow for Accessibility at the Kansas City Art Institute. His work in haptics has been recognized by the Pratt's Rowena Reed Award, SXSW, The Smithsonian, TED, and Google, among others.

Michael Johnston

Michael Johnston is a strategic design futurist with over 25 years of experience across diverse industries, countries and time horizons. He excels in future-proofing organizations by

envisioning and delivering their futures with a humane-led approach. He works in agencies, management consultancies and inhouse at corporations as a catalyst to accelerate the future. Michael also Co-Leads the London chapter of Speculative Futures (n.d.) hosting events which focus on alternative futures through the lens of Speculative Design, Design Fiction, Sci-Fi, and methods that provoke through imagination, making and storytelling.

James Auger, PhD

James Auger is the Director of the Department of Design at the École Normale Supérieure Paris-Saclay (ENS) and Co-Director of the Centre de Recherche en Design. His practice-based design research examines the social, cultural and personal impacts of technology and the products that exist as a result of its development. James is a partner in the Speculative Design practice Auger-Loizeau (n.d.) who develop speculative and critical artefacts which aim to instigate broader analysis of living in a technology rich environment, present and future. Projects have been published and exhibited internationally, including at MoMA, The Science Museum London, and The National Museum of China.

Sara Bozanic

Sara Bozanic is the CEO of the Institute for Transmedia Design in Slovenia. She stands at the intersection of creativity and production of technologically advanced storyworlds, using co-production as a form of collective action that encourages diverse audiences to think critically and act creatively. Sara also co-led SpeculativeEdu (n.d.), an educational project funded by the Erasmus+ Programme of the European Union, whose aim is strengthening Speculative Design education by collecting and exchanging existing knowledge and experience, whilst developing new methods in the field.

Imre Bard, PhD

Imre Bard is a postdoctoral researcher on the ethics team of the Dutch National Laboratory for AI in Education (NOLAI). He supports the responsible design and development of AI-driven solutions for schools. Imre's research interests include AI ethics, techno-moral change, and the intersection of artificial intelligence and democratic innovation. He holds a PhD in Social Research Methodology from the London School of Economics, where he studied the social representation of neuroenhancement. Imre is a contractor for OpenAI as a Trust and Safety

analyst, and on Policy Research. Imre co-created Hack the Senses, a multi-sensory research studio and experience design collective, funded by the Wellcome Trust (n.d.).

Katherine Templar-Lewis

Katherine Templar-Lewis is an interdisciplinary mind, an experienced science communicator and reality hacker with an extensive academic background in genetics, experimental psychology and neuroscience. Katherine is Co-Founder and Director of Kinda Studios (n.d.), a female led neuroaesthetic and neuroscience studio exploring the aesthetics of human experience who bring research from the lab into the world through creative collaboration and immersive, sensory experiences. She is also Co-Presenter and Lead Scientist of The Uncertainty Experts, who bring together UCL neuroscientists and Netflix producers 'to create the world's first interactive documentary scientifically proven to increase Uncertainty Tolerance' (Uncertainty Experts, n.d.).

6.4. *DESIGNING SENSES* REVIEWS

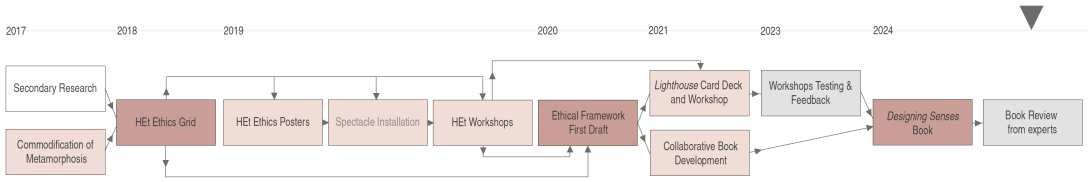


Figure 79 Practice work status – Designing Senses Book Reviews with Experts, Lesley-Ann Daly, 2025.

6.4.1. Analysis Methodology

As denoted above, reviewers were given the option to send a written review in response to the seven questions or attend a video interview which would be recorded and transcribed. Two participants sent written reviews, one sent an audio response to the questions (due to timing constraints), and the other seven attended an interview.

During video interviews reviewers were asked each of the questions in sequence, and as the interviewer I refrained from speaking during this section of the interview so as not to bias their responses.[62] Avoiding discussion in favour of straight feedback aimed to mimic the context of

[62] This structure generally was consistent across interviews, apart from occurrences where specific clarification was needed in relation to a question.

the written review as closely as possible, giving cohesion between the structure of the different feedback methods. Video interviews generally included time after this for a more informal discussion about the research, specific inquiries and general work/life – these sections have not been included in the interview transcripts or analysis due to their personal content and not being relevant to the review. The audio recordings were transcribed and then cleaned – correcting spelling, formatting, and removing non-review sections – however the review content was not altered in any significant way (for cleaned review transcripts see Appendix 9.2.).

The analysis of both written and transcribed qualitative reviews was then undertaken using two methods, one human and one AI. Firstly, an insights matrix (see Appendix 9.3.) was created to extract key quotes from each reviewer corresponding to the seven questions asked, with an extra row for suggested next steps for the work. Alongside re-reading the transcripts for formatting, creating the matrix enabled me to refamiliarize myself with reviews- which were collected over the space of five weeks- finding affinities and differing perspectives on the book.

Next, the 10 cleaned reviews were input into ChatGPT, along with the book abstract, contents and review questions. The AI tool was prompted to analyse the reviews and pull-out key insights across the questions, including commonalities and differences in opinions (see Appendix 9.3.). As AI tools are still in development, they are not infallible or fully reliable as yet, with no easy way to check the accuracy of responses given or validity of the source content used to generate the response. Having found these tools problematic in my professional work, particularly for analysing interviews, I also prompted ChatGPT to include specific quotes from the reviews to back up the insights that are being generated, so that I can verify that the source information is valid, and not a hallucination (IEEE Spectrum, 2023).

ChatGPT is useful for analysing large amount of data (the reviews), drawing out insights, and can mitigate bias from the researcher. However, I find it lacks the depth of an expert human researcher, who understands more of the context and nuance of the interview topic and its participants. Therefore, the bullet points provided by the AI (after verification) were used as a guideline for the insights, but the final insights below are written by me.

6.4.2. Insights from Reviews

Table 2 displays a summarised analysis of the book reviews against the seven questions posed. Although most questions were answered with more nuance than a purely affirmative or

negative response, the table indicates whether the reviewer thought that book predominantly succeeded in addressing each question or not. Following this in an in-depth analysis of the responses to each question in turn. All quotes can be found in the transcripts in Appendix 9.2. along with the consent forms signed by each reviewer.

	Ethical Exploration	Speculative Elements	Visual & Narrative Clarity	Creators' Responsi-bility	Academic &Industry Impacts	Accessibil-ity & Diversity	Comparative Analysis (originality)
Alex Pearlman	✓	✓	✓	x	Only industry	✓	✓
Scott Novich, PhD	✓	✓	✓	✓	✓	✓	✓
Dr Matt Hayler	✓	✓	✓	✓	✓	✓	✓
Dr Yasemin J Erden	✓	✓	✓	✓	✓	✓	✓
Keith Kirkland	✓	✓	x	✓	✓	✓	✓
Michael Johnston	✓	✓	✓	✓	✓	✓	✓
James Auger, PhD	x	x	✓	✓	Only industry	✓	x
Sara Bozanic	✓	✓	✓	✓	✓	✓	✓
Imre Bard, PhD	✓	✓	✓	✓	✓	✓	✓
Katherine Templar-Lewis	✓	✓	✓	✓	✓	✓	✓

Table 2 Matrix of insights from book reviewers, Lesley-Ann Daly, 2024.

1. Ethical Exploration

Reviewers agreed that the book addresses ethics relevant to SA, and particularly commended the wide range of topics, as articulated by Dr Hayler:

> I can't imagine that anybody would, who was new to this kind of area of discussion, would not find something in here that they haven't thought of before and that's where the real strength is, for me is the sheer range of, kind of, thought experiments and provocations.

Bard also comments on the project's diversity: "It is also a virtue of the project that it seeks to consider sensory augmentation in an expanded frame of reference, looking at its individual, societal, and (broadly construed) environmental aspects", with Dr Erden expressing that she "really liked how concrete it was, but also how exploratory."

Both Pearlman and Auger, respectively, comment on the ethical topicality of the work: "I think this book really does a great job looking holistically at a lot of the issues that we face now and how those might be exacerbated in various directions"; "the current debate around artificial intelligence and how we don't control future is related to that. It makes your whole approach extremely topical and important right now."

A project that stood out for its simplicity when addressing complex ethical issues was *When Lights Stole the Night* (Figure 80): "I really liked the children's book a lot too, that engaged with some pretty heavy ethical questions in a way that I had not considered before and I loved it" (Pearlman); "my favourite one I think was the children's book because it was simpler" (Auger); it is the "standout project, it is really highly accessible. You know, it goes straight to the heart of like environmental impacts of human centred technologies. And so, it becomes an advocate piece for sustainable design practices" (Templar-Lewis).

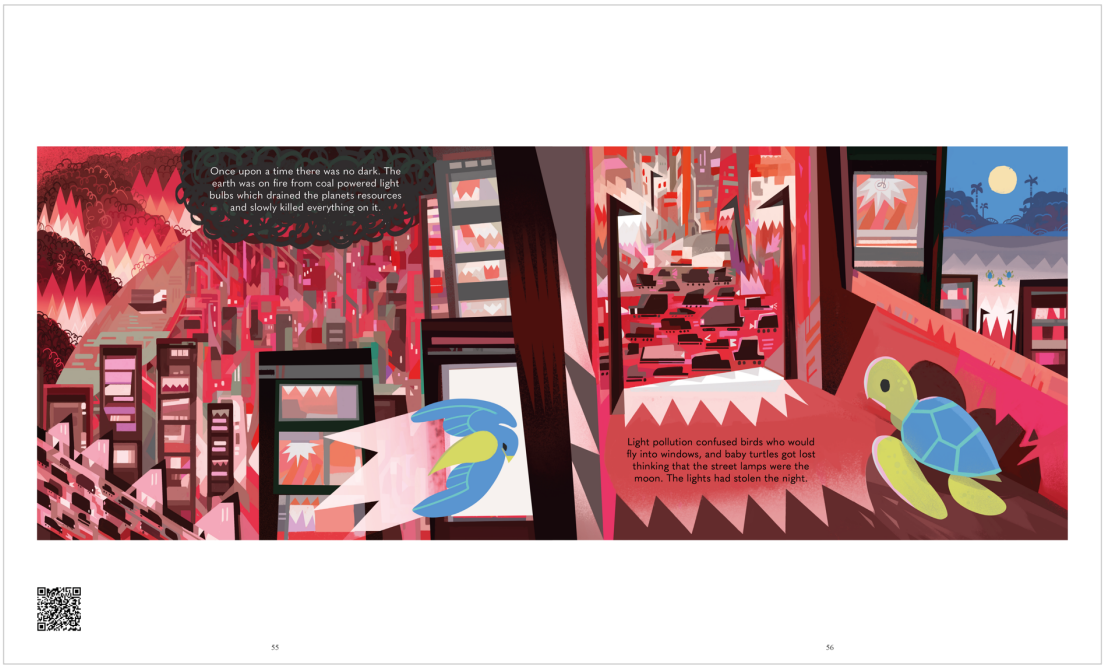


Figure 80 First two pages of When Lights Stole the Night. Illustration by Erin Overmann, curation by Lesley-Ann Daly, Designing Senses, pp. 55-56, 2024.

However, Auger noted that the format of the book and the use of SCD meant that projects lacked some of the depth that other formats enable: “filming [Black Mirror] TV scenarios allows for that particular category to get much deeper into the scenarios than the speculative design project can with typically a singular image". Though Bard did not necessarily see it as a negative trait, but an intentional choice:

> In my understanding, the purpose of the volume was not to advance or defend any particular ethical theory or to engage in deep analysis of any particular ethical issue in relation to enhancement, rather, to serve as a provocation, primarily intended for the designers of such technologies to think more carefully and systematically about the ramifications of their practice.

2. Speculative Elements

Nine of the ten reviewers (excluding Auger) enjoyed the use of SCD to explore ethical issues, commenting that it makes the topics fun and engaging. Novich speaks here about the use of humour: "I found it engrossing and engaging, and they have the sense of humour” and how it is:

> a really powerful concept that turns this from a boring philosophical thing to a really fun exercise. It's actually enjoyable and really doesn't even force you, you just naturally start thinking about this stuff. I think that's great.

Dr Hayler and Johnston, respectively, further discuss how the method inherently invites the viewer into the process: "I think there is an inviting in that goes with the provocation, it doesn't push you away”; “I think the way you've structured this is letting them go through the experience. What their own ethical questions are within that, and I think that's really nice way to expand a speculative designs impact on a broader group of people.” As a designer Johnston appreciated how the specific SCD methods were utilised: “And I actually think the power of storytelling, and narrative, and characters, and tools you use in design, that you used quite well here, will broaden their own perspective of it."

However, as someone with a self-declared “lack of understanding of some of these kind of sensory augmentation capabilities and where that particular type of technological development is heading”, Auger found some of the projects difficult to engage with. As he first needed to understand the technology, “any project that follows from that is going to be another level of fiction beyond for me", losing the familiarity that is needed for the uncanny, leaving just the unsettling feeling. He particularly referenced the briefs in *Enhancing Akansha* which required an existing level of SA knowledge. Whereas other reviewers who have that technical knowledge could move directly to engaging with the projects’ critique, ultimately

making it one of the most favoured projects. This dichotomy of response highlights the fact that the book was made for a specialist audience and may not be as accessible for those without prior knowledge of, or interest in, the field.

Nine out of ten reviewers (bar Pearlman) discovered the reveal in the book, unveiling that I was the creator of the projects, producing mixed reactions. Johnston spoke of the surprise positively: “I had to step back and realized that it wasn't real. And it took me a while because I really did get sucked into it.” Dr Hayler praised the ability of one designer to consider such wide-ranging topics: “The fact that you can do it all shows that the other designers don't have an excuse. It's not just you, everyone's silos often focuses on one thing. You can keep this all-in mind.” Dr Erden found the reasoning logical and enjoyed the discussion on it in the second half of the book: “I thought your point that they're already kind of speculative stories means that you're already inviting the reader to suspend some disbelief” but was ultimately neutral on the deceptive device: “So I guess I found that interesting, but I didn't have much to say about it." Whereas Kirkland alone found the deception a challenge: “I understand deception and outright fiction is a tool. Under any subject other than ethics, it may have felt creative. But here it created an unnecessary questioning of is it ok to be deceptive in a book about ethics?"

Overall, as articulated above, SCD as a method was considered beneficial to how the book addressed the ethics of SA. The humour and engagement experienced by the reviewers highly outweighed any negative reactions to the deception.

3. Visual & Narrative Clarity

Reviewers praised the visual and experiential qualities of both the individual probes for each project and the overall design of the book, with Johnston validating its aim to appear as a design book:

> It looks like a coffee table book, feels like a coffee table book. I put that I love the textured pages at the beginning, there is a very clear design sense and an awareness of the kind of books that it is attempting to, it's not even mimicking, it's just doing that thing.

Following Johnstons reference to tactility, Bard commented on its sensory qualities: “the visual layout and overall quality of the work is appropriate to the topic of sensory augmentation for the book itself is an exciting sensory experience with its visual imagery, haptic qualities, and unusual ‘flip over’ idea at the end." With Pearlman also using the term ‘experience’ when discussing the engagement with it: “I don't even know if a reader is the right way- experiencers,

people who are experiencing this work." Novich added that even as a non-designer he found it "super visually engaging, I would say for obvious reasons the artwork and design in this is absolutely gorgeous."

Along with the aesthetic qualities, reviewers enjoyed the structure of the book, seeing two clear sections that have different but complementary purposes: "The projects themselves are highly original creative pieces that foreground different ethical issues, and they do so in a way that reveals the complexity and simultaneous presence of multiple issues in each case, while the final Lighthouse card set offers a novel toolkit to practically move ethical reflexivity along" (Bard). Johnston observed logic in the order of projects, which he found to grow in complexity: "It almost felt like the first one was a bit easy and then you kind of pushed a little bit further", finding that by the time he reached the more complex he already had trust in the process. While Bozanic and Dr Erden, respectively, enjoyed the flip as a moment of surprise, "why I love this book so much because it's full of the surprises", and identified it as an interesting physical as well as perceptive change "I found it a clever idea to flip the book and in so doing ask people to flip what they, their engagement with it". Though Dr Erden did question whether the ensuing confusion on how to interact with the book- working forwards or backwards- was intentional but stated that she would like if it was.

Critique generally paralleled Auger's perception of an implied knowledge needed to engage with the book, with three reviewers wanting more contextual clarity around specific areas. For example, Dr Erden was conscious of specialist terminology used: "maybe some things are taken for granted there about what people will understand by those words and by those concepts", and Bozanic suggesting using the introduction to contextualise Posthumanism and views of the human today, rather than just focusing on SCD. Additionally, Templar-Lewis found that while the introductions and overall concepts for Chapters 1 and 3 were clear, "Chapter 2 doesn't fit into that sort of need state, it's more of a sort of conceptual discussion, so that [needs] I think some context around that." Overall, the view is that the book needs some more contextualising, firstly to define the audience (whether just specialists or also wider audiences) and secondly to define terminology or theories that different specialists may not all be familiar with.

4. Creators Responsibility

Reviewers identified the clear "call to action for designers" (Templar-Lewis) and other creators of SA:

> I believe it is the core message of the work to draw attention to the fact that designers unavoidably make ethically laden choices in their practice, and that being attentive and thoughtful about the values embedded in design can lead to more desirable futures (Bard).

Kirkland finds “the book requires that each creator or creative team to take a deep look at their pipeline of potential biases, both explicit and implicit” and “is effective in delivering ethical empathy for future sufferers of our current design (in)considerations.” Templar-Lewis comments that by giving questions, not answers “you imply that it's creative responsibility”, while Auger thinks “it's critical that anybody developing a technology finds ways of doing that in more responsible ways, and this is an example of that and it's working and that's a big step forward."

Novich and Dr Hayler both highlight the problems with people not thinking critically about what they are making: "people they read cyberpunk … think the technology available is cool, let's make it happen. And that's kind of about where things stop right in terms of thinking about things." (Novich); "I think that's really important for designers, that just because the current law and the current society might say that something is okay, that doesn't mean that you are ethically obliged to think that it's okay” (Hayler), citing the book as an effective way to provoke independent thought about ethics by showcasing the inherent implications.

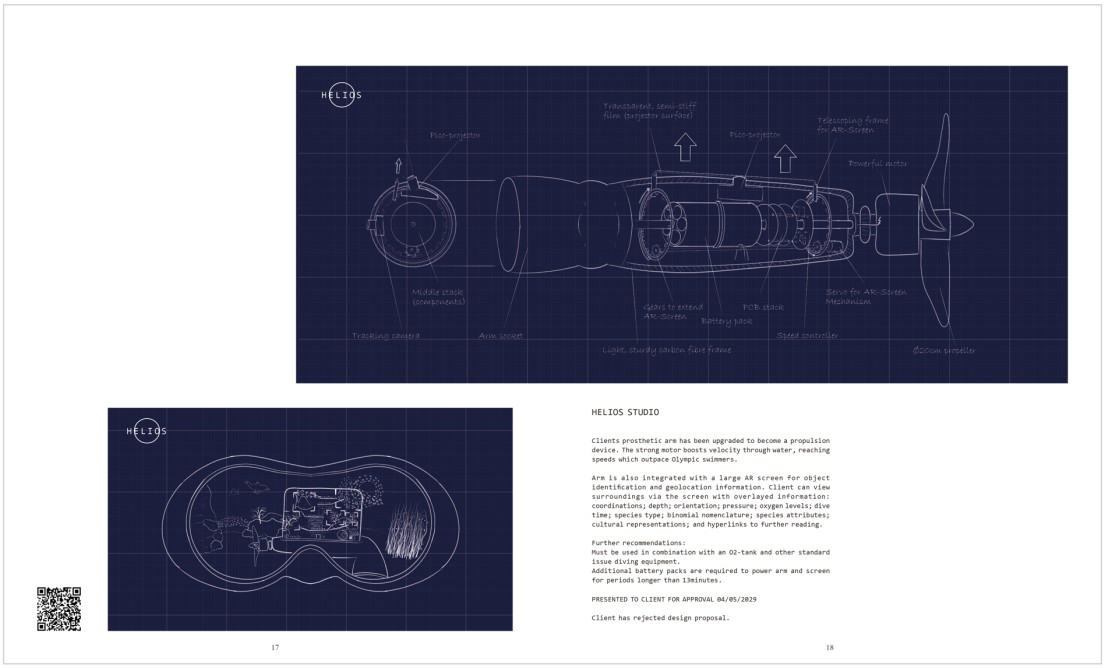


Figure 81 Double page spread from Enhancing Akansha project, version 1. Technical drawings by Felix Hundertmark, curation by Lesley-Ann Daly. Designing Senses, pp. 17-18, 2024.

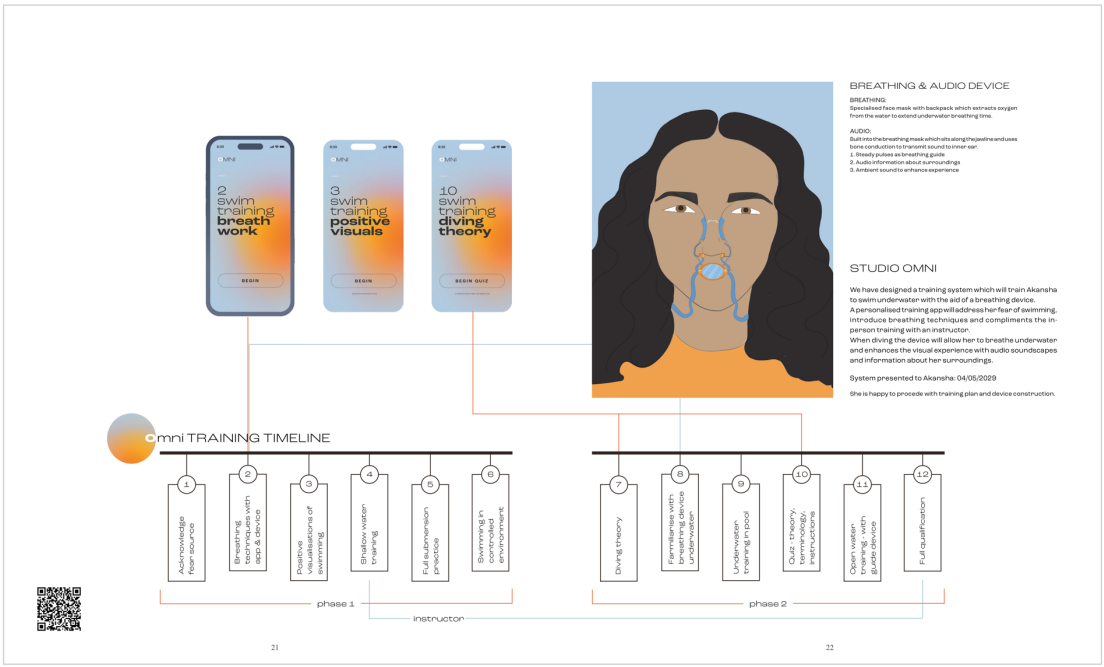


Figure 82 Double page spread from Enhancing Akansha project, version 2. Illustrated breathing device by Felix Hundertmark, curation by Lesley-Ann Daly, Designing Senses, pp. 21-22, 2024.

Enhancing Akansha (Figures 81 and 82) stood out as it confronted the reader with the implications of two different design practices in parallel. Dr Hayler found that juxtaposing the first approach with the second more ethical approach "seemed to me a really great example of what putting this way of thinking into practice would actually look like", showing the unintentional consequences "even when aspiring to do good." While Novich particularly resonated with this project as an engineer, contending that engineers "a lot of times are designers, they're just untrained designers" who create the technology people interact with. He liked the project as it highlights the importance of human-centred design, seeing the book as "being really valuable for people in like the engineering discipline who aren't getting real lessons on ethics and user research and empathy."

While all reviewers agreed that the book highlights the responsibility of creators, two articulated an interest in including wider forces in development, such as the government and policy makers: "these are also evolving ethical questions in terms of how much of the responsibility is on the creator and how much of the responsibility is on sort of external policymakers, regulators, consumers, and where those lines blur... I'm not sure if the project really explicitly grapples with it" (Pearlman). Kirkland also perceived a gap around exploring how to "deal with ethics when there is larger forces that are not prioritizing it, or even worse, actively looking to suppress it." Though Bard highlights this particular narrative in his favourite

project*, Feel the Truth* (Figure 83), as it conveys “how deep the manipulative power of data-driven technologies may be and how risky it is to give unchecked power to market mechanisms.”



Figure 83 Double page spread from Feel the Truth project. Lesley-Ann Daly. Designing Senses, pp. 31-32, 2024.

5. Academic & Industry Impacts

A clear application for the book, as identified by six reviewers, is in academia, to give students an introduction to ethics in their early careers. According to Kirkland: “it is only when we have to confront ethical dilemmas that we are often ill-prepared with no prior practice and in the face of overwhelming pressure, forced to confront them” and this book could be used as a way for students to learn, before the pressure of being held accountable. Both Novich and Bard identified its “place in design and engineering curricula for it offers an easily digestible opportunity to deepen reflexive capacities and provides a tool to implement in practice” (Bard). Novich stated that "having something like this workshop that you've put together, and this book are, they're really powerful potential tools for people who aren't designers specifically" and continued to imagine a class where “you have to come up with the story, like a speculative story or two around the thing that you're designing or something. I think would be really cool, interesting.” Dr Hayler has requested a copy for his undergraduate teaching as the format is ideal for him to instigate discussions on HEt ethics: “I can kind of put that in front

of 60 students a year and just be like we should think about this, and we can talk about this." Dr Hayler also sees:

> Where the work kind of sits is between the academic and the practical. Is asking rigorous academic questions that are grounded in current cutting edge literature in these fields, but it's also designed to actually be provocatively used within industry spaces.

Bozanic expresses that the book also has application beyond academia and design, finding it "really relevant for any business player that is in the field of technology and innovation." Bard identified its potential for professional ethicists to use "as an unconventional – at least for the discipline – method to address familiar ethical issues and to help convey the significance to ethical issues to the representatives of other disciplines", a similar vision to how it could be used in academia i.e., used by experts as a provocation for non-specialists. Similarly, Johnston forefronts its potential impact in policy making for industry, where people are "often looking at quite a narrow perspective of what could happen or what they want to happen". He states that having both sides of the book "offers really usable structures and frameworks" to open the discussion and consider other perspectives before creating regulations.

Although Novich could see its adoption and interest at an individual level in industry, "I think most employees at a company at least are not sociopaths and like to think that they're trying to make the world a better place" he was doubtful if this sentiment extended up the chain to management and corporate levels who have other priorities. Pearlman has also found this dichotomy from working in the industry:

> some of them are very, very interested and feel like a deep responsibility to answering and really grappling with these ethical questions around their technologies. And some of them, they just cannot be forced to care and that to me is a very scary piece of this puzzle.

Here she is not necessarily stating that the book cannot impact the industry, but she is critiquing the ethics and priorities of certain players who do not want to change, and the inability for any tool to change their mind.

Both Pearlman and Auger think that academia isn't the right context for producing change in industry. Pearlman contests that academia focuses on preparation for a potential harm, but "it's not an 'if' but a 'when' question that academics and the commercial industry are going to need to deal with", also stating that it takes a disaster for people to act. Auger equates ethics with critiques of SCD, as both fields "kind of remain in their own academic bubble and it's breaking that. This is where I think it's really important to talk more about the workshops" (Auger). He sees the workshop section as the most important part of the book because it forces

people to move away from theory and into applied ethics in context, which is what he thinks is needed to impact industry practices.

6. Accessibility & Diversity

Both Dr Hayler and Bozanic highlighted the special attention that the book has for accessibility: "there's certainly like an attentiveness to a greater diversity of humans across different kinds of protected characteristics" (Hayler); and

> you took special care on contrast so it can be read by everybody. Then the font, the typography that you choose, it's also like special care that is taken to the book design, so it allows everybody to read it. I really loved it (Bozanic).

Novich identified how the QR-linked text and alt text can connect to a myriad of assistive devices, greatly expanding who is able to interact with the content, with Bozanic adding in relation to this, "if everybody was so responsible as you, half of the problems from the world would disappear." While Kirkland stated that "the focus on perspectives beyond humans and the need to decentralize the human as the most significant benefactor, is a powerful call to reframe the way we have historically designed for the world."

The theme of diverse perspectives was echoed by Templar-Lewis, affirming that "it is all about collaboration with different people and the inclusion diverse voices and scenarios." Johnston expressed that the book enables each reader to also bring their own perspectives to the work: "I think the style in which you've done this, as I've said, is not only the vantage point for the creator, but for others to bring their vantage points as well." Other reviewers also commented on the inclusion of voices from different genders, sexualities, political stances, and ability levels as well as the variation of technology addressed.

How the book makes complex topics accessible was conveyed by Templar-Lewis: "the visual narrative is very, very rich. And it, it makes it sort of, what is actually very complex, a very difficult discussion, really accessible." This is reiterated by Pearlman:

> I think it's very accessible to its intended audience in a way that I just want to share it with more people. And usually when I see something on this topic, it's not accessible or fun at all because as an ethicist, I just get a bunch of boring papers with no pictures and it's terrible, so this is way better.

Comments on the terminology, or jargon, and lack of contextualisation of some of the more specialist topics does hinder the accessibility for wider audiences, as stated above.

Reviewers identified numerous ways in which this book is unique compared to other work in their fields, contributing to knowledge by: expanding the discussion on the ethics of SA (and therefore HEt) through the combination of design and Posthumanist theory; and through the creation of the design book, including provocations and practical tools, to make ethics more accessible and engaging.

Dr Hayler states that "there just isn't a ton of literature in the field when it comes to Posthumanist design in particular", from editing the *Posthumanism in Practice* series (Hayler & Daigle, 2024) he has identified that they get "a lot of art practice and Posthumanism, we don't get a lot of design and Posthumanism submissions". He commends the works' "meticulous understanding of what Posthumanism and its practical implications might be… also the deep understanding of design is also something that is rare, the breadth here stands out", alongside the "blending together of this diversity of perspective that is deeply grounded in both the design and the philosophy, that feels really unique to me and I can't see that, kind of, being competed with very soon."

As an ethicist and science communicator, Pearlman expressed that "for Sensory Augmentation in particular [we need] show-not-tell" seeing the method of this design book as a more comprehensive exploration of ethics than a book written by an ethicist on a singular topic. She critiques ethicists as "generally trying to teach lessons to the designers and the technologists and that is A: close-minded and B: usually unsuccessful because they don't care to read an ethics paper." Whereas she finds this book much more accessible for those audiences:

> I don't feel like it's a lecture. I feel like it's a friendly guiding hand that helps anyone who's experiencing this work to think about it in new ways that they probably wouldn't have before, in a way that is not patronizing and it's not egotistical.

Similarly, Johnston "would say that this would have a greater impact on more people, it's more accessible than reading a 10,000 word, let's say, thesis". He goes on to say that it also "brings more of emotive point to it than just a rational analysis. Which I think is often missed." He reiterates the emotive nature of the book, seeing the real unique contribution as how it is "sucking them [the reader] into the experience and making them feel", with the participation making them feel "a sense of ownership over it," "so, I think that is a massive difference [to a rational piece] and I think that's in essence the whole point of speculative design."

Dr Erden echoes the uniqueness of the design book as a method: "I think the main thing it does is offer a new, or at least an unusual method to do those things", the "stories present a

lot of scope for thought and putting that thought into practice.” Novich appreciates that the method steers away from unviable tick boxing exercises that can dominate the practice: “this kind of methodology that you're talking about for learning and understanding ethics at a really deep level where it's not just something you're trying to kind of check off, I think it's a great concept." While Templar-Lewis focuses on, in her view, the books’ unique ability to provoke thought:

> What I love about this is that it's is really food for thought, really makes you think. It really poses lots of scenarios and it makes me think in different ways. So, I don't know any book like this of anything I've come across.

Bozanic highlights the books special care for being accessible to people, as something she has not seen in this format before: “for me, that's the biggest benefit of the book, like your responsibility as a designer and really putting it in front.” She states that it will impact how she creates any future publications, physical or digital: “any tool that comes out of our studio or my work shouldn't go without taking care that it's accessible to all and that can be read by all."

While the reviews of the book were overwhelmingly positive, there were a few areas in which reviewers thought it could be improved. Bard noted that it doesn’t address a few topics that are prevalent in the literature such as "the question of societal, economic, and peer pressure to engage in augmentation in the first place", and a “greater emphasis on the importance of ongoing reflection during the entire cycle of technology development." Dr Hayler suggested adding in a case study, "talking to you as Lesley-Ann Daly” as a:

> nice way to kind of show people, not an imagination of what someone else might do but really saying this is what I would do and talking through the steps of that process. That would be another potential way of, kind of, showing how this could go into practice.

Templar-Lewis would have preferred the inclusion of more narrative around the diverse people represented in the projects: “I just want a bit more of their stories so I could really, sort of, have more empathy for them as well." And, like Dr Hayler, she also would have liked a bit more of my own voice in the work: "I love your forward because it's really lovely and personal. And because I know you and because you know, it's got your voice coming through, which I think is really nice." Overall, reviewers did not identify any significant gaps or oversights in the book, suggestions were made to enhance the book further, not inherently change it in any way.

6.5. REFLECTIONS ON THE REVIEWS AND WORKSHOPS

Giving over your work to others to get feedback is tough and puts one in a vulnerable position - awaiting the scrutiny that you have signed yourself up for. Particularly after dedicating many years of my life to a specialised subject, in what can be a quite a lonely pursuit. Having designed and conducted my research in such a participatory manner, one would think that anxiety around conducting the workshops and sending the book for review would have abated by then. For all the anticipation I felt I could not have received a better response to the work, not perfect of course, but I value the constructive criticism. Bringing all of the participants and reviewers into my research practice only sought to make the work more thorough, inclusive and practically applicable – helping validate the research aims. Here I will reflect on the feedback and insights from both the workshops and book review.

6.5.1. *Lighthouse* Workshops

The workshops provided an interesting insight into the ethical literacy levels of SA specialists and non-specialists, companies and students. A general comprehension of ethics was usually present, but the palette of topics was commonly limited either to their discipline or their device design. For example, designers would focus on the human aspects while software engineers would focus on data security. Enthusiasm levels were also variable, with some appearing more engaged in the process than others, which is to be expected in group activities, particularly if you are not the one who has instigated it, i.e., your boss or your lecturer has required you to attend. The feedback received has assured me that at least some of the participants found the process beneficial, whether it be the discovery of previously unknown ethical topics, the tools and methodology used, or the resulting potential benefits to their device design.

Facilitating the workshops with both Sensae and Valence Vibrations was an opportunity to better understand the differing dynamics in working SA companies, where I could see how the workshop would address very different technologies. From varying disciplines being present, to different personalities, team structures, and device developmental needs, seeing the workshop adapt to suit the requirements of each was a testament to its design. It does not try to be one thing for all, but a tool to be used as needed while still achieving the aim of facilitating the ethical discussion around their technologies and having teams leave with concrete next steps. I am conscious that both the companies and Dr Hamilton-Fletcher were aware that the workshop was making up part of my PhD research (many with academic research experience

of their own), so may have felt obliged to engage in the full session to be considerate. Therefore, I think it would be interesting to see how an unconnected company would act where the time and effort are their own, without the moral incentive to help (or not disadvantage) someone in a relatable position.

Staying quiet as the workshop facilitator and not trying to bias their discussions with my input was challenging. However, I did not want them to look to me to validate if their response was the correct one or not, because that was not the point. I am not the sole arbiter of ethical SA knowledge, and these tools are meant to democratise that process. I witnessed during the workshops that participants grew in confidence and began to trust their own insights as individuals and teams, allowing independent discussion to flow more freely. While the participants left with positive feedback for the workshop and research, I left with a renewed enthusiasm for the potential of commercial SA, particularly when there are teams like these who are so open to being as ethical as possible. Though the cards are designed to work on their own, i.e., without me, I definitely see the potential to be both facilitator and contributor, helping provoke ethical discussions and also conceptualise new ideas with teams. An ideal outcome would be the creation of this role in industry[63], an 'ethical provocateur', advocating ethical rigour and creative concept exploration through collaborative engagement.

6.5.2. *Designing Senses* book

To find that reviewers of the book could clearly see the ethics in the projects was hugely validating, for the research and myself as a researcher. Choosing to use Posthumanism as a theoretical structure for the content enabled me to ensure that diverse human and non-human perspectives were included, while also exploring implications on a planetary and temporal scale. Reviewers acknowledging the breadth of issues addressed and the diversity of perspectives presented, showed that the book achieved its aims of broadening the current discussion on enhancement ethics. While each project dealt with specific themes or issues, it was interesting to hear how different reviewers viewed the same scenarios and what they each took from them. I didn't go through each project individually in the book feedback; however, each one was highlighted by at least one reviewer who found something poignant and relevant to them. While there was some critique around the projects lacking the depth afforded to other mediums, I maintain that the intention was never to go deeply into each, or even one,

[63] This role also translates to academia in the role of the lecturer or guest lecturer.

ethical issue. Doing so would have been prohibitively time consuming, and unnecessary. The purpose of doing multiple projects was to be able to address a breadth of different ethical topics, so that readers could find at least one relevant to them or their technology. And additionally, to discover concepts that they were entirely unfamiliar with, sparking new thoughts and conversation.

Numerous reviewers commented on this discovery of a new ethical concept, or alternative take on familiar ones. This shows that not even those engaging in ethics on a daily basis can hold an exhaustive compendium of eternally relevant knowledge on ethics – nor would they claim to. Though it may not have been articulated in the book as clearly as intended, the book advocates for ongoing, collaborative ethical engagement in SA, to ensure that our reflective capacities develop alongside the ever-changing technology and society. The suggestions for the book to be published for a wider audience and adopted in academic curricula corroborates that the reviewers also see the need for ethical literacy in SA and wider technology fields. This also validates that they see the design book as a relevant medium for this purpose. The provocations were commended for their ability to not only open up new perspectives but also make the dense subject of ethics enjoyable, and the flip side a befitting space to offer the tools to put ethics in to practice. It was the two halves together that made the book successful, showing the need for ethics, in context, and giving teams the tools to affect change.

The ‘experience’ of the book was a recurring theme, with reviewers understanding the impact that the design of its physicality has. Comments on its size, texture, and visual design were highly positive, but comments on the care taken for it to be accessible stood out for me. To hear that the book will impact someone’s practice from now on, making all of their work accessible as standard, is an outcome that I didn’t expect but greatly appreciate. It acknowledges the considerations made to ensure that the book embodies the ethics that it preaches, in a way that did not restrict its development but instead enhanced the experience of it, and for more people. To make the book text more accessible to wider audiences is something that will be taken into consideration for the future of the work (discussed in the next chapter). I will once again articulate that I could not have made this work without the invaluable contributions and feedback of the people involved at each step. Be they workshop participants, book collaborators, reviewers, or my personal and academic cheerleaders who have been with me throughout the entirety of this research.

CONCLUSION

This chapter has explored the feedback from specialists and non-specialists for both the *Designing Senses* book and *Lighthouse* card deck and workshop. The feedback and insights validate the approaches and methodologies proposed in the previous chapters, including the use of SCD to immerse readers in SA ethics, and PD to enable SA creators to produce actionable next steps towards making their SA more ethical. They provide evidence of the impact and relevance of the research in industry and academia, as well as in teaching, reinforcing the argument for the need for ethical design frameworks in SA.

This chapter has confirmed that the book and workshop tools are effective for SA creators (the primary intended audience), who have a knowledge of the field and their specific technology, enabling more contextual and situated evaluation. This chapter showcases the achievement of the aim to include SA creators in the development of this framework, enabling the book and tools to be curated and optimised for their needs. It underscores the value of SCD to create an 'experience' with the book, making the content more enjoyable, with reviewers praising the unique format which differs from less engaging ethical texts. Additionally, it articulates how enabling greater understanding of ethics relevant to the reader drives motivation to evaluate their own technologies using the workshop tools, and to do so repeatedly during their device development. The book as an ethical probe in itself was also highlighted by reviewers, inspiring change in their own practice, validating that ethics does not have to hinder or restrict a design process but can also bring added value.

Through testing, the workshops have also shown potential to be used with non-specialists to learn about ethical design practice, with reviewers identifying opportunities for use in their own teaching and also with policy makers. This iterative evaluation reinforces the role of experimentation as a methodological and ethical practice within the research. Further insights from reviewers indicate numerous future applications for the book beyond its intended purpose, predominantly through publishing and disseminating to wider audiences, physically or digitally.

The next chapter, the conclusion, will summarize the thesis chapters and map how the design methods used have contributed to achieving the aims of the research. It will look at the unique contribution to knowledge produced through this project and the next steps for this research.

CHAPTER 7: CONCLUSION

INTRODUCTION

This concluding chapter synthesizes the arguments and findings presented throughout the practice-led research, emphasizing the contributions of each chapter to the broader discourse on ethical Sensory Augmentation development. It revisits the foundational aims of the research – developing an ethical design framework for SA and creating tools to enable ethical practices – and demonstrates how these aims were achieved through the integration of literature, public engagement, design methods, and feedback from specialists. It outlines the major contribution to new knowledge: the *Lighthouse* card deck – a comprehensive set of ethics-related questions for SA development – and its accompanying workshop, which enables teams to collaboratively generate ethical, actionable outcomes. It also presents the *Designing Senses* book as a minor contribution, providing essential context for engaging with the tools. Additionally, the chapter articulates next steps for the research and discusses its broader implications for academia, industry, education, and adjacent emerging technologies, solidifying its relevance and potential for future application.

7.1. REVIEW OF CHAPTERS

Below is a summary of each chapter and its contribution to the research.

Chapter 1

This chapter introduces the research's foundation, detailing the motivations, methodologies, and aims that drive the study of Sensory Augmentation and Human Enhancement technology. By defining the scope and establishing the use of Speculative Critical Design and Participatory Design, and mapping the practice, it sets the groundwork for exploring ethical issues in SA and developing tools to address them, positioning the thesis as a meaningful contribution to the ethical design of emerging technologies.

Chapter 2

This chapter provided historical and cultural context for HEt, SA, and Posthumanism, illustrating how human desire for augmentation has evolved into practices like gene editing and device implantation. It introduces key terms, highlights diverse SA technologies, and emphasizes the profound behavioural and social impacts of Sensory Augmentation. The chapter underscores the need for ethical SA design for diverse users and acknowledges the broader network of entities affected. By tracing HEt's transition from medical applications to non-therapeutic uses, it sets the stage for the next chapter's exploration of ethical and legal challenges in commercializing HEt.

Chapter 3

The chapter begins by establishing key ethical positions on Human Enhancement and clarifies the research's theoretical stance within these debates. This chapter identifies critical challenges in the commercialization of HEt and SA, such as regulatory gaps, negative public perceptions, and biases within design practices. It underscores the need for an ethical design framework to support the safe and responsible development of these technologies. By highlighting the connection between ethics and design, it emphasizes the role of designers in driving trustworthy and beneficial technological advancements, advocating for bottom-up change in the absence of specific, top-down regulation. This approach situates design as a powerful tool for ethical progress in HEt and SA.

Chapter 4

This chapter achieves two key objectives: conducting Participatory Design workshops to assess public perceptions of SA and HEt and synthesizing ethical issues related to SA. It demonstrates the importance of public engagement in broadening the ethical landscape and validating PD as a means to address ethical concerns. It situates this work within contemporary PD, extending its methods to emerging technologies and ethical inquiry. A significant milestone, the chapter introduces the first draft of an ethical design framework for SA, integrating insights from diverse publics and Posthumanist perspectives. It also highlights the challenge of ensuring audiences understand complex topics like SA ethics to engage meaningfully, emphasizing the need for accessible, context-rich presentations of these issues.

Chapter 5

This chapter examines the theory behind creating the *Designing Senses* book and *Lighthouse* card deck as responses to the research. It highlights the book's goals to raise awareness of SA ethics, use Speculative Critical Design to provoke readers, and offers a participatory tool for ethical SA development. It also positions the work within SCD practice, identifying its contribution as moving beyond provocation towards actionable ethical tools. The chapter underscores the role of accessible design in making complex ethics publicly engaging, with Posthumanism helping to structure topics and include diverse voices. It also addresses the ethical use of deception in SCD, concluding its role is justified in enhancing the book's authenticity and narrative depth.

Chapter 6

This chapter evaluates feedback from specialists and non-specialists on the *Designing Senses* book and *Lighthouse* card deck, affirming the effectiveness of SCD and PD in fostering ethical engagement with SA. The tools successfully support SA creators by contextualizing ethics within their work, motivating continuous ethical evaluation. Reviewers praised the book's engaging format, seeing it as an ethical probe that inspires change without restricting creativity. Additionally, the book and workshops show promise for broader applications, including education and policymaking, with potential for wider dissemination to reach diverse audiences.

7.2. ACHIEVING THE AIMS OF THE RESEARCH

The aims and objectives of this research are detailed in the introductory chapter to the thesis, for ease, they have been included again below. Additionally, the Map of Practice (Figure 82) has also been included here as a visual reference. This section of the chapter will discuss how these aims were met.

Aim 1

To generate the first ethical design framework for Sensory Augmentation devices.

Objectives:

- To review existing literature on Human Enhancement technology ethics.

- To conduct Participatory Design workshops to assess public perception of Sensory Augmentation & Human Enhancement technology.
- To explore Posthumanism as a means to expand the discussion beyond humans.
- To synthesise ethical issues relating to Sensory Augmentation technology development into a framework for creators of devices.

Achieving Aim 1

The first aim is predominantly concerned with knowledge gathering and synthesis of insights during the first stages of this research (see Chapter 1.2.). The research has achieved this aim through exploration of HEt, SA and Posthumanist literature, and the facilitation of workshops with the public. Doing so enabled the analysis and synthesis of diverse perspectives, academic and public, on the ethics of HEt. Filtering the insights on HEt through SA literature and my knowledge of SA technology and design, led to the first draft of the ethical design framework for SA devices. The draft consolidates the research and provides a comprehensive ethical framework for creators of SA devices, which considers humans and non-humans, in the development of commercially available technology. The creation of the draft framework was foundational to creating and achieving the second aim as articulated below. The development of the card deck is the framework in its final format, thus achieving Aim 1.

Aim 2

To develop tools for Sensory Augmentation creators which enable them to put ethics into practice.

Objectives:

- To use Speculative Critical Design to raise awareness about ethics relevant to Sensory Augmentation.
- To create design tools which make the ethics actionable in Sensory Augmentation device design and development.
- To engage Sensory Augmentation creators in evaluating the tools to ensure that they work in real-world device development.

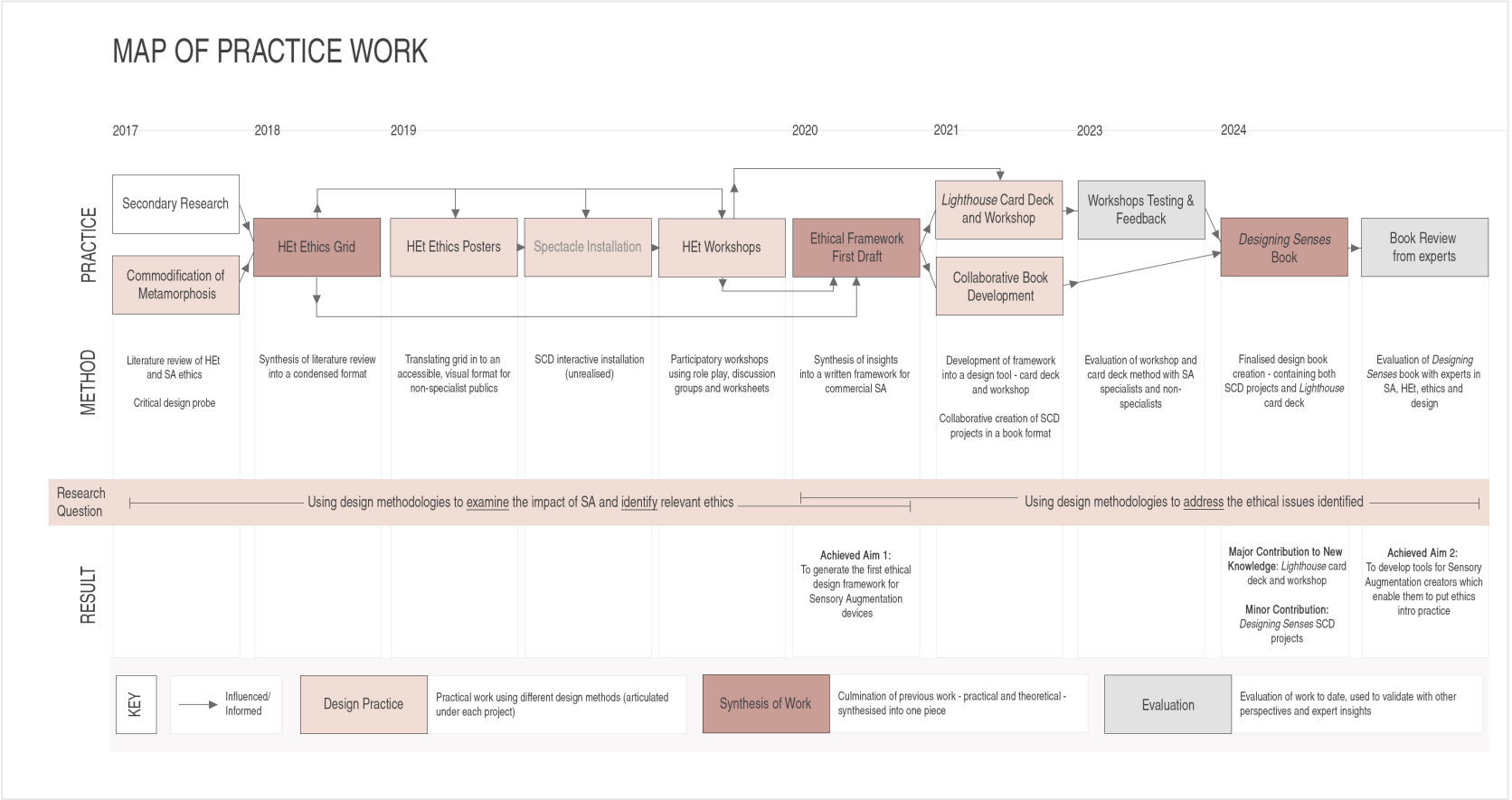


Figure 84 Map of Practice Work throughout PhD, Lesley-Ann Daly, 2025.

Achieving Aim 2

Aim 2 focused on SA creators need to first understand the plethora of ethics that relate to their devices, and developing the framework so that it could be used by these diverse teams to produce actionable outcomes. The SCD projects within *Designing Senses* immerse SA creators in the speculative scenarios of ethical and unethical technology design, enabling them to understand the ethics in context. SCD was crucial as a method to draw the reader into the narratives and provoke reflection on their own device development. The flip side of the book then addressed the next objective, housing the tools for creators to collaboratively assess their technology and generate specific, relevant, actionable next steps. By embodying the framework in a card deck and workshop, the ethical assessment becomes a participatory process that can be understood by the diverse disciplines in the team. Making the tools both physical (printed) and digital (figma board) makes the tools accessible to teams across the globe.

A crucial part of Aim 2 was engaging relevant participants to review the book and workshop method, to ensure that they are suitable to be used in real world situations. The book reviews showed the effectiveness of the SCD projects in illuminating SA ethics to experts in different fields, such as design and engineering. While the workshops showed the validity of the method for teams, or individuals, to assess their devices, resulting in ethical, actionable next steps. The objectives of Aim 2 were validated by the reviewers and workshop participants, thus Aim 2 was achieved.

7.2. ORIGINAL CONTRIBUTION TO NEW KNOWLEDGE

This section will show the original contribution to new knowledge that has resulted from this body of practice-led research and articulate why it is unique.

Original Contribution to New Knowledge:

This research's major contribution to new knowledge in the field of design is the comprehensive set of questions in the *Lighthouse* card deck (the final medium of the framework) which depicts the diverse ethics that relate to SA design and development. This includes the Lighthouse workshop which enables SA creators to collaboratively reflect up on their device development and create informed, actionable next steps towards more ethical

outcomes. Additionally, the corresponding book *Designing Senses* is a minor contribution to new knowledge in the field of design as it enables SA specialists to understand SA ethics in context before engaging with *Lighthouse* card deck and workshop.

Why the *Lighthouse* card deck and workshop are a unique, major contribution to new knowledge in the field of design:

- To my knowledge (at time of writing) this is the only comprehensive set of ethics related specifically to commercial SA. This research is built upon literature which documents the ethical issues of HEt (some of which reference sensory technologies) however, while these documents provide invaluable insights, they do not outline the diverse variety of ethics specific to commercial SA, which this card deck does.
- The card deck is informed by a unique combination of perspectives – theoretical HEt ethics, public perspectives of HEt and SA, and Posthumanist theory. Moving beyond the academic literature, the research is bolstered by perspectives from potential users of the devices – collected during the PD workshops – so that it can understand and address their concerns and needs. Additionally, by leveraging Posthumanism it broadens the consideration for those who are impacted (beyond the impacts addressed in HEt literature which predominantly focus on humans) to include non-humans i.e. the zeo/geo/techno.
- It is informed and structured by my unique knowledge of, and experience in, the SA industry. As an academic also working in industry, I can utilise my expertise in designing SA with a diverse team to inform the issues addressed by the framework and the practical design of the workshops. The framework aims to be as comprehensive as possible (from the varied inputs mentioned above) while also leaving room for input from non-design team members (via the 'Wild Card') – from different disciplines, perspectives, and experiences – who work in the SA industry. Its development is situated within my practice and experiences as a designer in industry, a researcher and a woman, while acknowledging and facilitating the invaluable input of others. This contribution situates design as an active site of ethical practice, rather than a neutral process.

Why the *Designing Senses* book is a unique, minor contribution to new knowledge in the field of design:

- While not a unique method in itself, the book is unique as a partner to the card deck and workshop, as it first shows the reader SA ethics in context. The SCD projects provoke reflection on the readers own devices, enabling them to participate in the workshop with added understanding and awareness of the ethics that are articulated on the cards. The reviewers have validated the use of SCD in the book as engaging, making the ethics more accessible, as compared to ethical texts which can feel like a lecture and therefore can be off-putting. This ultimately makes the cards more effective in positively impacting SA design and development as diverse creators can engage with them, with greater contextual awareness of the ethics in relation to their own devices.

7.3. NEXT STEPS

Articulated here are possibilities for future work which extend this body of research. These are activities and developments that the time-bound nature of the PhD did not permit but would be logical next steps for, in particular, the *Designing Senses* book and associated *Lighthouse* card deck and workshop. These are the most prevalent and promising directions that have been identified but are by no means exhaustive.

7.3.1. Publishing *Designing Senses*

The most obvious next step is to publish *Designing Senses*. Making the book available to wider audiences will enable the ethics within to reach beyond my network, to provide tools for other individuals, companies and institutes interesting in ethical technology design. Alongside publishing a physical book and card deck, a website and connected social media accounts would aid in expanding the audience and giving access to the tools digitally. This would also act as a portfolio piece for companies and others interested in having me run the workshop with their team.

As the book has been designed as a published book it is already in a suitable form to send to publishers. Having already been reviewed by experts in the field, I can provide positive reinforcement for its necessity and desirability with specialist audiences. Additionally, by giving

parts of the text more contextualisation, as recommended by reviewers, this can open up the target audience, making it more accessible to wider demographics. A key advantage of doing video feedback with a number of the reviewers was the opportunity to talk about the possibility of publishing the book (which several recommended). Many have either published or edited books and kindly offered their editing expertise and connections to publishers.

7.3.2. Course Content for Academia

Though I did not explicitly ask reviewers and workshop participants what they think the next steps could be for the book and card deck, many suggestions arose. Particularly when talking about academic impacts, reviewers made several suggestions for utilising it for different types of university level class content. There were specific recommendations to make it part of the curriculum for designers and engineers, potentially as these are the disciplines of the reviewers who felt that their academic experience had minimal, if any, ethical training. Some proposed making it part of a courses' reading list to give students an understanding of (enhancement) technology ethics, enabling the lecturer to open up an informed discussion with them. It could also be used by engineering and design students as inspiration to create their own speculative scenarios around a technology, facilitating an exploration into the intended and unintended consequences of their designs. The first candidate would be Dr Matt Hayler, who has already requested the materials for his class on the ethics of human enhancement at Birmingham University, who would act as a proof of concept for this use. Consideration can then be given to taking the work to institutions, and also to other disciplines related to technology development.

7.3.3. Ethical Provocateur in Industry

A similar concept applies to the utilisation of the book in industry or with academics working in technology research and development (i.e., not with students), both within and beyond SA. There is the potential to run workshops with SA creators on a more formal basis, creating that role of the 'ethical provocateur'. I would facilitate the workshop with SA creators and also bring my expertise in the industry to assist with tasks throughout development- from ideation to concept validation, through to post-launch assessments and redesigns. While SA acted as a useful tool to focus the research and its resulting outputs for the PhD, the majority of ethical topics seen on the cards could be applicable to a plethora of other devices. As Scott Novich

commented in his review of the book "I don't think there's any reason why this framework has to apply specifically to Sensory Augmentation" (see Appendix 8.2.) so the workshop could therefore be applicable to the ethical design of other technologies. Moreover, all technologies have some type of sensory aspect in their design – from a viewable screen, to a wearable attachment, or tactile means of interaction. Editing the book with added contextualisation – as suggested by reviewers – would aid in making the book content more accessible to wider audiences and more industries.

7.3.4. Re-Engagement of Experts

Lastly, I would like to re-engage reviewers and workshop participants to explore the half of the research that they did not get to experience. Due to time limitations during the PhD, the workshops needed to be tested and adjusted ready to be included in the book for printing. Therefore, I was not able to conduct a session where participants would first review the book and then partake in the workshop. It would be advantageous to the future of the research to explore the impact of the two in conjunction. For example, giving the book to Valence Vibrations to explore the provocations and see how this may impact a second round of the workshop. Also, organising a workshop with Scott Novich and the team at Neosensory[64], to see how they approach the workshop after having experienced the book.

7.4. CONCLUDING THOUGHTS

It would be remiss of me not to mention the pervasive spread of Artificial Intelligence (AI) in the year preceding the completion of this research and thesis. While a conversational AI program, ChatGPT, was used in the latter stages of my practice (in 2024) the capabilities and diversity of AI applications has grown rapidly since then. This opens up opportunities for designers, technologists and the public to experiment with AI in exponential ways as the technology becomes better, more accessible and ubiquitous. This includes the potential collaboration of SA creators and intelligent agents during the ideation, design, development, testing, and use of SA devices. AI could, for example, speed up the coding of firmware and software, simulate user product testing, and enhance the 'smart' functionalities of the

[64] Scott Novich was approached originally to do the workshop with Neosensory, but unfortunately the timelines did not align with their stage of development. However, he has expressed a great interest in being able to run the workshop at a later date.

resulting device - among many, many other things. Building AI into the SA device could potentially allow people to modulate their new perceptions, suggest contextual optimisations in real-time, or enable abilities that we have not conceived of yet. Additionally, by gathering data during use, it can continuously learn about the person using the device and personalise the interactions. This use of AI could be hugely beneficial for both creators and users of SA, through making the development more efficient (and therefore cheaper) and ensuring devices work for each unique person using it.

However, as with SA and all other technologies, AI comes with a plethora of ethical issues. Data security, loss of human agency, data bias, and fake content or identities are just a few of the dilemmas surrounding the use and development of AI. Some of the issues overlap with the ethics addressed in this research, however the multiplicity and complexity of problems that could impact the future of SA need their own investigation[65]. Many AI ethical assessments and regulations have already been developed and are beginning to be enforced across the globe and will be a prevalent and ongoing consideration for all technologies for many years to come. I believe that AI will create untold opportunities for SA, but the impacts of these devices will need to be explored, understood, questioned and directed, akin to how is articulated in this research. The *Lighthouse* card deck and workshop have been designed in such a way that they can be augmented to include assessment of intelligent systems integrated into device design and development. The deliberate flexibility of the design tools ultimately future proof them, enabling them to be utilised by diverse creators, for diverse applications, in perpetuity, as the technology landscape evolves. I personally (and professionally), look forward to experiencing and being part of the future of Sensory Augmentation.

[65] This is not in the scope of this PhD research.

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APPENDIX

1. RESEARCH ETHICS FORMS

1.1. UAL Application Forms for Participatory Methods

SECTION B: RESEARCH ETHICS **TO BE COMPLETED BY THE STUDENT**

Guidance – Research Ethics:

- **Please ensure that you have read the *'UAL Guidance for Research Ethics Approval'* and *'UAL Code of Practice on Research Ethics'* before completing this form.** All supporting documentation on research ethics can be found in the UAL Research Degrees section on Moodle

Name:	**Lesley-Ann Daly**
College:	**Central Saint Martins**

1. Please provide a 100-word summary of your proposed research. Explain in terms appropriate to a layperson.

Sensory Augmentation technology reached the consumer market in 2017. The product creation is led by scientists without a designer integrated into the team. A critical design eye, alongside experience in developing and realising SA products, could affect the products' success in both ethical and pragmatic terms.

With new SA technologies continually being developed, this practice based project enables me to question:
'How can Critical Design methodologies be used to examine the impact of Sensory Augmentation, and assess ethical issues related to the design and use of the technology?'

2. Does your research involve participants

	No*
X	Yes

***If you answer 'No', you do not need to complete Questions 3 to 12, instead please go to Question 13 and continue from there.**

3. Who will the participants be? Please tick as appropriate.

	Students at the University
	Staff at the University
X	Other*

***If you answered 'Other' please specify below**

1. Users of Sensory Augmentation devices
2. Focus Group Participants – that I will arrange
3. Audience members at future exhibitions
4. Researchers in the field

Figure 85 Page 1/6 UAL Research Ethics application form, Lesley-Ann Daly, 2018.

4. How will participants be recruited and how many will be involved?

1. Through email participation calls via the company that has created the device they are using. 20 participants.
2. Through an email participation call, or online public call for participants (social media, blogs, twitter). 10 participants per focus group, 3 groups carried out per topic.
3. Those who consent to fill out a questionnaire/ be interviewed when at an exhibition. 20 participants per exhibition.
4. Through email correspondents. And/or introduction through existing contacts, either online or personally. Minimum 5.

5. What will participants be asked to do? Explain in terms appropriate to a layperson.

1. Asked to partake in an interview that looks at why they are using the device, what their expectations were and how the device has affected them during use. This may be a single interview, or if agreed by the participant a course of several interviews to document their ongoing journey.
2. They will be asked to meet and receive a presentation on a particular issue/idea and provide feedback on their perceptions, opinions, concept, idea etc
3. Partake in an informal brief interview on how they view the work, the concept it portrays, how well this is portrayed (success), and the broader context that the work lies in (sensory augmentation)
4. Partake in interviews about their research, helping to provide a more scientific insight into the field. If able to/ applicable share insights from case studies or research projects.

6. What potential risks to the interests of participants do you foresee and what steps will you take to minimise those risks? A participant's interests include their physical and psychological well-being, their commercial interests; and their rights of privacy and reputation.

- Intellectual rights of the participants will need to be carefully managed, with agreements in place prior to interviews etc, and will need to be continually checked throughout the long duration of the project. This is in regard to both the interview participants and the researchers and companies that I will correspond with, as some ongoing research information may be sensitive or have standing privacy clauses.
- Privacy and confidentiality will need to be agreed in advance regarding what information about them, or related to them, is made public. What information should be anonymised, and a confidentiality agreement that will allow me to share the information only with researchers pertinent to my study.
- Measures will be taken to ensure the security of the data collected, so that only authorised persons have access to it. Restricted folders available only to those who I have specifically given access and who have themselves agreed to the security, privacy and confidentiality of the information. Names will be removed in place of coded numeric file names which only I will know the code for.
- I will need to make a clear distinction between my research and any researcher/company that I correspond with. To be clear that any 'opinions' or critical angles investigated through my exhibitions are my own and are not representative of the individuals or companies that I have contacted.

7. What potential risks do you foresee to yourself as the researcher and what steps will you take to minimise those risks? E.g. does your research raise issues of personal safety for you or others involved in the project, especially if taking place outside working hours or off University premises.

Figure 86 Page 2/6 UAL Research Ethics application form, Lesley-Ann Daly, 2018.

- Minimal risk to myself or others involved in the project. The only foreseeable risks would arise in constructing and running any exhibitions that I create during the research period. Which will more than likely take place off the University premises and potentially outside of working hours. A risk rassesment for all exhibtions will be created prior to the installation so that risks can be kept to a minimum.
- Risks in asking personal/confidential information during the interviewing. Interview questionnaires will be reviewed by a Psychologist before being approved to take to the participants (Psychology advisor on the project – Aurora Paillard – Senior Lecturer in Psychology at LCF)

8. Please attach a copy of proposed written consent form and information sheet to be given to participants. If you are not obtaining written consent or supplying an information sheet, please explain the reasons for this.

I have attached a copy of the 'Participant information sheet template', 'Consent form template' and the 'Interview questionnaire templates' for the interviews which shows what information I will give to participants, that informed consent is asked for and the questions that the participants are asked. This will serve as a guide /format for forthcoming interviews to be undertaken as part of the project proposed in this document.

X	Please tick here if the written consent form and information sheet are attached

9. Does your project involve children or vulnerable adults? E.g. a person with a learning disability.

X	No. Go to Question 10
	Yes*

***If you answer 'Yes', you must refer to Section 4 in the '*Guidance for Research Ethics Approval*' AND obtain a Disclosure and Barring Service (DBS) check (formerly known as a CRB check).**

	I confirm that I have obtained a DBS check

10. Does your research concern groups which may be construed as terrorist or extremist?

X	No. Go to Question 11
	Yes*

***If you answer 'Yes', you must refer to Section 5.5 in the '*Guidance for Research Ethics Approval*' AND complete the questionnaire at Appendix 1 of this form.**

Please Note:

It is a presumption of academic research that, wherever possible and feasible, the information on which the research is based should be preserved, so that it can be made available to future researchers. However, the privacy of participants must be respected. Please refer to the guidance note on data protection before answering Question 11.

Figure 87 Page 3/6 UAL Research Ethics application form, Lesley-Ann Daly, 2018.

	11. Will you be obtaining personal information from any of the participants? E.g. name, personal opinions, address, recorded images or audio, date of birth, notes and observations.
	No. Go to Question 12
X	Yes*

***If you answer 'Yes', please give details. In your response, please consider:** How will you store and use this information during the course of your research? What parts of this information will need to be confidential and how? Will you exhibit or publish the information? Will you retain information after the research is concluded? If information is to be destroyed, explain why this is appropriate.

I will be obtaining personal information from some participants, particularly those that are using Sensory Augmentation Devices, such as: name and email for ongoing contact; demographic data such as age and gender; personal opinions and experiences; most of which will be audio or video recorded, then transcribed. Any participants of this kind will be anonymised (no names or recognisable information given) for use in any publications or exhibits, with their consent.

Researchers or companies may have names attributed to their work or interviews, with their prior consent and respecting any privacy agreements they have regarding their work. Statements they make will be checked with them after transcription of interviews and any amendments made immediately.

All data will be stored on my own personal drive, in a password protected file, with coded file names. This will be accessible only to me and any pertinent researchers whom myself and the participant give permission to view the information, following their agreement to all security, privacy and confidentiality agreements.

After the research is concluded any confidential information will remain with me on a secure drive, to be used only under the previously agreed circumstances, should the participant have agreed for the information to be used on an ongoing basis after the research has concluded.

	12. Will payments to participants be made?
X	No. Go to Question 13
	Yes*

***If you answer 'Yes', please state amount and whether payment is for out-of-pocket expenses or a fee.**

Figure 88 Page 4/6 UAL Research Ethics application form, Lesley-Ann Daly, 2018.

13. If the project is to receive financial support from outside the University, please give details. Include any restrictions that have been imposed upon the conduct of the research. Please discuss this with your Director of Studies. Both financial propriety and the protection of commercial rights are important for you, the University and other third parties (e.g. sponsors, participants etc.)

14. Will any restrictions be placed on the publication of results?	
X	No. Go to Question 15
	Yes*

***If you answer 'Yes', please state the nature of the restrictions, e.g. details of any confidentiality agreement.**
Any publications will comply with the previously agreed confidentiality agreement with the participants on the anonymization of the participants involved. This will most likely be information from the companies that have shared their research with me, to ensure the security of their R&D insights.

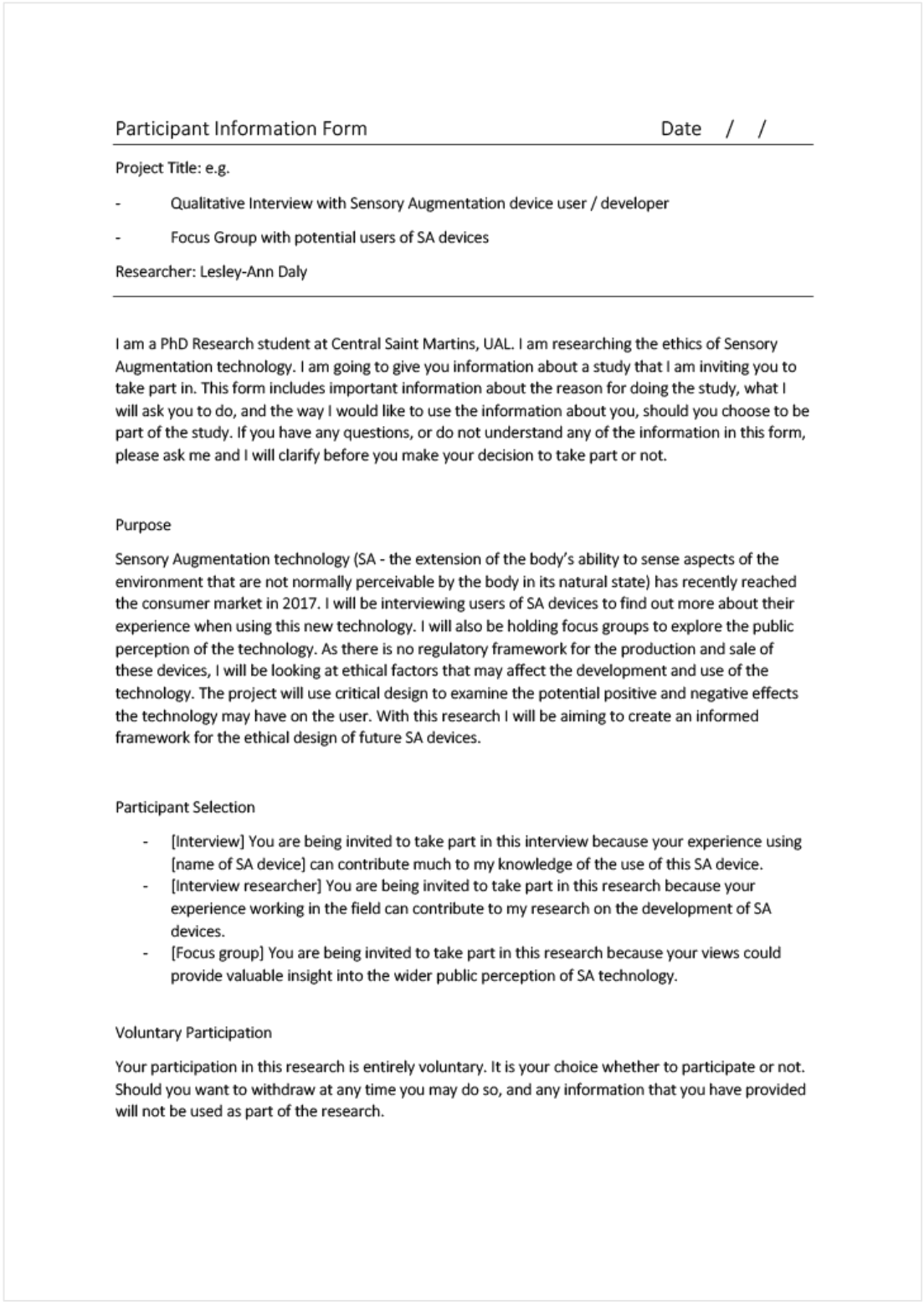
15. Have you attached a detailed outline of the research project to this form?	
X	Yes, the detailed outline is attached as part of the Application for Registration form

Figure 89 Page 5/6 UAL Research Ethics application form, Lesley-Ann Daly, 2018.

Student Declaration:	
16. I confirm my responsibility to deliver the project in accordance with the Code of Practice on Research Ethics of the University of the Arts London (the University). In signing this form I am also confirming that: **a)** The form is accurate to the best of my knowledge and belief. **b)** There is no potential material interest that may, or may appear to, impair the independence and objectivity of researchers conducting this project. **c)** I undertake to conduct the project as set out in the application unless deviation is agreed by the University and to comply with any conditions set out in the letter sent by the relevant College Research body and/or the University's Research Ethics Sub-Committee. **d)** I understand and accept that the ethical propriety of this project may be monitored by the relevant College Research body and/or the University's Research Ethics Sub-Committee.	
Signature of Student:	Lesley-Ann Daly
Date *(dd/mm/yyyy):*	25/02/2018

Director of Studies Declaration:	
17. I support this project and have reviewed it with the applicant.	
Name:	Carole Collet
Signature of Director of Studies:	Via email
Date *(dd/mm/yyyy):*	26/02/2018

FIGURE 90 PAGE 6/6 UAL RESEARCH ETHICS APPLICATION FORM, LESLEY-ANN DALY, 2018.



Participant Information Form Date / /

Project Title: e.g.

- Qualitative Interview with Sensory Augmentation device user / developer
- Focus Group with potential users of SA devices

Researcher: Lesley-Ann Daly

I am a PhD Research student at Central Saint Martins, UAL. I am researching the ethics of Sensory Augmentation technology. I am going to give you information about a study that I am inviting you to take part in. This form includes important information about the reason for doing the study, what I will ask you to do, and the way I would like to use the information about you, should you choose to be part of the study. If you have any questions, or do not understand any of the information in this form, please ask me and I will clarify before you make your decision to take part or not.

Purpose

Sensory Augmentation technology (SA - the extension of the body's ability to sense aspects of the environment that are not normally perceivable by the body in its natural state) has recently reached the consumer market in 2017. I will be interviewing users of SA devices to find out more about their experience when using this new technology. I will also be holding focus groups to explore the public perception of the technology. As there is no regulatory framework for the production and sale of these devices, I will be looking at ethical factors that may affect the development and use of the technology. The project will use critical design to examine the potential positive and negative effects the technology may have on the user. With this research I will be aiming to create an informed framework for the ethical design of future SA devices.

Participant Selection

- [Interview] You are being invited to take part in this interview because your experience using [name of SA device] can contribute much to my knowledge of the use of this SA device.
- [Interview researcher] You are being invited to take part in this research because your experience working in the field can contribute to my research on the development of SA devices.
- [Focus group] You are being invited to take part in this research because your views could provide valuable insight into the wider public perception of SA technology.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Should you want to withdraw at any time you may do so, and any information that you have provided will not be used as part of the research.

Figure 91 Page 1/4 Example Participant Information Form, Lesley-Ann Daly, 2018.

Procedure

I am asking you to take part in this study to learn about the potential positive and negative effects that SA devices may have on the user, and so to develop ethical guidelines for them. If you accept, you will be asked to...

- [Interview] ...participate in an interview with myself. The interview will be conducted online via a videocall. I will ask you questions about your experience using [name of SA device] including what your motivations where for buying it, the practical use of the device and your thoughts about SA technology. If you do not wish to answer any of the questions during the interview, you do not have to and I will move on to the next question. The interview is expected to last approximately [insert time], with the possibility of subsequent interviews should you agree to that. As the interviewer I will be the only one present, unless you should want someone else to be there. The information recorded is confidential, only I will have access to the information documented during the interview. The entire interview will be recorded, however only the audio file will be used for transcription and analysis. The video will not be used and you will not be identified by name, anonymised, when the file is stored. All files will be kept on my laptop in password protected files.
- [Interview with Researcher] ... participate in an interview with myself. The interview will be conducted either online via a videocall or in person. I will ask you questions about your experience working with/researching [name of SA device] including motivations behind making this device, the development process, aspirations for its use and your thoughts about SA technology. If you do not wish to answer any of the questions during the interview, you do not have to and I will move on to the next question. The interview is expected to last approximately [insert time], with the possibility of subsequent interviews should you agree to that. As the interviewer I will be the only one present, unless you should want someone else to be there. The information recorded is confidential, only I will access to the information documented during the interview. Should there be any sensitive information given about the development process, or other information about the business, this will be kept confidential unless otherwise agreed. The entire interview will be recorded, however only the audio file will be used for transcription and analysis. The video will not be used and you will not be identified by name, anonymised, when the file is stored. All files will be kept on my laptop in password protected files.
- [Focus Group] ...take part in a discussion with 7-8 other people. As the moderator I will ask you questions about SA technology in general, about specific real or future devices, and your views on ethical issues that may affect the technology and potential users. I will not ask you to share any personal information that you are not comfortable sharing, you do not have to answer questions if you do not wish to. The discussion will take place [name of place], and no one else will be present except myself and those taking part in the focus group. The discussion is expected to last approximately [insert time]. The information recorded is confidential, only I will access to the information documented during the discussion. The entire discussion will be recorded. I will be the only one with access to the videos, and you will not be identified by name, anonymised, when the file is stored. All files will be kept on my laptop in password protected files.

Expenses

You will not be provided any incentive to participate in the research.

Figure 92 Page 2/4 Example Participant Information Form, Lesley-Ann Daly, 2018.

Risks

I may be asking you to share some personal information regarding [your personal views/ your body/ your business or research], and you may feel uncomfortable talking about some of the topics. You do not have to answer any question or take part in the [interview/discussion] if you do not wish to do so, and that is also fine. You do not have to give a reason for not responding to any question.

Should you feel affected by anything discussed during the [interview/ focus group] I advise you to contact a professional to discuss your thoughts. There are a number of helplines that you can call or email, for example [insert examples]

Benefits

The aim of this project is to create an informed ethical design framework for the future creation of SA devices, which will hopefully have a positive impact on the experiences of the users of these devices. This project may not directly benefit you, but your participation is likely to help me inform better methods of design that will give the users an improved experience.

Confidentiality

The personal information you provide will not be shared outside of the research team - this team includes myself & [name any collaborating researchers who will need access to this info and why], this information will be kept private. Any information collected for the research will be stored under a coded number instead of your name, only I will know which number is yours.

Extracts from the [interview/focus group] may be used in conference presentations, reports, journals, or physical work that is developed from the research. However, your name will not be linked with the research material, and will not be identified or identifiable in the material that results from the research, unless previously discussed and agreed.

Your anonymised data will be kept for future research purposes. This data may be shared securely with other researchers, for research purposes, during and after the completion of this study. The information collected will not be given to any unauthorised persons, without obtaining your consent beforehand.

[Focus group only] As there are a number of participants involved in the focus group, we are asking that all participants keep what is shared within the group confidential. There may be sensitive or personal information shared during the discussion that should not be discussed outside of the group. As the researcher I cannot guarantee that other participants will not share information that should be confidential.

Figure 93 Page 3/4 Example Participant Information Form, Lesley-Ann Daly, 2018.

Contact Information

If you have any questions about the research, or are unclear about anything in this information form, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

This proposal has been reviewed and approval by the Research Ethics Committee at Central Saint Martins, UAL, to ensure that research participants are protected from harm. If you would like to contact UAL Research Management and Administration, please do so at this email address - researchethics@arts.ac.uk

Figure 94 Page 4/4 Example Participant Information Form, Lesley-Ann Daly, 2018.

Consent Form Date / /

Project Title: e.g.

- Qualitative Interview with Sensory Augmentation device user / developer
- Focus Group to with potential users of SA devices

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated DD/MM/YYY for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	☐ ☐
I understand that my responses will be kept strictly confidential. I understand that my name will not be linked with the research material, and will not be identified or identifiable in the material that results from the research, unless previously discussed and agreed.	☐ ☐
I understand that this [interview/focus group] will be tape-recorded. I understand that the audio-recording will be used only for analysis and that extracts from the [interview/focus group] may be used in any conference presentation, report, journal, or physical work that is developed from the research.	☐ ☐
I agree that my anonymised data will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	☐ ☐
[Focus group only] I understand that as there are a number of participants involved in the focus group, that we have been asked to keep what is shared within the group confidential. I understand that the researchers cannot guarantee that other participants will not share information that should be confidential.	☐ ☐
I agree to take part in this [interview/focus group]	☐ ☐

_____	___/__/_____	_____
Participant Name	Date	Signature
_____	___/__/_____	_____
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 95 Example Consent Form, Lesley-Ann Daly, 2018.

Questionnaire Date / /

Project Title: e.g.

- Qualitative Interview with Sensory Augmentation device developer

Researcher: Lesley-Ann Daly

Introduction

My name is Lesley-Ann, I am a PhD Research student at Central Saint Martins, UAL. I am researching the ethics of Sensory Augmentation technology. You are being invited to take part in this research because I feel that your experience working in the augmentation field, and developing [name device] can contribute to my knowledge of the development of SA devices.

Firstly, I will ask you some questions on the development of the device, then the expected use, and the reaction it has got. If you do not wish to answer any of the questions during the interview, you do not have to and I will move on to the next question. The interview is expected to last approximately [insert time]. The entire interview will be tape-recorded and the information recorded is confidential.

You have read the information form and provided written consent to participate in this interview.

Preliminary

- Tell me a little bit about yourself and how you got into this field?
- What is your background in?
- What interested you about sensory augmentation?

Device Research

- How did the idea for this device come about?
- What inspired it?
- What made you choose this particular sense?
- Is there previous research on it?
- How much time was spent on the research?

Device Development

- How about the development of the device?
- Who was involved in the development? List the expertise in the team
- Did you have a product/ industrial designer in the team?
- Or anyone who had previously worked on devices like this?
- Who has consulted in the development? E.g psychologists
- What kind of experts would you like to have on the team that aren't currently part of the development?

As you know, unlike medical devices, augmentation technology does not have to legally meet up to regulations and go through testing before being made available to the public. From that position does the company self-regulate the development of the devices? For example:

- Did the device go through much testing?
- Can you tell me about these tests?
- What hurdles did you encounter?

Figure 96 Page 1/3 Example Questionnaire for SA Creator, Lesley-Ann Daly, 2018.

- What criteria did you have when creating it?
- Were there certain standards that the company to judge the success of the development?
- Did you encounter any legal or ethical issues? What were they?
- Where there any concerns about health implications?
- How many iterations were there before the 'final' design was decided on?
- How important was the aesthetics/design of the device when developing it?
- Is there anything about the look of the device that you would like to be different? (size, shape etc)

Expectation

- What were you expecting the device to do?
- Did you have any concerns about the device?

Application (if device is attached to the body)

- Where on the body is it attached? Why?
- Can you talk me through this process? (how, where on body, by who etc)
- Are there any problems with attaching it?
- Is there a suggested healing time?

Use

- How does it work?
- Is it intended to be used if for a specific purpose?
- Does the user wear it every day? Or take it off? [depends on device]
- Are there any functions that you wished it could do that it doesn't?

Effects on perception

- What affect do you think it might have on [sense of smell, perception of direction, how you perceive sounds etc]?
- Do you intend to keep in touch with users to see how it is working/affecting them?
- Have you done any in house tests with it for extended periods of time?
- What have been the results of these? How has it affected the user?

Reaction

- How have people within the industry reacted to the device?
- How have the public reacted to the device?
- What comments have been made about it?
- Has it generally been positive or negative?
- Have the sales of the device been what you expected?
- Why do you think that is?

Cyborgism/Augmentation

- Do you have any body modifications? (tattoos, piercings, RFID implant etc)
- Do you see yourself as a cyborg?
- How would you define a 'cyborg'?
- What other senses/abilities would you like to augment?
- What do you think should not be augmented?

Ethics (don't expect everyone to answer these)

Figure 97 Page 2/3 Example Questionnaire for SA Creator, Lesley-Ann Daly, 2018.

- How much do you know about the ethics and regulations of enhancement?
- Are there any issues that worry you about the future of human enhancement?
- How do you feel about these devices being commercial products?
- Do you feel they should be available for everyone? (NHS etc)
- Do you think enhancement will cause any kinds of contention between augmented and un-augmented?
- Do you believe that it should be the individuals choice whether to augment? Why?
- Do you think this technology should undergo the same kinds of testing as medical devices? Why?

Final Questions

- Is there anything else that you would like to add?
- Are you happy with the device?

Thank you for your time and sharing your experience with me. If you have any questions about the research or anything else, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

Figure 98 Page 3/3 Example Questionnaire for SA Creator, Lesley-Ann Daly, 2018.

Questionnaire Date / /

Project Title: e.g.

- Qualitative Interview with Sensory Augmentation device user

Researcher: Lesley-Ann Daly

Introduction

My name is Lesley-Ann, I am a PhD Research student at Central Saint Martins, UAL. I am researching the ethics of Sensory Augmentation technology. You are being invited to take part in this interview because your experience using [name of SA device] can contribute to my research of the use of this SA device.

Firstly, I will ask you some questions on why you bought the device, then about its use, and finally some broader questions about augmentation. If you do not wish to answer any of the questions during the interview, you do not have to and I will move on to the next question. The interview is expected to last approximately [insert time]. The entire interview will be recorded, the information recorded is confidential and you will be anonymised when the data is stored and disseminated.

You have read the information form and provided written consent to participate in this interview.

Preliminary

- How did you first find out about [name device]?
- What were your first impressions?
- Why did you choose to buy one? What was the attraction?
- How long did you consider the purchase before going ahead with it?
- Had you looked into this sort of technology before? [refer to sense or tech type]
- Where did you find this information?
- How good did you find the information provided about the device before purchase?

Body Modification

- Do you have any other body modifications? (tattoo, piercing, RFID implant etc)
- Would you consider yourself an active part of the body modification community?

Expectation

- What did you expect the device to do before using it?
- Did you have any concerns about the device?
- Do you know anyone else who has the device?

Application (if device is attached to the body)

- How did you feel about the process of attaching the device to your body?
- Can you talk me through this process? (how, where on body, by who etc)
- Where there any problems with attaching it?
- Is there a suggested healing time?

Figure 99 Page 1/3 Example Questionnaire for SA User, Lesley-Ann Daly, 2018.

Use

- How long have you been using the device for?
- How does it work?
- How has it effected your everyday life? (working, exercising, eating etc)
- Do you use if for a specific purpose?
- Do you wear it every day? Or take it off? [depends on device]
- Can you tell me about a specific event where the effect was valuable to you?
- Can you tell me about an event where the effect was not valuable or unwanted?
- Does it motivate you to test its capabilities/ try certain activities?
- Has it discouraged you from any activities?
- Is there anything that you wish it could do that it doesn't?

Effects on perception

- Do you feel like it has had an effect on your [sense of smell, perception of direction, how you perceive sounds etc]?
- How would you judge [particular sense or ability] before using the device?
- How long did it take for you to get used to it?
- Can you describe how the device "feels" when using it?
- Are you always aware of it, or do you forget that it is there?
- Are there any other effects that you have noticed?

Physicality

- What do you think about the look of the device?
- Do you like how it looks on your body? Why?
- Do you like where it is placed on your body?
- Do you hide it or have it on display?
- Is there anything about the look of it that you would change? (design, shape, colour etc)
- What would your ideal device look like?

Others

- How have others reacted to you getting the device?
- What kinds of questions do they ask?
- Is it generally a positive or negative response?
- Would you recommend getting this device to others?
- Are there particular groups of people you think would like it over others?

Cyborgism/Augmentation

- Do you see yourself as a cyborg?
- How would you define a 'cyborg'?
- What other senses/abilities would you like to augment?
- What do you think should not be augmented?

Ethics (don't expect everyone to answer these)

- How much do you know about the ethics and regulations of enhancement?
- Are there any issues that worry you about the future of human enhancement?
- How do you feel about these devices being commercial products?
- Do you feel they should be available for everyone? (NHS etc)
- Do you think enhancement will cause any kinds of contention between augmented and un-augmented?
- Do you believe that it should be the individuals choice whether to augment? Why?

Figure 100 Page 2/3 Example Questionnaire for SA User, Lesley-Ann Daly, 2018

- Do you think this technology should undergo the same kinds of testing as medical devices? Why?

Final Questions

- Is there anything else that you would like to add?
- Are you happy with your device?
- Do you think it was worth the money?
- Are you planning to keep it?

Thank you for your time and sharing your experience with me. If you have any questions about the research or anything else, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

Figure 101 Page 3/3 Example Questionnaire for SA User, Lesley-Ann Daly, 2018

ual: university of the arts london

General Risk Assessment Form

Id. Code: .....

College / Pro-Vice Chancellery		School / Dept.	
Name(s) of Assessor(s)		Location	
Date of Assessment		Review Date	
Risk Assessment of	Interviews/ Focus Groups		

1. Description of task / activity / area

Interviewing
- users of sensory augmentation technology
- developers/scientist creating sensory augmentation technology
- focus groups of participants to talk about sensory augmentation

Interviews will be conducted either in person or via Skype.
Interviews will be recorded for transcribing.
Interviews will be conducted during daytime hours – unless a suitable time with a change in time zone doesn't allow this.
Interviews in person will be conducted either at the University or in a public space that suits the interviewee

2. Identification of hazards and risks

Identification of hazards and risks	Risk rating (with existing control measures)
1 Travel risks – road accident	Low
2 Distress caused from addressing sensitive information	Low
3 Risk of harm caused to researcher/participant	Low
4 Risk of sensitive information being released - Identity, business information, reputation.	Low
5	

Figure 102 Page 1/3 General Risk Assessment Form, Lesley-Ann Daly, 2018.

3. Existing Control Measures

1 Awareness of safe means of travel				
2 Good practice advised to researcher beforehand. Psychologist review of questions beforehand.				
3 No further preventive action is necessary				
4 Consent for signed/agreed beforehand. Identities kept confidential. Any sensitive business information kept confidential under agreement.				
5				
Are the control measures adequate?	Yes		No	

	Multiple deaths or over £1,000,000 in damage	Single death or over £100,000 in damage	Major injury or over £10,000	Lost time or over £1000	Minor injury or over £1000	Delay
Certain	Very High	Very High	High	High	High	High
Very likely	Very High	Very High	High	High	High	Medium
Likely	Very High	High	High	High	High	Medium
May happen	High	High	High	High	Low	Low
Unlikely	High	Medium	Medium	Low	Low	Low
Very unlikely	Medium	Medium	Low	Low	Low	Low

4. Additional Control Measures Required

1 No further preventive action is necessary				
2				
3				
4				
5				
Will additional control measures reduce the risk to an acceptable level?	Yes		No	

Figure 103 Page 2/3 General Risk Assessment Form, Lesley-Ann Daly, 2018.

5. Actions

Action	Person responsible	Acknowledged	Time scale	Date completed
No further preventive action is necessary	Lesley-Ann Daly		N/A	N/A

Has a safe system of work been completed?	Yes		No		Not required	

Risk assessment **completed** by……Lesley-Ann Daly…… Lesley-Ann Daly …… 25/02/2018

Risk assessment **accepted** by (Manager)……(print name)……(signature)……(Date)

Figure 104 Page 3/3 General Risk Assessment Form, Lesley-Ann Daly, 2018.

1.3. Proof of Approval

ual: university of the arts london

RESEARCH DEGREES

Private and Confidential

Extract from the minutes of the CSM Research Degrees Subcommittee meeting on 08/03/2018 for the Application for Registration of **Daly, Lesley-Ann (Version 1)**.

A: Overall assessment of the proposal

Suggested Modifications/Comments:

Think about extending the methodology. How will you test the framework, how will you receive feedback on this in order to make claims in relation to the success/ shortcomings and generalisability of the framework and the methodological approach undertaken through the project. This will aid in addressing the 'so what?' and 'what's the impact?' questions that critical and speculative design projects increasingly face.

B: Research Ethics

Overall assessment of the ethical aspects of the project and the ethics form (where provided):

Comments:

The ethics is extremely well done.

- The Committee agreed that this proposal was deemed to represent **minimal ethical risk**
- If **minimal ethical risk** - please note that research projects may be monitored and can be called in for review at any time by the Research Ethics Subcommittee (RESC). Any substantial changes proposed to, and deviations from, the original project should be reported to the CSM College Research Degrees Subcommittee (CRDSC) for consideration and possible referral to RESC.

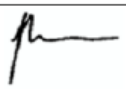
C: Agreed

- That the CSM Committee **approves** this Application for Registration to be forwarded to the next University Research Degrees Subcommittee (URDSC), advising URDSC to confirm Registration for a Research Degree (unspecified) with the intention to complete as PhD

Last updated: 13/03/2017

Figure 105 UAL Overall Assessment of Application for Registration and Research Ethics, 2018.

SECTION D **FOR UAL COMMITTEE USE ONLY**

Approval of Registration (CRDSC)			
▪ I confirm that the College Research Degrees Sub-Committee approves this student's Registration for an unspecified research degree of University of the Arts London. ▪ I confirm that any nominated co-Supervisor from a UAL college other than the student's college (i.e. requiring cross-college supervision) has been approved by that Supervisor's College Associate Dean of Research or their nominee.			
Ethics			
[X] This student's Application for Registration is approved as **minimal ethical risk.** [ ] This student's Application for Registration is deemed as **more than minimal ethical risk**			
Signature *College Associate Dean of Research or Chair of CRDSC*			
Print name	James Swinson	**Date** *(dd/mm/yyyy)*	08/03/2018

Approval of Registration (URDSC)			
▪ I confirm that the University Research Degrees Subcommittee approves this student's Registration for an unspecified research degree of University of the Arts London.			
Signature *Chair of URDSC*			
Print name		**Date** *(dd/mm/yyyy)*	

Figure 106 UAL Signed Approval of Registration and Research Ethics Application, 2018.

2. HET ETHICS GRID

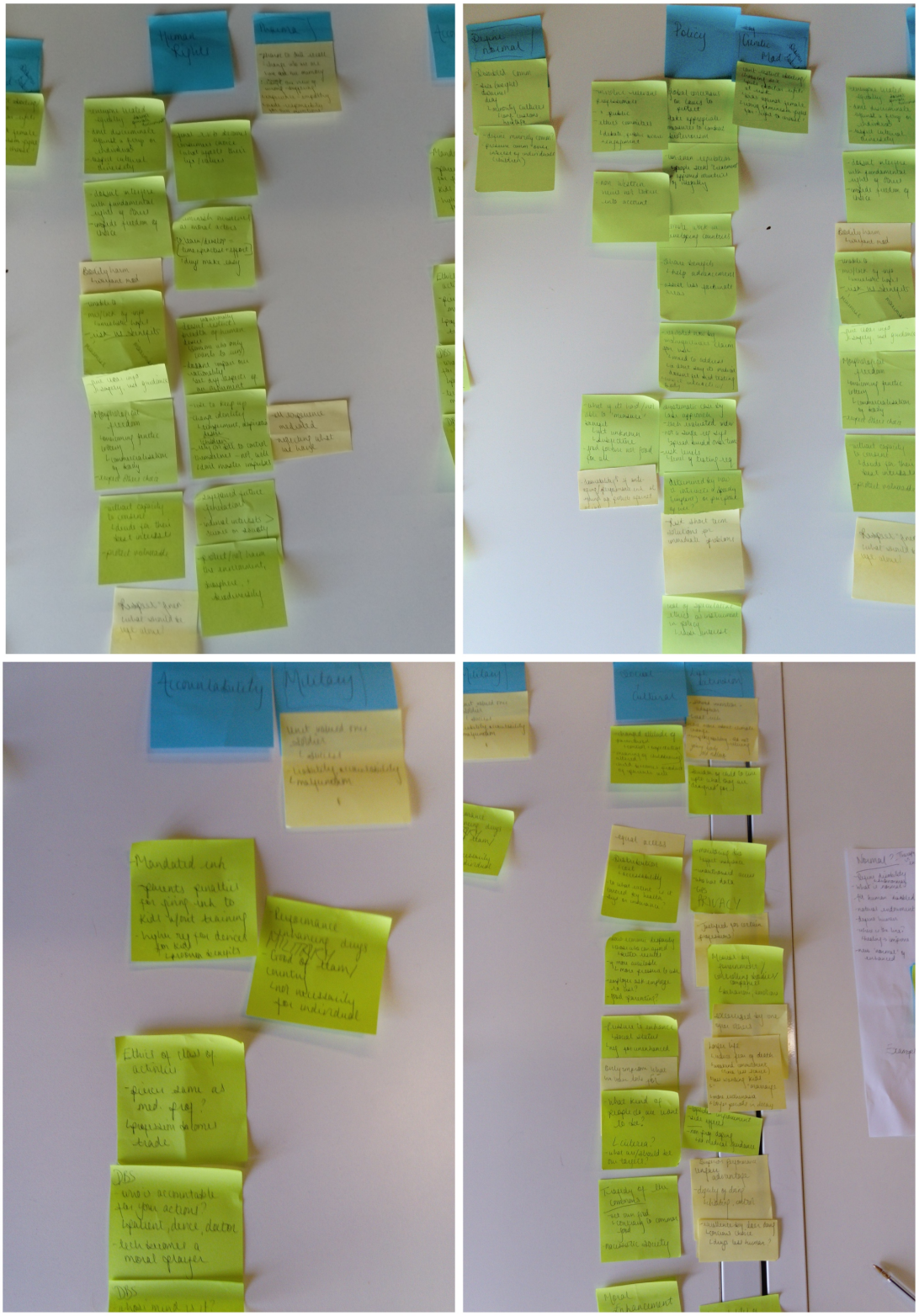


Figure 107 Affinity mapping HEt ethical issues, 2018.

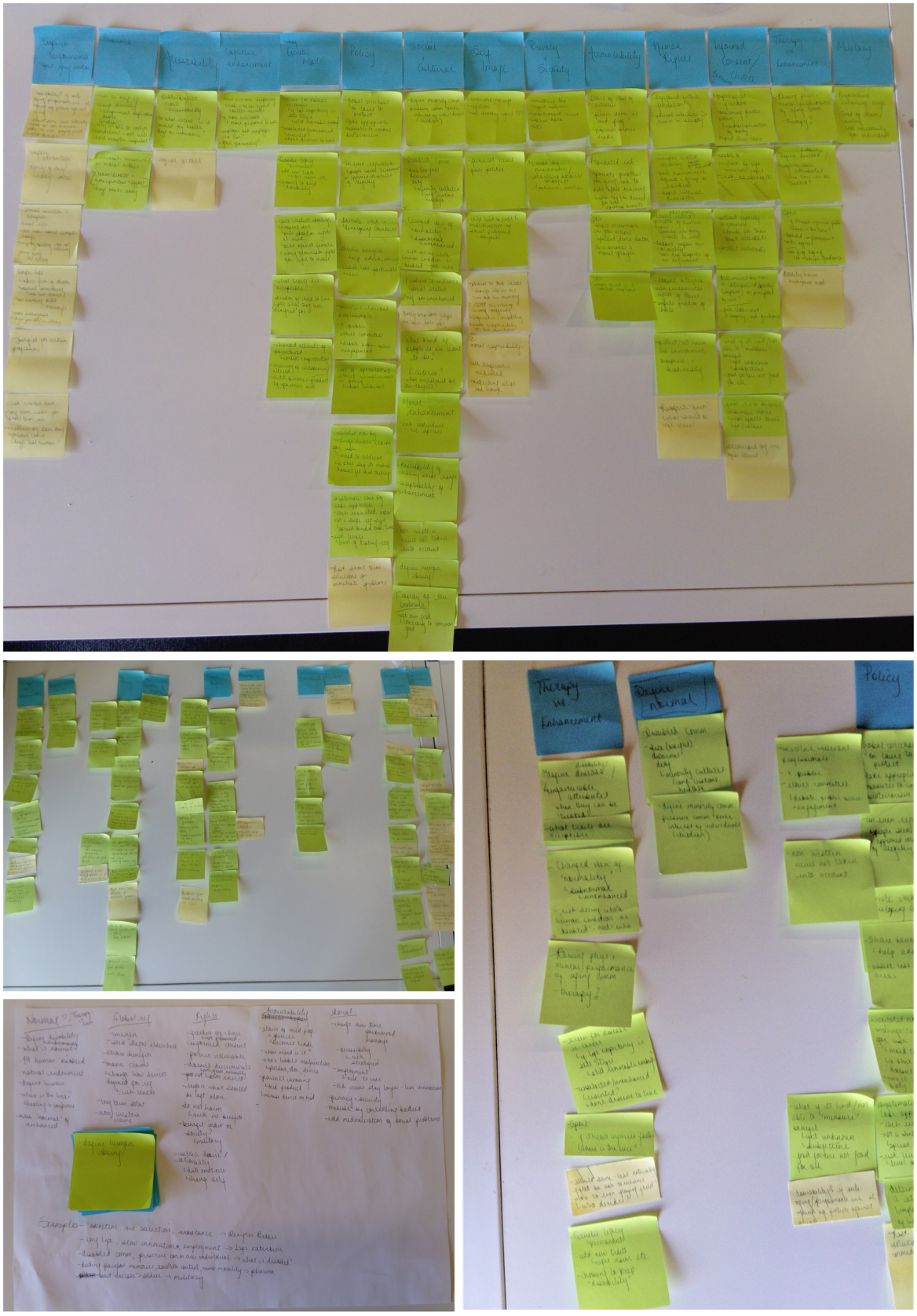


Figure 108 Affinity mapping HEt ethical issues, 2018.

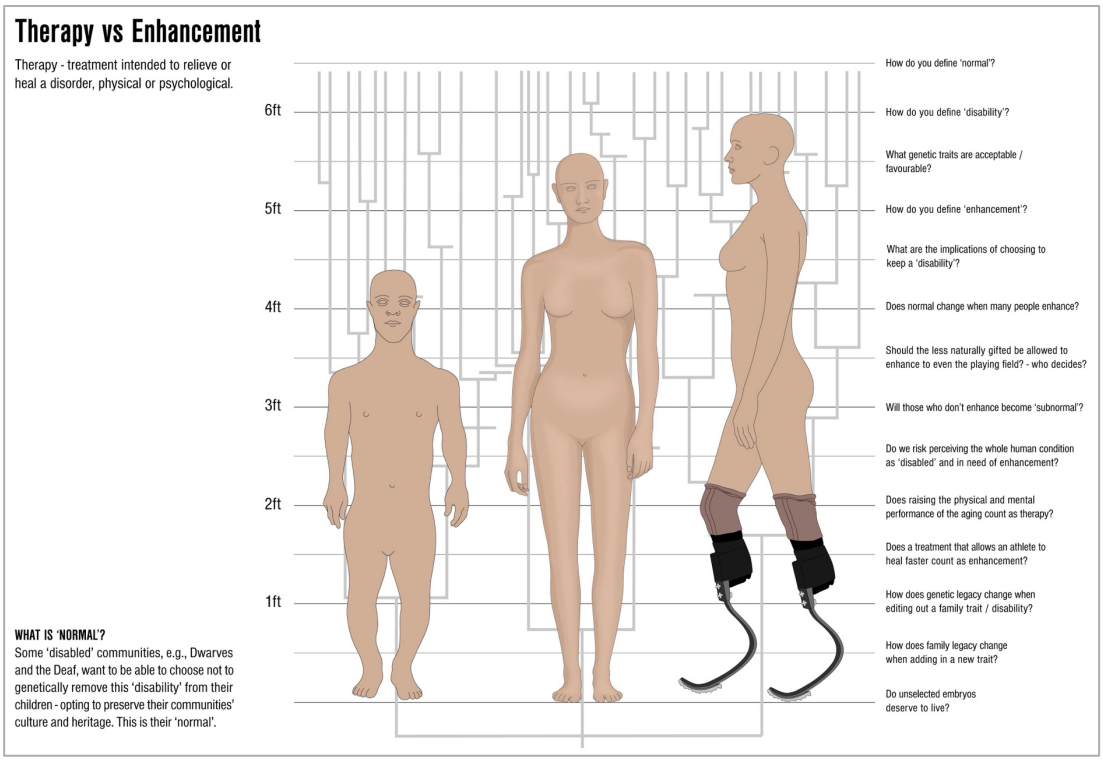


Figure 109 A Therapy vs Enhancement poster early mockup. Illustration by Dr Gill Brown, 2019.



Figure 110 Therapy vs Enhancement poster early illustration test. Illustration by Dr Gill Brown, 2019.

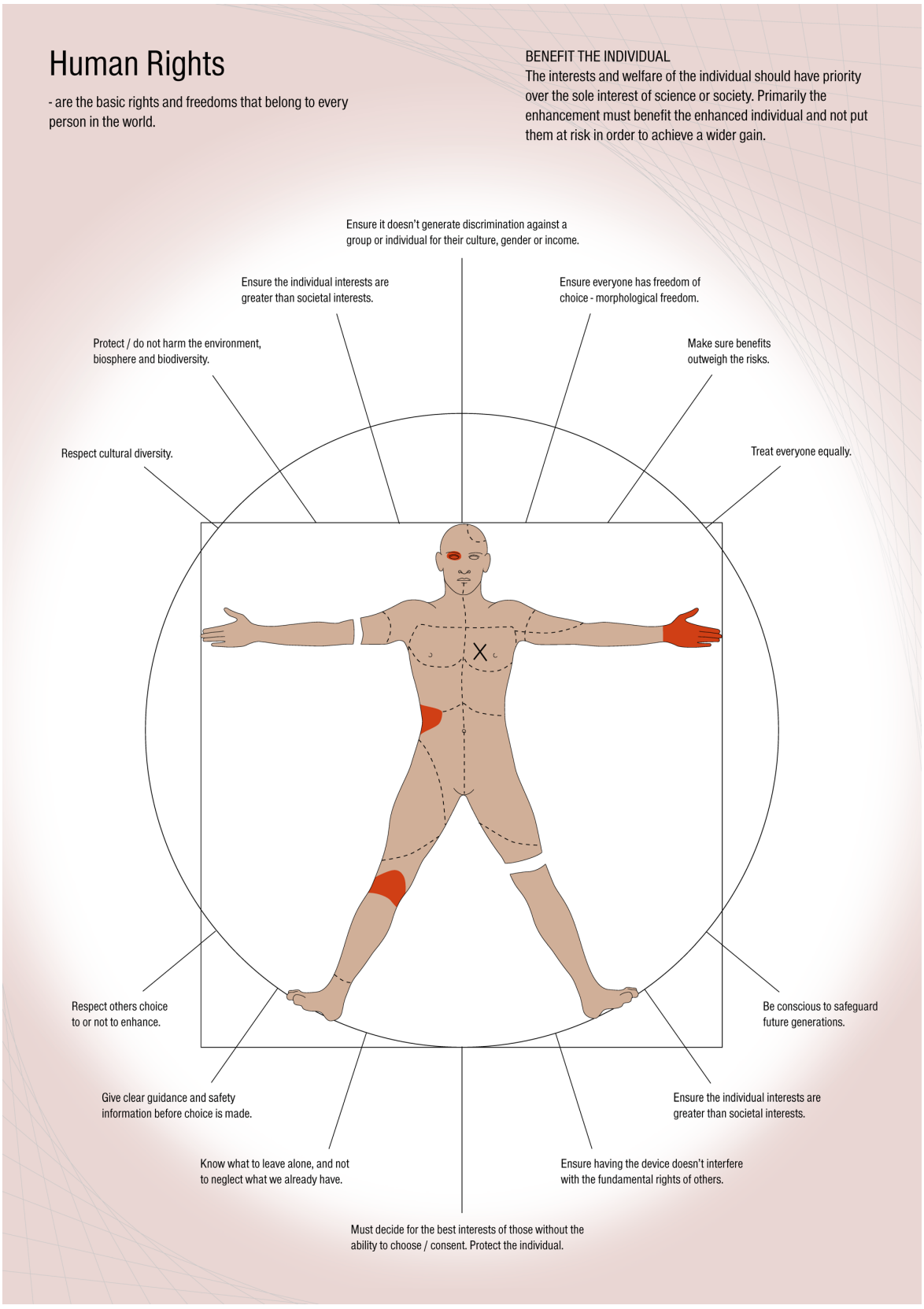


Figure 111 Human Rights poster early mock up. Illustrations by Dr Gill Brown, 2019.



Figure 112 Unused smaller posters on specific questions. Illustrations by Dr Gill Brown, 2019



Figure 113 Unused smaller posters on specific questions. Illustrations by Dr Gill Brown, 2019

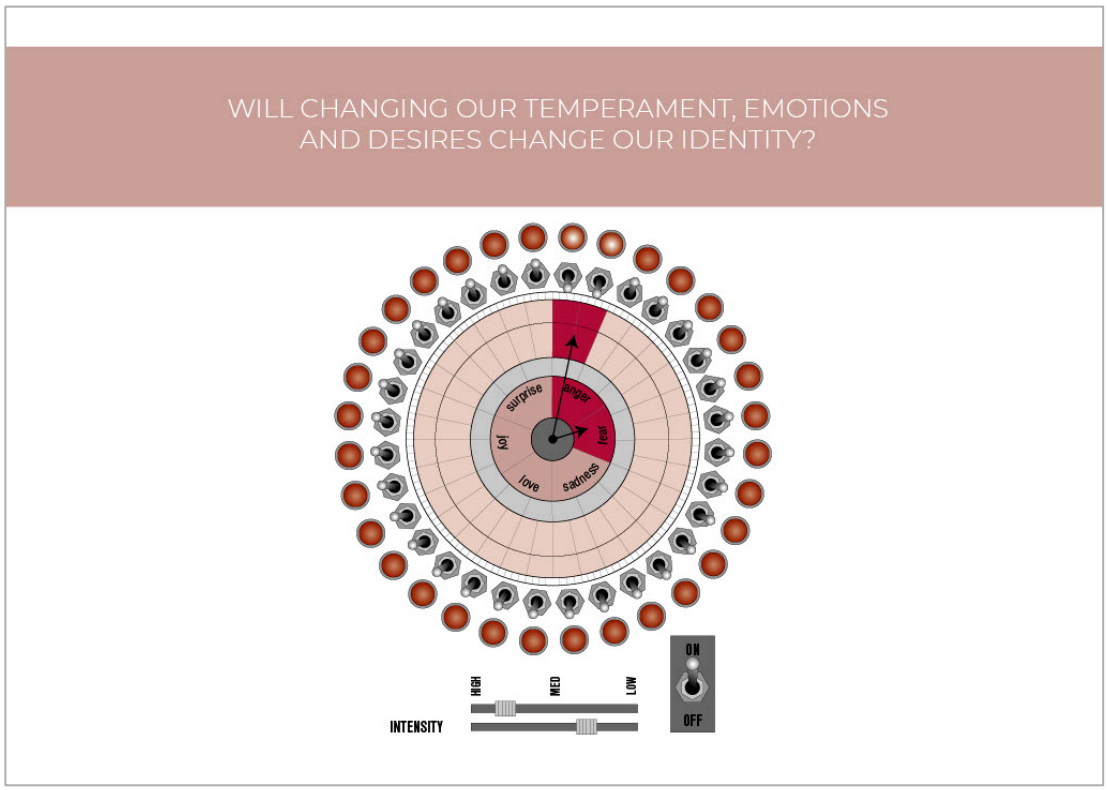


Figure 114 Unused smaller posters on specific questions. Illustrations by Dr Gill Brown, 2019



Figure 115 Unused smaller posters on specific questions. Illustrations by Dr Gill Brown, 2019



Figure 116 Unused smaller posters on specific questions. Illustrations by Dr Gill Brown, 2019

4. SPECTACLE INSTALLATION (UNREALISED)

4.1. Making Process

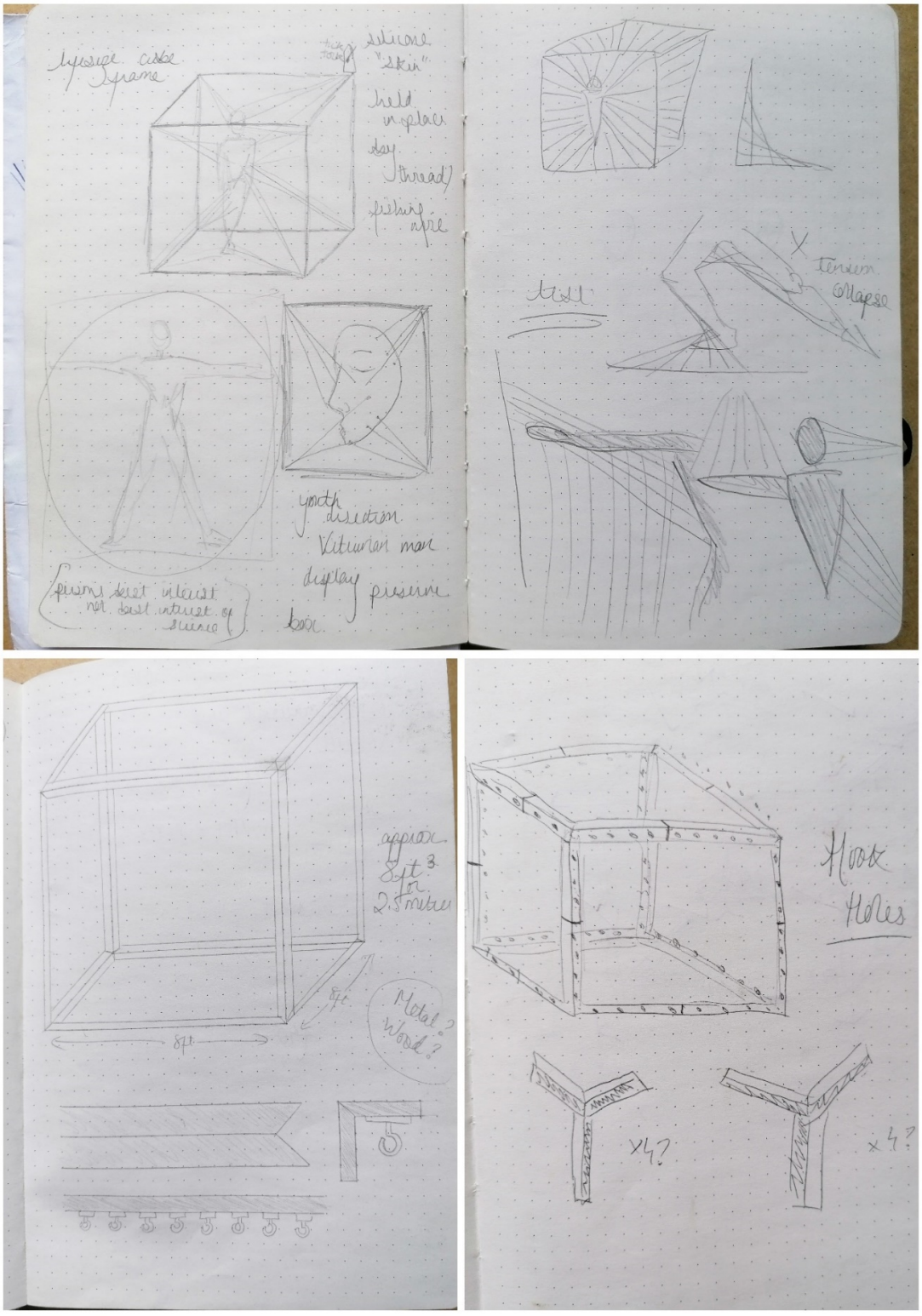


Figure 117 Spectacle Installation – Sketches of box to suspend sculpture in. Lesley-Ann Daly, 2019.

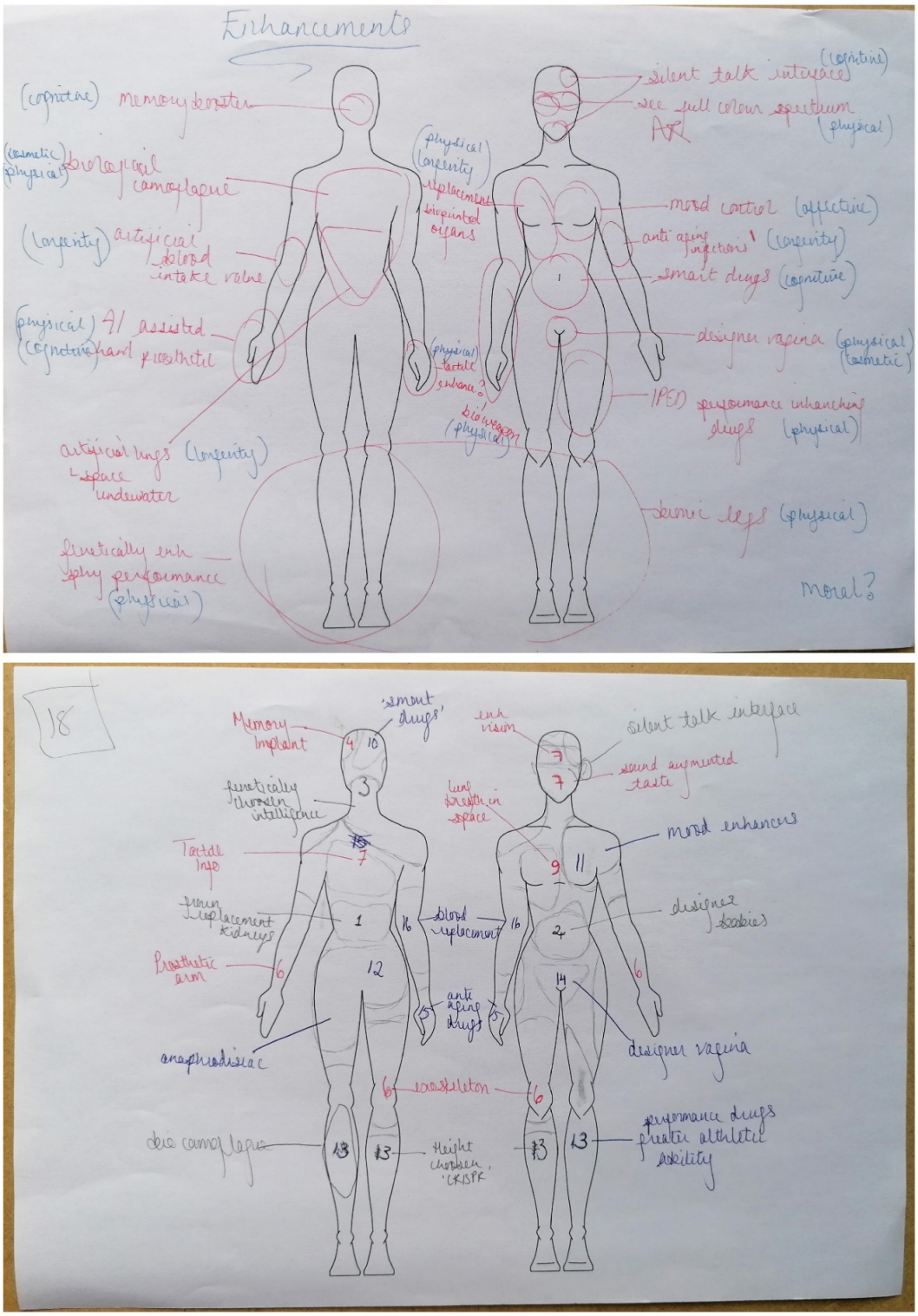


Figure 118 Spectacle Installation – Sketches of mapping enhancement technologies to body parts. Lesley-Ann Daly, 2019.



Figure 119 Spectacle Installation – Casting tests on doll face. Lesley-Ann Daly, 2019.

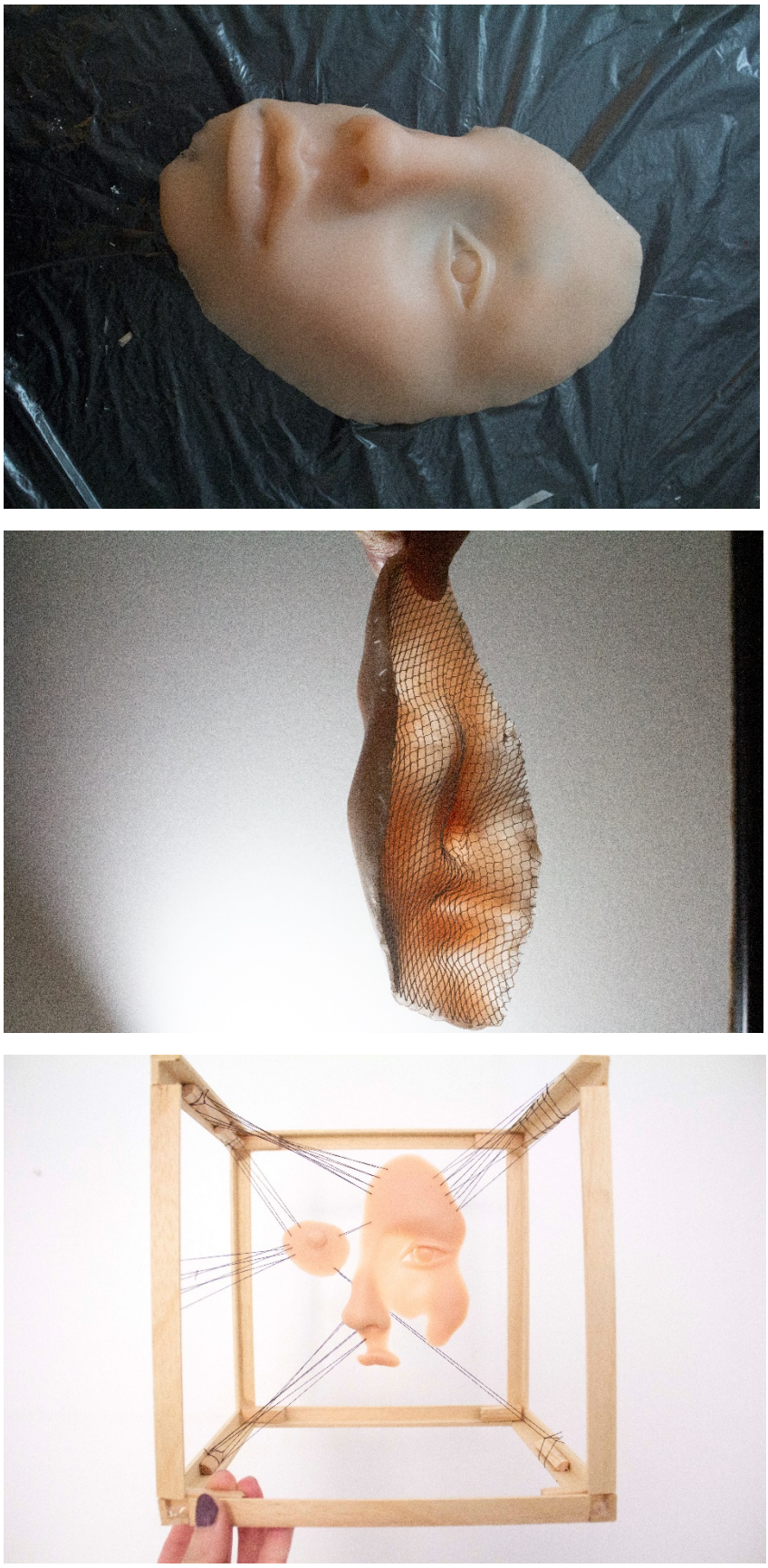


Figure 120 Spectacle Installation – Silicone casts with mesh backing and suspension tests. Lesley-Ann Daly, 2019.

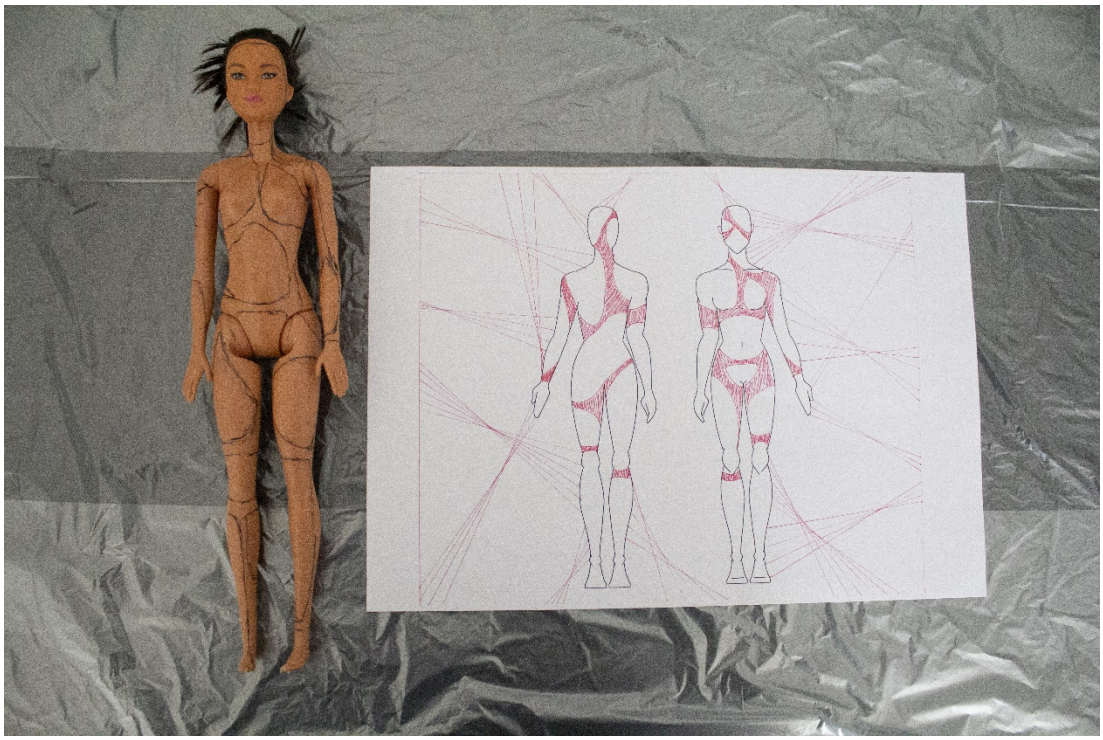


Figure 121 Spectacle Installation - Mapping body parts to cast on 3D doll. Lesley-Ann Daly, 2019.



Figure 122 Spectacle Installation – Skin colour matching tests in silicone. Lesley-Ann Daly, 2019.

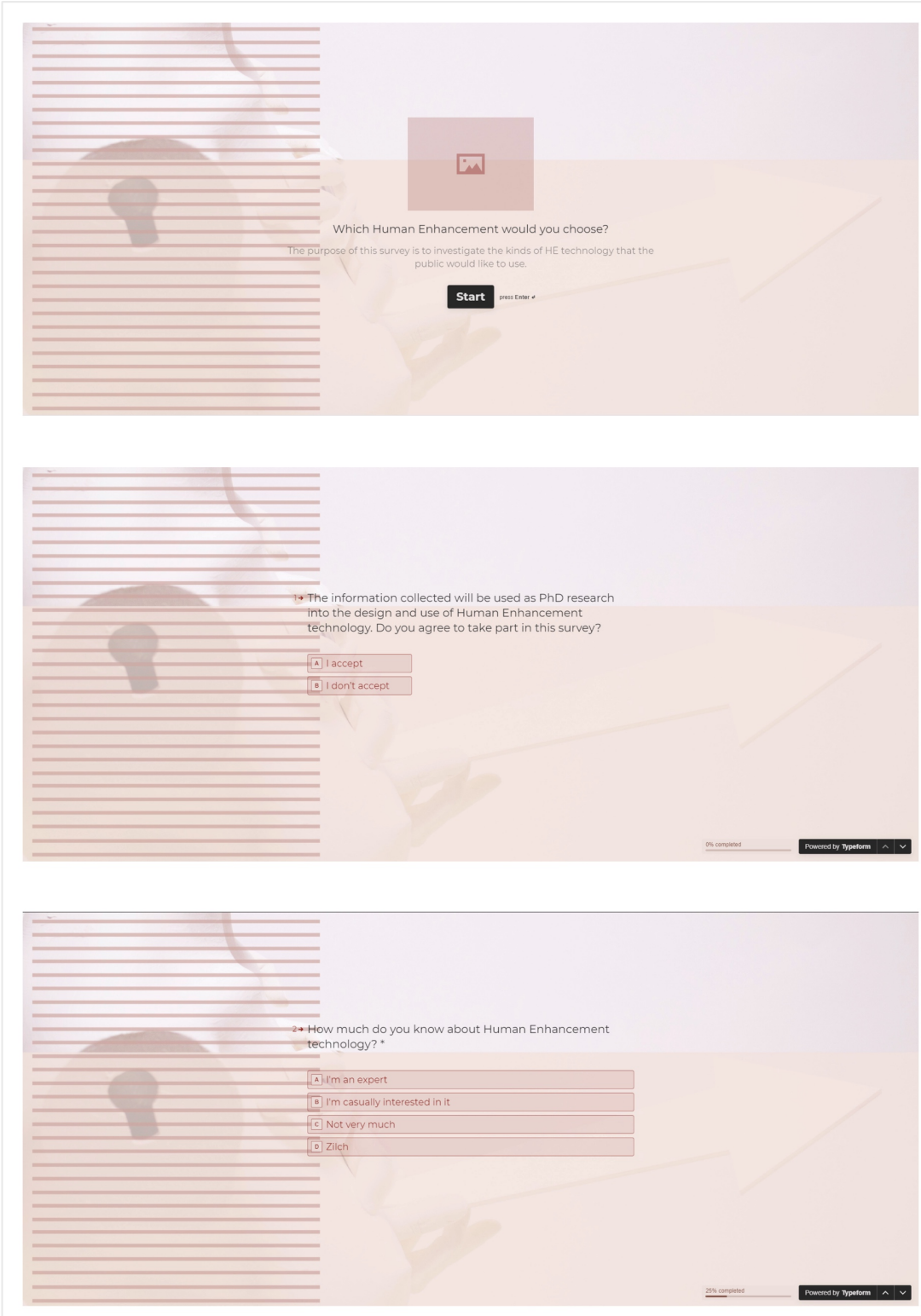


Figure 123 Spectacle Installation Indicative Questionnaire Mockup. Lesley-Ann Daly, 2019.

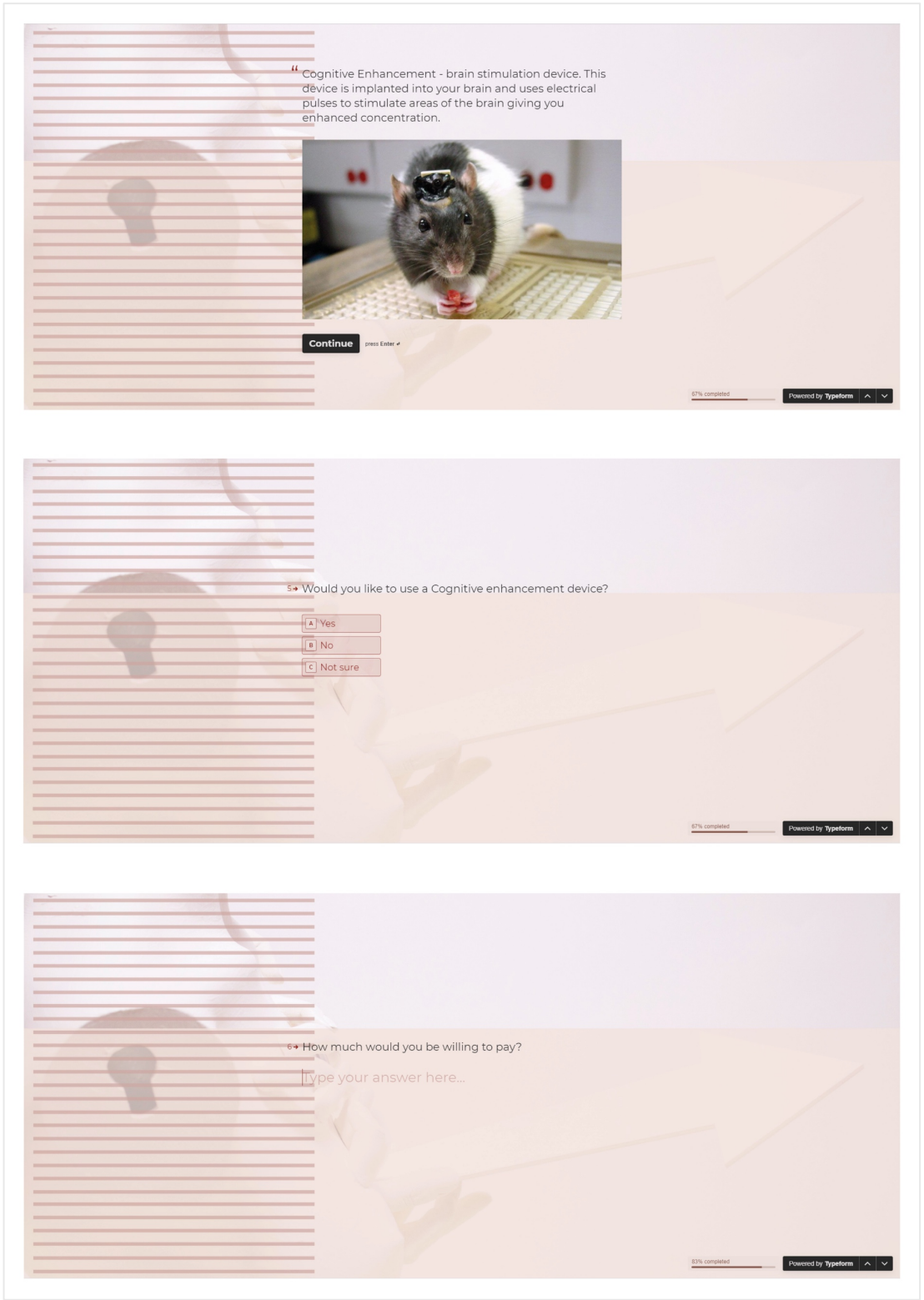


Figure 124 Spectacle Installation Indicative Questionnaire Mockup. Lesley-Ann Daly, 2019.

ual:

RESEARCH DEGREES

Post-Registration Research Ethics Approval Form

Guidance:

- **Please ensure that you have read the '*UAL Guidance for Research Ethics Approval'* and '*UAL Code of Practice on Research Ethics'* before completing this form**. All supporting documentation on research ethics can be found in the UAL Research Degrees section on Moodle
- Please complete this form electronically
- **Section A and Appendix 1** (if applicable) are to be completed by the student and supervisors
- **Section B** is for UAL Committee use only
- Once Section A (and Appendix 1 if necessary) has been completed, including all necessary signatures, the form should be submitted to researchdegrees@arts.ac.uk by the student
- Incomplete forms, including any that are missing signatures, will be returned to the student for completion

SECTION A **TO BE COMPLETED BY THE STUDENT**

Name:	**Lesley-Ann Daly**
College:	**Central Saint Martins**

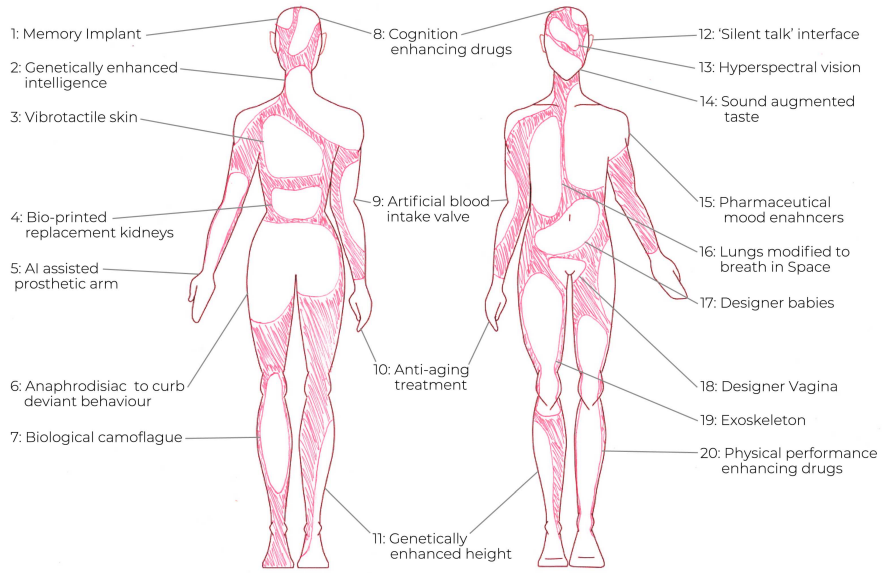
1. Please provide a 100-word summary of your proposed research. Explain in terms appropriate to a layperson.

I am proposing to create an installation piece to gain audience feedback about their views on commercial Human Enhancement Technology. The piece will be a large 8ft cube frame with a silicone replica of a naked human body inside. The body will be made of 20 body parts cast from people of varying genders, ages, and body types, in the shape of DaVinci's Vitruvian Man. Each body part will correspond to a different enhancement technology that the viewer will be able to view information on, and answer questions about. The image below shows the body parts to be cast and the technology that will be related specifically to each part, this is based on the implantation area or application of the tech.

Last Updated: 24/08/2017

Figure 125 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

PRODUCT DISPLAY SCHEMATIC
COMMERCIALLY AVAILABLE HUMAN ENHANCEMENT TECH



2. Does your research involve participants	
	No*
X	Yes
***If you answer 'No', you do not need to complete Questions 3 to 12, instead please go to Question 13 and continue from there.**	

3. Who will the participants be? Please tick as appropriate.	
X	Students at the University
	Staff at the University
X	Other*
***If you answered 'Other' please specify below**	

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 126 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

There will be 3 kinds of participants: those being cast, those assisting the casting process, and the audience of the final piece.

LIFE CASTING

For the body casting (making a replica of the persons' body part) I will be reaching out to body positive societies (e.g. Naked Queers Reading Club) with a call for participation.

Within the research aims, the piece is intended to challenge the notion of the 'normal' or 'ideal' body. The perception of the body has been undergoing radical reform with the growing reverence for body positivity. I believe to create an accurate future scenario the piece should advocate the acceptance of the body no matter the size, shape, form or modification. This also correlates to Posthuman rhetoric on how resigning the body with technology could change our perceptions of identity and the body. For this reason I will be taking body casts from a diverse assortment of willing and consenting persons to accurately represent this body positive future.

ASSISTANT CASTER

Will be students from UAL

AUDIENCE

Whomever is present at the display of the final piece.

4. How will participants be recruited and how many will be involved?

LIFE CASTING

The main recruitment is through me contacting body positive groups, via the organiser, and asking them to post online a recruitment poster that I have created (find attached). This will allow interested and willing participants to contact me if they want to.

I will need to cast 20 body parts to make up the whole figure. So this will include up to 20 participants, potentially less if some participants have more than 1 body part cast. They will be given a Participation Information Form and a Consent Form to review and discuss before agreeing to the process. (find documents attached).

ASSISTANT CASTER

For the assistant caster I will be sending a recruitment poster to courses within UAL that have life casting as part of their training, for example BA (Hons) Hair, Make-up and Prosthetics for Performance at LCF. Any students interested will be able to contact my university email address to discuss assisting me on one or more of the casting.

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 127 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

They will be given a Participation Information form, a 'How to lifecast' sheet and a Consent Form to review and discuss before agreeing to the process. (find documents attached).

AUDIENCE

The audience will be whomever attends the exhibitions of the piece, the number will vary depending on the location and length of time shown.

5. What will participants be asked to do? Explain in terms appropriate to a layperson.

LIFE CASTING

This process will require 2 meetings per participant. One for introductions, and the second for the actual casting process.

Meeting 1 - Introductions

- First, we will arrange a meeting, this can be in person or via Skype. Here I will describe the project and casting process to them, and we will go through the Information Sheet and Consent form. This will also allow us to clarify any questions they may have in relation to the project.
- We will have a discussion on what body parts I am casting and they can identify which they would like to have cast. The final decision will be theirs; they are free to take some time to consider after the meeting and let me know later.
- I will also ask them about any allergies or skin conditions that they have to ensure the process is safe for them to participate in.
- I will bring along a small amount of alginate (the casting material) to do a patch test, this is to check whether they are allergic to it. If any reaction occurs we will wash it off immediately to stop the reaction. If they have a reaction they will not be able to participate in the body casting for their own health and safety.
- This will take maximum 1 hour.
- Should they wish to proceed with the casting you will need to email me the consent form and your choice of body part so that I can prepare accordingly.

Meeting 2 - Casting

- The casting will take place in my studio in London, to ensure their privacy during the casting process as they will need to remove some clothing.
- As the casting will be done at my studio an assistant caster will always be present, to help me with the process and ensure that you feel comfortable at all times. This assistant caster will also keep the casting process confidential and will not have access to any personal information.
- I will take a cast of the body part agreed upon using alginate (an industry standard, non-toxic casting material) and plaster bandages (to hold the shape). When this has set, I will remove it from the skin and clean the area.

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 128 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

- After this I will run the mould in silicone to create a silicone replica of the body part (they do not need to be present for this). This replica body part will be part of a whole body that will be put on display for exhibition and feedback purposes.
- All information is confidential and anonymised. No personal or identifying information will be displayed with the body part in the installation.
- Any contact information will be kept on a secure UAL server which is only accessible by myself.
- I will not take any photos during the casting process.
- Depending on which body part is being cast, this can take 30mins-1hour.

ASSISTANT CASTER

This process will contain 2 meetings. One for introductions, and the second for the actual casting process.

Meeting 1 - Introductions

- First, we will arrange a meeting, this can be in person or via Skype. Here I will describe the project and casting process to them, and we will go through the Information Sheet and Consent form. This will also allow us to discuss anything that isn't clear in the forms.
- We will chat about their experience casting and also go through the 'How to lifecast' information sheet. This is to make sure we are both using the same casting techniques and so we both know what they will need to do throughout the process.
- This will take maximum 1 hour.

Meeting 2 - Casting

- The casting will take place in my studio in London
- The process of casting is detailed in the 'How to lifecast' information sheet.
- As the assistant caster they will be there to help me with the process and ensure that the participant feels comfortable at all times. As the assistant caster they will also keep the casting process confidential and will not have access to any personal information from the participants.
- Any contact information will be kept on a secure UAL server which is only accessible by myself.
- I will not take any photos during the casting process, this is to respect and protect the anonymity of the participants.
- Depending on which body part is being cast, this can take 30mins-1hour.

AUDIENCE

The audience will be able to view the piece visually and also have the option to interact with the piece through a digital platform which contains a questionnaire. See Indicative Questionnaire form attached. Here the audience can use a device, e.g. phone or tablet, to choose a body part, read information about it, and answer some questions about it. The beginning of this questionnaire will ask for the participants consent for me to use the data as part of my research, if they decide not to consent the quiz will end and no data will be collected. Data that is collected will be stored on my secure UAL server.

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 129 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

6. What potential risks to the interests of participants do you foresee and what steps will you take to minimise those risks? A participant's interests include their physical and psychological well-being, their commercial interests; and their rights of privacy and reputation.

LIFE CASTING

Risk: They may feel uncomfortable firstly revealing particular body parts for me to be able to cast, and secondly having these body parts put on display.

I have a bachelors' degree in body casting and prosthetic design (Design for Stage and Screen – specialising in Make-Up at IADT, Dublin). Through this I have learnt how to work with people whom I am casting to ensure that they feel safe and respected throughout the process, as well as how to cast bodies at a professional level. My set up will be clean and professional, as if done in a workshop, with the area closed off.
I will make sure that you have adequate information before agreeing to be cast, and you will be free to withdraw at any time and I will destroy the casts.

For health reasons I will do a small patch test with the alginate before casting, to check for allergic reactions, and will ask for your history of any skin allergies.

Any contact information will be kept on a secure UAL server which is only accessible by myself. I will retain this information for the duration of my PhD (approx. 5years) in case there is a need to contact them about the piece. Once I have completed my PhD the information will be deleted permanently.
No identifying information or images will be associated with this project or its' public display.

The particular choice of participant (detailed above) is also because of their body positive attitude and eagerness to promote the wide variety of body types. This means that they should be much more comfortable with having their body cast displayed in the installation.

ASSISTANT CASTER

Risk: They may feel uncomfortable with the process and/or working with me.

Resolution as above.

AUDIENCE

Risk: They may feel unsure about the use of any data that I am collecting.

I will make it explicit on the digital platform that the data collected is for my research purposes only and ask for their consent before they can begin the questionnaire. If no consent is given the quiz will end. The data recorded will be stored on my secure UAL server and deleted when I complete my PhD.

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 130 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

7. What potential risks do you foresee to yourself as the researcher and what steps will you take to minimise those risks? E.g. does your research raise issues of personal safety for you or others involved in the project, especially if taking place outside working hours or off University premises.
As the casting process can be a bit unnerving for those who have not experienced it before a casting assistant will always be present at the castings to ensure the security of the participant and myself. If the participant or I feel uncomfortable with the process at any time, the casting assistant will act as a witness in case of any allegations of misconduct from either party. The casting assistant will have been briefed beforehand by me, and given all the relevant information. They will also have consented to keep the casting process of each participant confidential.

8. Please attach a copy of proposed written consent form and information sheet to be given to participants. If you are not obtaining written consent or supplying an information sheet, please explain the reasons for this.	
X	Please tick here if the written consent form and information sheet are attached

9. Does your project involve children or vulnerable adults? E.g. a person with a learning disability.	
X	No. Go to Question 10
	Yes*
***If you answer 'Yes', you must refer to Section 4 in the '*Guidance for Research Ethics Approval*' AND obtain a Disclosure and Barring Service (DBS) check (formerly known as a CRB check).**	
X	I confirm that I have obtained a DBS check

10. Does your research concern groups which may be construed as terrorist or extremist?	
X	No. Go to Question 11
	Yes*
***If you answer 'Yes', you must refer to Section 5.5 in the '*Guidance for Research Ethics Approval*' AND complete the questionnaire at Appendix 1 of this form.**	

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 131 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

Please Note:
It is a presumption of academic research that, wherever possible and feasible, the information on which the research is based should be preserved, so that it can be made available to future researchers. However, the privacy of participants must be respected. Please refer to the guidance note on data protection before answering Question 11.

11. Will you be obtaining personal information from any of the participants? E.g. name, personal opinions, address, recorded images or audio, date of birth, notes and observations.	
	No. Go to Question 12
X	Yes*
***If you answer 'Yes', please give details. In your response, please consider:** How will you store and use this information during the course of your research? What parts of this information will need to be confidential and how? Will you exhibit or publish the information? Will you retain information after the research is concluded? If information is to be destroyed, explain why this is appropriate.	
I will be obtaining names and contact details from participants (life casting participants and assistant casters) to discuss the casting and arrange times. This will remain confidential to me, kept on a secure UAL server. . I will retain this information for the duration of my PhD (approx. 5years) in case there is a need to contact them about the piece. Once I have completed my PhD the information will be deleted permanently. The assistant casters will be credited as part of the installation, therefor their name will be listed as part of the exhibition and research. Basic demographic information will be asked for from those who interact with the questionnaire but no names or contact information. They will be asked if they consent to this beforehand and have the right to not participate. This information will be kept on my secure UAL server and deleted once I have completed my PhD.	

12. Will payments to participants be made?	
	No. Go to Question 13
X	Yes*
***If you answer 'Yes', please state amount and whether payment is for out-of-pocket expenses or a fee.**	
Travel costs will be covered to attend meetings (within reason - UK/London only). Participants will not be provided with any other incentive to participate in the research. A submission has been made to the Student Support Fund to cover travel costs (see form attached)	

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 132 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

13. If the project is to receive financial support from outside the University, please give details. Include any restrictions that have been imposed upon the conduct of the research. Please discuss this with your Director of Studies. Both financial propriety and the protection of commercial rights are important for you, the University and other third parties (e.g. sponsors, participants etc.)

14. Will any restrictions be placed on the publication of results?	
	No. Go to Question 15
X	Yes*
***If you answer 'Yes', please state the nature of the restrictions, e.g. details of any confidentiality agreement.**	
Depending on where it is exhibited I will discuss with the institution its policy on nudity and act accordingly.	

15. Have you attached a detailed outline of the research project to this form?	
X	Yes, the detailed outline is attached
	No

Student Declaration:

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 133 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

16. I confirm my responsibility to deliver the project in accordance with the Code of Practice on Research Ethics of the University of the Arts London (the University). In signing this form I am also confirming that:

a) The form is accurate to the best of my knowledge and belief.

b) There is no potential material interest that may, or may appear to, impair the independence and objectivity of researchers conducting this project.

c) I undertake to conduct the project as set out in the application unless deviation is agreed by the University and to comply with any conditions set out in the letter sent by the relevant College Research body and/or the University's Research Ethics Sub-Committee.

d) I understand and accept that the ethical propriety of this project may be monitored by the relevant College Research body and/or the University's Research Ethics Sub-Committee.

Signature of Student:	Lesley-Ann Daly
Date *(dd/mm/yyyy):*	18/7/19

Director of Studies Declaration:

17. I support this project and have reviewed it with the applicant.

Name:	Carole collet
Signature of Director of Studies:	
Date *(dd/mm/yyyy):*	22-07-2019

SECTION B **FOR UAL COMMITTEE USE ONLY**

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 134 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

Approval of Post-Registration Ethics (CRDSC):

- The College Research Degrees Sub-Committee (CRDSC) recommends that:

	This student's Post-Registration Ethics Approval Form is approved as **minimal ethical risk.** This decision and a copy of the form will be sent to RESC for noting at their next meeting.
	This student's Post-Registration Ethics Approval Form is approved as **more than minimal ethical risk** and so will be forwarded to RESC for final approval
	This student's Post-Registration Ethics Approval Form must be resubmitted, and the following **required** modifications should be made (*see below*)

Required Modifications List *(if applicable)*	1)		
Suggested Modifications List *(if applicable)*	1)		
Name		**Date** *(dd/mm/yyyy)*	
Signature *College Associate Dean of Research or Chair of CRDSC*			

Approval of Post-Registration Ethics (RESC):

- The Research Ethics Subcommittee (RESC) recommends that:

x	This student's Post-Registration Ethics Approval Form is approved as **minimal ethical risk**
	This student's Post-Registration Ethics Approval Form is approved as **more than minimal ethical risk**
	This student's Post-Registration Ethics Approval Form must be resubmitted, and the following modifications should be made (see below)

Required Modifications List *(if applicable)*	1)		
Suggested Modifications List *(if applicable)*	1)		
Name	**Felicity Colman**	**Date** *(dd/mm/yyyy)*	**03/09/2019**
Signature *Chair of RESC*			

Appendix 1 - Post-Registration Research Ethics Approval Form

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 135 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

Please note – you only need to complete this *Appendix 1 – Post-Registration Research Ethics Approval Form* if you answered 'Yes' to Question 10 in Section A

The Terrorism Act (2006) outlaws the dissemination of records, statements and other documents that can be interpreted as promoting or endorsing terrorist acts. The University supports its researchers in undertaking research using security sensitive material, but takes seriously the need to protect them from the misinterpretation of intent by authorities, which can result in legal sanction. It is therefore important that the University is aware of the research before it begins and can ensure proper data management and oversight.

1. Does your research involve the storage on a computer of any such records, statements or other documents?	
	No
	Yes*
***If you answer 'Yes', you must respond to Question 3**	

2. Might your research involve the electronic transmission (e.g. as an email attachment) of such records or statements?	
	No
	Yes*
***If you answer 'Yes', you must respond to Question 3**	

3. If you answered 'Yes' to Questions 1 or 2, you are advised to store the relevant records or statements electronically on a secure university file store. The same applies to paper documents with the same sort of content. These should be scanned and uploaded. Access to this file store will be protected by a password unique to you. You agree to store all documents relevant to Questions 1 and 2 on that file store:	
	Yes
3a. You agree not to transmit electronically to any third party documents in the document store:	
	Yes

4. Will your research involve visits to websites that might be associated with extreme or terrorist organisations?	
	No.
	Yes*
***If you answer 'Yes', you must respond to Question 5**	

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 136 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

5. If you answer 'Yes' to Question 4, you are advised that such sites may be subject to surveillance by the police. Accessing those sites from university IP addresses might lead to police enquiries. **Please acknowledge that you understand this risk by putting an 'X' in the 'Yes' box.**	
	Yes

6. By submitting to the ethics process, you accept that University Research Ethics Sub-Committee (RESC) will have access to a list of titles of documents (but not the contents of documents) in your document store. The titles will only be available to RESC. **Please acknowledge that you understand this risk by putting an 'X' in the 'Yes' box.**	
	Yes

Completed forms should be sent to researchdegrees@arts.ac.uk

Figure 137 Spectacle Body Casting UAL Ethical Approval form – amended & approved, 2019.

ual: university of the arts london

General Risk Assessment Form

Id. Code: ……

College / Pro-Vice Chancellery		School / Dept.	
Name(s) of Assessor(s)		Location	Central Saint Martins
Date of Assessment		Review Date	
Risk Assessment of	Body casting for installation piece		

1. Description of task / activity / area

- I will be casting participants body parts to make silicone replicas that will be part of an installation that I am making.
- Participants will be recruited through a poster that will be sent to various related groups. This will act as an open call for willing participants.
- Participants will be asked to come to my studio to do the casting, to ensure privacy as they will need to undress in varying degrees.
- An assistant caster will always be present – to help with the casting process and make sure that the participant and myself feel comfortable at all times.
- I will explain to them the casting process. Then I will cast the chosen body part using alginate and plaster bandage. Then the skin will be cleaned when the moulding material is removed.
- This mould will be used to make a silicone replica of the body part (participants do not need to be here for this part).
- The body part will be used in an installation for my PhD project – the body parts will be strung up in an 8ft cube to create a full body. A separate risk assessment for will be submitted for the final installation of the piece.
- No identifying information will be recorded with the process, nor will any identifying information be associated with the final installation. Participants will remain anonymous throughout

Figure 138 Spectacle Body Casting General Risk Assessment Form, 2019.

2. Identification of hazards and risks

Identification of hazards and risks	Risk rating (with existing control measures)
1 Allergic reaction to alginate (this is an industry standard body casting material made from seaweed)	Low
2 Participants becoming uncomfortable/upset during the casting process	Low
3 Participants becoming distressed over their body part being displayed (sometimes intimate)	Low
4 I may be at risk by bringing someone into my studio	Low
5	

3. Existing Control Measures

1 Alginate is an industry standard casting material that is skin safe and has a very low risk of causing an allergic reaction. I will also perform a skin patch test prior to doing the casting and ask participants of any previous skin allergies.				
2 As most participants will be recruited from body positive groups the likelihood of them being uncomfortable with having a body part cast is low. I will be describing in detail how the casting process works before gaining consent, along with providing the information sheets. I am qualified at body casting through my Bachelors' degree, so have been taught how to cast respectfully and professionally. There will always be an assistant caster present to ensure the safety of both myself and the participant. They are also able to withdraw at any stage.				
3 See above				
4 There will always be an assistant caster present for the comfort and protection of myself and the model.				
5				
Are the control measures adequate?	Yes	x	No	

	Multiple deaths or over £1,000,000 in damage	**Single death or over £100,000 in damage**	**Major injury or over £10,000**	**Lost time or over £1000**	**Minor injury or over £1000**	**Delay**
Certain	**Very High**	**Very High**	**High**	**High**	**High**	**High**
Very likely	**Very High**	**Very High**	**High**	**High**	**High**	**Medium**
Likely	**Very High**	**High**	**High**	**High**	**High**	**Medium**
May happen	**High**	**High**	**High**	**High**	**Low**	**Low**

Figure 139 Spectacle Body Casting General Risk Assessment Form, 2019.

Unlikely	**High**	**Medium**	**Medium**	**Low**	**Low**	**Low**
Very unlikely	**Medium**	**Medium**	**Low**	**Low**	**Low**	**Low**

4. Additional Control Measures Required

1				
2				
3				
4				
5				
Will additional control measures reduce the risk to an acceptable level?	Yes		No	

Figure 140 Spectacle Body Casting General Risk Assessment Form, 2019.

Figure 141 Spectacle Body Casting General Risk Assessment Form, 2019.

5. Actions

Action	Person responsible	Acknowledged	Time scale	Date completed
No further preventive action is necessary	Lesley-Ann Daly		N/A	N/A

Has a safe system of work been completed?	Yes		No		Not required	

Risk assessment **completed** by……Lesley-Ann Daly……..(signature) Lesley-Ann Daly … …(Date) 26/04/2019

Risk assessment **accepted** by (Manager)…….....(print name)…….....……(signature)……..……(Date)



Design Brief

This post registration ethics form is related to a specific design installation I want to produce in relation to the research question: 'How can Critical Design methodologies be used to examine the impact of Sensory Augmentation, and assess ethical issues related to the design and use of the technology?' - as detailed in the registration document dated 25/02/2018.

This speculative critical design installation will articulate the variety of Human Enhancement (HE) technologies that are available to purchase in a near future shopping scenario. A life size, dismembered reproduction of the body is suspended within a large frame, acting as a product display. Consumers are able to interact with it, mediated by a digital platform which informs them of the merchandise on display and questions their desire to purchase.

Aims:

- To gain greater insight into the publics' knowledge and perception of HE technologies in terms of what devices the public audience would like to use themselves.
- To create a critical design installation to widen public knowledge about HE technologies.

Objectives:

- Create a map of potential commercial HE technologies on the body
- Create a series of small-scale silicone body part tests
- Create a speculative critical design installation that looks at the future of HE technologies as a commodifiable product.
- Create an interactive platform that allows the audience to gain more insight into HE technologies.
- Create a questionnaire within the platform that investigates how much the audience knows about HE, what devices they would choose to buy and why.

In a time when HE technologies are beginning to come to market, whether advertised as such or not, it is important to question the desirability of these devices.

Desirable – 1: having pleasing qualities or properties

2: worth seeking or doing as advantageous, beneficial, or wise

Syn: beneficial, enviable, gratifying, useful, profitable

Figure 142 Spectacle Design Brief, 2019.

Market research into the potential demand for specific categories of devices, e.g. cognitive, physical or affective enhancements, could show how trends in the market will develop as HE devices become available. This may allow producers to direct development towards the demand, or rethink the advertising around unpopular projects to better reflect the motivations of specific groups. However, as this technology still remains in somewhat of a technological subculture it is also necessary to inform the potential consumer about the products on offer. By integrating product information into the interactive platform the customer can browse through their options by selecting the different body parts, which are each associated with an enhancement technology. Here the viewer can read about the devices capabilities and how it will interact with their body and/or mind, before answering a short series of questions on their thoughts about the product.

The aim of this piece is to draw attention to the rising commodification of enhancement technologies and ascertain what the public thinks about them. Will they see it as a world of new technological possibilities ready to try? Or as a desecration of the pure human form? And what (if any) enhancements are the most desirable?

Within the research aims, the piece is intended to challenge the notion of the 'normal' or 'ideal' body.

The perception of the body has been undergoing radical reform with the growing reverence for body positivity. By advocating the acceptance of the body no matter the size, shape or form, this social movement is challenging the way that society views the physical body. Skin colour, size and gender no longer carry the societal weight that they used to, with emphasis being placed on the individual as a person, not a colour, number or pronoun.

Similar rhetoric can be found in Posthuman writings, proclaiming that as we merge with technology the divisions of our human social systems will become irrelevant. Donna Haraway in her Cyborg Manifesto criticises identity politics and problematic dualisms such as self/other, male/female and natural/artificial. The future hopes to give rise to a hybrid of human and machine (cyborg) which will challenge identity and instead unify us through our affinities.

With this in mind a future corporeal product display showcasing the tall, slim, 'ideal' body of the early 21st century seems senseless. Speculative futures don't exist in isolation, when projecting forward one must also consider other technologies and (body)politics to create a well-informed, plausible scenario. In this scenario through cultural progression, the commercial sector will be openly promoting the diversity and beauty of all bodies. For this reason I will be taking body casts from a diverse assortment of willing and consenting persons to accurately represent this body positive future.

Figure 143 Spectacle Design Brief, 2019.

How to Life Cast – process sheet

Time:

Approx. 30mins – 1hour

Place:

My private studio space. Area will be closed off with a sign to deny entry during the casting process.

Equipment/Materials:

- Alginate (non-toxic, skin safe, industry standard casting material)
- Plaster bandages
- Vaseline
- Scissors
- Bowl
- Jug of water

Additional for head cast:

- Bald cap & adhesive
- Cotton buds

Preparation:

- Prepare the area by covering surfaces with plastic, including the floor. Ensure your equipment is laid out.
- Cut plaster bandage into strips – 6inchs for smaller areas, increase size depending on the area being cast. Have a container with water ready beside this.
- Talk through the method with your model so they know what you will be doing. Discussion of what body part will be cast will have happened prior to this meeting. If the model has read the information sheet and has no further questions, ask them to sign the consent form and store in a safe place.
- Patch test for alginate would have been done previous to this day to check for allergic reactions. If reaction occurs, remove the alginate and thoroughly rinse and clean the area. This person cannot be life cast and should be referred to a doctor for treatment.
- If you are doing a head cast establish a non-verbal means of communication with the model for when the cast is on the face. This can include hand signals – thumbs up/down – and use of a small notepad and pen, so they can write something if they need to. Waving hands can be decided as a signal that the model is not comfortable and wants the cast to be taken off immediately.
- Ask model to remove relevant items of clothing, and jewellery, to expose the area being cast. Vacate the area while model is undressing if they prefer. Cover the rest of your models clothing with plastic to protect from alginate & plaster.

Figure 144 How to Life Cast Information sheet, 2019.

    - Ensure the space that you are working in is appropriately concealed if model is removing items of clothing. Ensure that the area will not be disturbed throughout the casting process.
- If necessary, have a second person there to help with the casting process. This will be necessary for facial casts so that one person can ensure the airway is not being obstructed. This may be helpful for larger body casts to speed up the process. Smaller casts can be done by 1 person.
- Ensure any hair is covered with a thin layer of Vaseline so that the alginate does not encapsulate and pull out hairs – e.g. eyebrows, eyelashes, arm hair etc. Skin is self-releasing with alginate so will not need a release agent. Ensure the skin is clean.
- If doing a head cast apply a bald cap to the model and glue down the edges using an appropriate adhesive for the bald cap material. Using a bald cap that is flush with the skin will ensure a smooth cast surface on the head. If just the face is being cast, clingfilm wrapped around the hair and taped down will be sufficient to protect the hair.

N.B. – Ensure that you have read the MSDS Product Information sheets for all products or chemicals that you will be using so that you are aware of the risks and safety guidelines before use.

- Ensure that good hygiene is practised throughout the process, by you and your model.

- Do not cast any areas with broken skin or wounds, or that look like there may be an infection present. Refer model to a doctor for treatment and/or wait for wound to heal.

- As a MUA you have a Duty of Care to your model to ensure that they feel safe and respected throughout the process, and that you are doing everything to the highest of standards of the industry. You MUST be absolutely sure that you have taken all reasonable precautions to ensure that the products are correctly used, and the appropriate safeguards are in place.

Method:

1. Make sure you have everything you need equipment wise, and that your model is fully prepared to begin.
2. Position your model the way you want the cast to be e.g. arm bent or straight, face relaxed or posed – this will be how the cast will come out.
3. Mix the alginate – have the alginate powder in a bowl, add water to the powder in the ratio 1:1. Mix quickly ensuring that all the powder is absorbed. Depending on the alginate (refer to packet) working time is 4-8mins, so do not spend too long mixing as it will begin to set.
4. Use your hands to smear the alginate on to the area, focusing on more detailed areas first e.g. eyelids, mouth. Make sure that you no do not trap any air bubbles between the skin and alginate as these will set in. Ensure that a larger area than what you need is covered.
    a. Face cast. While one person applies the alginate the second will need to use cotton buds to keep the models' nostrils clear so that they can breathe.
    b. Try to do the cast using only one batch of alginate, adding additional batches may create a seam line that will be visible in the mould.

Figure 145 How to Life Cast Information Sheet, 2019.

5. The alginate will start relatively liquid, this will require you to scoop the alginate back up as gravity pulls it down. Then the alginate will begin to lose its' shine and become less malleable – at this point you need to stop manipulating it as it is about to set, and you might rip it.
6. Leave the alginate to fully set for approx. 1minute. Clean your hands.
7. Check that your model is ok. This should be repeated throughout the process.
8. Dip a length on plaster bandage into the water. Run it between your fingers to remove excess water.
9. Apply on top of alginate. Create a clean loop around the outer edge of the cast for strength and support. Add over lapping strips across the whole piece until it is fully covered.
    a. Face cast. Do not cover the nostrils/ airway with the bandage.
10. Smooth this down as much as possible so that the surface is even and without air pockets/the weave of the plaster bandage is no longer visible – the smoother the surface is the more structurally strong it is, gaps and lumps are more prone to breaking.
11. Allow the plaster to set. This will take up to approx. 10minutes depending on the warmth of the room. The wet plaster will heat up slightly before going cold and becoming dry and hard. Place your hand on the plaster to feel the temperate and moistness of the bandage, this will allow you to determine when it is fully set.
12. Remove the cast carefully and slowly, first by loosening it around the edges and lifting it away. You can ask the model to move this area of skin to loosen it, e.g. wiggle their face, this should help to release the airlock between the skin and alginate. Do not let go of the cast while removing as it may suddenly pop off.
13. Lay the cast down, alginate side up. Clean off the models' skin and make sure that they are ok.
14. The models' part is now finished and the cast can be cleaned ready for the next process – creating a plaster or silicone positive.

Figure 146 How to Life Cast Information Sheet, 2019.



Figure 147 Spectacle Body Casting Recruitment Poster, 2019.

Body casting Participant Information Form Date / /

Project Title:

SPECTACLE

Researcher: Lesley-Ann Daly

I am a PhD Research student at Central Saint Martins, UAL. I am researching the ethics of Sensory Augmentation technology. I am going to give you information about a study that I am inviting you to take part in. This form includes important information about the reason for doing the study, what I will ask you to do, and the way I would like to use the information about you, should you choose to be part of the study. If you have any questions, or do not understand any of the information in this form, please ask me and I will clarify before you make your decision to take part or not.

Purpose

My research focuses on Sensory Augmentation technology (SA - the extension of the body's ability to sense aspects of the environment that are not normally perceivable by the body in its natural state) has recently reached the consumer market in 2017, and is within the field of Human Enhancement technology. For this project I will be creating an interactive installation that aims to gather feedback from the public about their view on potential future commercial Human Enhancement technologies. The installation will be a body cast from numerous participating models, with each body part representing a different enhancement technology. With this research I will be aiming to create an informed framework for the ethical design of future devices.

Participant Selection

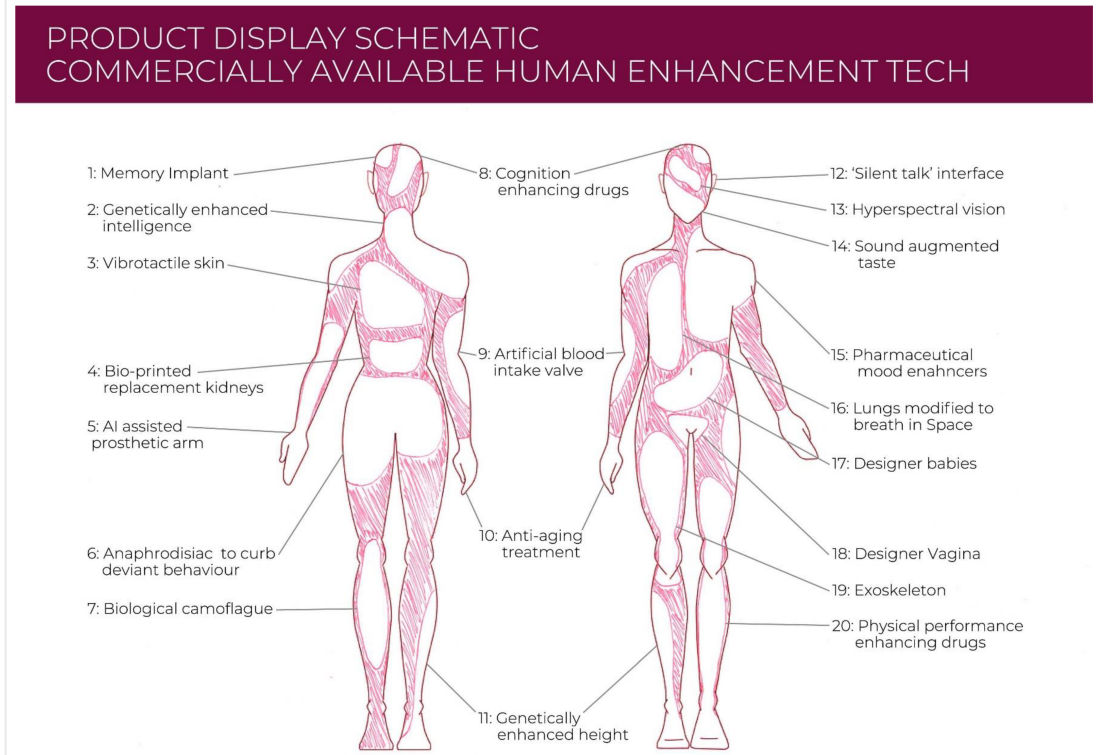
You are being invited to take part in this casting process because I believe your body part will greatly contribute to the overall construction of the installation that I am creating. This is a London based project; all participants should be residents of London.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Should you want to withdraw at any time you may do so, and any information that you have provided will not be used as part of the research. Any casts or replicas already made will also be destroyed.

1

Figure 148 Spectacle Body Casting Participant Information Form, 2019.



The above image shows a map of which body parts will need to be cast for the installation and the technology that will be linked to each. We will discuss which one you would like to have cast.

Procedure

This process will contain 2 meetings. One for introductions, and the second for the actual casting process.

Meeting 1 - Introductions

- First, we will arrange a meeting, this can be in person or via Skype. Here I will describe the project and casting process to you, and we will go through the Information Sheet and Consent form. This will also allow us to clarify any questions you may have in relation to the project.
- We will have a discussion on what body parts I am casting and you can identify which you would like to have cast. The final decision will be yours; you are free to take some time to consider after the meeting and let me know later.

Figure 149 Spectacle Body Casting Participant Information Form, 2019.

- I will also ask you about any allergies or skin conditions that you have to ensure the process is safe for you to participate in.
- This will take maximum 1 hour.
- Should you wish to proceed with the casting you will need to email me the consent form and your choice of body part so that I can prepare accordingly.

Meeting 2 - Casting

- The casting will take place in my studio in London, to ensure your privacy during the casting process as you will probably need to remove some clothing.
- As the casting will be done at my studio an assistant caster will always be present, to help me with the process and ensure that you feel comfortable at all times. This assistant caster will also keep your casting process confidential and will not have access to any personal information.
- I will take a cast of the body part agreed upon using alginate (an industry standard, non-toxic casting material) and plaster bandages (to hold the shape). When this has set, I will remove it from the skin and clean the area.
- After this I will run the mould in silicone to create a silicone replica of the body part (you do not need to be present for this). This replica body part will be part of a whole body that will be put on display for exhibition and feedback purposes.
- All information is confidential and anonymised. No personal or identifying information will be displayed with the body part in the installation.
- Any contact information will be kept on a secure UAL server which is only accessible by myself.
- I will not take any photos during the casting process.
- Depending on which body part is being cast, this can take 30mins-1hour.

Expenses

You will not be provided any incentive to participate in the research.

Risks

You may feel uncomfortable firstly revealing particular body parts for me to be able to cast, and secondly having these body parts put on display.

I have a bachelors' degree in body casting and prosthetic design (Design for Stage and Screen – specialising in Make-Up at IADT, Dublin). Through this I have learnt how to work with people whom I am casting to ensure that they feel safe and respected throughout the process, as well as how to cast bodies at a professional level. My set up will be clean and professional, as if done in a workshop, with the area closed off.

Figure 150 Spectacle Body Casting Participant Information Form, 2019.

I will make sure that you have adequate information before agreeing to be cast, and you will be free to withdraw at any time and I will destroy the casts.

For health reasons I will do a small patch test with the alginate before casting, to check for allergic reactions, and will ask for your history of any skin allergies.

NB. Alginate is made of seaweed, a natural material, so has a very small possibility of causing a reaction – it is the industry standard casting material that is used on most/all productions for casting the body.

Benefits

The aim of this project is to gain public feedback regarding what they think about being enhanced in the future. This insight will contribute to me developing an informed ethical design framework for the future creation of SA devices, which will hopefully have a positive impact on the experiences of the users of these devices. This project may not directly benefit you, but your participation is likely to help me inform better methods of design that will give the users an improved experience.

Confidentiality

Any contact information will be kept on a secure UAL server which is only accessible by myself.

No identifying information or images will be associated with this project or its' public display.

Contact Information

If you have any questions about the research, or are unclear about anything in this information form, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

This proposal has been reviewed and approval by the Research Ethics Committee at Central Saint Martins, UAL, to ensure that research participants are protected from harm. If you would like to contact UAL Research Management and Administration, please do so at this email address - researchethics@arts.ac.uk

Figure 151 Spectacle Body Casting Participant Information Form, 2019.

Body casting Consent Form Date / /

Project Title:

SPECTACLE

Researcher: Lesley-Ann Daly

(please tick) Y / N

I confirm that I have read the Information sheet dated DD/MM/YYY for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐	☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences.	☐	☐
I understand that my identity will be anonymised and kept strictly confidential. I understand that my name, or any identifiable information, will not be linked with the replica body piece, final installation or research documentation.	☐	☐
I understand that any personal contact information will be kept on a secure UAL server accessible only by the researcher – Lesley-Ann Daly.	☐	☐
I understand that a third party will always be present at the castings, to help with the process and ensure that I feel comfortable at all times. I understand that this person will also keep my casting process confidential and will not have access to my personal information.	☐	☐
I agree that my replicated body part can be used for this installation and put on display publicly.	☐	☐
I agree to take part in this body casting, for use in the stated installation.	☐	☐

_____	___/__/_____	_____
Participant Name	Date	Signature
_____	___/__/_____	_____
Researcher Name	Date	Signature

1

Figure 152 Spectacle Body Casting Participant Consent Form, 2019.

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

2

Figure 153 Spectacle Body Casting Participant Consent Form, 2019.



Figure 154 Spectacle Body Casting Assistant Recruitment Poster, 2019.

Casting Assistant Participant Information Form Date / /

Project Title:

SPECTACLE

Researcher: Lesley-Ann Daly

I am a PhD Research student at Central Saint Martins, UAL. I am researching the ethics of Sensory Augmentation technology. I am going to give you information about a study that I am inviting you to take part in. This form includes important information about the reason for doing the study, what I will ask you to do, and the way I would like to use the information about you, should you choose to be part of the study. If you have any questions, or do not understand any of the information in this form, please ask me and I will clarify before you make your decision to take part or not.

Purpose

My research focuses on Sensory Augmentation technology (SA - the extension of the body's ability to sense aspects of the environment that are not normally perceivable by the body in its natural state) has recently reached the consumer market in 2017, and is within the field of Human Enhancement technology. For this project I will be creating an interactive installation that aims to gather feedback from the public about their view on potential future commercial Human Enhancement technologies. The installation will be a body cast from numerous participating models, with each body part representing a different enhancement technology. With this research I will be aiming to create an informed framework for the ethical design of future devices.

Participant Selection

You are being invited to take part in this casting process because you have training casting body parts.

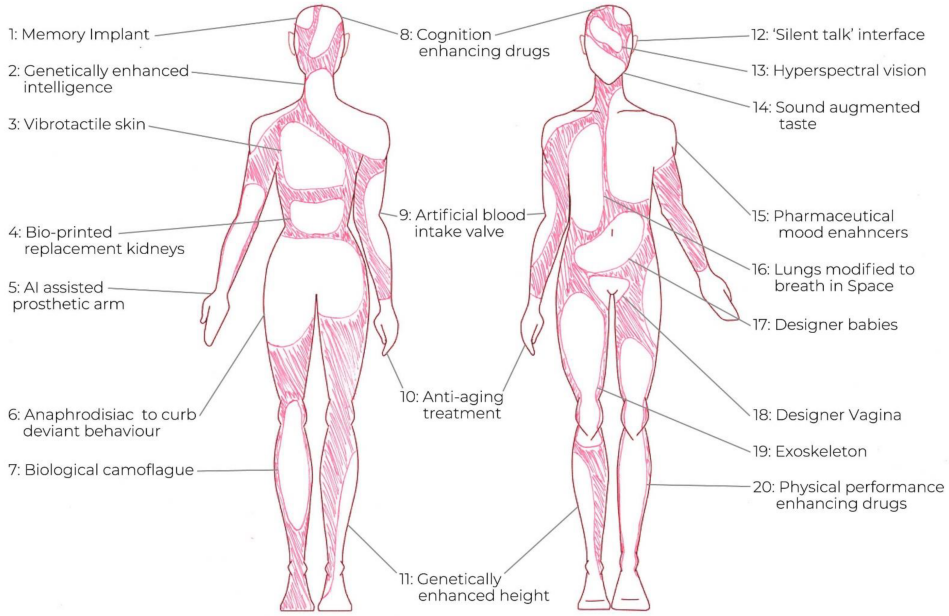
Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Should you want to withdraw you may do so, and any information that you have provided will not be used as part of the research.

1

Figure 155 Spectacle Body Casting Assistant Information Form, 2019.

PRODUCT DISPLAY SCHEMATIC
COMMERCIALLY AVAILABLE HUMAN ENHANCEMENT TECH



The above image shows a map of which body parts will need to be cast for the installation and the technology that will be linked to each. I will discuss which one the participant would like to have cast prior to our casting session.

Procedure

This process will require 2 meetings. One for introductions, and the second for the actual casting process.

1 - Introductions

- First, we will arrange a meeting, this can be in person or via Skype. Here I will describe the project and casting process to you, and we will go through the Information Sheet and Consent form. This will also allow us to discuss anything that isn't clear in the forms.
- We will chat about your experience casting and also go through the 'How to lifecast' information sheet. This is to make sure we are both using the same casting techniques and so we both know what you will need to do throughout the process.
- This will take maximum 1 hour.

2

Figure 156 Spectacle Body Casting Assistant Information Form, 2019.

2 - Casting

- The casting will take place in my studio in London
- The process of casting is detailed in the 'How to lifecast' information sheet.
- As the assistant caster you will be there to help me with the process and ensure that the participant feels comfortable at all times. As the assistant caster will also keep the casting process confidential and will not have access to any personal information from the participants.
- Any contact information will be kept on a secure UAL server which is only accessible by myself.
- I will not take any photos during the casting process, this is to respect and protect the anonymity of the participants.
- Depending on which body part is being cast, this can take 30mins-1hour.

Expenses

You will not be provided any incentive to participate in the research.

Risks

You may feel unsure of the process and/or working with me.

I have a bachelors' degree in body casting and prosthetic design (Design for Stage and Screen – specialising in Make-Up at IADT, Dublin). Through this I have learnt how to work with people whom I am casting to ensure that they feel safe and respected throughout the process, as well as how to cast bodies at a professional level. My set up will be clean and professional, as if done in a workshop, with the area closed off.

I will make sure that you have adequate information before agreeing to assist casting, and you will be free to withdraw before or after a casting session, as explained above.

Benefits

The aim of this project is to gain public feedback regarding what they think about being enhanced in the future. This insight will contribute to me developing an informed ethical design framework for the future creation of SA devices, which will hopefully have a positive impact on the experiences of the users of these devices. This project may not directly benefit you, but your participation is likely to help me inform better methods of design that will give the users an improved experience.

Intellectual Property (IP) & Credits

The IP rights to the project and the casts remain with me as the primary caster and researcher. You will not have any Intellectual Property (IP) from this project, but you will be credited as an assistant caster and are welcome to put this on your CV. The experience will also help to forward your own practise and casting techniques.

Figure 157 Spectacle Body Casting Assistant Information Form, 2019.

Confidentiality

Any contact information will be kept on a secure UAL server which is only accessible by myself.

Contact Information

If you have any questions about the research, or are unclear about anything in this information form, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

This proposal has been reviewed and approval by the Research Ethics Committee at Central Saint Martins, UAL, to ensure that research participants are protected from harm. If you would like to contact UAL Research Management and Administration, please do so at this email address - researchethics@arts.ac.uk

Figure 158 Spectacle Body Casting Assistant Information Form, 2019.

Casting Assistant Consent Form Date / /

Project Title:

SPECTACLE

Researcher: Lesley-Ann Daly

(please tick) Y / N

I confirm that I have read the Information sheet and 'How to lifecast' sheet dated DD/MM/YYY for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐	☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences.	☐	☐
I understand that the identity of the participants will be anonymised and kept strictly confidential. I understand that any identifying information about participants will not be linked with the replica body piece, final installation or research documentation.	☐	☐
I understand that any personal contact information will be kept on a secure UAL server accessible only by the researcher – Lesley-Ann Daly.	☐	☐
I understand that when I am present at the castings, I am there to help with the process and ensure that the participant feels comfortable at all times. I understand that I will also keep the casting process of each participant confidential and I will not have access to any of their personal information.	☐	☐
I understand that I have no Intellectual Property rights to this project, but will be credited and can reference it on my CV.	☐	☐
I agree to take part as an assistant caster for the stated installation.	☐	☐

_____	___/__/_____	_____
Participant Name	Date	Signature
_____	___/__/_____	_____
Researcher Name	Date	Signature

1

Figure 159 Spectacle Body Casting Assistant Consent Form, 2019.

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly0620171@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

2

Figure 160 Spectacle Body Casting Assistant Consent Form, 2019.

SPECTACLE

QUESTIONNAIRE

Questionnaire is accessible through an interactive digital platform that the audience can use when looking at the installation.

Aims:

- Use the interactive platform as a way to inform the public about speculative commercially available HE technology
- Find out how much the public audience know about Human Enhancement technology
- Find out which technology they are more interested in (quantitative) and why (qualitative)
- Find out if they would like to use this tech and why/why not (desirability)

Indicative Questionnaire

Title: SPECTACLE

Purpose/ sub heading: The purpose of this investigation is to explore the kinds of Human Enhancement technology that you would like to use in the future

GDPR: The information collected will be used as PhD research into the design and use of Human Enhancement technology. Do you agree to take part in this survey?

- I accept ----------> continue to survey
- I don't accept --------> directed to a thank you page

Demographic info:

- Age
- Gender
- Profession (professional, academic, student, etc etc)
- Residence

Questions:

- How much do you know about Human Enhancement technology? [multiple choice]
- *Shown a body map of the installation*

Figure 161 Spectacle Installation Indicative Questionnaire, 2019.

- Please choose a body part/ technology
- *information shown about this technology, e.g. a cognitive enhancement device – product catalogue explanation*

- Would you like to use this? Y/N
    - Why?
- What would you use it for?
- Who do you think this would benefit?
- Is there anything that concerns you about this (e.g. cognitive enhancement device)?
- Do you think this product should be developed?
- What would motivate you to purchase it?
- How do you think it could be changed to better suit you?

- Would you like to explore another technology?

    - Yes ---------> direct to body map
    - No ----------> direct to end

Thank you for participating in this survey. If you would like to contact me or know more about this project, please contact me through my website www.lesleyanndaly.com

Figure 162 Spectacle Installation Indicative Questionnaire, 2019.

5. PUBLIC WORKSHOPS

5.1. Design Museum Workshop Analysis

Address: Design Museum, 224-238 Kensington High St, Kensington, London

Event: Tricky Design: Design and Ethics for a Complex World, 2-day Symposium & Workshop

Date: 8 June 2019

Time: 11.30 – 12.30 am

Participants: Approx. 28 (4 groups of 6/7)

Duration: 40minutes (10minutes per group)

Workshop type: Vignette and group discussion

Event link: https://designmuseum.org/whats-on/talks-courses-and-workshops-3/tricky-design-design-ethics-for-a-complex-world

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Tricky Design Symposium and Workshop 2019

This two-day symposium brings together leading designers, academics, journalists, and theorists to discuss ethical approaches for design in response to some of today's most urgent challenges. This symposium builds on the publication of Tricky Design: The Ethics of Things (Bloomsbury 2019) and is a collaboration between University of the Arts London, the Design Research Society and the Design Museum.

Application

The team organising the symposium, Design Against Crime (DAC), based at Central Saint Martins, put out a call for postgraduates to submit for the second day of the symposium. The submission included a Pecha Kucha style presentation related to your work on design and ethics, and a vignette for a fast-paced workshop. I submitted for both and was chosen to present both.

TITLE & DEFINITIONS	THERAPY vs ENHANCEMENT Therapy - treatment intended to relieve or heal a disorder, physical or psychological	REGULATORY CONSIDERATIONS -rules made by a government or other authority in order to control the way something is done	HUMAN RIGHTS -are the basic rights and freedoms that belong to every person in the world	HUMAN AGENCY/ ACCOUNTABILITY - the capacity of individuals to act independently and to make their own free choices.	SOCIOCULTURAL IMPACT -related to the different groups of people in society and their habits, traditions, and beliefs
EXAMPLES	WHAT IS 'NORMAL'? Some 'disabled' communities, for example Dwarves & the Deaf, want to be able to choose not to genetically remove this 'disability' from their children – opting to preserve their communities' culture and heritage. This is their 'normal'	GLOBAL CONSENSUS Global solidarity is needed on how the technology is regulated. Uneven regulation across countries, and cultures, may force people to seek 'treatment' abroad or procure technologies illegally - adding risks from counterfeit devices.	BENEFIT THE INDIVIDUAL The interests and welfare of the individual should have priority over the sole interest of science or society. Primarily the enhancement must benefit the enhanced individual and not put them at risk in order to achieve a wider gain.	MILITARY A soldier is required to enhance to increase probability of mission success. Due to the hierarchical structure of the military could it be considered that they are giving their consent freely? Who will be accountable if it malfunctions?	LIFE EXTENSION Longer life changes our perception of time and will give people the physical and mental ability to stay in jobs longer. By leaving less room for young, fresh ideas this will slow innovation. Young bodies - old outlook
ISSUES	How do you define 'enhancement'?	There needs to be a global consensus on regulation of HE technology	Treat everyone equally	If all experience is mediated by technology, how does it affect our decisions?	Would longer lives mean reduced fear of death, less drive & commitment?
	How do you define 'normal'?	Need to increase awareness so that the public and relevant professionals can be involved in regulation committees	Respect cultural diversity	If our experience is already mediated anyway, will the addition of the enhancement matter?	Would extended life mean extended time in decay? Increasing interest in assisted suicide?
	How do you define 'disability'?	Must take non-Western views into account	Ensure it doesn't generate discrimination against a group or individual for their culture, gender or income	If the tech becomes a moral actor, who is controlling your actions, you or the device?	Will some enhancements be detrimental to other aspects of health, creating unknown side effects in the long term?
	What genetic traits are acceptable/ favourable?	Need to consider feminist views, queer/gender politics, and the other	Ensure having the device doesn't interfere with the fundamental rights of others	Do we want the technology to make moral judgements for us?	Who are enhancements accessible to? To what extent is it covered by the health system?
	What are the implications of choosing to keep a 'disability'?	Must share benefits & advancements globally, and promote work in developing countries	Ensure everyone has freedom of choice – Morphological freedom	If enhancement makes learning easy, taking away the time and effort normally involved, how will this affect self-development?	If enhancement is only for the rich will this create greater socio-economic disparity?
	How does genetic legacy change when editing out a family trait/disability?	Need to be regulated on a case by case approach and create risk evaluation levels	Respect others choice to or not to enhance	If we rely on enhancement to control emotion – how will we/children learn to master our impulses?	If all those around you are enhanced will you feel pressured into doing it yourself?
	How does family legacy change when adding in a new trait?	Need to regulate according to the devices' actual effects on the user, not by how the manufacturer claims it will work	Ensure using the device doesn't impair our rationality or restrict the breadth of human desire	Will changing our temperament, emotions, desires change our identity?	Will the enhanced gain greater social status, causing a negative social effect on the unenhanced?
	Do unselected embryos deserve to live?	Potentially consider how the device interacts with the body as defining factor e.g. attached to skin, implanted, neural	Give clear guidance and safety information before choice is made	If our memories and experiences define our personalities, will augmenting our memory change who we are?	In a narcissistic society will each person acting for their own betterment detriment society?
	Does 'normal' change when many people enhance?	Must consider long term effects and benefits, not short-term solutions	Make sure benefits outweigh the risks	As medical practitioners only claim to do the best practise, what happens when results are not what we asked for?	Will increased popularity in enhancing boost its acceptance?
	Will those who don't enhance become 'subnormal'?	Need to find a way to quantifiably measure risks vs benefits when the affect is not yet clear	Ensure the individual interests are greater than societal interests	As consumers, how might buying enhancements promote the commercialisation of the body?	Is it justifiable to ask certain professions, such as doctors & pilots & teachers, to enhance for the greater good?
	Do we risk perceiving 'the whole human condition as 'disabled' and in need of enhancement?	Understand that desirability will increase when clear benefits are proven	Must decide for the best interests of those without the ability to choose/consent. Protect the vulnerable	Should a piercer providing enhancement services be held to the same standards as a medical professional?	What privacy & security measures should be put in place? Who will have (authorised) access to your data?
	Does raising the physical & mental performance of the aging count as therapy?	Must consider that what is good for one is not necessarily good for all	Be conscious to safeguard future generations	Will medical professionals essentially become service providers?	What if employers and/or the government had control over your enhancements? With or without your knowledge?
	Does a treatment that allows an athlete to heal faster count as enhancement?	Need more thorough regulated testing on devices made for children	Protect/ do not harm the environment, biosphere and biodiversity	Who is responsible for the outcome of a malfunctioning enhancement?	If children become a product of their parents desire, will this change attitudes about control in parenting?
	Should the less naturally gifted be allowed to enhance to even the playing field? – who decides?	Consider having criminal sanctions for using devices on children without proper training	Know what to leave alone, and not to neglect what we already have	Should parents liable for misusing enhancements on their children? How much is the child choice?	Will children be burdened by the idea that they must live up to what they were 'designed for'?

Figure 163 'Ethics Grid for Human Enhancement Technology' Highlighted with Issues That the Workshop at The Design Museum Will Be Addressing. Colour Coding Below. Lesley-Ann Daly, 2019.

Issues on ‘Ethics Grid for HEt’ addressed in workshop at the Design Museum, colour coding:

Design considerations particular to the device
Effects of the technology on person and others
Medical considerations
Commercialisation/money
Privacy & Security

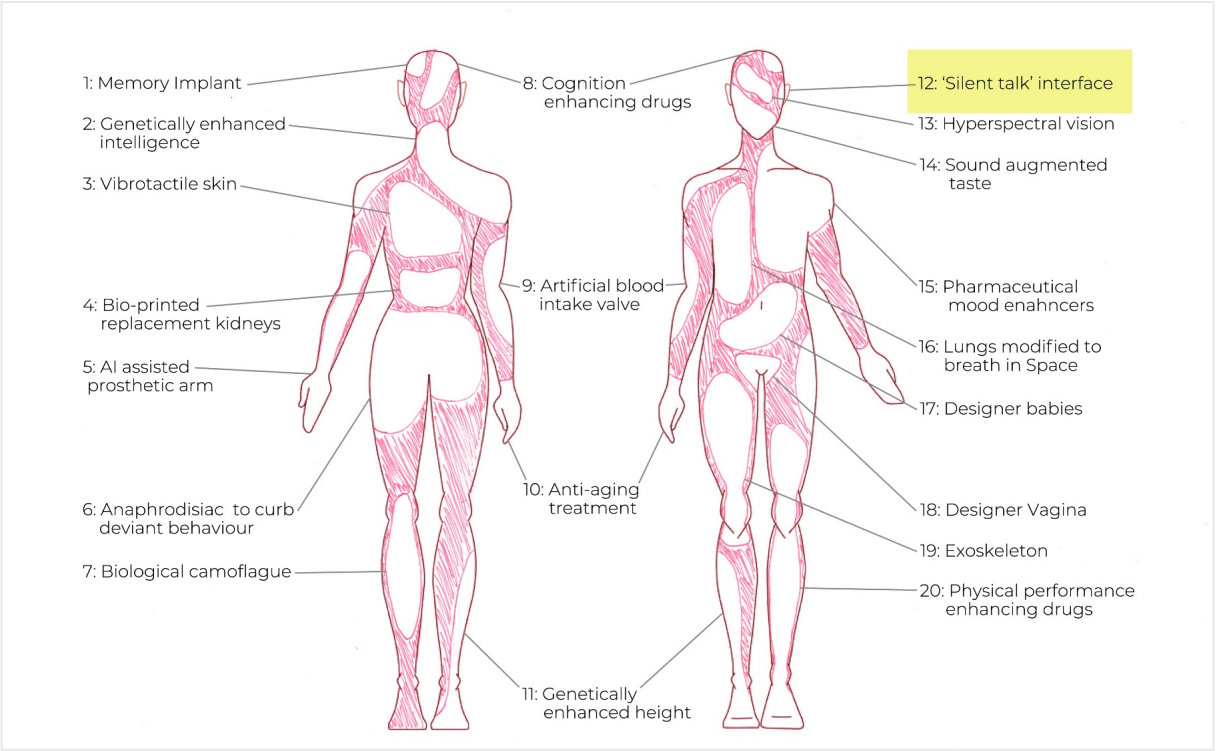

Figure 164 'Body Schematic Of (Future) Commercially Available He Technologies’ Marked with The Technology That the Workshop At The Design Museum Addresses. Lesley-Ann Daly, 2019.

Vignette

A designer is asked to create a ‘silent talk’ device, which allows the user to communicate using thought, both person-to-person, or person-to-machine. The enhancement device will be available to buy on the market and needs to be permanently connected to the skull. What ethical issues will the designer have to consider when creating the device?

For this vignette I decided to look at the response to one specific HE technology being designed for use in the marketplace. I chose a ‘silent talk’ device from the body map of potential commercial HE technologies that I created for the ‘SPECTACLE’ installation. There were a few reasons for choosing this device:

- it was age friendly – as I was not sure of the age range attending the workshop, I decided against something like the ‘designer vagina’ which I felt would have been an

interesting and provocative HE to discuss but would not be best suited if children were present.

- it is relatively easy to understand the basic premise of the device, as a communicator between subjects, through the small description in the vignette – I considered choosing a SA device however this could have led to a significant portion of the short workshop time explaining the basic principles of sensory substitution and therefor SA, as it is a relatively unknown field, before the participants would begin to consider the ethical implications.
- it is something that potentially needs the collaboration of a designer for the creation of the device (if external to the skull) – as opposed to say a genetic intervention which is predominantly in the hands of scientists and doctors.
- it has some ethical issues that I think would be more immediately recognised by participants, such as data protection and need, allowing the conversation to flow and hopefully grow and diverge to other issues.

I anticipated that there would be issues with understanding the pragmatic workings of most HE technologies, including the 'silent talk' interface. Knowing this I chose to be more descriptive on the devices function (silent communication) rather than its technical specifications, e.g. material & neuro-connectivity, so as not to distract from ethics to technical details.

The workshop was set up in two adjoining rooms, with 4tables in each. These tables had a number of stools each, print outs of the vignette (one vignette per table), paper, post its and pens. Workshop attendees were briefed by Lorraine Gammon, Professor of Design and Director of DAC. She first asked for a verbal consent so that the responses of participants could be written down and used for further research both by DAC and by the researchers chairing each vignette. Participants were instructed to pick a table, any table, at this table they would hear the vignette and then discuss ethical issues they think are pertinent. After 10minutes a bell would ring, and they would change tables.

We were able to run the workshop 4times, with different groups of people each round. For each round there was approximately 6-7participants involved in discussing my vignette. These participants were generally over 25, a mix of male and female, with most either students or lecturers at UAL, and/or professional practitioners in design or a design related field. I did not collect any ethnographic, or personal, information for my workshop, however this information was shown via a show of hands at another time during the day.

To begin each workshop round I reiterated the need for ethical consent to use the participants responses for my PhD research and gained verbal consent from everyone at the table. I made clear that those who do not want their response recorded was free to not give consent and their responses would not be recorded – all were happy to give consent. A person at the table was asked to act as scribe for the session and I also informed participants that they can write any issues they perceive on post its and I will collect them at the end.

As it was the first time that I have ran this sort of workshop about my research I knew that it would also be a training experience for me as the facilitator. For example, I was asked, as I anticipated, specifics about the design of the device. I initially started to give options for this but then withdrew and posed that question back to the group. This happened several times, so I was clear to say that I do not have the answers, that this session is about questioning and brainstorming ideas, not necessarily resolution. I was also careful not to lead the discussion too much, or bring up issues that I had thought of, instead allowing the participants to freely explore their ideas. To moderate I occasionally intervened to sum up an issue that I felt was being reiterated too much, as I was aware of the time limit, and encouraged them to identify other issues. I thanked participants for their input at the end of each session and collected all notes from the table.

Insights

After affinity mapping the notes[66] on what participants questioned, I found the following insights:

Purpose?

- Why do we need it and who is it for?
- What is the context?
- What is the benefit? Does it outweigh the risk? – it is not a medical device
- Is there a demand for this?

Who is the client?

- Who is asking you to make it?
- What are the intentions of the client?
- How does the clients' agenda change the design?

Data Safety

- Who holds the data, where is it stored and who can access it?
- Can it easily be misused/hacked?
- Can you affect someone else's implant?
- Can you record the thoughts?
- What is the legality?

[66] Unfortunately, due to the pandemic the notes were locked in the university and couldn't be recovered to photograph for inclusion here.

Designers' role

- What is the designer's role? How much input do they have and at what stage of the development?
- How will designers be taught to deal with the ethics of this type of situation?
- Will designers be able to question the implied nature of the request? E.g. they are asked to create a 'device' – can they question it needing to be a 'device'?
- Can the designer choose not to create it?
- How much is designed and how much is packaging the manufactured part?

Inclusion/Exclusion

- Will it create a class distinction between who has and doesn't have it?
- Will those in the physical space feel left out of the communication?
- Will people feel pressure to get one so as not to miss out?

Permanence

- How permanent is permanent?
- What about updating, policy change and obsolescence over the lifetime of the device?
- Who does permanence benefit? Is it a limitation?

Filtering

- Is there a filter?
- Thoughts are personal and in process, is this regulated to only chosen transmissions?
- Can you decide what to share?

Consent

- Is consent needed to 'read someone's thoughts?
- Is consent implied by the fact that they have the device? (Like owning a phone implying consent to be contacted)
- Can you choose to turn it on/off at will?
- Will other devices be made to block it?

Changing interactions

- How may it change social structure? How will it change how we communicate?

- Could it empower those without the ability to talk before? (physically and metaphorically)
- Aren't other types of communication enough?
- Could it intensify the lack of communication already happening?

Other (only mentioned by one group – not falling under other categories)

- How do you remove bias from the AI system?
- How do you make sure people are informed about the device beforehand?
- Will it need animal testing first?
- Will it be like piecing together someone's thoughts out of context?
- What kind of future bodies do we want?

Analysis

Through the mapping process some thoughts came to mind.

- How much of these responses are influenced by popular topics in the news & media at this time?

One of the topics that came up most frequently and was discussed for the longest length of time was Data protection. This is a very pertinent issue especially in regard to this particular technology which has the capability to extract very personal information. However, the emphasis on this point more than others made me question how much this response was influenced by the current bombardment of data extraction, corruption, and illegal use in the media. Governments and companies have been called out for taking citizen data to use for their own gains, leading to the creation of GDPR data protection policy which pops up on nearly every webpage or link you click on. It is understandable to think that this would be at the forefront of people's mind while discussing the ethics of new technologies.

- Nobody spoke about manipulation by commercial/ advertising brands

Opposingly, no one brought up the concern that brands would use this to stream advertisements and product placements directly into your brain. This potential issue was more of a hot topic a few years ago when VR and particularly AR devices were being brought to market. With the Google glass being released designers and artists responded to this with dystopic scenarios of people being bombarded with ads and pop up as they went about their everyday lives. For example, the video 'Hyper-reality' by Keiichi Matsuda and 'Sight' by Sight Systems. Potentially now that the AR scare has died down these kinds of issues are, maybe not of less concern, but of less immediate concern.

- How much of these responses are directly influenced by the presentations on the first day of the symposium?

The first day of the symposium saw presentations from 12 diverse practitioners giving insight into their work and its relation to ethics. The point regarding a designers' ability to question the implied outcome I think came up in relation to a talk by Shana Agid form Parsons New School of Design. During his presentation he talked about a group who believed that there is a need for prisons to be redesigned to be more ethical, which led to a radical proposal by architects and designers for a new model of a prison. This in-turn led to a counter movement that argued that the prisons aren't the problem, and the redesigning of an ethical prison will not solve the underlying issue – the social conditions that leads to criminal behaviour is the issue and this is what must be addressed. With this fresh in their minds, I believe that participants were aware of questioning the need for the 'silent talk' device and the specifics of the end product.

- Nobody spoke about cost

Somewhat surprisingly no one brought up how much such a device would cost. Given current discourse around technology creating a socio-economic divide between those who can and can't afford the newest devices, the groups did not question who the technology would be available to. When discussing those who would be, or not be, included in the use the tendency was to think of those in the same physical space. For example, if two people were communicating silently leaving out other parties within the room. Bringing up notions of secrecy and exclusivity in that immediate social scenario as opposed to those who could not part-take due to lack of funds. There was also the counter argument here that this already happens with those who speak other languages.

- Nobody spoke about health risks

Also noted what that none of the groups thought about the health risks connected to having a device connected to your skull. Regarding the statement in the vignette '*needs to be permanently connected to the skull'* the focus went to 'permanently'. Participants questioned the need for it to be permanent and what would happen when it needs to be updated or becomes obsolete. This leads me to think that the participants were focusing mainly on the technological aspect (the device) and not the human. I am unsure whether this is due to the phrasing of the vignette causing them to concentrate only on the device, or potentially whether they are not worried about the health risks or presume that aspect to have been worked out safely already. Neil Harbissons' antenna, which is attached to his skull, was brought up in 2discussions – once referring to his difficulty in finding a surgeon to attach the device, and once in relation to the comfort of having this permanently attached, neither mentioned health risks he may have faced. This will need more research through other workshops to see if this pattern continues.

- Disputing the need for such devices when not for therapeutic use

A recurring theme that came up across all groups was questioning the need for such a device. Groups discussed the device being relevant within a therapeutic context, allowing speech to those with speech impediments or physical conditions that affect the motor functions, prohibiting speech. In this context the device was seen within a positive light and worth designing. When questioned within an enhancement context, being a 'want' as opposed to a 'need', things became less black and white. This led to participants speculating what it could be used for and in what situations it would be beneficial – in general not many where discovered. Instead, they questioned why in such scenario's other forms of existing communication where not sufficient, such as text or sign language.

- Asking for more solutions as a facilitator

In general, I found that the majority of responses where negative when discussing the device in the context of enhancement, as detailed above. Moving forward, as facilitator, I will also ask participants to imagine how these negative scenarios could be reconciled. For example, if they are questioning the data security, where/who holds this, I will ask where/who they think should hold the data – to give pragmatic solutions to their concerns. This could help participants to view the technology not solely as a site of problems, but one of potential positive solutions that reflect how they would like the technology to be.

- Device specific vs overall ethical issues

From the workshop insights I expected to see a mix of concerns that were device specific and ones that could relate more broadly to enhancement technologies. Device specific insights can be seen in 'filtering' (the need to be able to choose which thoughts to broadcast), the specific consideration to ask for 'consent' to communicate with someone, and the focus of 'inclusion/exclusion' and 'changing interactions' on how the device will divide social groups. However, most of the insights, including broader considerations in 'consent', 'inclusion/exclusion' and 'changing interactions' can also be applied to numerous other enhancement technologies.

- Future bodies

Only 1 participant posed the question 'what kind of future bodies do we want?' Very briefly touching on the notion of how much we want to augment our bodies with technology. Other participants seemed to find this point interesting but did not chose to continue this line of thought.



Figure 165 Affinity mapping of participant responses in workshop. Light blue, bright blue, yellow and pink represent one of the four groups. Turquoise indicates titles of grouped responses, 2019.



Figure 166 Affinity mapping of participant responses in workshop. Light blue, bright blue, yellow and pink represent one of the four groups. Turquoise indicates titles of grouped responses, 2019.



Figure 167 Affinity mapping of participant responses in workshop. Light blue, bright blue, yellow and pink represent one of the four groups. Turquoise indicates titles of grouped responses, 2019.



Figure 168 Affinity mapping of participant responses in workshop. Light blue, bright blue, yellow and pink represent one of the four groups. Turquoise indicates titles of grouped responses, 2019.

TITLE & DEFINITIONS	THERAPY vs ENHANCEMENT Therapy - treatment intended to relieve or heal a disorder, physical or psychological	REGULATORY CONSIDERATIONS -rules made by a government or other authority in order to control the way something is done	HUMAN RIGHTS -are the basic rights and freedoms that belong to every person in the world	HUMAN AGENCY/ ACCOUNTABILITY - the capacity of individuals to act independently and to make their own free choices.	SOCIOCULTURAL IMPACT -related to the different groups of people in society and their habits, traditions, and beliefs
EXAMPLES	WHAT IS 'NORMAL'? Some 'disabled' communities, for example Dwarves & the Deaf, want to be able to choose not to genetically remove this 'disability' from their children – opting to preserve their communities' culture and heritage. This is their 'normal'	GLOBAL CONSENSUS Global solidarity is needed on how the technology is regulated. Uneven regulation across countries, and cultures, may force people to seek 'treatment' abroad or procure technologies illegally - adding risks from counterfeit devices.	BENEFIT THE INDIVIDUAL The interests and welfare of the individual should have priority over the sole interest of science or society. Primarily the enhancement must benefit the enhanced individual and not put them at risk in order to achieve a wider gain.	MILITARY A soldier is required to enhance to increase probability of mission success. Due to the hierarchical structure of the military could it be considered that they are giving their consent freely? Who will be accountable if it malfunctions?	LIFE EXTENSION Longer life changes our perception of time and will give people the physical and mental ability to stay in jobs longer. By leaving less room for young, fresh ideas this will slow innovation. Young bodies - old outlook
ISSUES	How do you define 'enhancement'?	There needs to be a global consensus on regulation of HE technology	Treat everyone equally	If all experience is mediated by technology, how does it affect our decisions?	Would longer lives mean reduced fear of death, less drive & commitment?
	How do you define 'normal'?	Need to increase awareness so that the public and relevant professionals can be involved in regulation committees	Respect cultural diversity	If our experience is already mediated anyway, will the addition of the enhancement matter?	Would extended life mean extended time in decay? Increasing interest in assisted suicide?
	How do you define 'disability'?	Must take non-Western views into account	Ensure it doesn't generate discrimination against a group or individual for their culture, gender or income	If the tech becomes a moral actor, who is controlling your actions, you or the device?	Will some enhancements be detrimental to other aspects of health, creating unknown side effects in the long term?
	What genetic traits are acceptable/ favourable?	Need to consider feminist views, queer/gender politics, and the other	Ensure having the device doesn't interfere with the fundamental rights of others	Do we want the technology to make moral judgements for us?	Who are enhancements accessible to? To what extent is it covered by the health system?
	What are the implications of choosing to keep a 'disability'?	Must share benefits & advancements globally, and promote work in developing countries	Ensure everyone has freedom of choice – Morphological freedom	If enhancement makes learning easy, taking away the time and effort normally involved, how will this affect self-development?	If enhancement is only for the rich will this create greater socio-economic disparity?
	How does genetic legacy change when editing out a family trait/disability?	Need to be regulated on a case by case approach and create risk evaluation levels	Respect others choice to or not to enhance	If we rely on enhancement to control emotion – how will we/children learn to master our impulses?	If all those around you are enhanced will you feel pressured into doing it yourself?
	How does family legacy change when adding in a new trait?	Need to regulate according to the devices' actual effects on the user, not by how the manufacturer claims it will work	Ensure using the device doesn't impair our rationality or restrict the breadth of human desire	Will changing our temperament, emotions, desires change our identity?	Will the enhanced gain greater social status, causing a negative social effect on the unenhanced?
	Do unselected embryos deserve to live?	Potentially consider how the device interacts with the body as defining factor e.g. attached to skin, implanted, neural	Give clear guidance and safety information before choice is made	If our memories and experiences define our personalities, will augmenting our memory change who we are?	In a narcissistic society will each person acting for their own betterment detriment society?
	Does 'normal' change when many people enhance?	Must consider long term effects and benefits, not short-term solutions	Make sure benefits outweigh the risks	As medical practitioners only claim to do the best practise, what happens when results are not what we asked for?	Will increased popularity in enhancing boost its acceptance?
	Will those who don't enhance become 'subnormal'?	Need to find a way to quantifiably measure risks vs benefits when the affect is not yet clear	Ensure the individual interests are greater than societal interests	As consumers, how might buying enhancements promote the commercialisation of the body?	Is it justifiable to ask certain professions, such as doctors & pilots & teachers, to enhance for the greater good?
	Do we risk perceiving the whole human condition as 'disabled' and in need of enhancement?	Understand that desirability will increase when clear benefits are proven	Must decide for the best interests of those without the ability to choose/consent. Protect the vulnerable	Should a piercer providing enhancement services be held to the same standards as a medical professional?	What privacy & security measures should be put in place? Who will have (authorised) access to your data?
	Does raising the physical & mental performance of the aging count as therapy?	Must consider that what is good for one is not necessarily good for all	Be conscious to safeguard future generations	Will medical professionals essentially become service providers?	What if employers and/or the government had control over your enhancements? With or without your knowledge?
	Does a treatment that allows an athlete to heal faster count as enhancement?	Need more thorough regulated testing on devices made for children	Protect/ do not harm the environment, biosphere and biodiversity	Who is responsible for the outcome of a malfunctioning enhancement?	If children become a product of their parents desire, will this change attitudes about control in parenting?
	Should the less naturally gifted be allowed to enhance to even 'the playing field? – who decides?	Consider having criminal sanctions for using devices on children without proper training	Know what to leave alone, and not to neglect what we already have	Should parents liable for misusing enhancements on their children? How much is the child choice?	Will children be burdened by the idea that they must live up to what they were 'designed for'?

Figure 169 Issues raised by workshop participants that were additional to the issues identified prior to the workshop (black). Lesley-Ann Daly, 2019.

5.2. Victoria & Albert Museum Workshop Analysis

Address: Victoria and Albert Museum, Cromwell Road, London

Event: Friday Late – 'Anthropocene'

Date: 27 September 2019

Time: 6.30 – 9.30 pm

Participants: Approx. 73 (see Table1)

Duration: 3hours

Workshop type: Drop-in style with worksheets

Event link: https://www.vam.ac.uk/event/QVxeon32/friday-late-september-2019

V&A Friday Late

Friday Late celebrates all aspects of contemporary visual culture and design in society, bringing audiences face-to-face with leading and emerging artists and designers through live performance, film, installation, debate, DJs and late-night exhibition openings. The theme of this event is the 'Anthropocene'- thoughts around 'nature' and 'naturalness' in a technology driven era. This event was open to the public for the evening, with the general demographic consisting of 18-35year olds. Visitors were free to walk between pop-ups within the gallery making this a drop-in style workshop.

Application

After contacting the Victoria and Albert Museum I was connected to Jenna Mason the Friday Late Curator and Coordinator, to discuss my workshop proposal. After a meeting and tour of the event areas I was accepted to run the facilitated workshop on 27 September.

TITLE & DEFINITIONS	THERAPY vs ENHANCEMENT Therapy - treatment intended to relieve or heal a disorder, physical or psychological	REGULATORY CONSIDERATIONS -rules made by a government or other authority in order to control the way something is done	HUMAN RIGHTS -are the basic rights and freedoms that belong to every person in the world	HUMAN AGENCY/ ACCOUNTABILITY - the capacity of individuals to act independently and to make their own free choices.	SOCIOCULTURAL IMPACT -related to the different groups of people in society and their habits, traditions, and beliefs
EXAMPLES	WHAT IS 'NORMAL'? Some 'disabled' communities, for example Dwarves & the Deaf, want to be able to choose not to genetically remove this 'disability' from their children – opting to preserve their communities' culture and heritage. This is their 'normal'	GLOBAL CONSENSUS Global solidarity is needed on how the technology is regulated. Uneven regulation across countries, and cultures, may force people to seek 'treatment' abroad or procure technologies illegally - adding risks from counterfeit devices.	BENEFIT THE INDIVIDUAL The interests and welfare of the individual should have priority over the sole interest of science or society. Primarily the enhancement must benefit the enhanced individual and not put them at risk in order to achieve a wider gain.	MILITARY A soldier is required to enhance to increase probability of mission success. Due to the hierarchical structure of the military could it be considered that they are giving their consent freely? Who will be accountable if it malfunctions?	LIFE EXTENSION Longer life changes our perception of time and will give people the physical and mental ability to stay in jobs longer. By leaving less room for young, fresh ideas this will slow innovation. Young bodies - old outlook
ISSUES	How do you define 'enhancement'?	There needs to be a global consensus on regulation of HE technology	Treat everyone equally	If all experience is mediated by technology, how does it affect our decisions?	Would longer lives mean reduced fear of death, less drive & commitment?
	How do you define 'normal'?	Need to increase awareness so that the public and relevant professionals can be involved in regulation committees	Respect cultural diversity	If our experience is already mediated anyway, will the addition of the enhancement matter?	Would extended life mean extended time in decay? Increasing interest in assisted suicide?
	How do you define 'disability'?	Must take non-Western views into account	Ensure it doesn't generate discrimination against a group or individual for their culture, gender or income	If the tech becomes a moral actor, who is controlling your actions, you or the device?	Will some enhancements be detrimental to other aspects of health, creating unknown side effects in the long term?
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	Do unselected embryos deserve to live?	Potentially consider how the device interacts with the body as defining factor e.g. attached to skin, implanted, neural	Give clear guidance and safety information before choice is made	If our memories and experiences define our personalities, will augmenting our memory change who we are?	In a narcissistic society will each person acting for their own betterment detriment society?
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Figure 170 'Ethics Grid for Human Enhancement Technology' Highlighted with Issues That the Workshop at the V&A Friday Late Will Be Addressing. Colour Coding Below. Lesley-Ann Daly, 2019.

Issues on ‘Ethics Grid for HEt’ addressed in workshop at the V&A Friday Late, colour coding:

Therapy vs Enhancement
Genetic Engineering
Anti-Aging / Life extension
Physical Enhancement in Sport
Changing perceptions with widespread use

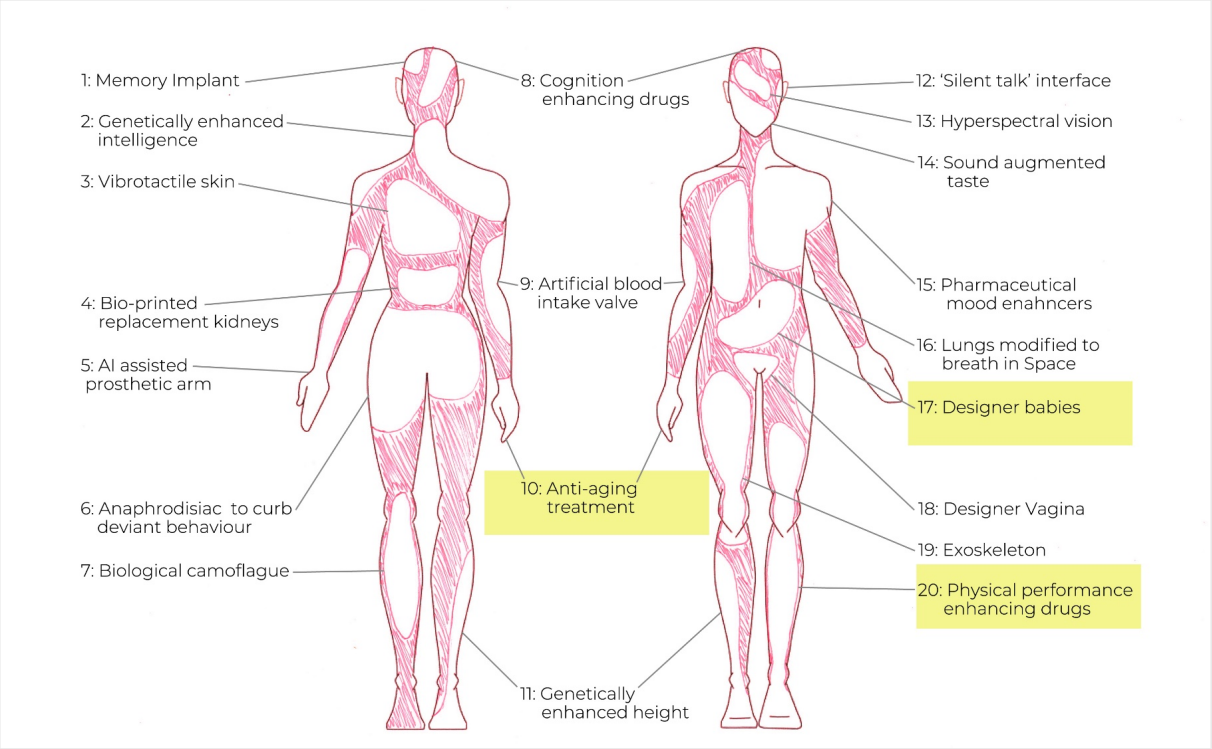


Figure 171 'Body Schematic Of (Future) Commercially Available HE Technologies’ Marked with The Technology That The Workshop At The V&A Friday Late Addresses. Lesley-Ann Daly, 2019.

Worksheets

The question presented was – How ‘natural’ is Human Enhancement technology? This was split into 3 relevant fields: Anti-Ageing; Birth Control; and Physical Enhancement in Sport. The intention was to understand whether some seemingly more ‘natural’ technologies (such as exercise, contraception and beauty creams) are perceived to be more acceptable as a means of enhancement than more modern, seemingly synthetic technologies (such as performance enhancing drugs, gene-editing, and radical life extension technologies). The questions and scenarios were defined as neutral and objectively as possible, so as not to assume that participants were accepting of the more ‘natural’ technologies.

Worksheets were made to fit to the drop-in style of the event. This allowed visitors to choose whether to participate by the act of choosing a sheet and could choose which topic they wanted. The format was explained clearly on the sheet (with no physical interaction by a

facilitator) and collection of responses was by way of collecting the completed sheets. Each sheet included a check box for consent to use responses as part of my PhD research.

Some initial notes from the event:

- First 6 people choose Anti-Ageing
- Quiet to start – filled up later, more people encourages more people to join
- Considered music to fill the exam room type silent feel
- Several people said that they would prefer to take them home so that they would have time to think about it
- A lot of people appeared to fill it in individually
- Lots of people were conversing during filling in
- Some people filled in as a group of 2-4people
- Ageing was the most popular topic followed closely by Birth Control
- Birth Control has the highest amount of non-response to the last question which asked to consider better alternatives
- Physical Enhancement in Sport had by far the least amount filled out

	Total filled	Fully filled	Partial/1 side	No answer to final Question
ANTI-AGEING	30	23	5	2
BIRTH CONTROL	27	19	3	5
PHYSICAL ENHANCEMENT IN SPORT	15	9	5	1
TOTAL	73	52	13	8

Table 3 Total Worksheets Filled In, Divided by Theme and Amount of Worksheet Filled In.

Method of Analysis

Sheets were grouped by topic, and I quantitatively collected responses to each question – tallying up multiple similar responses. This was done using an Excel spread sheet which also tallies how many responses/points people made per question – showing which questions or scenarios evoked a stronger response.

In general, across the three topics, there was about the same number of responses to the Positives of the 'natural' (existing) enhancements as to the Negatives of the enhancement scenario.

And in parallel, equal response to the Positives of enhancement scenario to the Negatives of the 'natural' scenario. E.g.

A: POSITIVES OF BIRTH CONTROL = NEGATIVES OF GENETIC ENGINEERING (e.g. 40 responses each)

B: NEGATIVES OF BIRTH CONTROL = POSITIVE OF GENETIC ENGINEERING (e.g. 25 responses each)

A always had more responses than B

- Participants had more to say/opinion on Positives of 'natural' technologies and the Negatives of enhancements.
- They had less Positives for enhancement and less Negatives for 'natural' technologies.

Insights

Defining 'Nature'

The most common phrases used for defining 'nature' across all topics:

- Unaltered by humans (30responses)
- Related to nature- animals, plants etc. (20 responses)
- Organic (15 responses)

Birth Control (additionally)

- Being yourself
- Accepting flaws – 'squishy', 'hairy'
- Real
    - Terms related to body image/confidence and personality (big topic in the media and society right now – acceptance of all genders/non gender, body types, personalities etc)

Anti-Aging (additionally):

- Humans are natural no matter what
- Enjoying life as it is
- Harmony

    - Terms about letting things be and acceptance, seems to be ideas related to wisdom (which can be related to aging) and a spirituality or connection with the 'natural' world (holistic).

Physical Enhancement in Sport (additionally)

- 'pure'
- Body in its' 'pure' form
    - Terms related to not interfering with the body – referring to with the body via supplements, doping etc. Very much linked to the idea of sport being about human excellence (without aids).

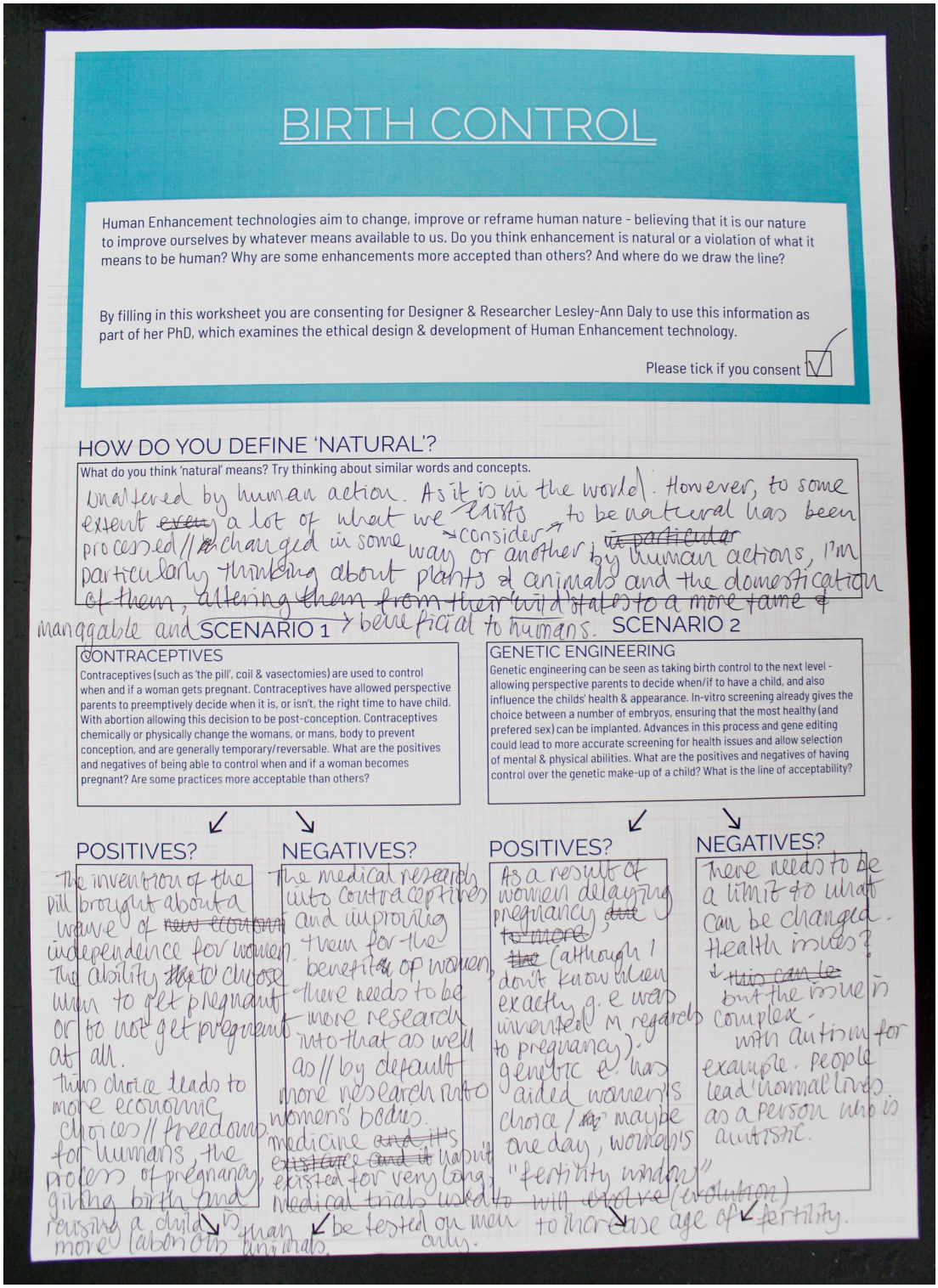


Figure 172 Birth Control Worksheet - Filled In, 2019.

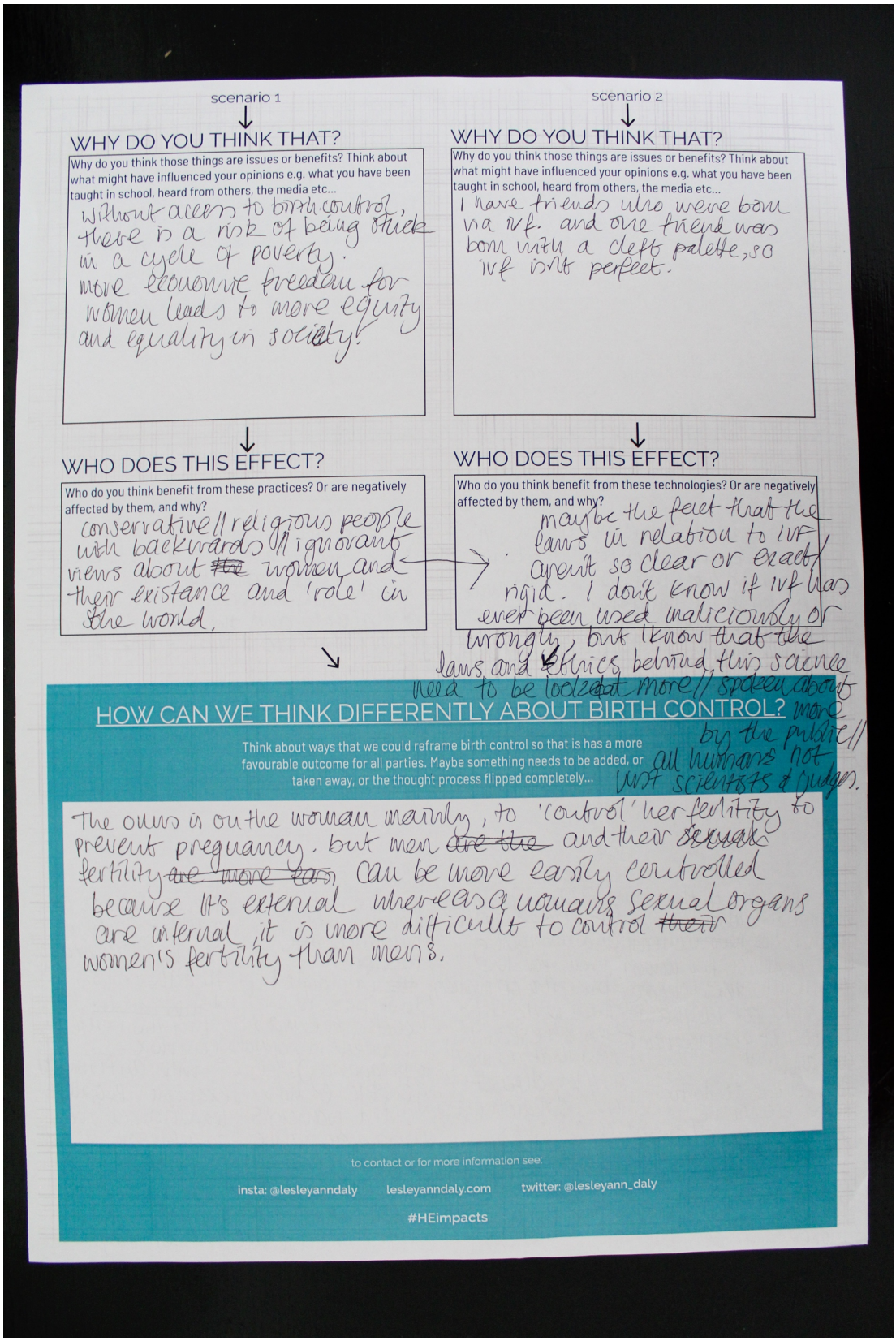
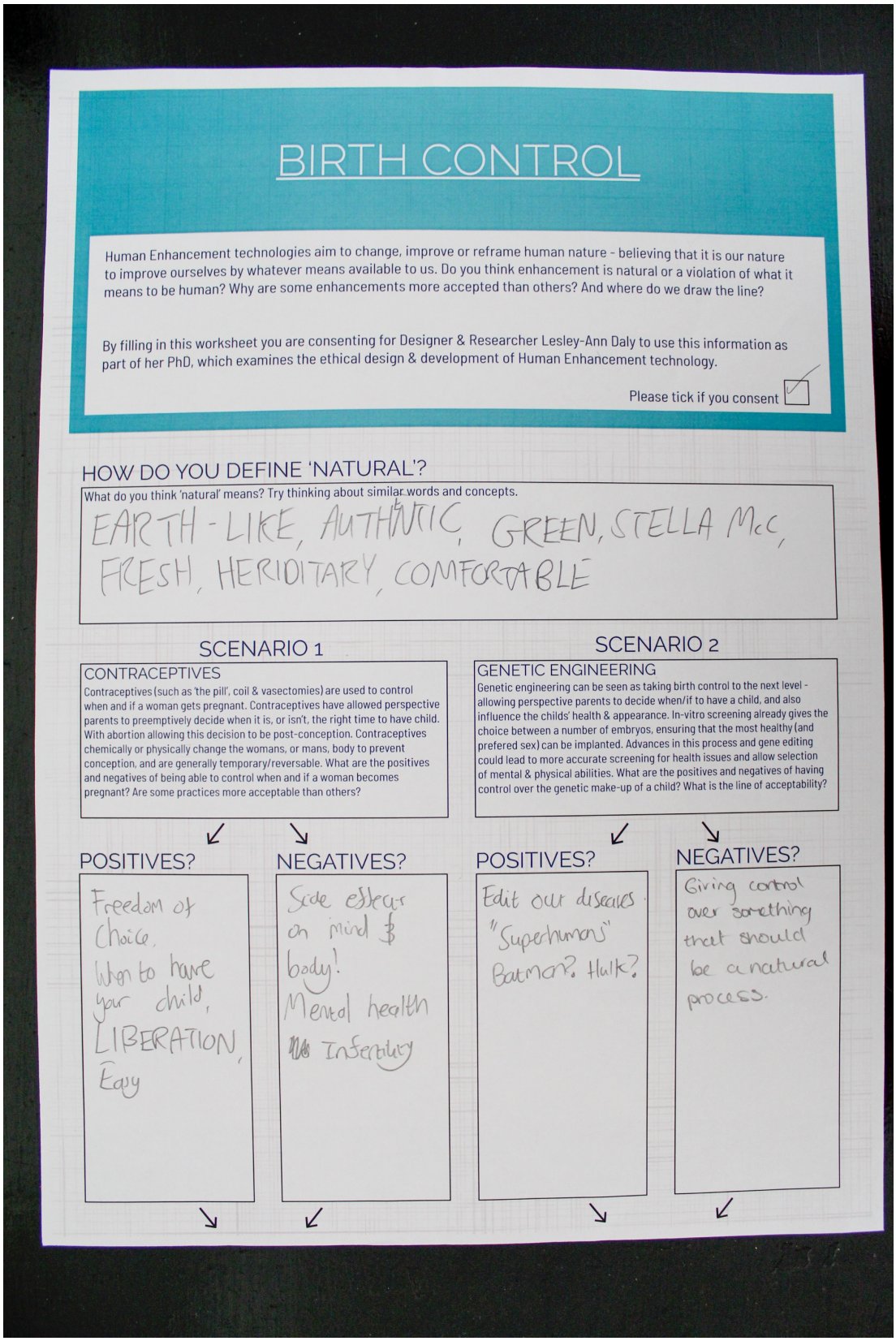


Figure 173 Birth Control Worksheet - Filled In, 2019.



BIRTH CONTROL

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

EARTH-LIKE, AUTHENTIC, GREEN, STELLA McC, FRESH, HERIDITARY, COMFORTABLE

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

Freedom of Choice, When to have your child, LIBERATION, Easy

NEGATIVES?

Side effects on mind & body! Mental health Infertility

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

Edit out diseases "Superhumans" Batman? Hulk?

NEGATIVES?

Giving control over something that should be a natural process.

Figure 174 Birth Control Worksheet - Filled In, 2019.

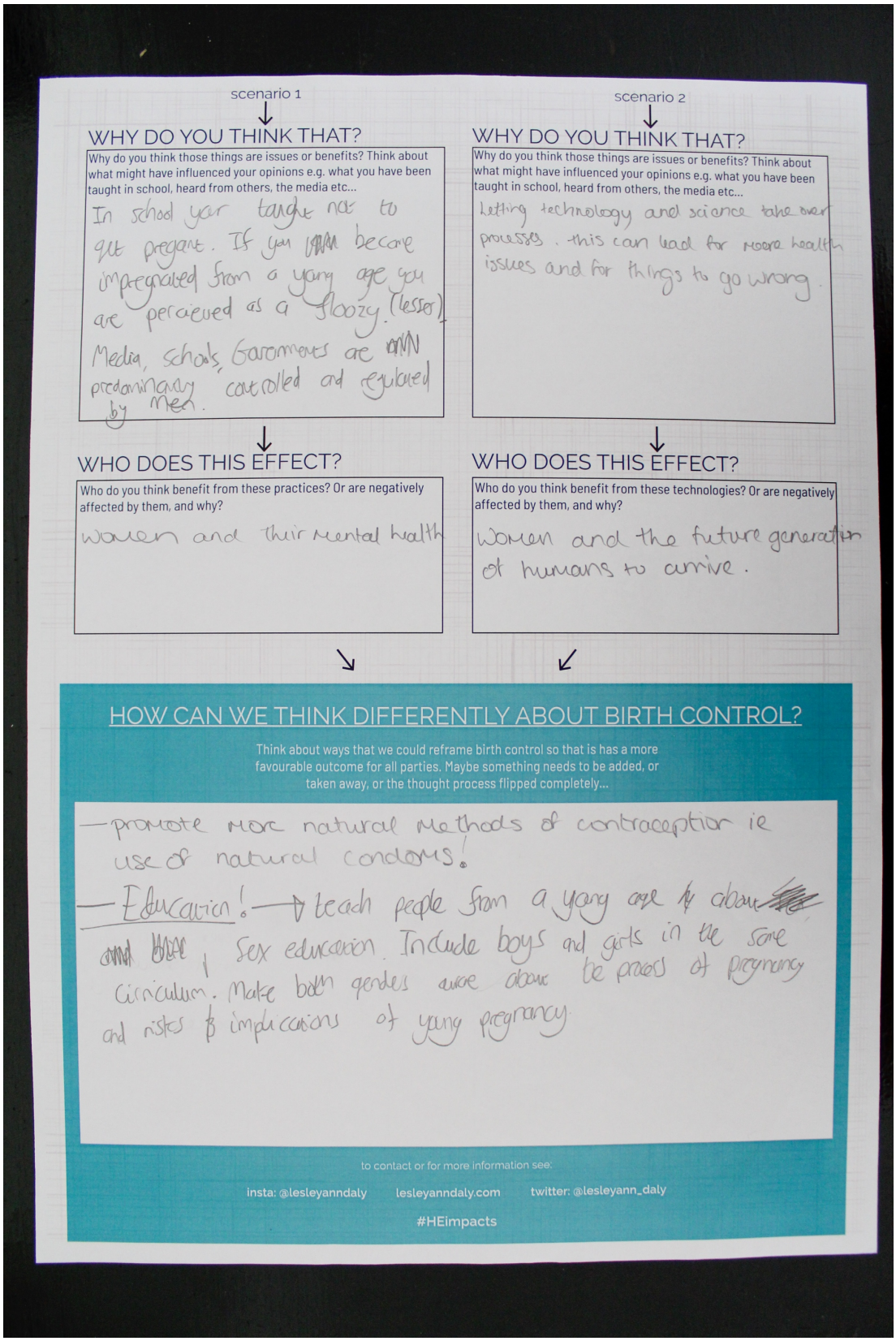
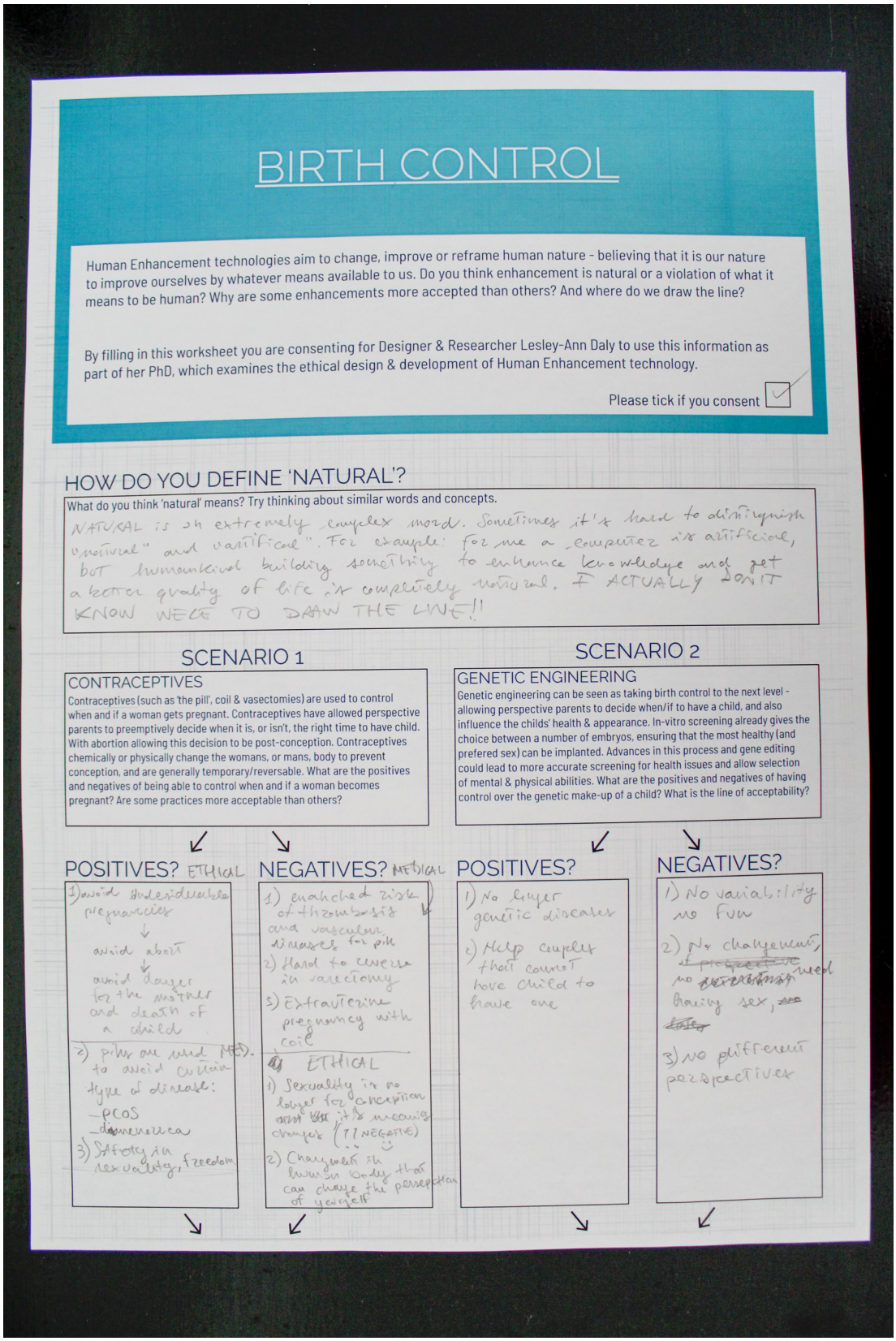


Figure 175 Birth Control Worksheet - Filled In, 2019.



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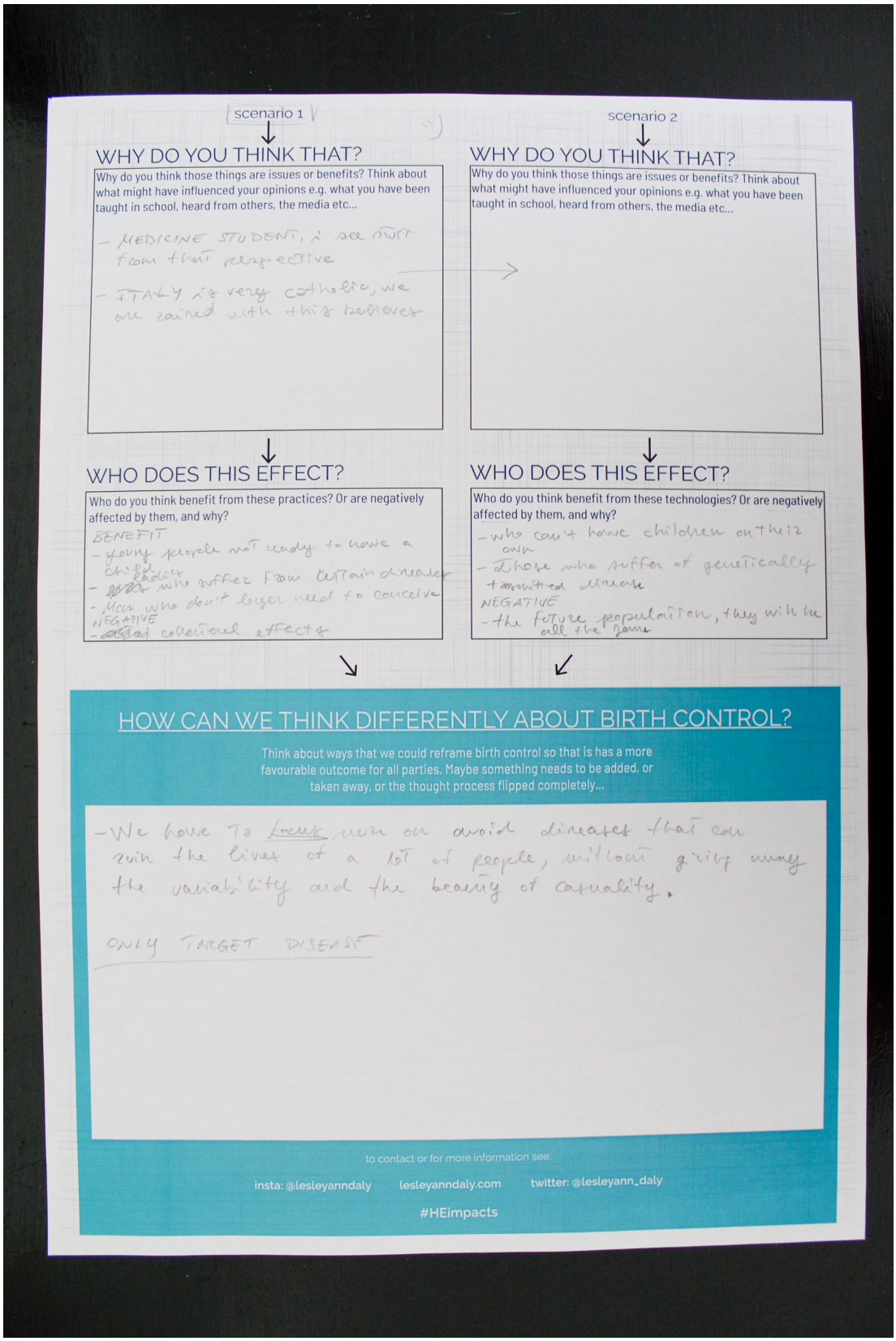

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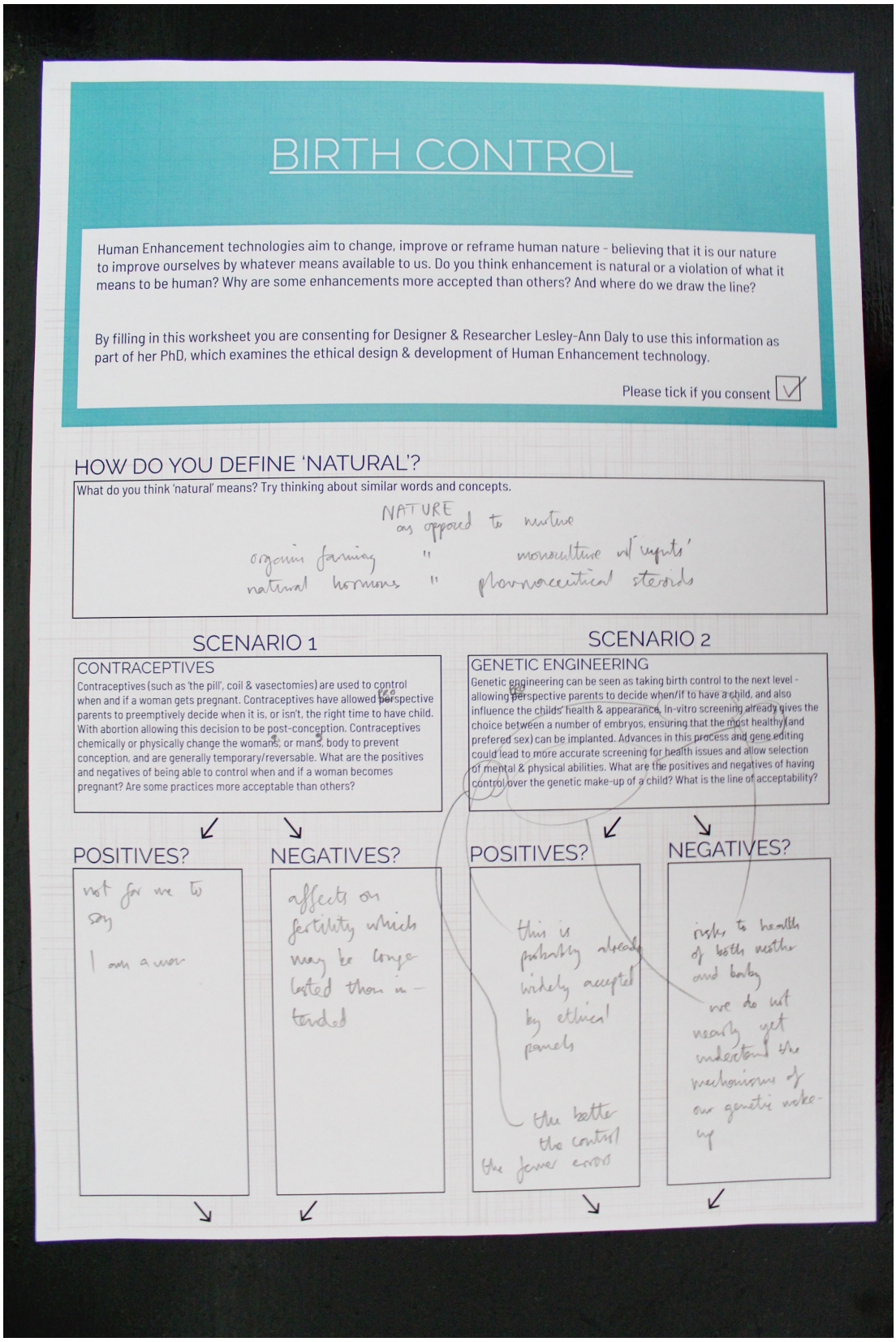
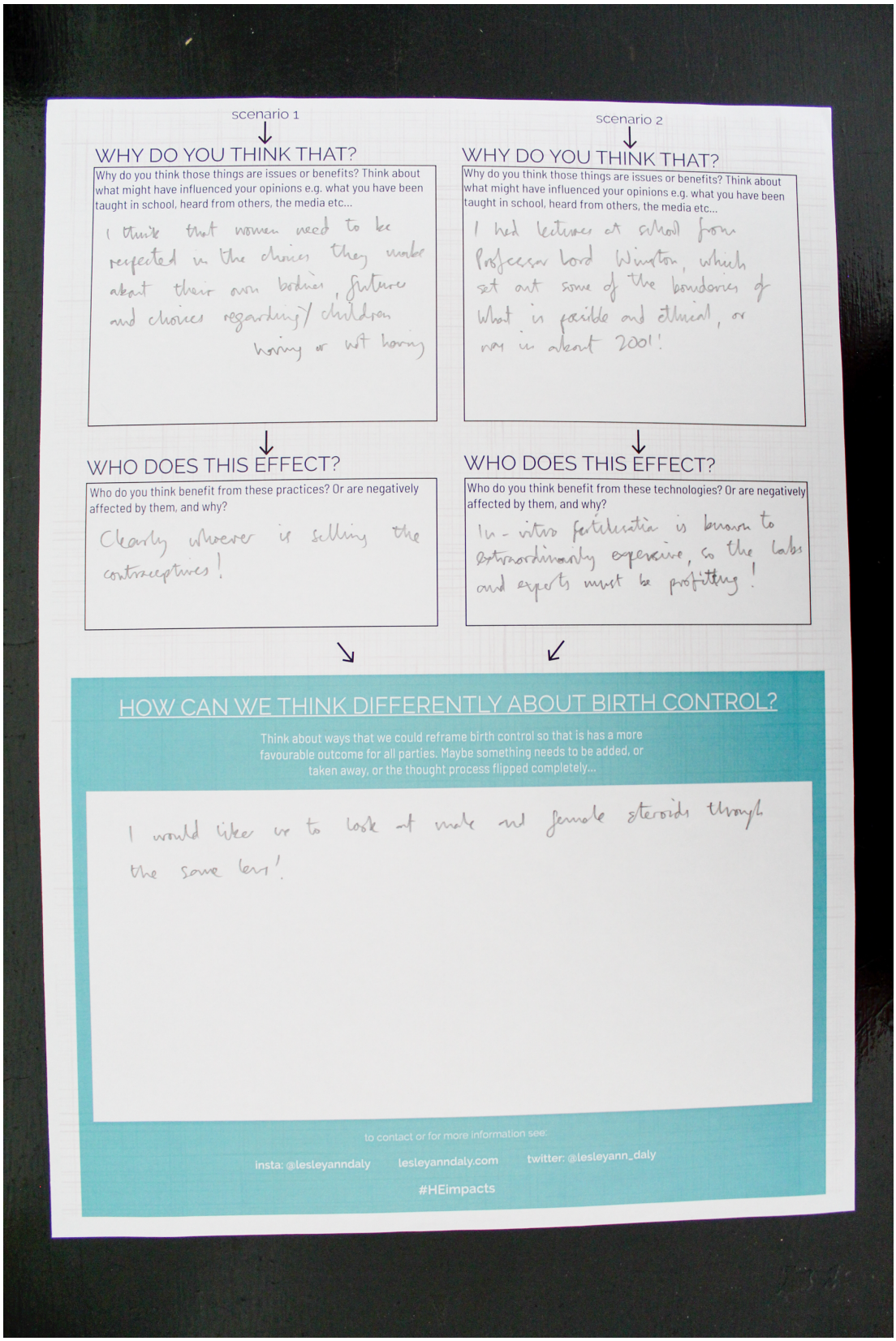


Figure 178 Birth Control Worksheet - Filled In, 2019.



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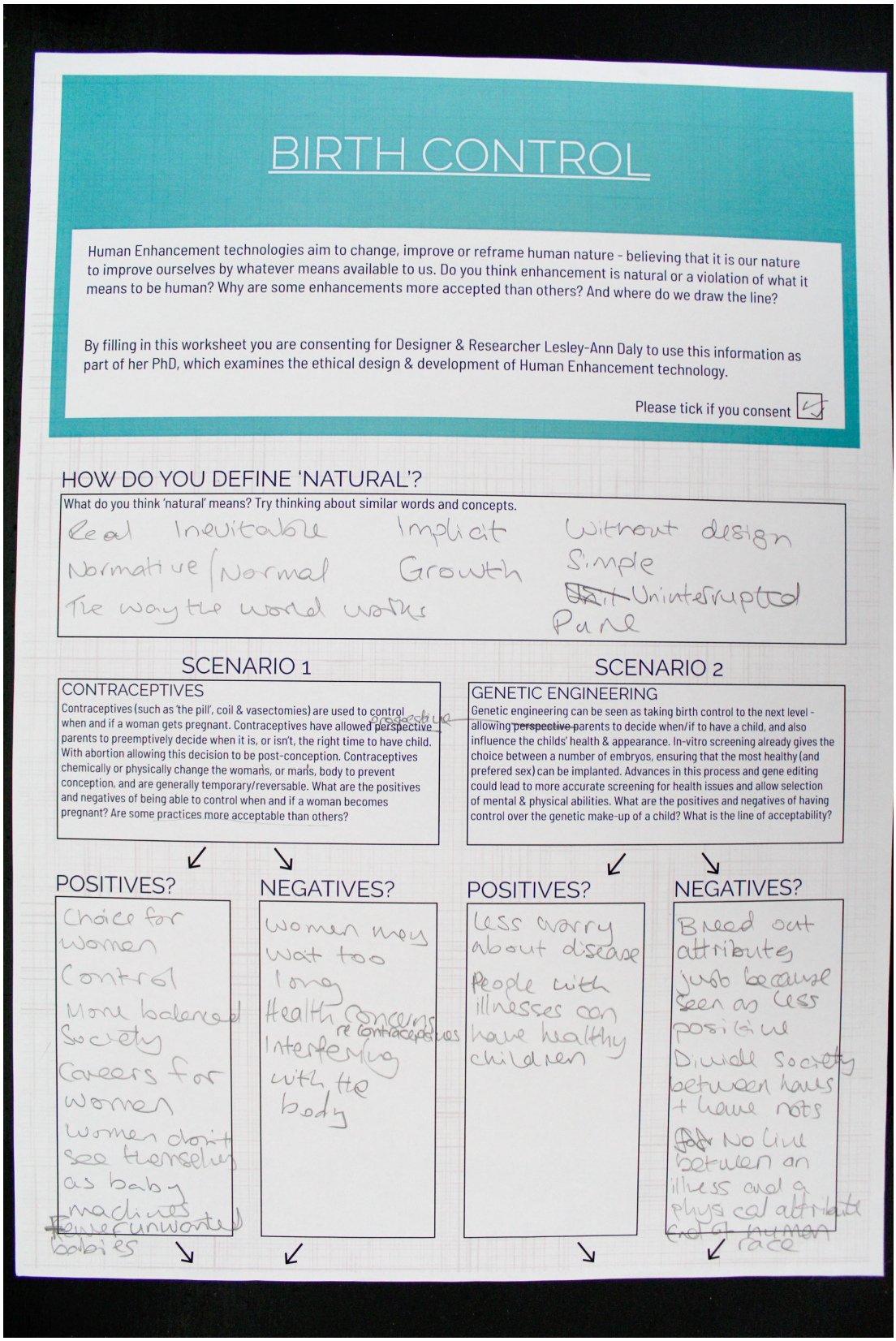


Figure 180 Birth Control Worksheet - Filled In, 2019.

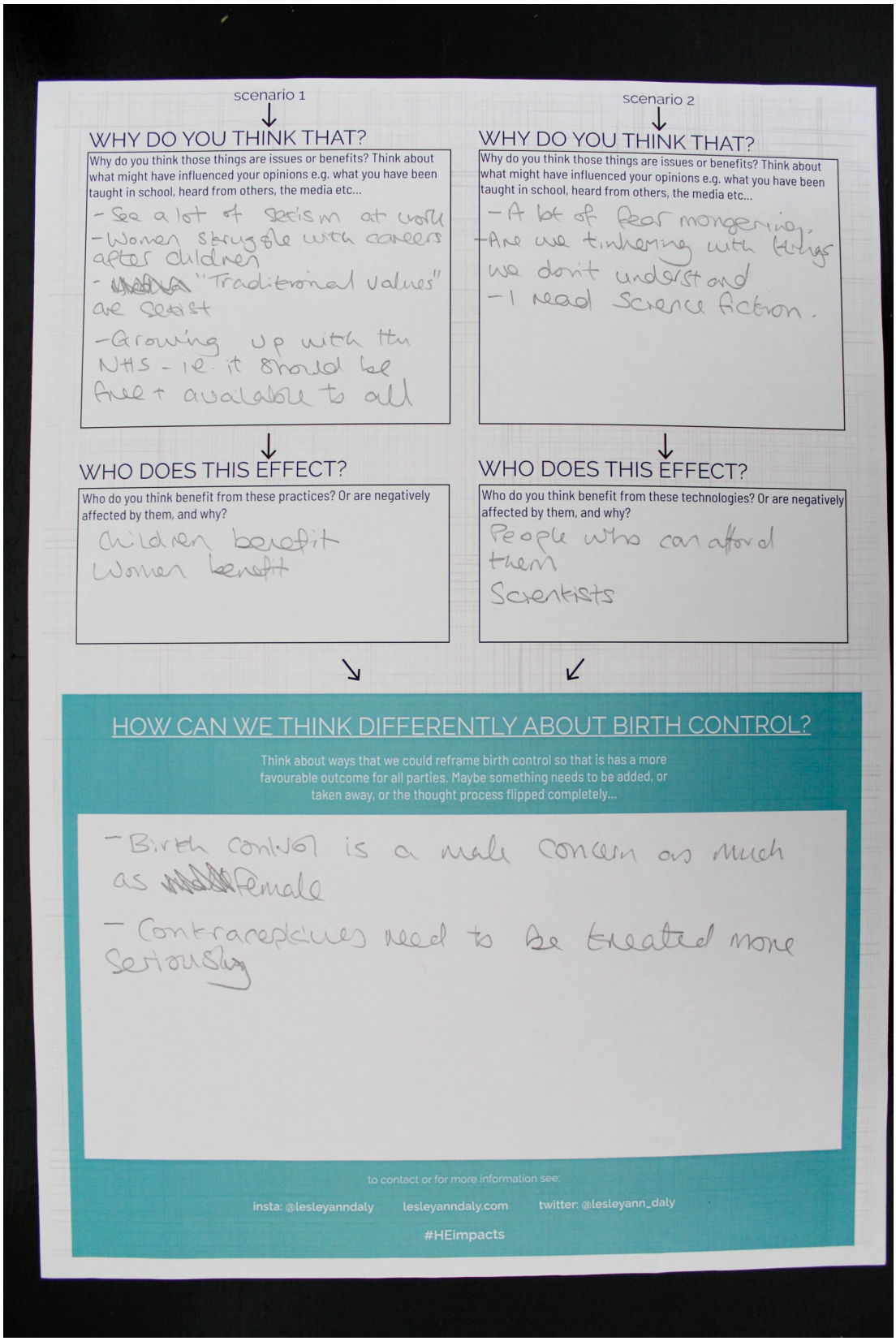
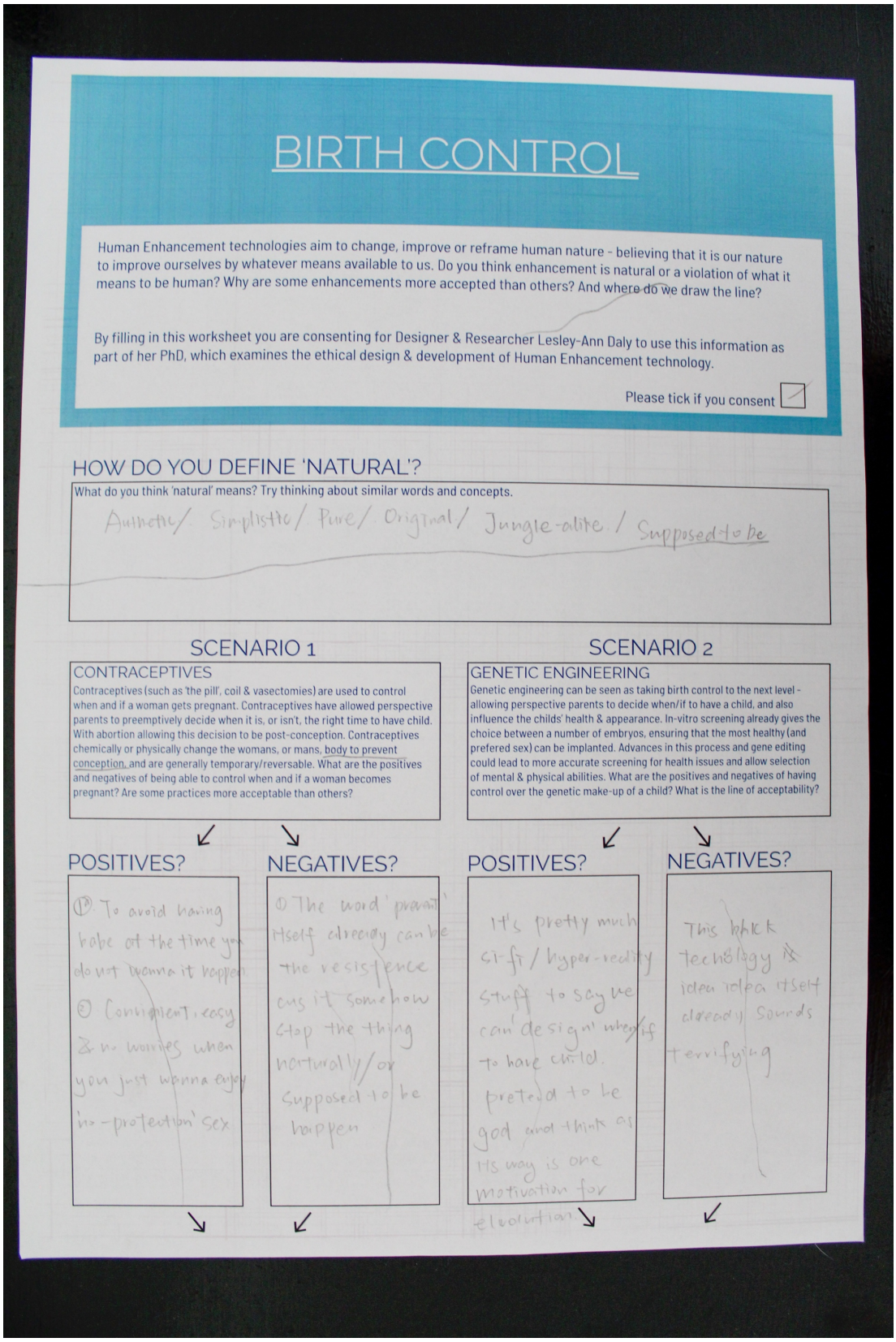


Figure 181 Birth Control Worksheet - Filled In, 2019.



BIRTH CONTROL

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By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Authentic / Simplistic / Pure / Original / Jungle-alike / Supposed-to be

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

① To avoid having babe at the time you do not wanna it happen

② Consistent, easy & no worries when you just wanna enjoy 'no-protection' sex

NEGATIVES?

① The word 'prevent' itself already can be the resistence cus it somehow stop the thing naturally/or supposed to be happen

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

It's pretty much sci-fi / hyper-reality stuff to say we can design when/if to have child. pretend to be god and think as its way is one motivation for evolution

NEGATIVES?

This kinda technology & idea idea itself already sounds terrifying

Figure 182 Birth Control Worksheet - Filled In, 2019.

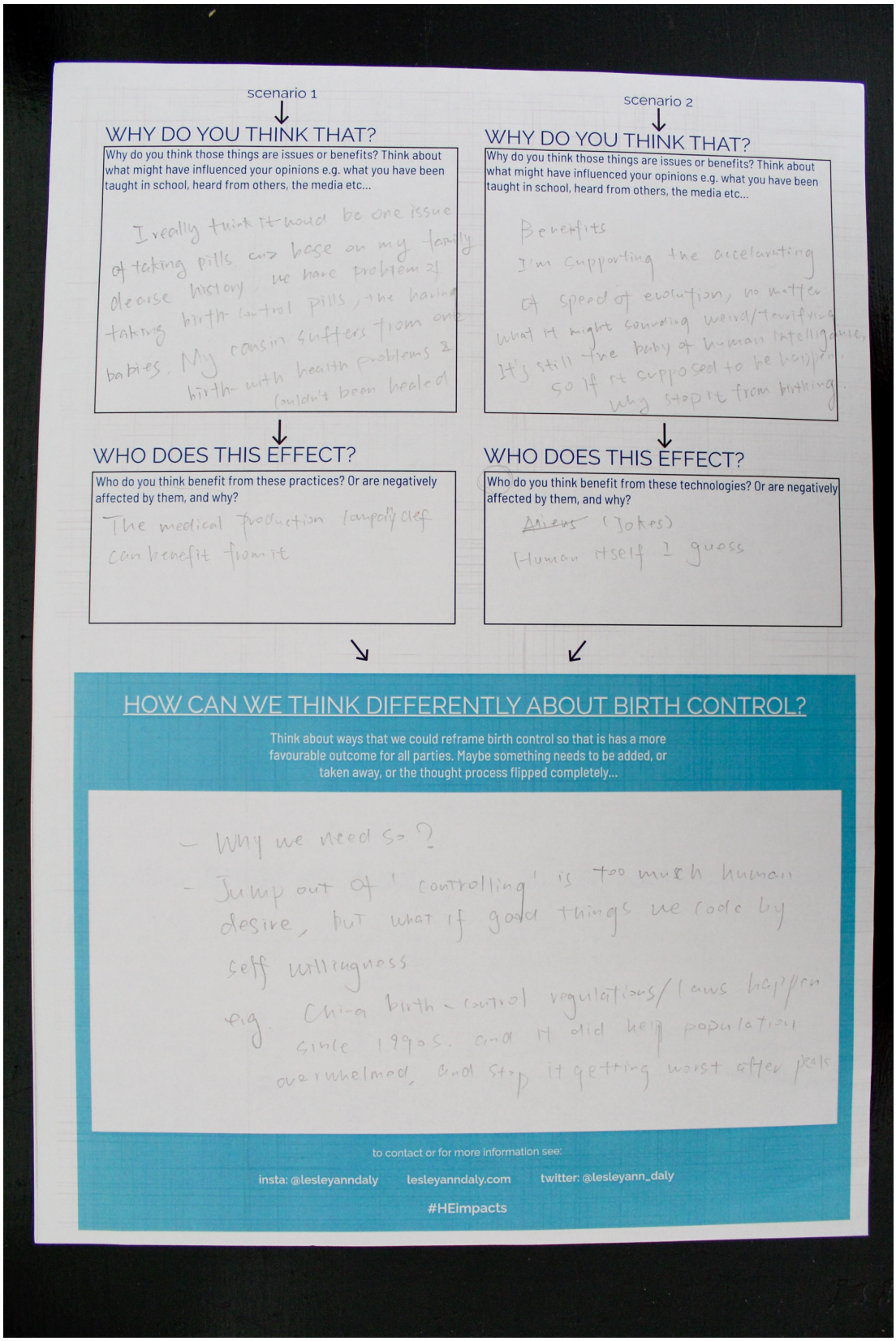
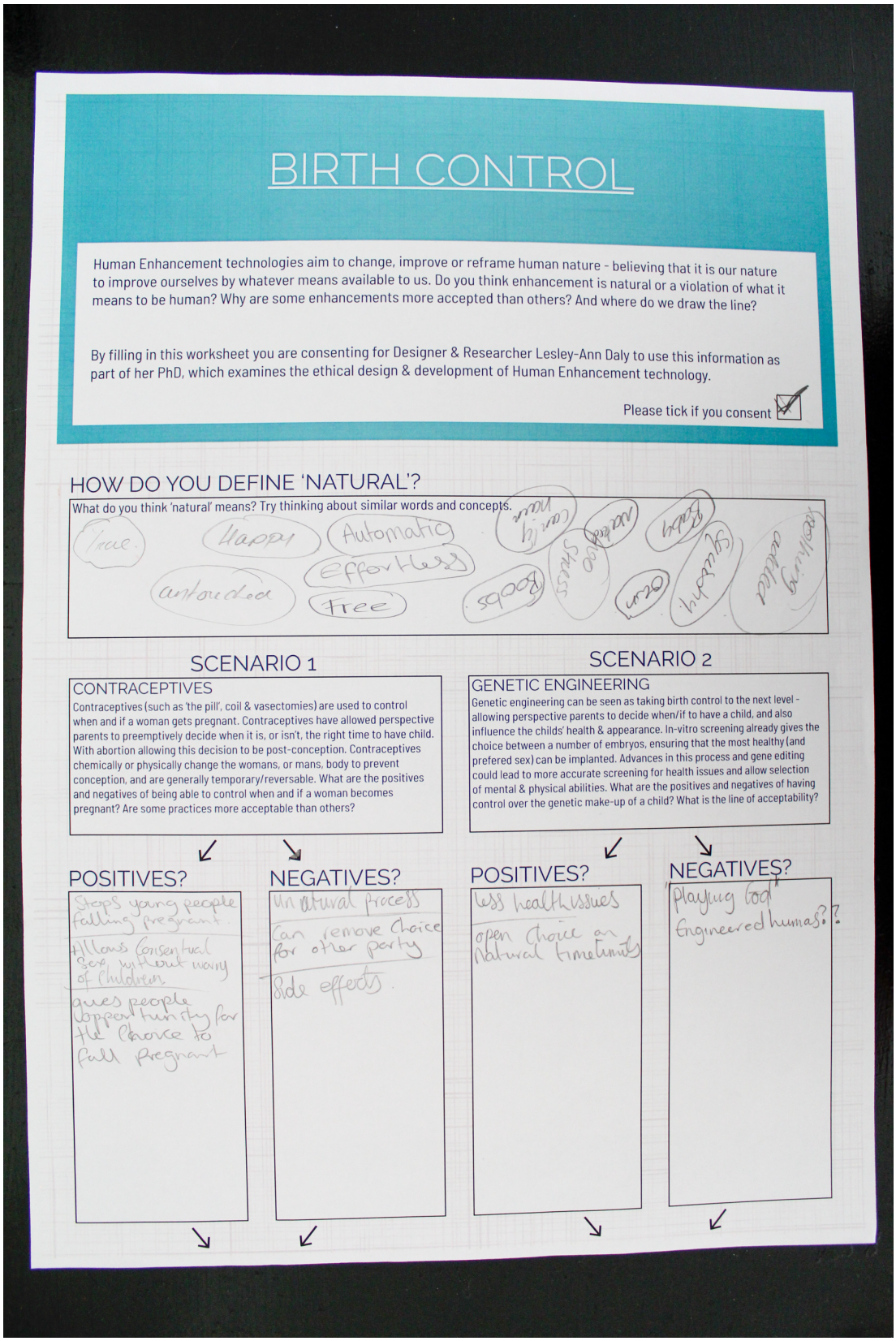


Figure 183 Birth Control Worksheet - Filled In, 2019.



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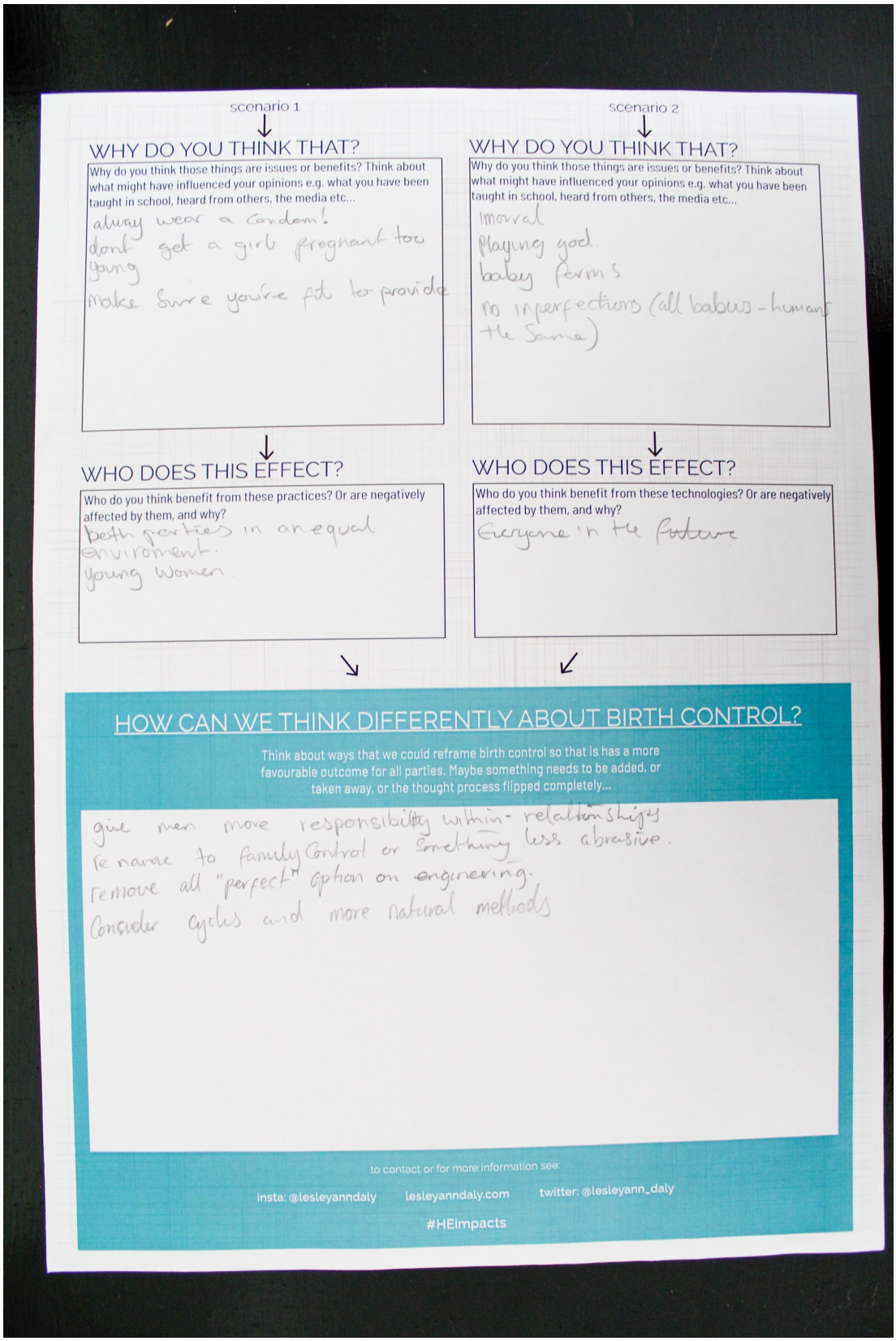

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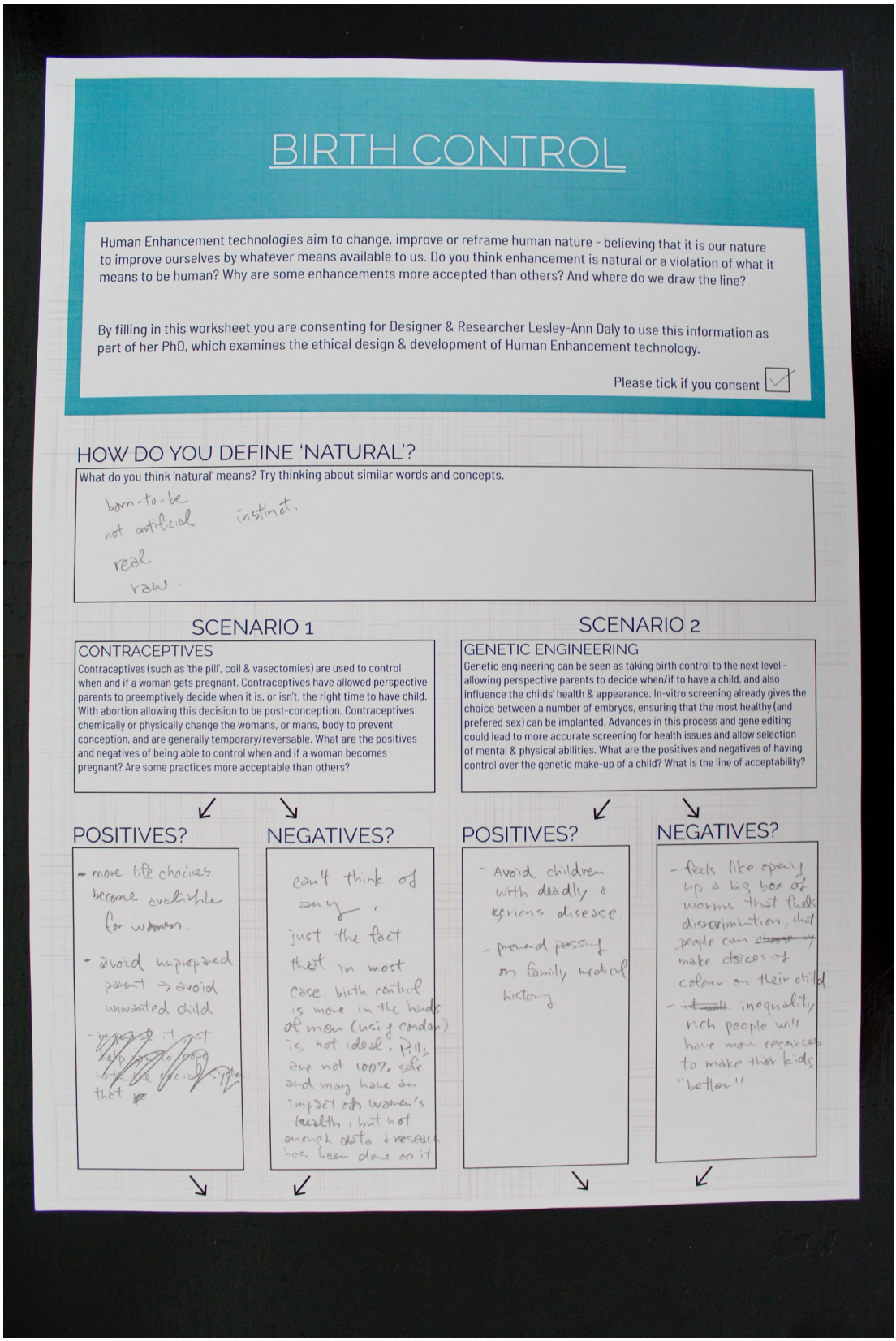

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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

born-to-be
not artificial
instinct.
real
raw

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

- more life choices become available for women.
- avoid unprepared parent → avoid unwanted child

NEGATIVES?

can't think of any, just the fact that in most case birth control is more in the hands of men (sadly condom) is not ideal. Pills are not 100% safe and may have an impact on women's health, but not enough data research has been done on it

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

- Avoid children with deadly & serious disease
- prevent passing on family medical history

NEGATIVES?

- feels like opening up a big box of worms that floods discrimination, that people can ~~choose by~~ make choices of colour on their child
- ~~it will~~ inequality, rich people will have more reserves to make their kids "better"

Figure 186 Birth Control Worksheet - Filled In, 2019.

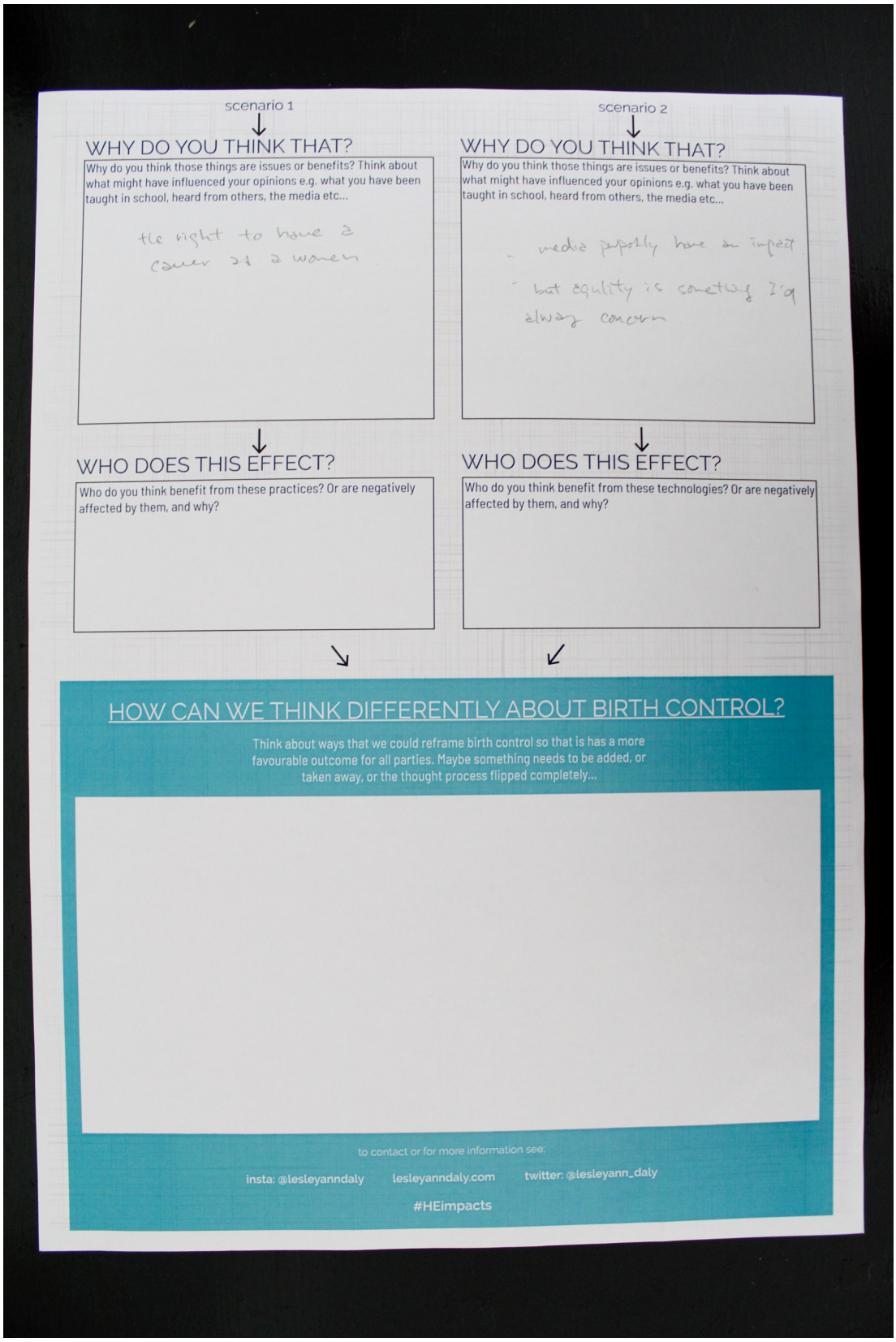
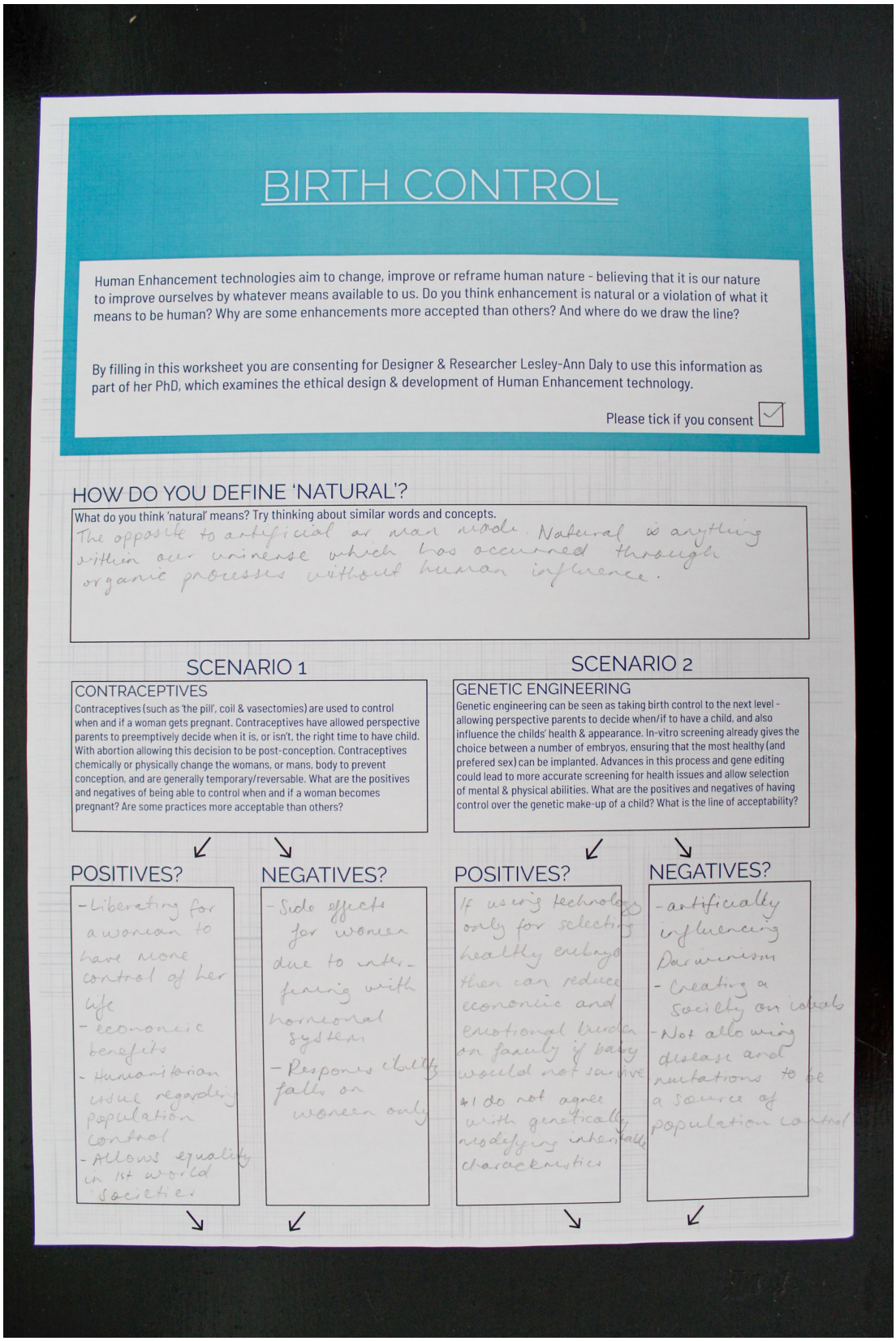


Figure 187 Birth Control Worksheet - Filled In, 2019.



BIRTH CONTROL

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

The opposite to artificial or man made. Natural is anything within our universe which has occurred through organic processes without human influence.

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

- Liberating for a woman to have more control of her life
- economic benefits
- Humanitarian issue regarding population control
- Allows equality in 1st world societies

NEGATIVES?

- Side effects for women due to interfering with hormonal system
- Responsibility falls on women only

SCENARIO 2

GENETIC ENGINEERING

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POSITIVES?

If using technology only for selecting healthy embryo then can reduce economic and emotional burden on family if baby would not survive

* I do not agree with genetically modifying inherited characteristics

NEGATIVES?

- artificially influencing Darwinism
- Creating a society on ideals
- Not allowing disease and mutations to be a source of population control

Figure 188 Birth Control Worksheet - Filled In, 2019.

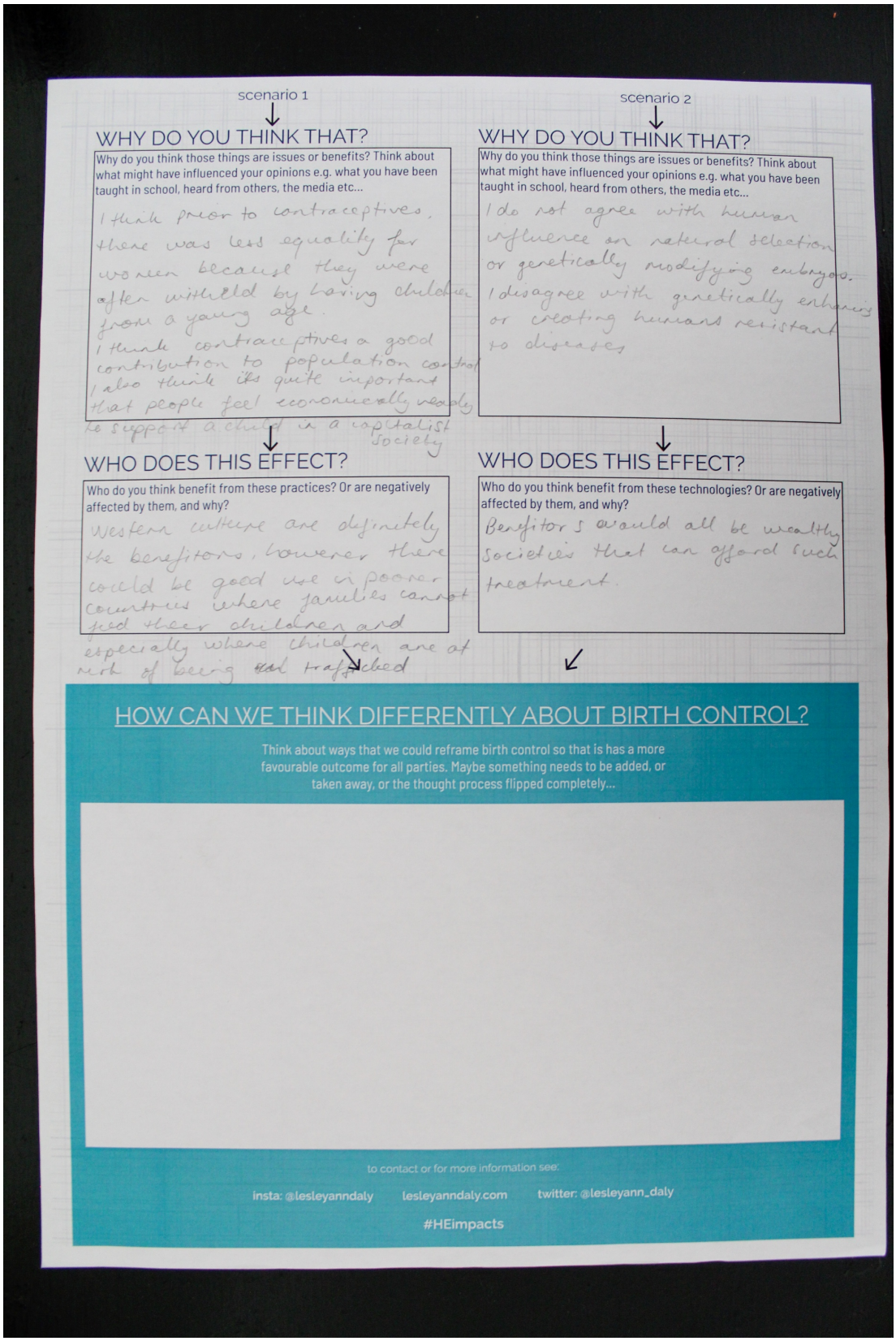
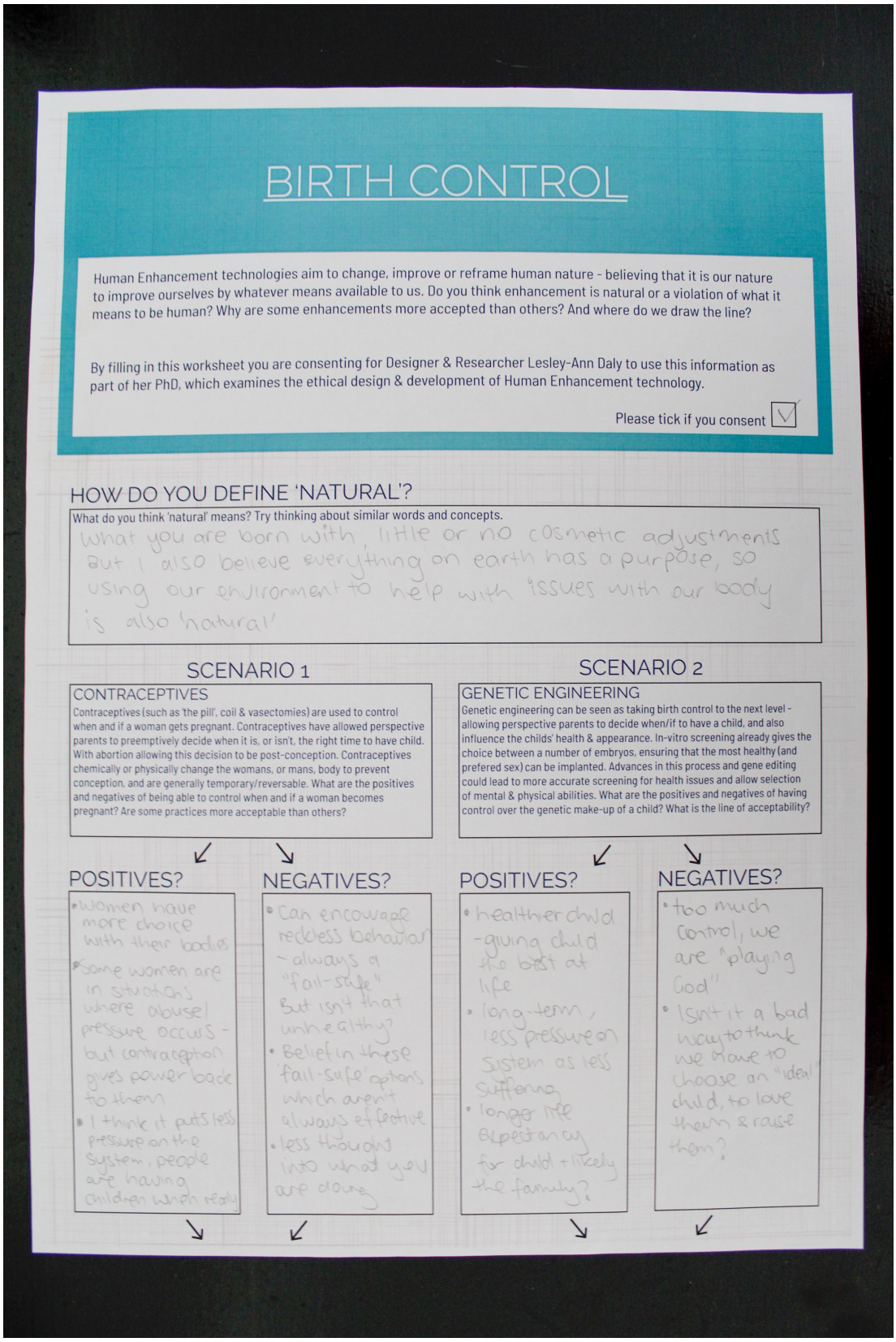


Figure 189 Birth Control Worksheet - Filled In, 2019.



BIRTH CONTROL

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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

What you are born with, little or no cosmetic adjustments but I also believe everything on earth has a purpose, so using our environment to help with issues with our body is also 'natural'

SCENARIO 1

CONTRACEPTIVES

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POSITIVES?

- Women have more choice with their bodies
- Some women are in situations where abuse/ pressure occurs - but contraception gives power back to them
- I think it puts less pressure on the system, people are having children when ready

NEGATIVES?

- Can encourage reckless behaviour - always a "fail-safe" But isn't that unhealthy?
- Belief in these 'fail-safe' options which aren't always effective
- less thought into what you are doing

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

- healthier child - giving child the best at life
- long-term, less pressure on system as less suffering
- longer life expectancy for child + likely the family?

NEGATIVES?

- too much control, we are "playing God"
- Isn't it a bad way to think we have to choose an "ideal child, to love them & raise them?

Figure 190 Birth Control Worksheet - Filled In, 2019.

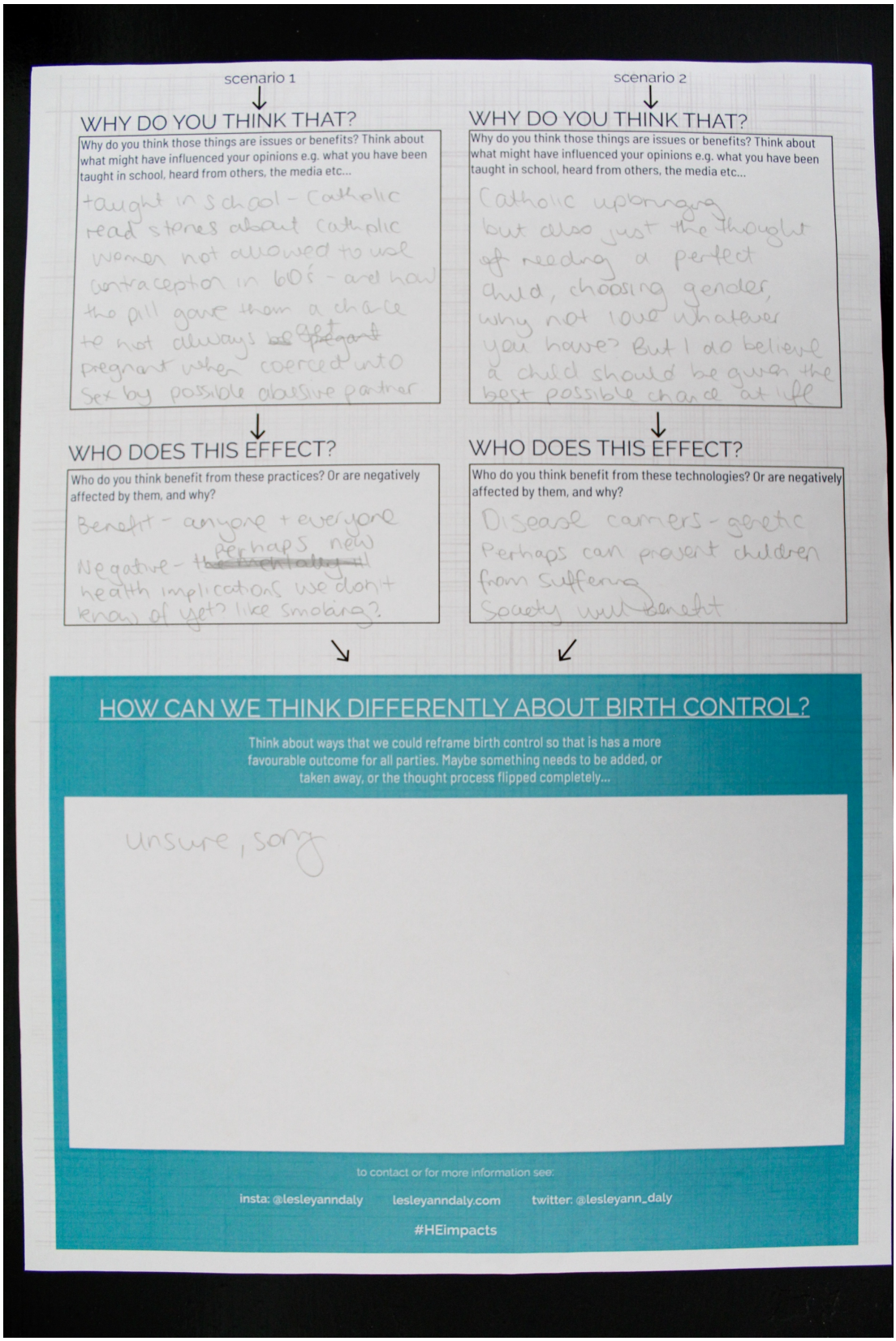
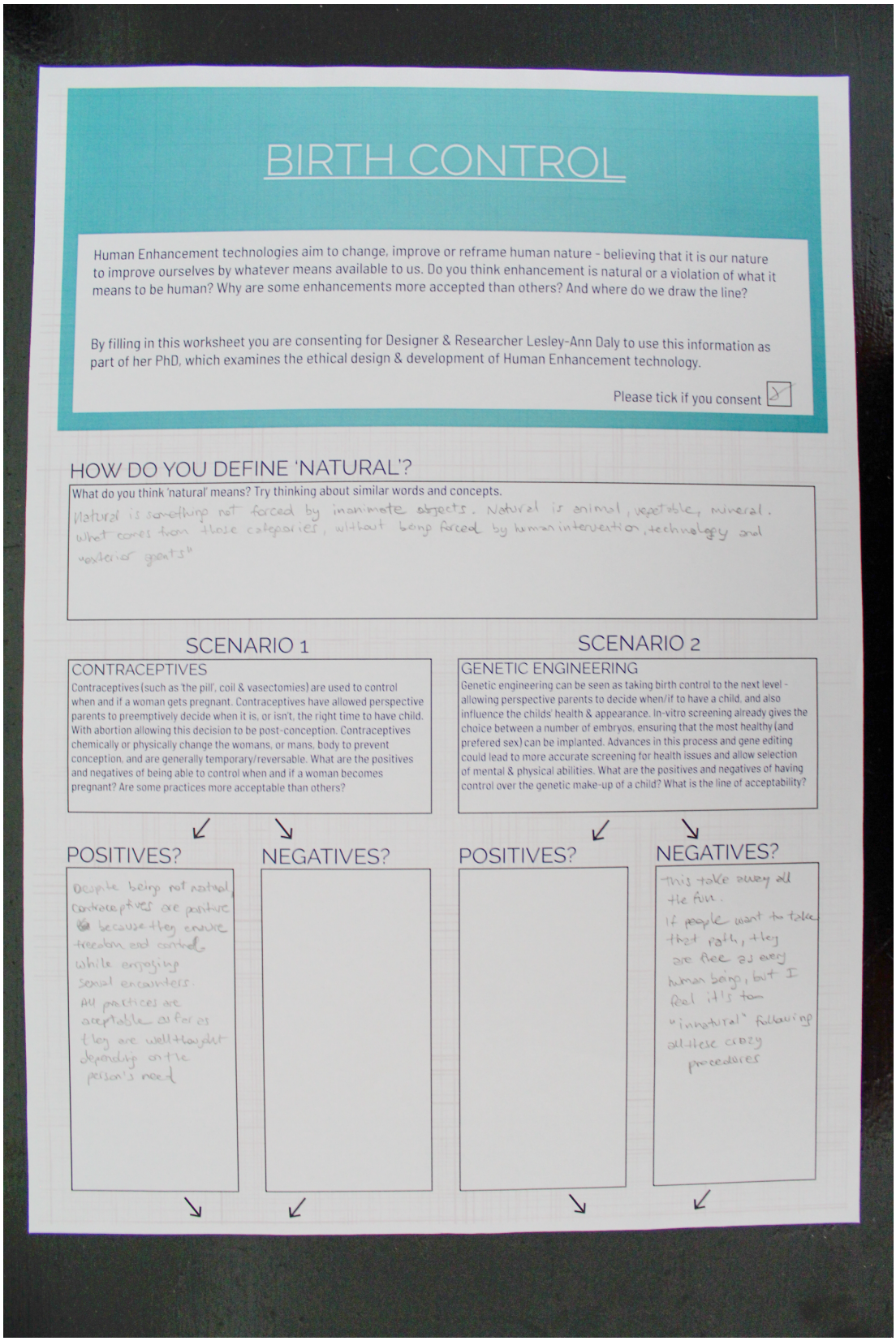


Figure 191 Birth Control Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Natural is something not forced by inanimate objects. Natural is animal, vegetable, mineral. What comes from those categories, without being forced by human intervention, technology and exterior agents"

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

Despite being not natural contraceptives are positive because they ensure freedom and control while enjoying sexual encounters. All practices are acceptable as far as they are well thought depending on the person's need

NEGATIVES?

SCENARIO 2

GENETIC ENGINEERING

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POSITIVES?

NEGATIVES?

This take away all the fun. If people want to take that path, they are free as every human being, but I feel it's too "unnatural" following all these crazy procedures

Figure 192 Birth Control Worksheet - Filled In, 2019.

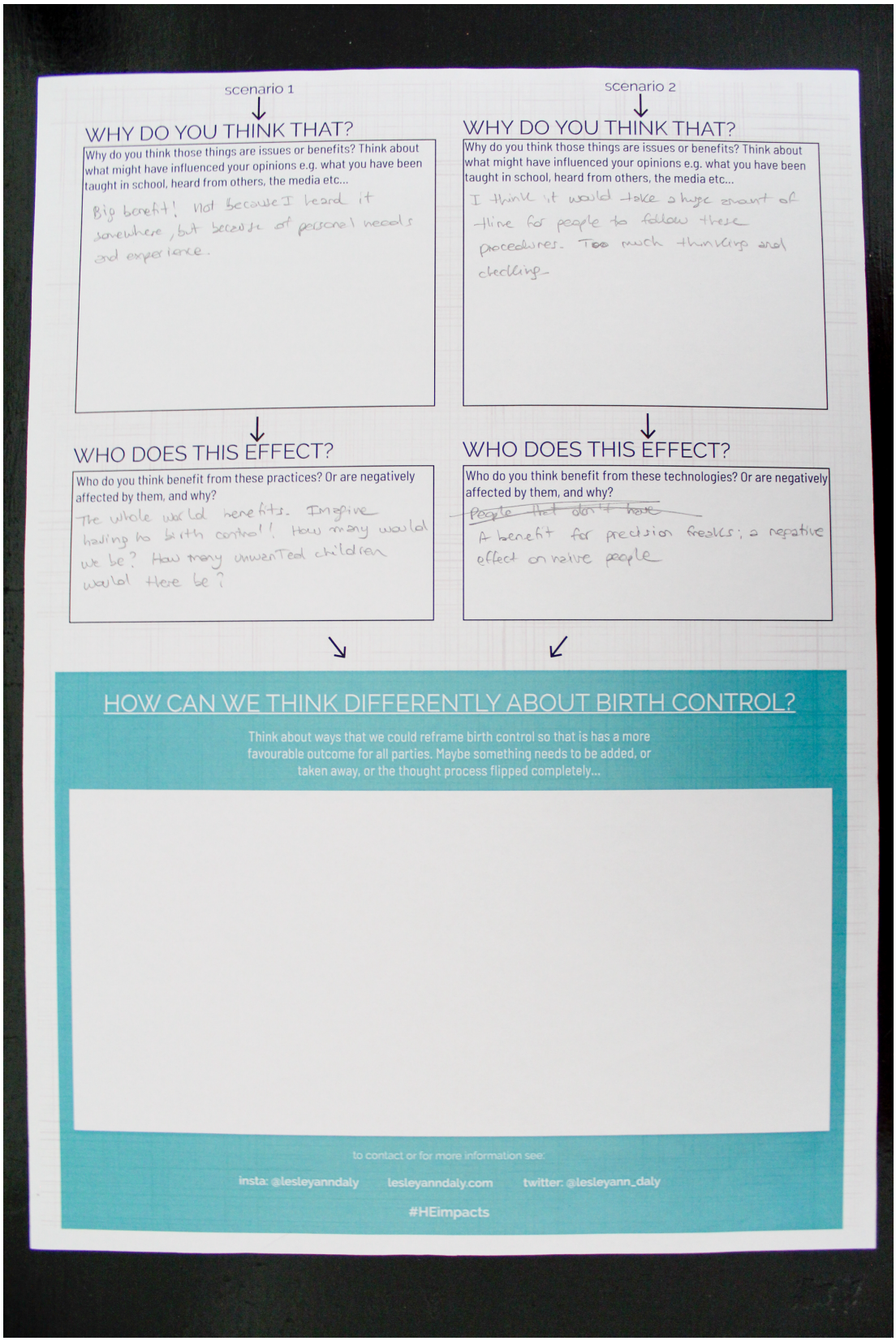
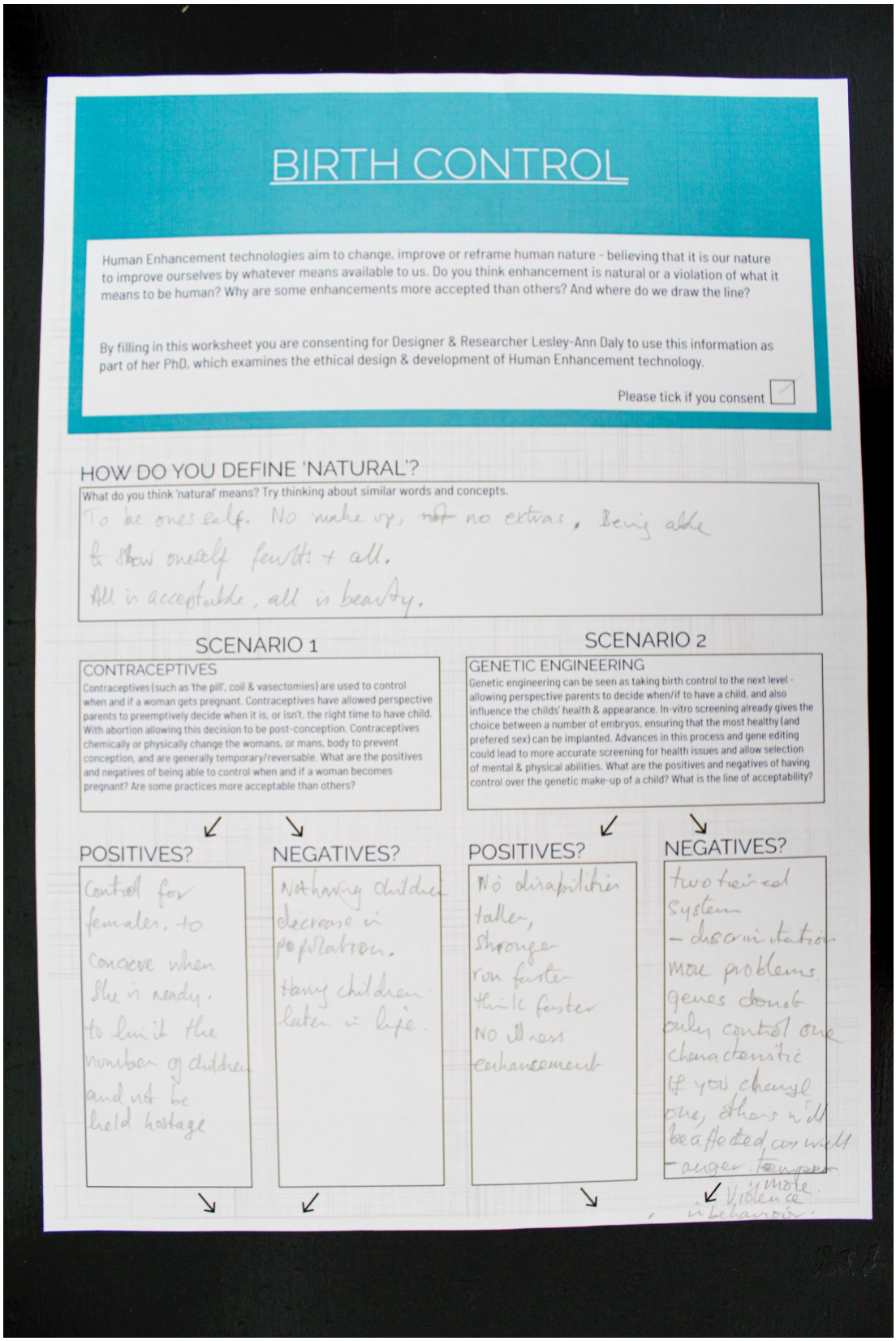


Figure 193 Birth Control Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

To be ones self. No make up, ~~not~~ no extras, Being able to show oneself faults + all.
All is acceptable, all is beauty.

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

Control for females. to conceive when she is ready. to limit the number of children and not be held hostage

NEGATIVES?

Not having children decrease in population. Having children later in life.

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

No disabilities taller, shrouger run faster think faster No illness enhancement

NEGATIVES?

two tiered system - discrimination more problems genes donot only control one characteristic If you change one, others will be affected as well - anger: temper more. Violence in behaviour.

Figure 194 Birth Control Worksheet - Filled In, 2019.

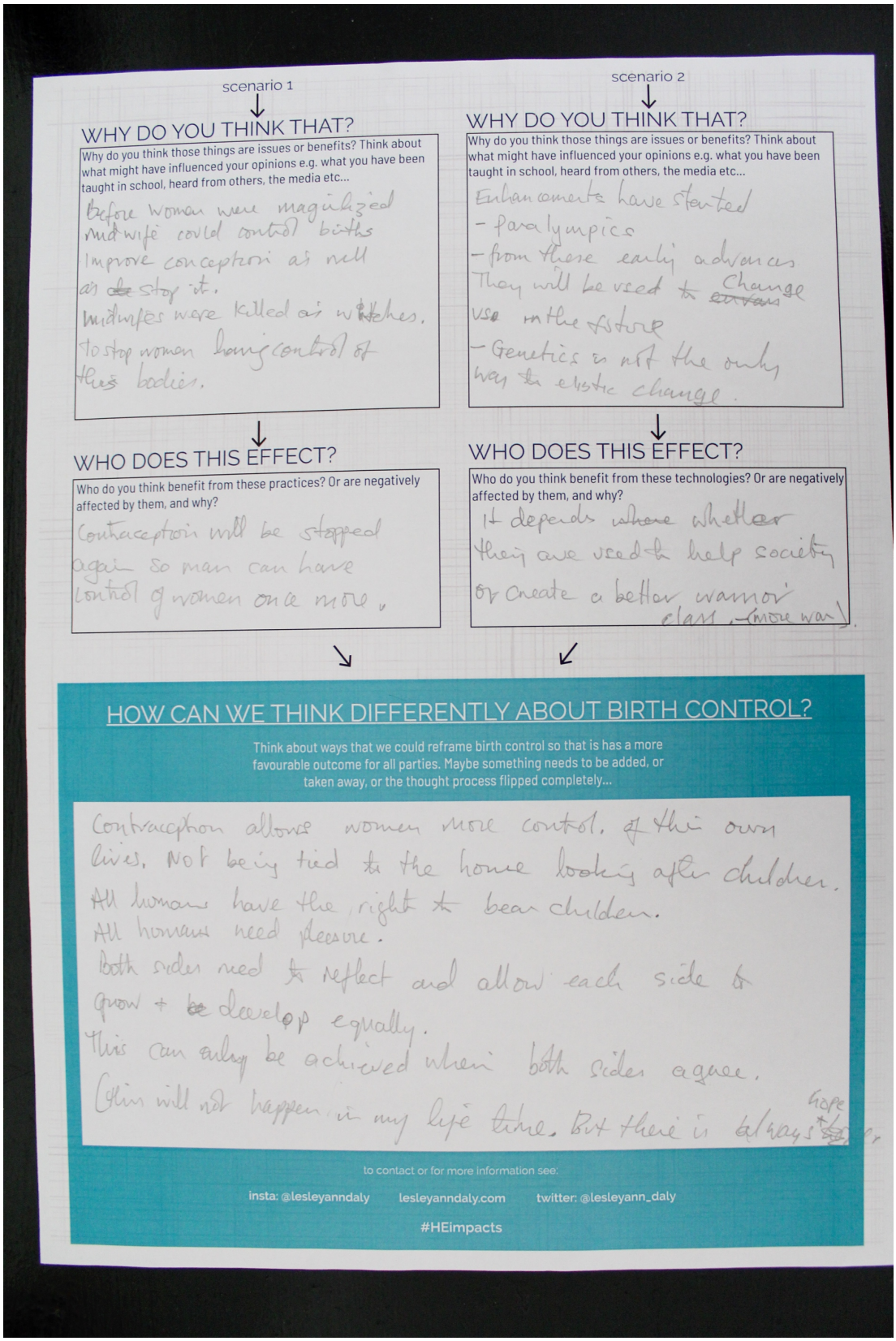
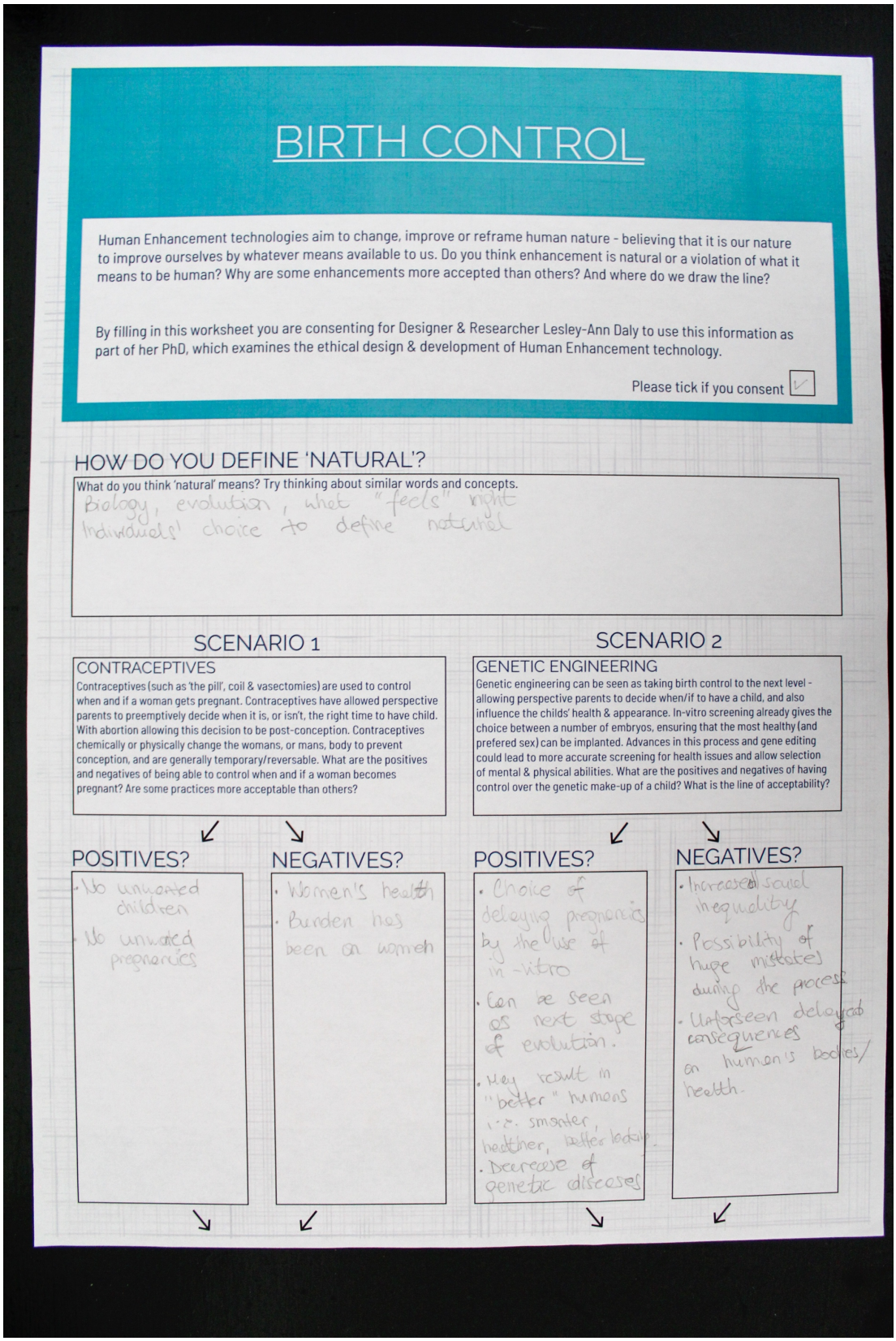


Figure 195 Birth Control Worksheet - Filled In, 2019.



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Please tick if you consent ✓

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Biology, evolution, what "feels" right
Individuals' choice to define natural

SCENARIO 1

CONTRACEPTIVES

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POSITIVES?

- No unwanted children
- No unwated pregnancies

NEGATIVES?

- Women's health
- Burden has been on women

SCENARIO 2

GENETIC ENGINEERING

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POSITIVES?

- Choice of delaying pregnancies by the use of in-vitro
- Can be seen as next stage of evolution.
- May result in "better" humans i.e. smarter, healther, better looking
- Decrease of genetic diseases

NEGATIVES?

- Increased social inequality
- Possibility of huge mistakes during the process
- Unforseen delayed consequences on human's bodies/ health.

Figure 196 Birth Control Worksheet - Filled In, 2019.

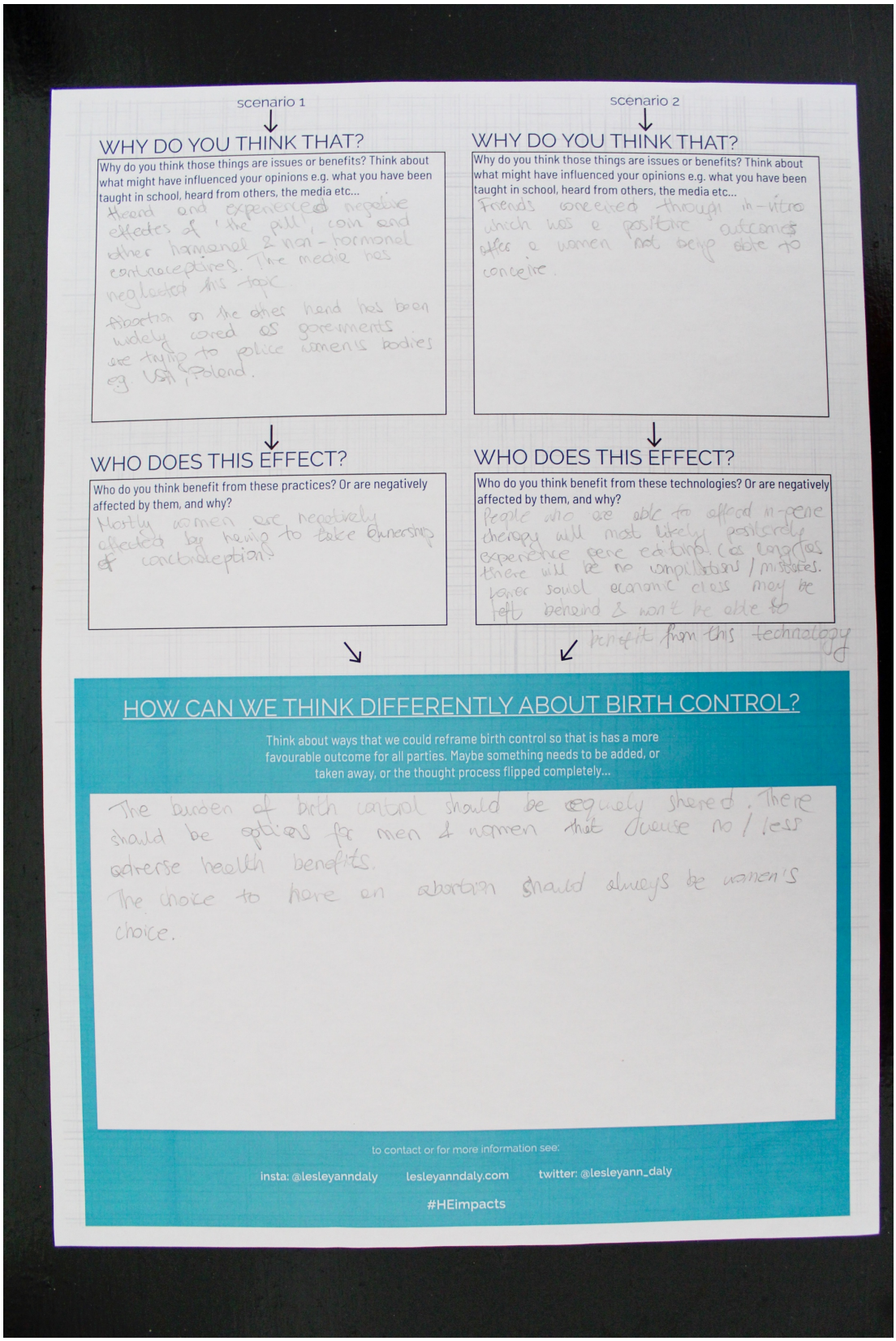
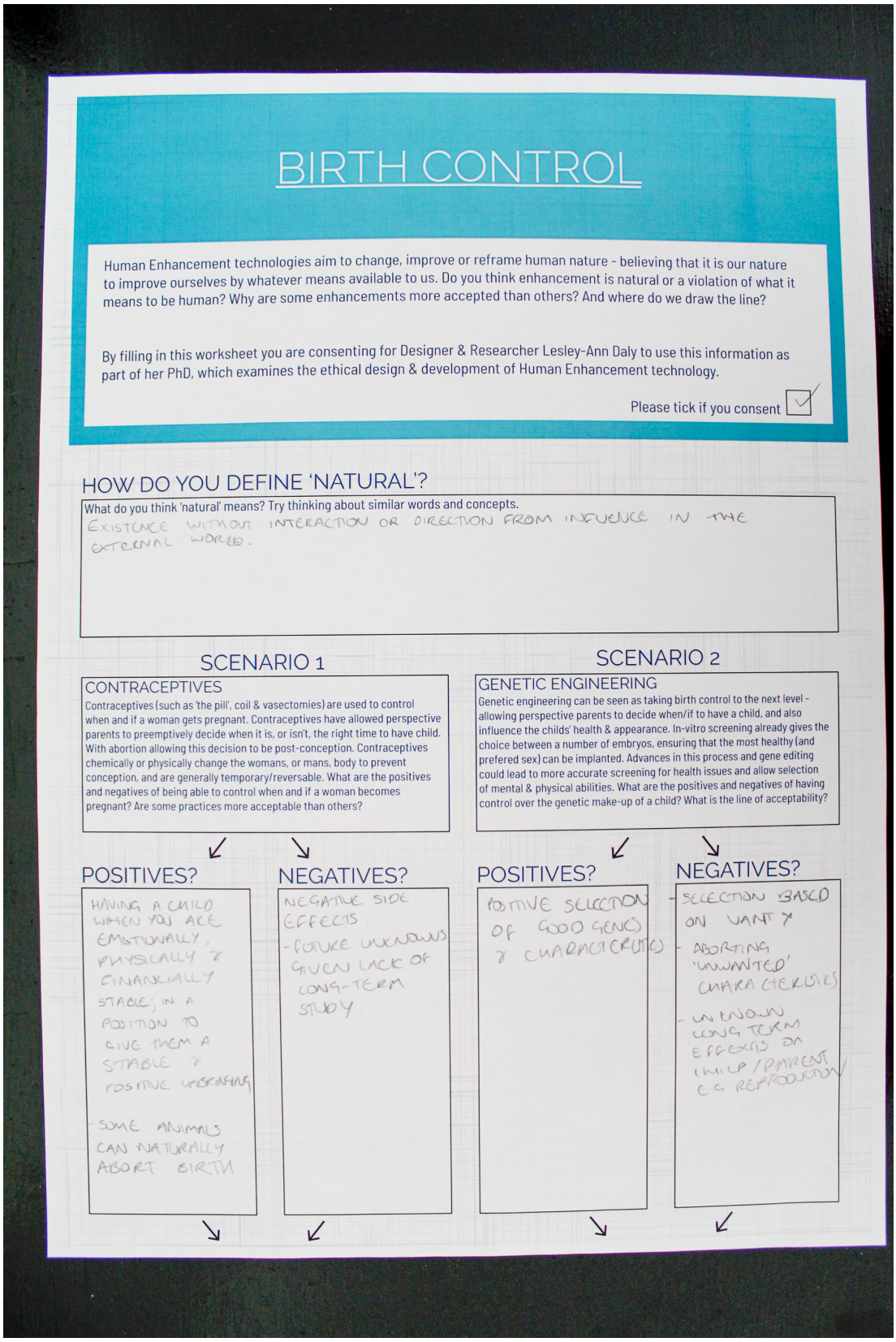


Figure 197 Birth Control Worksheet - Filled In, 2019.



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HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

EXISTENCE WITHOUT INTERACTION OR DIRECTION FROM INFLUENCE IN THE EXTERNAL WORLD.

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

HAVING A CHILD WHEN YOU ARE EMOTIONALLY, PHYSICALLY & FINANCIALLY STABLE; IN A POSITION TO GIVE THEM A STABLE & POSITIVE UPBRINGING

- SOME ANIMALS CAN NATURALLY ABORT BIRTH

NEGATIVES?

NEGATIVE SIDE EFFECTS

- FUTURE UNKNOWNS GIVEN LACK OF LONG-TERM STUDY

SCENARIO 2

GENETIC ENGINEERING

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POSITIVES?

POSITIVE SELECTION OF GOOD GENES & CHARACTERISTICS

NEGATIVES?

- SELECTION BASED ON VANITY
- ABORTING 'UNWANTED' CHARACTERISTICS
- UNKNOWN LONG TERM EFFECTS ON CHILD / PARENT E.G. REPRODUCTION

Figure 198 Birth Control Worksheet - Filled In, 2019.

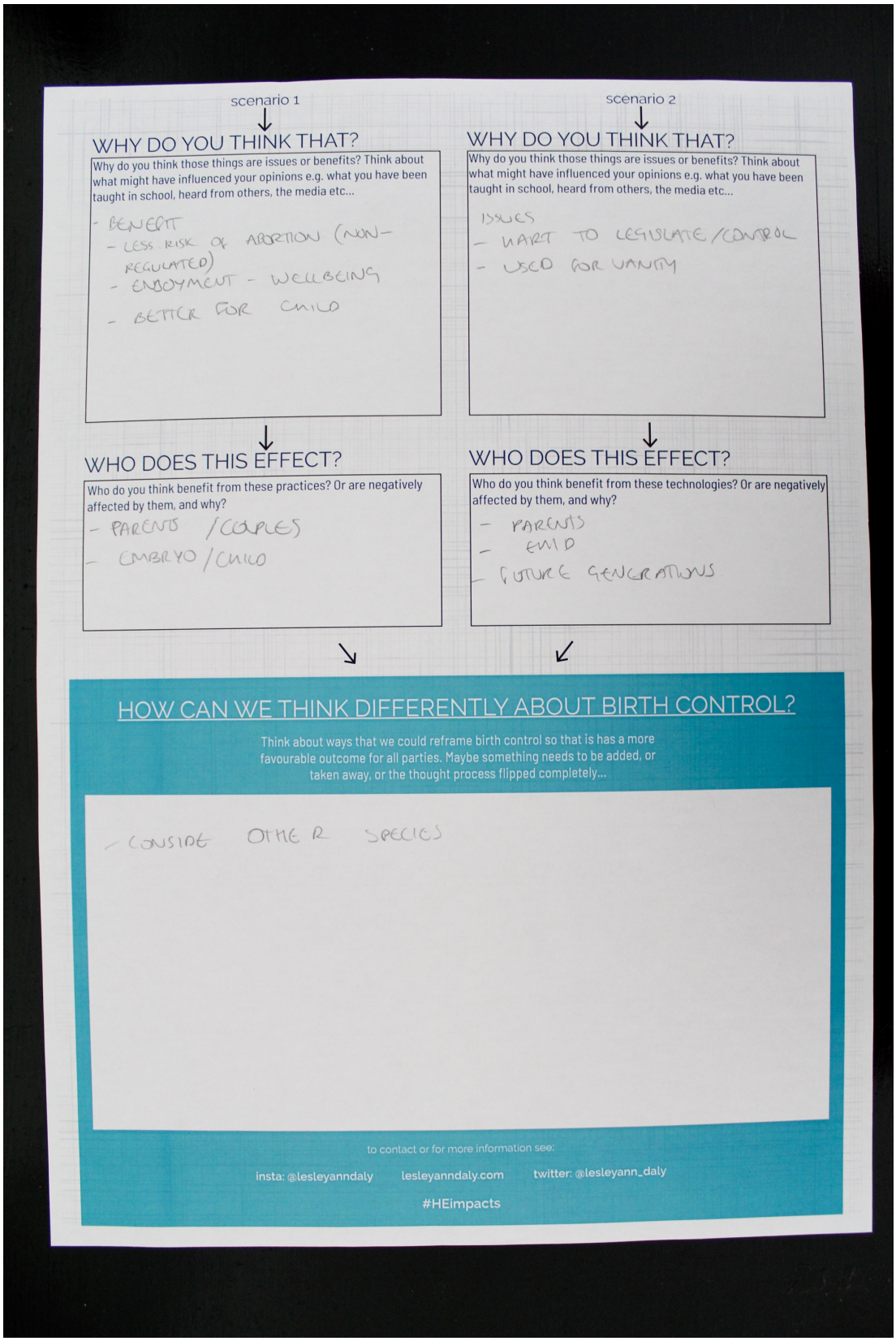
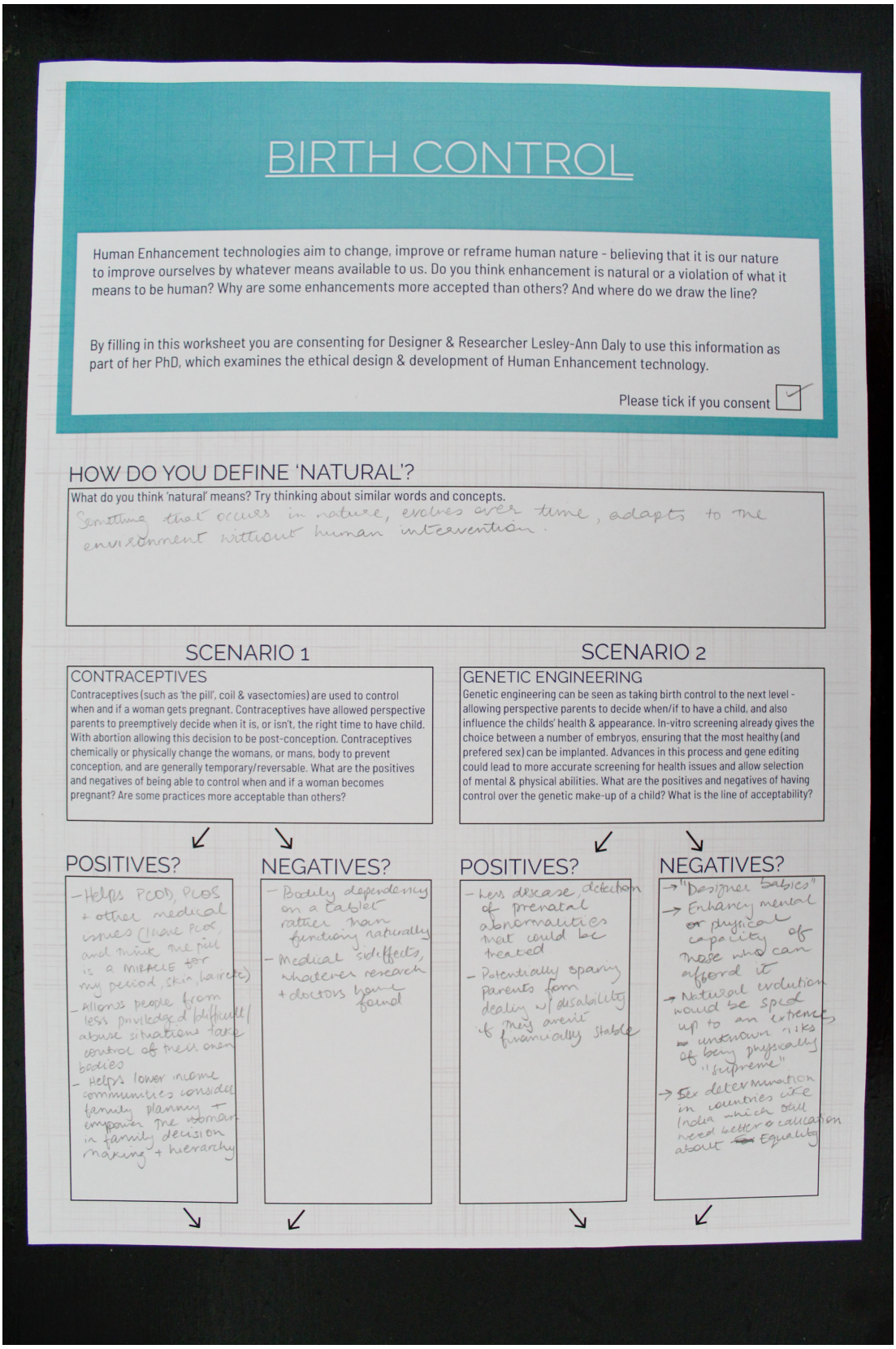


Figure 199 Birth Control Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Something that occurs in nature, evolves over time, adapts to the environment without human intervention.

SCENARIO 1

CONTRACEPTIVES

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POSITIVES?

- Helps PCOD, PCOS + other medical issues (have PCOS and think the pill is a MIRACLE for my period, skin, hair etc)
- Allows people from less privileged/difficult/abuse situations take control of their own bodies
- Helps lower income communities consider family planning + empowers the woman in family decision making + hierarchy

NEGATIVES?

- Bodily dependency on a tablet rather than functioning naturally
- Medical side effects, whatever research + doctors have found

SCENARIO 2

GENETIC ENGINEERING

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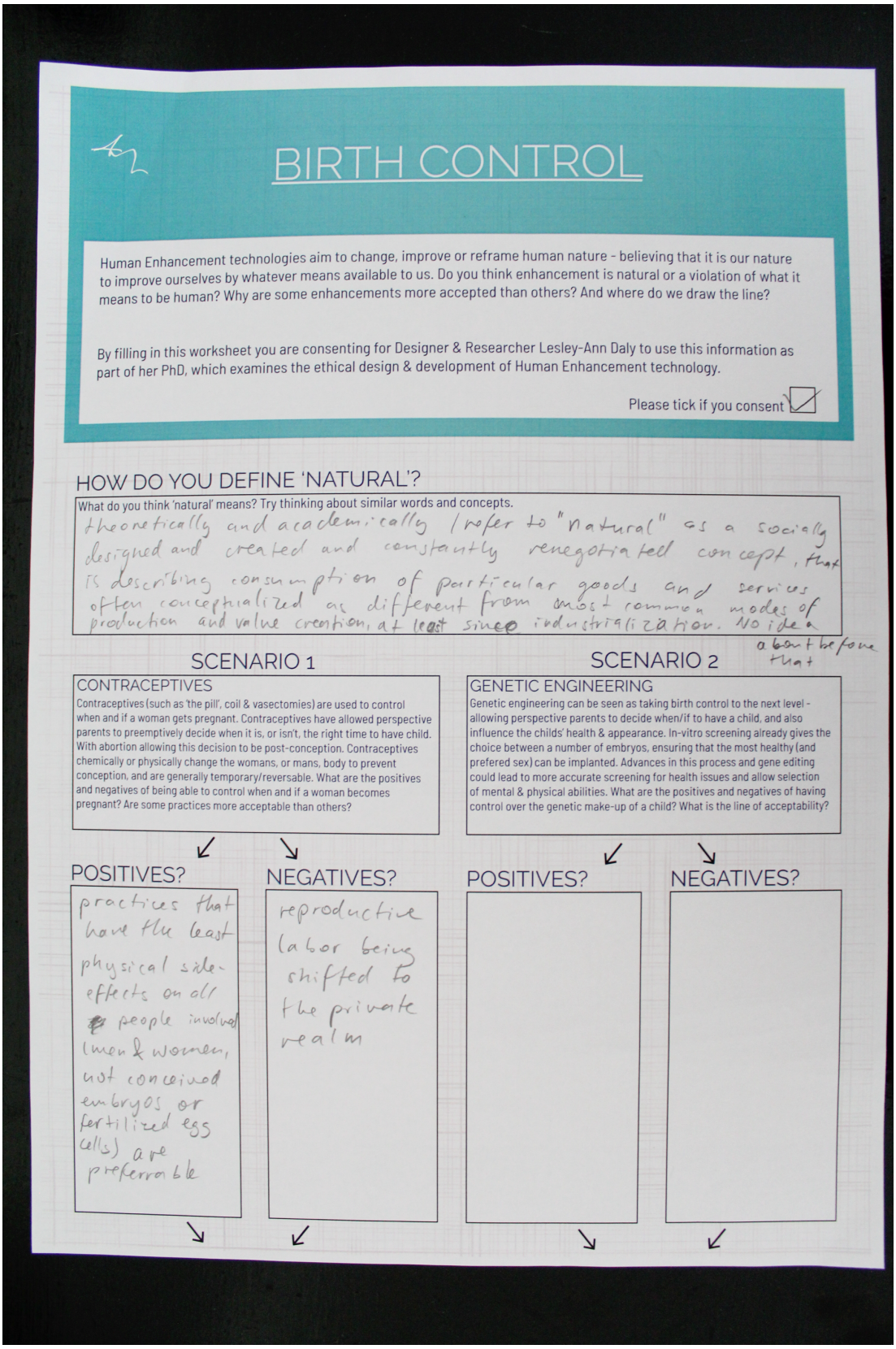
POSITIVES?

- Less disease, detection of prenatal abnormalities that could be treated
- Potentially sparing parents from dealing w/ disability if they aren't financially stable

NEGATIVES?

- → "Designer babies"
- → Enhancing mental or physical capacity of those who can afford it
- → Natural evolution would be sped up to an extent ∞ unknown risks of being physically "supreme"
- → Sex determination in countries like India which still need better education about ~~sex~~ Equality

Figure 200 Birth Control Worksheet - Filled In, 2019.



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HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

theoretically and academically I refer to "natural" as a socially designed and created and constantly renegotiated concept, that is describing consumption of particular goods and services often conceptualized as different from most common modes of production and value creation, at least since industrialization. No idea about before that

SCENARIO 1

CONTRACEPTIVES

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POSITIVES?

practices that have the least physical side-effects on all people involved (men & women, not conceived embryos or fertilized egg cells) are preferrable

NEGATIVES?

reproductive labor being shifted to the private realm

SCENARIO 2

GENETIC ENGINEERING

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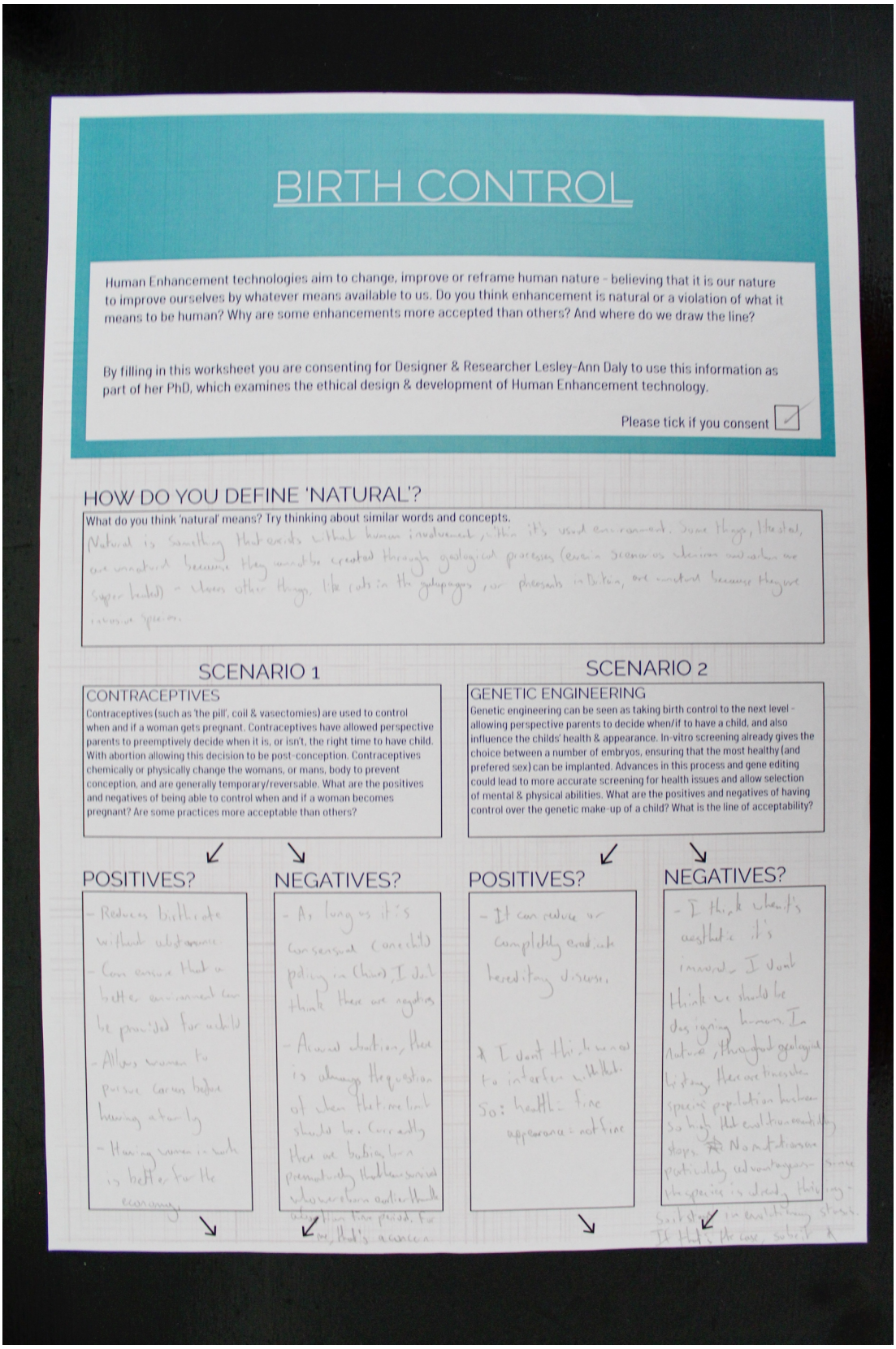
POSITIVES?

NEGATIVES?

Figure 201 Birth Control Worksheet - Filled In, 2019.



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HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Natural is something that exists without human involvement, within it's used environment. Some things, like tool, are unnatural because they must be created through geological processes (even in scenarios wherein evolution are super fasted) - where other things, like rats in the galapagos, our pheasants in Britain, are unnatural because they are invasive species.

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

- Reduces birthrate without abstinence
- Can ensure that a better environment can be provided for child
- Allows women to pursue careers before having a family
- Having women in work is better for the economy

NEGATIVES?

- As long as it's consensual (one child) policy in China, I don't think there are negatives
- Around abortion, there is always the question of when that time limit should be. Currently there are babies born prematurely that have survived outside the womb at 21 weeks, that's a week a

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

- It can reduce or completely eradicate hereditary diseases.

* I don't think I want to interfere with that. So: health = fine appearance = not fine

NEGATIVES?

- I think what's aesthetic it's invasive - I don't think we should be designing humans. In nature, throughout geological history, there are times when species population has so high that evolution essentially stops. ☆ No mutations are positively advantageous - since the species is already thriving. Such changes in evolutionary stasis. If that's the case, subject ☆

Figure 202 Birth Control Worksheet - Filled In, 2019.

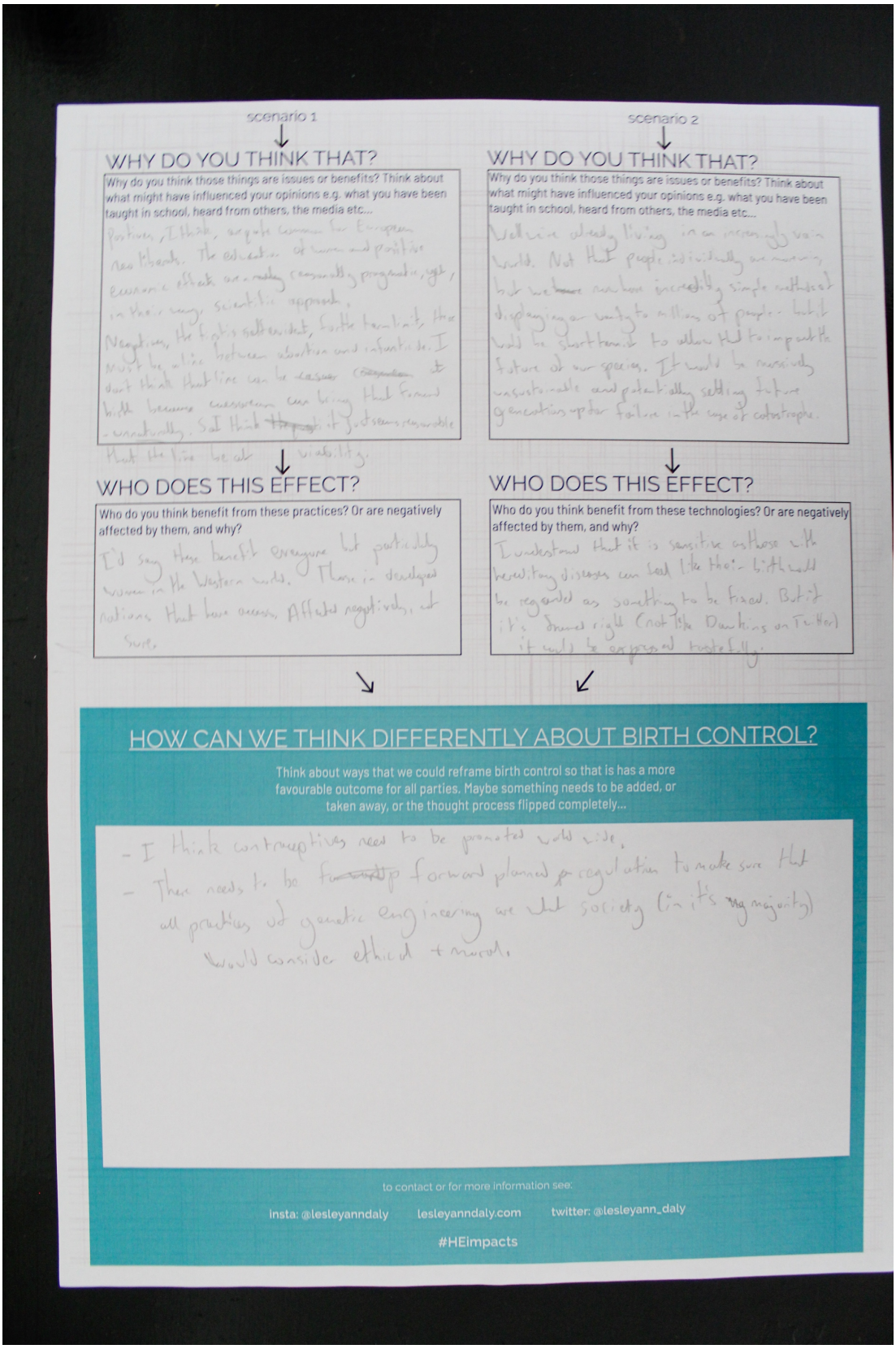
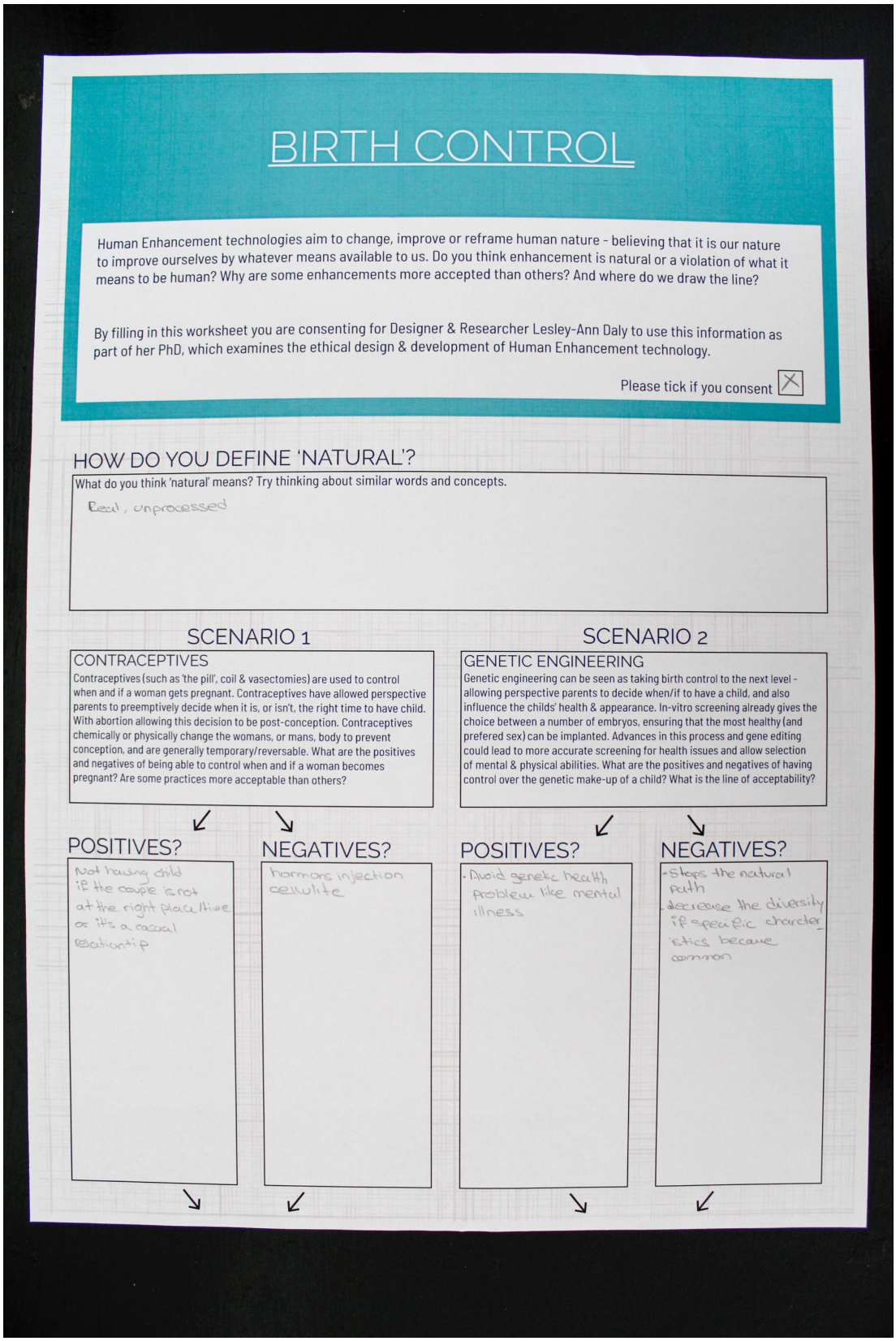


Figure 203 Birth Control Worksheet - Filled In, 2019.



BIRTH CONTROL

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☒

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Real, unprocessed

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

Not having child if the couple is not at the right place/time or it's a casual relationship

NEGATIVES?

hormons injection
cellulite

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

- Avoid genetic health problems like mental illness

NEGATIVES?

- Stops the natural path
- decrease the diversity if specific character
- ethics because common

Figure 204 Birth Control Worksheet - Filled In, 2019.

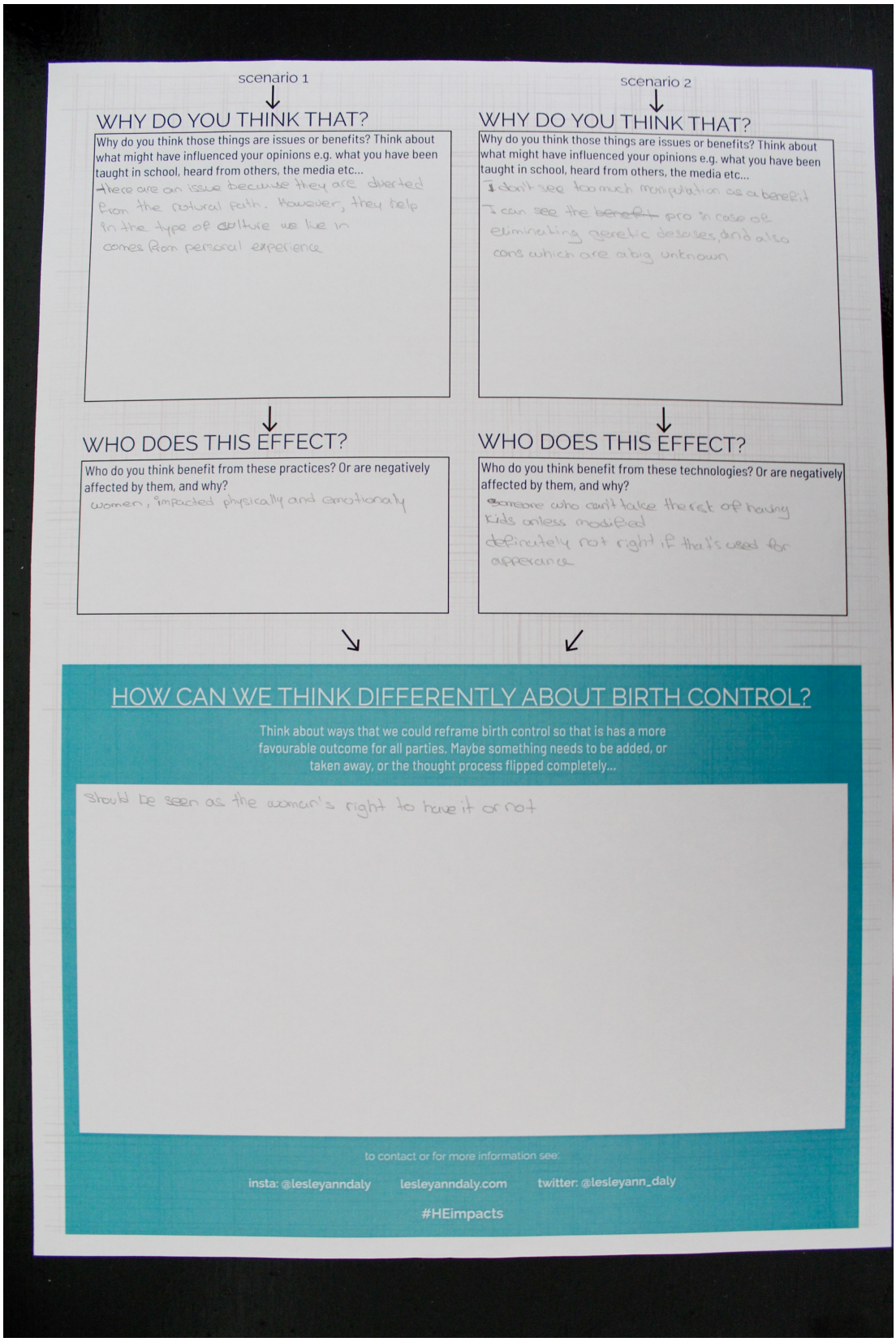


Figure 205 Birth Control Worksheet - Filled In, 2019.

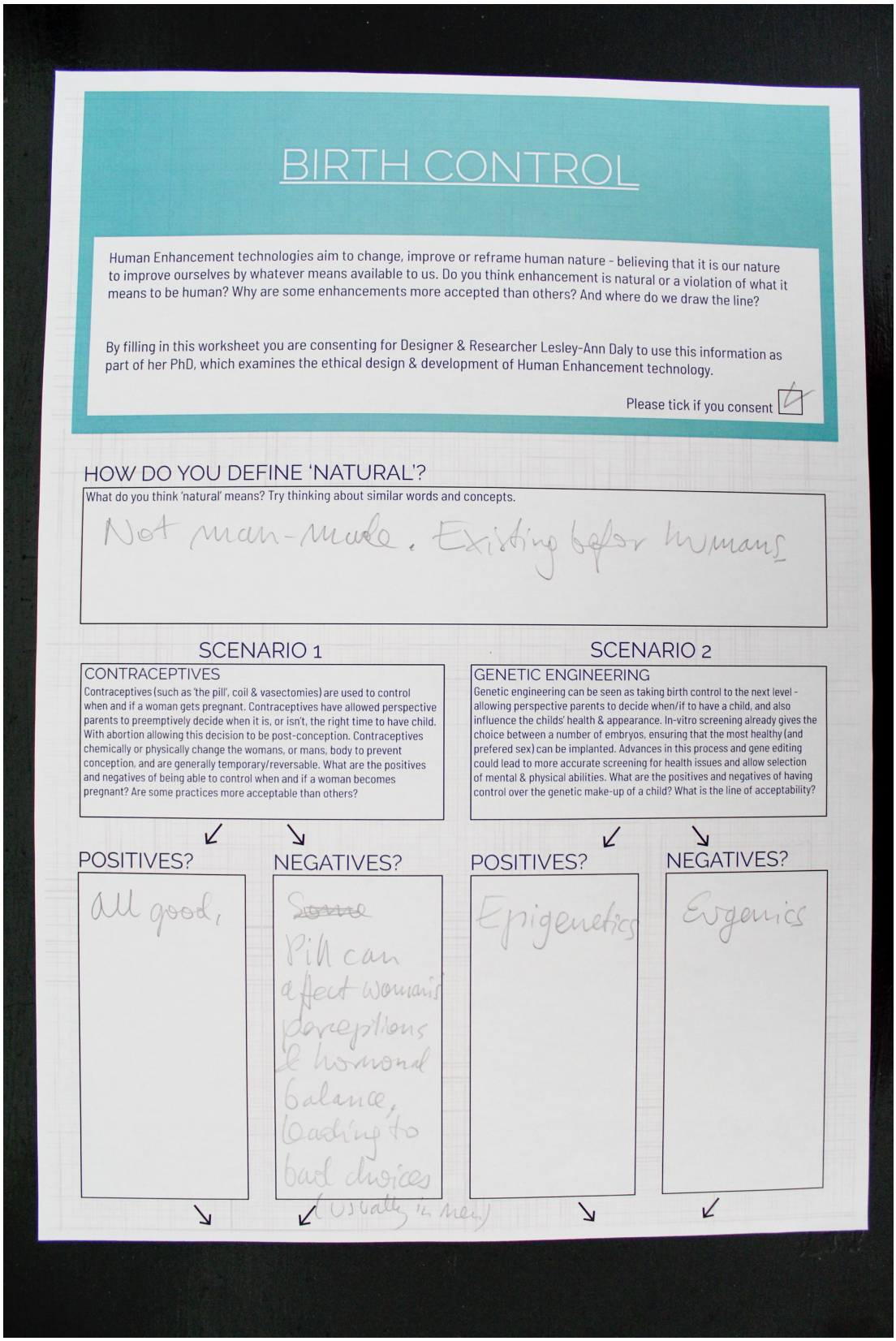


Figure 206 Birth Control Worksheet - Filled In, 2019.

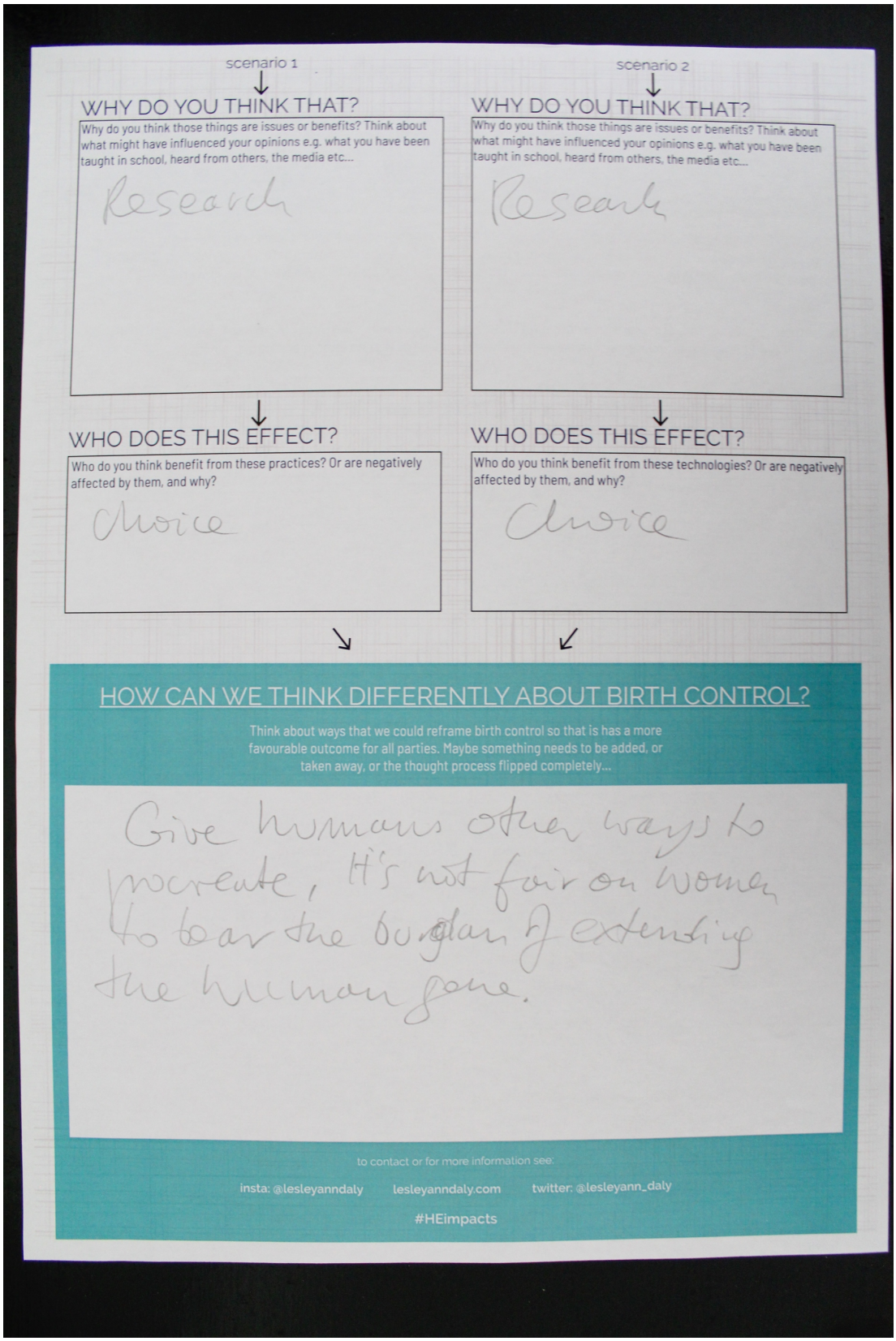


Figure 207 Birth Control Worksheet - Filled In, 2019.

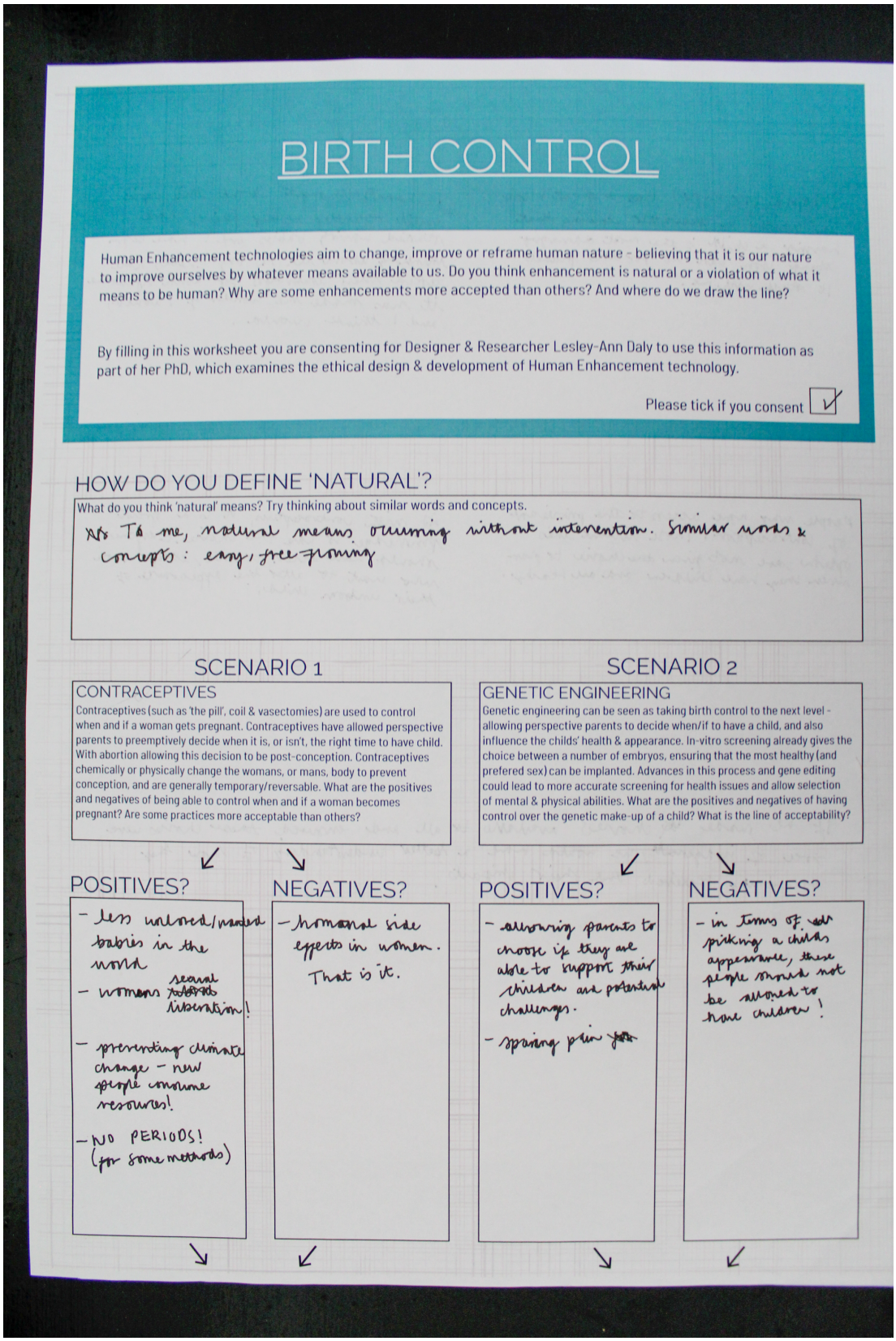
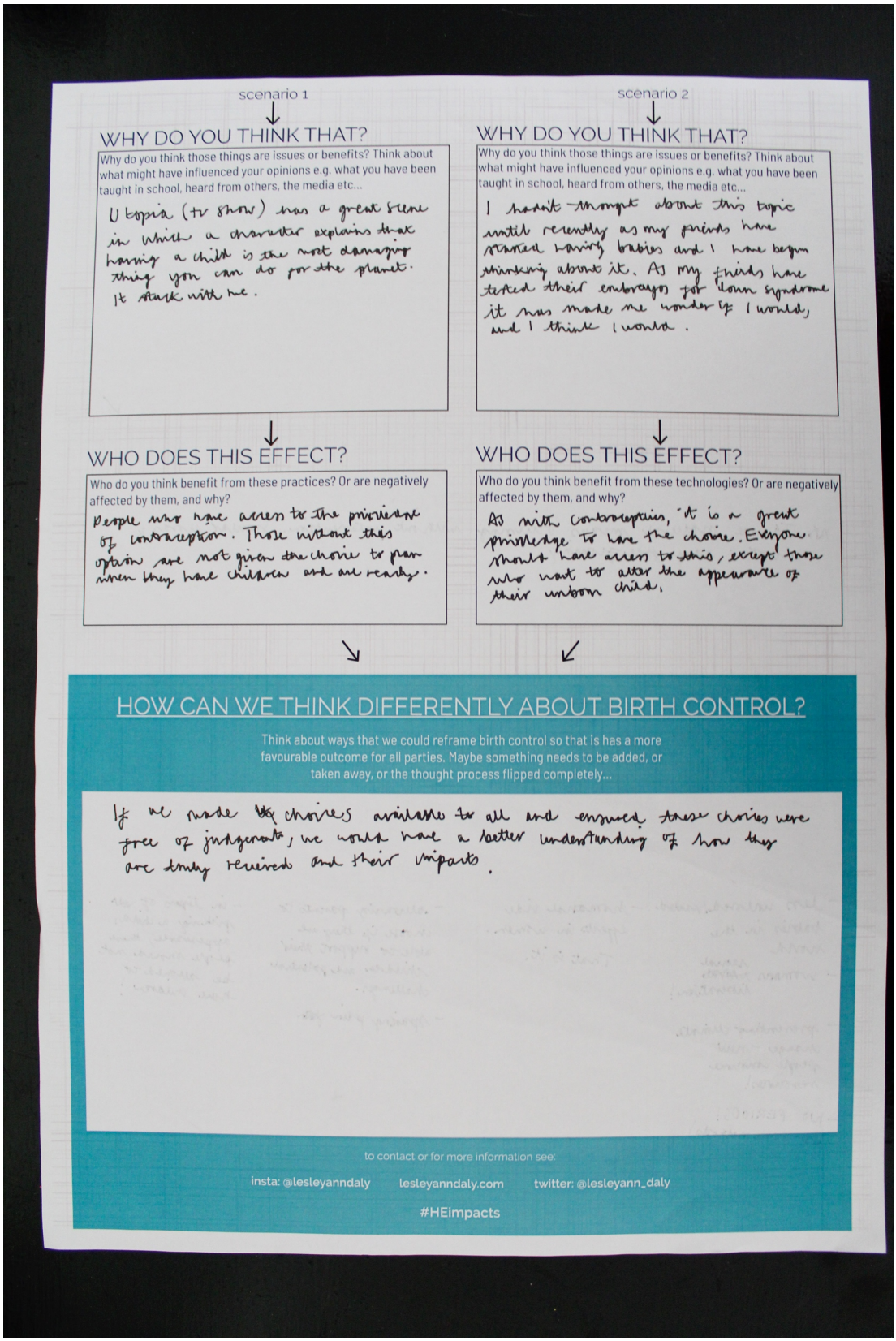


Figure 208 Birth Control Worksheet - Filled In, 2019.



scenario 1

WHY DO YOU THINK THAT?

Why do you think those things are issues or benefits? Think about what might have influenced your opinions e.g. what you have been taught in school, heard from others, the media etc...

Utopia (tv show) has a great scene in which a character explains that having a child is the most damaging thing you can do for the planet. It stuck with me.

WHO DOES THIS EFFECT?

Who do you think benefit from these practices? Or are negatively affected by them, and why?

People who have access to the privilege of contraception. Those without this option are not given the choice to plan when they have children and are ready.

scenario 2

WHY DO YOU THINK THAT?

Why do you think those things are issues or benefits? Think about what might have influenced your opinions e.g. what you have been taught in school, heard from others, the media etc...

I hadn't thought about this topic until recently as my friends have started having babies and I have begun thinking about it. As my friends have tested their embryos for down syndrome it has made me wonder if I would, and I think I would.

WHO DOES THIS EFFECT?

Who do you think benefit from these technologies? Or are negatively affected by them, and why?

As with contraception, it is a great privilege to have the choice. Everyone should have access to this, except those who want to alter the appearance of their unborn child.

HOW CAN WE THINK DIFFERENTLY ABOUT BIRTH CONTROL?

Think about ways that we could reframe birth control so that is has a more favourable outcome for all parties. Maybe something needs to be added, or taken away, or the thought process flipped completely...

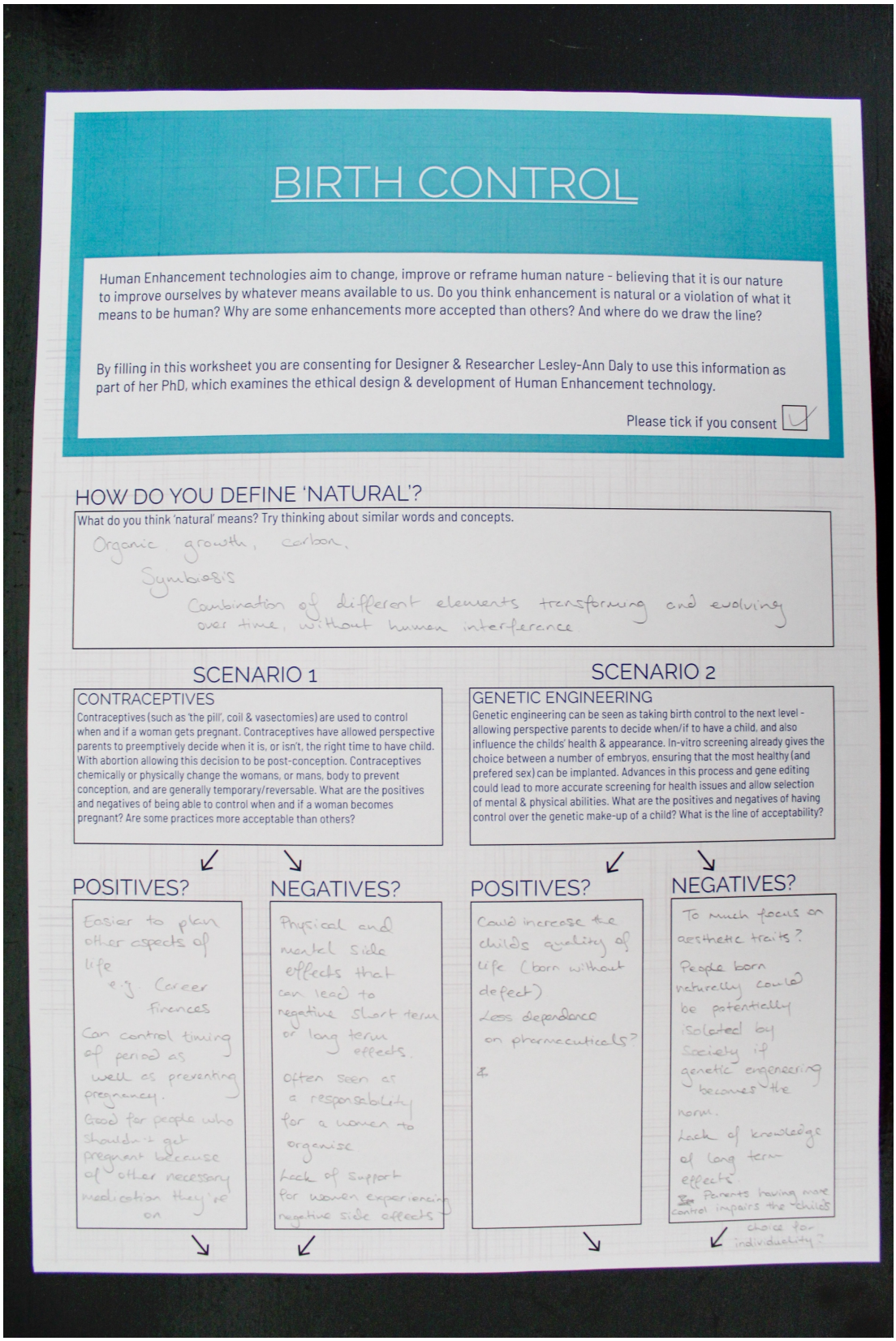
If we made the choices available to all and ensured these choices were free of judgement, we would have a better understanding of how they are truly received and their impacts.

to contact or for more information see:

insta: @lesleyanndaly lesleyanndaly.com twitter: @lesleyann_daly

#HEimpacts

Figure 209 Birth Control Worksheet - Filled In, 2019.



BIRTH CONTROL

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Organic growth, carbon, Symbiosis
Combination of different elements transforming and evolving over time, without human interferance

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

Easier to plan other aspects of life
e.g. Career
Finances
Can control timing of period as well as preventing pregnancy.
Good for people who shouldn't get pregnant because of other necessary medication they're on

NEGATIVES?

Physical and mental side effects that can lead to negative short term or long term effects.
Often seen as a responsability for a women to organise
Lack of support for women experiencing negative side effects

SCENARIO 2

GENETIC ENGINEERING

Genetic engineering can be seen as taking birth control to the next level - allowing perspective parents to decide when/if to have a child, and also influence the childs' health & appearance. In-vitro screening already gives the choice between a number of embryos, ensuring that the most healthy (and prefered sex) can be implanted. Advances in this process and gene editing could lead to more accurate screening for health issues and allow selection of mental & physical abilities. What are the positives and negatives of having control over the genetic make-up of a child? What is the line of acceptability?

POSITIVES?

Could increase the childs quality of life (born without defect)
Less dependance on pharmaceuticals?
&

NEGATIVES?

To much focus on aesthetic traits?
People born naturally could be potentially isolated by society if genetic engeneering becomes the norm.
Lack of knowledge of long term effects
Parents having more control impairs the childs choice for individuality?

Figure 210 Birth Control Worksheet - Filled In, 2019.

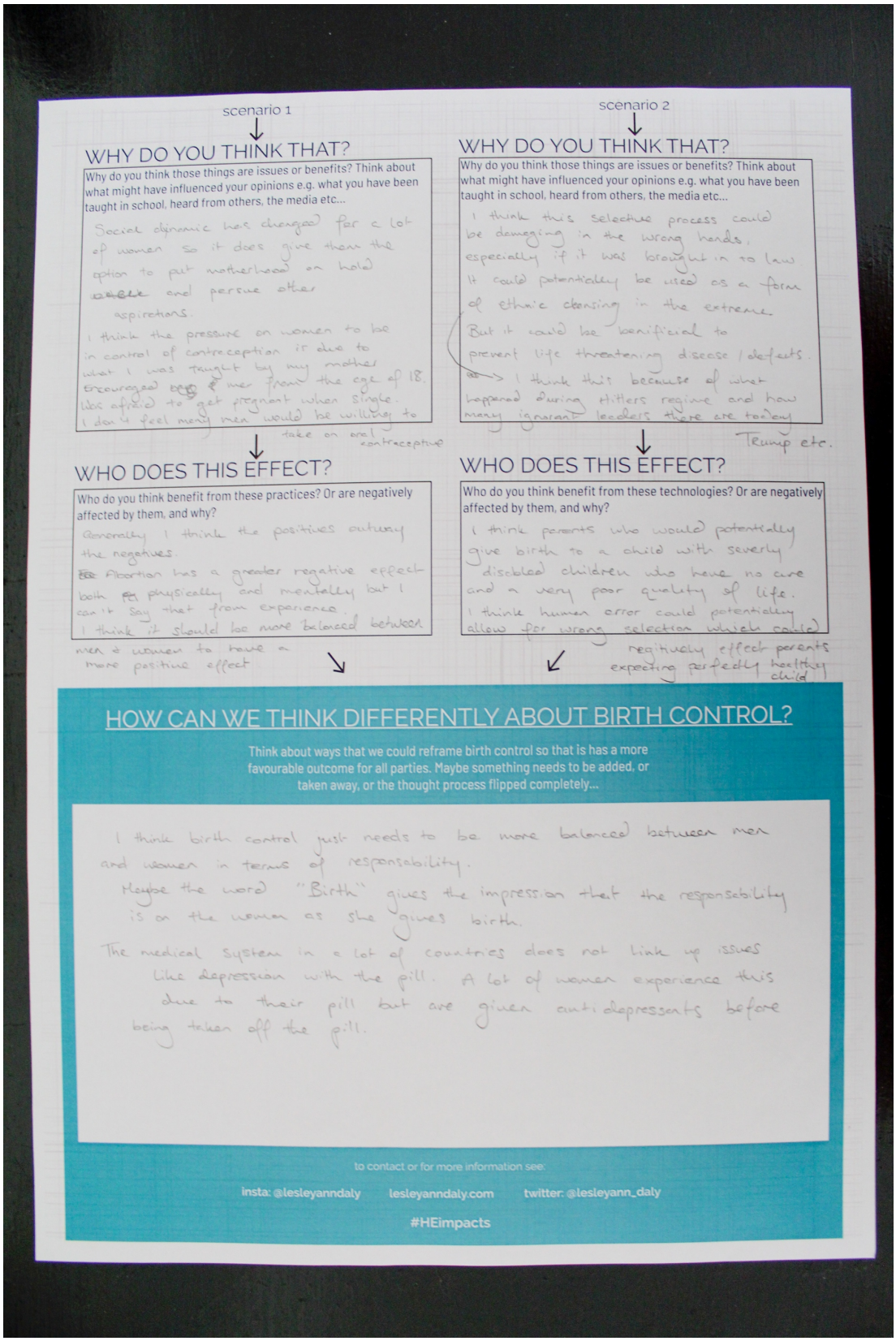


Figure 211 Birth Control Worksheet - Filled In, 2019.

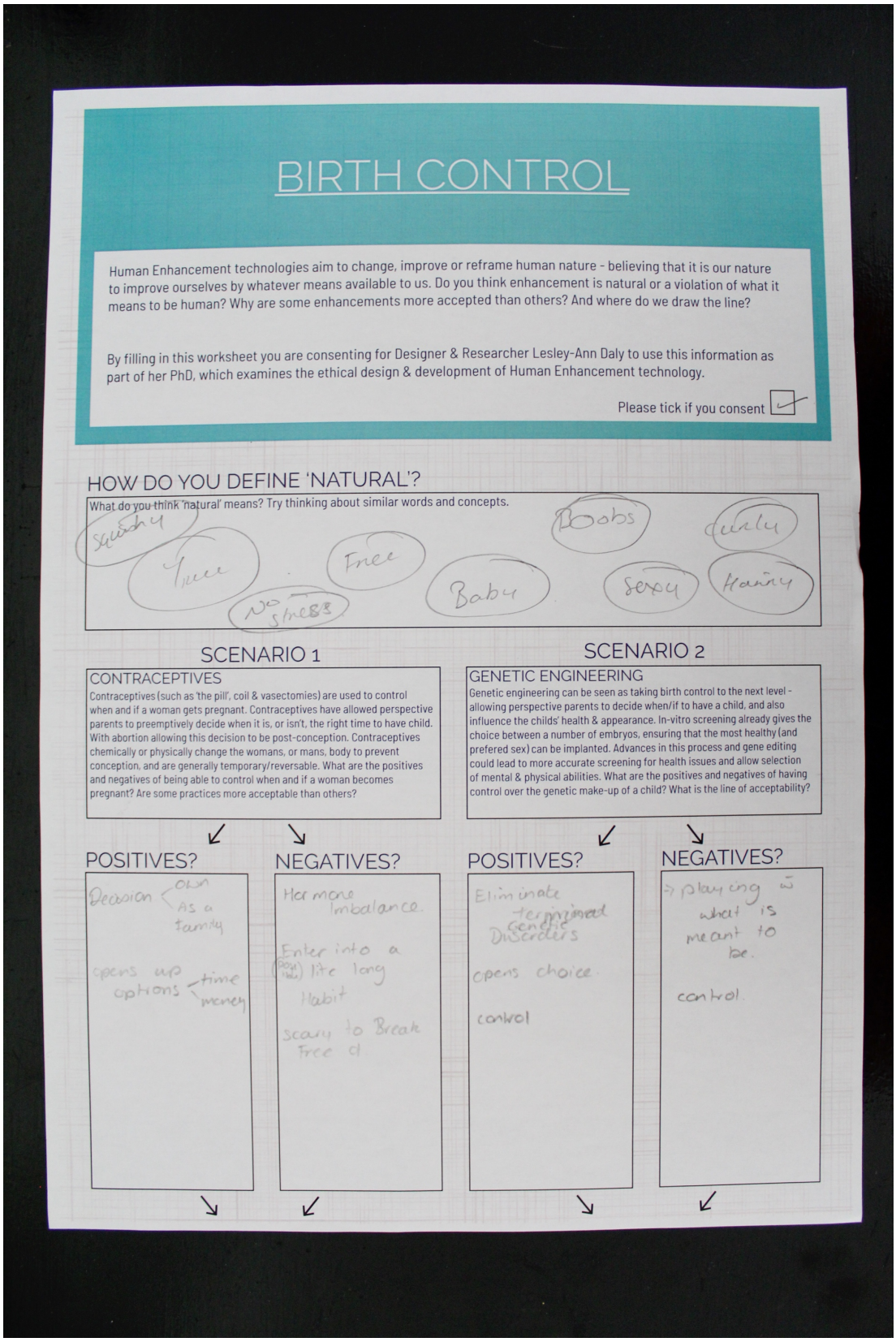


Figure 212 Birth Control Worksheet - Filled In, 2019.

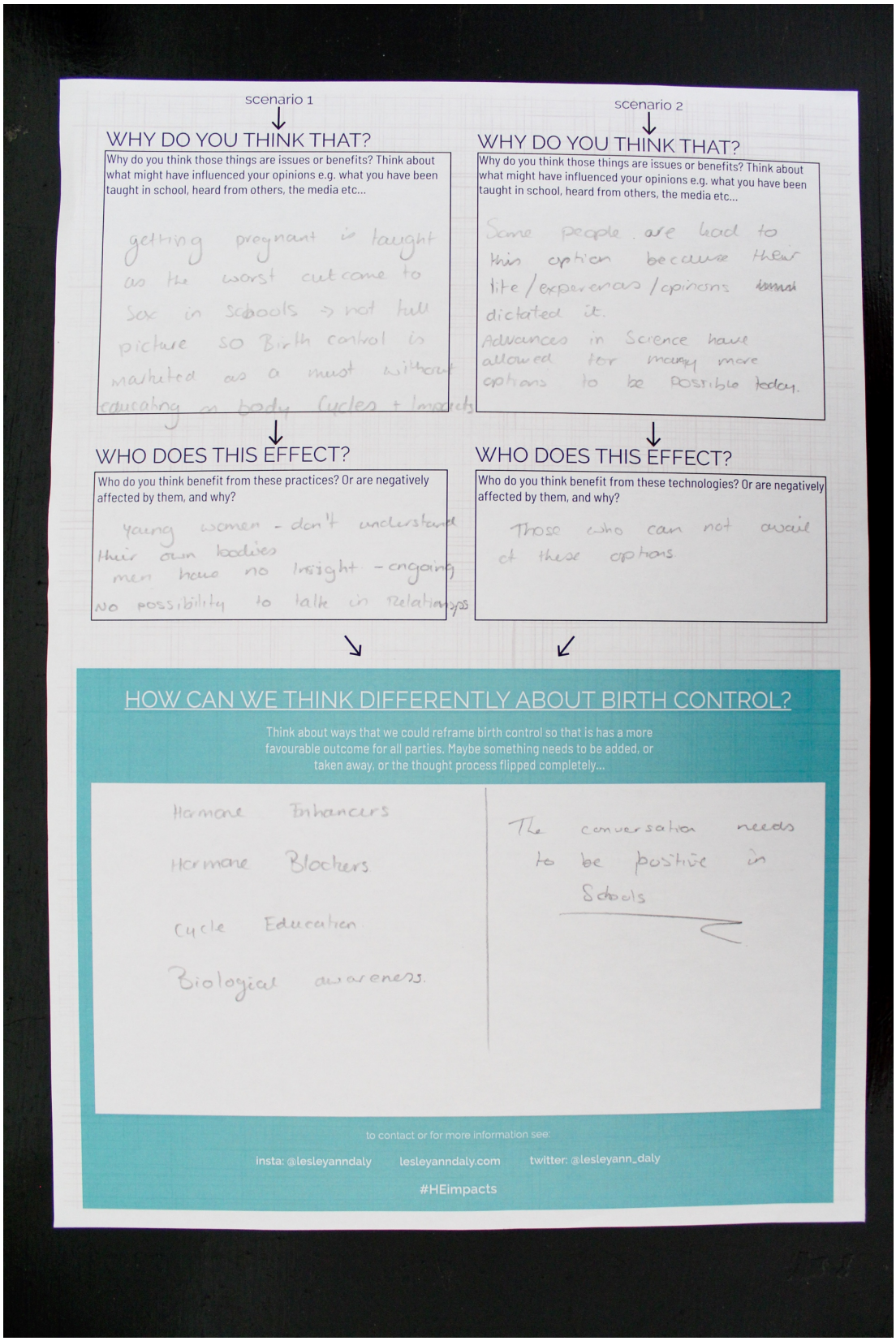


Figure 213 Birth Control Worksheet - Filled In, 2019.

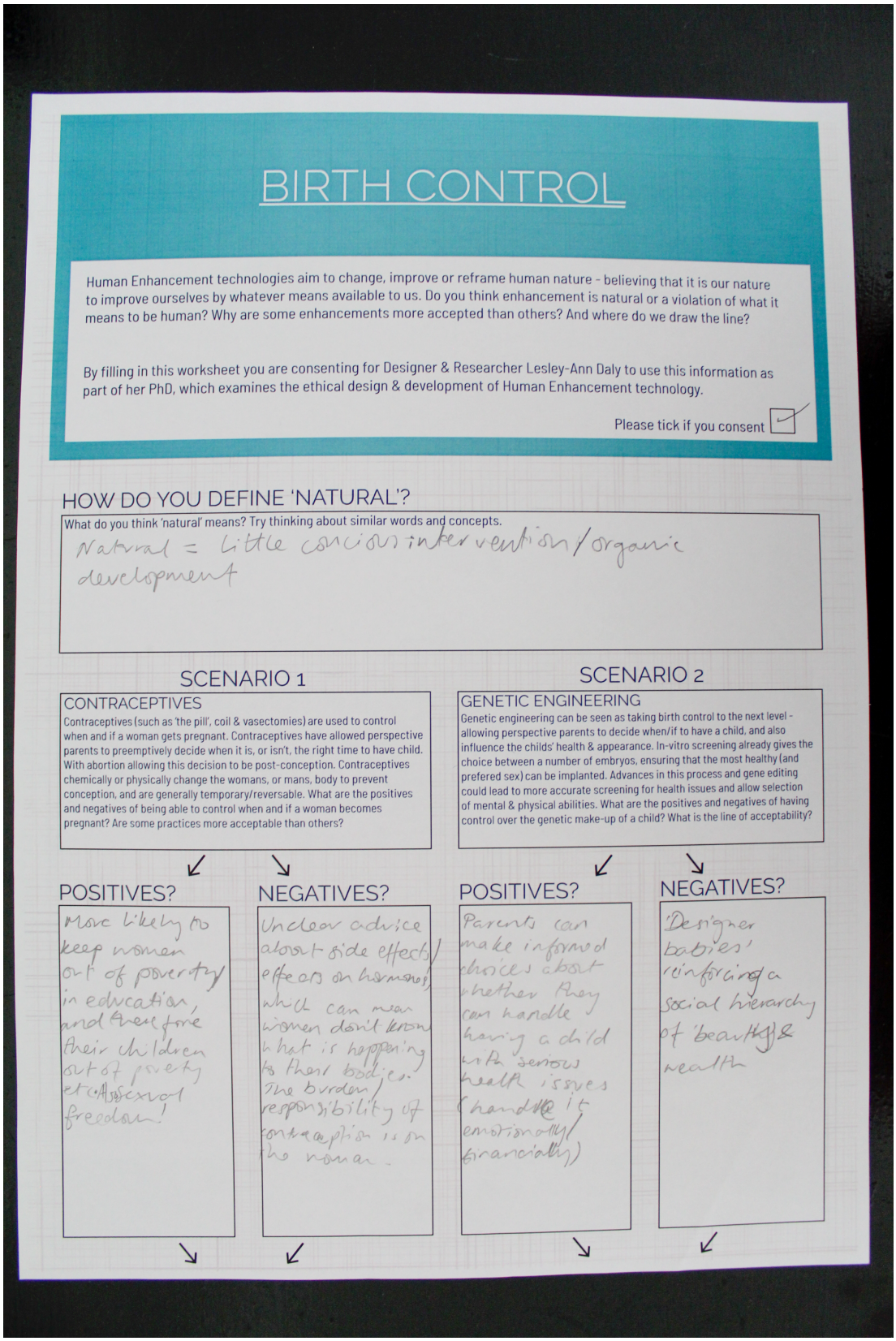


Figure 214 Birth Control Worksheet - Filled In, 2019.

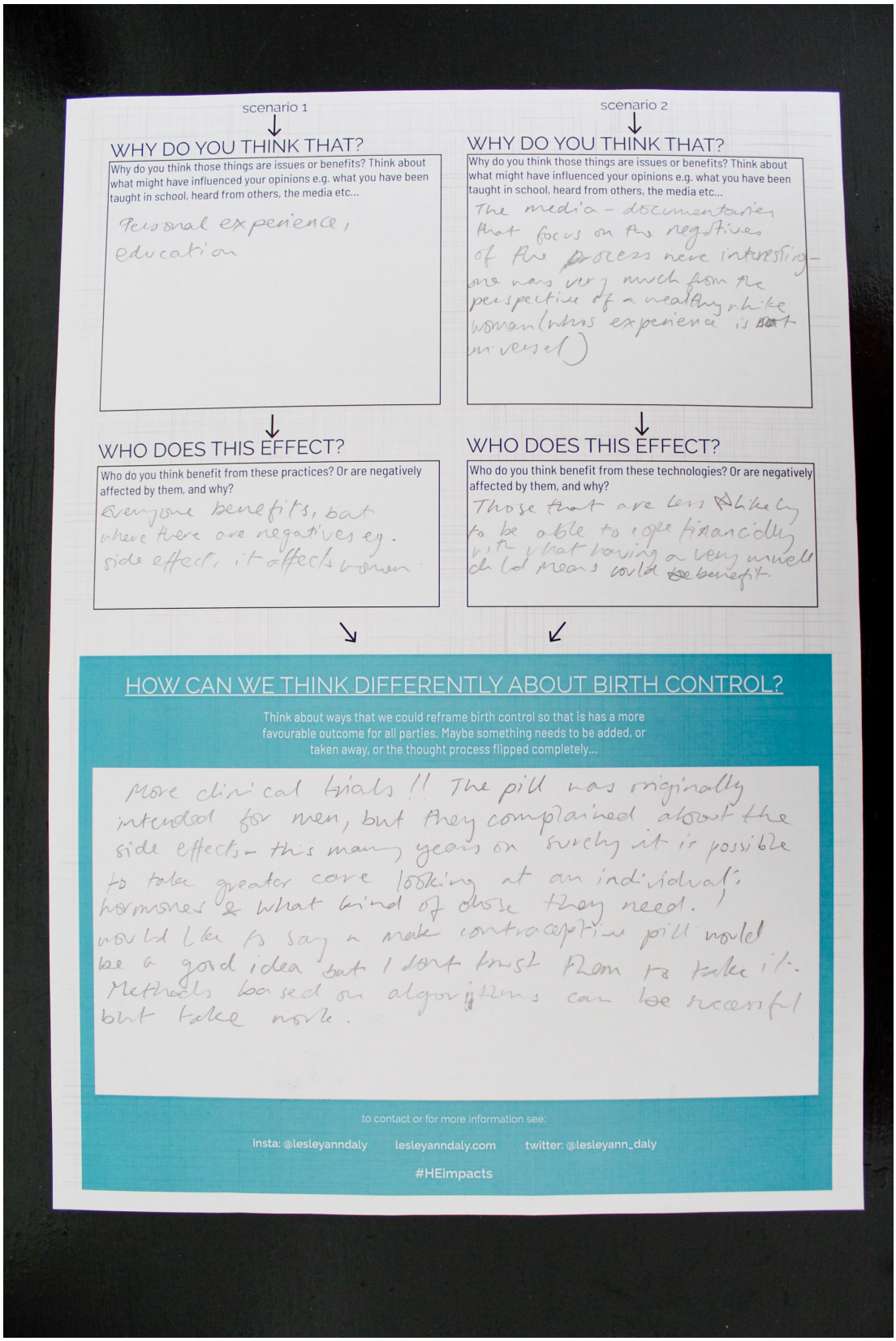


Figure 215 Birth Control Worksheet - Filled In, 2019.

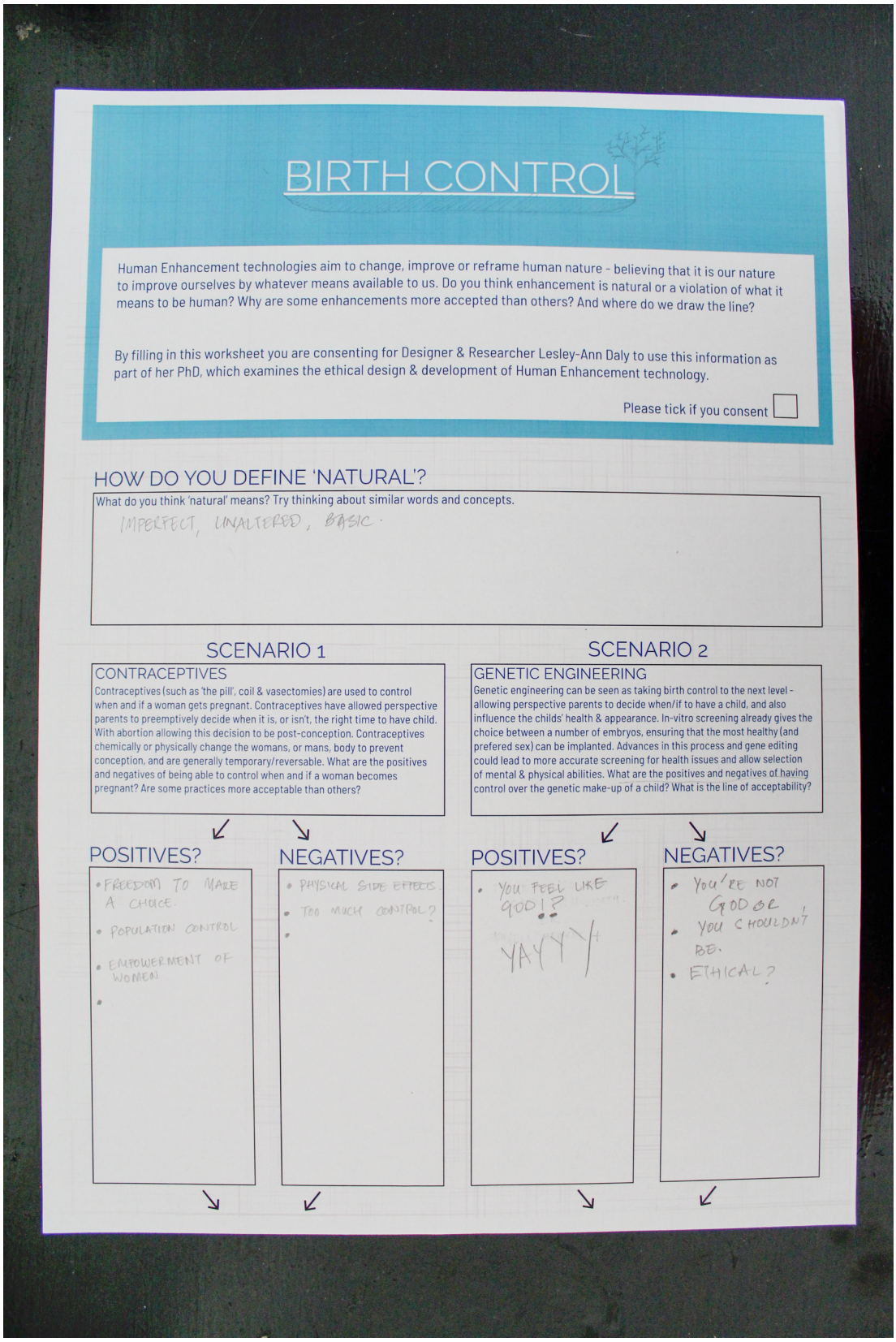


Figure 216 Birth Control Worksheet - Filled In, 2019.

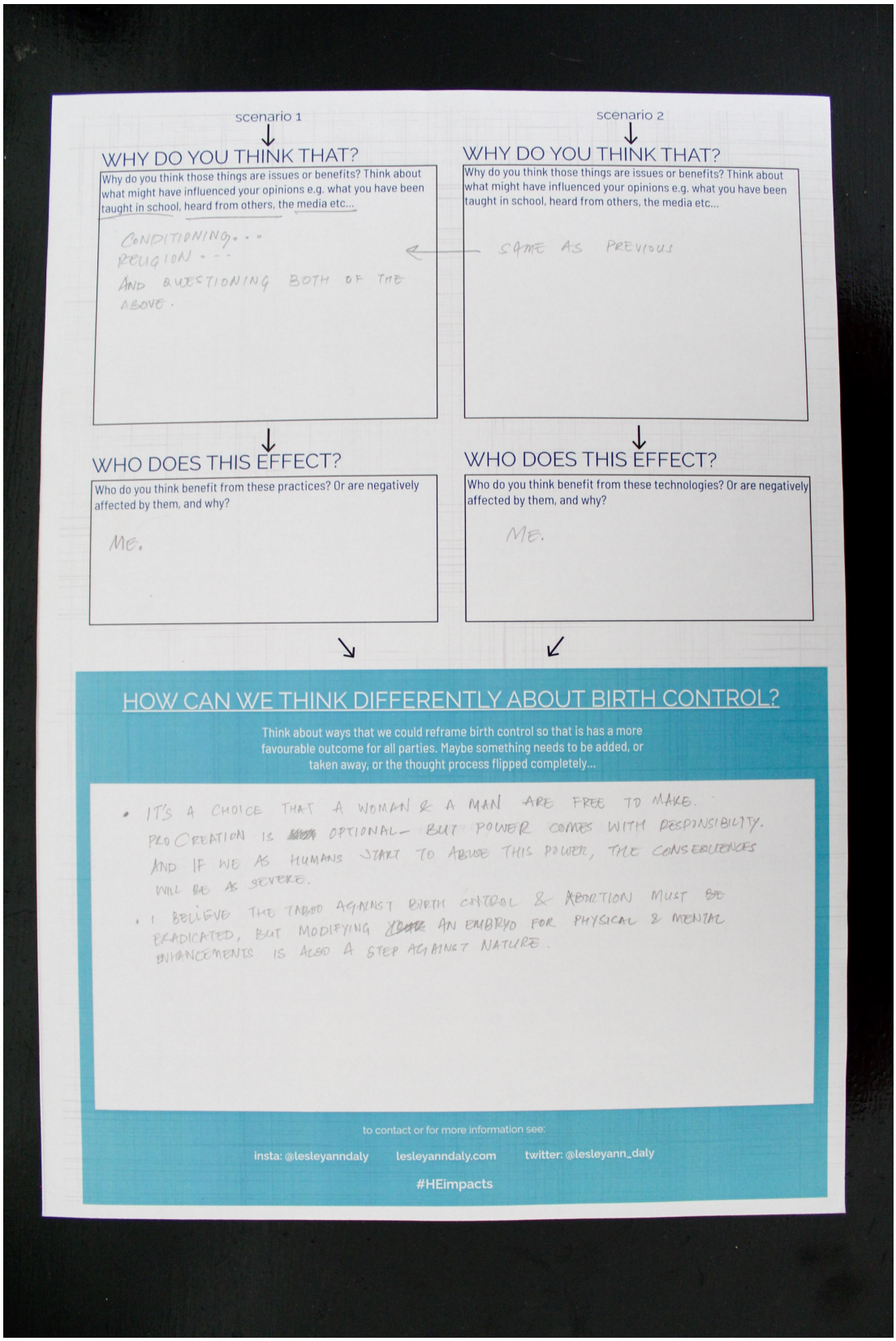
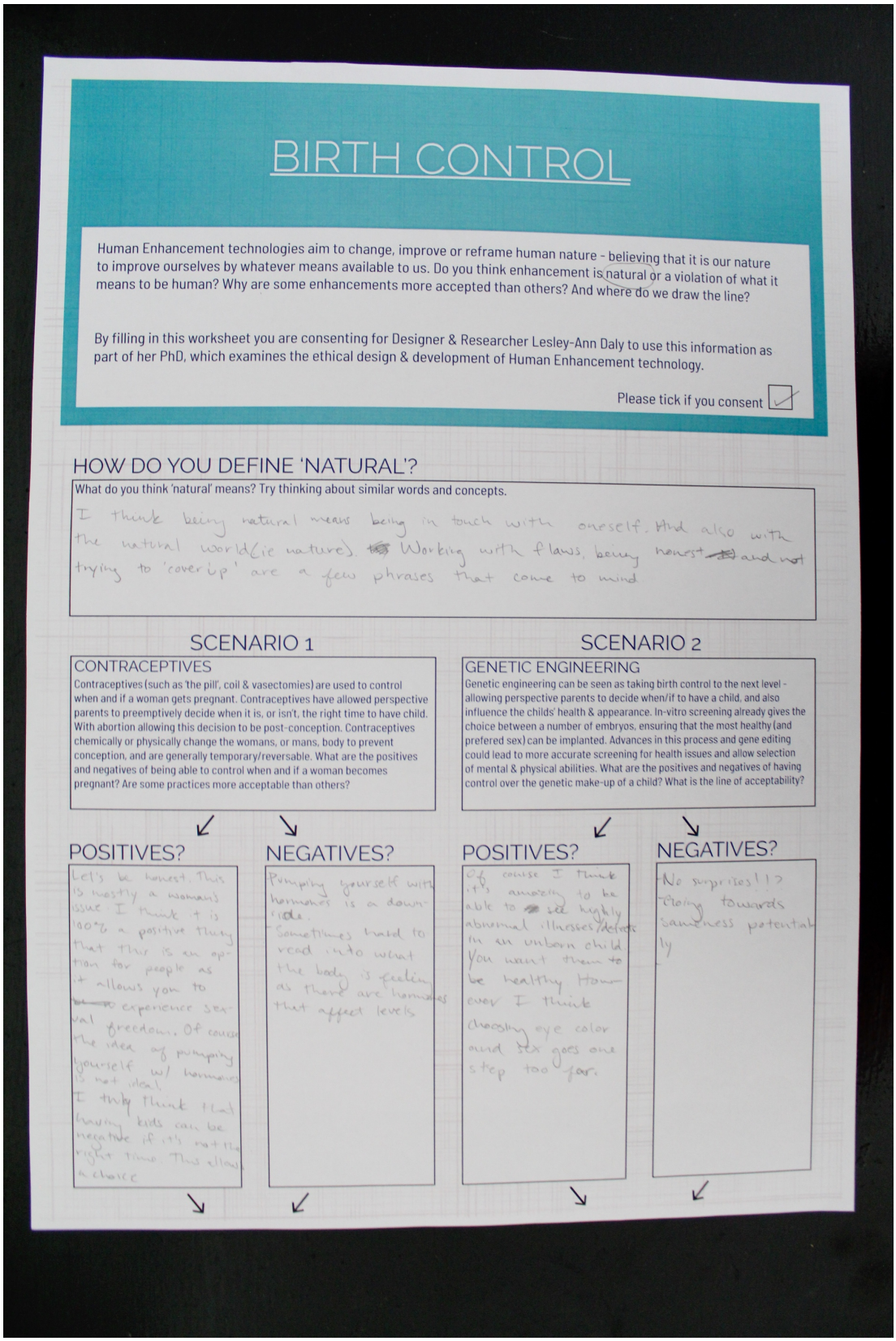


Figure 217 Birth Control Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

I think being natural means being in touch with oneself. And also with the natural world (ie nature). Working with flaws, being honest and not trying to 'cover up' are a few phrases that come to mind.

SCENARIO 1

CONTRACEPTIVES

Contraceptives (such as 'the pill', coil & vasectomies) are used to control when and if a woman gets pregnant. Contraceptives have allowed perspective parents to preemptively decide when it is, or isn't, the right time to have child. With abortion allowing this decision to be post-conception. Contraceptives chemically or physically change the womans, or mans, body to prevent conception, and are generally temporary/reversable. What are the positives and negatives of being able to control when and if a woman becomes pregnant? Are some practices more acceptable than others?

POSITIVES?

Let's be honest. This is mostly a woman's issue. I think it is 100% a positive thing that this is an option for people as it allows you to experience sexual freedom. Of course the idea of pumping yourself w/ hormones is not ideal.

I truly think that having kids can be negative if it's not the right time. This allows a choice

NEGATIVES?

Pumping yourself with hormones is a downside.

Sometimes hard to read into what the body is feeling as there are hormones that affect levels

SCENARIO 2

GENETIC ENGINEERING

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POSITIVES?

Of course I think it's amazing to be able to see highly abnormal illnesses/defects in an unborn child. You want them to be healthy. However I think choosing eye color and sex goes one step too far.

NEGATIVES?

No surprises!!?

Closing towards sameness potentially

Figure 218 Birth Control Worksheet - Filled In, 2019.

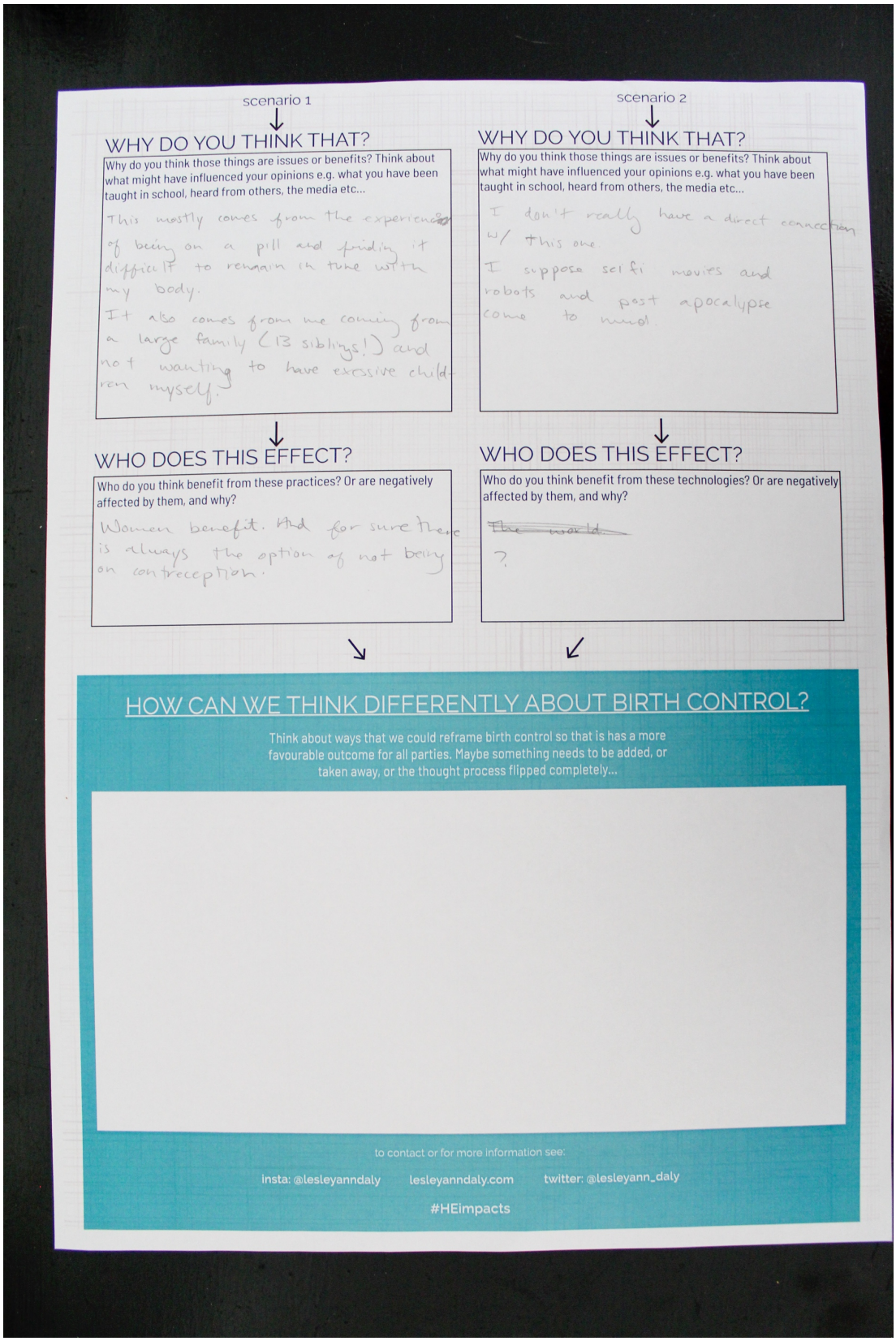


Figure 219 Birth Control Worksheet - Filled In, 2019.

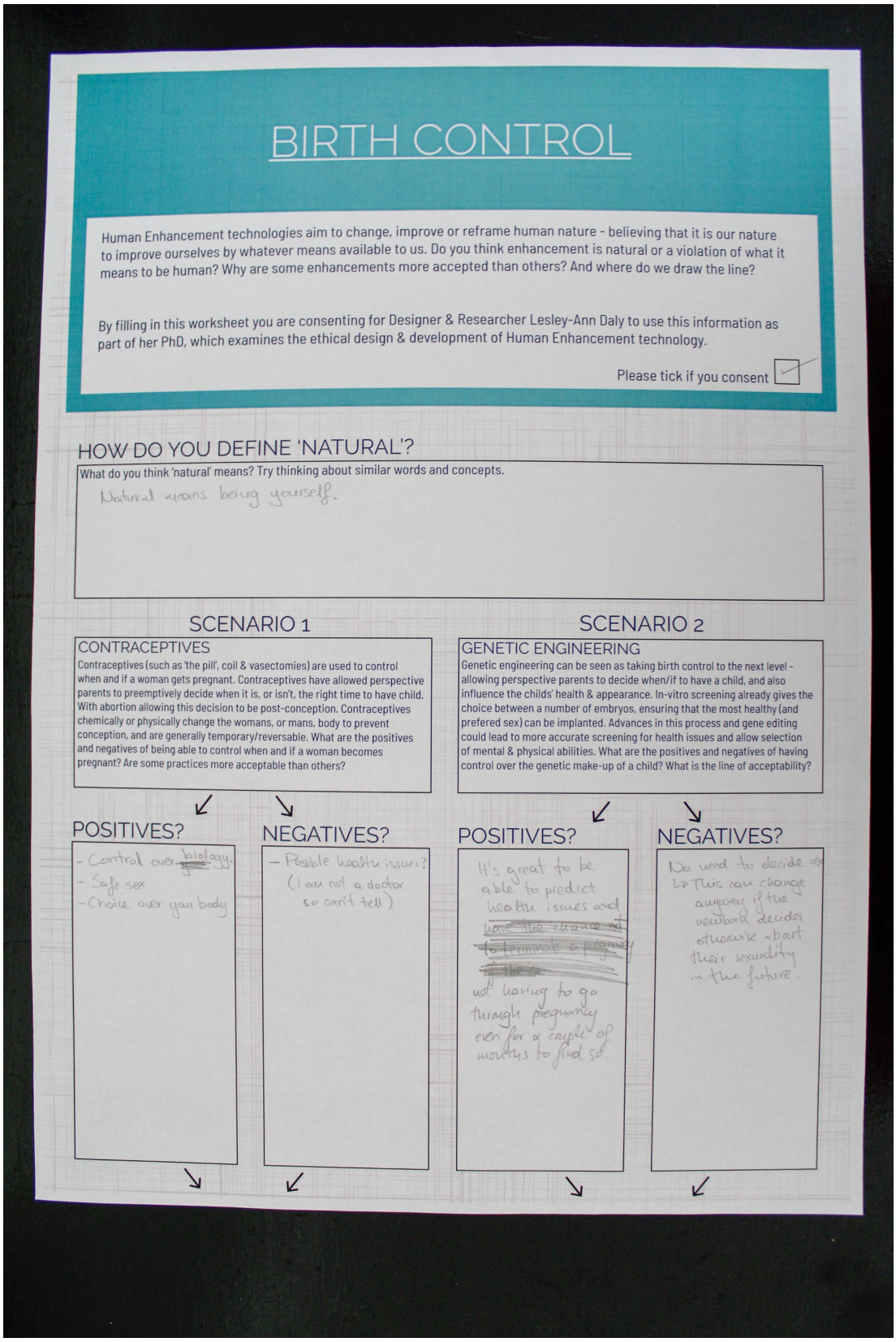


Figure 220 Birth Control Worksheet - Filled In, 2019.

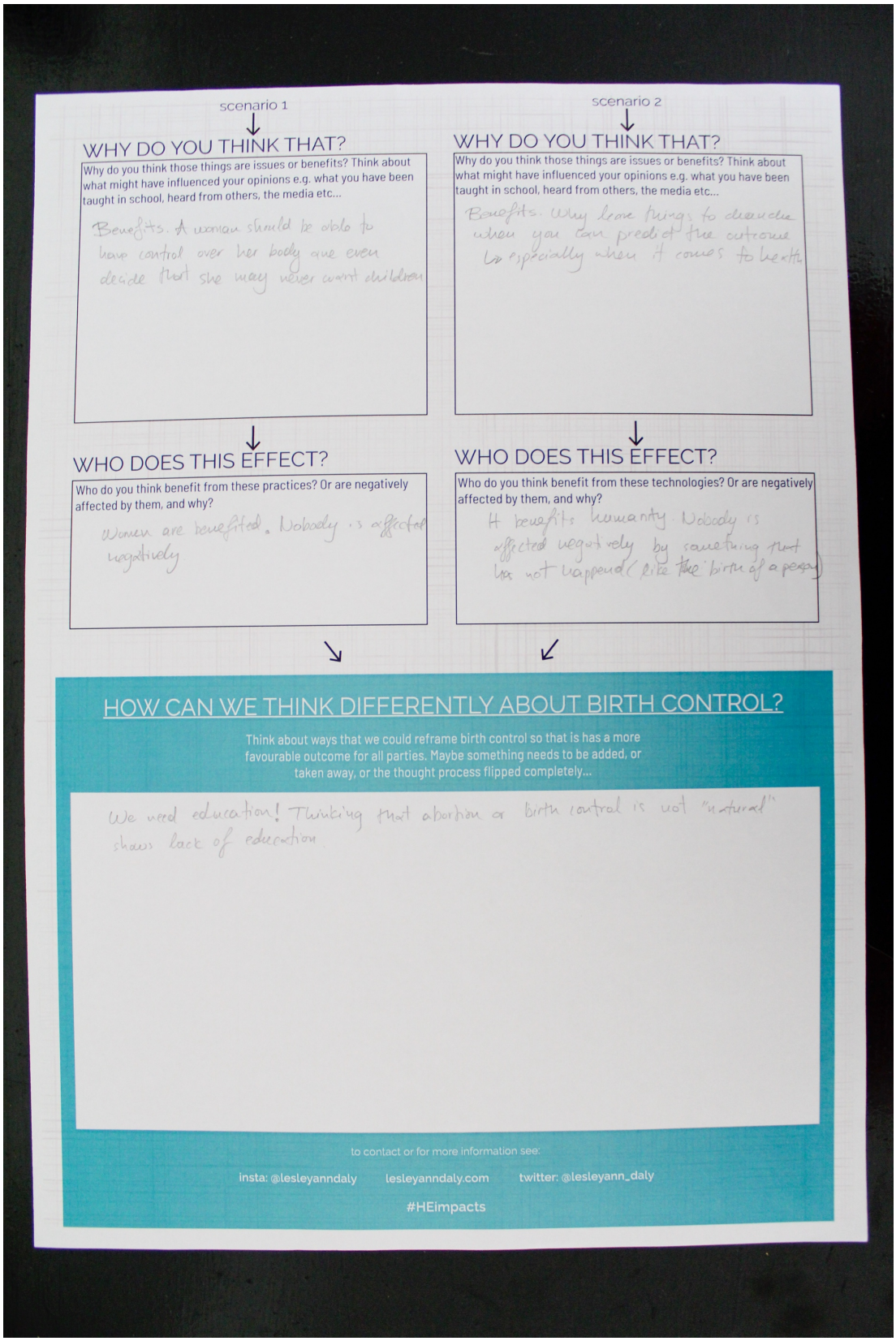
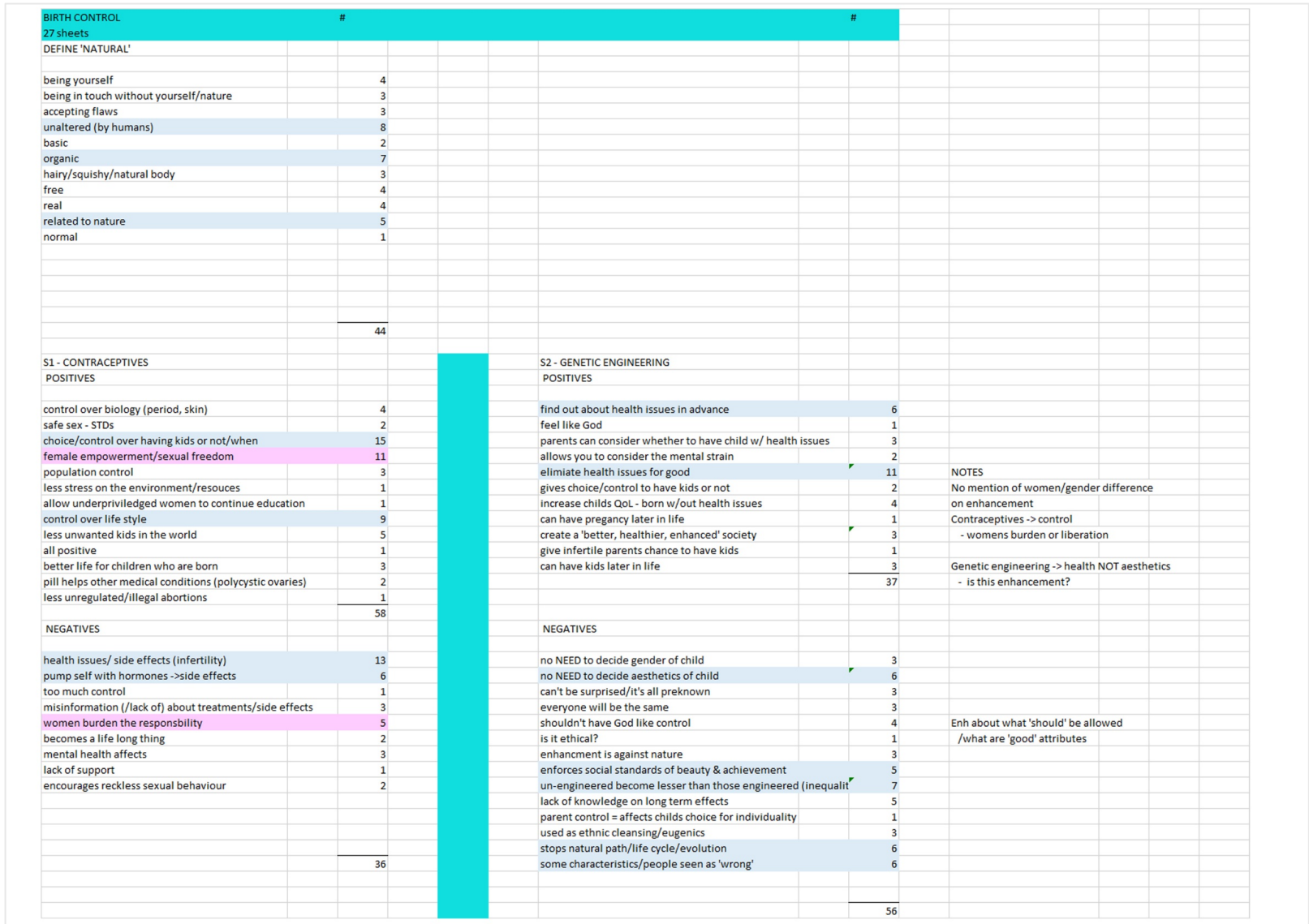


Figure 221 Birth Control Worksheet - Filled In, 2019.



BIRTH CONTROL	#
27 sheets	
DEFINE 'NATURAL'	
being yourself	4
being in touch without yourself/nature	3
accepting flaws	3
unaltered (by humans)	8
basic	2
organic	7
hairy/squishy/natural body	3
free	4
real	4
related to nature	5
normal	1
	44

S1 - CONTRACEPTIVES	
POSITIVES	
control over biology (period, skin)	4
safe sex - STDs	2
choice/control over having kids or not/when	15
female empowerment/sexual freedom	11
population control	3
less stress on the environment/resouces	1
allow underpriviledged women to continue education	1
control over life style	9
less unwanted kids in the world	5
all positive	1
better life for children who are born	3
pill helps other medical conditions (polycystic ovaries)	2
less unregulated/illegal abortions	1
	58
NEGATIVES	
health issues/ side effects (infertility)	13
pump self with hormones ->side effects	6
too much control	1
misinformation (/lack of) about treatments/side effects	3
women burden the responsbility	5
becomes a life long thing	2
mental health affects	3
lack of support	1
encourages reckless sexual behaviour	2
	36

S2 - GENETIC ENGINEERING	#
POSITIVES	
find out about health issues in advance	6
feel like God	1
parents can consider whether to have child w/ health issues	3
allows you to consider the mental strain	2
elimiate health issues for good	11
gives choice/control to have kids or not	2
increase childs QoL - born w/out health issues	4
can have pregancy later in life	1
create a 'better, healthier, enhanced' society	3
give infertile parents chance to have kids	1
can have kids later in life	3
	37
NEGATIVES	
no NEED to decide gender of child	3
no NEED to decide aesthetics of child	6
can't be surprised/it's all preknown	3
everyone will be the same	3
shouldn't have God like control	4
is it ethical?	1
enhancment is against nature	3
enforces social standards of beauty & achievement	5
un-engineered become lesser than those engineered (inequalit	7
lack of knowledge on long term effects	5
parent control = affects childs choice for individuality	1
used as ethnic cleansing/eugenics	3
stops natural path/life cycle/evolution	6
some characteristics/people seen as 'wrong'	6
	56

NOTES
No mention of women/gender difference
on enhancement
Contraceptives -> control
- womens burden or liberation
Genetic engineering -> health NOT aesthetics
- is this enhancement?
Enh about what 'should' be allowed
/what are 'good' attributes

Figure 222 Birth Control worksheets quantitative analysis. Lesley-Ann Daly, 2019.

S1 - WHY DO YOU THINK THAT?		S2 - WHY DO YOU THINK THAT?		
personal opinion/experience	12	personal opinion/experience	10	
experience of friends/family	3	sci-fi	2	Education bigger role in contraceptives
Religion	3	Religion	3	- taught in school
conditioning/traditions/values	2	conditioning	1	
education	7	media	4	
taught by mother	1	experiences of wealthy white women (priviliedged)	1	
media	3	experience of friends/family	4	
research	1	science	1	
		education	2	
		history (Nazis)	1	
		research	1	
			30	
	32			
S1 - WHO DOES IT EFFECT?		S2 - WHO DOES IT EFFECT?		
women	9	everyone	6	
me	1	me	1	
men	1	underpriviledged (can't avail of this)	2	Again women only mentioned in contr
everyone	6	parents of children w/ severe health issues	1	- present experience/view
those with access to contraceptives (Western/priviledged)	5	those with health issues (pass on)	3	
those without access	2	future generations	6	Enh - everyone & future considered
those making them (medical companies)	2	those who can afford it	3	
young people	3	those making them $$	1	
		women	1	
	29		24	
	155		147	
HOW CAN WE THINK DIFFERENTLY?				
need to be educated	5			
must learn the consequences	2			
remove taboo/judgement of BC & abortion	2			
more clinical trials	1			
consider male contraceptives	5			
better hormonal control	1	Equality - not just womens burden		
better services for negative effects (mental)	1			
give access to everyone	3			
take burden off just women (equally shared)	8			
find other ways to procreate/natural ways	4			
accept it's the womens choice	3			
regulation (ethical & moral)	3			
remove option for 'perfect' engineered child, only target dise	3			
	41			

Figure 223 Birth Control worksheets quantitative analysis. Lesley-Ann Daly, 2019.

INSIGHTS FROM BIRTH CONTROL WORKSHEETS

Positives

Contraceptives

- Control over having kids – or when
- Female empowerment / sexual freedom
- Control over lifestyle

Genetic Engineering

- Eliminate health issues for good
- Can find out about health issues in advance

Positives for C was mainly about being in control of your life and being able to decide when and if you want children – allowing non procreational sex, time for a career, and kids later in life. This was predominantly referenced in terms of the females' life.

Whereas for GE it was all about health, early detection of disease and eradication thereof. Most positives were related to the parents (choosing x, knowing y) with only a few people mentioning that the child would have a better quality of life. Only a few people mentioned it creating a 'better, healthier, *enhanced*' society.

Negatives

Contraceptives

- Health issues/side effects (fertility)
- Hormonal side effects
- Women burden the responsibility

Genetic Engineering

- Inequality (those un-engineered become lesser than those engineered)
- Some characteristics would be seen as wrong
- Enforces social standards of beauty and achievement
    - There is no NEED for choosing child's aesthetics
- Stops the natural life cycle & evolution

Negatives for contraceptives mainly consisted of health issues – by the terminology (use of 'I') and specific references to effects it can be reasonably deduced that most of these were written by female participants who have personally been affected. As with the positive's women are mentioned as the ones affected by contraception – they are burdened with the responsibility to take it – but oppositely are liberated by it.

Negatives for GE are mainly formed around concepts of what are good, preferable or acceptable traits and unfair access to them. The general idea being that we shouldn't value persons with ideal (beautiful) or un-ideal (disabled) traits differently – a division that the technology could exacerbate. A lot of participants expressed the opinion that GE should not be used for aesthetic reasons but only for health – this misses the HE possibilities – they choose 'therapy' as being the only modification that is acceptable.

The effect on women featured heavily in +&- for contraceptives but 'women' or any point related to gender differences were not made in GE. This may be because with GE the change is made to the child not the mother.

Why do you think that?

For C personal experience and education played the biggest role in influencing participants opinions. Contraceptives are a method of birth control being used extensively in the Western world so there is a high probability that participants have intimate knowledge of it. And Sexual education is taught in schools in the UK, which may be where participants first gained knowledge of birth control options.

For GE personal opinion/ or experience was cited the most, and the experience of friends – some because of experience with IVF, but some just noted as 'their opinion' with no reference to influence. The media was cited several times – there have been several stories in recent years to do with genetic engineering and CRISPR cas-9 (Chinese twins HIV, 3parents etc [find references]). Interestingly the Nazis were only mentioned once – they are well known for their eugenics programs, which has been brought up in the media and academia in relation to GE as a possible negative use for the technology.

Who does it effect?

Again for C women came up highest for who it effects (as detailed above). With 'everyone' and 'those who have access (West)' rating quite high also. This may be due to knowledge of the pill/ contraceptives being widely used in our culture and not other less affluent areas.

For GE 'everyone' and 'future generations' ranked the highest. As a future focused technology with not much practical application at this time (apart from some screening with IVF) it seem participants were thinking about who would be affected when it becomes more commonplace. And as it will not affect us personally but our potential children this pushes the affect to the future.

Across both scenarios those who do or don't have access came up many times – usually to do with access to the money to pay for it. This could both be for those less well off in richer areas or large areas of the developing world that only have limited access.

How can we think about it differently?

By far the highest response was to 'take the burden off women' and 'consider male contraceptives' or to find more 'natural' birth control – from the definitions of 'natural' as the beginning I would deduce that this could be organic methods that don't involve chemicals and hormone change. This is mainly in relation to rethinking todays birth control practices and does not relate to GE. The need to be educated also came up several times – both for contraceptives and the possibilities and consequences of GE.

ANALYSIS OF BIRTH CONTROL WORKSHEETS

Contraceptives

- Good for freedom of choice and control over your life
- Bad for your health
- Effects women mainly

Genetic Engineering

- Good for your health (prevention & eradication)
- Bad for freedom of choice – should restrict the parents' control of how it can be used (not for non-health reasons – promote inequality)
- Effects everyone

Social control of choice

Some people see female sexual liberation (and promiscuity) as 'bad' and some see it as 'good', we are at a point in time now where the negative opinions no longer out way the positive. Therefor women are generally free (in Western society) to have control over their sexual lives, usually aided by contraception, without fear of oppression or judgement. They are free to make 'bad' decisions because it is their choice, their life. Social ideals of beauty and achievement are seen as good by some people and bad by others. Now we are at a point where the dissenting voices are growing stronger and one will be judged for wanting to conform to old beauty ideals as they promote inequality. Now the ideal is to be yourself, and appreciate others for being themselves. In GE it is thought that people will still pick these old beauty standards for their children and therefor overpower the ideal of social equality -> taking a step backwards. So participants would rather see the option for aesthetic change taken away rather than consider that the old ideals may have become null and void by the time the technology is ready for widespread use. As we are still in uncertain times, still trying hard to rebel against repressive 'norms' it is understandable that the general public wouldn't want their opposition (who are generally be wealthy and would have first access to this technology) to have the means and opportunity to increase their numbers and influence. Due to the nature of the event as the V&A which usually has a younger and more liberal demographic, participants are more likely to be part of the rejecting norms group, which is reflected within the worksheet.

Emphasis NOT on the child but on the parent

Participants haven't thought about the potential positives it may have for their children – they thought more about the negatives it may have on others. In general very little said about the effect for the child, the child was barely mentioned at all. All the emphasis is on the parent/the participant (the parent wanting to reject societies ideals) and the wider societal effect. As the technology is not yet available people have not been in the position to need to choose themselves yet, so only think abstractly about it on a social scale. This could change drastically when faced with the decision personally – what parent would not want to give their child the best start in life? Aspirational vs practical (realistic).

It was not explicitly mentioned by any of the participants that the choice of aesthetics, height, intelligence should be the child's – and the parents shouldn't be able to make this choice for them. Does this equate to 'informed consent' and those who are proxies for those

who cannot give consent? We don't want to allow the parents (or doctors) proxy control over non-medical decisions for the child as we don't know what the child would want.

Eugenics & Money

Some contraceptives were given out originally to prevent lower classes from procreating and overtaking over the upper class (eugenics) [find reference + ref BBC doc 'Eugenics'] but contraceptives eventually became a symbol of female empowerment. Can GE go from a being seen as a potential form of eugenics to a form of liberation? Access is the main obstacle - GE can improve QoL and reduce suffering but only for those who can afford it. The inequality stems from money, or lack thereof, those who have it have more control over themselves and over others. Those without the ability to afford this will be seen as lesser and potentially resent those who have been enhanced, while those who are enhanced may look down upon those who are not. Contraceptives became more accessible and affordable (in the West) which aided their rise is use and change in meaning. Will GE become so widely accessible that it too can become less about oppression and more about liberation?

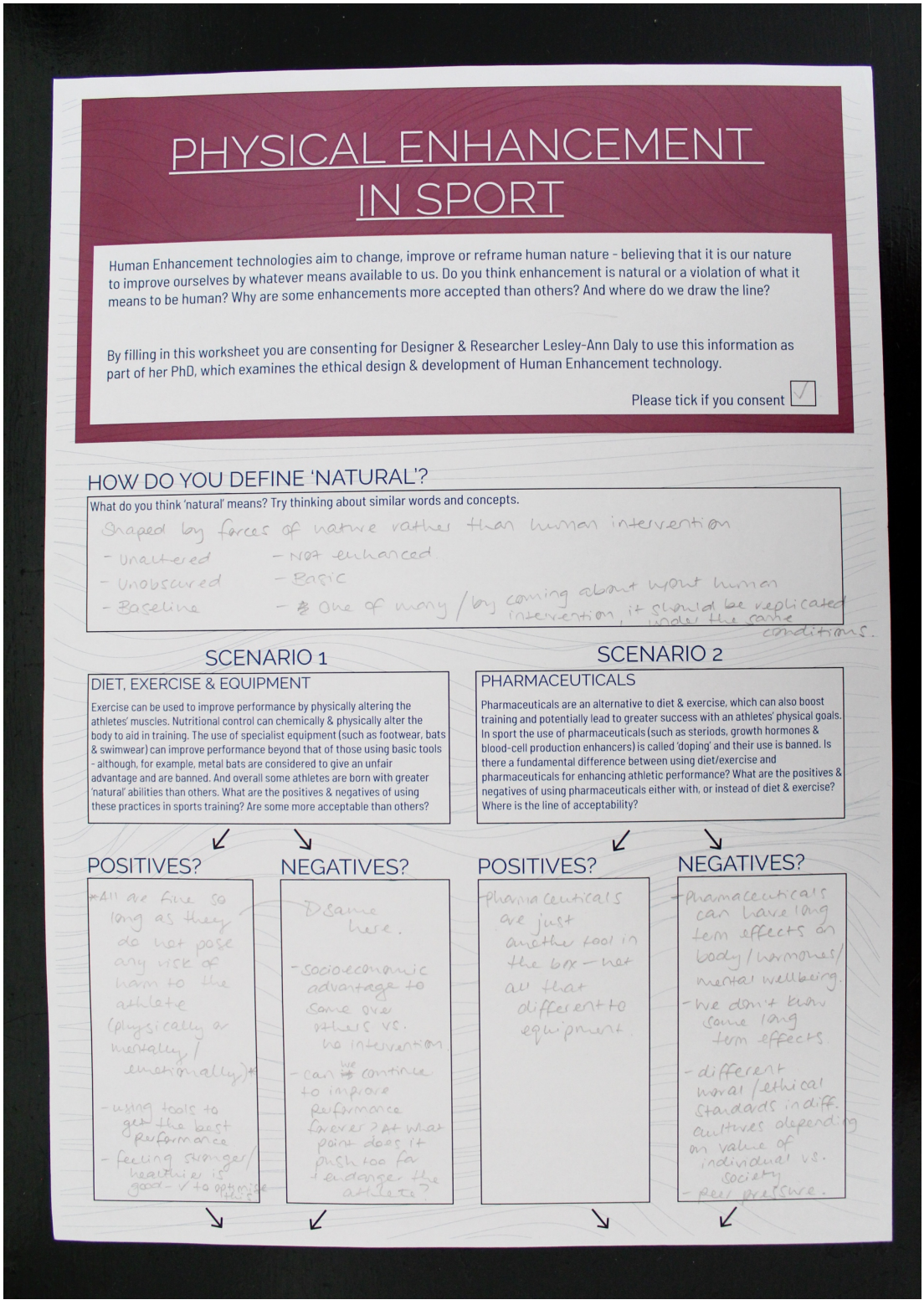
Health vs Enhancement

In general participants rejected the use of GE for anything other than medical reasons, particularly not for aesthetics purposes. However it is worth noting that the enhancement of skills or intelligence was not mentioned by any participants. Participants show an adversity to HE, it is seen as not necessary and therefor not wanted. This may partially stem from not knowing the possible benefits associated with it and mainly from being exposed to the dystopian views in the media and science fiction. Only 3 participants stated that GE would create a 'better, healthier, enhanced society' as a positive. It will be interesting to parallel the health vs enhancement perspectives with those from the Anti-Aging group.

Gender

Although the burden, health risks and liberation of women was noted many times throughout the worksheet this was exclusively about contraceptives. For GE no genders were identified, merely referring to the 'parents', 'child' or 'individual' (or versions of). This type of enhancement technology seems to bring equality to the genders (or non-binary) when it comes to birth control and procreation as it involves whoever is choosing to have a child. This technology is mostly associated with planned pregnancies as it is mainly paralleled to IVF, which takes conscious thought and decision making by the parents at the beginning of the process. At this stage this may be an idyllic scene however there is no reason why GE can't or won't be done by mothers who have chosen to have a baby solo, who have been forced to get pregnant or who the father has left. At this stage women are still bearing the pregnancy and giving birth to the child, so there is still somewhat of a heavy burden on women regardless.

PHYSICAL ENHANCEMENT IN SPORTS: EXERCISE AND EQUIPMENT VS PHARMACEUTICAL 'DOPING'



PHYSICAL ENHANCEMENT IN SPORT

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Shaped by forces of nature rather than human intervention
- Unaltered
- Unobscured
- Baseline
- Not enhanced
- Basic
- One of many / by coming about w/out human intervention, it should be replicated under the same conditions.

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

Exercise can be used to improve performance by physically altering the athletes' muscles. Nutritional control can chemically & physically alter the body to aid in training. The use of specialist equipment (such as footwear, bats & swimwear) can improve performance beyond that of those using basic tools - although, for example, metal bats are considered to give an unfair advantage and are banned. And overall some athletes are born with greater 'natural' abilities than others. What are the positives & negatives of using these practices in sports training? Are some more acceptable than others?

POSITIVES?

All are fine so long as they do not pose any risk of harm to the athlete (physically or mentally / emotionally)
- using tools to get the best performance
- feeling stronger / healthier is good - ✓ to optimise this

NEGATIVES?

Same here.
- socioeconomic advantage to some over others vs. no intervention
- can we continue to improve performance forever? At what point does it push too far + endanger the athlete?

SCENARIO 2

PHARMACEUTICALS

Pharmaceuticals are an alternative to diet & exercise, which can also boost training and potentially lead to greater success with an athletes' physical goals. In sport the use of pharmaceuticals (such as steriods, growth hormones & blood-cell production enhancers) is called 'doping' and their use is banned. Is there a fundamental difference between using diet/exercise and pharmaceuticals for enhancing athletic performance? What are the positives & negatives of using pharmaceuticals either with, or instead of diet & exercise? Where is the line of acceptability?

POSITIVES?

Pharmaceuticals are just another tool in the box - not all that different to equipment.

NEGATIVES?

- Pharmaceuticals can have long term effects on body / hormones / mental wellbeing.
- We don't know some long term effects.
- different moral / ethical standards in diff. cultures depending on value of individual vs. society
- peer pressure.

Figure 224 Physical Enhancement in Sport Worksheet - Filled In, 2019.

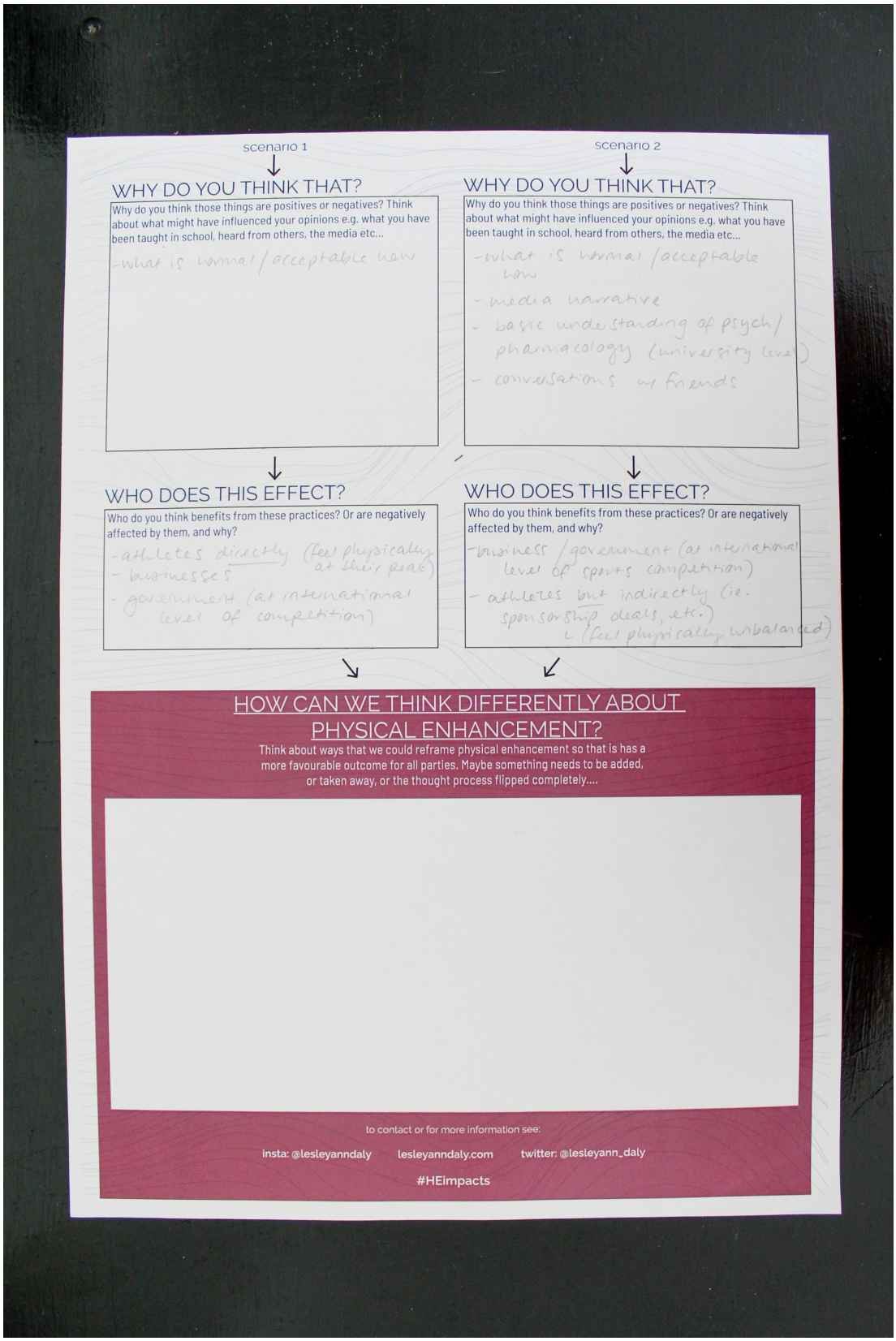


Figure 225 Physical Enhancement in Sport Worksheet - Filled In, 2019.

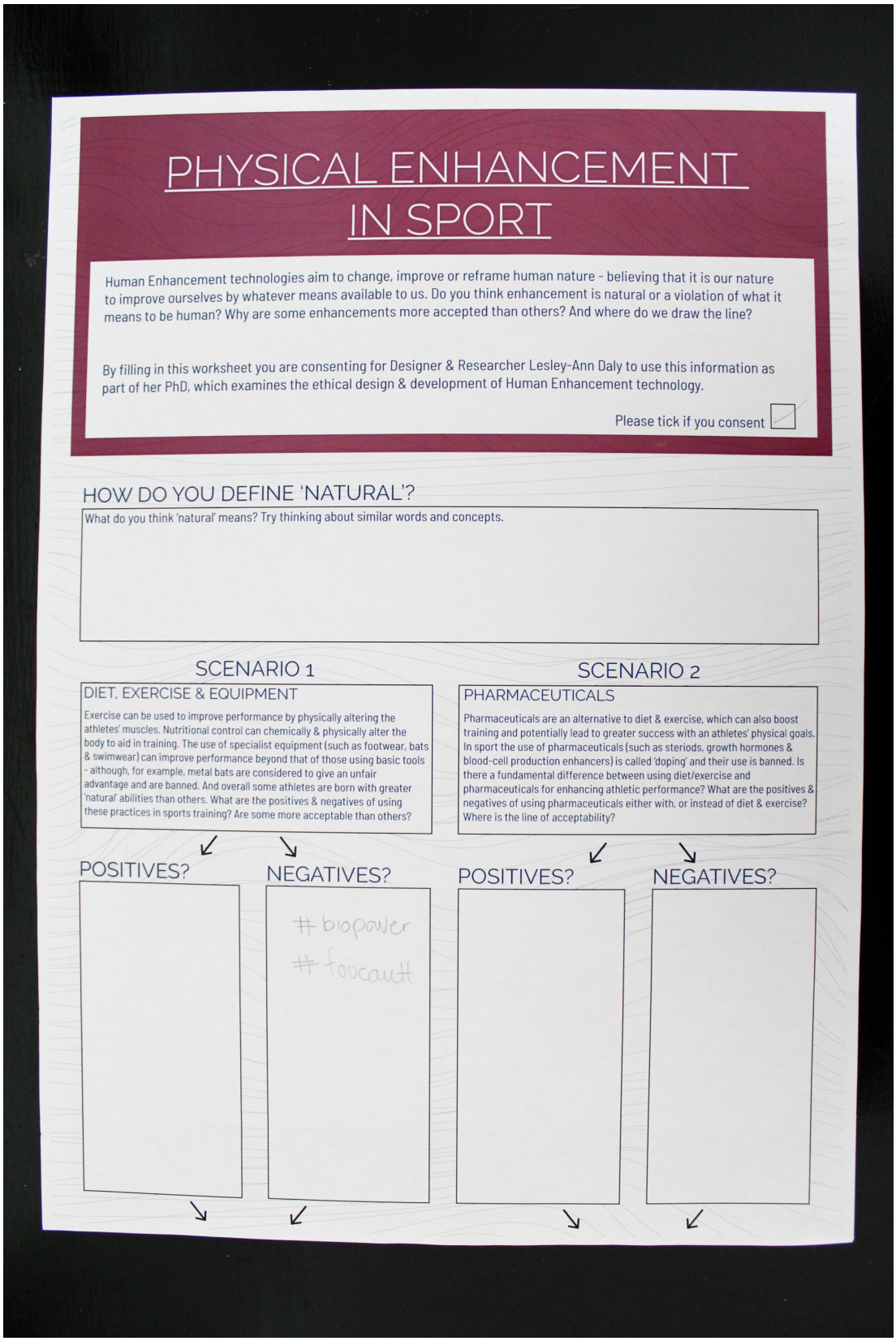
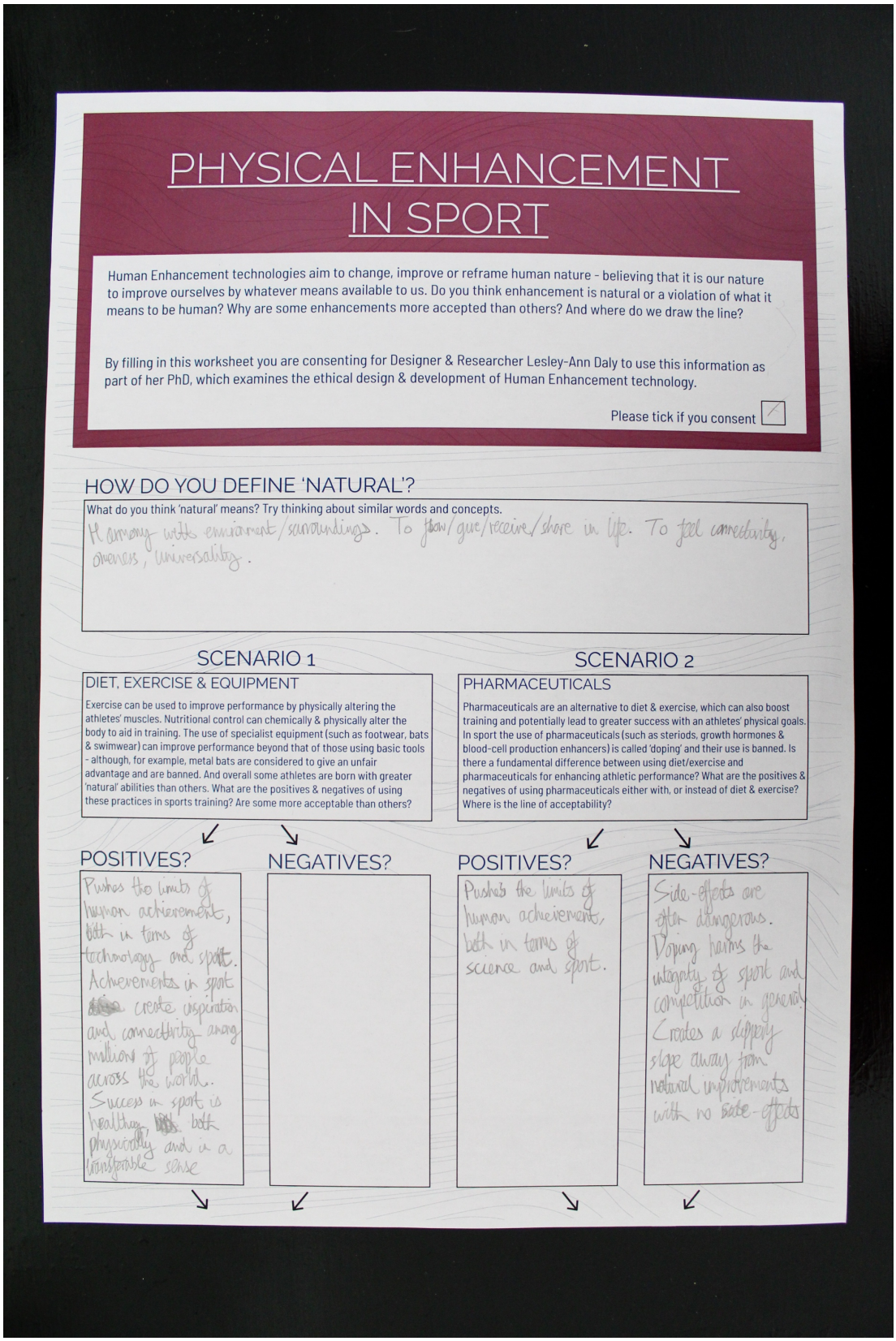


Figure 226 Physical Enhancement in Sport Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Harmony with environment/surroundings. To flow/give/receive/share in life. To feel connectivity, oneness, universality.

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

Exercise can be used to improve performance by physically altering the athletes' muscles. Nutritional control can chemically & physically alter the body to aid in training. The use of specialist equipment (such as footwear, bats & swimwear) can improve performance beyond that of those using basic tools - although, for example, metal bats are considered to give an unfair advantage and are banned. And overall some athletes are born with greater 'natural' abilities than others. What are the positives & negatives of using these practices in sports training? Are some more acceptable than others?

POSITIVES?

Pushes the limits of human achievement, both in terms of technology and sport. Achievements in sport create inspiration and connectivity among millions of people across the world. Success in sport is healthy, both physically and in a comfortable sense

NEGATIVES?

SCENARIO 2

PHARMACEUTICALS

Pharmaceuticals are an alternative to diet & exercise, which can also boost training and potentially lead to greater success with an athletes' physical goals. In sport the use of pharmaceuticals (such as steriods, growth hormones & blood-cell production enhancers) is called 'doping' and their use is banned. Is there a fundamental difference between using diet/exercise and pharmaceuticals for enhancing athletic performance? What are the positives & negatives of using pharmaceuticals either with, or instead of diet & exercise? Where is the line of acceptability?

POSITIVES?

Pushes the limits of human achievement, both in terms of science and sport.

NEGATIVES?

Side-effects are often dangerous. Doping harms the integrity of sport and competition in general. Creates a slippery slope away from natural improvements with no side-effects

Figure 227 Physical Enhancement in Sport Worksheet - Filled In, 2019.

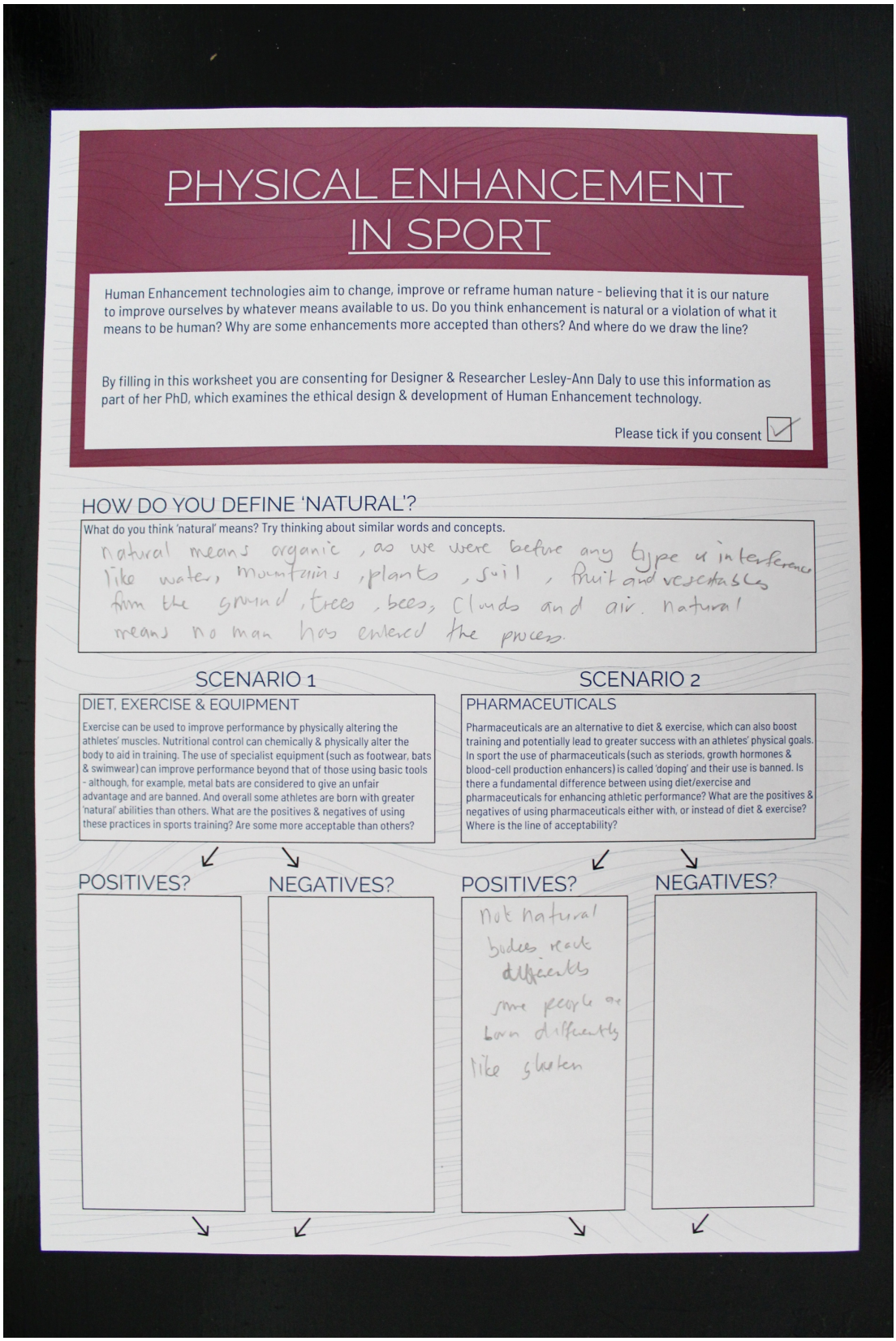
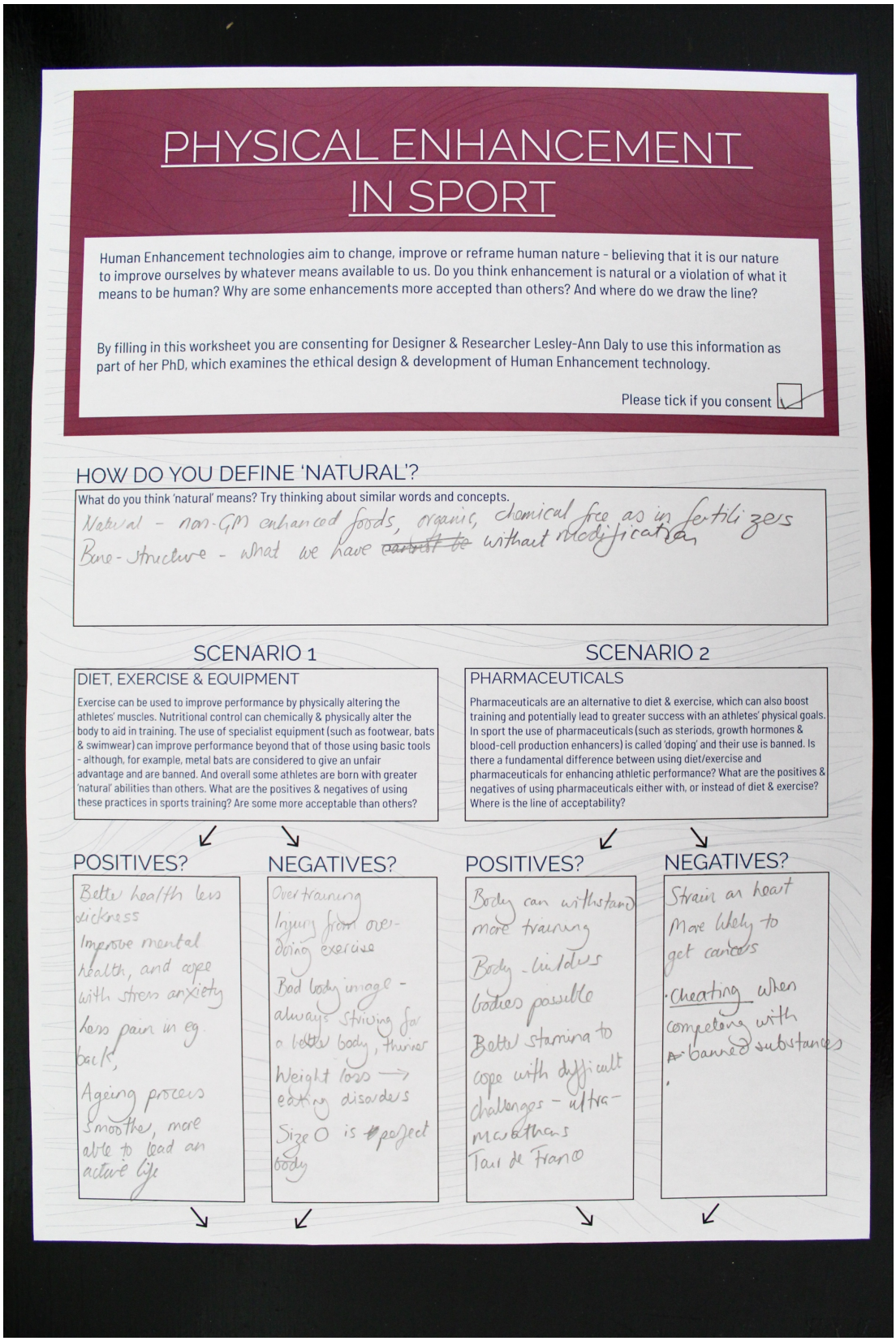


Figure 228 Physical Enhancement in Sport Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Natural - non-GM enhanced foods, organic, chemical free as in fertilizers
Bone-structure - what we have ~~cannot be~~ without modification

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

Exercise can be used to improve performance by physically altering the athletes' muscles. Nutritional control can chemically & physically alter the body to aid in training. The use of specialist equipment (such as footwear, bats & swimwear) can improve performance beyond that of those using basic tools - although, for example, metal bats are considered to give an unfair advantage and are banned. And overall some athletes are born with greater 'natural' abilities than others. What are the positives & negatives of using these practices in sports training? Are some more acceptable than others?

POSITIVES?

Better health less sickness
Improve mental health, and cope with stress anxiety
less pain in eg. back,
Ageing process smoother, more able to lead an active life

NEGATIVES?

Over training
Injury from over-doing exercise
Bad body image - always striving for a better body, thinner
Weight loss → eating disorders
Size 0 is ~~perfect~~ body

SCENARIO 2

PHARMACEUTICALS

Pharmaceuticals are an alternative to diet & exercise, which can also boost training and potentially lead to greater success with an athletes' physical goals. In sport the use of pharmaceuticals (such as steriods, growth hormones & blood-cell production enhancers) is called 'doping' and their use is banned. Is there a fundamental difference between using diet/exercise and pharmaceuticals for enhancing athletic performance? What are the positives & negatives of using pharmaceuticals either with, or instead of diet & exercise? Where is the line of acceptability?

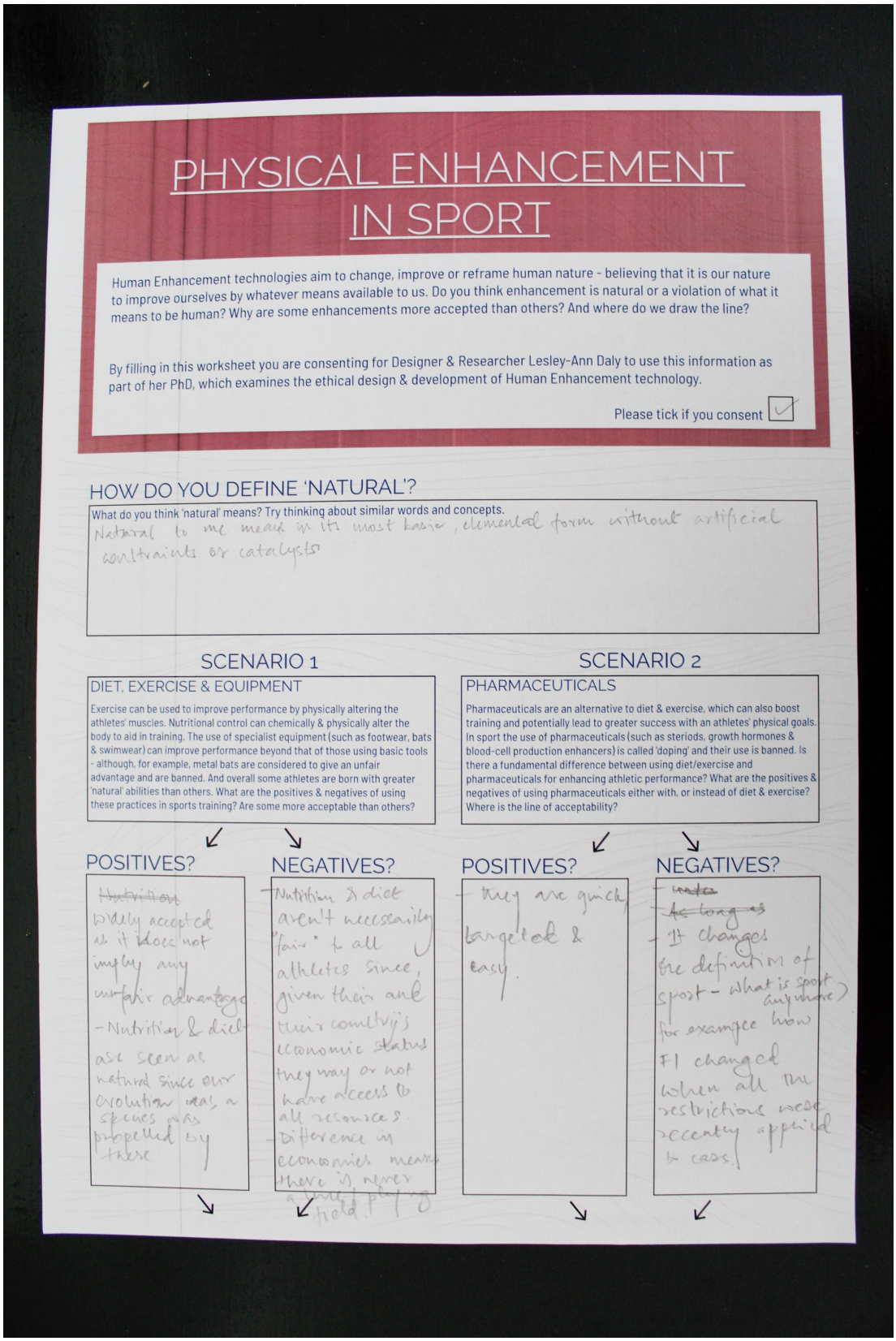
POSITIVES?

Body can withstand more training
Body-building bodies possible
Better stamina to cope with difficult challenges - ultra-marathons Tour de France

NEGATIVES?

Strain on heart
More likely to get cancers
·Cheating when competing with ~~A~~ banned substances

Figure 229 Physical Enhancement in Sport Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Natural to me means in its most basic, elemental form without artificial constraints or catalysts

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

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POSITIVES?

~~Nutrition~~
widely accepted as it does not imply any unfair advantage
- Nutrition & diet are seen as natural since our evolution was a species was propelled by these

NEGATIVES?

Nutrition & diet aren't necessarily "fair" to all athletes since, given their and their country's economic status they may or not have access to all resources.
- Difference in economies means there is never a level playing field.

SCENARIO 2

PHARMACEUTICALS

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POSITIVES?

- they are quick, targeted & easy.

NEGATIVES?

~~- water~~
~~- As long as~~
- It changes the definition of sport - what is sport anymore) for example how F1 changed when all the restrictions were recently applied to cars.

Figure 230 Physical Enhancement in Sport Worksheet - Filled In, 2019.

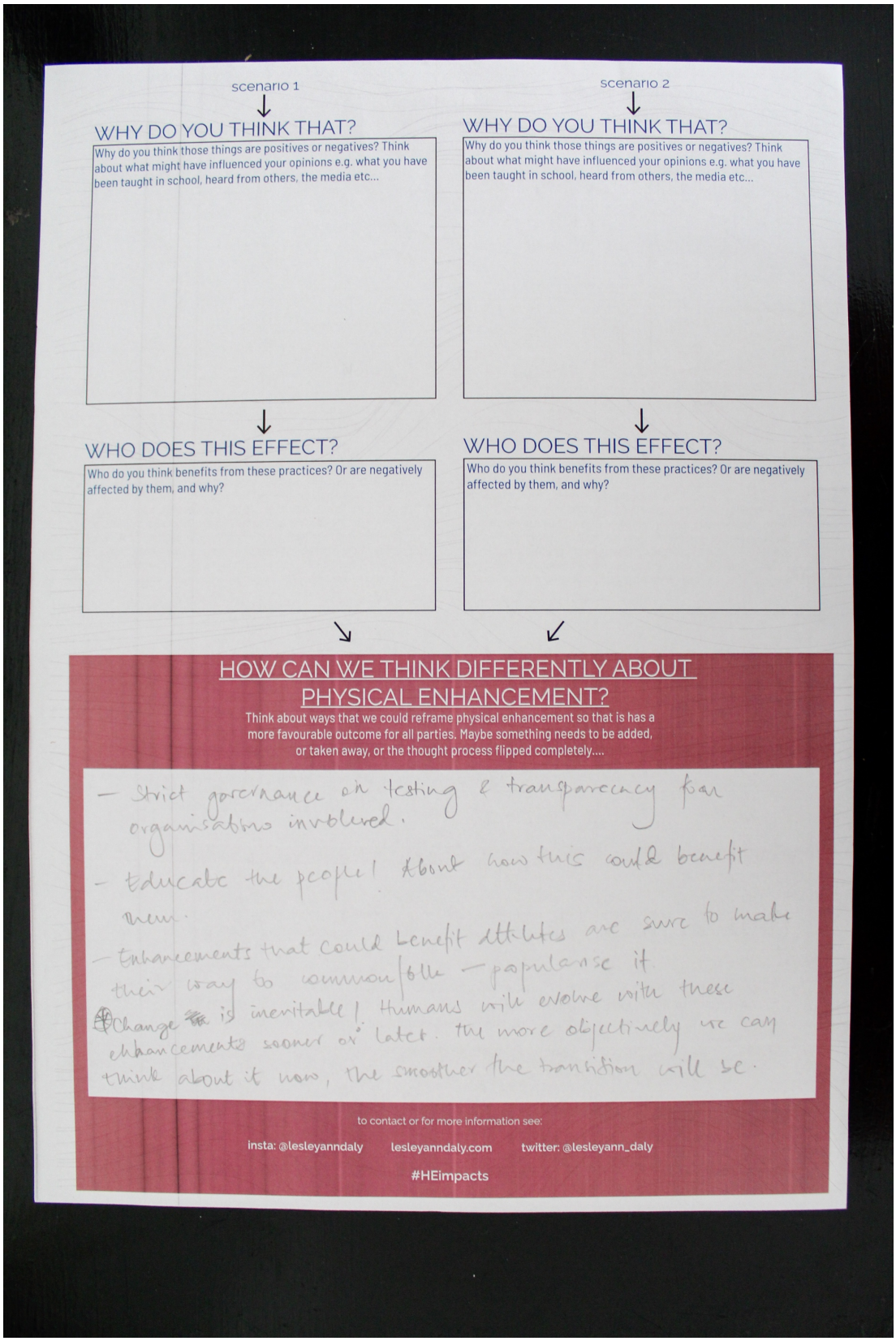


Figure 231 Physical Enhancement in Sport Worksheet - Filled In, 2019.

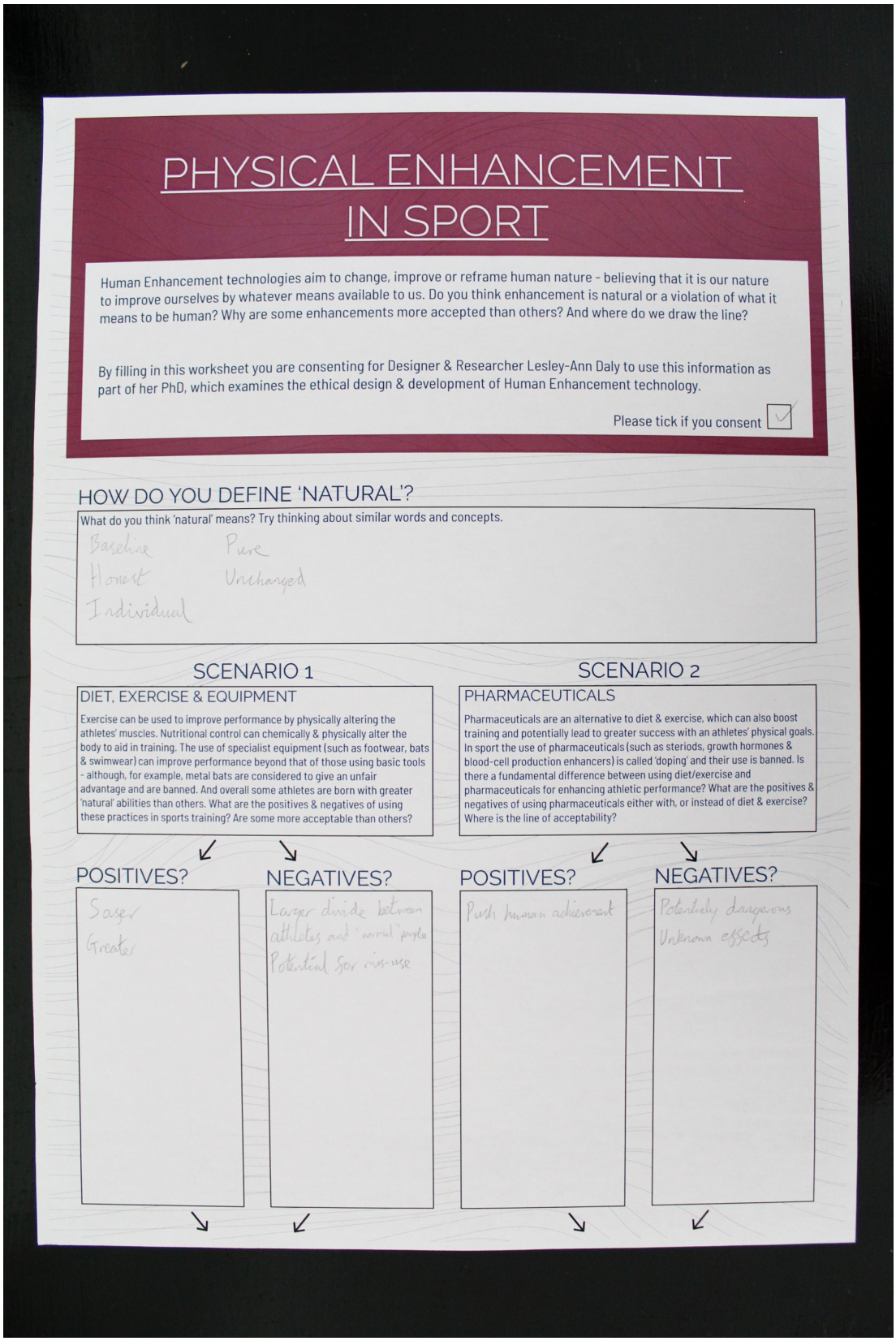


Figure 232 Physical Enhancement in Sport Worksheet - Filled In, 2019.

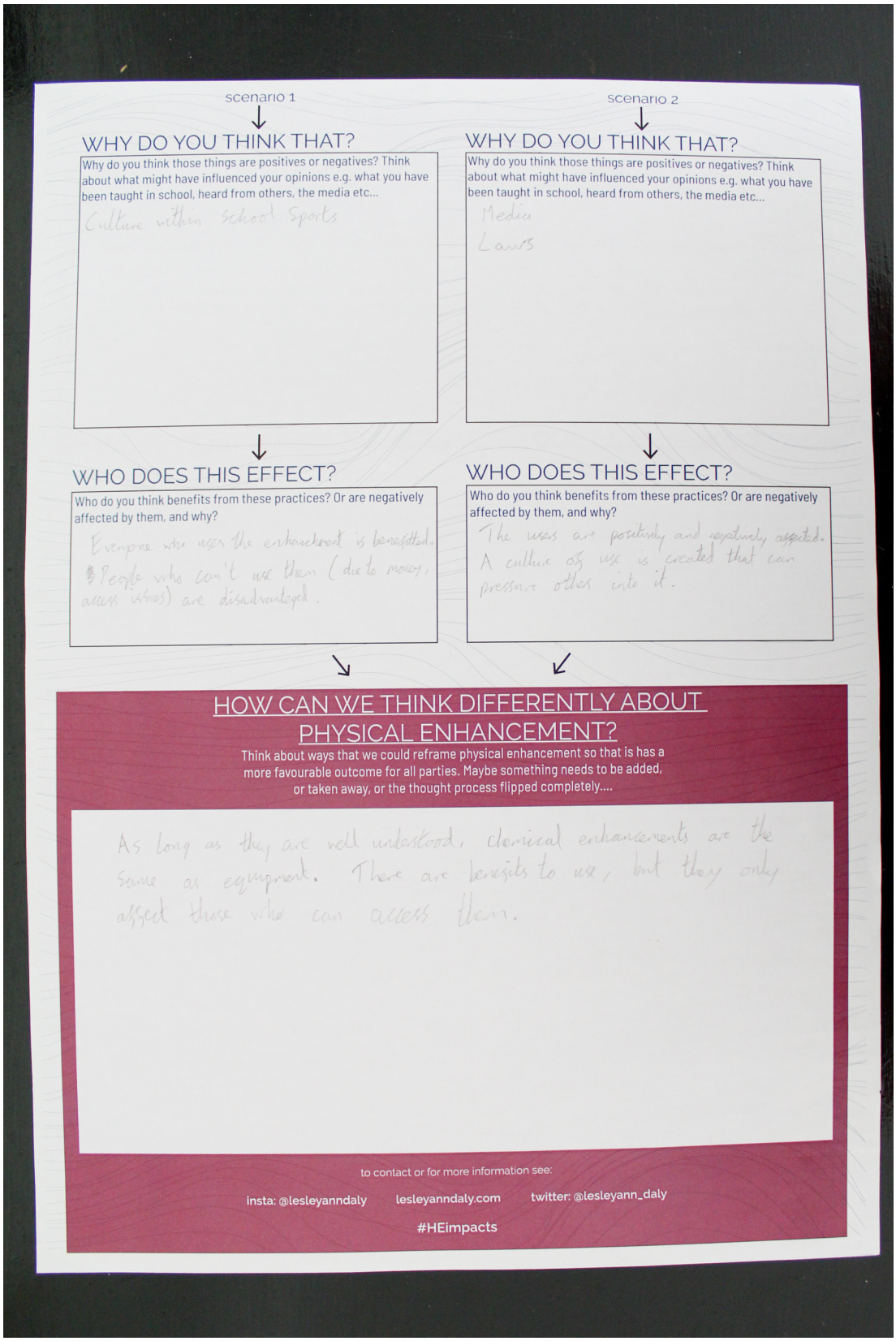
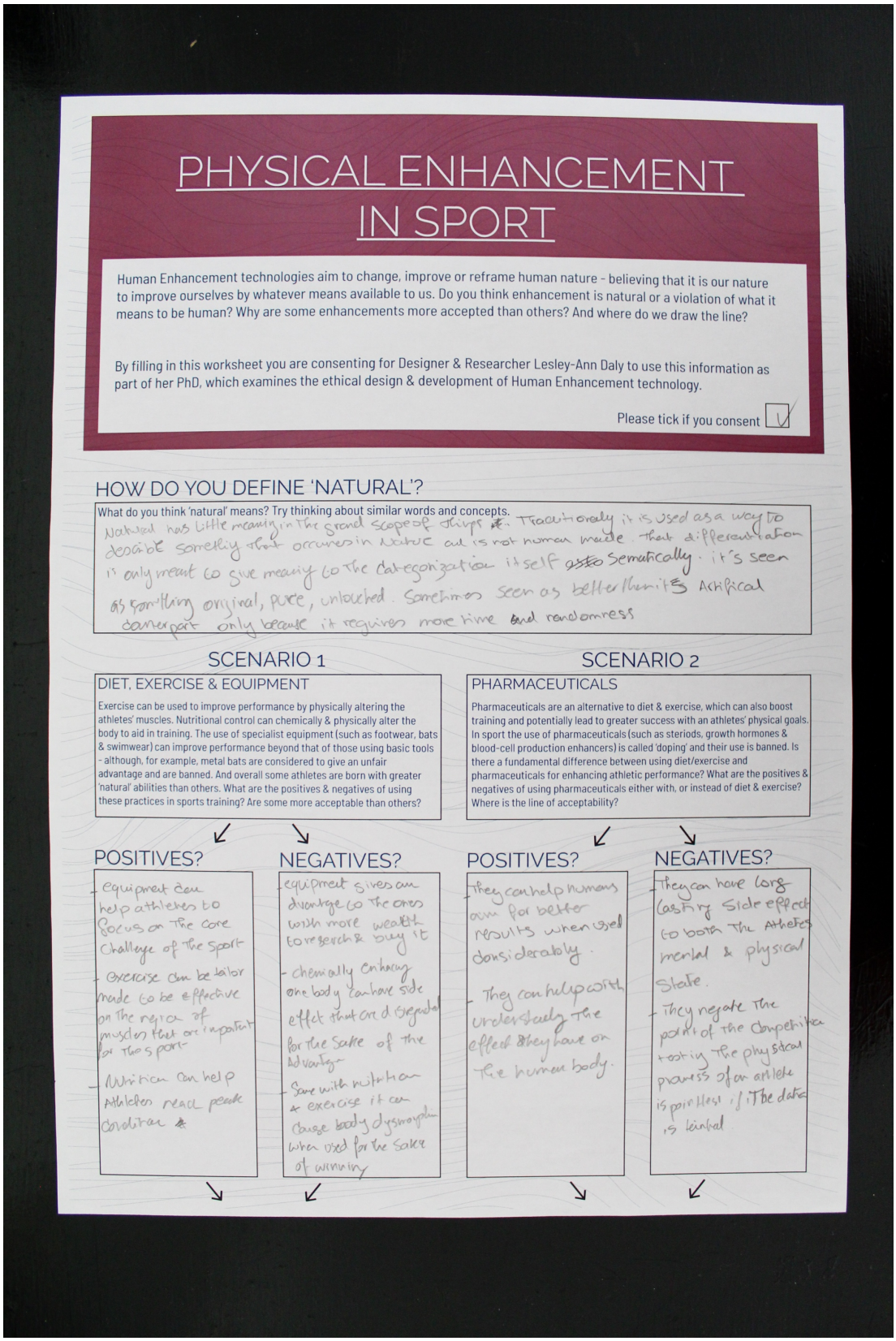


Figure 233 Physical Enhancement in Sport Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Natural has little meaning in the grand scope of things. Traditionally it is used as a way to describe something that occurs in nature and is not human made. Their differentiation is only meant to give meaning to the categorization itself ~~also~~ semantically. it's seen as something original, pure, untouched. Sometimes seen as better than its artifical counterpart only because it requires more time and randomness

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

Exercise can be used to improve performance by physically altering the athletes' muscles. Nutritional control can chemically & physically alter the body to aid in training. The use of specialist equipment (such as footwear, bats & swimwear) can improve performance beyond that of those using basic tools - although, for example, metal bats are considered to give an unfair advantage and are banned. And overall some athletes are born with greater 'natural' abilities than others. What are the positives & negatives of using these practices in sports training? Are some more acceptable than others?

POSITIVES?

- equipment can help athletes to focus on the core challenge of the sport
- exercise can be tailor made to be effective on the region of muscles that are important for the sport
- Nutrition can help Athletes reach peak condition &

NEGATIVES?

- equipment gives an advantage to the ones with more wealth to research & buy it
- chemically enhancing one body can have side effect that are disregarded for the sake of the advantage
- Same with nutrition & exercise it can cause body dysmorphia when used for the sake of winning

SCENARIO 2

PHARMACEUTICALS

Pharmaceuticals are an alternative to diet & exercise, which can also boost training and potentially lead to greater success with an athletes' physical goals. In sport the use of pharmaceuticals (such as steriods, growth hormones & blood-cell production enhancers) is called 'doping' and their use is banned. Is there a fundamental difference between using diet/exercise and pharmaceuticals for enhancing athletic performance? What are the positives & negatives of using pharmaceuticals either with, or instead of diet & exercise? Where is the line of acceptability?

POSITIVES?

- they can help humans aim for better results when used considerately.
- They can help with understanding the effect they have on the human body.

NEGATIVES?

- They can have long lasting side effects to both the Athletes mental & physical state.
- They negate the point of the competition testing the physical prowess of an athlete is pointless if the data is limited

Figure 234 Physical Enhancement in Sport Worksheet - Filled In, 2019.

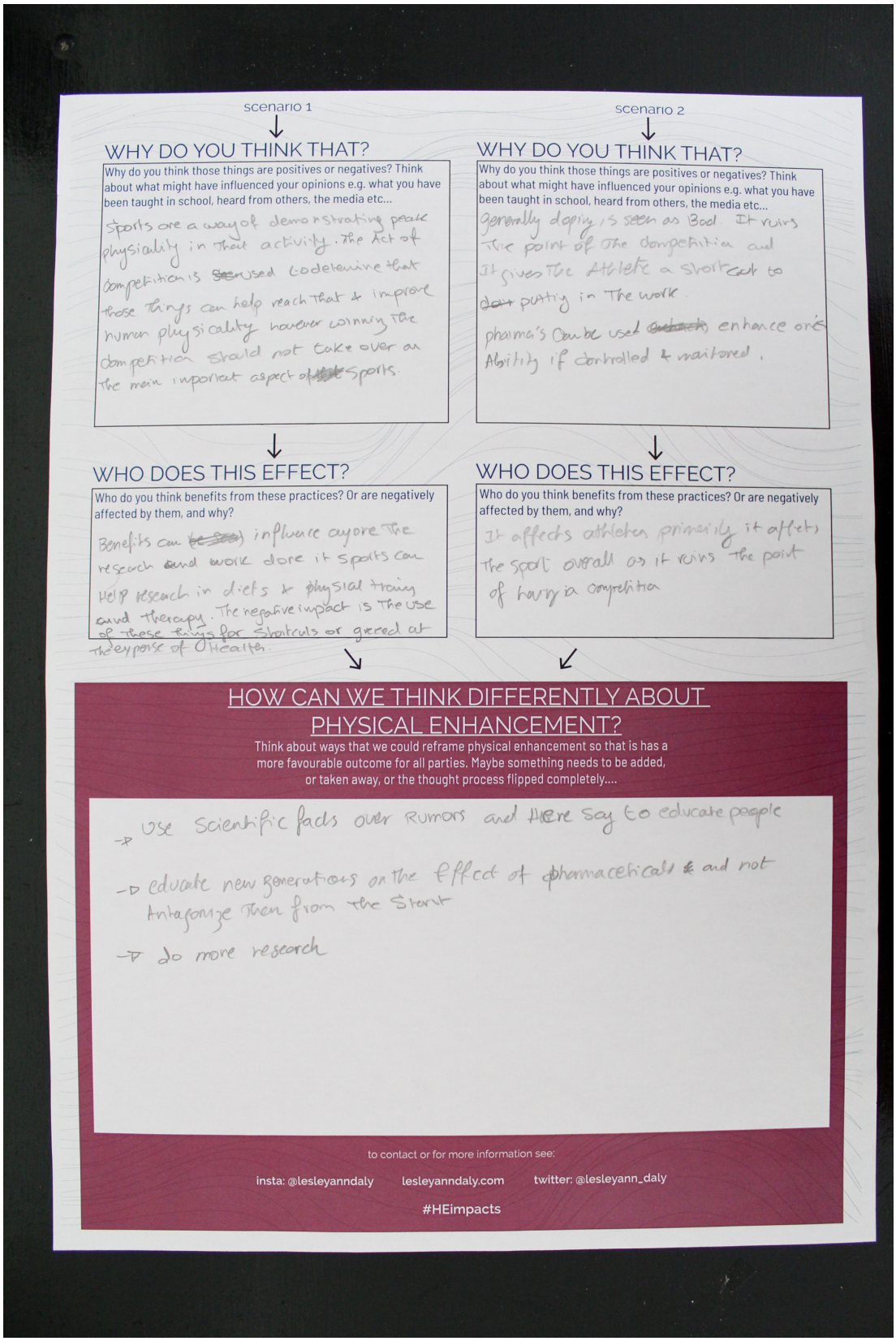
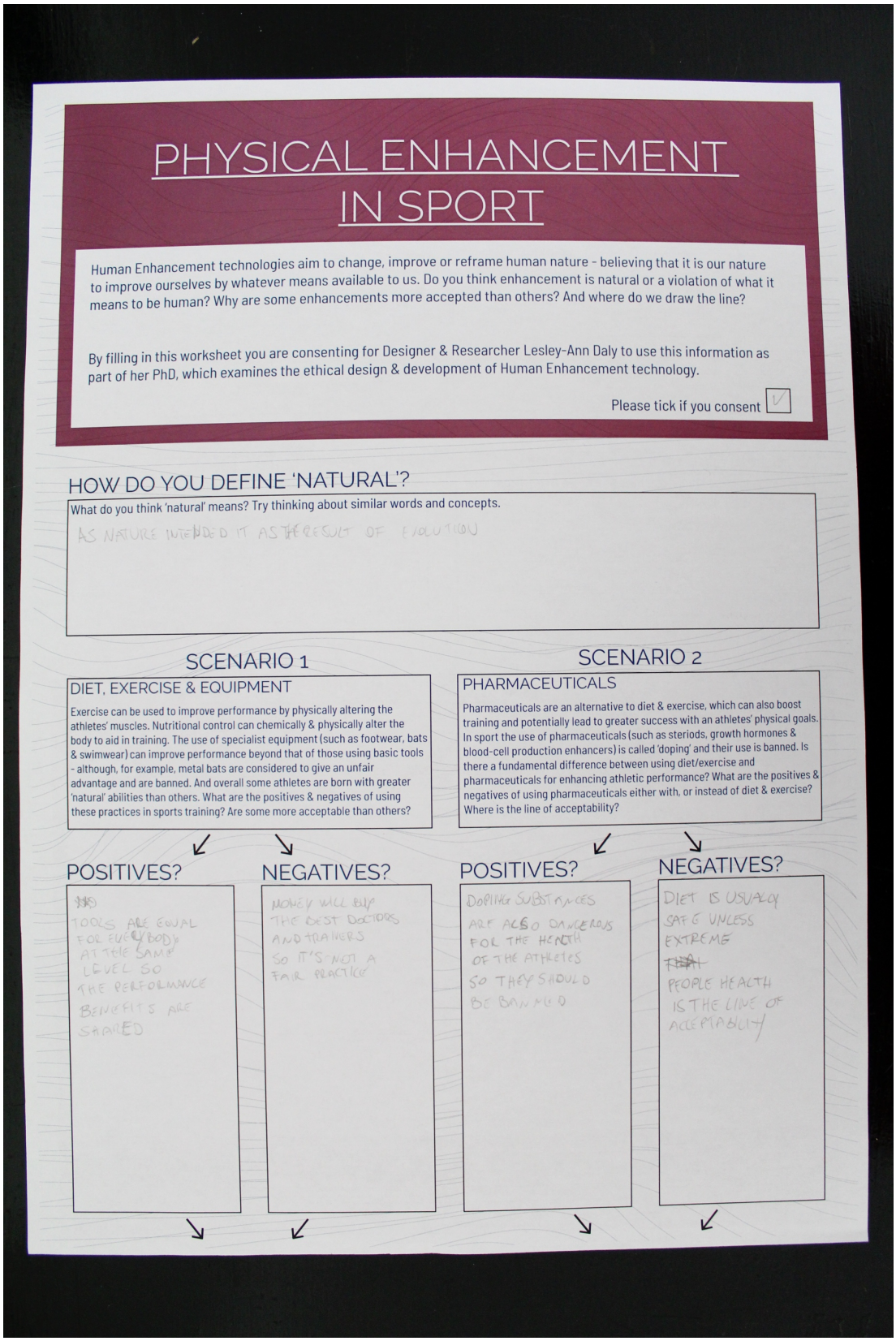


Figure 235 Physical Enhancement in Sport Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

AS NATURE INTENDED IT AS THE RESULT OF EVOLUTION

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

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POSITIVES?

~~XXX~~
TOOLS ARE EQUAL FOR EVERYBODY AT THE SAME LEVEL SO THE PERFORMANCE BENEFITS ARE SHARED

NEGATIVES?

MONEY WILL BUY THE BEST DOCTORS AND TRAINERS SO IT'S NOT A FAIR PRACTICE

POSITIVES?

DOPING SUBSTANCES ARE ALSO DANGEROUS FOR THE HEALTH OF THE ATHLETES SO THEY SHOULD BE BANNED

NEGATIVES?

DIET IS USUALLY SAFE UNLESS EXTREME
~~TRIAL~~
PEOPLE HEALTH IS THE LINE OF ACCEPTABILITY

Figure 236 Physical Enhancement in Sport Worksheet - Filled In, 2019.

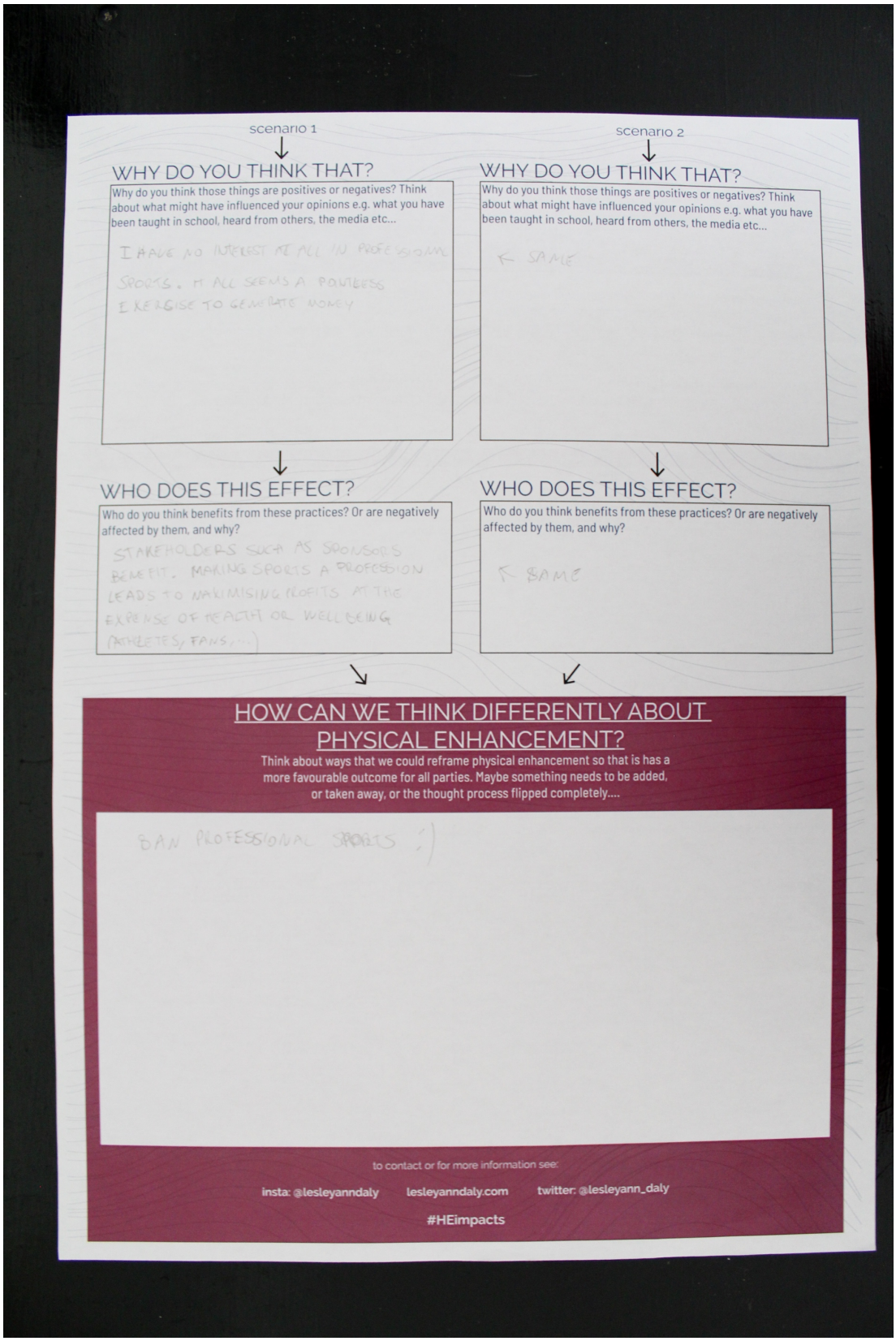


Figure 237 Physical Enhancement in Sport Worksheet - Filled In, 2019.

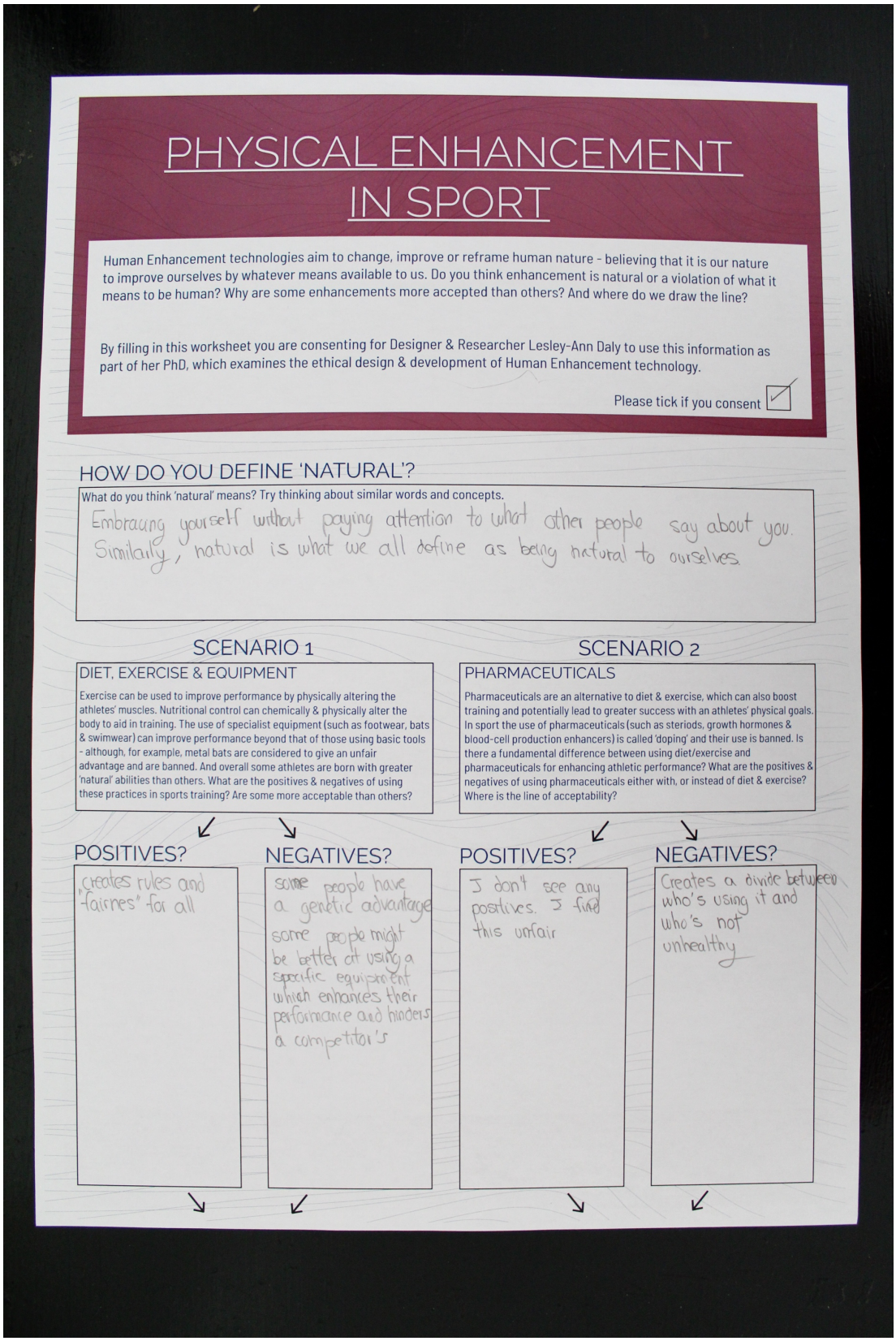


Figure 238 Physical Enhancement in Sport Worksheet - Filled In, 2019.

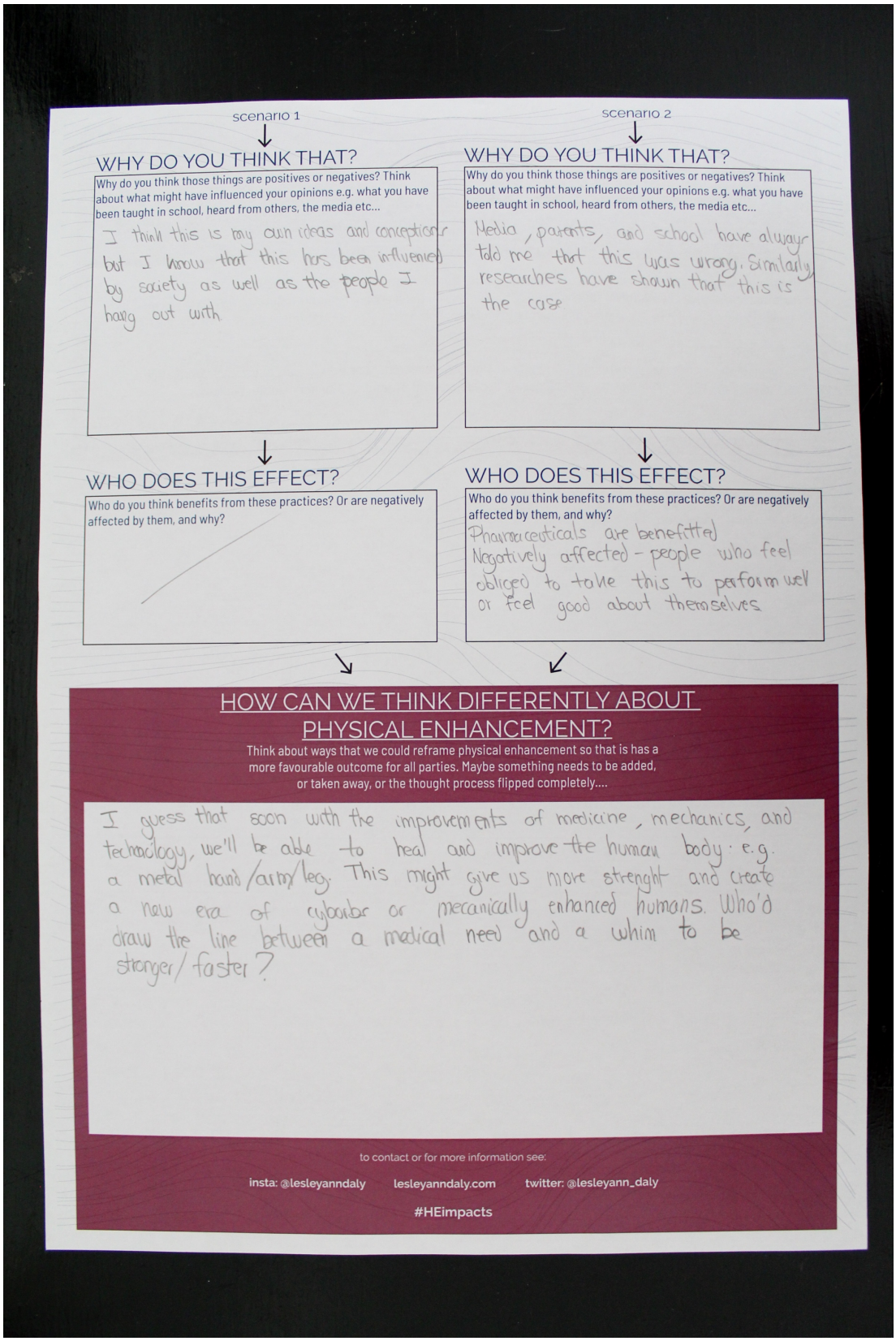


Figure 239 Physical Enhancement in Sport Worksheet - Filled In, 2019.

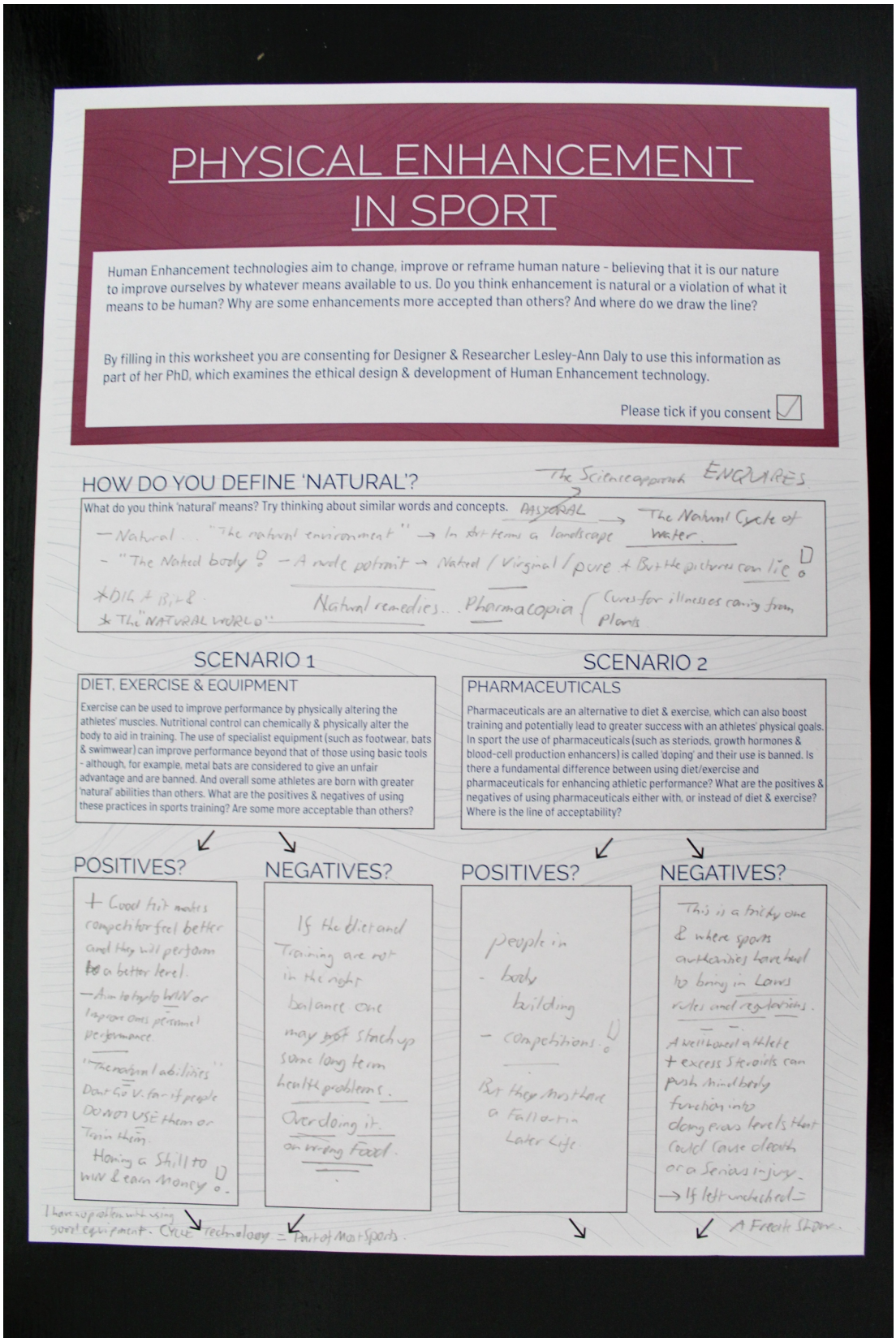


Figure 240 Physical Enhancement in Sport Worksheet - Filled In, 2019.

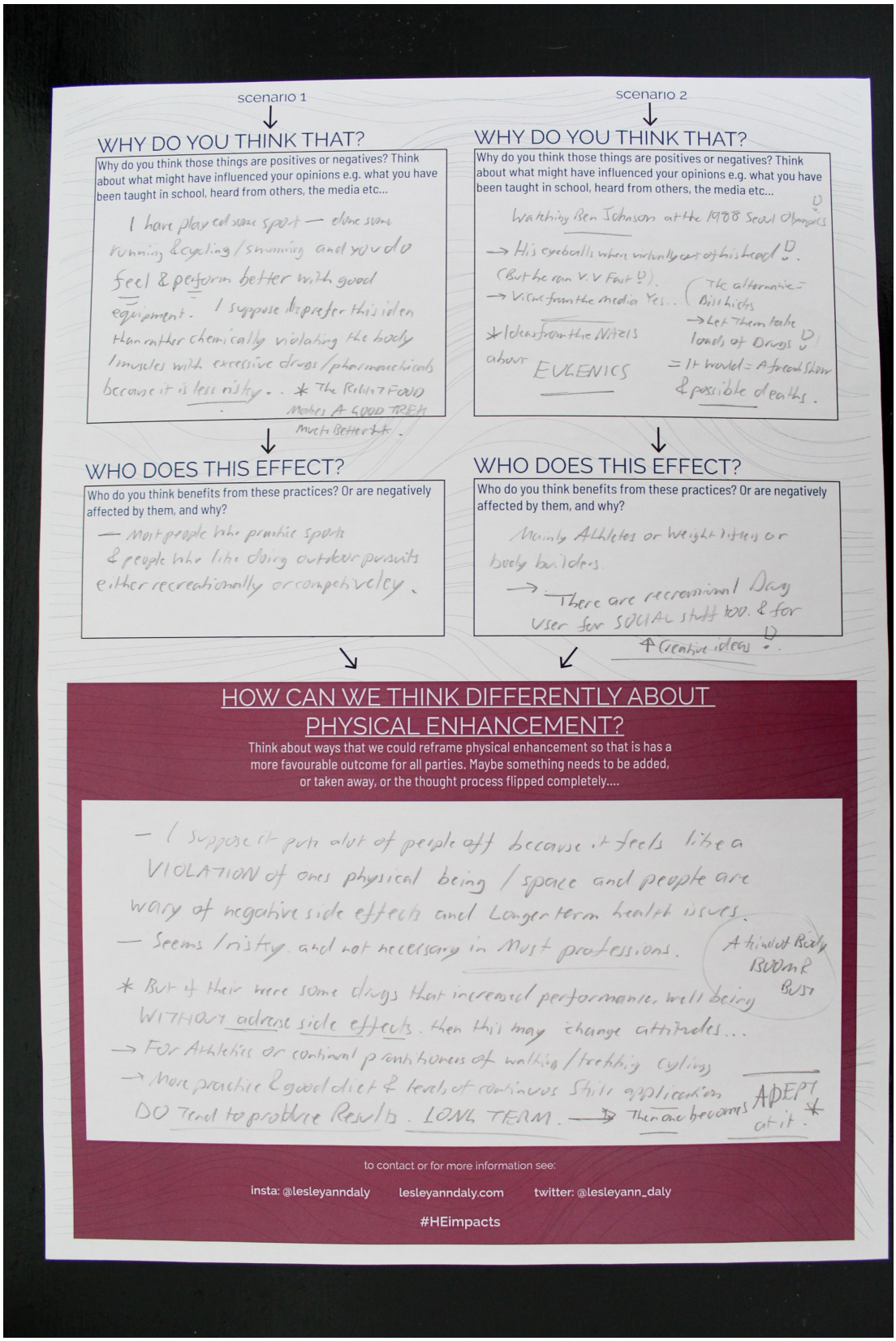
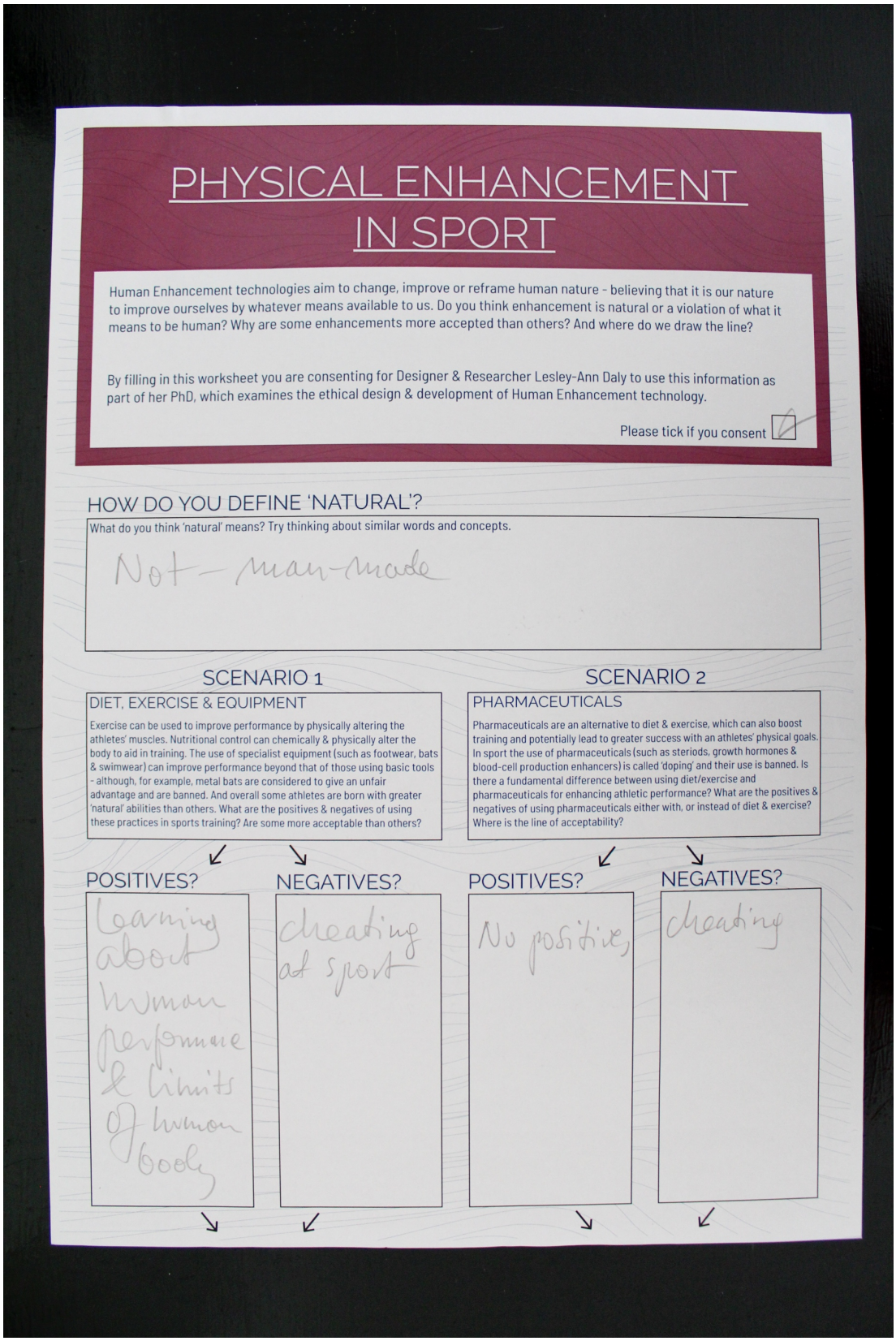


Figure 241 Physical Enhancement in Sport Worksheet - Filled In, 2019.



PHYSICAL ENHANCEMENT IN SPORT

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Not - man-made

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

Exercise can be used to improve performance by physically altering the athletes' muscles. Nutritional control can chemically & physically alter the body to aid in training. The use of specialist equipment (such as footwear, bats & swimwear) can improve performance beyond that of those using basic tools - although, for example, metal bats are considered to give an unfair advantage and are banned. And overall some athletes are born with greater 'natural' abilities than others. What are the positives & negatives of using these practices in sports training? Are some more acceptable than others?

POSITIVES?

learning about human performance & limits of human body

NEGATIVES?

cheating at sport

SCENARIO 2

PHARMACEUTICALS

Pharmaceuticals are an alternative to diet & exercise, which can also boost training and potentially lead to greater success with an athletes' physical goals. In sport the use of pharmaceuticals (such as steriods, growth hormones & blood-cell production enhancers) is called 'doping' and their use is banned. Is there a fundamental difference between using diet/exercise and pharmaceuticals for enhancing athletic performance? What are the positives & negatives of using pharmaceuticals either with, or instead of diet & exercise? Where is the line of acceptability?

POSITIVES?

No positive,

NEGATIVES?

cheating

Figure 242 Physical Enhancement in Sport Worksheet - Filled In, 2019.

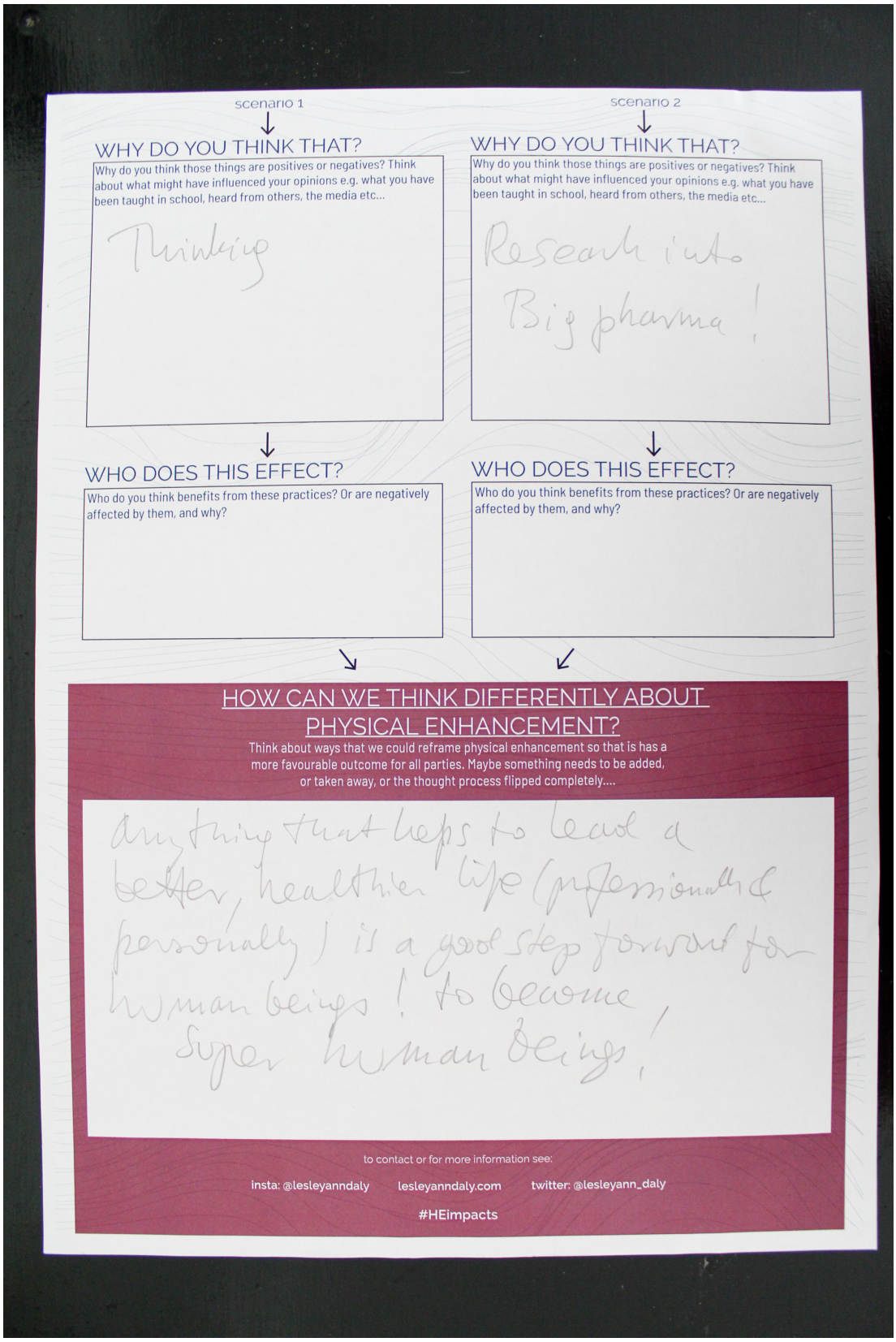
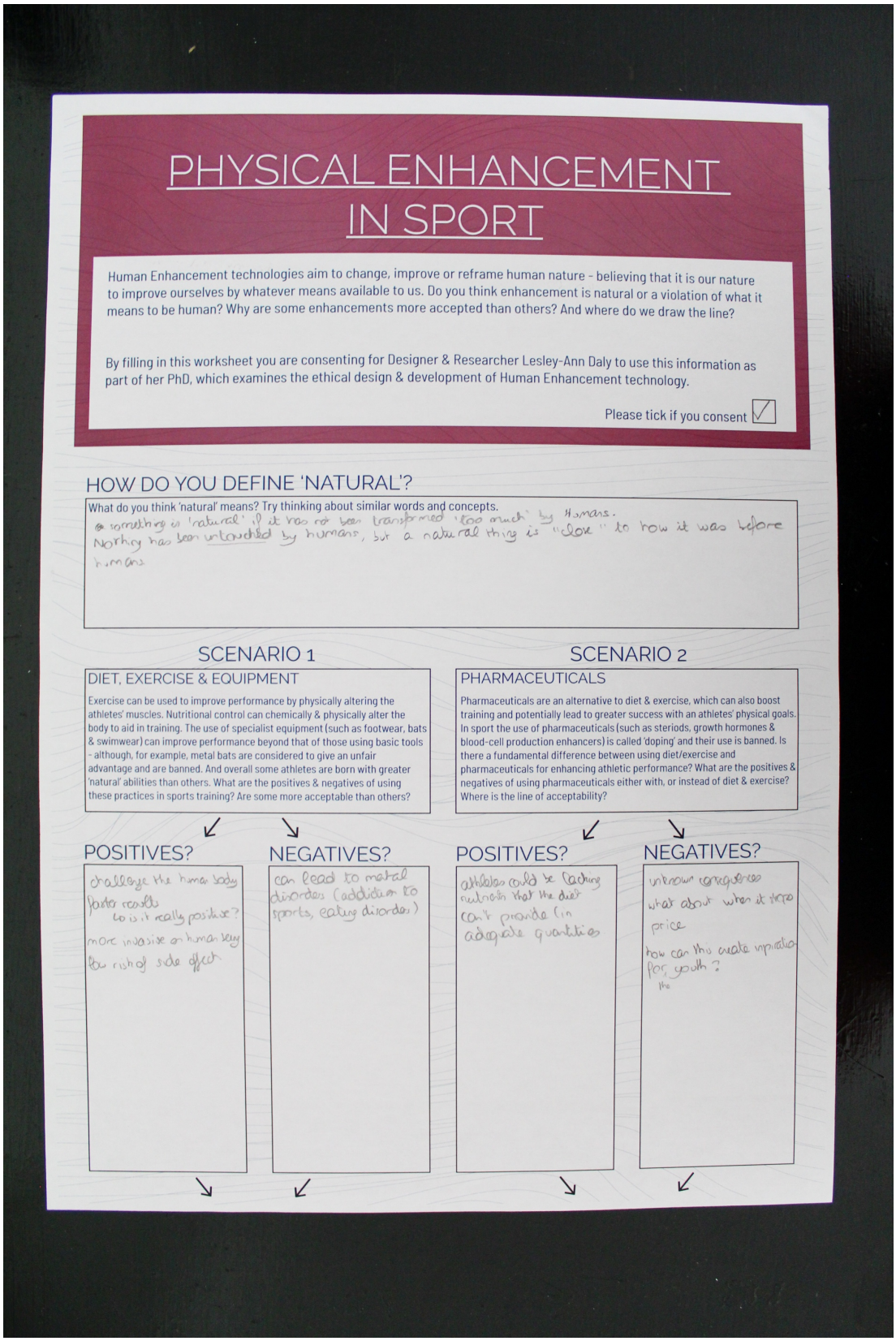


Figure 243 Physical Enhancement in Sport Worksheet - Filled In, 2019.



PHYSICAL ENHANCEMENT IN SPORT

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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

something is 'natural' if it has not been transformed 'too much' by Humans.
Nothing has been untouched by humans, but a natural thing is "close" to how it was before humans

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

Exercise can be used to improve performance by physically altering the athletes' muscles. Nutritional control can chemically & physically alter the body to aid in training. The use of specialist equipment (such as footwear, bats & swimwear) can improve performance beyond that of those using basic tools - although, for example, metal bats are considered to give an unfair advantage and are banned. And overall some athletes are born with greater 'natural' abilities than others. What are the positives & negatives of using these practices in sports training? Are some more acceptable than others?

POSITIVES?

challenge the human body
faster results
so is it really positive?
more invasive on human body
low risk of side effect

NEGATIVES?

can lead to mental disorders (addiction to sports, eating disorder)

SCENARIO 2

PHARMACEUTICALS

Pharmaceuticals are an alternative to diet & exercise, which can also boost training and potentially lead to greater success with an athletes' physical goals. In sport the use of pharmaceuticals (such as steriods, growth hormones & blood-cell production enhancers) is called 'doping' and their use is banned. Is there a fundamental difference between using diet/exercise and pharmaceuticals for enhancing athletic performance? What are the positives & negatives of using pharmaceuticals either with, or instead of diet & exercise? Where is the line of acceptability?

POSITIVES?

athletes could be lacking nutrients that the diet can't provide (in adequate quantities

NEGATIVES?

unknown consequences
what about when it stops
price
how can this create impracticalities for youth?

Figure 244 Physical Enhancement in Sport Worksheet - Filled In, 2019.

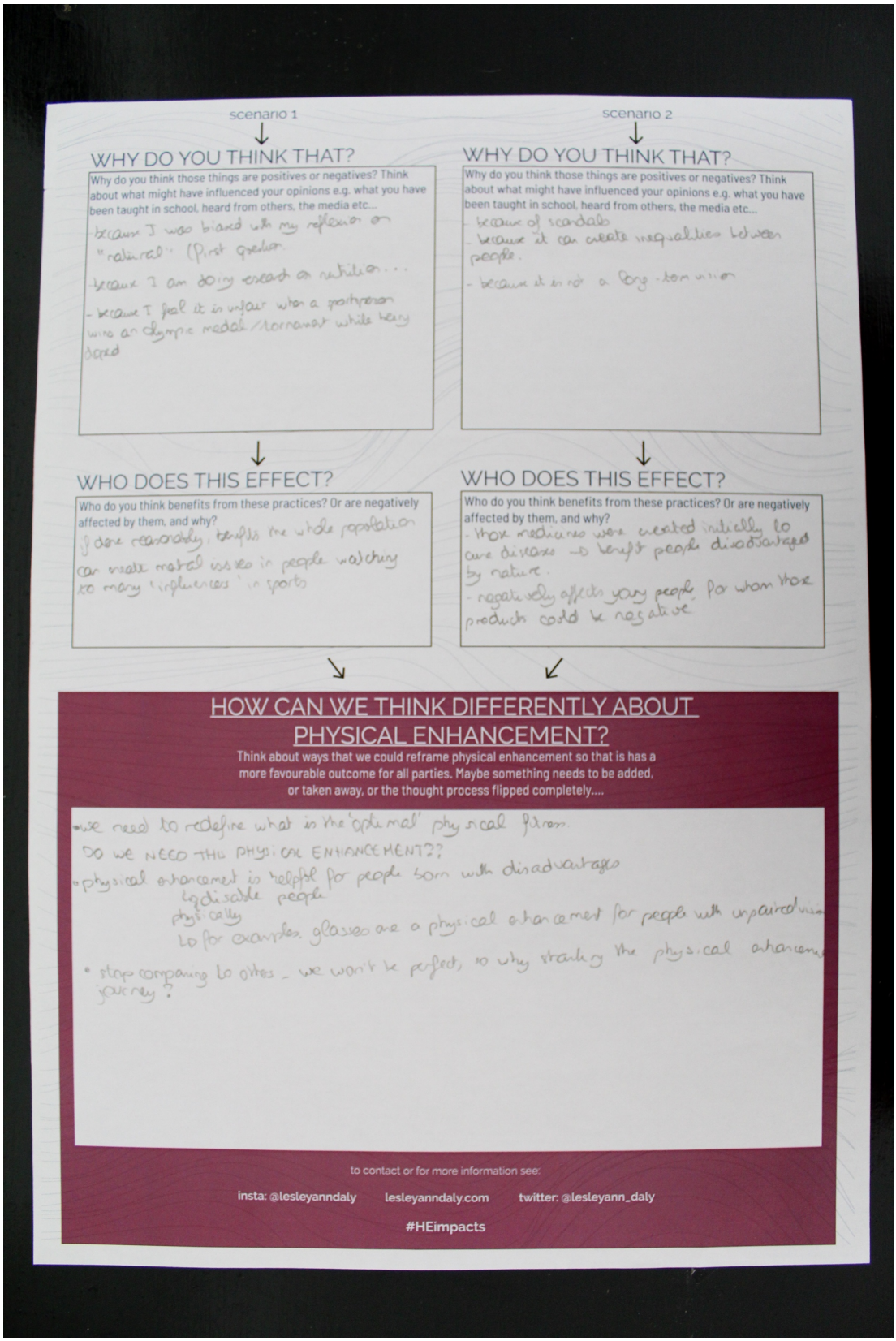
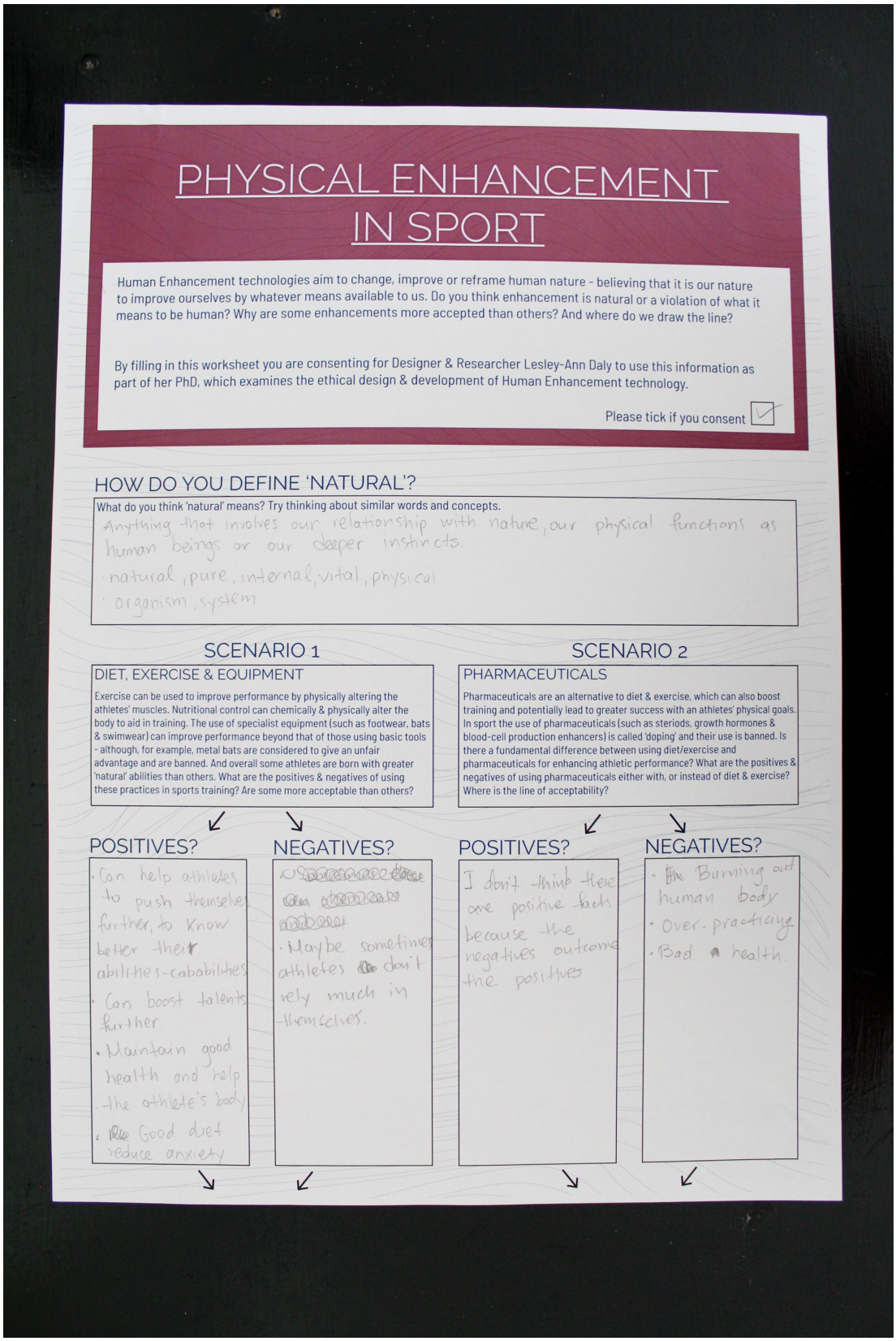


Figure 245 Physical Enhancement in Sport Worksheet - Filled In, 2019.



PHYSICAL ENHANCEMENT IN SPORT

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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Anything that involves our relationship with nature, our physical functions as human beings or our deeper instincts.

- natural, pure, internal, vital, physical
- organism, system

SCENARIO 1

DIET, EXERCISE & EQUIPMENT

Exercise can be used to improve performance by physically altering the athletes' muscles. Nutritional control can chemically & physically alter the body to aid in training. The use of specialist equipment (such as footwear, bats & swimwear) can improve performance beyond that of those using basic tools - although, for example, metal bats are considered to give an unfair advantage and are banned. And overall some athletes are born with greater 'natural' abilities than others. What are the positives & negatives of using these practices in sports training? Are some more acceptable than others?

POSITIVES?

- Can help athletes to push themselves further, to know better their abilities-cababilities
- Can boost talents further.
- Maintain good health and help the athlete's body
- Good diet reduce anxiety

NEGATIVES?

- Maybe sometimes athletes don't rely much in themselves.

SCENARIO 2

PHARMACEUTICALS

Pharmaceuticals are an alternative to diet & exercise, which can also boost training and potentially lead to greater success with an athletes' physical goals. In sport the use of pharmaceuticals (such as steriods, growth hormones & blood-cell production enhancers) is called 'doping' and their use is banned. Is there a fundamental difference between using diet/exercise and pharmaceuticals for enhancing athletic performance? What are the positives & negatives of using pharmaceuticals either with, or instead of diet & exercise? Where is the line of acceptability?

POSITIVES?

I don't think there are positive facts because the negatives outcome the positives

NEGATIVES?

- The Burning out human body
- Over-practicing
- Bad health

Figure 246 Physical Enhancement in Sport Worksheet - Filled In, 2019.

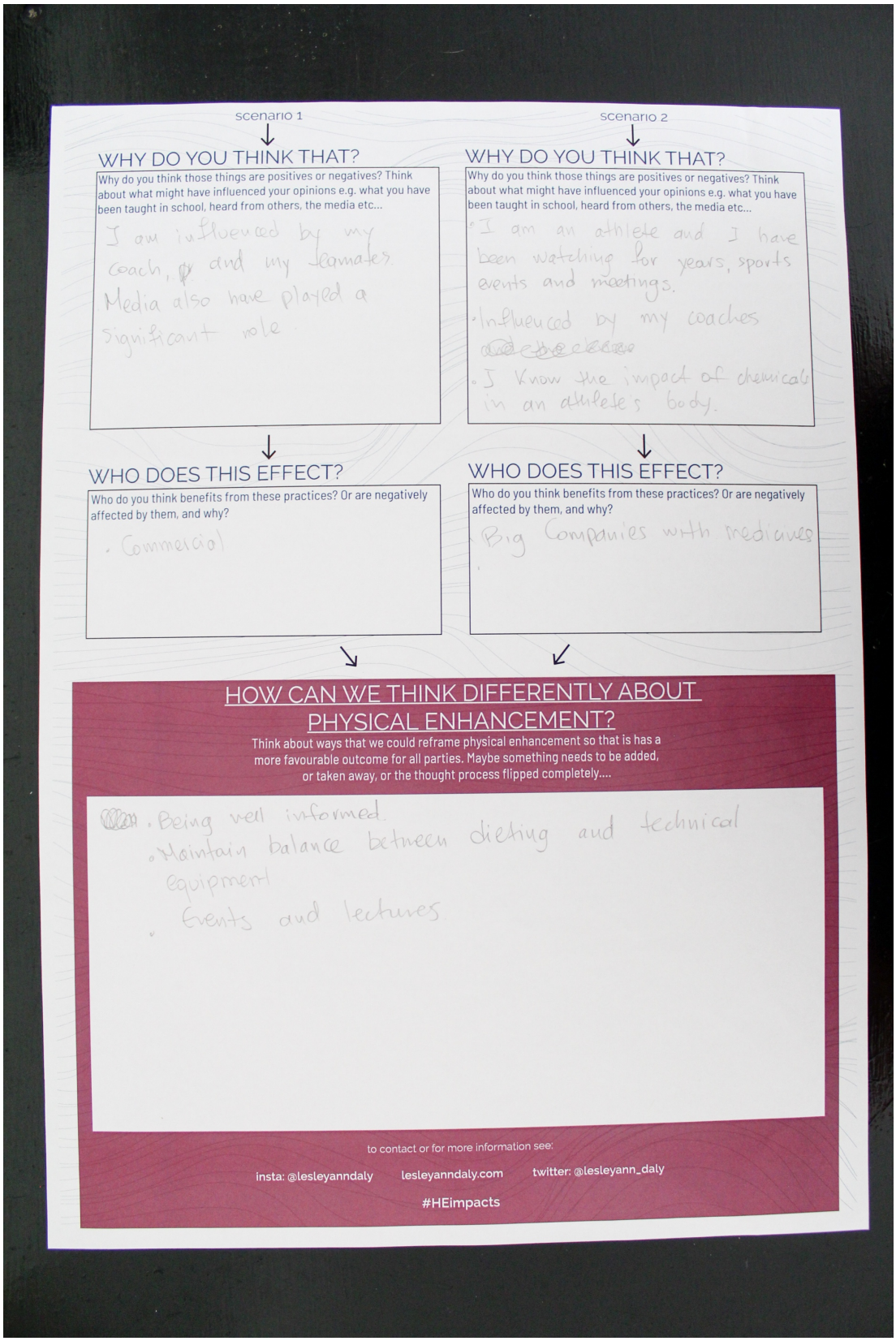


Figure Physical Enhancement in Sport Worksheet - Filled In, 2019.

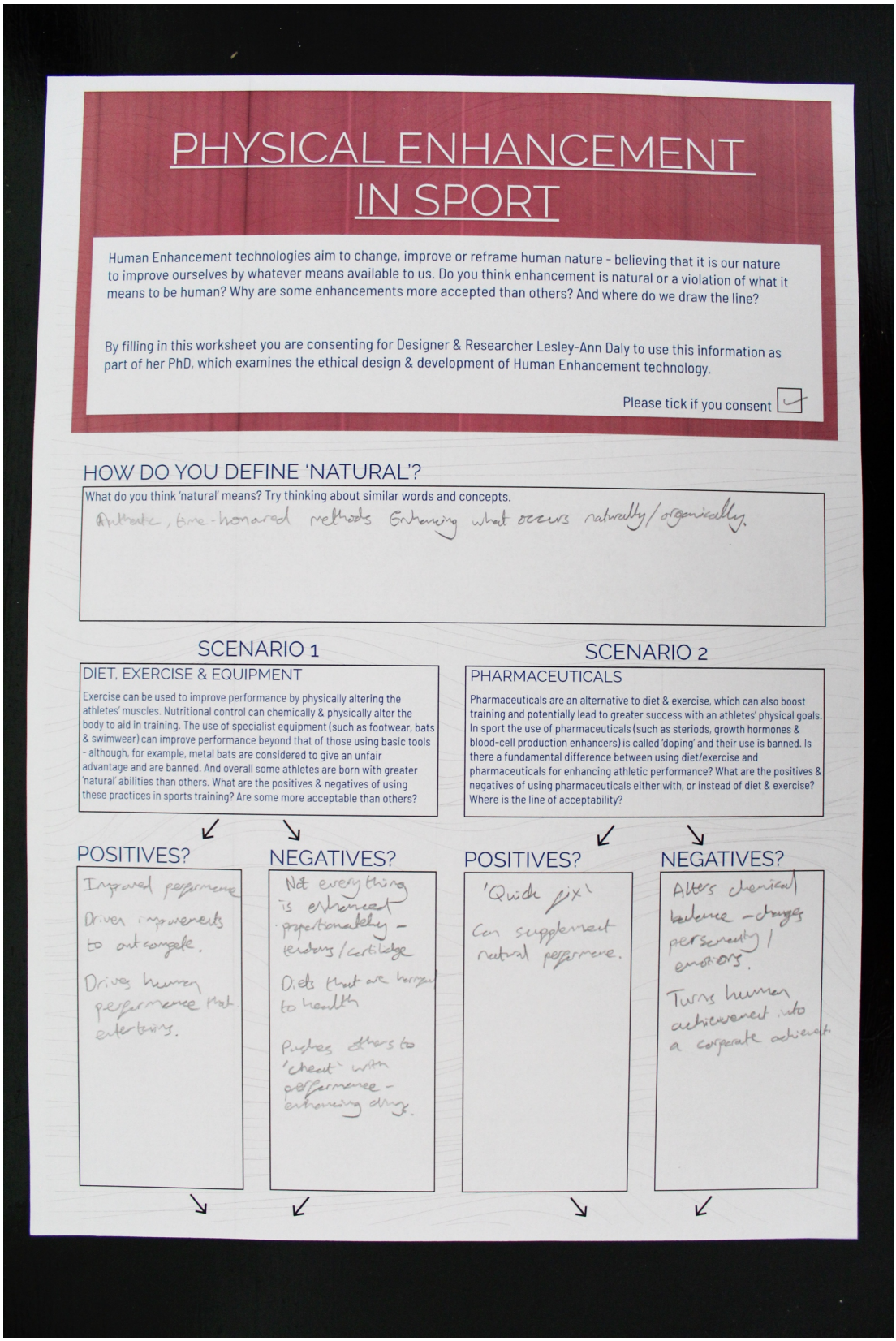


Figure 247 Physical Enhancement in Sport Worksheet - Filled In, 2019.

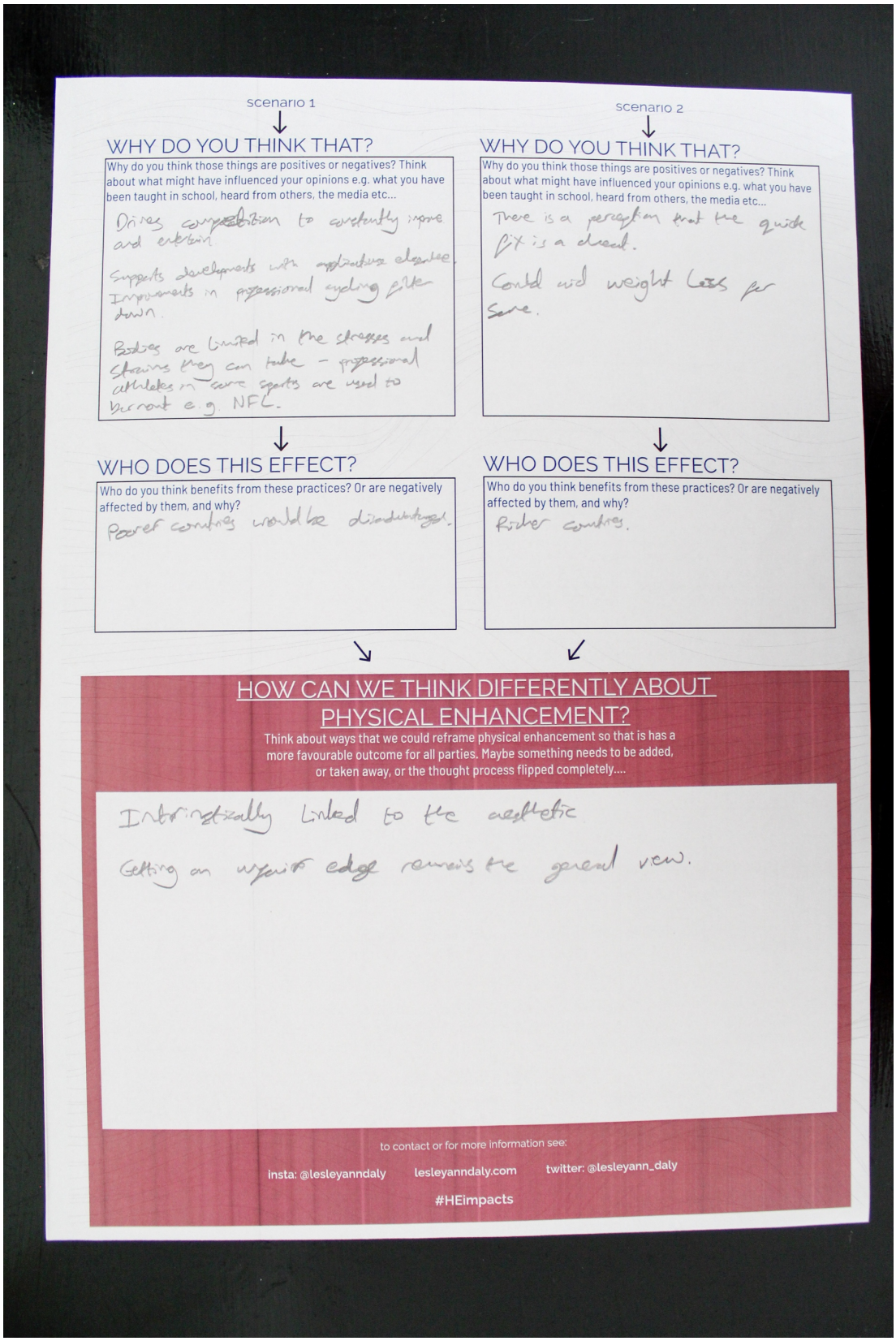


Figure 248 Physical Enhancement in Sport Worksheet - Filled In, 2019.

PHYSICAL ENHANCEMENT IN SPORT 14 sheets	#
DEFINE 'NATURAL'	
authentic	1
organic	3
time-honoured methods	1
to do with nature	4
instincts/behaviours	1
pure	5
not interefered w/ by humans	4
not man-made	2
the body in it's pure form	2
being yourself	1
evolution	1
harmony w nature	1
	26
S1 - EXERCISE & EQUIPMENT	
POSITIVES	
improved performance	6
sports/performance is entertaining	2
imp performance for competition	2
good for your health	4
helps with anxiety	2
lower risk of side effects	2
learning your limits/pushing them	2
everyone has equal access/opportunity	3
can tailor to needs	1
learn about body -> can help w/ therapy for ppl	1
helps aging - lead a more active later life	1
	26
NEGATIVES	
uneven enhancement - damages other parts	1
some diets harmful to health	1
pushes ppl to 'cheat' to keep up	2
athletes don't rely on themselves	1
addiction (image/eating disorders)	4
long term health problems	2
can overdo it	2
some ppl are naturally better anyway	1
money can buy better eq/coaches etc	4
when do we stop? When is it too much?	1
	19
S2 - PHARMACEAUTICALS	
POSITIVES	
works quickly	2
supplements 'natural' training	1
aid weight loss	1
provides nutrients the body needs/can't get elsewhere	1
boosts body builders	2
improves performance/pushes boundaries	3
body can withstand more training	1
pharma is a tool like equipmeny	2
	13
NEGATIVES	
different cultures value individual/society more	1
changes personality /mental health (mood, emotion etc)	4
human achievement becomes corporate achievement	1
cheating/unfair edge	6
can cause burn out/pushing too far	2
bad for health	8
unknown side effects	3
price - inequality	1
bad inspiration (role model) for youth	1
harms integrity of competition -> body prowess	3
causes peer pressure to keep up	1

#	NOTES
	both improved preformance
	both health issues

S1 - WHY DO YOU THINK THAT?			S2 - WHY DO YOU THINK THAT?			
own experience in sport	4		own experience in sport	1		
media	1		coaches	1		personal experience
coaches	1		own experience in sport 'supplements'	1		media scandals - cycling, paralympics etc
research	1		media/scandals	5		
personal opinion	6		personal opinion	3		
friends/family	1		research	2		
			Nazis	1		
			education	2		
			parents/friends	2		
	14			18		
S1 - WHO DOES IT EFFECT?			S2 - WHO DOES IT EFFECT?			
poorer countries	1		richer people/countries	1		
everyone	2		companies that make it	3		
those influenced by behaviours of famous athletes	1		young people	1		money money money
athletes	2		athletes	4		
non professionals interseted in exercise	1		those using recreationally	1		
sponsors (profit from)	3		those using it to 'keep up' (peer pressure)	2		
those who can't afford it	1		sponsors	2		
			essense of sport	1		
	11			15		
	70			77		
HOW CAN WE THINK DIFFERENTLY?						
be better informed/educate ppl	3					
learn to maintain a health balance	1					
need to define 'optimal fitness'	1					
don't compare oursleves to others	1		open to embrace the good aspects to improve life			
do we need enhancement?	1		but needs more research			
embrace how it can improve our lives	4					
research -improve/ reduce side effects	3					
these developments may create superhumans	1					
consider where is the line - need/whim	1					
ban doping	1					
sport shouldn't be all about winning	1					
make accessible for all	1					
	19					

Figure 250 Physical Enhancement in Sport worksheet quantitative analysis. Lesley-Ann Daly, 2019.

INSIGHTS FROM PHYSICAL ENHANCEMENT WORKSHEETS

Positives

Exercise & Equipment

- Improved performance
- Good for your health
- Equal access and opportunity

Doping

- Improves performance/ pushes your performance boundaries

In general exercise and healthy eating habits are viewed positively as they are proven to increase health and performance (when done right). With the added bonus that these practices are not necessarily expensive (minus equipment and specialised diet/person trainers) so are accessible practices to almost everyone.

Using pharma to improve performance was noted as a good way to push your performance boundaries and push your personal best.

Negatives

Exercise & Equipment

- Addiction – eating/image disorders
- Money can buy better coaches/equipment

Doping

- Bad for your health
- Cheating/unfair edge

Social beauty standards can cause/ flare up body dysmorphia or compulsions to look a certain way. This may lead to addiction to exercise and unhealthy eating practices in the struggle to attain these aesthetics which is very damaging to the health and mental wellbeing of people. As uncontrolled practices people are able to control and monitor their diet and exercise how they see fit without intervention from a medical body until symptoms have become excessively worse. Also having access to money can allow people to buy better equipment, pay for better coaches, or eating plans/specialist food which may give them an advantage when it comes to competitive sport.

The excessive use of pharmaceuticals to boost exercise and/or supplement healthy eating can also have a negative affect on your health – either overloading your system or leaving it lacking vital nutrients. This added boost is also seen as cheating and therefor unfair to other competitors who have not used doping to enhance their performance. It is seen as detrimental to the 'spirit of the game' – which promotes the astonishing accomplishments of the human body.

Why do you think that?

Exercise & Equipment

- Own experience in sport
- Personal opinion

Doping

- Media/scandals
- Personal opinion

Most people have at least a small amount of experience of sport (required participation in school) and it is widely covered by the media. Participants expressed their main reason for thinking this way as from personal experience or personal opinion – this may be contributed to by the possibility that those who have a deeper interest in sport may have been more likely to choose the worksheet on sport.

Opinions on doping was similarly from personal opinion but also informed by media scandals which have been prevalent in the last 15years (Lance Armstrong, Russia – Icarus documentary). These media scandals generally denounce the use of doping in sport and document how those using it are penalised by the World Anti-Doping Agency (WADA).

Who does it effect?

Exercise & Equipment

- Athletes
- Those who profit from it

Doping

- Athletes
- Those using it to keep up
- Those who profit from it

For both scenarios' participants noted its effect on athletes, with the added pressure on athletes who want to be able to keep up with those who are doping – causing peer pressure to also take pharmaceutical supplements. In both the role of money was brought up, how sport equipment/training/doping etc benefits those who are producing or selling these goods. Due to the pressure for high performance quality both in professional and leisure sports there is a high demand for these products and services and an ever-revolving door of new customers. This also includes the sponsors of athletes or athletic events who profit from entertaining and extraordinary performances.

How can we think about it differently?

- Better educating people
- Embracing how it can improve our lives
- More research to improve quality/ reduce side effects

Participants expressed a strong need for people to be better educated about good eating and exercise practices, extending to the use of pharmaceuticals. This is coupled with the awareness for added research to ensure these practices are not detrimental to the person.

Participants also expressed that we should embrace how these practices, including pharmaceuticals, can improve our lives (when made & used properly). Out of the three groups these participants were the most open to the use of pharmaceutical technologies for human enhancement purposes and not just for health reasons. Only 1 participant expressed the view that doping should be banned. This attitude may be a result of a longer exposure to pharmaceutical use in sports, in both the scandals and the everyday use of supplements by non-professional athletes. There is more knowledge and information about the actual practice of physical enhancement through supplements due to its widespread use and therefor the practice is seen as relatively safe. Though what potencies would be acceptable was not mentioned, nor was the regulation of it in competitive sports.

ANALYSIS OF PHYSICAL ENHANCEMENT IN SPORT WORKSHEETS

Inequality of Access/ Unfair Advantage

Inequality was a recurring theme throughout these scenarios – whether it be about access or use in competition. E&E was praised for its wide accessibility but also condemned for being more beneficial to those who can afford specialist equipment or training. Similarly for doping participants viewed that those who have access to, or can afford, pharmaceuticals have an unfair sporting advantage to those who don't/can't. This disparity in fairness comes back to the 'spirit of the game' where athletes, professional or not, are competing against fellow human beings with relatively similar physical competencies which they have improved via training. Though participants acknowledge that this training is not equal in general, it is seen as worse when doping is involved.

Money

Linked to the inequality of access is the role of money and who profits from its' use. Money can control the production, distribution of and access to doping technologies. Those who profit from it are more likely to want to promote its use and benefits thereof – this includes companies and sponsors.

Openness to Use

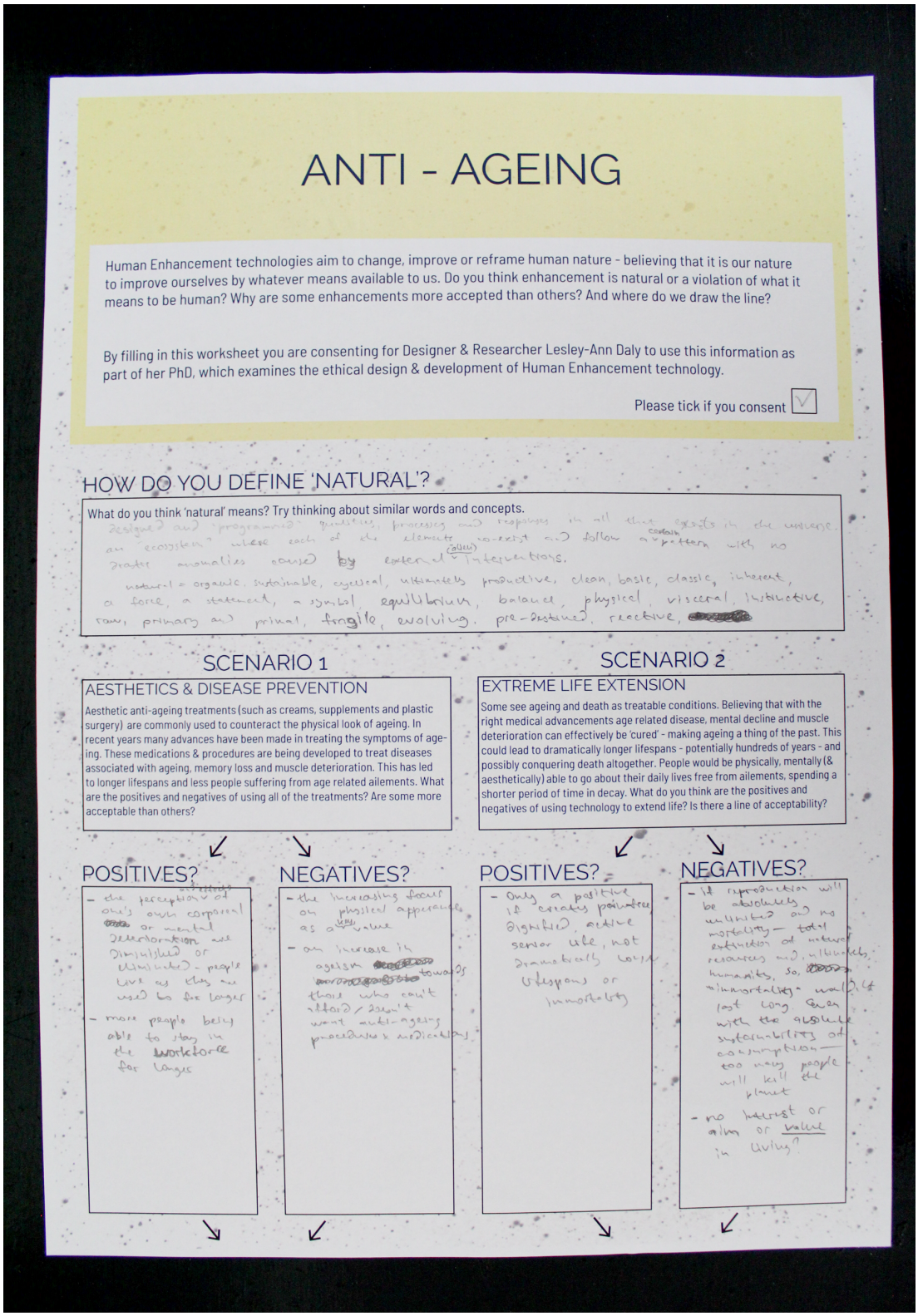
Participants in this subject were relatively open to the benefits of pharmaceuticals for physical enhancement. The enhancement was not rejected due to health-related issues, as

with GE, possibly because it does not claim any extensive health benefits or risks beyond being an aid to achieving a healthier body through exercise and dieting. Biohacking (not Grinders) has also seen a rise in popularity in recent years, the term now being associated with supplements and regimes that improve your health and wellness (not altering/implanting your body with technology). New pharmaceuticals and tried and tested supplements (such as Nootropics, vitamin supplements, metabolism boosters, coffee

) provide low risk boosts to performance from legal sources which are available online or in-stores. Though tradition doping drugs are not necessarily legal (definitely not in sport), the participants have expressed the opinion that they/people are open to their use for enhancing performance. To note the term 'biohacking' was not mentioned in the worksheet nor brought up by any participant.

Education

Education is key to moving forward with performance enhancers – both from a research and a public facing perspective. The drugs need to be researched and made safe for use by athletes or a general public, and the public needs to be informed about their correct use and dosage. Just as with any pharmaceutical, diet or exercise regime doing it wrong can cause, sometimes irreversible, harm. This need for research and public information is also noted in the BC worksheets.



ANTI - AGEING

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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

designed and programmed qualities, processes and responses in all their aspects in the universe contain an ecosystem where each of the elements co-exist and follow a pattern with no (given) greater anomalies caused by external interventions.

natural = organic, sustainable, cyclical, ultimately productive, clean, basic, classic, inherent, a force, a statement, a symbol, equilibrium, balance, physical, visceral, instinctive, raw, primary and primal, fragile, evolving, pre-destined, reactive,

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

- the perception of one's own corporeal or mental deterioration are diminished or eliminated - people live as they are used to for longer
- more people being able to stay in the workforce for longer

NEGATIVES?

- the increasing focus on physical appearance as a key value
- an increase in ageism towards those who can't afford / don't want anti-ageing procedures & medications

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

- only a positive if creating positively dignified, active senior life, not dramatically longer lifespans or immortality

NEGATIVES?

- if reproduction will be absolutely restricted and no mortality — total extinction of natural resources and, ultimately, humanity, so, immortality won't last long. Even with the absolute sustainability of consumption — too many people will kill the planet
- no interest or aim or value in living?

Figure 251 Anti-Ageing Worksheet - Filled In, 2019.

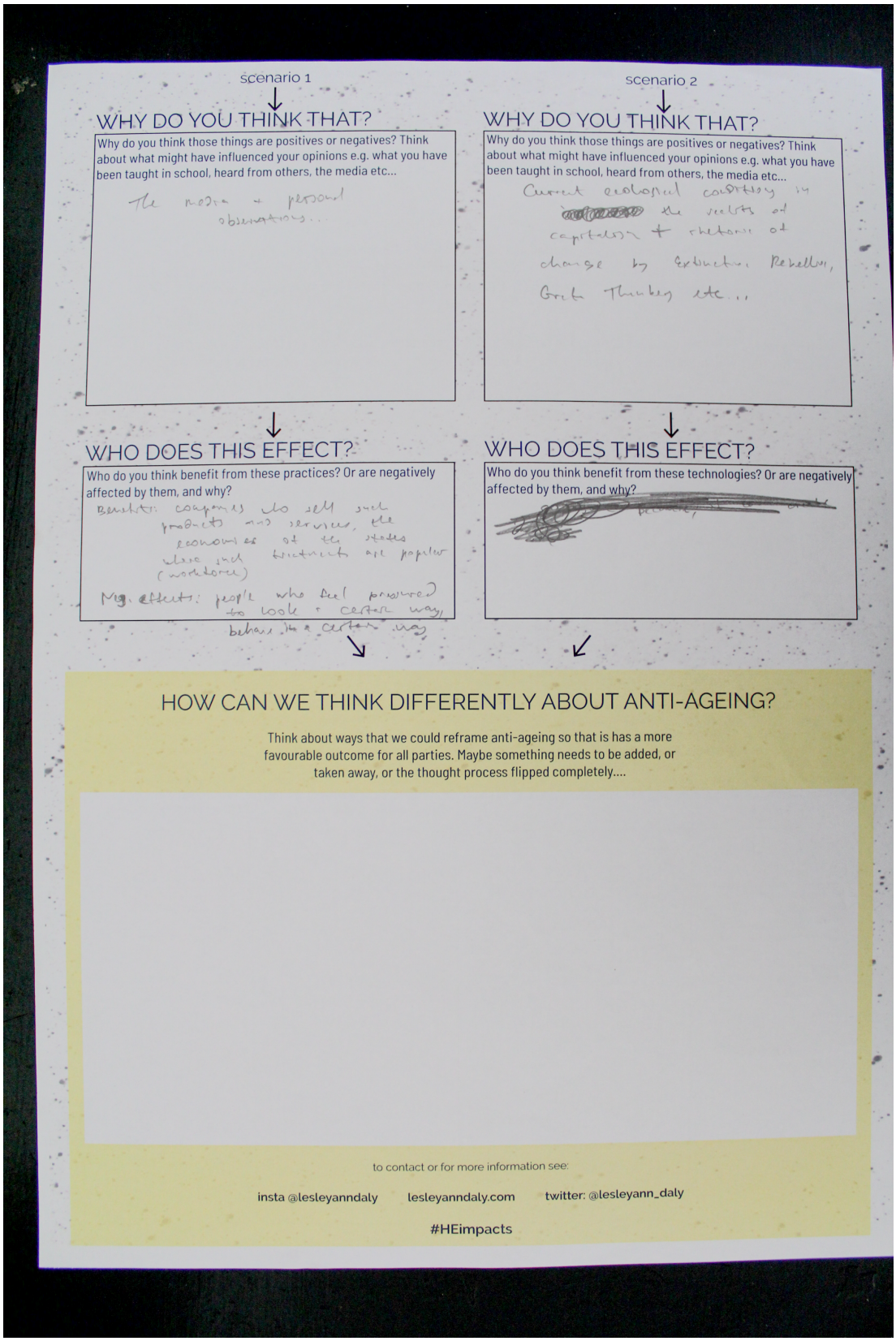


Figure 252 Anti-Ageing Worksheet - Filled In, 2019.

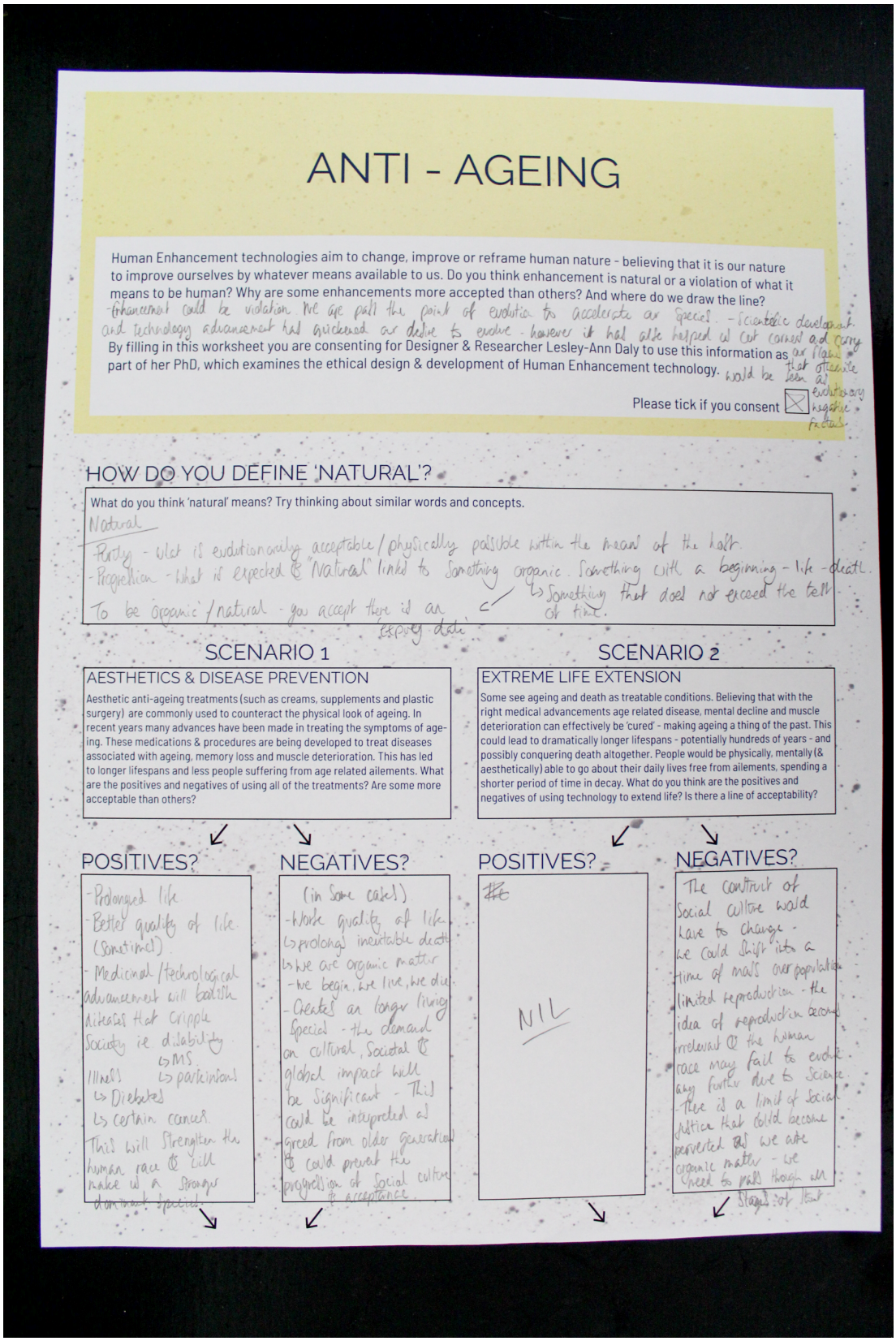


Figure 253 Anti-Ageing Worksheet - Filled In, 2019.

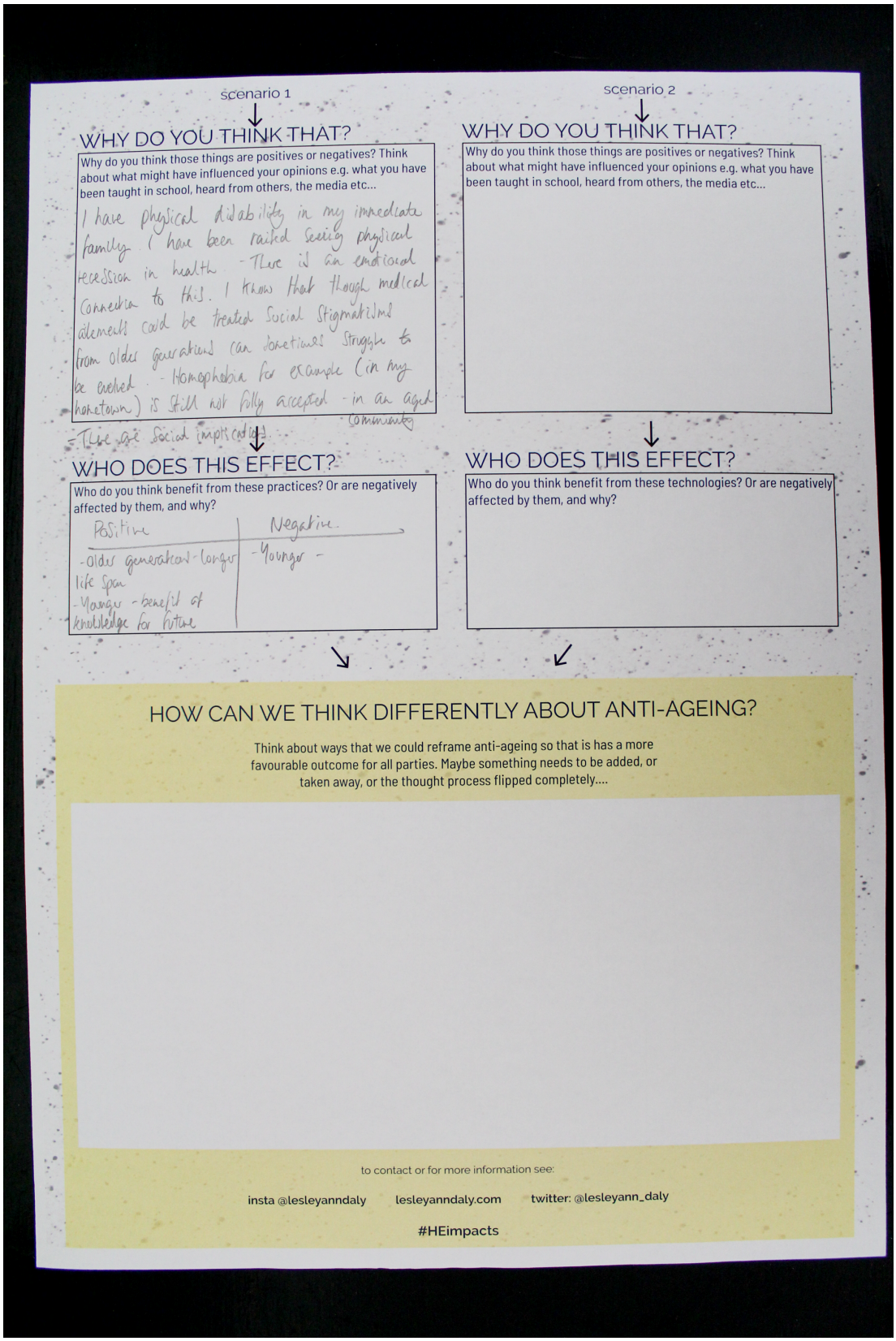


Figure 254 Anti-Ageing Worksheet - Filled In, 2019.

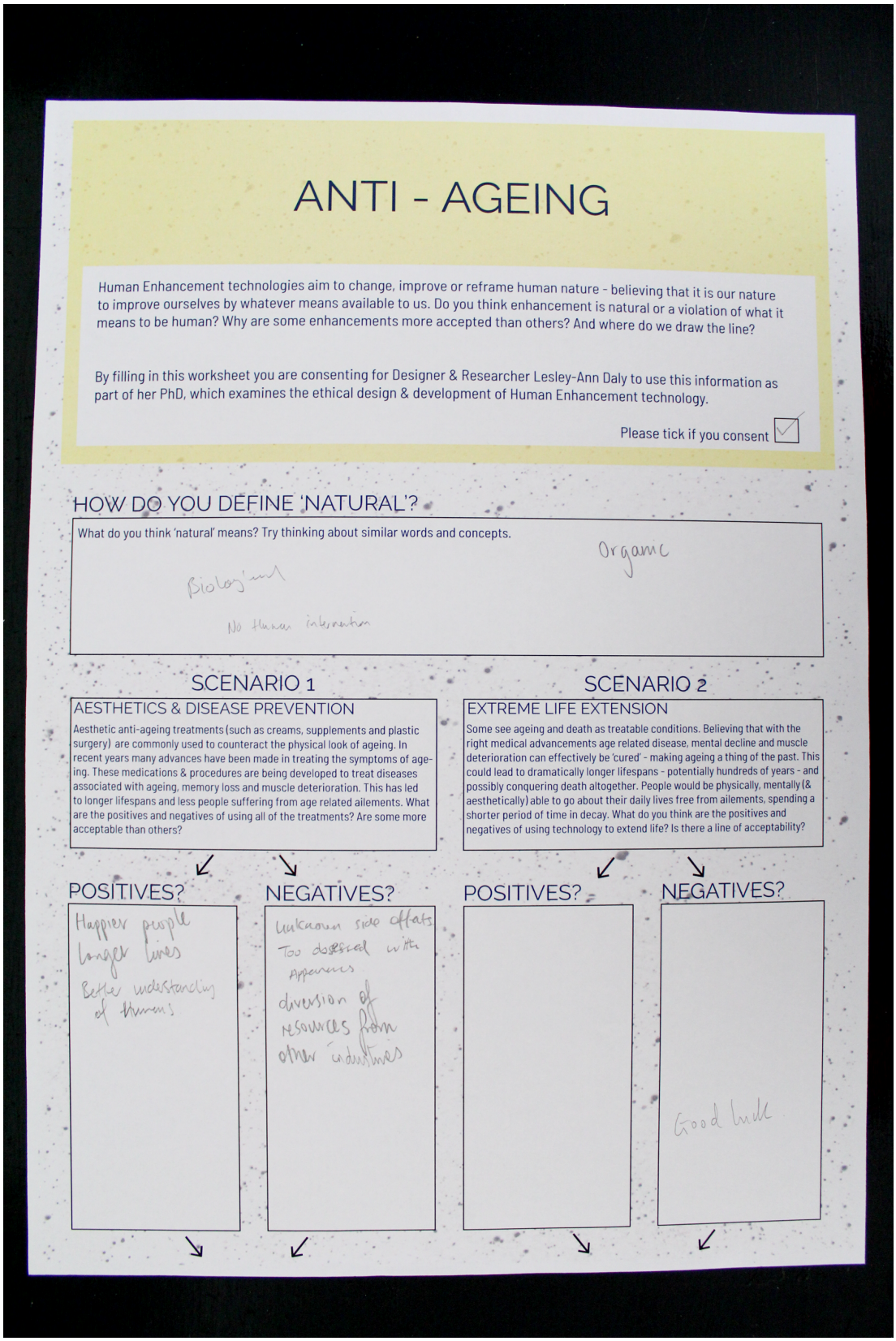


Figure 255 Anti-Ageing Worksheet - Filled In, 2019.

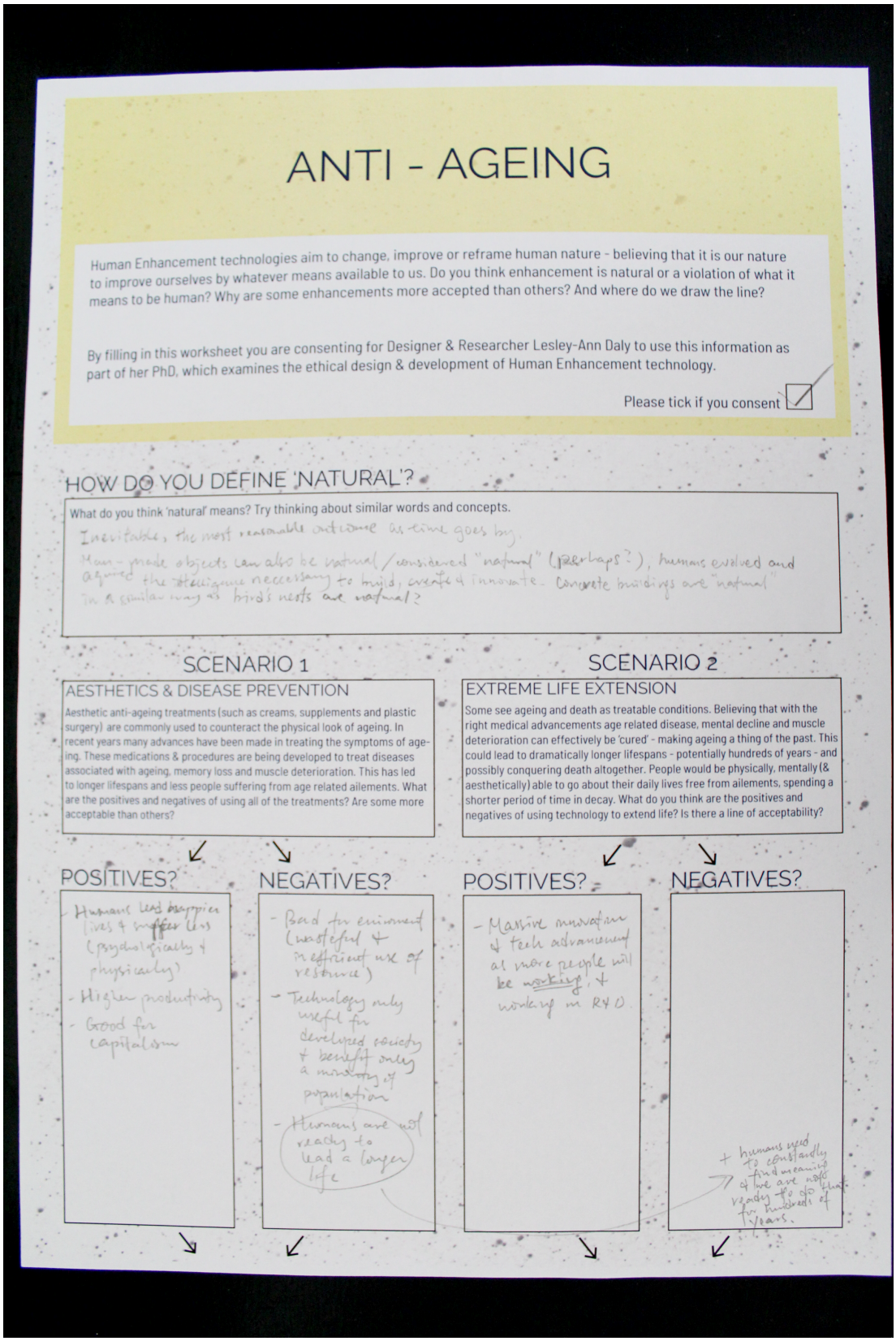
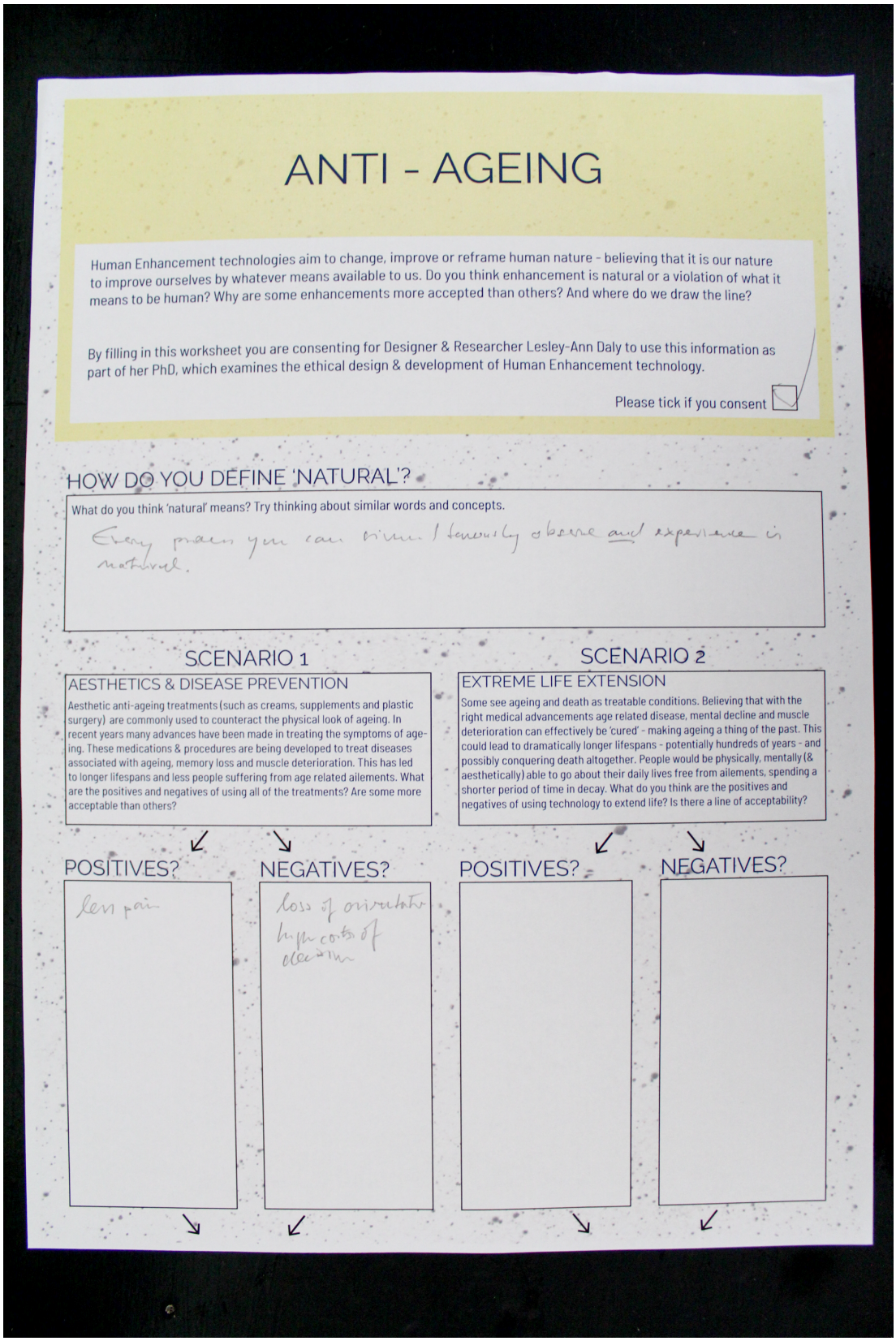


Figure 256 Anti-Ageing Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Every process you can virtually observe and experience is natural.

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

less pain

NEGATIVES?

loss of orientation
high costs of
operations

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

NEGATIVES?

Figure 257 Anti-Ageing Worksheet - Filled In, 2019.

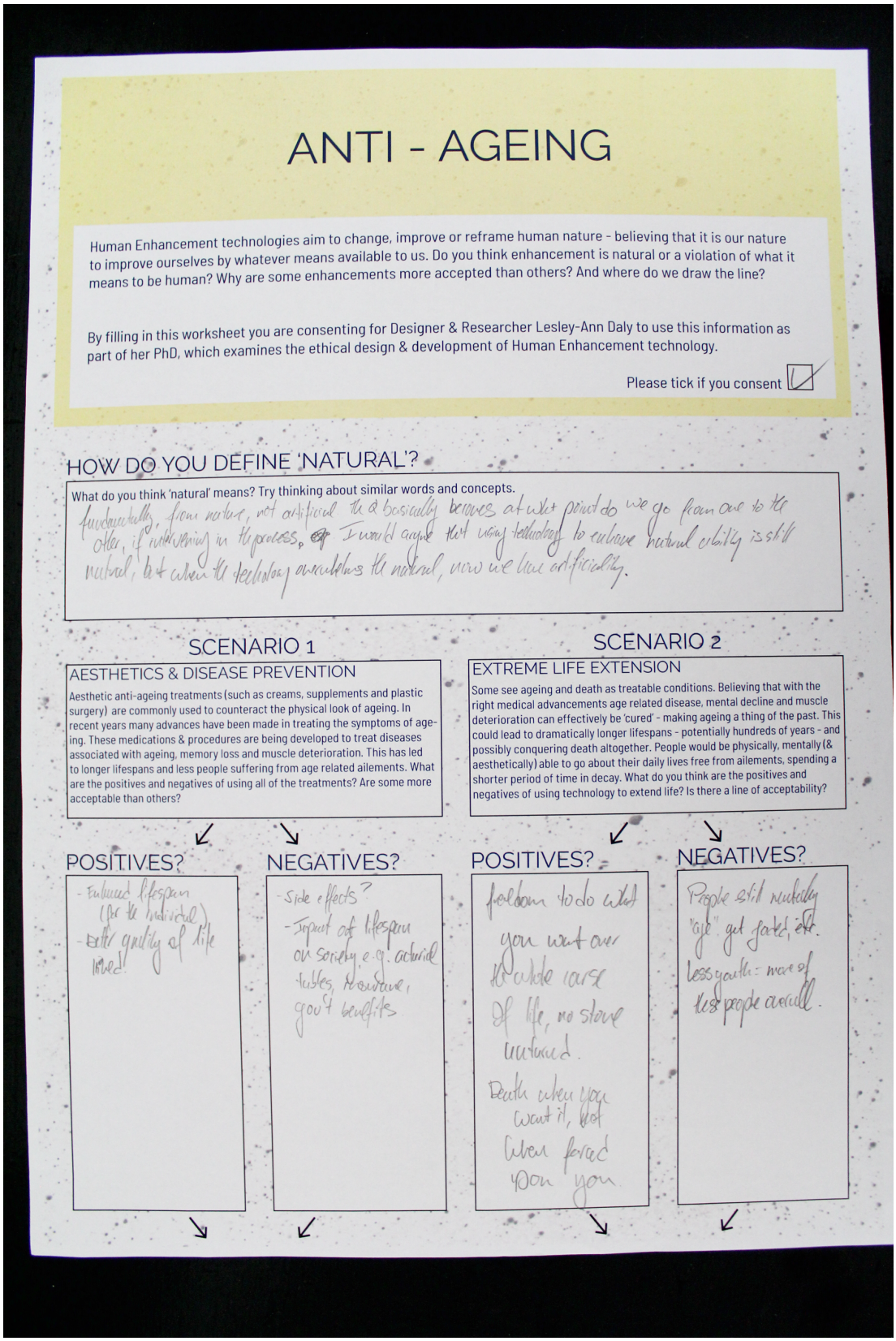


Figure 258 Anti-Ageing Worksheet - Filled In, 2019.

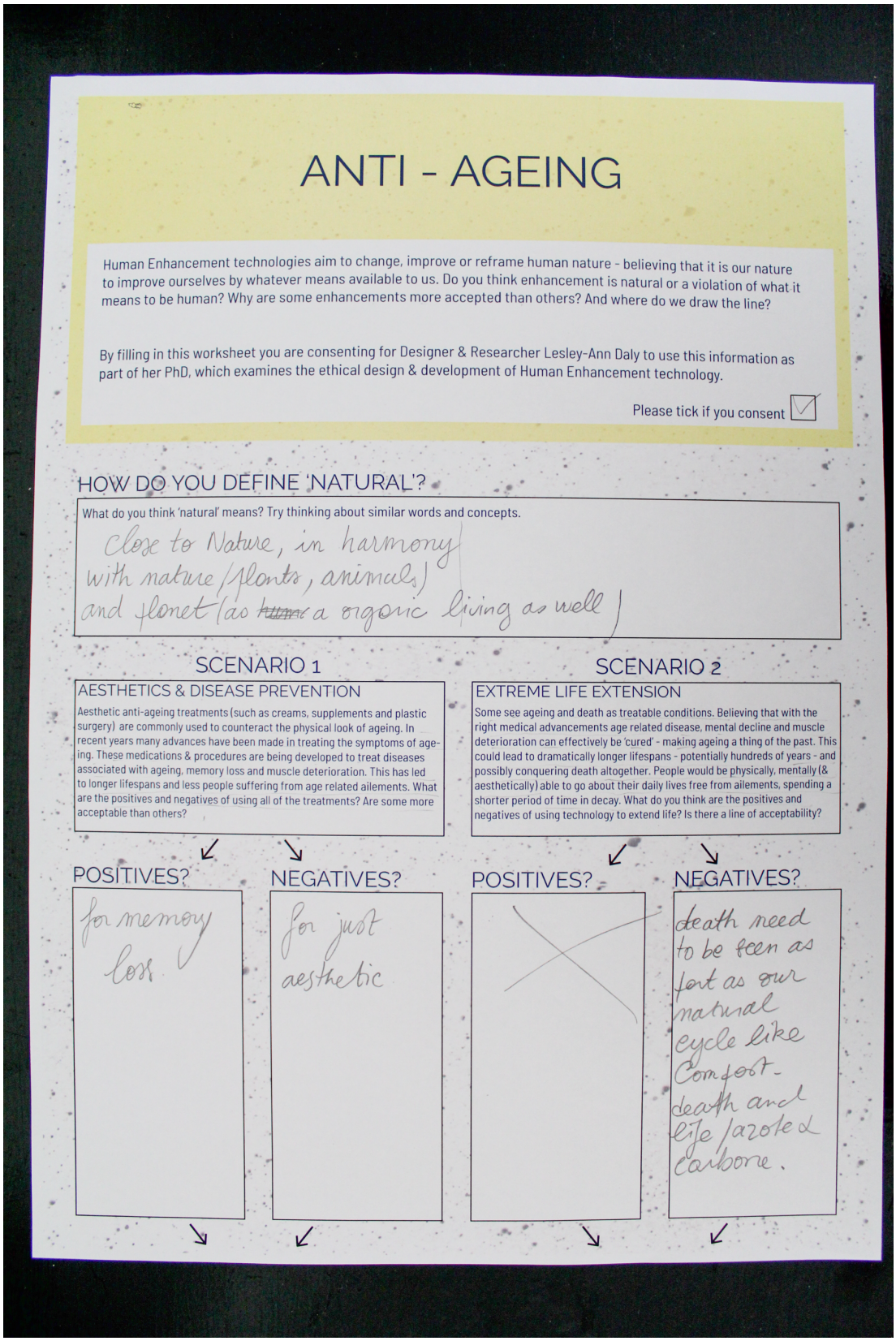


Figure 259 Anti-Ageing Worksheet - Filled In, 2019.

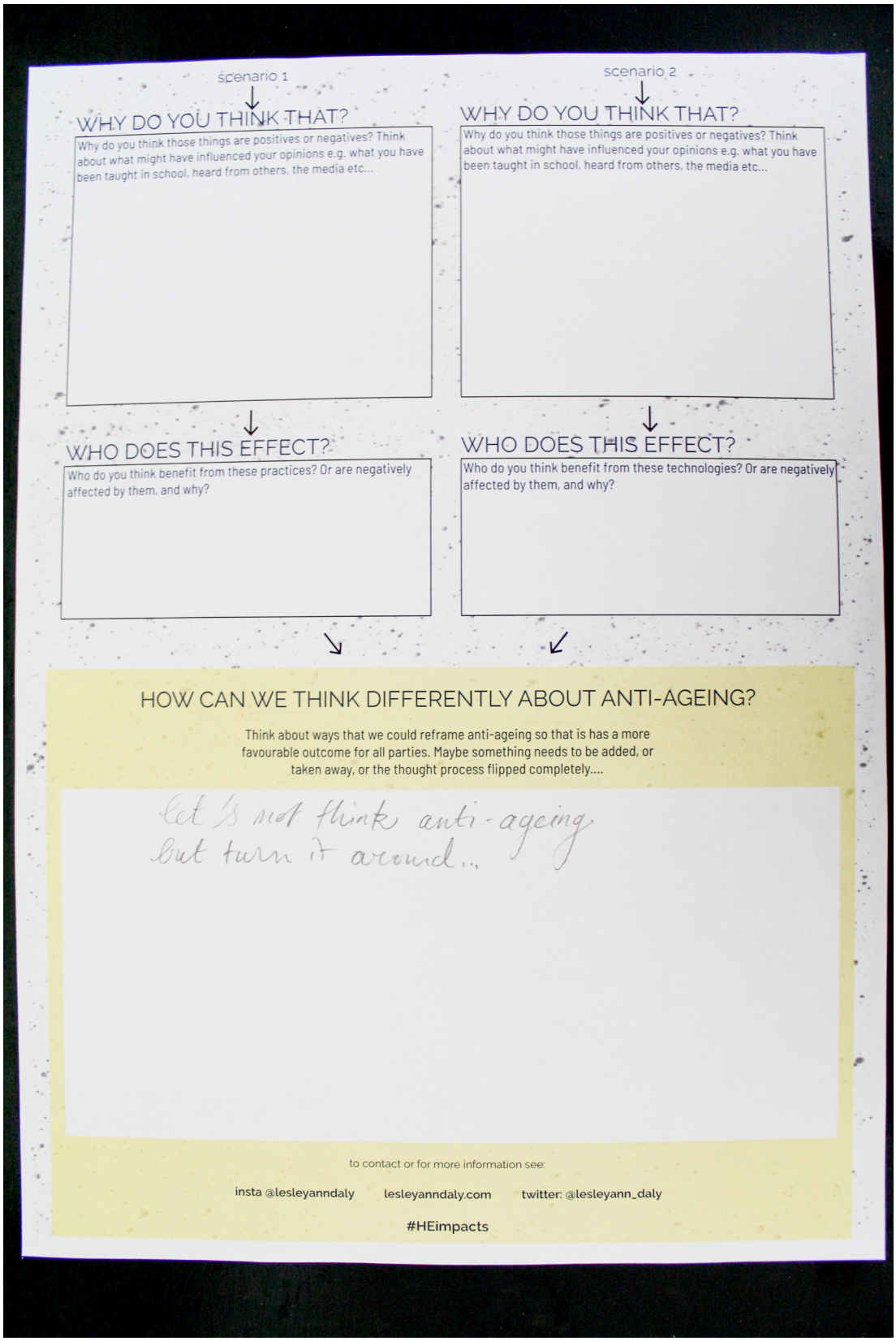


Figure 260 Anti-Ageing Worksheet - Filled In, 2019.

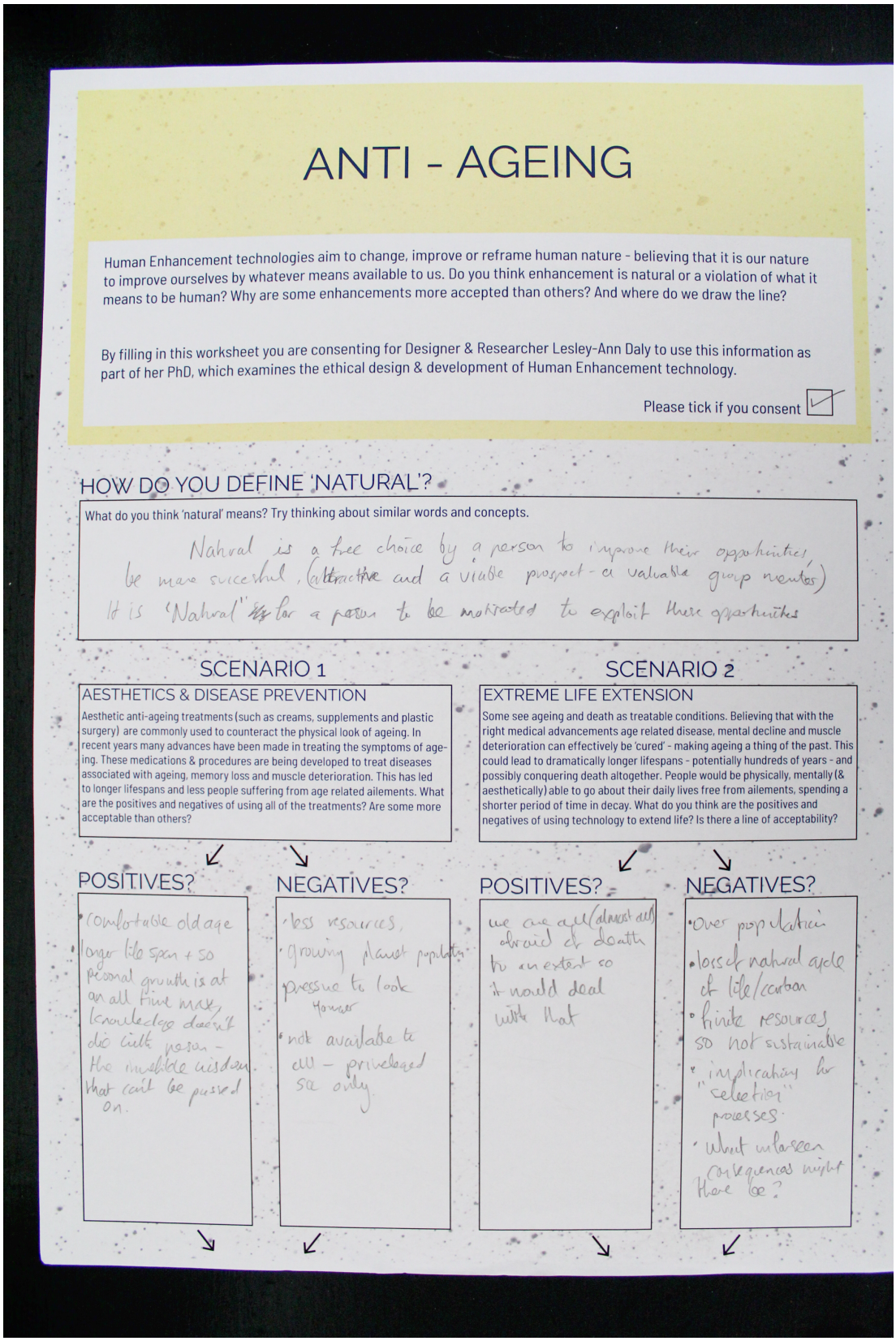


Figure 261 Anti-Ageing Worksheet - Filled In, 2019.

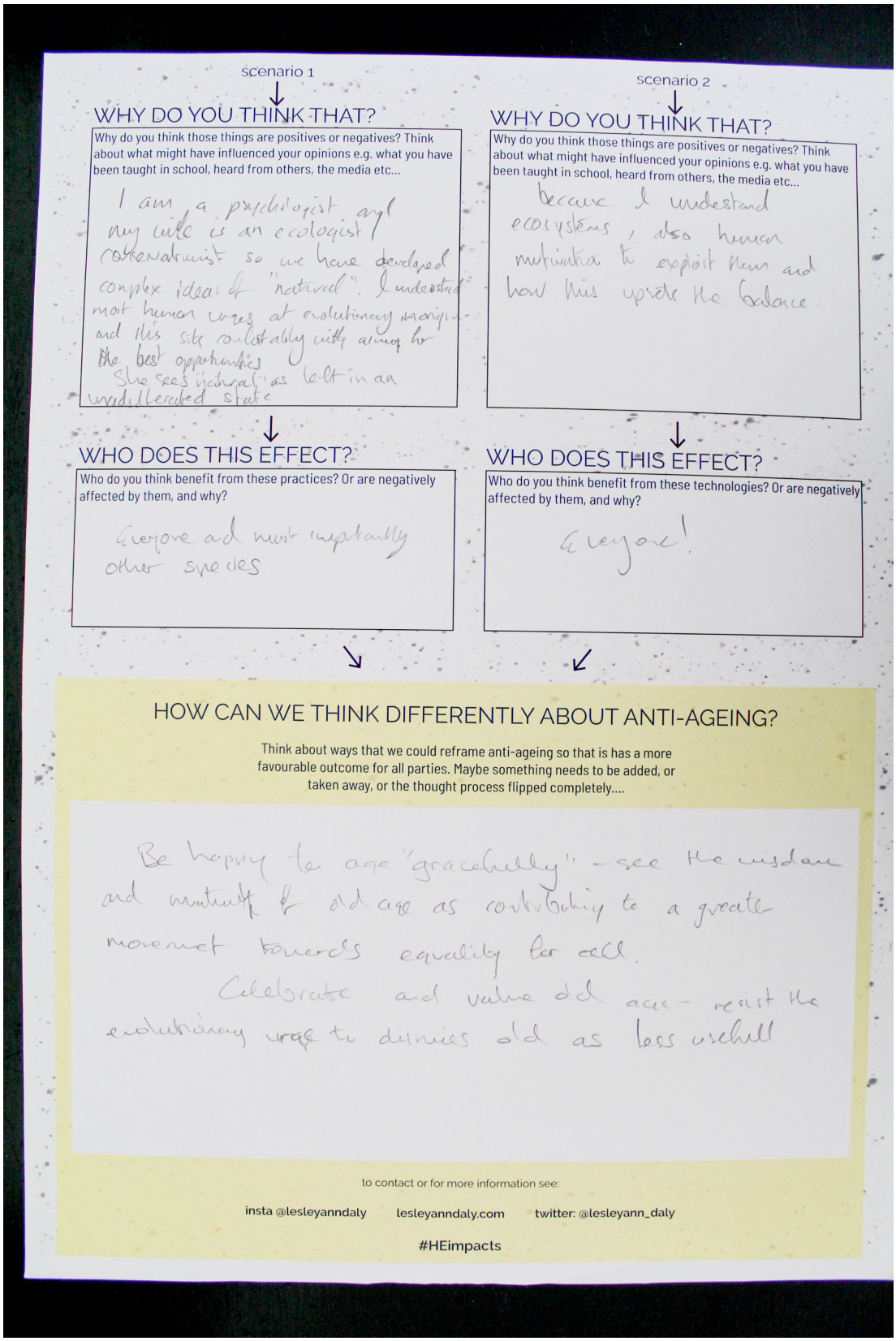
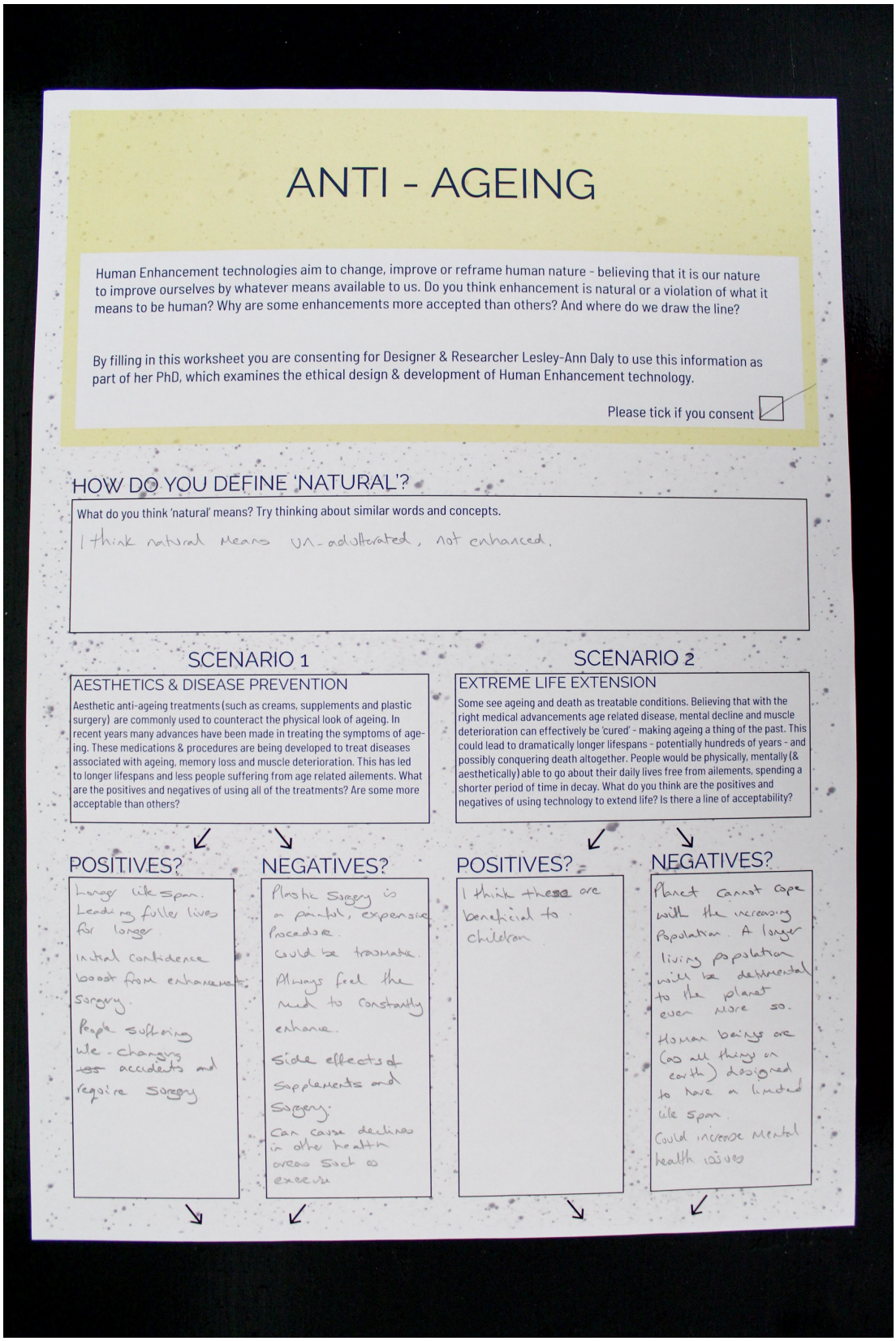


Figure 262 Anti-Ageing Worksheet - Filled In, 2019.



ANTI - AGEING

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☒

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

I think natural means un-adulterated, not enhanced.

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

Longer life span. Leading fuller lives for longer

Initial confidence boost from enhancement surgery.

People suffering life-changing accidents and ~~ill~~ require surgery

NEGATIVES?

Plastic surgery is a painful, expensive procedure.

Could be traumatic.

Always feel the need to constantly enhance.

Side effects of supplements and surgery.

Can cause declines in other health areas such as exercise

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

I think these are beneficial to children

NEGATIVES?

Planet cannot cope with the increasing population. A longer living population will be detrimental to the planet even more so.

Human beings are (as all things on earth) designed to have a limited life span.

Could increase mental health issues

Figure 263 Anti-Ageing Worksheet - Filled In, 2019.

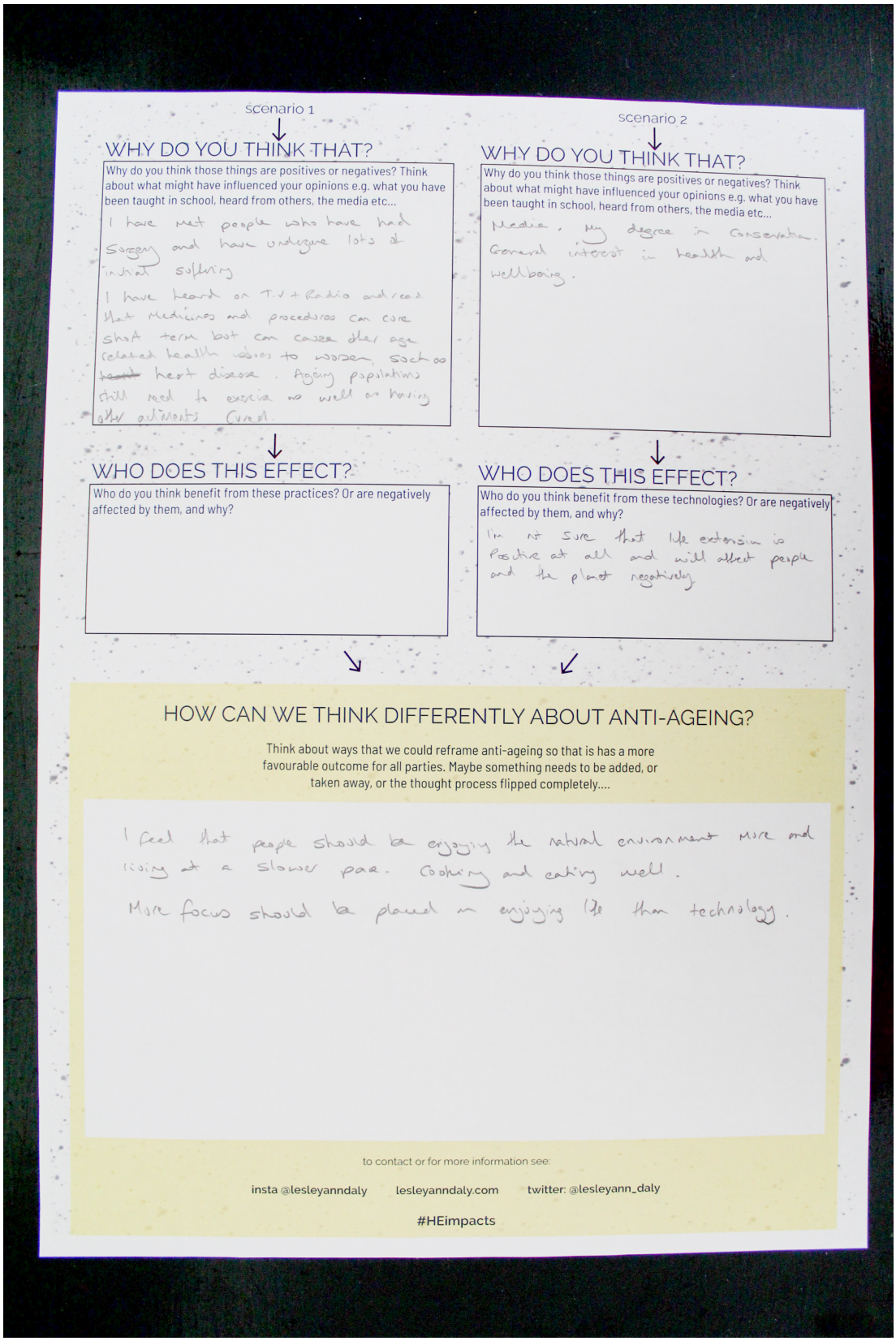
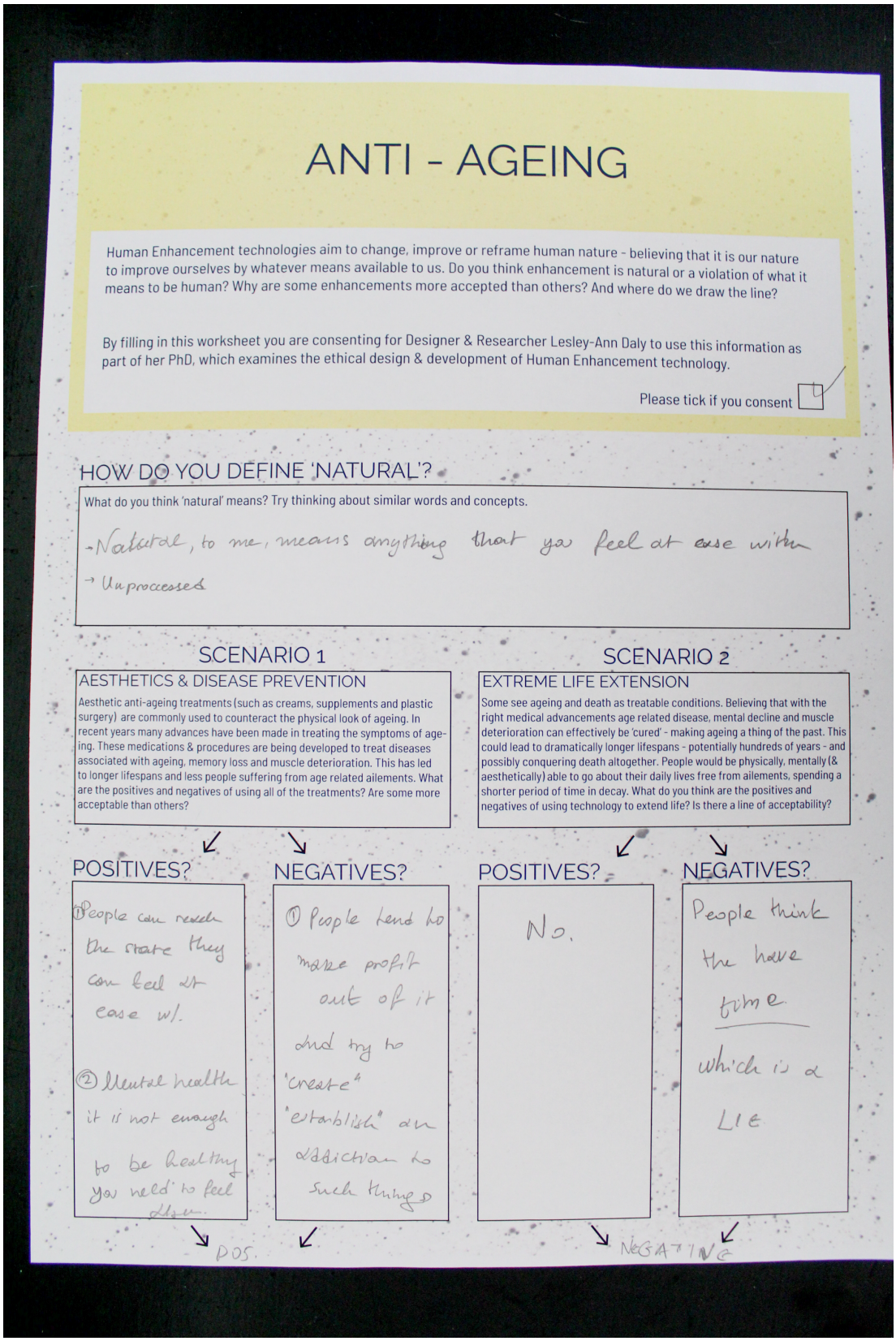


Figure 264 Anti-Ageing Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

- Natural, to me, means anything that ya feel at ease with
- Unprocessed

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

① People can reach the state they can feel at ease w/.

② Mental health it is not enough to be healthy you need to feel also.

→ POS.

NEGATIVES?

① People tend to make profit out of it and try to "create" "establish" an addiction to such things

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

No.

NEGATIVES?

People think the have time which is a Lie

→ NEGATIVE

Figure 265 Anti-Ageing Worksheet - Filled In, 2019.

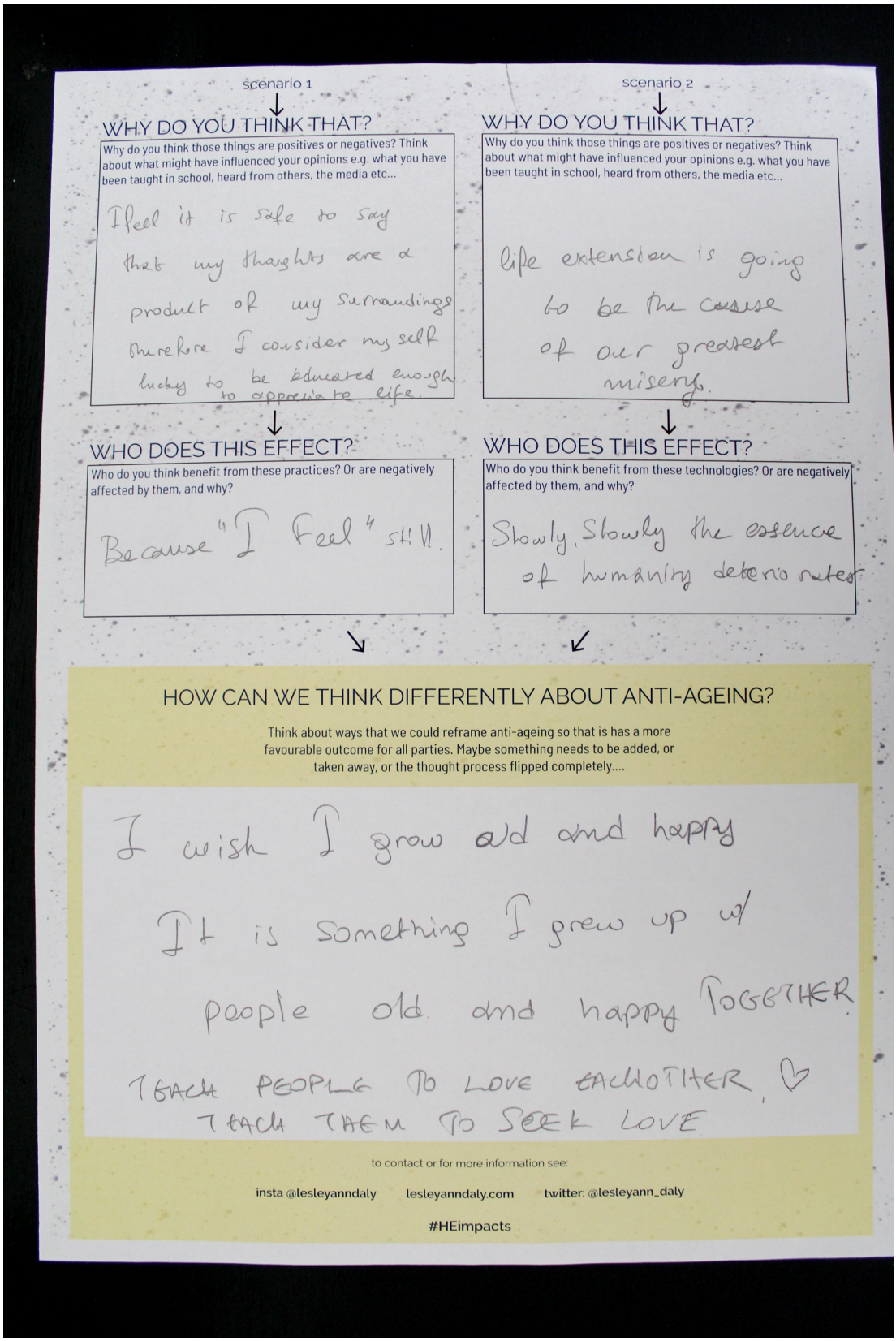


Figure 266 Anti-Ageing Worksheet - Filled In, 2019.

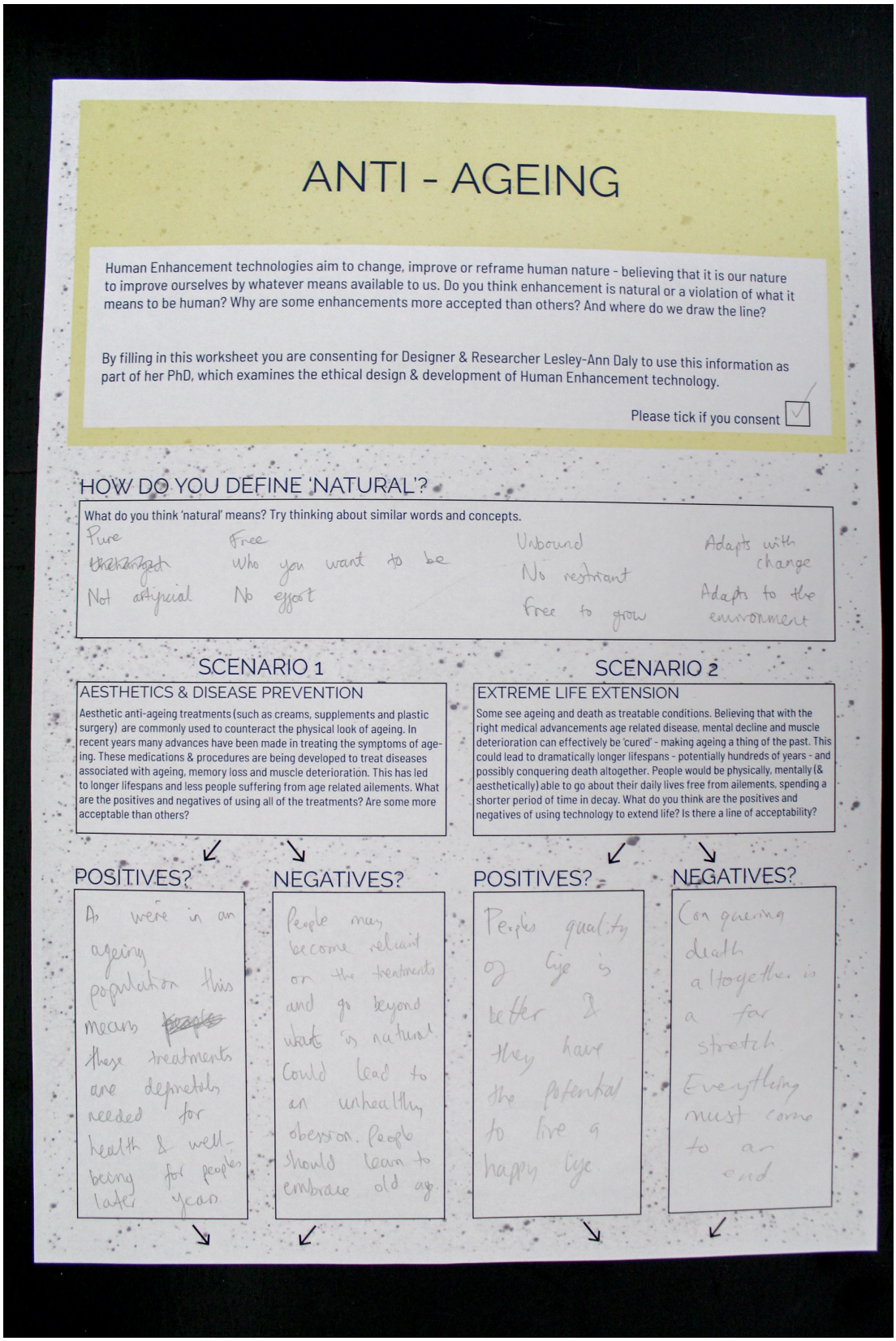


Figure 267 Anti-Ageing Worksheet - Filled In, 2019.

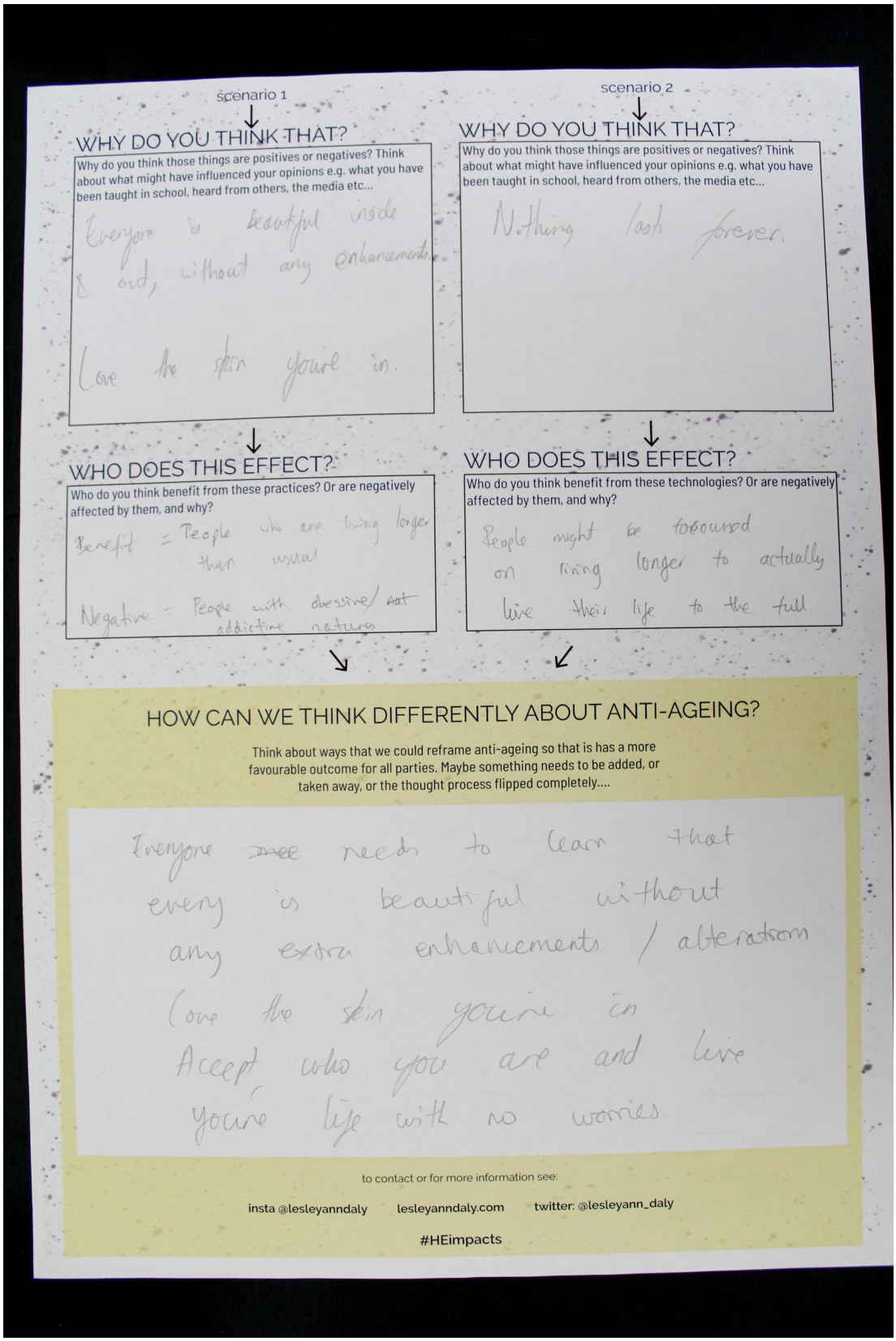
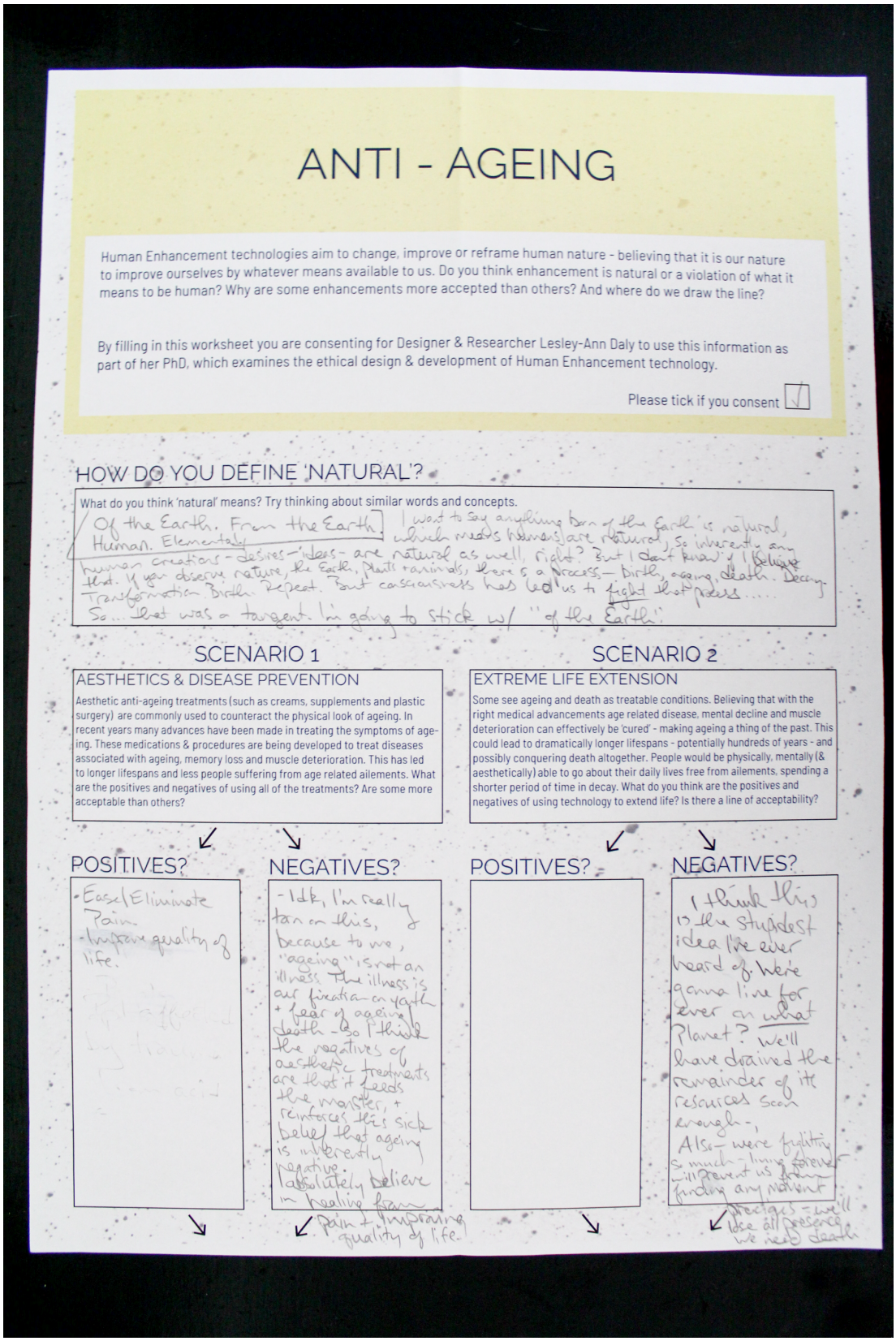


Figure 268 Anti-Ageing Worksheet - Filled In, 2019.



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HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Of the Earth. From the Earth. Human. Elemental.

I want to say anything born of the Earth is natural, which means humans are natural, so inherently any human creations - desires - ideas - are natural as well, right? But I don't know if I believe that. If you observe nature, the Earth, plants + animals, there is a process — birth, ageing, death. Decay. Transformation. Birth. Repeat. But consciousness has led us to fight that process....

So... that was a tangent. I'm going to stick w/ "of the Earth."

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

- Ease/Eliminate Pain.
- Improve quality of life.

NEGATIVES?

- Idk, I'm really torn on this, because to me, "ageing" is not an illness. The illness is our fixation on youth + fear of ageing/death - so I think the negatives of aesthetic treatments are that it feeds the monster, + reinforces this sick belief that ageing is inherently negative. I absolutely believe in healing from pain + improving quality of life.

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

NEGATIVES?

I think this is the stupidest idea I've ever heard of. We're gonna live for ever on what Planet? We'll have drained the remainder of its resources soon enough -,

Also - we're fighting so much - living forever will prevent us from finding any moment

Practices - we'll lose all presence we need death

Figure 269 Anti-Ageing Worksheet - Filled In, 2019.

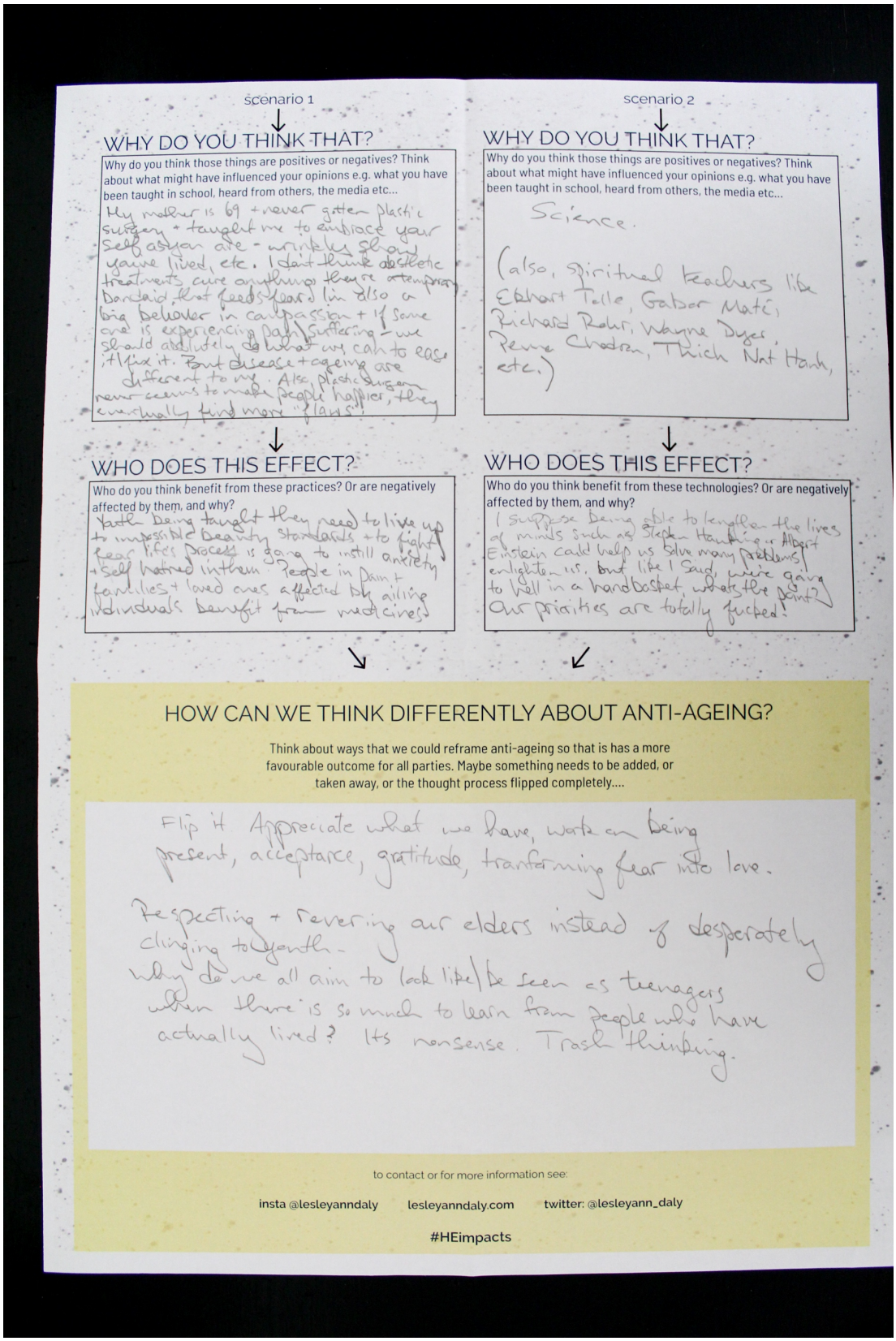
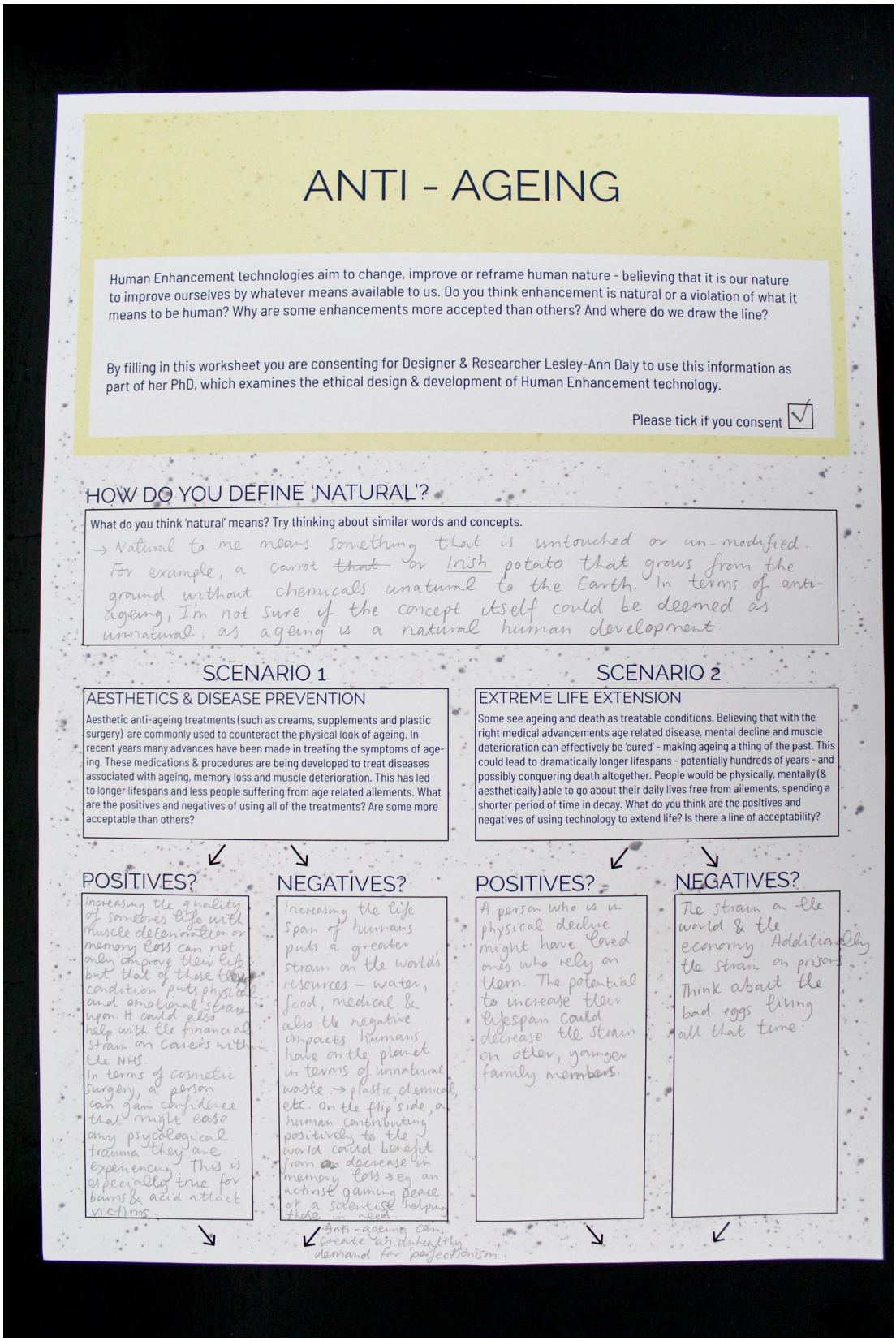


Figure 270 Anti-Ageing Worksheet - Filled In, 2019.



ANTI - AGEING

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

→ Natural to me means something that is untouched or un-modified. For example, a carrot ~~that~~ or Irish potato that grows from the ground without chemicals unatural to the Earth. In terms of anti-ageing, I'm not sure if the concept itself could be deemed as unnatural, as ageing is a natural human development.

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

Increasing the quality of someone's life with muscle deterioration or memory loss can not only improve their life but that of those ~~they~~ condition puts physical and emotional strain upon. It could also help with the financial strain on carers with the NHS.
In terms of cosmetic surgery, a person can gain confidence that might ease any psycological trauma they are experiencing. This is especially true for burns & acid attack victims.

NEGATIVES?

Increasing the life span of humans puts a greater strain on the world's resources – water, food, medical & also the negative impacts humans have on the planet in terms of unnatural waste → plastic, chemical, etc. On the flip side, a human contributing positively to the world could benefit from a decrease in memory loss → eg. an activist gaining peace of a scientist helping those in need.

Anti-ageing can create an unhealthy demand for perfectionism.

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

A person who is in physical decline might have loved ones who rely on them. The potential to increase their lifespan could decrease the strain on other, younger family members.

NEGATIVES?

The strain on the world & the economy. Additionally the strain on prisons. Think about the bad eggs living all that time.

Figure 271 Anti-Ageing Worksheet - Filled In, 2019.

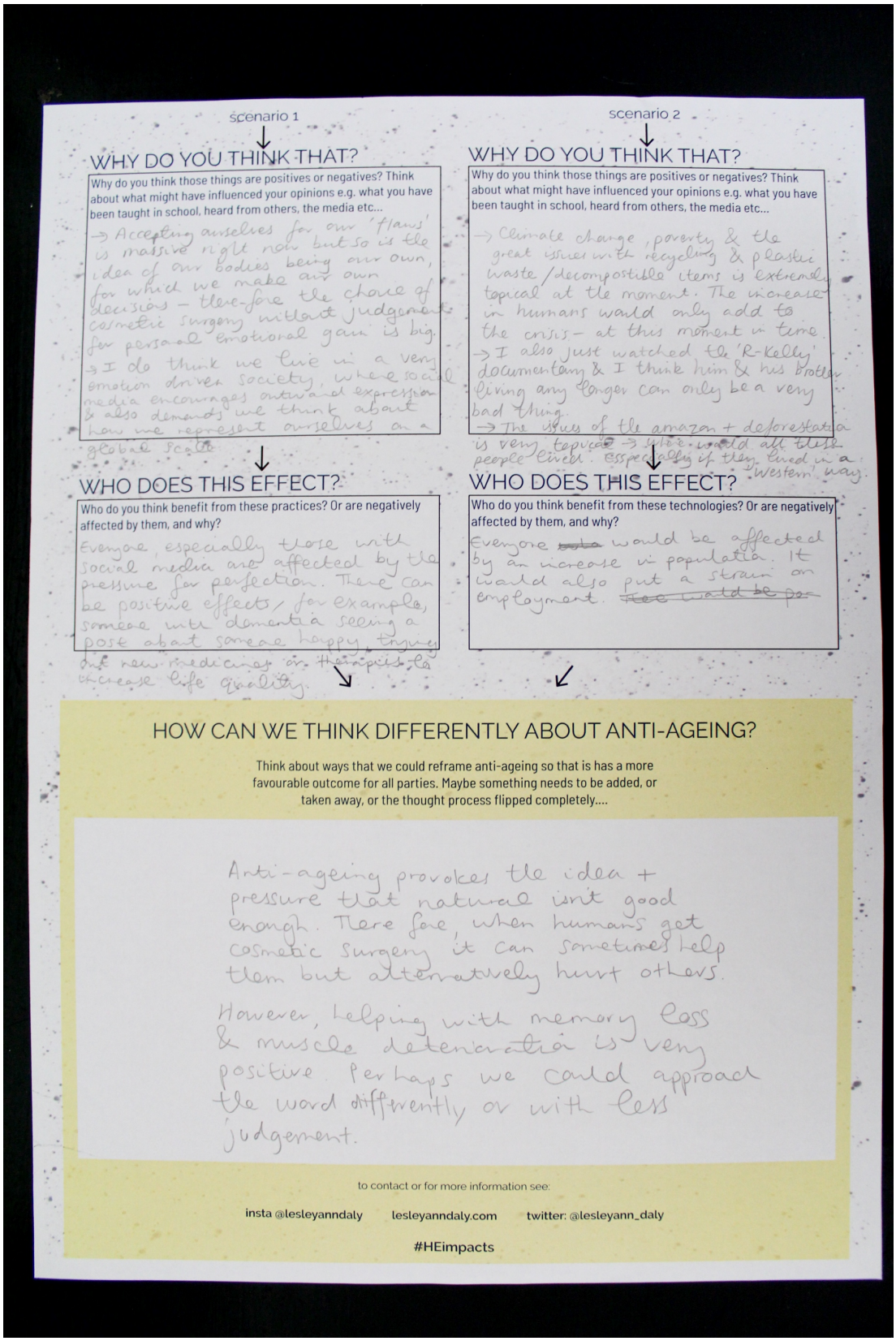


Figure 272 Anti-Ageing Worksheet - Filled In, 2019.

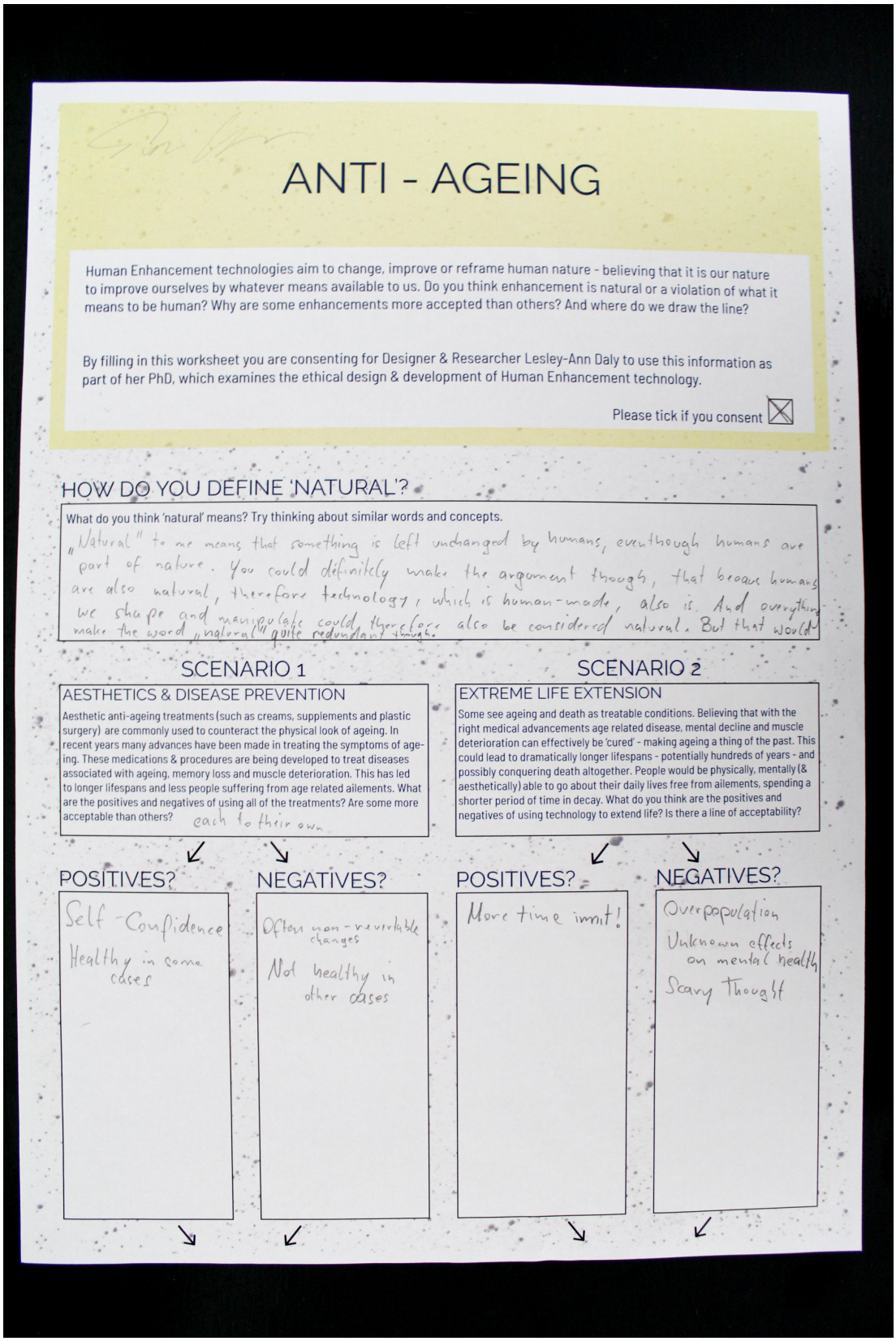


Figure 273 Anti-Ageing Worksheet - Filled In, 2019.

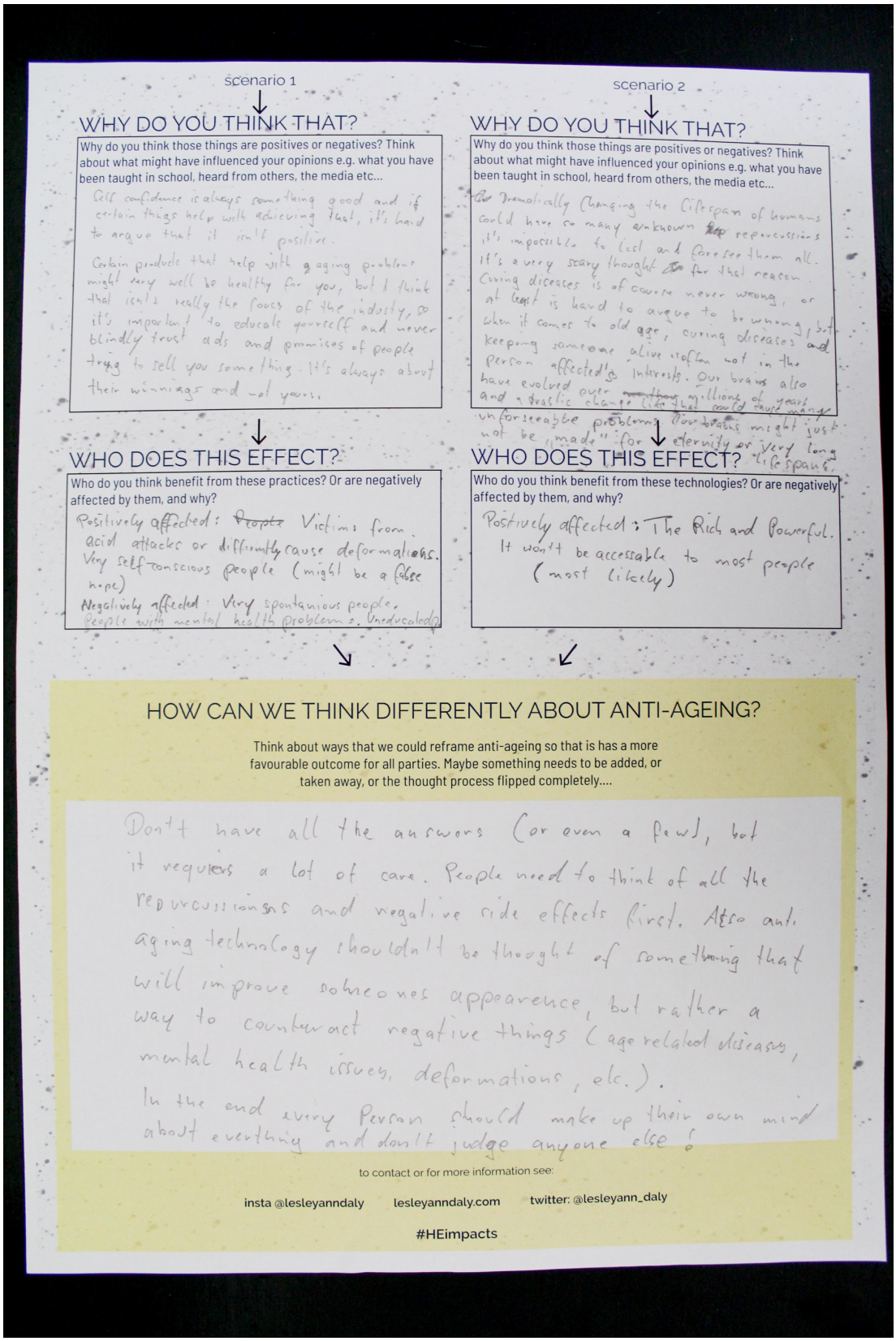


Figure 274 Anti-Ageing Worksheet - Filled In, 2019.

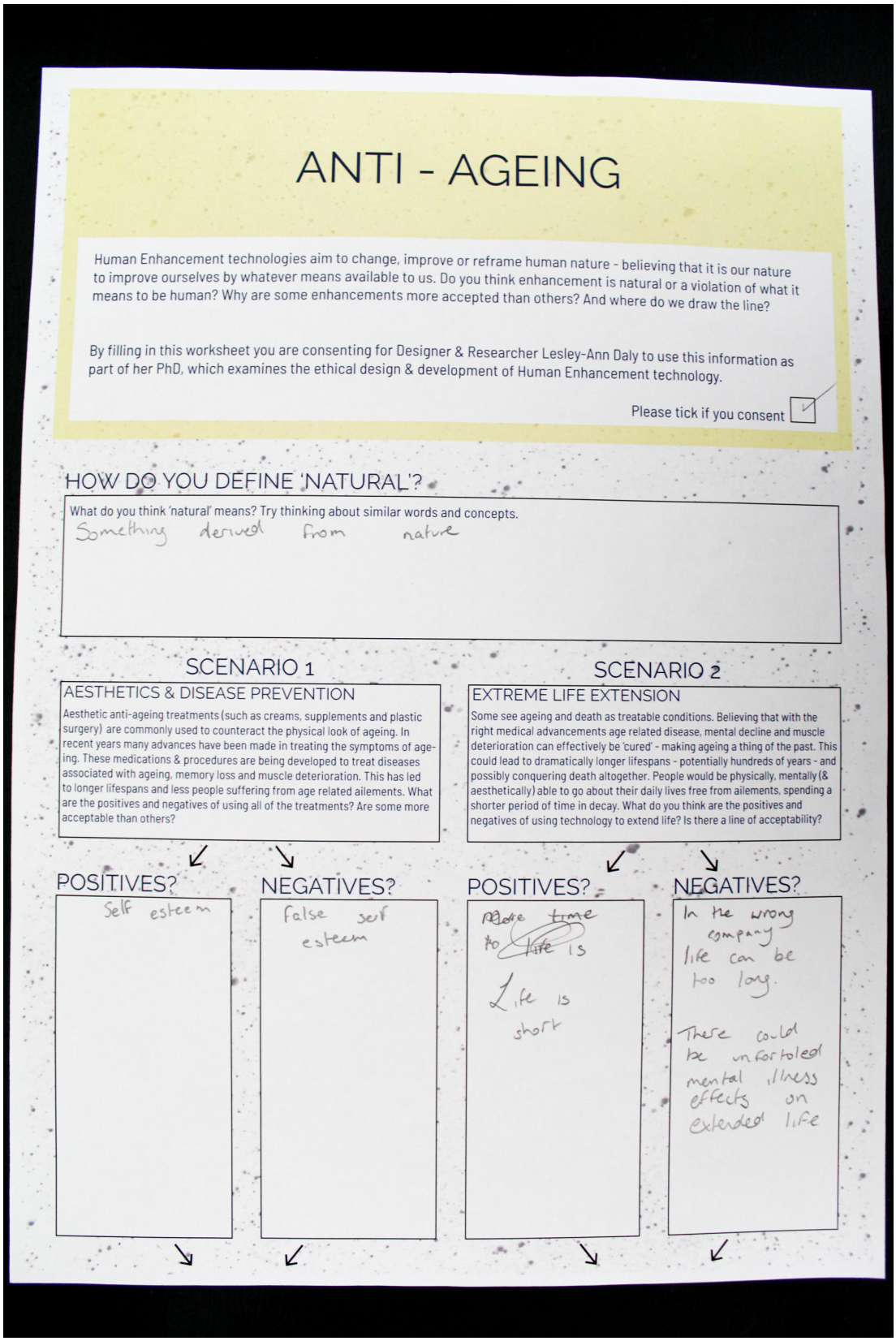


Figure 275 Anti-Ageing Worksheet - Filled In, 2019.

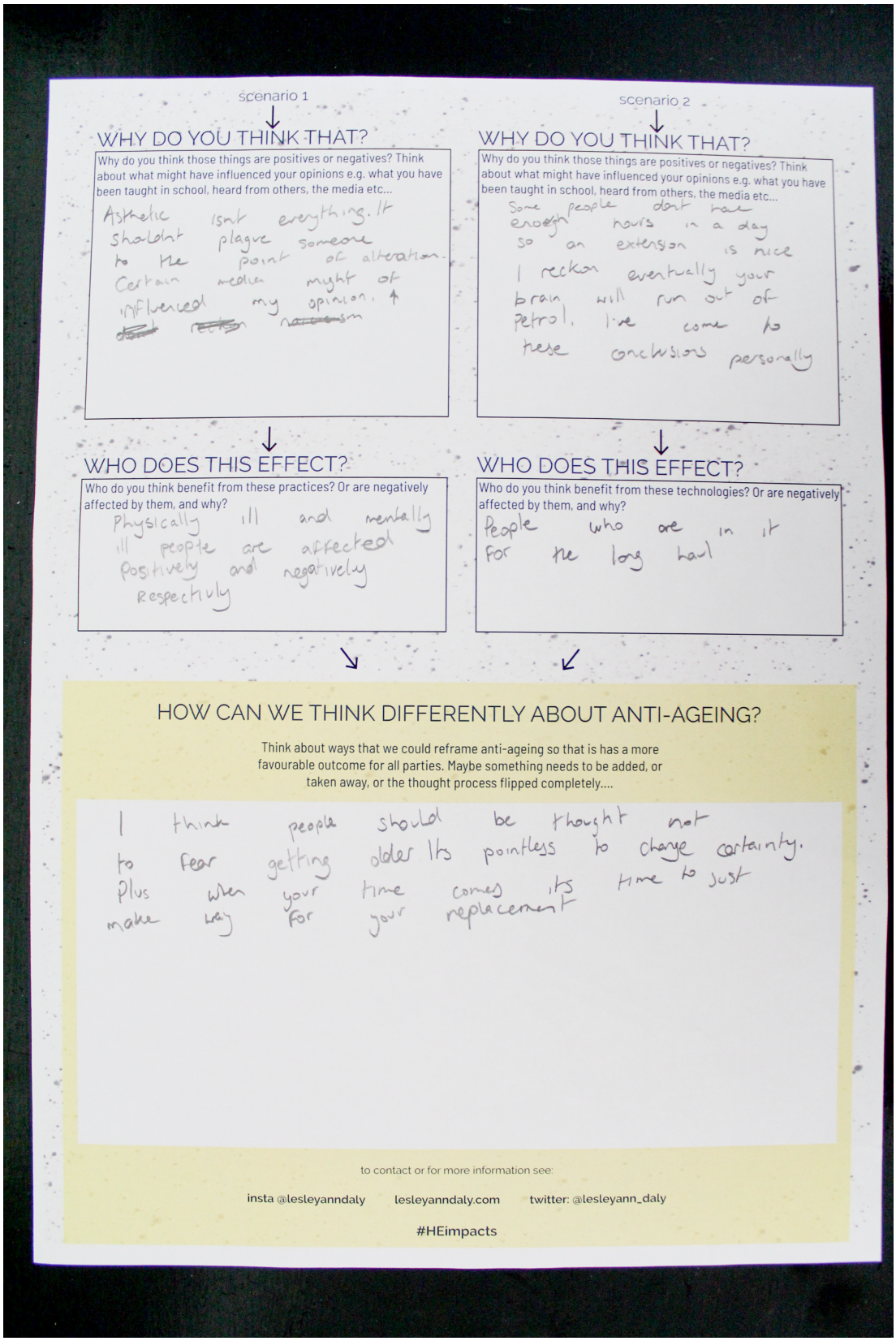
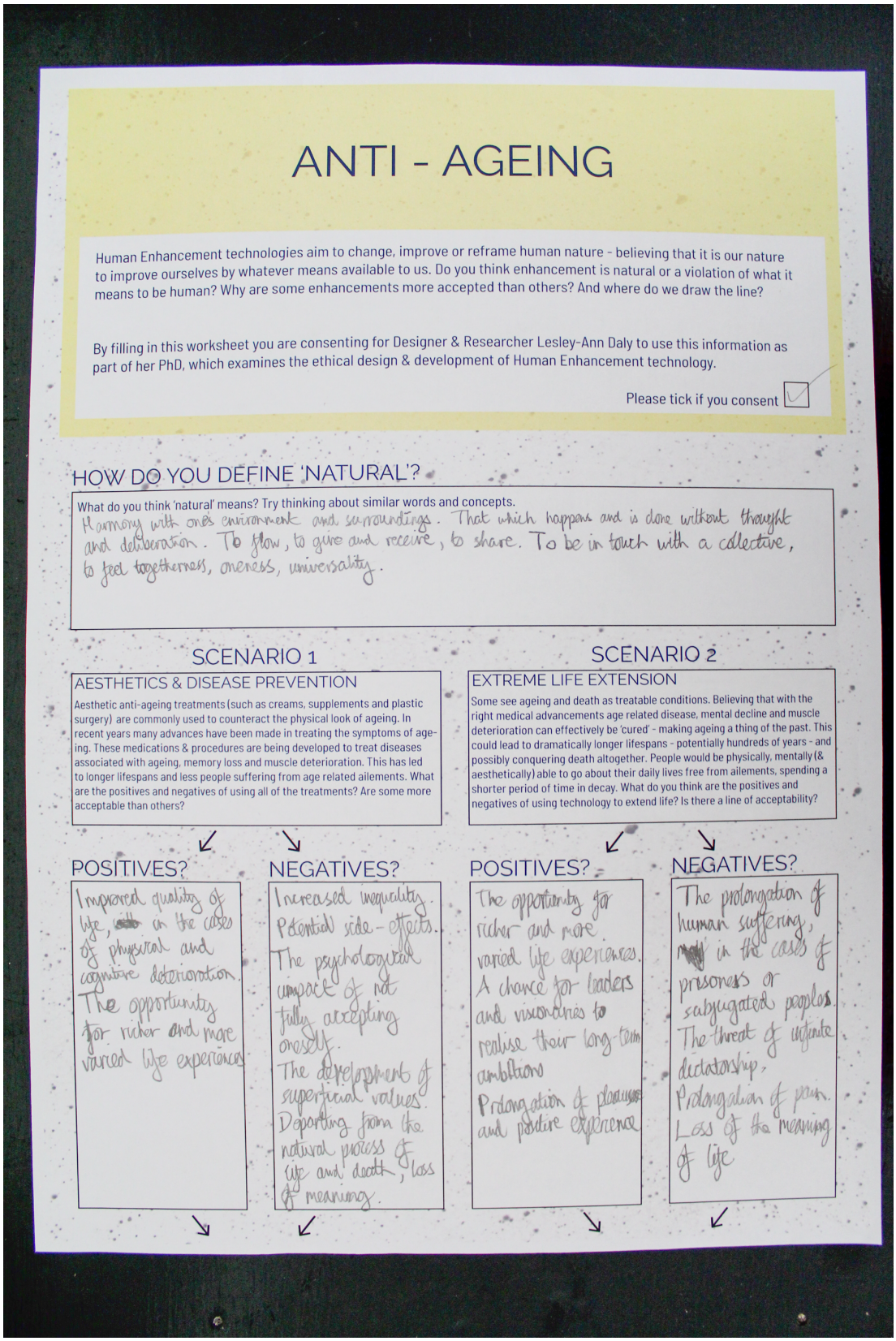


Figure 276 Anti-Ageing Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Harmony with one's environment and surroundings. That which happens and is done without thought and deliberation. To flow, to give and receive, to share. To be in touch with a collective, to feel togetherness, oneness, universality.

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

Improved quality of life, in the cases of physical and cognitive deterioration.
The opportunity for richer and more varied life experiences.

NEGATIVES?

Increased inequality.
Potential side-effects.
The psychological impact of not fully accepting oneself.
The development of superficial values.
Departing from the natural process of life and death, loss of meaning.

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

The opportunity for richer and more varied life experiences.
A chance for leaders and visionaries to realise their long-term ambitions
Prolongation of pleasure and positive experience

NEGATIVES?

The prolongation of human suffering, in the cases of prisoners or subjugated peoples.
The threat of infinite dictatorship.
Prolongation of pain.
Loss of the meaning of life

Figure 277 Anti-Ageing Worksheet - Filled In, 2019.

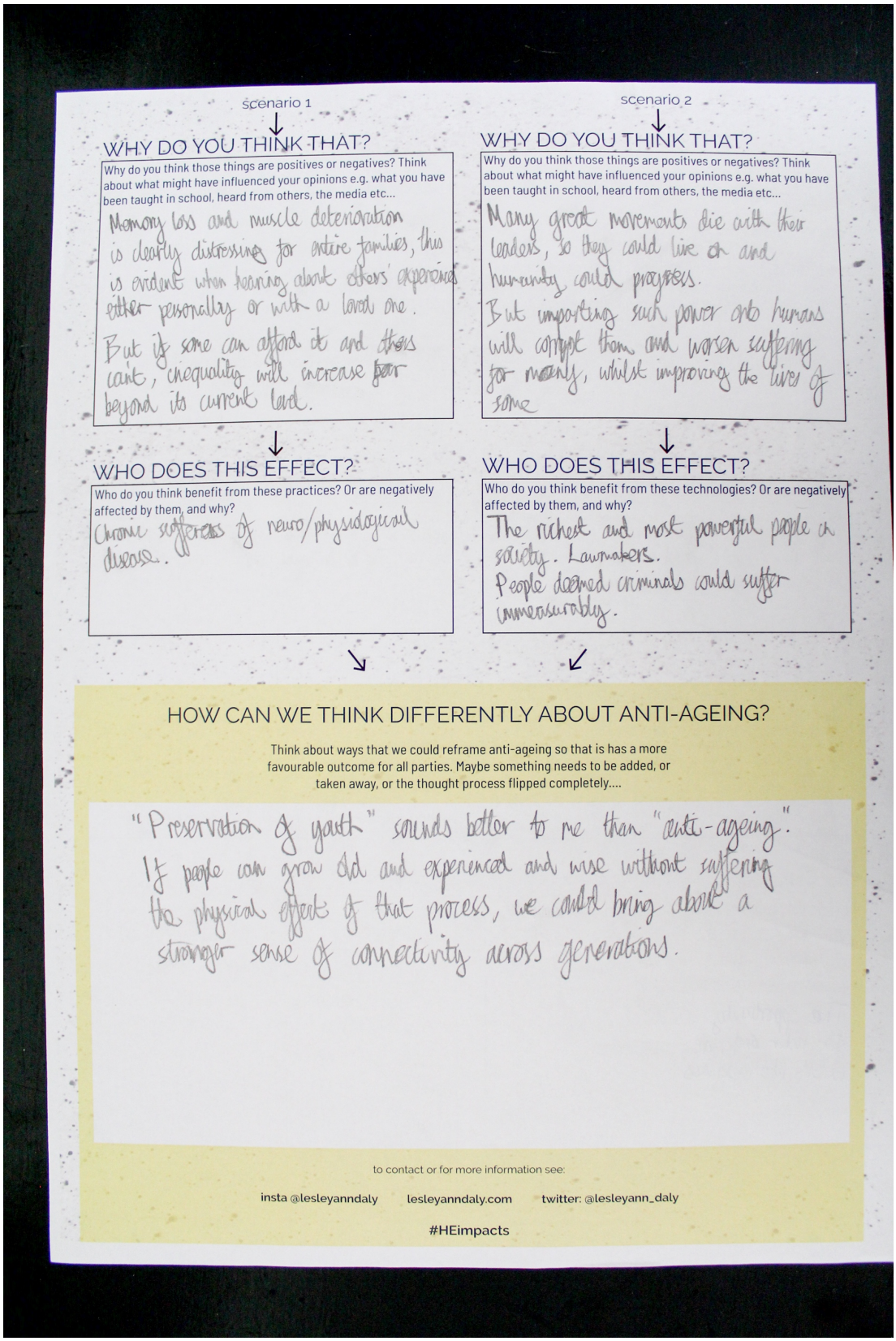


Figure 278 Anti-Ageing Worksheet - Filled In, 2019.

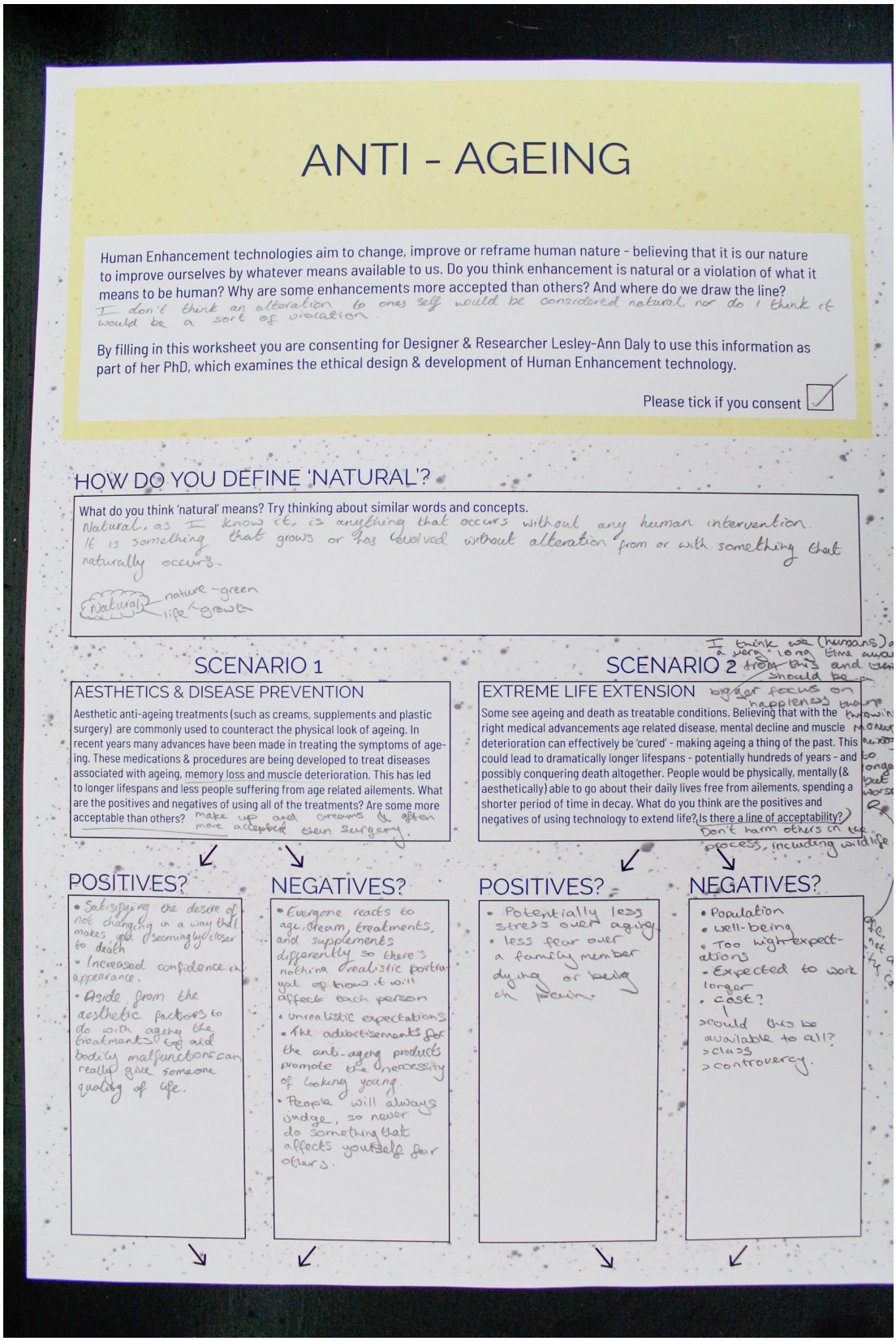


Figure 279 Anti-Ageing Worksheet - Filled In, 2019.

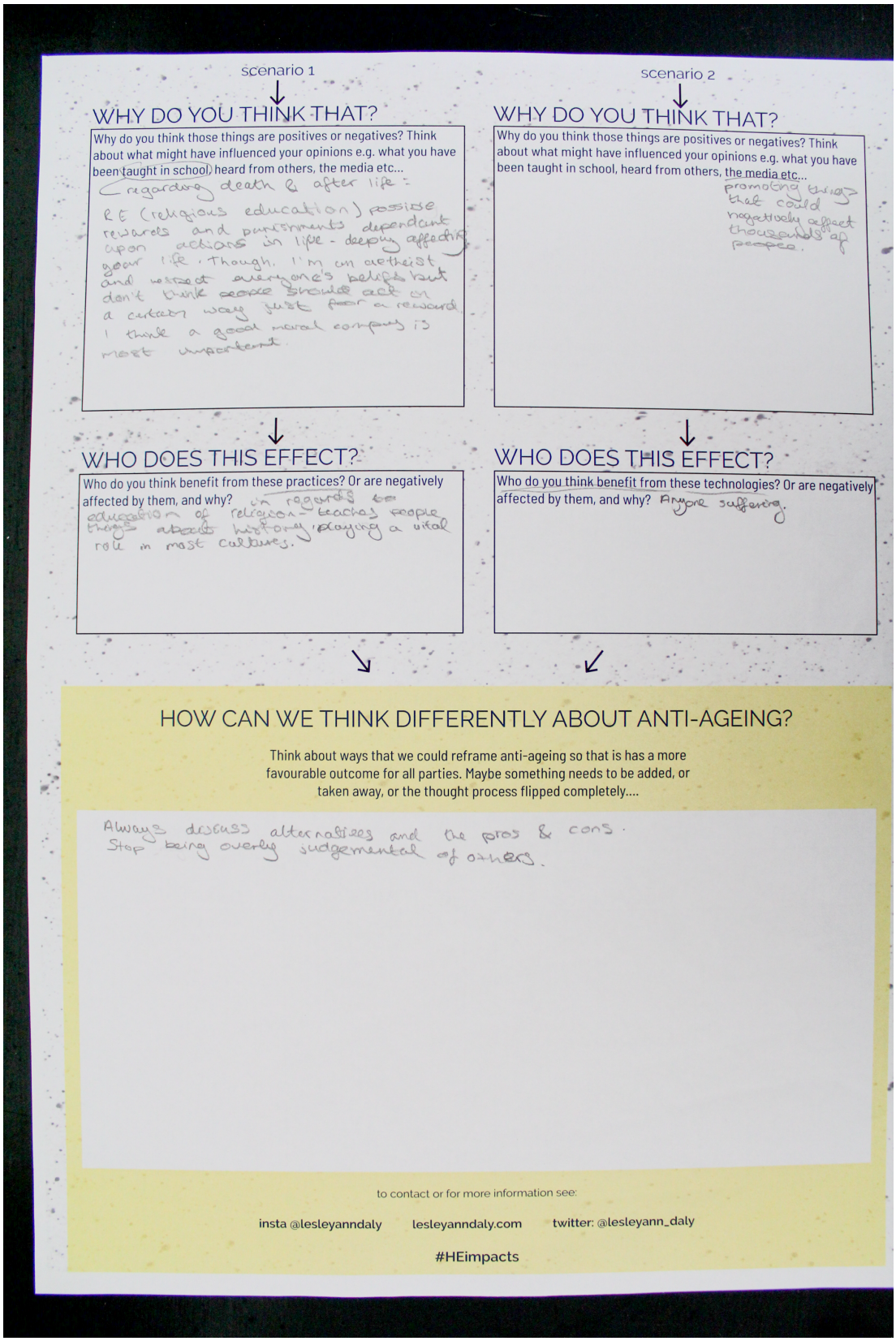


Figure 280 Anti-Ageing Worksheet - Filled In, 2019.

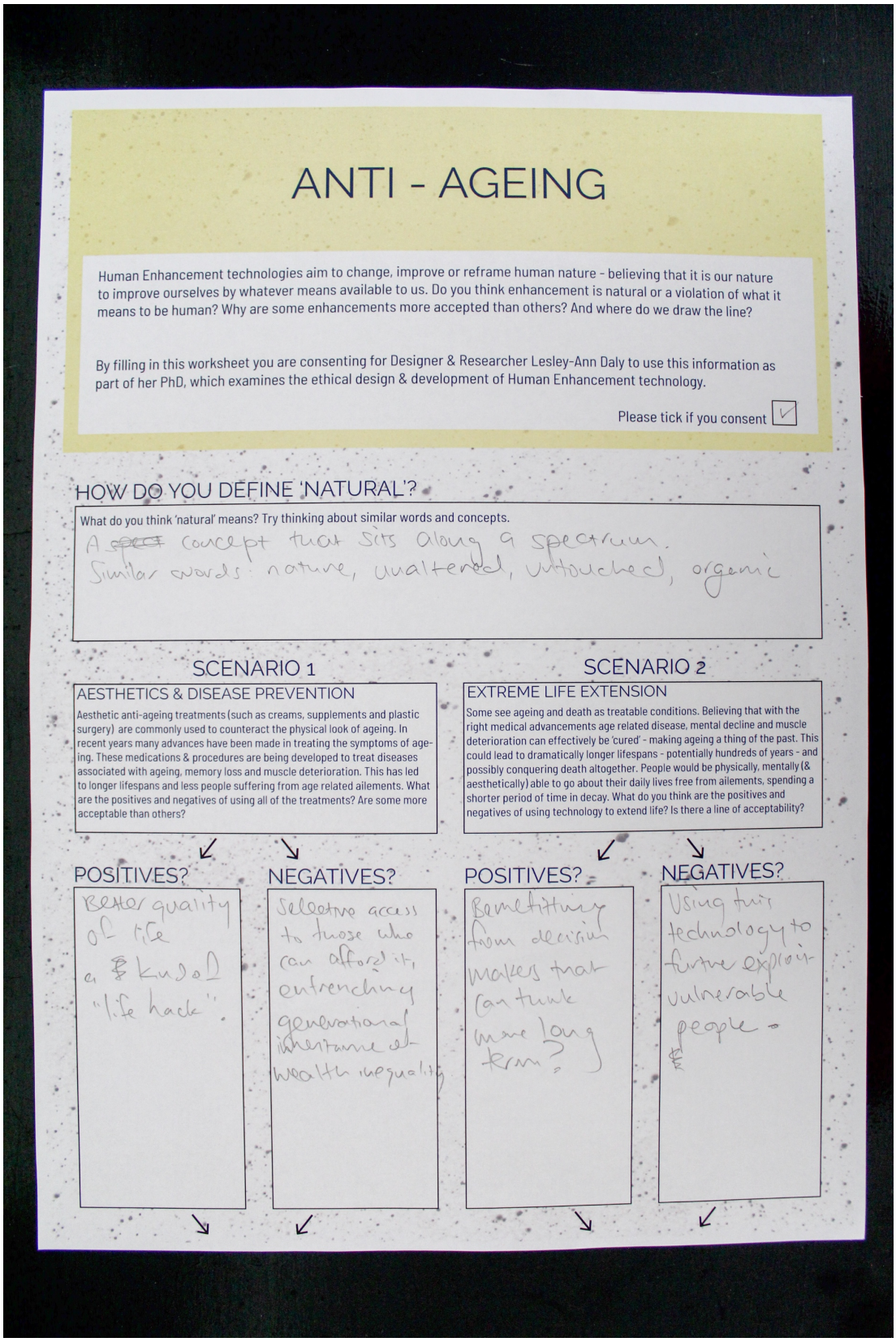


Figure 281 Anti-Ageing Worksheet - Filled In, 2019..

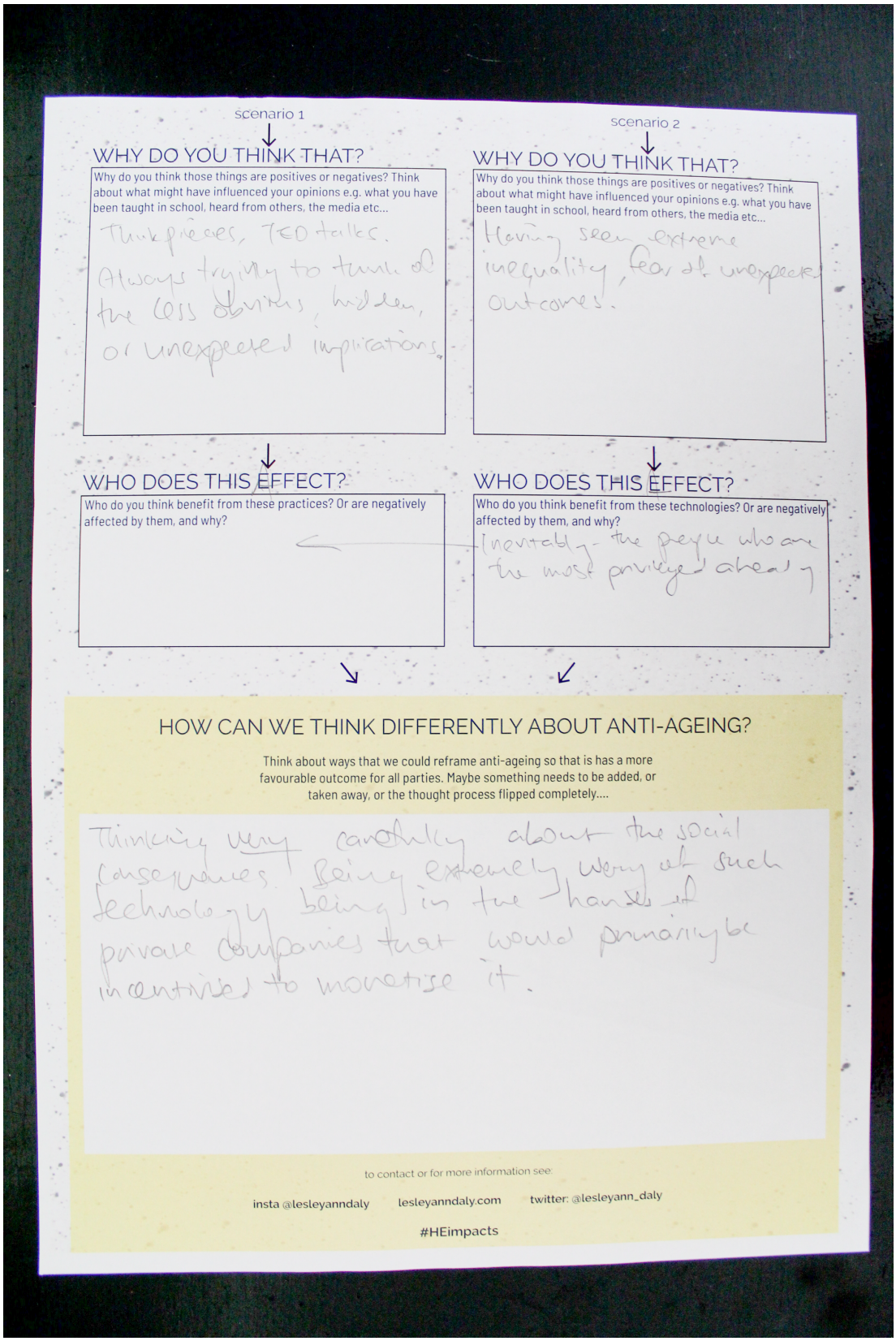
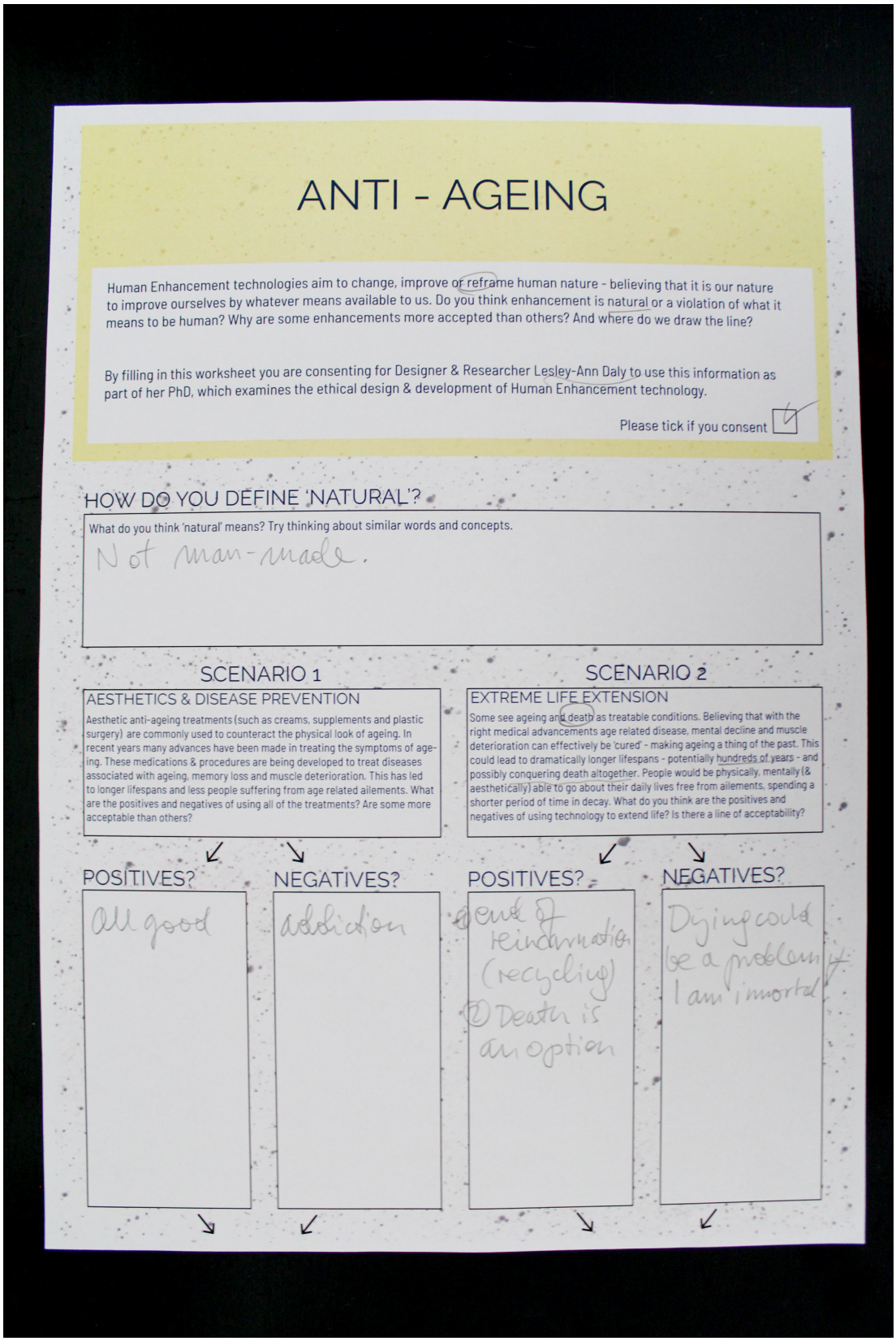


Figure 282 Anti-Ageing Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Not man-made.

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

All good

NEGATIVES?

addiction

SCENARIO 2

EXTREME LIFE EXTENSION

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POSITIVES?

① end of reincarnation (recycling)

② Death is an option

NEGATIVES?

Dying could be a problem if I am immortal

Figure 283 Anti-Ageing Worksheet - Filled In, 2019.

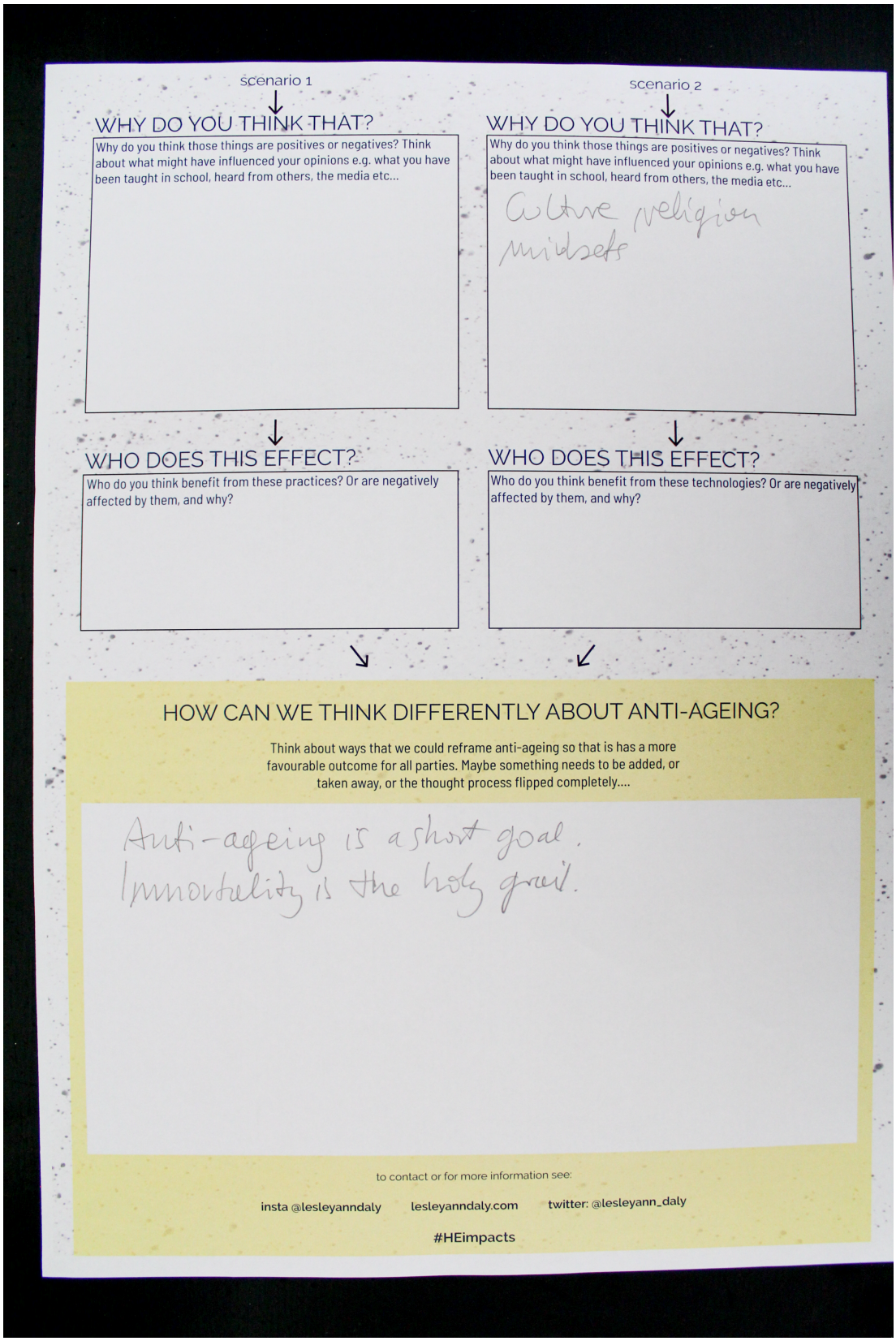
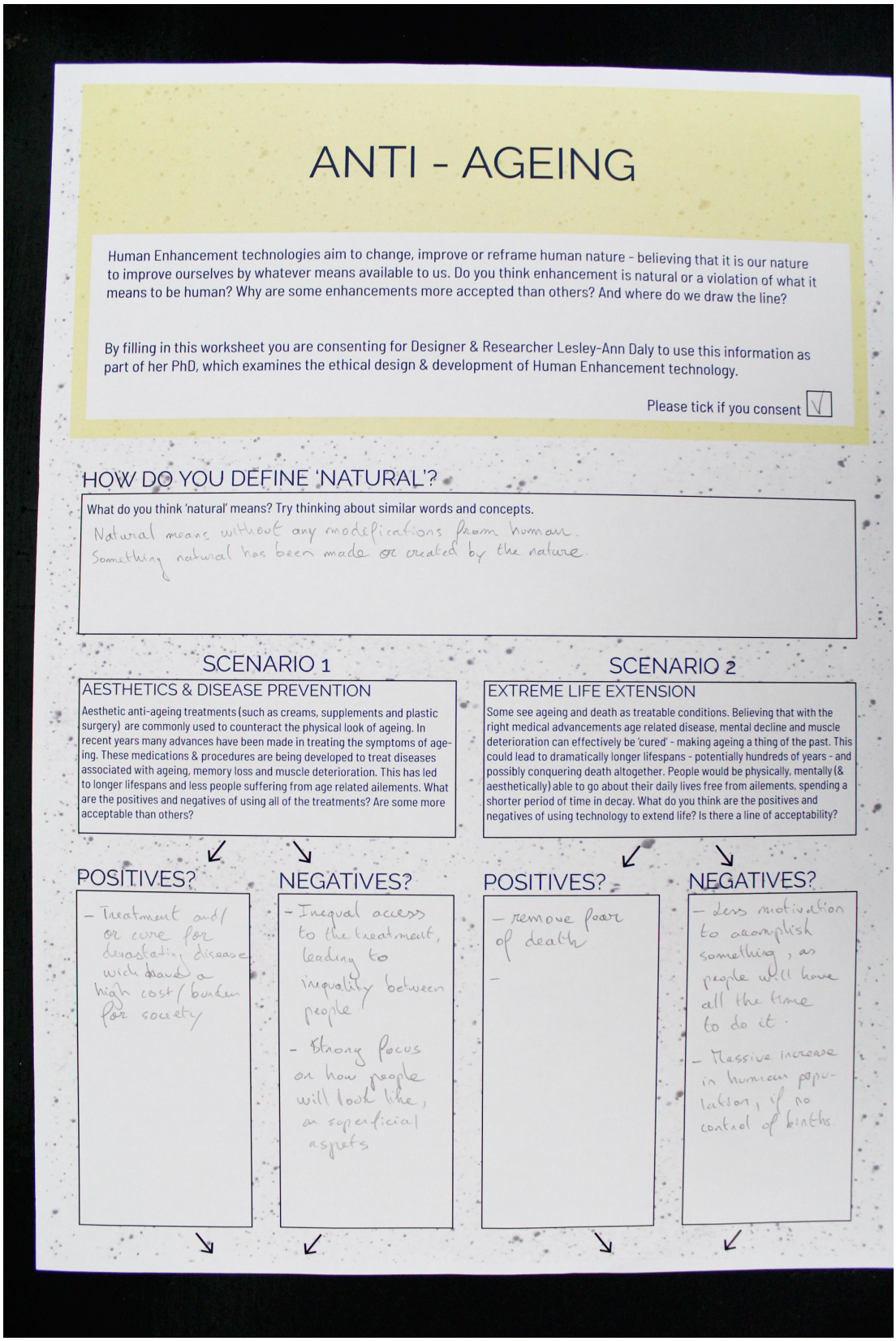


Figure 284 Anti-Ageing Worksheet - Filled In, 2019.



ANTI - AGEING

Human Enhancement technologies aim to change, improve or reframe human nature - believing that it is our nature to improve ourselves by whatever means available to us. Do you think enhancement is natural or a violation of what it means to be human? Why are some enhancements more accepted than others? And where do we draw the line?

By filling in this worksheet you are consenting for Designer & Researcher Lesley-Ann Daly to use this information as part of her PhD, which examines the ethical design & development of Human Enhancement technology.

Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Natural means without any modifications from humans.
Something natural has been made or created by the nature

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of age-ing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

- Treatment and/ or cure for devastating disease with drawn a high cost/ burden for society

NEGATIVES?

- Inequal access to the treatment, leading to inequality between people
- Strong focus on how people will look like, on superficial aspects

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

- remove fear of death
-

NEGATIVES?

- Less motivation to accomplish something, as people will have all the time to do it
- Massive increase in human popu-lation, if no control of births

Figure 285 Anti-Ageing Worksheet - Filled In, 2019.

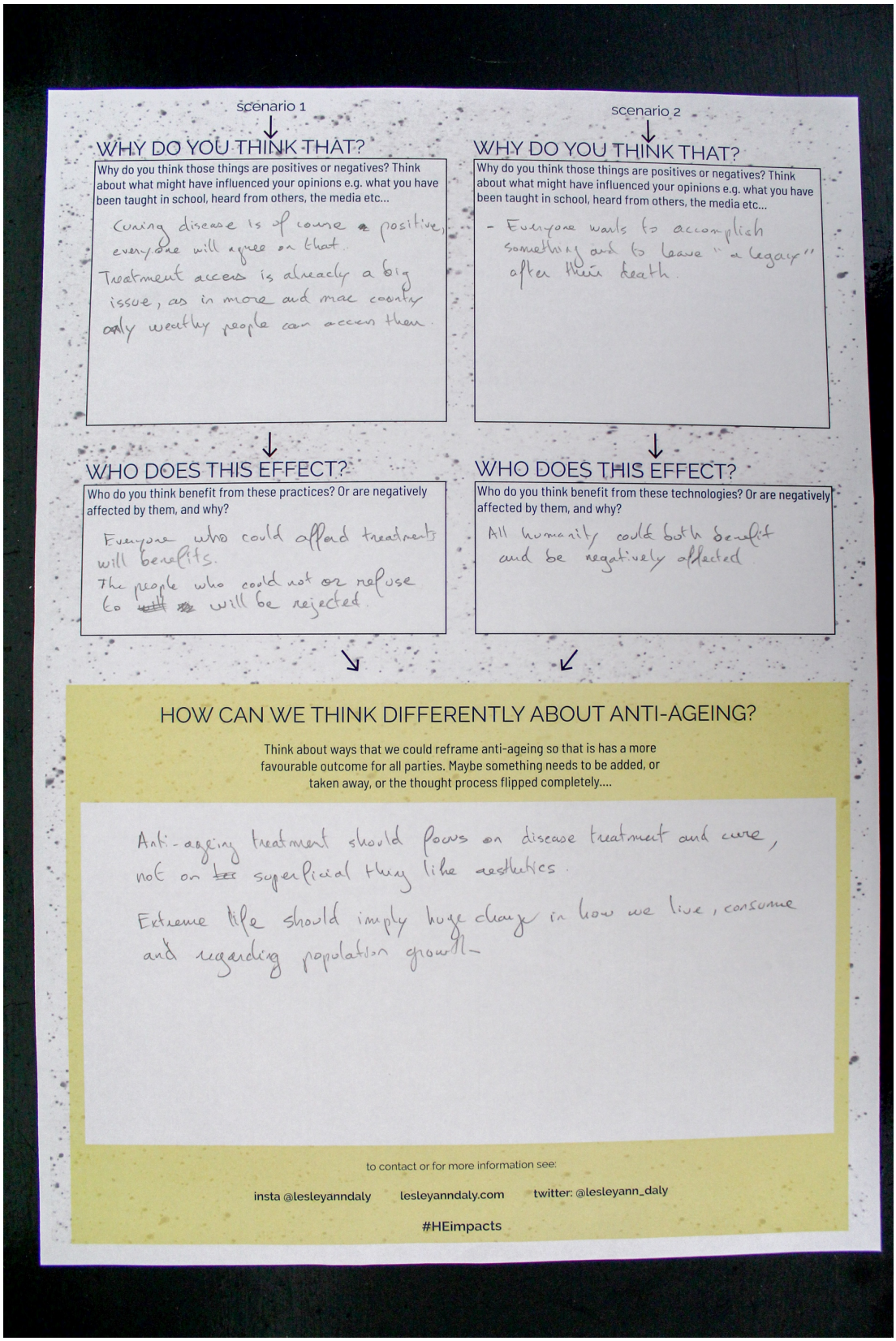
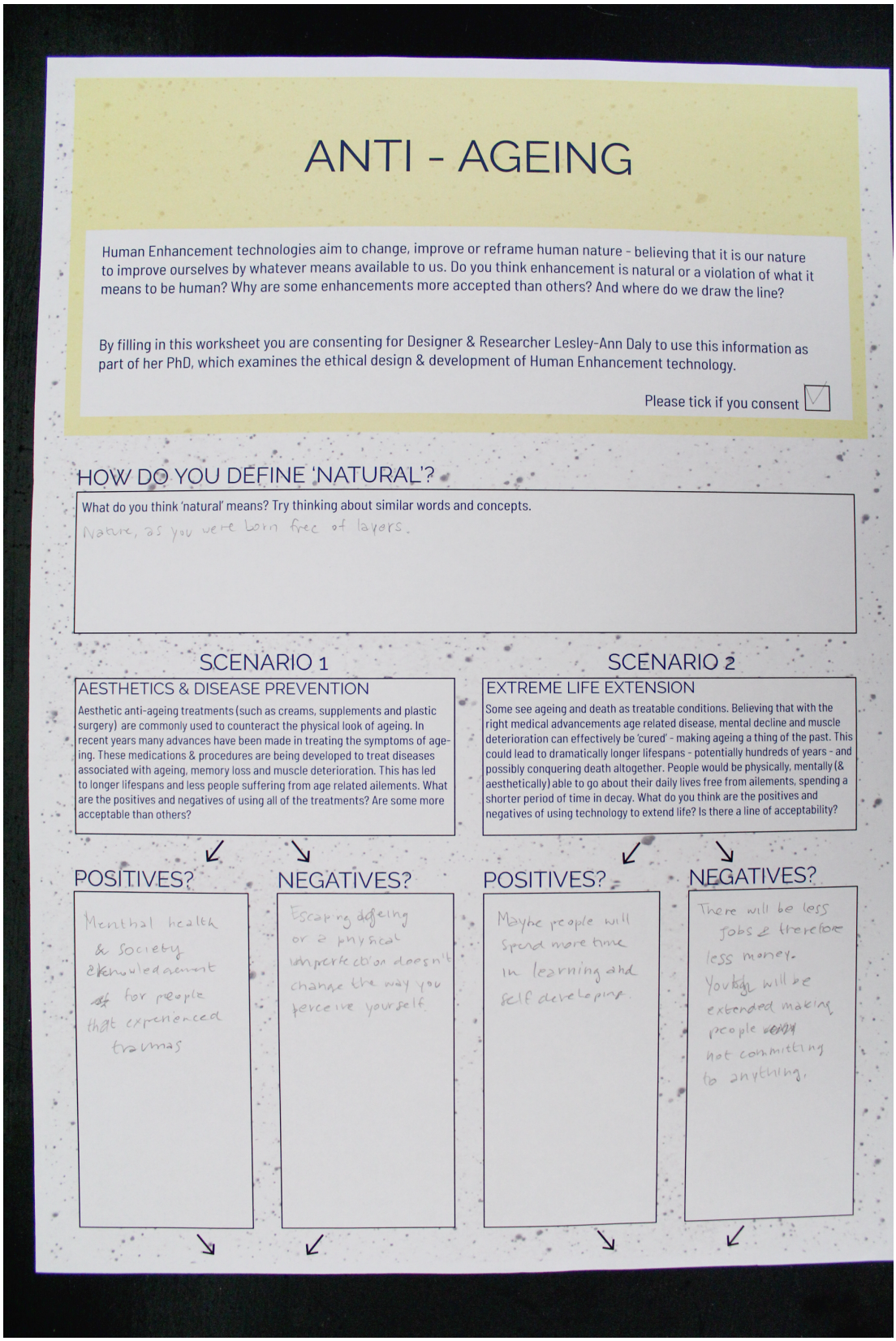


Figure 286 Anti-Ageing Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Nature, as you were born free of layers.

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

Menthal health & society acknowledgement for people that experienced traumas

NEGATIVES?

Escaping dysfeling or a physical imperfection doesn't change the way you perceive yourself

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

Maybe people will spend more time in learning and self developing.

NEGATIVES?

There will be less jobs & therefore less money. Youth will be extended making people ~~very~~ not committing to anything.

Figure 287 Anti-Ageing Worksheet - Filled In, 2019.

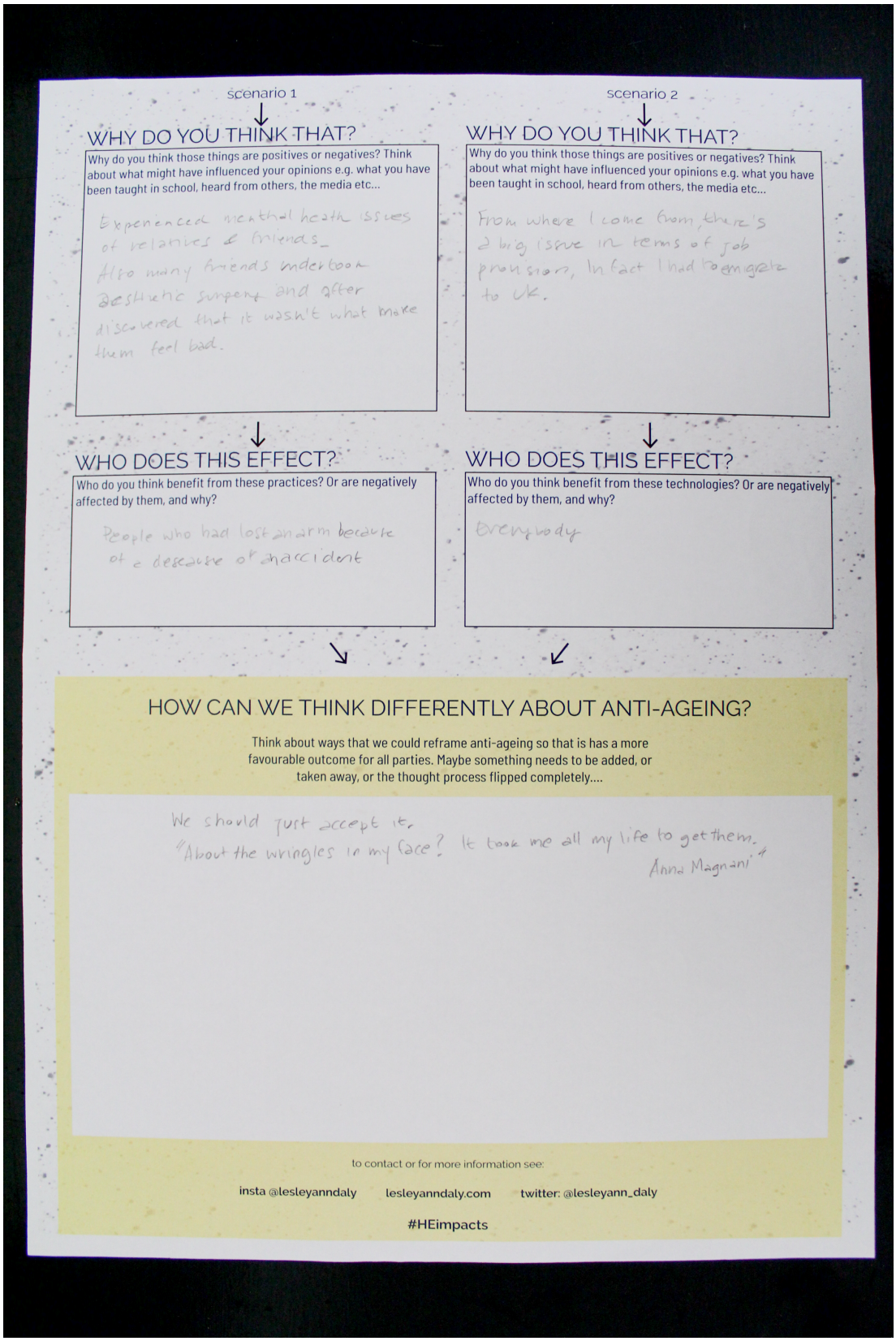
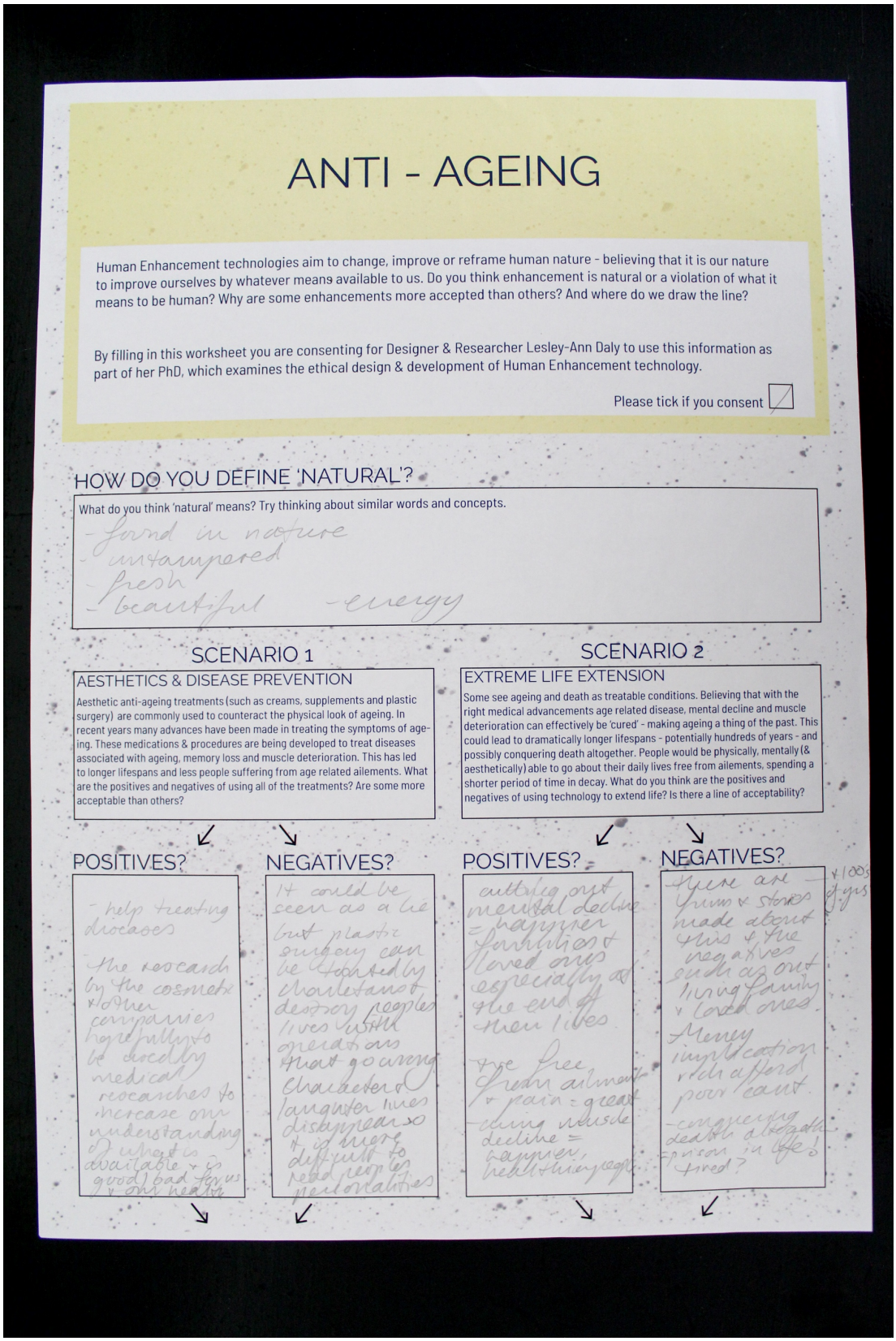


Figure 288 Anti-Ageing Worksheet - Filled In, 2019.



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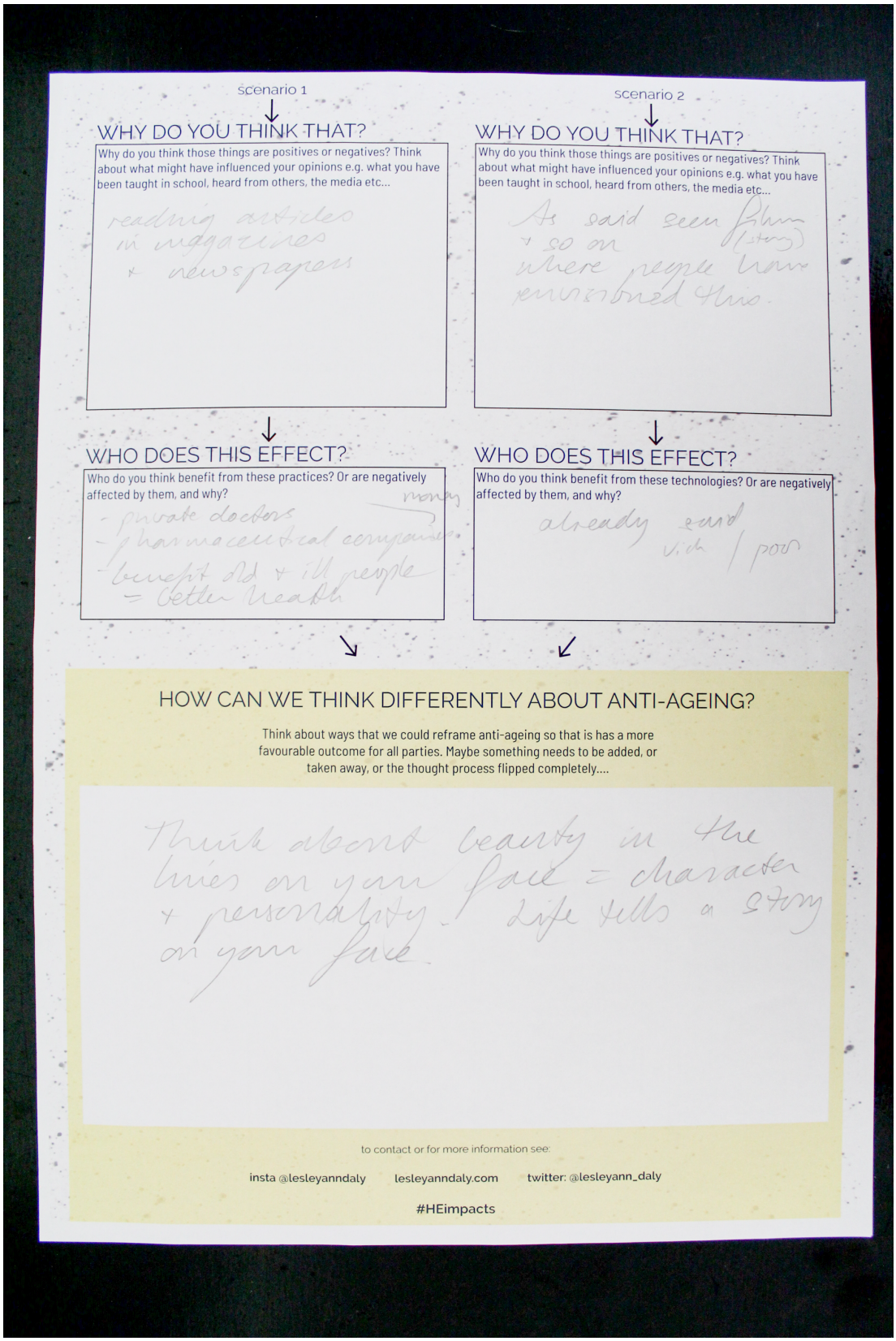


Figure 290 Anti-Ageing Worksheet - Filled In, 2019.

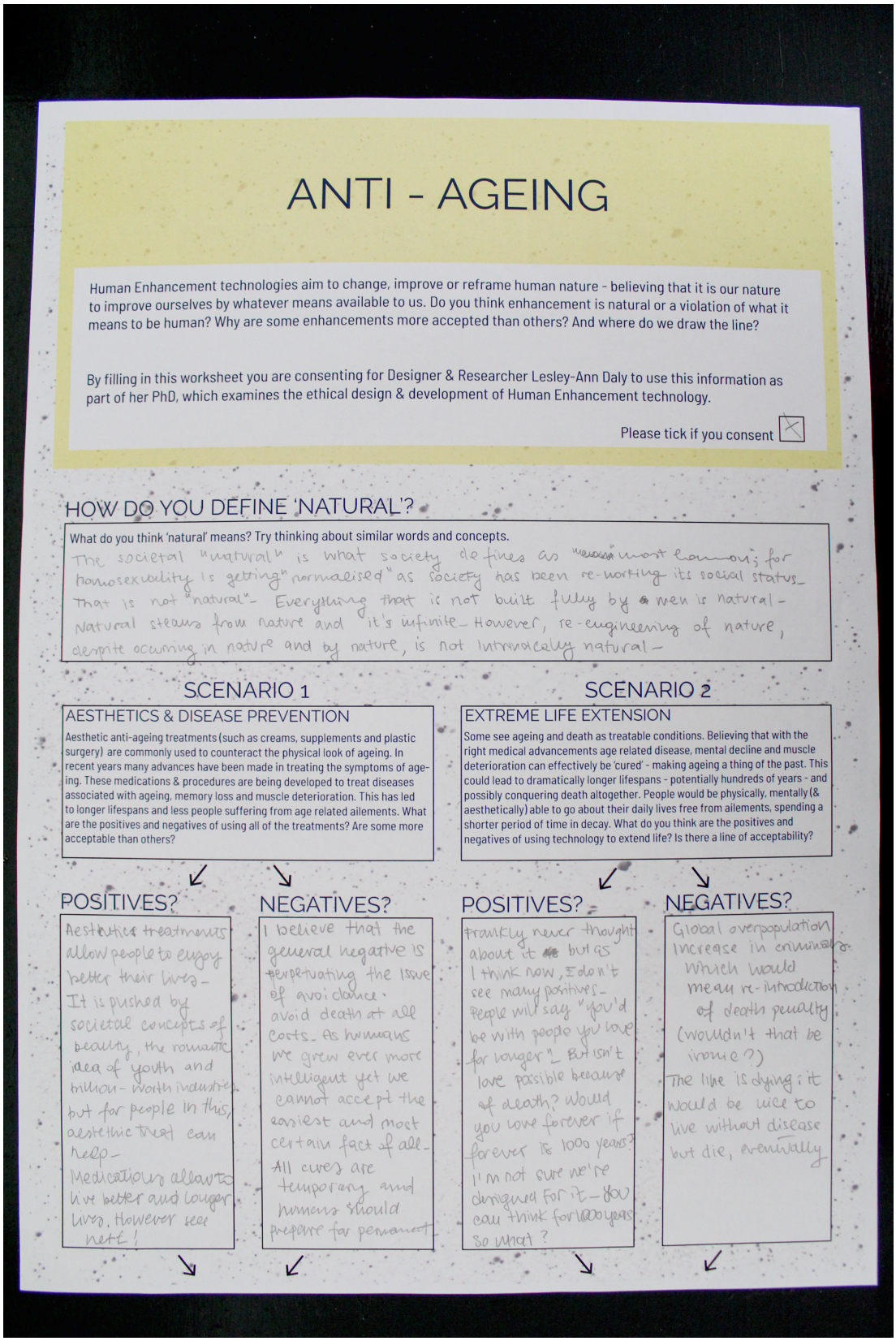


Figure 291 Anti-Ageing Worksheet - Filled In, 2019.

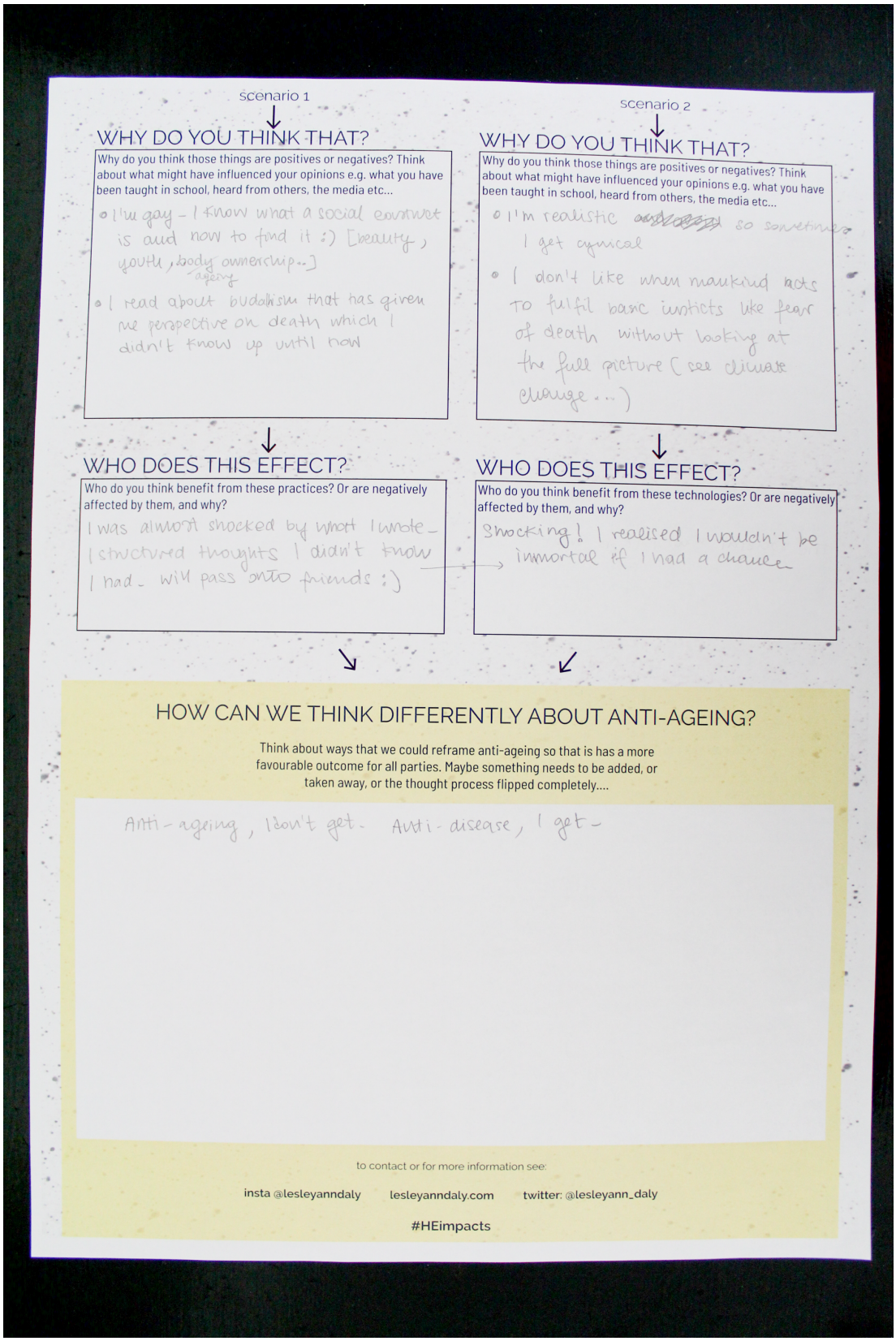
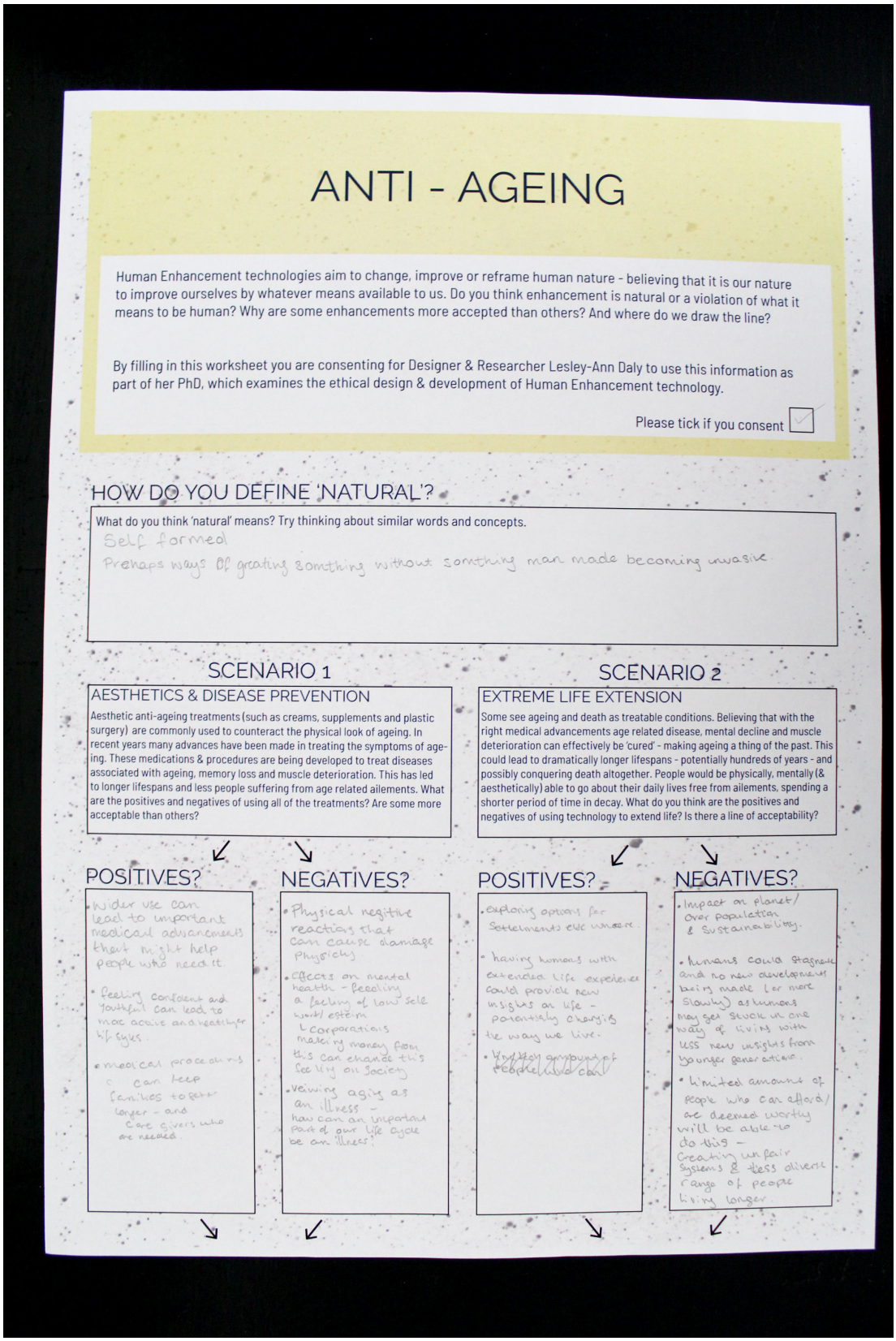


Figure 292 Anti-Ageing Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

Self formed

Prehaps ways of creating something without something man made becoming invasive

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

- wider use can lead to important medical advancements that might help people who need it
- feeling confident and youthful can lead to more active and healthier lifestyles
- medical procedures can keep families together longer - and care givers who are needed

NEGATIVES?

- Physical negitive reactions that can cause damage physically
- effects on mental health - feeling a feeling of low self worth/esteem
- corporations making money from this can change this seeing on society
- veiwing aging as an illness - how can an important part of our life cycle be an illness?

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

- exploring options for settlements else where
- having humans with extended life experience could provide new insights on life - potentially changing the way we live.
- Wealthy group of people lived can

NEGATIVES?

- Impact on planet/ over population & sustainability.
- humans could stagnate and no new developments being made (or more slowly) as humans may get stuck in one way of living with less new insights from younger generations.
- limited amount of people who can afford/ are deemed worthy will be able to do this - Creating unfair systems & less diverse range of people living longer

Figure 293 Anti-Ageing Worksheet - Filled In, 2019.

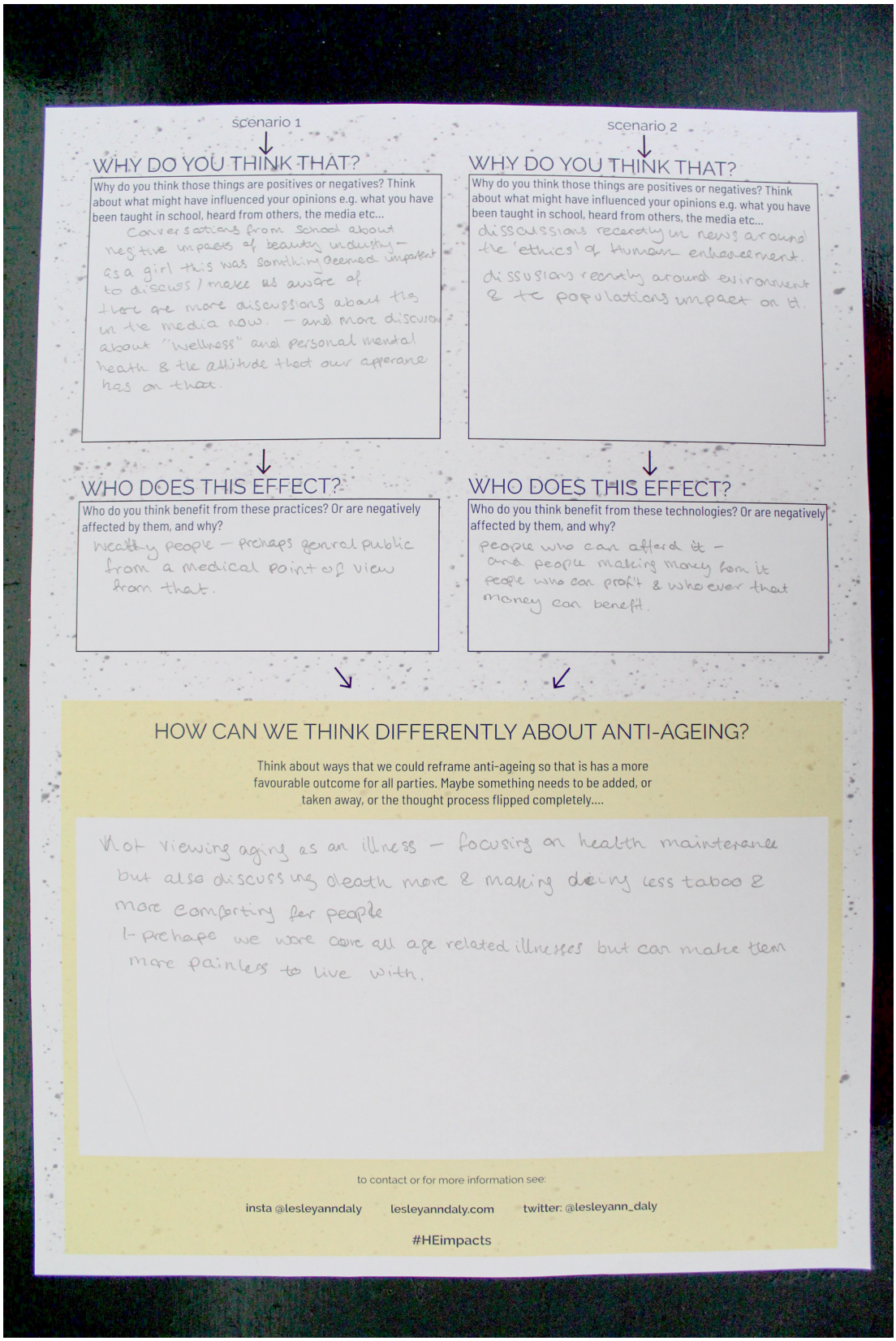
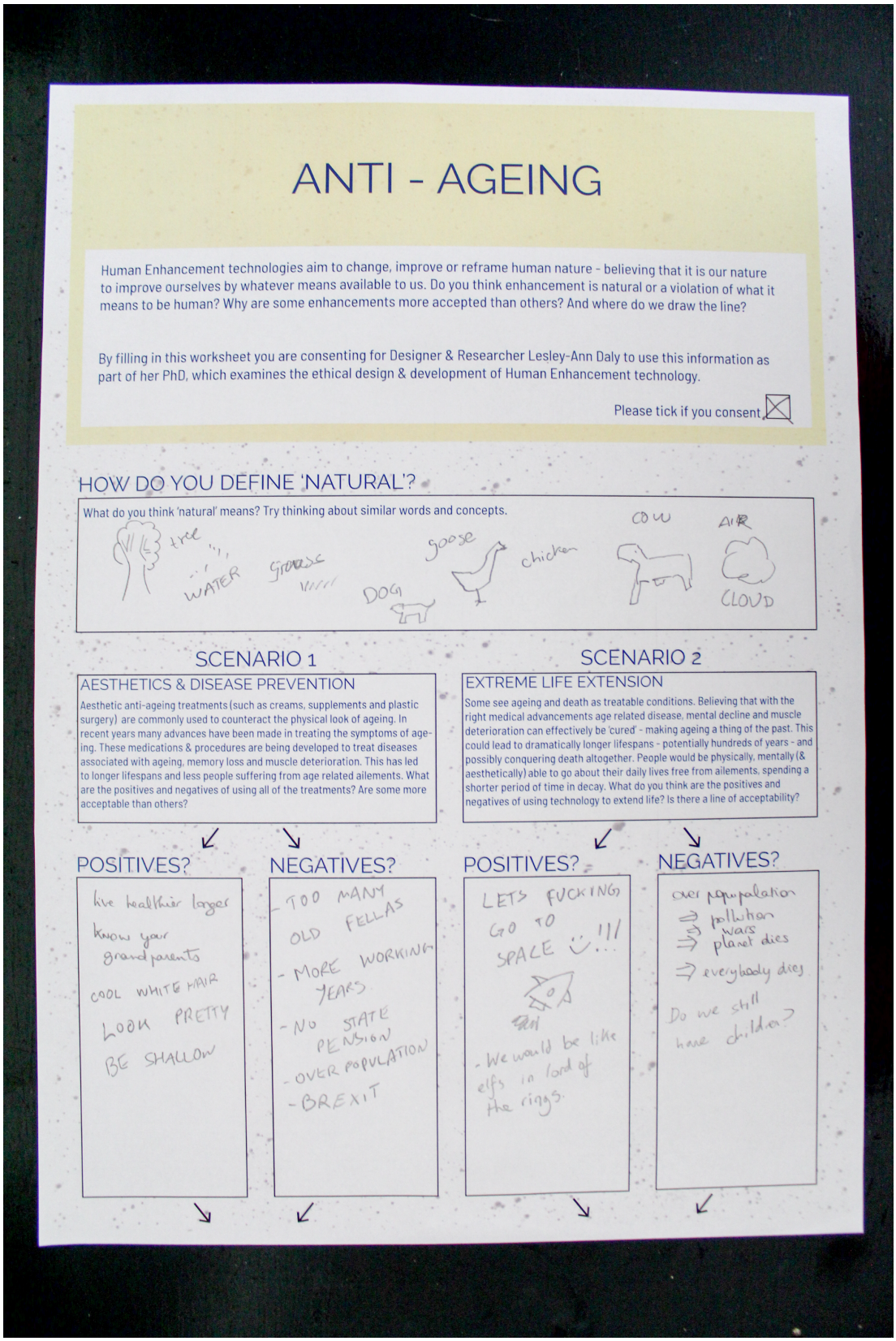


Figure 294 Anti-Ageing Worksheet - Filled In, 2019.



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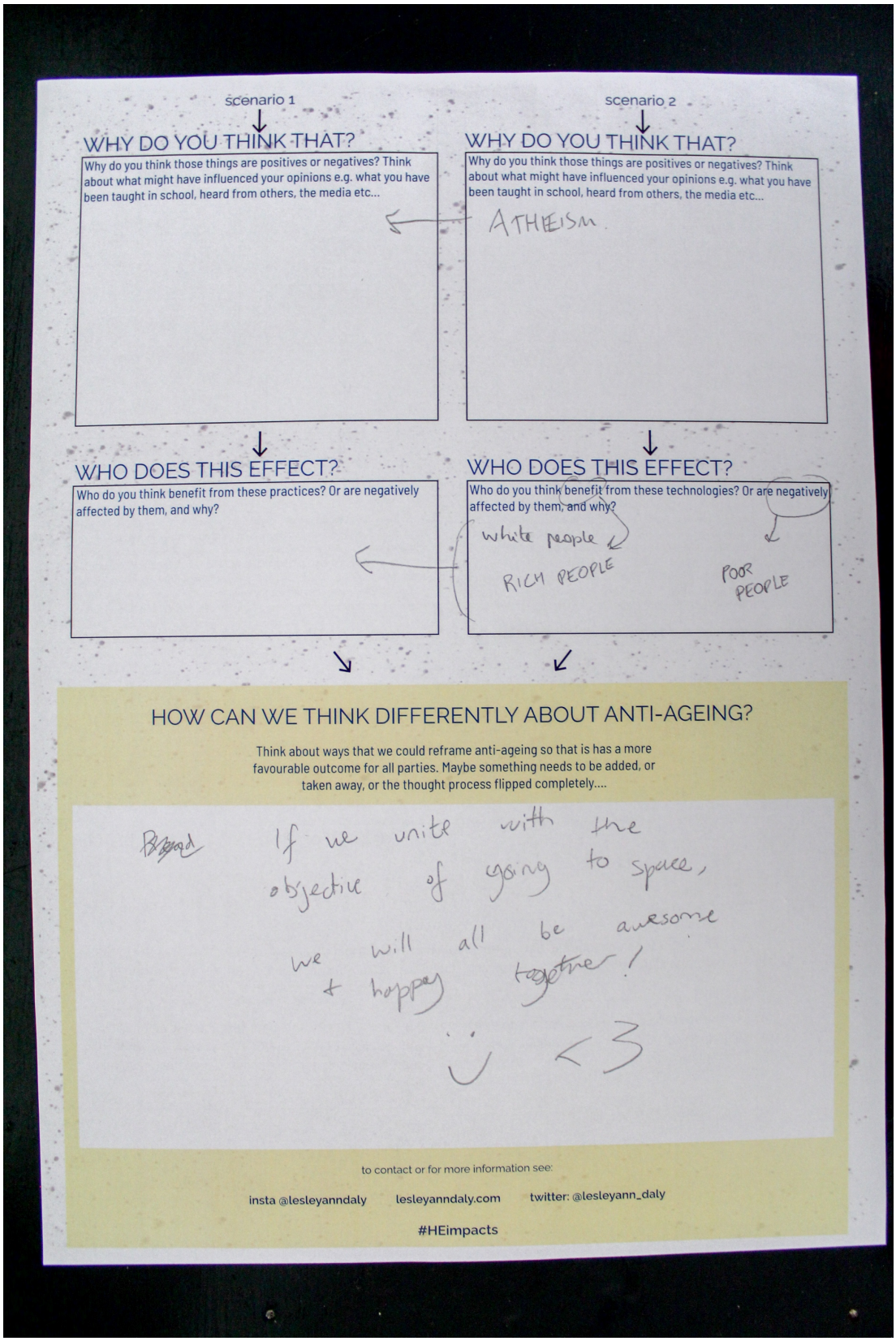


Figure 296 Anti-Ageing Worksheet - Filled In, 2019.

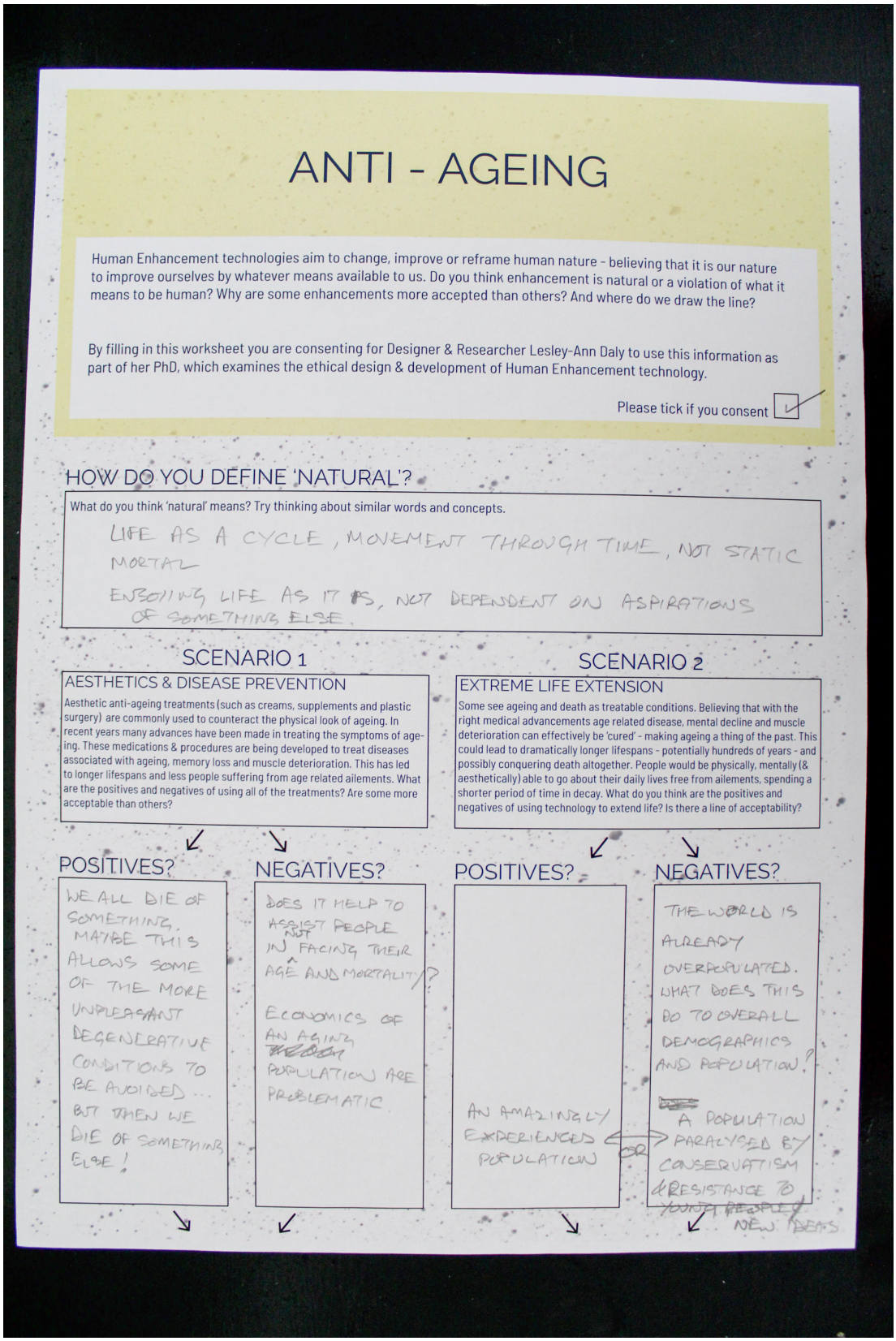


Figure 297 Anti-Ageing Worksheet - Filled In, 2019.

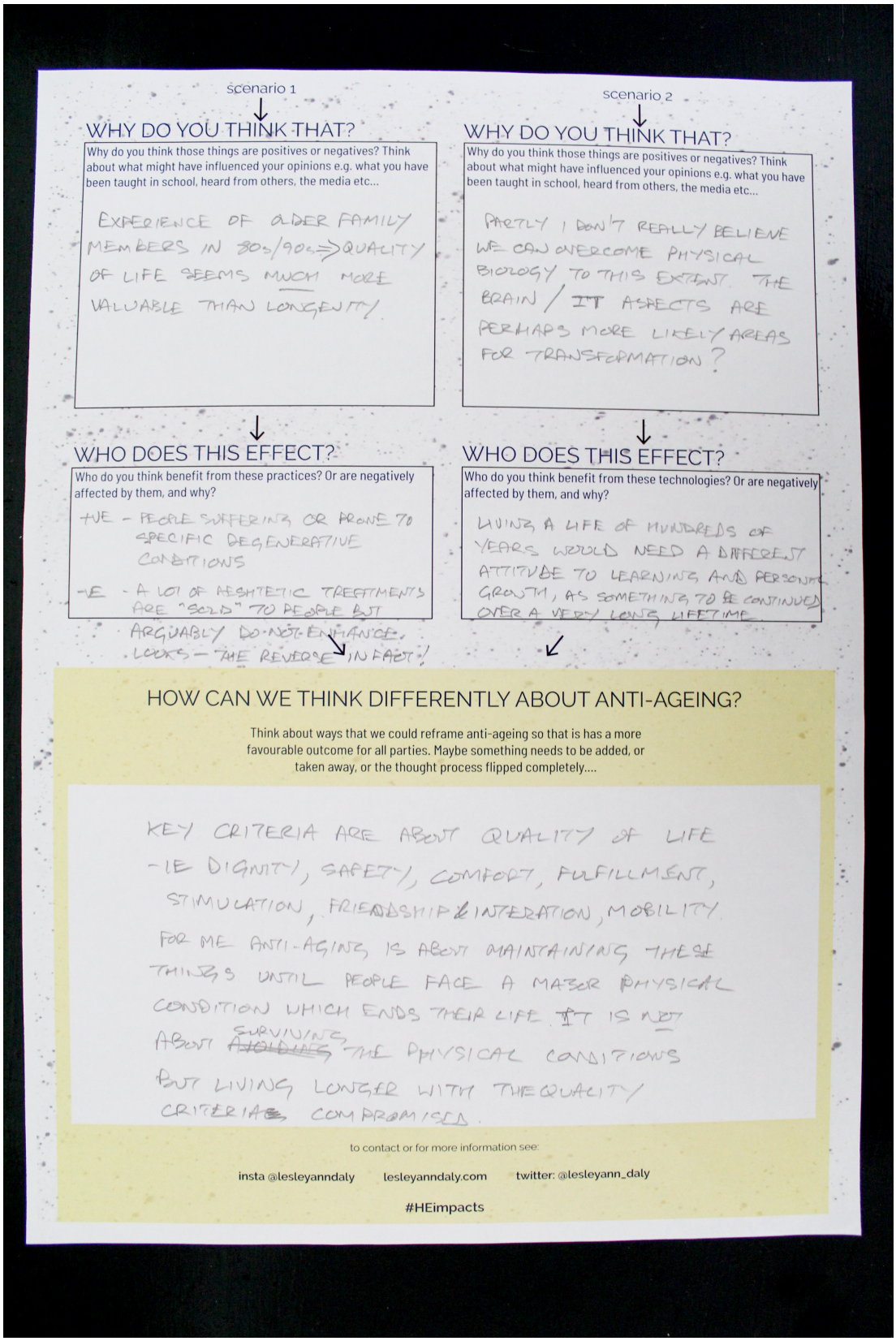


Figure 298 Anti-Ageing Worksheet - Filled In, 2019.

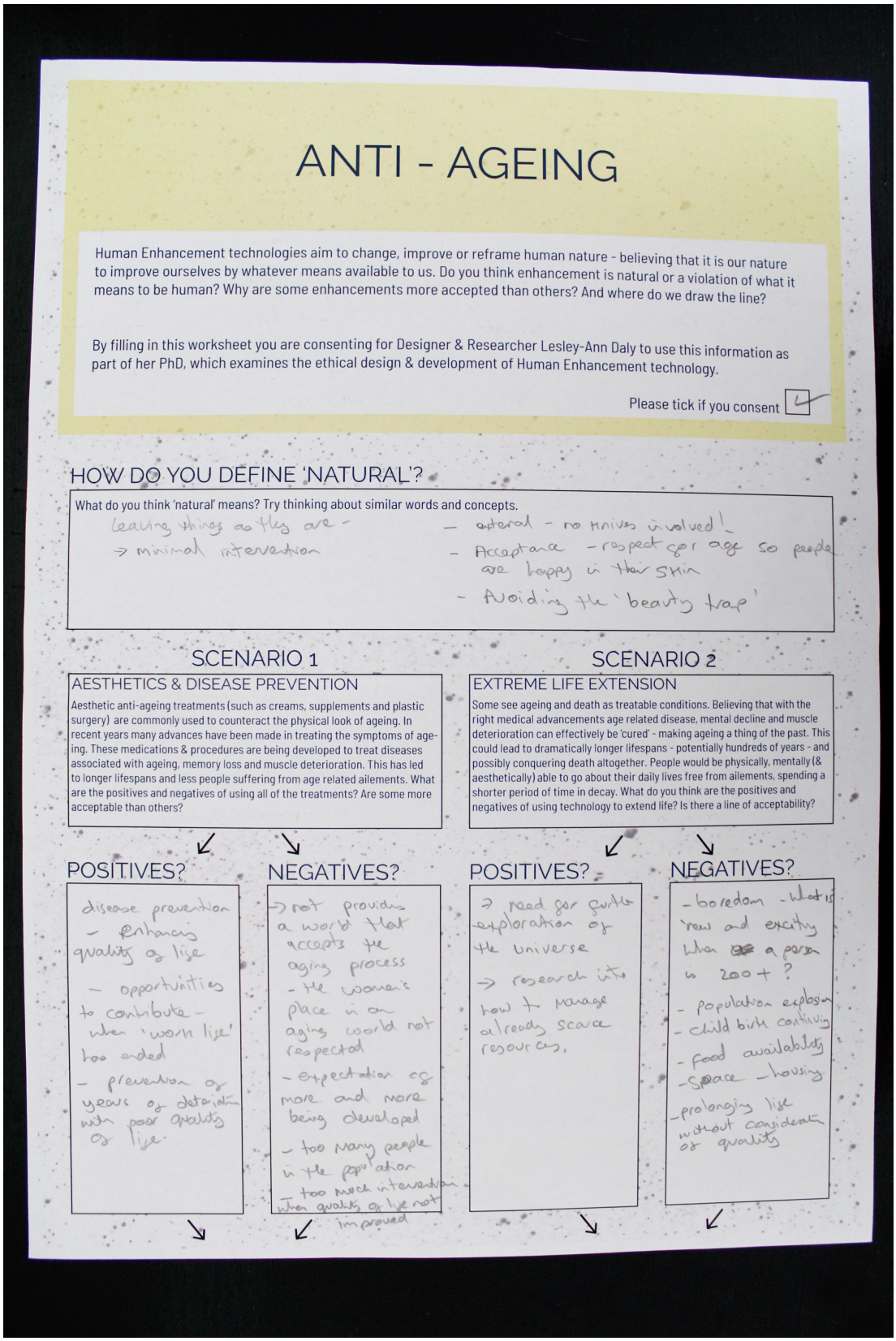


Figure 299 Anti-Ageing Worksheet - Filled In, 2019.

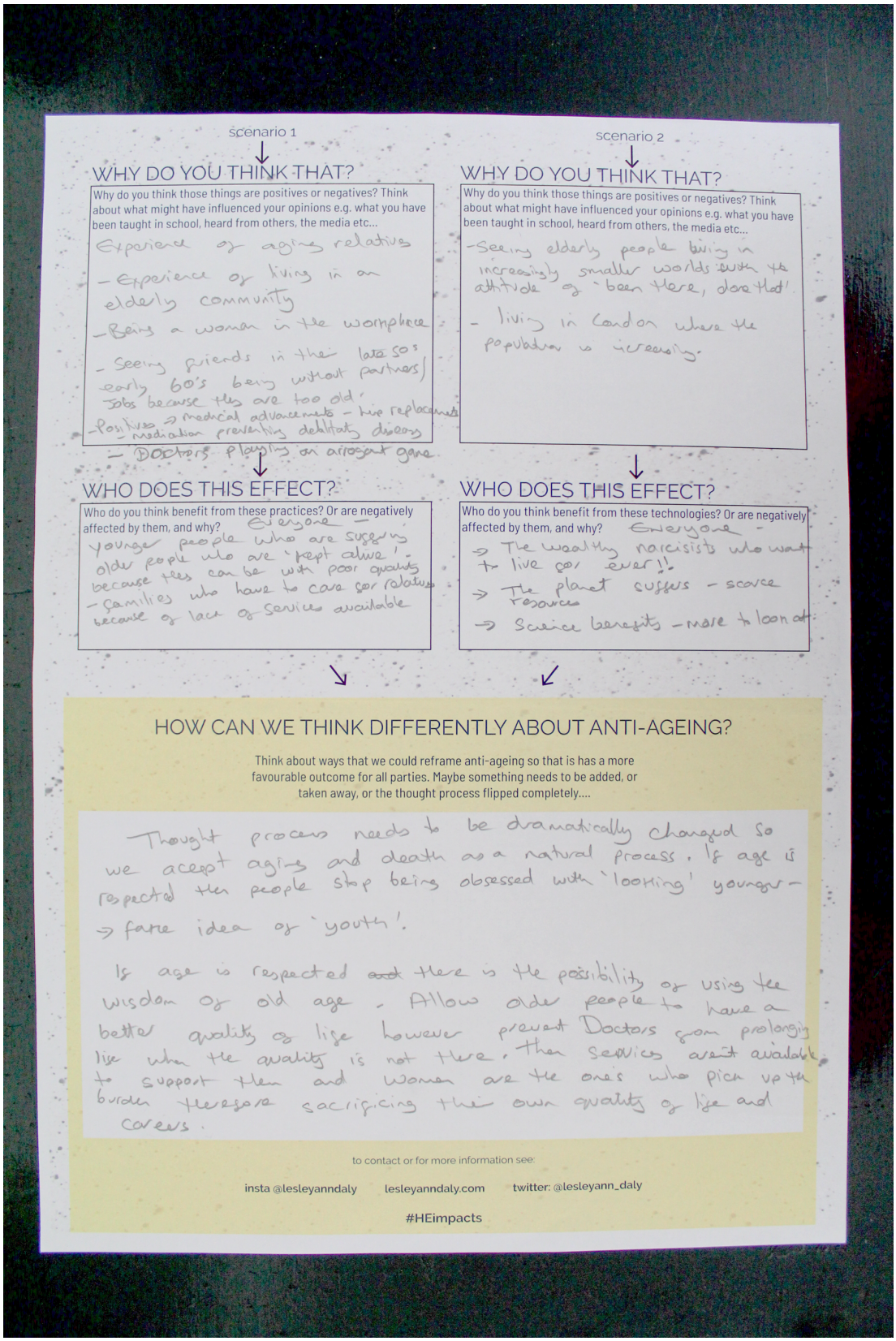


Figure 300 Anti-Ageing Worksheet - Filled In, 2019.

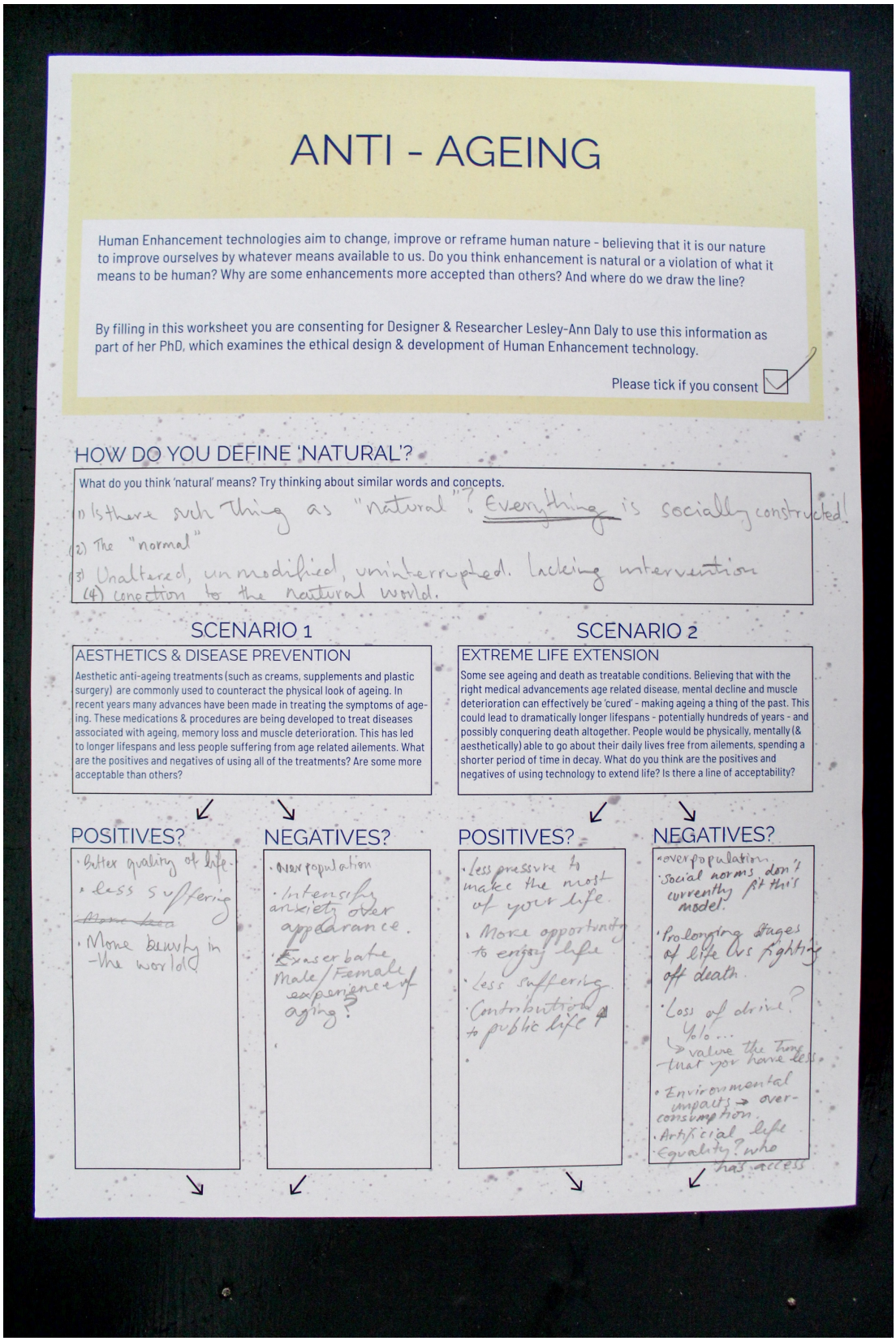


Figure 301 Anti-Ageing Worksheet - Filled In, 2019.

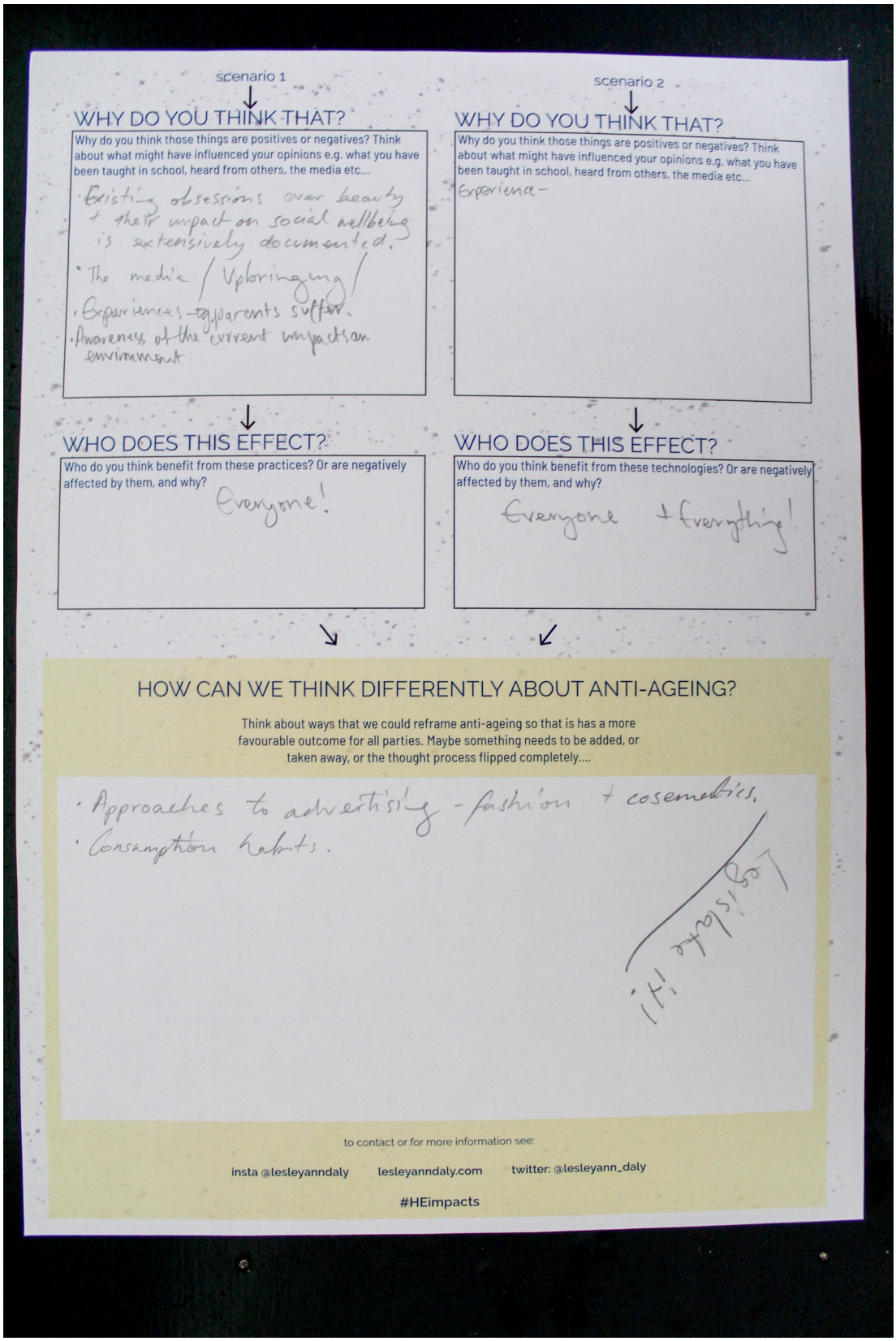
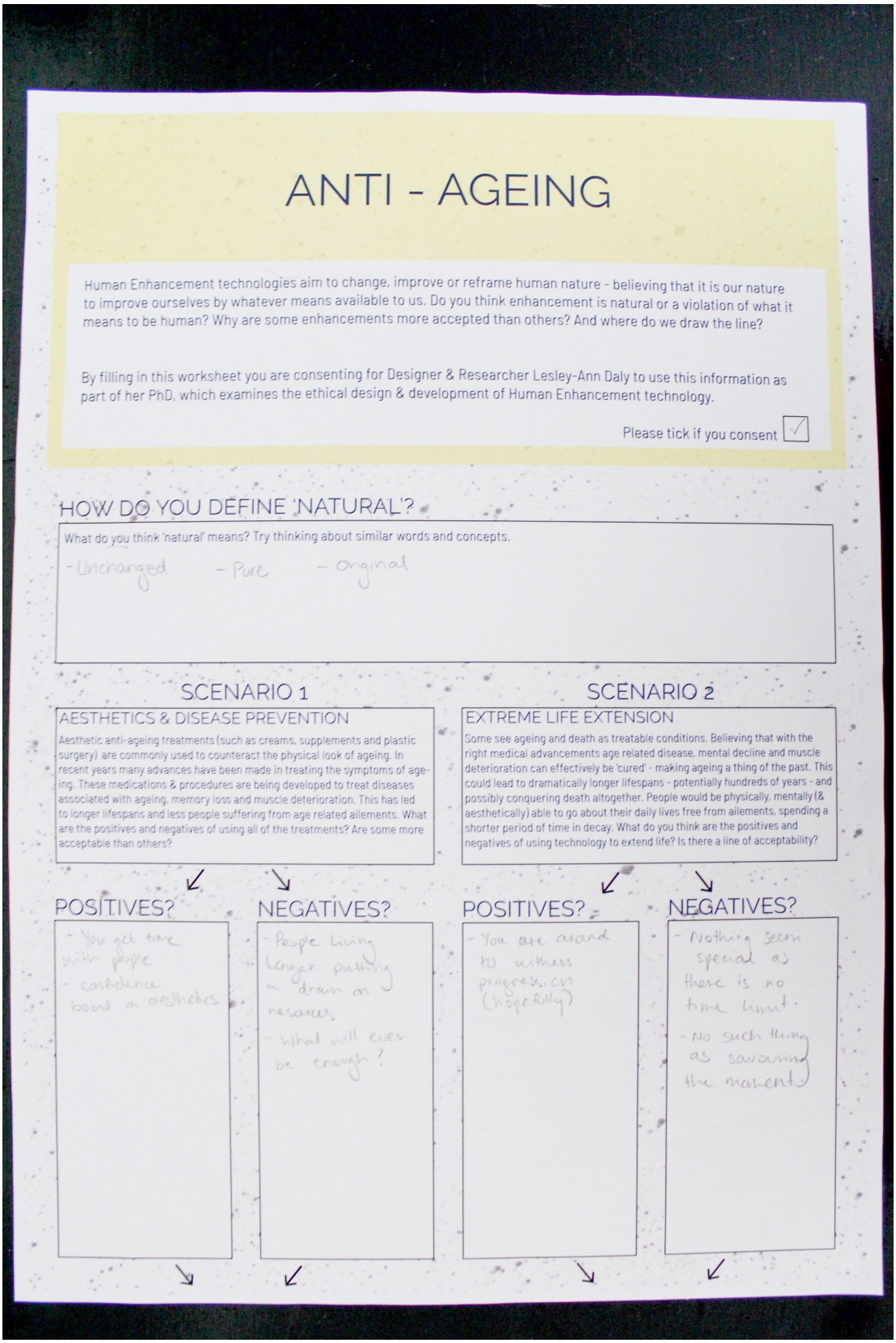


Figure 302 Anti-Ageing Worksheet - Filled In, 2019.



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Please tick if you consent ☑

HOW DO YOU DEFINE 'NATURAL'?

What do you think 'natural' means? Try thinking about similar words and concepts.

- Unchanged - Pure - original

SCENARIO 1

AESTHETICS & DISEASE PREVENTION

Aesthetic anti-ageing treatments (such as creams, supplements and plastic surgery) are commonly used to counteract the physical look of ageing. In recent years many advances have been made in treating the symptoms of ageing. These medications & procedures are being developed to treat diseases associated with ageing, memory loss and muscle deterioration. This has led to longer lifespans and less people suffering from age related ailements. What are the positives and negatives of using all of the treatments? Are some more acceptable than others?

POSITIVES?

- You get time with people
- confidence based on aesthetics

NEGATIVES?

- People living longer putting a drain on resources
- what will ever be enough?

SCENARIO 2

EXTREME LIFE EXTENSION

Some see ageing and death as treatable conditions. Believing that with the right medical advancements age related disease, mental decline and muscle deterioration can effectively be 'cured' - making ageing a thing of the past. This could lead to dramatically longer lifespans - potentially hundreds of years - and possibly conquering death altogether. People would be physically, mentally (& aesthetically) able to go about their daily lives free from ailements, spending a shorter period of time in decay. What do you think are the positives and negatives of using technology to extend life? Is there a line of acceptability?

POSITIVES?

- You are around to witness progression (hopefully)

NEGATIVES?

- Nothing seem special as there is no time limit.
- No such thing as savouring the moment

Figure 303 Anti-Ageing Worksheet - Filled In, 2019.

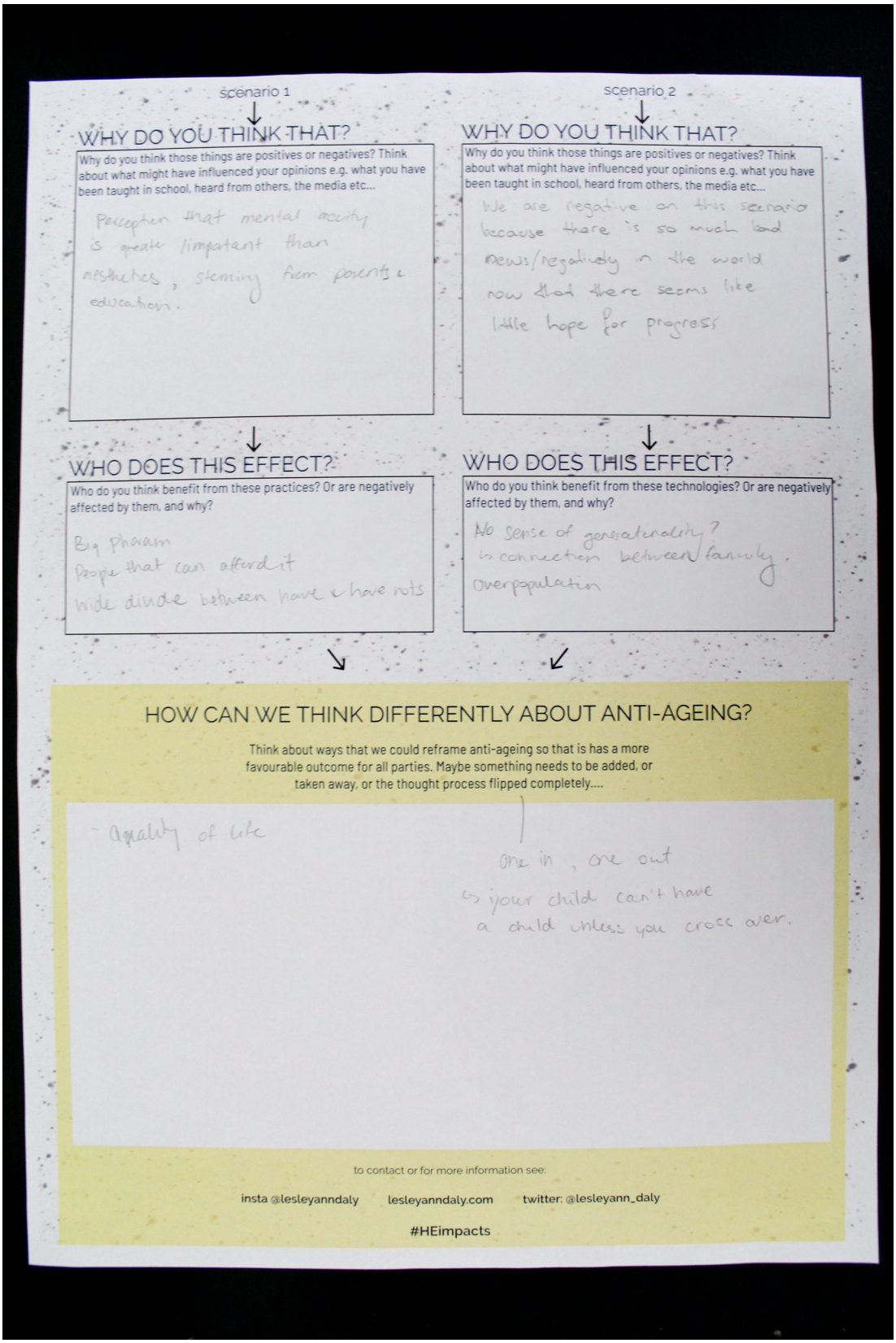


Figure 304 Anti-Ageing Worksheet - Filled In, 2019.

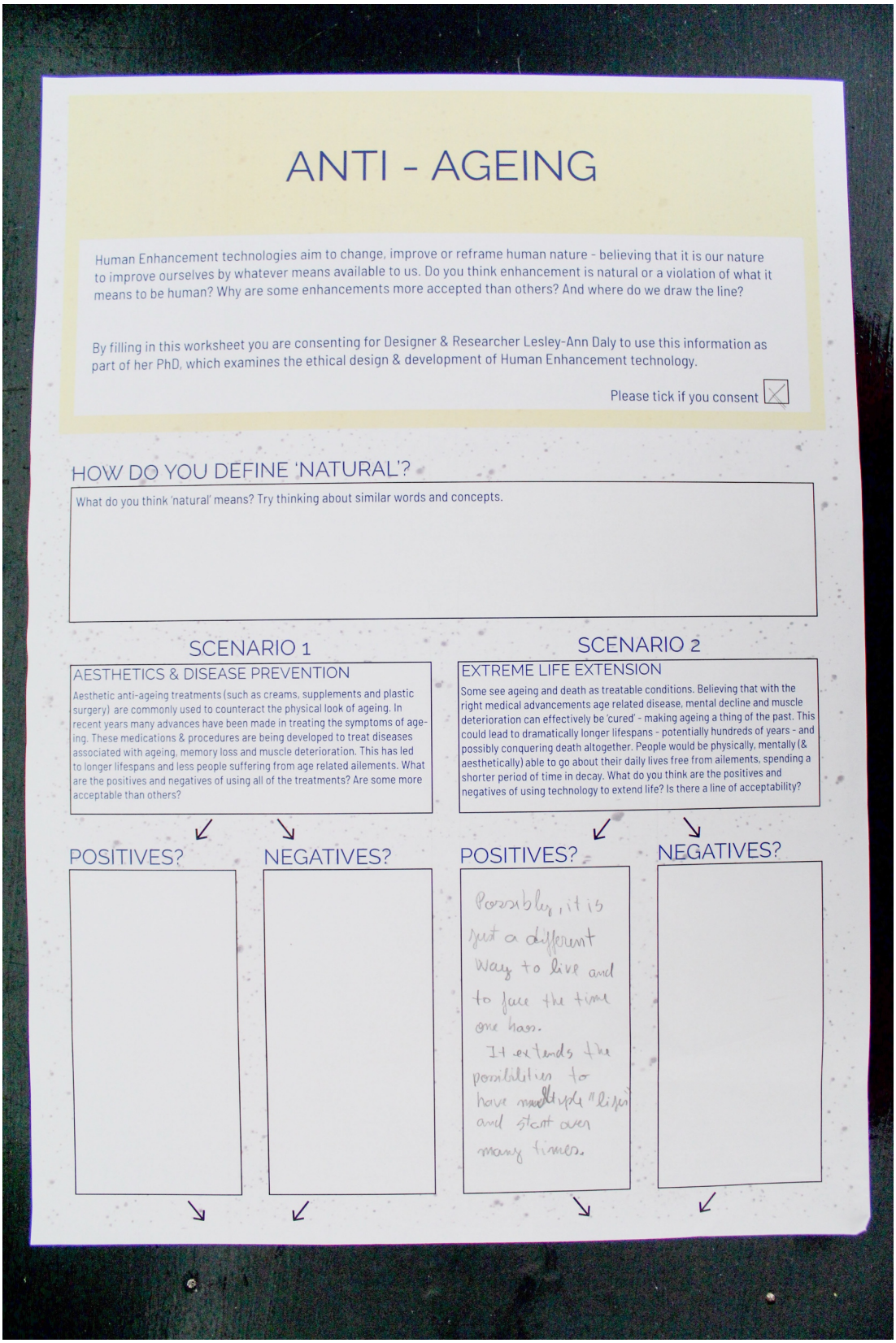


Figure 305 Anti-Ageing Worksheet - Filled In, 2019.

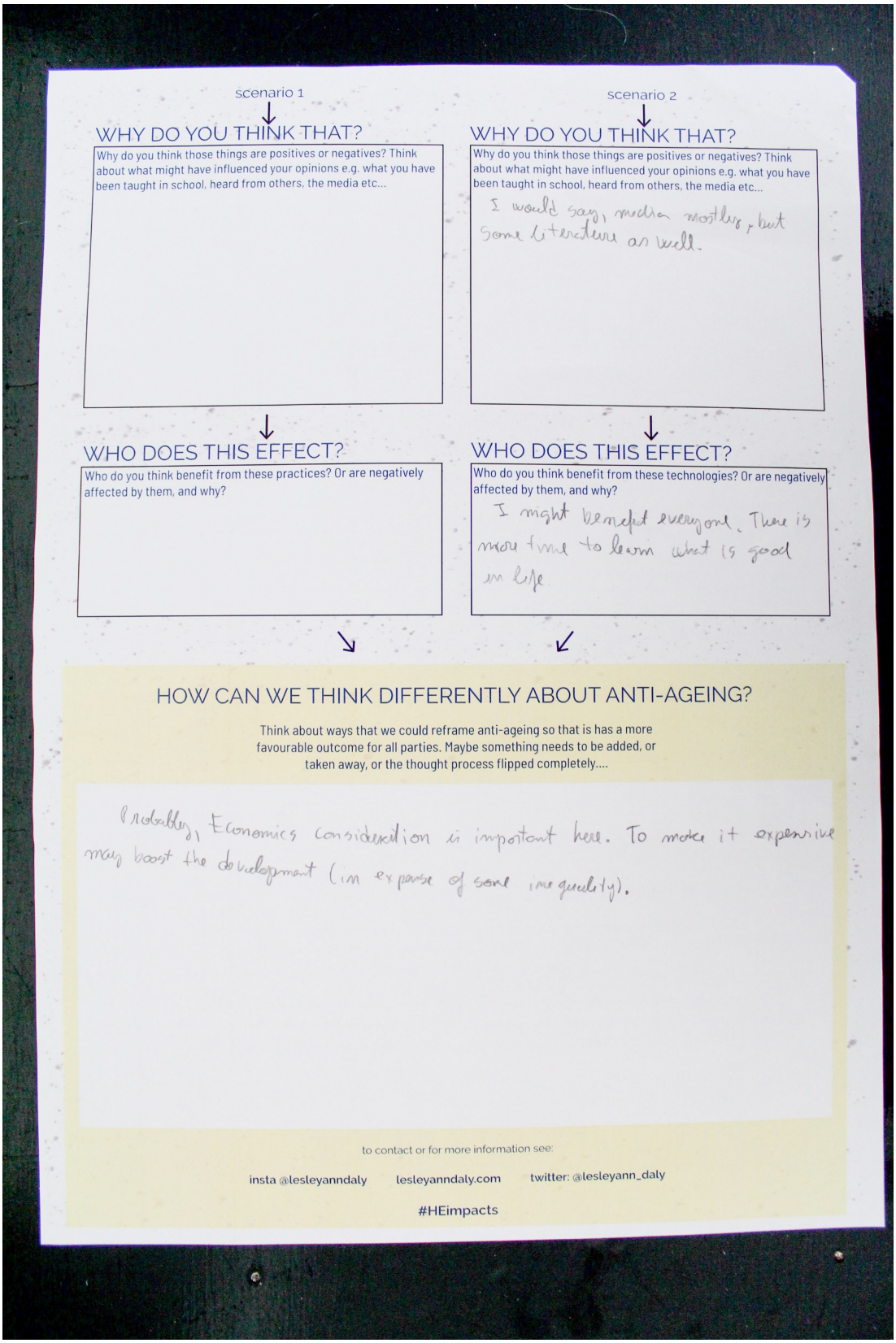
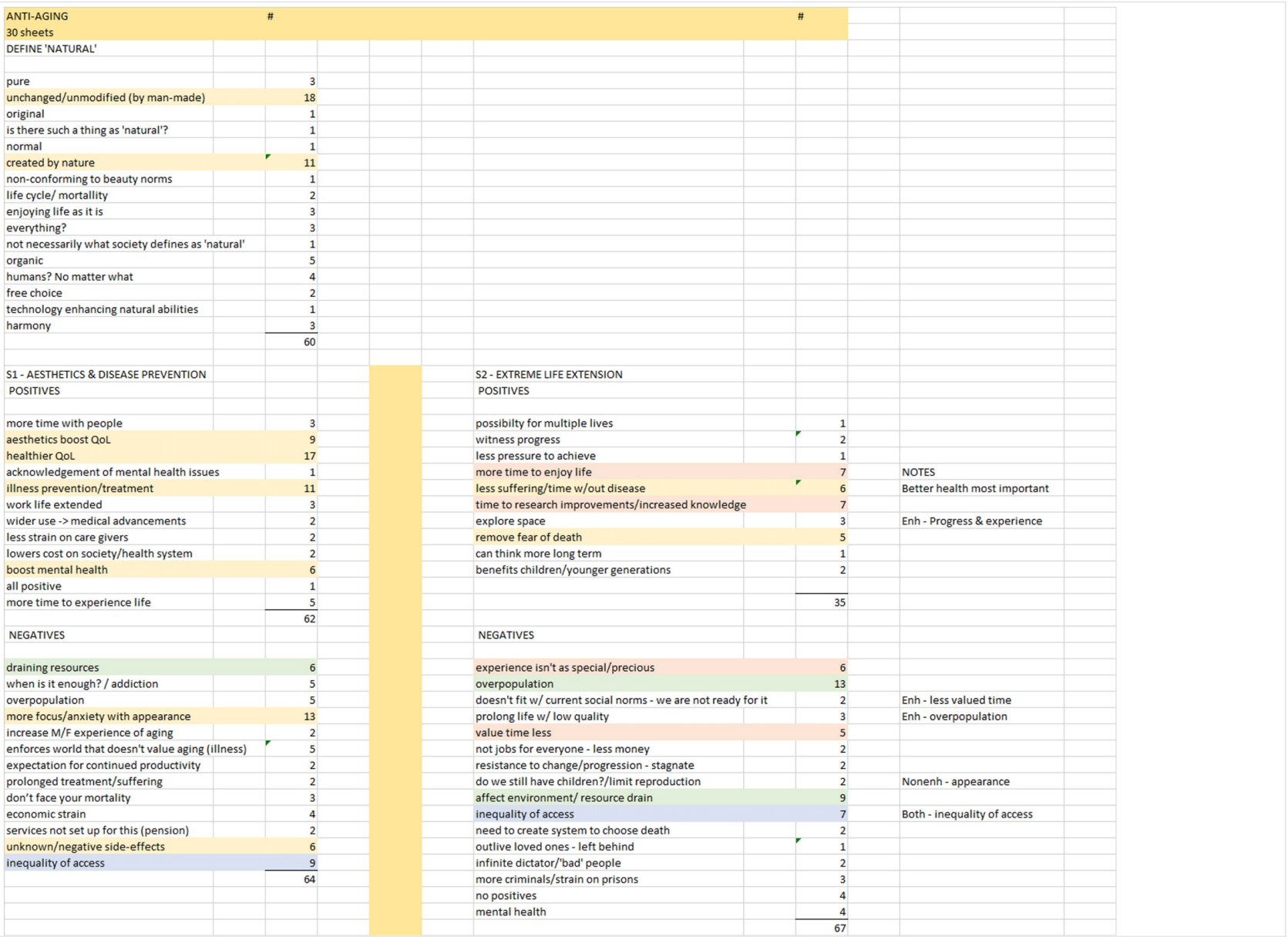


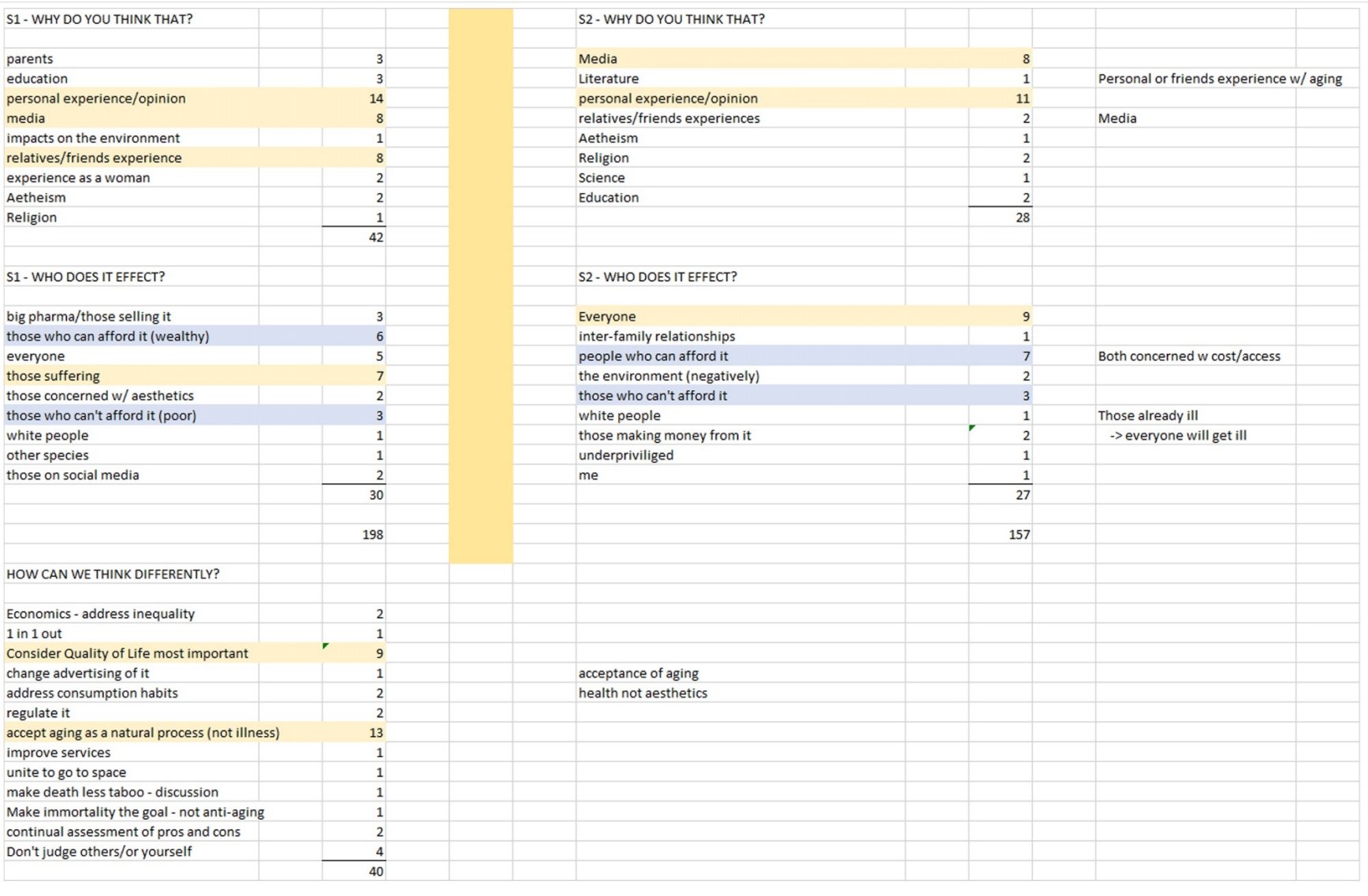
Figure 306 Anti-Ageing Worksheet - Filled In, 2019.



ANTI-AGING	#
30 sheets	
DEFINE 'NATURAL'	
pure	3
unchanged/unmodified (by man-made)	18
original	1
is there such a thing as 'natural'?	1
normal	1
created by nature	11
non-conforming to beauty norms	1
life cycle/ mortallity	2
enjoying life as it is	3
everything?	3
not necessarily what society defines as 'natural'	1
organic	5
humans? No matter what	4
free choice	2
technology enhancing natural abilities	1
harmony	3
	60
S1 - AESTHETICS & DISEASE PREVENTION	
POSITIVES	
more time with people	3
aesthetics boost QoL	9
healthier QoL	17
acknowledgement of mental health issues	1
illness prevention/treatment	11
work life extended	3
wider use -> medical advancements	2
less strain on care givers	2
lowers cost on society/health system	2
boost mental health	6
all positive	1
more time to experience life	5
	62
NEGATIVES	
draining resources	6
when is it enough? / addiction	5
overpopulation	5
more focus/anxiety with appearance	13
increase M/F experience of aging	2
enforces world that doesn't value aging (illness)	5
expectation for continued productivity	2
prolonged treatment/suffering	2
don't face your mortality	3
economic strain	4
services not set up for this (pension)	2
unknown/negative side-effects	6
inequality of access	9
	64

S2 - EXTREME LIFE EXTENSION	
POSITIVES	
possibilty for multiple lives	1
witness progress	2
less pressure to achieve	1
more time to enjoy life	7
less suffering/time w/out disease	6
time to research improvements/increased knowledge	7
explore space	3
remove fear of death	5
can think more long term	1
benefits children/younger generations	2
	35
NEGATIVES	
experience isn't as special/precious	6
overpopulation	13
doesn't fit w/ current social norms - we are not ready for it	2
prolong life w/ low quality	3
value time less	5
not jobs for everyone - less money	2
resistance to change/progression - stagnate	2
do we still have children?/limit reproduction	2
affect environment/ resource drain	9
inequality of access	7
need to create system to choose death	2
outlive loved ones - left behind	1
infinite dictator/'bad' people	2
more criminals/strain on prisons	3
no positives	4
mental health	4
	67

NOTES
Better health most important
Enh - Progress & experience



S1 - WHY DO YOU THINK THAT?		S2 - WHY DO YOU THINK THAT?		
parents	3	Media	8	
education	3	Literature	1	Personal or friends experience w/ aging
personal experience/opinion	14	personal experience/opinion	11	
media	8	relatives/friends experiences	2	Media
impacts on the environment	1	Aetheism	1	
relatives/friends experience	8	Religion	2	
experience as a woman	2	Science	1	
Aetheism	2	Education	2	
Religion	1		28	
	42			
S1 - WHO DOES IT EFFECT?		S2 - WHO DOES IT EFFECT?		
big pharma/those selling it	3	Everyone	9	
those who can afford it (wealthy)	6	inter-family relationships	1	
everyone	5	people who can afford it	7	Both concerned w cost/access
those suffering	7	the environment (negatively)	2	
those concerned w/ aesthetics	2	those who can't afford it	3	
those who can't afford it (poor)	3	white people	1	Those already ill
white people	1	those making money from it	2	-> everyone will get ill
other species	1	underpriviliged	1	
those on social media	2	me	1	
	30		27	
	198		157	
HOW CAN WE THINK DIFFERENTLY?				
Economics - address inequality	2			
1 in 1 out	1			
Consider Quality of Life most important	9			
change advertising of it	1	acceptance of aging		
address consumption habits	2	health not aesthetics		
regulate it	2			
accept aging as a natural process (not illness)	13			
improve services	1			
unite to go to space	1			
make death less taboo - discussion	1			
Make immortality the goal - not anti-aging	1			
continual assessment of pros and cons	2			
Don't judge others/or yourself	4			
	40			

Figure 308 Anti-Aging worksheet quantitative analysis. Lesley-Ann Daly, 2019.

INSIGHTS FROM ANTI-AGING WORKSHEETS

Positives

Prevention

- Healthier Quality of Life
- Illness prevention and treatment
- Aesthetics boost QoL

Extension

- More time to enjoy life
- Time to increase knowledge/ research improvements
- Less time suffering with disease
- Removes fear of death

Preventing the ailments associated with senescence, both visually and physically, are seen to improve QoL as you get older. Participants note that you are able to live a better and healthier life for longer.

Similarly with life extension participants see the benefits of having a much longer life aided by disease eradication will allow you to enjoy more time and learn more. This added research time may benefit you and results thereof benefit the world as experts have more time to perfect solutions or better explore hypotheses. Participants also see a removed fear of death as beneficial.

Negatives

Prevention

- More focus on appearance which causes anxiety
- Inequality of access

Extension

- Overpopulation
    - Drain on resources/affect the environment
- Your experience is as precious
    - Value time less
- Inequality of access

Participants saw a focus on preventing the visible effects of aging as a negative because it plays into and prolongs the obsession with unhealthy beauty ideals. Rather than accepting aging skin as beautiful and 'natural' (valuing the process of aging) it prolongs the demand for a youthful appearance – only 2 participants noted the gender difference in beauty standards for those who are aging. Inequality of access was a big issue for participants – those with more money can afford better treatments - either product wise or private health care. This was generally referred to do with affluence in the West, not inaccessibility outside of that.

Extension also mentioned inequality of access for similar reasons. Also mentioned was the unknown side effects that these treatments may have.

Participants mentioned that the increased amount of people living (as older people are not dying as soon) could cause a drain on resources. However in Extension this became the main focus of the negative comments as there could potentially be radically more people living on the Earth and very few dying. The worry for participants is that this added pressure on resources and the environment would make out current climate crisis exponentially worse.

A decreased value of time and therefor experience was also an issue for participants. With so much more time (potentially infinite) we would not value the present. To note there were other very poignant perspectives on negative aspects of ELE brought up by participants (birth/death regulation, stagnation etc) however I am only picking out the most frequently raised insights to represent majority views held by participants.

Why do you think that?

Prevention

- Personal experience/opinion
- Media
- Relatives/friends experience

Extension

- Personal experience/opinion
- Media

The majority of participants opinions for both P&E came from either their own experience or that of people close to them. In general this was the experience of aging, being in a late stage of aging where visible and medical ailments have begun affecting their life.

The media also plays a big role in influencing/ informing the participants opinions. Especially the news which has recently been documenting sciences breakthroughs/ attempts to prevent age related diseases. Radical life extension has been a theme for science fiction, with new series such as Altered Carbon and Ad Vitam (both on Netflix) addressing futures where people have radically longer lives by varying methods (changing bodies with mind downloads and genetic engineering, respectively). Transhumanism would be the main promoter of radical life extension (or Immortality) which has received some media attention in recent years – mainly around the lives and investments of very rich Western men who want to cheat death.

Who does it effect?

Prevention

- Those who are suffering
- Those who can afford it
    - Those who can't

Extension

- Everyone
- Those who can afford it
    - Those who can't

Those affected are somewhat mirrored across P&E. The big issues raised by participants being money, this technology is beneficially to those who can pay for it and will leave behind or detriment those who can't. What differs is the health of those affected by the different technologies. For prevention the main group who will benefit will be those who are already suffering – with disease or general senescence. However the life extension technology has the ability to affect everyone as at some point we will all inevitably get sick and die – therefor everyone can benefit from disease and aging eradication.

How can we think differently?

- Accept aging as a natural process
- Consider QoL as the most important aspect

In general participants wanted to express their dislike for aging being seen as an illness and want people to accept it as a natural part of life. They consider quality of life to be the most important aspect when considering this technology – which can include both good health, good mental health and a sense of fulfilment. This corresponds to the positives for extension being both health and experience related, as opposed to BC where participants only considered health benefits as a positive for GE – QoL was not mentioned for GE. Participants were more open to us benefitting from the health aspects and also because of that being able to do more with the extra time we have. However there was a rejection for the use of the technology for aesthetic enhancement and advocating beauty norms – which parallels the participants on GE for aesthetic change.

ANALYSIS OF ANTI-AGING WORKSHEETS

Quality of Life

The overriding theme here is the importance of Quality of Life as we get older or extend our lifespan. One participant listed QoL as including: dignity, safety, comfort, fulfilment, stimulation, friendship, interaction, mobility. This can explain why participants valued both the improvement in health/eradication of disease and the opportunity to spend their added time doing something that they found fulfilling or beneficial to the world. Also the worry that this extra time will not be appreciated but instead wasted. This QoL however does not include the need to be 'beautiful' for longer as this is not necessary for a good life – which parallels the rejection of aesthetic modification by GE. However GE participants did not consider the QoL of the potential child, only their own believes for a moral society. For life extension the participants are considering the life they would like to have should they be able to avail of it, but GE participants did not put themselves in the shoes of the child and consider that the enhancement could offer them a better QoL by way of enhancing their intelligence or skills.

Some mention was made to those who would have an extended life with a bad quality – for example those living with an incurable disease or those incarcerated – contributing also to overflowing prisons.

Inequality of access (money)

Another theme throughout was how money played a big role in the inequality of access to these technologies – prevention or extension. Not much reference was made to whether this economic disparity was between those in affluent areas or between larger geographical areas, or both.

Environmental impact

Overpopulation leading to a strain on resources and damage to the environment was a big issues for the participants – especially for LE due to the potentially huge number of people living on the Earth in this future scenario. Climate change is big at the moment, we are seeing increasingly devastating natural disasters occurring across the globe, droughts, floods, temperature rise, species extinction etc. In May 2018 Extinction Rebellion formed in the UK, raising the climate crisis flag and performing non-violent protests to raise awareness and push the government to affect real action and change. This along with protests across the globe, raised popularity for sustainability practices, pollution scandals and new awareness for consumer consumption habits, have made climate change one of the most talked about issues globally which is covered extensively by the media. This is likely the reason for participants focus on environmental issues when it come to a potential increase in population.

Figure 309 Issues raised by workshop participants that were additional to the issues identified prior to the workshop (black). Lesley-Ann Daly, 2019.

5.3. Brave New World Conference Workshop Analysis

Address: Brave New World Conference, Leiden, The Netherlands

Event: Brave New World side program – workshops and exhibits

Date: 5 November 2019

Time: 12.00 – 13.00 pm

Participants: Approx. 18 (3 groups of 5/6)

Duration: 40minutes (groups running concurrently)

Workshop type: Group role-play in future scenario

Event link: https://bravenewworld.nl/

Brave New World conference 2019

Brave New World is an annual conference for people who want to know what the future holds in store and how this will affect their business, policies, and life. The conference looks at how future technologies may impact human life, with this years' theme being the 'Future of Species' and the 'Future of Consciousness'.

Application

Having presented a talk at the Brave New World conference the year previous (2018) I contacted the organisers Alexandre Mouret & Kim van den Wijngaard to propose running a workshop at the 2019 conference. Mouret provided the themes for the 2019 conference and after tailoring the workshop to these the workshop was approved.

TITLE & DEFINITIONS	THERAPY vs ENHANCEMENT Therapy - treatment intended to relieve or heal a disorder, physical or psychological	REGULATORY CONSIDERATIONS -rules made by a government or other authority in order to control the way something is done	HUMAN RIGHTS -are the basic rights and freedoms that belong to every person in the world	HUMAN AGENCY/ ACCOUNTABILITY - the capacity of individuals to act independently and to make their own free choices.	SOCIOCULTURAL IMPACT -related to the different groups of people in society and their habits, traditions, and beliefs
EXAMPLES	WHAT IS 'NORMAL'? Some 'disabled' communities for example Dwarves & the Deaf, want to be able to choose not to genetically remove this 'disability' from their children – opting to preserve their communities' culture and heritage. This is their 'normal'	GLOBAL CONSENSUS Global solidarity is needed on how the technology is regulated. Uneven regulation across countries, and cultures, may force people to seek 'treatment' abroad or procure technologies illegally - adding risks from counterfeit devices.	BENEFIT THE INDIVIDUAL The interests and welfare of the individual should have priority over the sole interest of science or society. Primarily the enhancement must benefit the enhanced individual and not put them at risk in order to achieve a wider gain.	MILITARY A soldier is required to enhance to increase probability of mission success. Due to the hierarchical structure of the military could it be considered that they are giving their consent freely? Who will be accountable if it malfunctions?	LIFE EXTENSION Longer life changes our perception of time and will give people the physical and mental ability to stay in jobs longer. By leaving less room for young, fresh ideas this will slow innovation. Young bodies - old outlook.
ISSUES	How do you define 'enhancement'?	There needs to be a global consensus on regulation of HE technology	Treat everyone equally	If all experience is mediated by technology, how does it affect our decisions?	Would longer lives mean reduced fear of death, less drive & commitment?
	How do you define 'normal'?	Need to increase awareness so that the public and relevant professionals can be involved in regulation committees	Respect cultural diversity	If our experience is already mediated anyway, will the addition of the enhancement matter?	Would extended life mean extended time in decay? Increasing interest in assisted suicide?
	How do you define 'disability'?	Must take non-Western views into account	Ensure it doesn't generate discrimination against a group or individual for their culture, gender or income	If the tech becomes a moral actor, who is controlling your actions, you or the device?	Will some enhancements be detrimental to other aspects of health, creating unknown side effects in the long term?
	What genetic traits are acceptable/ favourable?	Need to consider feminist views, queer/gender politics, and the other	Ensure having the device doesn't interfere with the fundamental rights of others	Do we want the technology to make moral judgements for us?	Who are enhancements accessible to? To what extent is it covered by the health system?
	What are the implications of choosing to keep a 'disability'?	Must share benefits & advancements globally, and promote work in developing countries	Ensure everyone has freedom of choice – Morphological freedom	If enhancement makes learning easy, taking away the time and effort normally involved, how will this affect self-development?	If enhancement is only for the rich will this create greater socio-economic disparity?
	How does genetic legacy change when editing out a family trait/disability?	Need to be regulated on a case by case approach and create risk evaluation levels	Respect others choice to or not to enhance	If we rely on enhancement to control emotion – how will we/children learn to master our impulses?	If all those around you are enhanced will you feel pressured into doing it yourself?
	How does family legacy change when adding in a new trait?	Need to regulate according to the devices' actual effects on the user, not by how the manufacturer claims it will work	Ensure using the device doesn't impair our rationality or restrict the breadth of human desire	Will changing our temperament, emotions, desires change our identity?	Will the enhanced gain greater social status, causing a negative social effect on the unenhanced?
	Do unselected embryos deserve to live?	Potentially consider how the device interacts with the body as defining factor e.g. attached to skin, implanted, neural	Give clear guidance and safety information before choice is made	If our memories and experiences define our personalities, will augmenting our memory change who we are?	In a narcissistic society will each person acting for their own betterment detriment society?
	Does normal' change when many people enhance?	Must consider long term effects and benefits, not short-term solutions	Make sure benefits outweigh the risks	As medical practitioners only claim to do the best practise, what happens when results are not what we asked for?	Will increased popularity in enhancing boost its acceptance?
	Will those who don't enhance become 'subnormal'?	Need to find a way to quantifiably measure risks vs benefits when the affect is not yet clear	Ensure the individual interests are greater than societal interests	As consumers, how might buying enhancements promote the commercialisation of the body?	Is it justifiable to ask certain professions, such as doctors & pilots & teachers, to enhance for the greater good?
	Do we risk perceiving the whole human condition as 'disabled' and in need of enhancement?	Understand that desirability will increase when clear benefits are proven	Must decide for the best interests of those without the ability to choose/consent. Protect the vulnerable	Should a pierce providing enhancement services be held to the same standards as a medical professional?	What privacy & security measures should be put in place? Who will have (authorised) access to your data?
	Does raising the physical & mental performance of the aging count as therapy?	Must consider that what is good for one is not necessarily good for all	Be conscious to safeguard future generations	Will medical professionals essentially become service providers?	What if employers and/or the government had control over your enhancements? With or without your knowledge?
	Does a treatment that allows an athlete to heal faster count as enhancement?	Need more thorough regulated testing on devices made for children	Protect/ do not harm the environment, biosphere and biodiversity	Who is responsible for the outcome of a malfunctioning enhancement?	If children become a product of their parents desire, will this change attitudes about control in parenting?
	Should the less naturally gifted be allowed to enhance to even the playing field? – who decides?	Consider having criminal sanctions for using devices on children without proper training	Know what to leave alone, and not to neglect what we already have	Should parents liable for misusing enhancements on their children? How much is the child choice?	Will children be burdened by the idea that they must live up to what they were 'designed for'?

Figure 310 'Ethics Grid for Human Enhancement technology' highlighted with issues that the workshop at Brave New World conference will be addressing. Colour coding below. Lesley-Ann Daly, 2019.

Issues on ‘Ethics Grid for HEt’ addressed in workshop at Brave New World conference, colour coding:

Individual vs societal interests
Brain Modulation technology
What about the unenhanced
Thinking long term

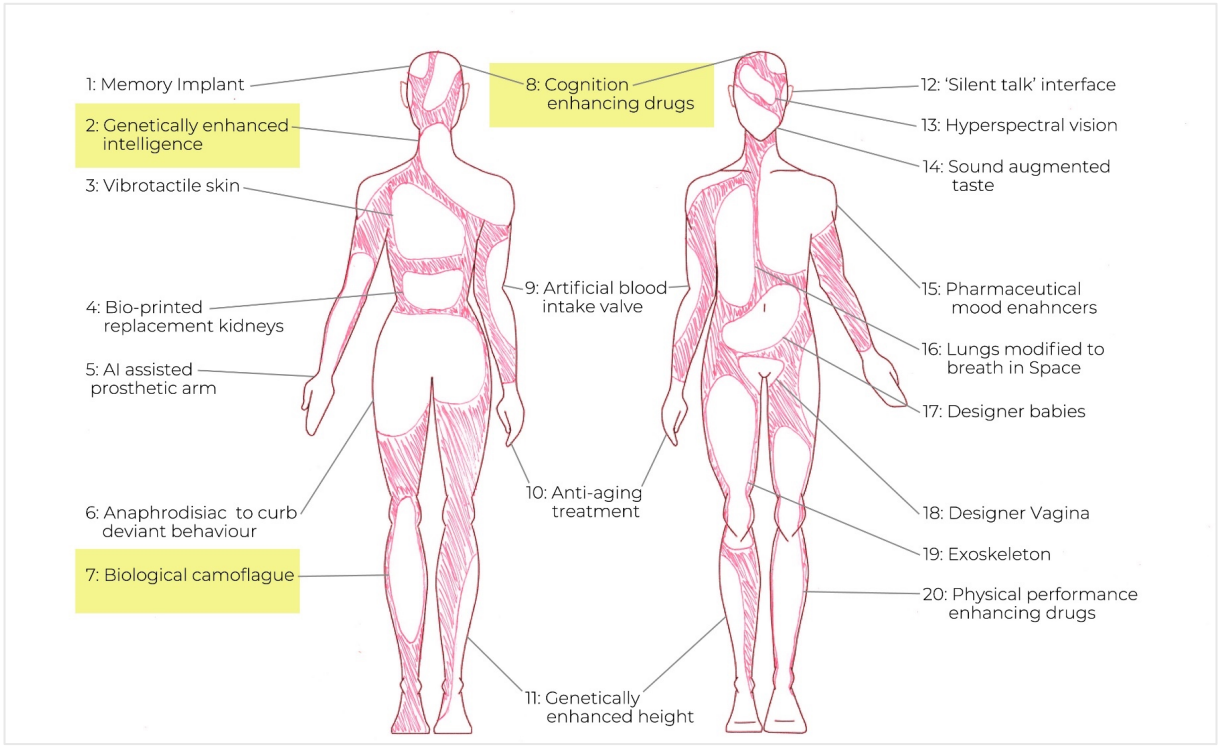


Figure 311 'Body Schematic Of (Future) Commercially Available HE Technologies’ Marked with The Technology That the Workshop at The Brave New World Conference Addresses. Lesley-Ann Daly, 2019.

Role-play in speculative scenario

This workshop was held in a break between the morning and afternoon session on the second day, during the ‘Interactive program’ where other activities or exhibitions also took place. The workshop was conducted in small groups, approx. 5-6 people, who chose to take part, with 3 groups running in tandem.

Participants were given role play cards with either an enhancement technology on, or an ‘unenhanced’ card. Corresponding with the conference themes the enhancement technologies are: brain modulation via neuro-implant (permanent – subject to software

upgrades); biological camouflage via genetic modification (permanent); and performance enhancement via pharmaceuticals and neuro-stimulation (not permanent). This workshop allowed participants to actively inhabit the role of a future enhanced citizen. As a group they discussed a future scenario where the earth is dying and only 2 people from the group can be chosen to go to an off-world colony, as outlined on the group scenario sheet. Participants are encouraged to develop their own opinions by investigating interactions that would be personal to them and their future life, exploring the social and ethical impacts in a more tangible, salient way.

Rather than passively learning about the possibilities and consequences of Human Enhancement technology, the aim is for participants to think subjectively about the impacts HEt would have on their life and others around them - be they enhanced or not.

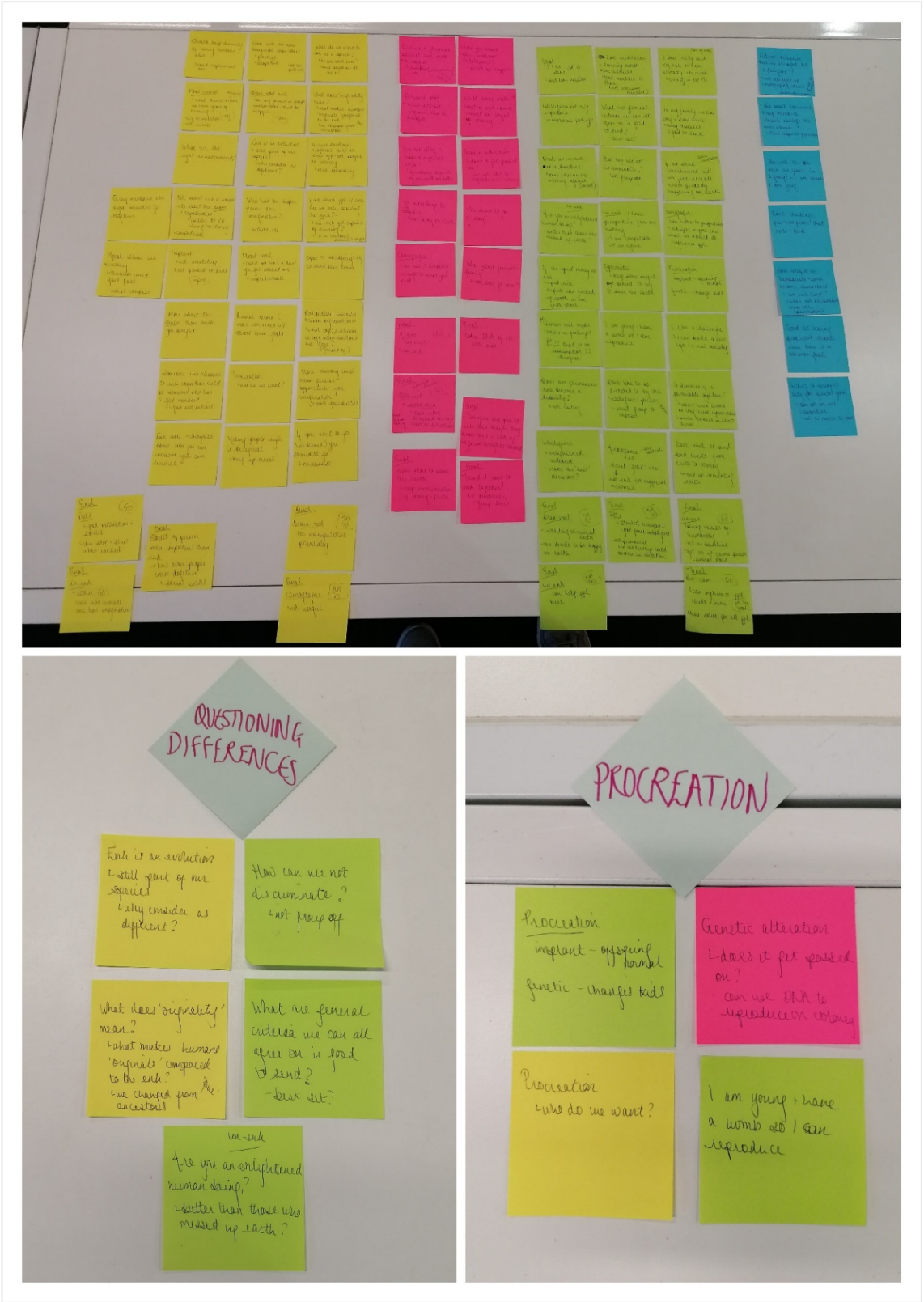


Figure 312 Affinity Mapping responses from workshop groups. Pink, yellow and green post its represent responses from different groups, light blue indicates headings for similar responses. Lesley-Ann Daly, 2019.

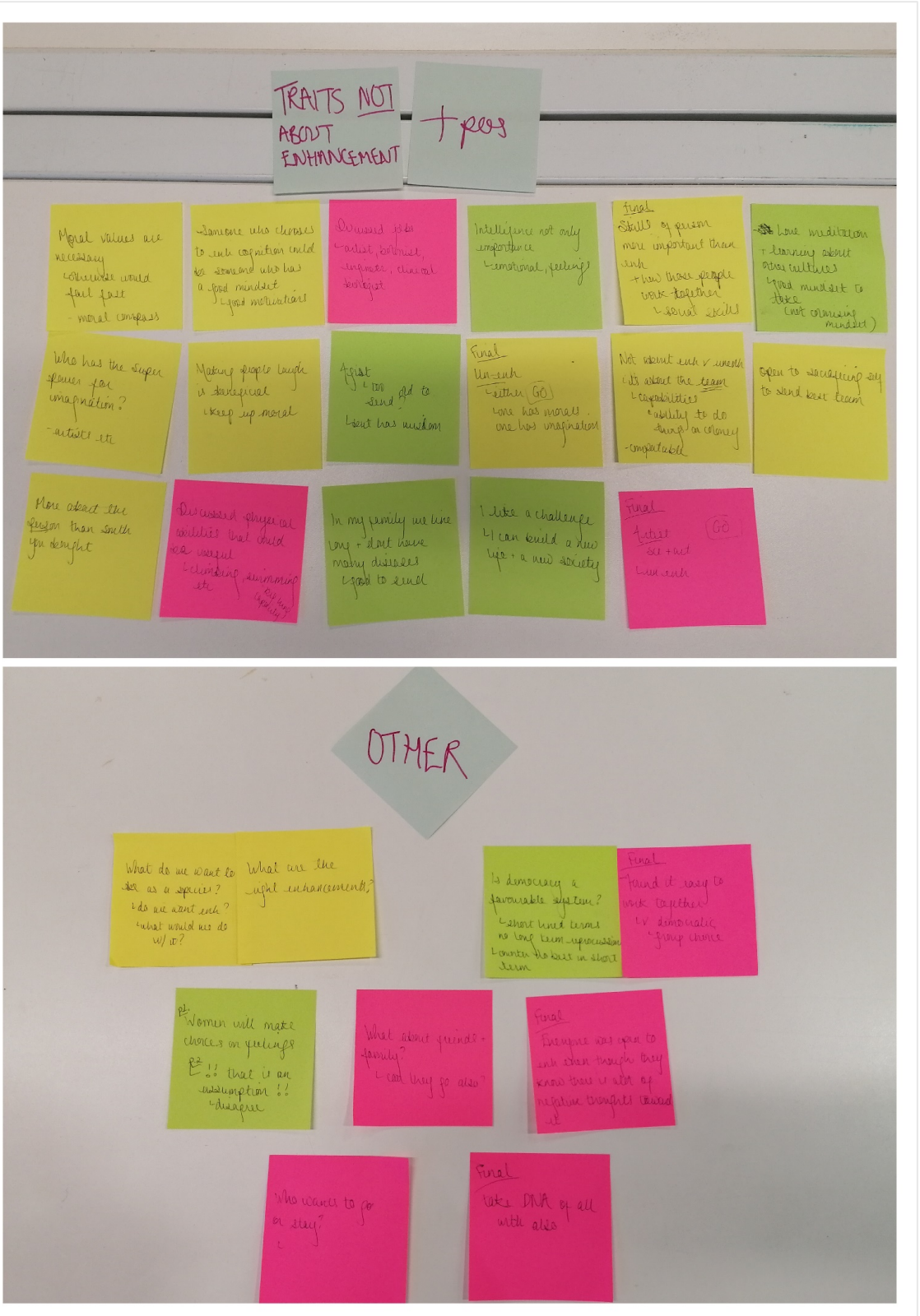


Figure 313 Affinity Mapping responses from workshop groups. Lesley-Ann Daly, 2019.

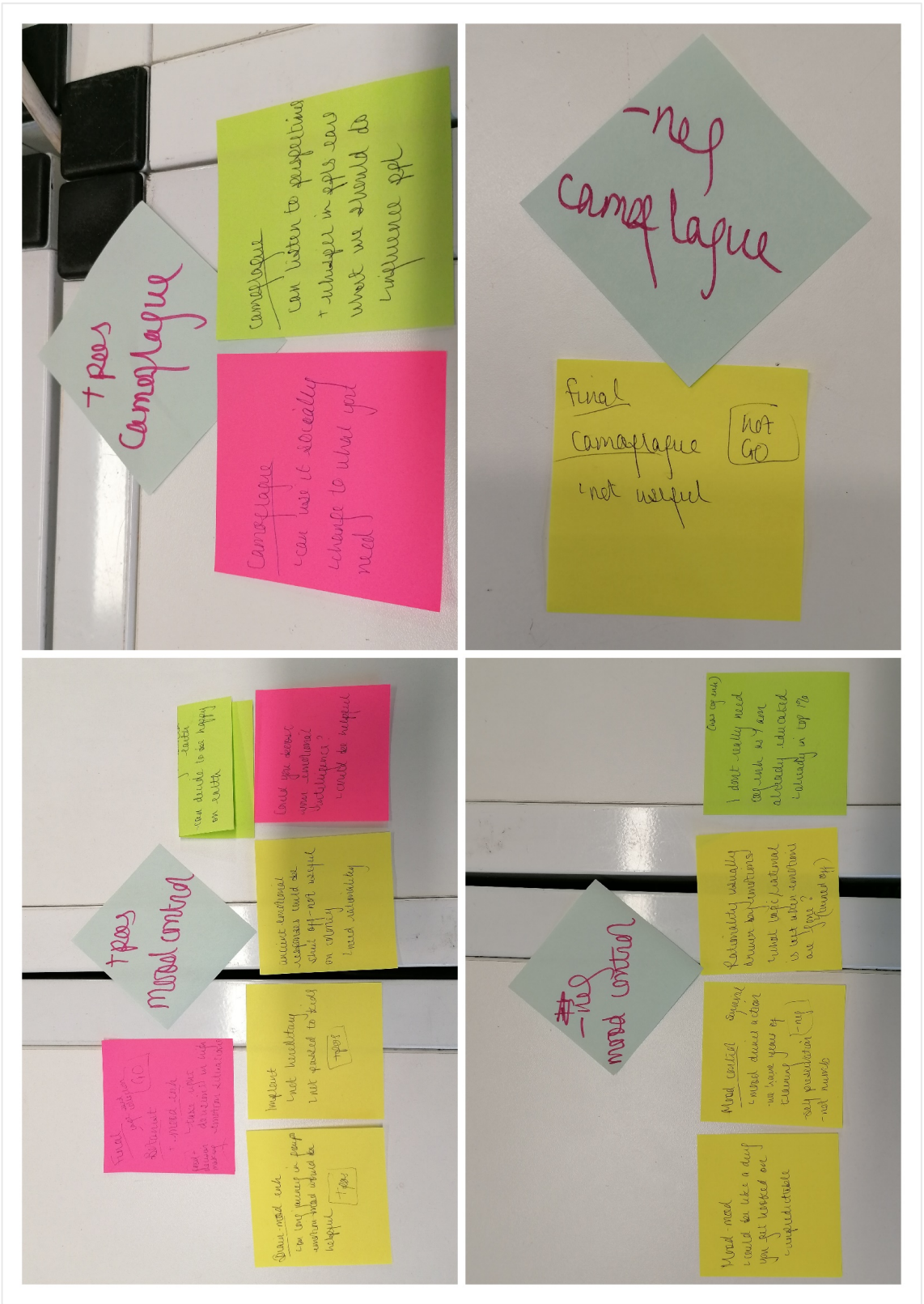


Figure 314 Affinity Mapping Responses from Workshop Groups. Lesley-Ann Daly, 2019.

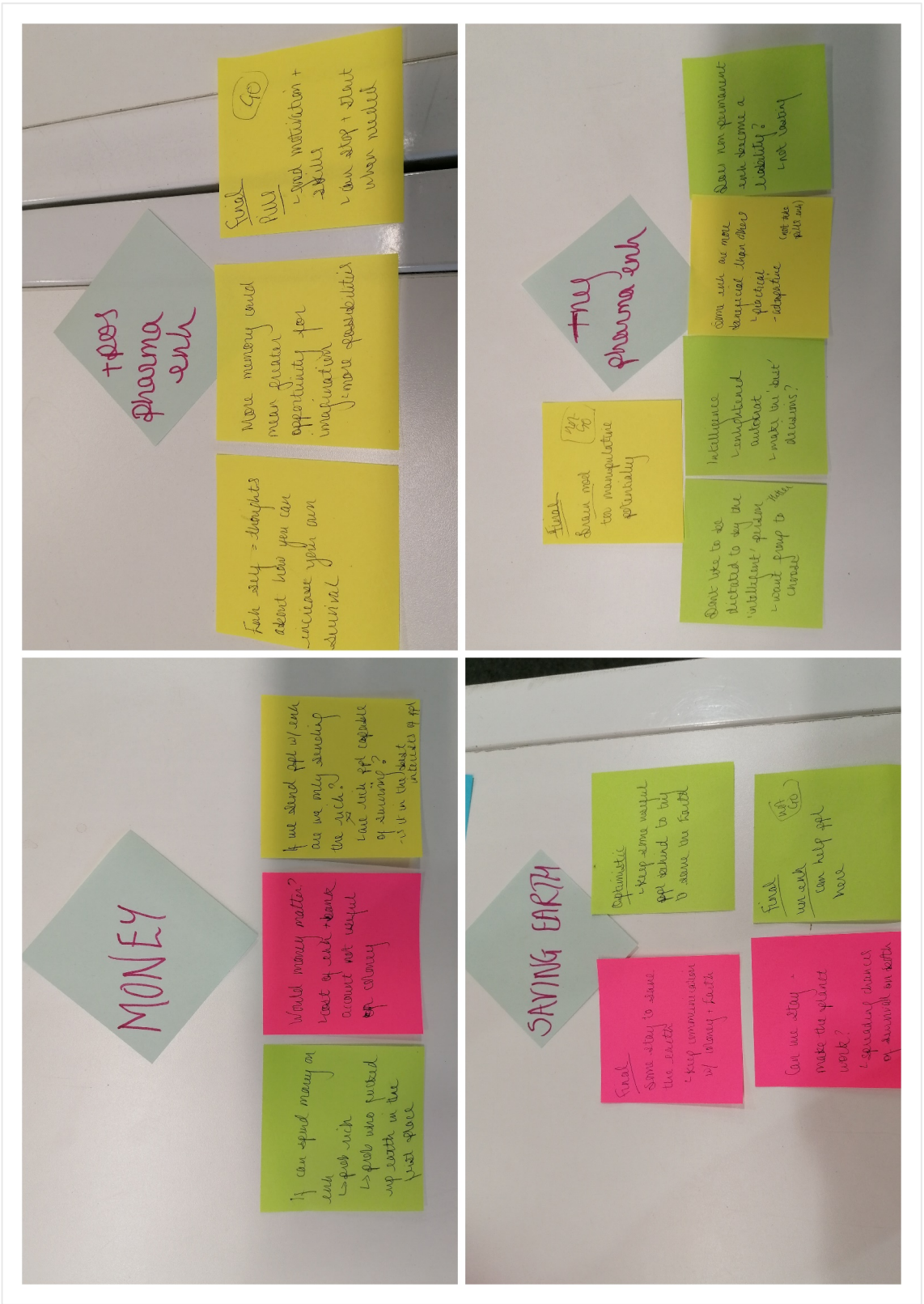


Figure 315 Affinity Mapping Responses from Workshop Groups. Lesley-Ann Daly, 2019.

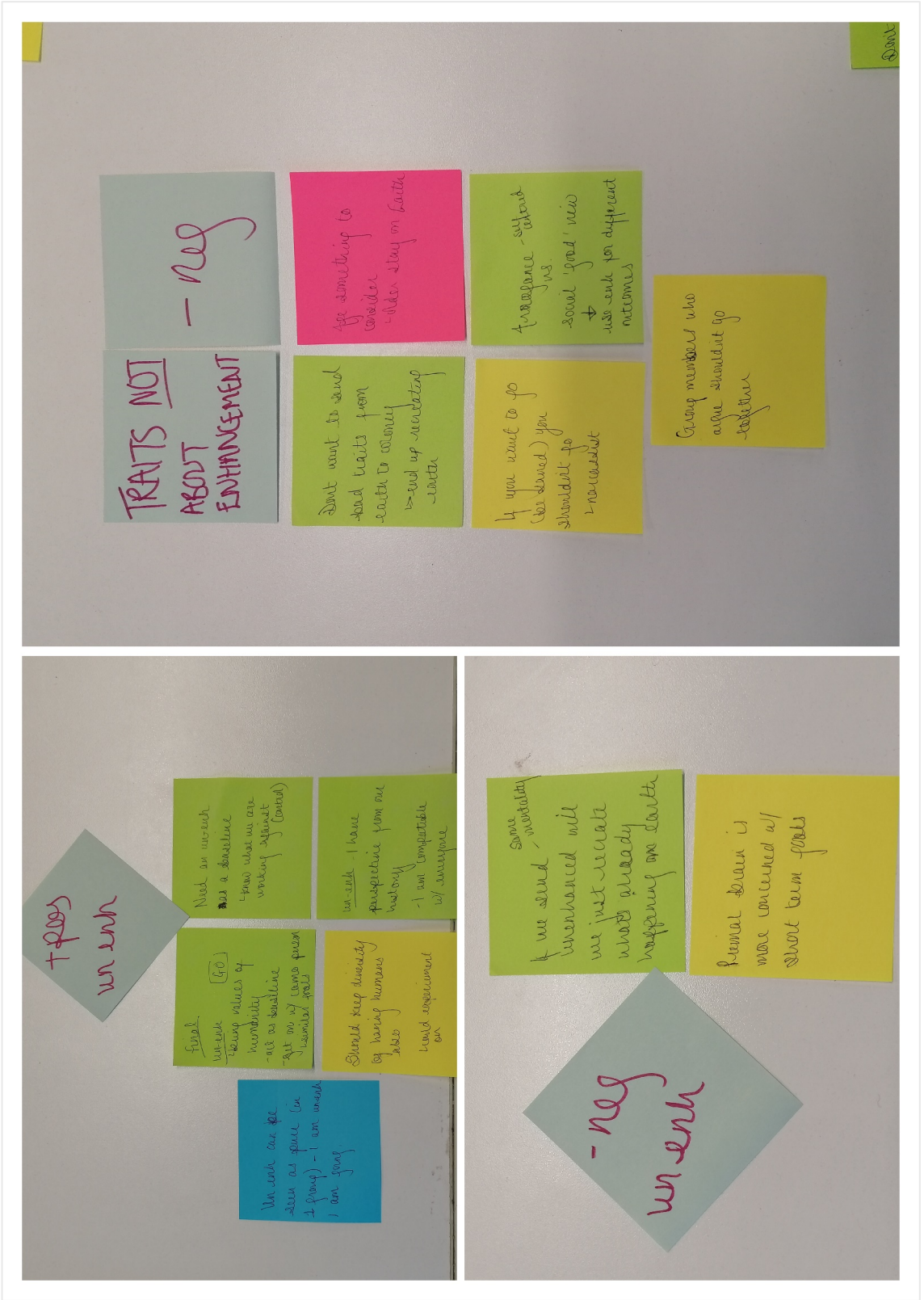


Figure 316 Affinity Mapping Responses from Workshop Groups. Lesley-Ann Daly, 2019.

INSIGHTS FROM WORKSHOP

Ideas discussed which were **not** enhancement related

Personal traits

Positive

- Moral compass
    - Would fail fast without it
- Ability to make people laugh
- Physical abilities
    - Climbing, swimming etc
- Creativity/ imagination/ artistic
- Emotional intelligence
- Liking a challenge
    - E.g. to build a new society
- Careers / skills
    - Engineer, botanist, biologist
- Family health (good indicator for future health of colony)
- Age having wisdom
- Open mindset to other cultures
- Self-sacrifice for the greater good
    - Choosing to stay so someone 'better' can go

Negative

- Age – too old for new colony
- Narcissism – if you want to go then you should stay
- Arrogance
- Argumentative
- Don't want to send 'bad' traits
    - End up repeating what happened on Earth

The unenhanced (as opposed to being enhanced)

Positive

- Generally seen as 'pure'
    - The baseline for humanity
    - 'Control' subject to remember what we are working from
- Has the values of humanity
- Keeps the history of humanity

Negative

- Sending unenhanced will just replicate what happened on Earth
- Primal brain is only concerned with short term goals

Saving the earth

- Leaving some 'useful' people to try to fix it
- Spreading chances of survival

Money

- The rich were the ones who ruined the Earth initially => therefor don't deserve second chance on new colony
- Money won't matter on a new colony

<u>Ideas discussed which were enhancement related</u>

Brain modulation

Positive

- Will be able to make rational decision in highly emotional situations
    - Can shut off ancient emotional responses that are no longer helpful (fight or flight)
- Would be helpful to have someone calm in the group on the long journey there
- As an implant it won't be passed on to the children
- Could be used to boost emotional intelligence (social skill)
- Can just decide to be happy (on Earth)

Negative

- Could be addictive like a drug – constant high
- Mood/ emotions drive action
    - Survival (fight or flight)
- Rationality is informed by emotions (empathy)
    - What logic is left if there is not emotional engagement?
- If you are educated do you really need enhancing?

Biological camouflage

Positive

- Can adapt to different social situations (was not elaborated on)
- Can listen to people's perspectives/views without them seeing you
    - => can influence people/ whisper in their ear what they should do

Negative

- Not useful for anything

Performance enhancers

Positive

- Enhanced cognitive skills can boost thoughts of how to survive
- Greater memory capacity could lead to greater imaginations => more options
- As it's not permanent the person can stop and start whenever they want

Negative

- Higher intelligence may lead to them being in charge
    - Has the potential to become a manipulative person
    - Potentially become an autocrat as they 'know best'
    - Others don't want to be dictated to
- Would it become a liability as it is non-permanent? Not consistent

Procreation

- Do we want enhancements to be passed down?
- Genetic (passed down) vs Implants (not passed down)
- The ability to procreate was seen as desirable
    - Either by being a young fertile female
    - Or bringing other DNA to use for reproduction

Questioning the difference between the enhanced & unenhanced

- Enhancements are evolution – we are still the same species
- What does 'originality' mean?
    - What makes unenhanced humans the 'original'
    - We all evolved from ancestors
- Does being enhanced make you more enlightened?
    - => better than those who ruined the Earth?
- Not about which is better - enhanced vs unenhanced
    - About the capabilities
    - What are the best criteria?
- How can we not discriminate against groups?

Other (generally insights only raised by one group)

- What do we want as a species?
    - Do we want enhancements?
    - What are the 'right' enhancements?
    - What would we do with them?
- Is democracy a favourable system?
    - Does it only work for short term goals?
    - Decision making as an equal democratic group worked well in a task orientated setting (comment on the workshop style)

    - One group asked everyone if they wanted to stay or go
- What about family and friends? Can we bring them?
- Everyone in 1 group expressed their willingness to be enhanced despite the negative thoughts around it
- Could bring DNA of others with them so they can use it to reproduce with all capabilities
- Gender difference in decision making
    - 'Women will decide more emotionally'
        - Strongly disagreed with immediately

ANALYSIS OF WORKSHOP

Rich = bad

All groups equated being rich with being a 'bad' person. The assumption was that if you were rich you were probably the reason for the Earth no longer being liveable, and therefor do not deserve to have a second chance on a new colony. Considering that they were told to be themselves in the scenario, one participant with an expensive enhancement even went as far as to say 'I am rich scum', taking on the persona of a presumedly morally corrupt wealthy person. The price for each enhancement was deliberately put in to provoke this kind of discussion, but it is interesting that no one challenged this assumption. This may be due to the economic demographic of the participants, presumably not being particularly wealthy and therefor harbouring some kind of resentment to those better off, and/or media portrayals of rich persons (and big businesses) as being corrupt and a negative influence on society (e.g. climate change, economic disparity, and the manipulation of technology and services to serve the needs of the few).

Permanence

In terms of the hereditary transmission of enhancements to a new generation, no conclusion was reached as to whether it is preferable to pass down modifications or not. Groups varied between thinking that passing down a genetic enhancement would be preferable as it could continue independently and spread. And conversely thinking that modifications such as implants would be preferable as they could not be passed down, stopping at that particular enhanced individual. In the context of this scenario this seems to have come into contention because, across the board, participants were unsure of "how much" enhancement they would want to continue the species, and how much 'original' persons they would like to keep, what is the ideal ratio?. This can be seen in the fact that every group picked one enhanced and one unenhanced person to go to the new colony. Outside of this scenario discussion may have swayed to the child's capacity to consent to inherit enhancements and the parents' role in this decision (which features heavily in academics discussions on the topic) – however this was not brought up in any of the groups.

Personal traits vs enhancement traits

All groups decided to send one enhanced and one unenhanced individual. The main decision criteria for the final picks was based predominantly on abilities, skills and personality traits of the individual and not the enhancement itself, or a combination of. For the unenhanced individual, if there were more than one in the group, the discussion evaluated the skills (job, intellectual, physical) and personality (creative, calm, arrogant, moral) to determine which would be best to send. Negative traits of unenhanced individuals were not discussed. For the enhanced some discussion was on the abilities that the particular enhancement gave them, or negative traits it could lead to, but this was always in combination with the personal traits of the individual. For example, one group saw the Camouflage as beneficial for secretly nudging decisions of others, which could be seen as a negative and manipulative trait. However in combination with the individuals (self-proclaimed) high moral standards it was concluded that these abilities could be used for the overall good of the colony. The enhancement that gave increased intelligence was partially seen as a positive attribute which could increase the users' imagination abilities for developing ways to survive. However in combination with the individuals' 'arrogant' personality it was decided that he had the capacity to become a dictator, or autocrat, who would become benevolent thinking that he knew better than everyone else. It seems that the inclusion of the enhancement amplified any negative traits, giving them added power which then became a threat. And vice versa for positive traits. In no group did the particular enhancement capabilities trump the personal traits of the individual to be chosen for saving. In general the most favourable traits were ones that enabled the individual to work well with groups (selflessness, emotional intelligence) and those attributed to creativeness in a profession (artist, biologist, engineer).

'Purity' of the unenhanced

As a majority the groups labelled the unenhanced as 'pure' or 'original' humans, meant in a strictly positive way. They were described as: being a 'control' or 'baseline' human with which they can measure any deviation of the species from - and as people that they could experiment on; as a vessel which maintains the history and values of the human race; as a default option "I am unenhanced, I am going"; and negatively as being 'primal' and bearing all the negative traits that ruined the Earth to begin with. The presumption of purity was challenged however, with participants questioning what the difference is between enhanced and unenhanced individuals: we have all evolved from our ancestors, we are all still part of the same species; why should an enhancement make someone not 'original?'; and likening this grouping to discrimination, leading to discussions on how we can eliminate discrimination so that it is not an issue on the new colony.

This equation with purity could also be challenged by considering the idea that not all human beings are inherently 'good' (just as not all rich people are 'bad'). Theoretically, in another discussion where enhancement does not play a role, it could be argued that the group would not value all members as 'good and pure' people merely because they are human. But instead that we mainly operate in a wide grey area, with extremities of 'good' and 'bad' people at opposing ends. That it is only in opposition that the 'baseline' human is perceived as having a more 'pure' value than someone who is modified. Even when a beneficial enhancement was amplified by the positive traits of the user, creating someone with great potential to do good, the 'pure' unenhanced human still seems to win out on a value scale. Regardless of challenging the concept of differences, all groups still chose to send one

unenhanced participant purely because they are unenhanced. This may be seen as an attempt to 'cover all bases'.

Positivity towards enhancement

In general there was a positive feeling toward the enhancement technologies, with one group expressly saying that they would all be open to enhancement regardless of the 'negative press' it gets. The positive and negative aspects of enhancement was explored in relation to its usefulness in the specific scenario, and/or its' combination with the personality traits of its user. In no cases was an enhancement technology seen as inherently bad (or good), the judgement was contextual and person specific. This critical but positive analysis may partly be due to conference type (future science, art & technology) and consequently the open-mindedness of the attendees to innovative technologies. This bodes well for the future of the technology, which is not being repelled for its own sake, but for its negative use (or portrayal of use in science fiction etc), and which therefor has the potential to be accepted more widely when shown in a more positive and useful scenario. Though this speculative scenario will always contend with the flaws of humanity and its' potential to use the technology to do harm.

Concepts greater than the self

While this exercise was aimed at choosing individuals from a small group, it was given in the greater context of the planet and the survival of the species. In this vein some, not all, participants took into consideration issues or opportunities that went beyond their own, or the groups', personal involvement in the task. Examples include: considering if family members could join them; bringing extra samples (seeds & DNA) to be cultivated and used on the colony; the ongoing protection and potential saving of Earth; and questioning the success of systems (democratic governance) and mind sets (capitalism, individualism) that we currently use. This shows that participants were considering influencing factors that did not relate directly to the potential outputs of persons involved in the group, that there are bigger more complex systems at work which impact on our future. Different issues and opportunities were raised by different groups with the only cross over being discussion on how to save the planet as well as build the new colony. It is however unclear whether the enthusiasm to save the dying Earth came from a love of our home planet and perceived moral obligation to fix what we have broken, or a more narcissistic wish by those left behind who want to be able to survive as well.

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	How does family legacy change when adding in a new trait?	Need to regulate according to the devices' actual effects on the user, not by how the manufacturer claims it will work	Ensure using the device doesn't impair our rationality or restrict the breadth of human desire	Will changing our temperament, emotions, desires change our identity?	Will the enhanced gain greater social status, causing a negative social effect on the unenhanced?
	Do unselected embryos deserve to live?	Potentially consider how the device interacts with the body as defining factor e.g. attached to skin, implanted, neural	Give clear guidance and safety information before choice is made	If our memories and experiences define our personalities, will augmenting our memory change who we are?	In a narcissistic society will each person acting for their own betterment detriment society?
	Does 'normal' change when many people enhance?	Must consider long term effects and benefits, not short-term solutions	Make sure benefits outweigh the risks	As medical practitioners only claim to do the best practise, what happens when results are not what we asked for?	Will increased popularity in enhancing boost its acceptance?
	Will those who don't enhance become 'subnormal'?	Need to find a way to quantifiably measure risks vs benefits when the affect is not yet clear	Ensure the individual interests are greater than societal interests	As consumers, how might buying enhancements promote the commercialisation of the body?	Is it justifiable to ask certain professions, such as doctors & pilots & teachers, to enhance for the greater good?
	Do we risk perceiving the whole human condition as 'disabled' and in need of enhancement?	Understand that desirability will increase when clear benefits are proven	Must decide for the best interests of those without the ability to choose/consent. Protect the vulnerable	Should a piercer providing enhancement services be held to the same standards as a medical professional?	What privacy & security measures should be put in place? Who will have (authorised) access to your data?
	Does raising the physical & mental performance of the aging count as therapy?	Must consider that what is good for one is not necessarily good for all	Be conscious to safeguard future generations	Will medical professionals essentially become service providers?	What if employers and/or the government had control over your enhancements? With or without your knowledge?
	Does a treatment that allows an athlete to heal faster count as enhancement?	Need more thorough regulated testing on devices made for children	Protect/ do not harm the environment, biosphere and biodiversity	Who is responsible for the outcome of a malfunctioning enhancement?	If children become a product of their parents desire, will this change attitudes about control in parenting?
	Should the less naturally gifted be allowed to enhance to even the playing field? – who decides?	Consider having criminal sanctions for using devices on children without proper training	Know what to leave alone, and not to neglect what we already have	Should parents liable for misusing enhancements on their children? How much is the child choice?	Will children be burdened by the idea that they must live up to what they were 'designed for'?

Figure 317 Issues raised by workshop participants that were additional to the issues identified prior to the workshop (black). Lesley-Ann Daly, 2019.

5.4. Wellcome Collection

Address: Wellcome Collection, 183 Euston Rd, London

Event: Open platform workshop session in the Reading Room

Date: 5 December 2019

Time: 15.00 – 14.00 pm

Participants: 5

Duration: 1 hour

Workshop type: Group discussion with traffic light coding

Event link: https://wellcomecollection.org/pages/WvljzSAAAB4E3uMF

Open Platform in the Reading Room at the Wellcome Collection

Open Platform is an event series where the content comes from Wellcome Collection's audience, so that voices other than Wellcome's can respond to the Reading Room's themes. Themes include the body, medicine, and education, among others.

Application

Having attended a drop-in session to discuss running a workshop, an application was submitted to the Wellcome collection which was accepted. Felicity Crentsil the Live Programme Producer coordinated the process, including organising the mandatory facilitation course which must be completed by all facilitators prior to running their workshop. This course was run by Malavika Anderson on the 23 October 2019.

TITLE & DEFINITIONS	THERAPY vs ENHANCEMENT Therapy - treatment intended to relieve or heal a disorder, physical or psychological	REGULATORY CONSIDERATIONS -rules made by a government or other authority in order to control the way something is done	HUMAN RIGHTS -are the basic rights and freedoms that belong to every person in the world	HUMAN AGENCY/ ACCOUNTABILITY - the capacity of individuals to act independently and to make their own free choices.	SOCIOCULTURAL IMPACT -related to the different groups of people in society and their habits, traditions, and beliefs
EXAMPLES	WHAT IS 'NORMAL'? Some 'disabled' communities, for example Dwarves & 'the Deaf, want to be able to choose not to genetically remove this 'disability' from their children – opting to preserve their communities 'culture and heritage. This is their 'normal'	GLOBAL CONSENSUS Global solidarity is needed on how the technology is regulated. Uneven regulation across countries, and cultures, may force people to seek 'treatment' abroad or procure technologies illegally - adding risks from counterfeit devices.	BENEFIT THE INDIVIDUAL The interests and welfare of the individual should have priority over the sole interest of science or society. Primarily the enhancement must benefit the enhanced individual and not put them at risk in order to achieve a wider gain.	MILITARY A soldier is required to enhance to increase probability of mission success. Due to the hierarchical structure of the military could it be considered that they are giving their consent freely? Who will be accountable if it malfunctions?	LIFE EXTENSION Longer life changes our perception of time and will give people the physical and mental ability to stay in jobs longer. By leaving less room for young, fresh ideas this will slow innovation. Young bodies - old outlook
ISSUES	How do you define 'enhancement'?	There needs to be a global consensus on regulation of HE technology	Treat everyone equally	If all experience is mediated by technology, how does it affect our decisions?	Would longer lives mean reduced fear of death, less drive & commitment?
	How do you define 'normal'?	Need to increase awareness so that the public and relevant professionals can be involved in regulation committees	Respect cultural diversity	If our experience is already mediated anyway, will the addition of the enhancement matter?	Would extended life mean extended time in decay? Increasing interest in assisted suicide?
	How do you define 'disability'?	Must take non-Western views into account	Ensure it doesn't generate discrimination against a group or individual for their culture, gender or income	If the tech becomes a moral actor, who is controlling your actions, you or the device?	Will some enhancements be detrimental to other aspects of health, creating unknown side effects in the long term?
	What genetic traits are acceptable/ favourable?	Need to consider feminist views, queer/gender politics, and the other	Ensure having the device doesn't interfere with the fundamental rights of others	Do we want the technology to make moral judgements for us?	Who are enhancements accessible to? To what extent is it covered by the health system?
	What are the implications of choosing to keep a 'disability'?	Must share benefits & advancements globally, and promote work in developing countries	Ensure everyone has freedom of choice – Morphological freedom	If enhancement makes learning easy, taking away the time and effort normally involved, how will this affect self-development?	If enhancement is only for the rich will this create greater socio-economic disparity?
	How does genetic legacy change when editing out a family trait/disability?	Need to be regulated on a case by case approach and create risk evaluation levels	Respect others choice to or not to enhance	If we rely on enhancement to control emotion – how will we/children learn to master our impulses?	If all those around you are enhanced will you feel pressured into doing it yourself?
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Figure 318 'Ethics Grid for Human Enhancement technology' highlighted with issues that the workshop at the Wellcome collection will be addressing. Lesley-Ann Daly, 2019.

Discussion Topic

How do you define 'normal'?

Policy making for enhancement technologies is proving difficult as it is such a complex, future focused field, but also because we haven't yet got a definitive definition for 'enhancement' - and therefore what technologies count as enhancement technologies.

In order to define 'enhancement' you need to define both 'normal' and 'therapy'– therapy already having been defined relatively universally as a treatment intended to relieve or heal a disorder. Although definitions of disorders are contested by the deaf community and dwarves who would have previously been considered disabled, they argue that it is their normal. 'Normal' is hard to define, it is contextual, subjective and ever changing. What is normal for one person is not normal for another – sport, health, intelligence, body shape etc, and is being challenged by perceptions of disability and by new enhancement technologies.

Method of Analysis

Participants were shown several definitions of 'normal' – medical, social, species-typical etc, and a space for new definitions. Participants will be invited to discuss and write down their thoughts on post-its, annotate these existing definitions and add their own definitions. Post-its worked on a traffic light basis: red (pink) for stop (disagree); green for agree; amber (yellow) for unsure or needs further thought. The aim is for participants to explore their perception of 'normal', consider why they define it as such, potentially open themselves to new definitions, and see which (if any) existing definitions adequately define the concept. The workshop will serve to challenge our existing perceptions of 'normal', both personal and public, and explore how these definitions therefore inform definitions of 'enhancement'. The format will be informal and allow for all perspectives to be heard.

The group consisted of 5 participants who joined on a drop-in basis. The workshop lasted for just over 1hour and each participant gave verbal consent for me to use their responses for my research. Due to time constraints we did not address how these definitions related to enhancement.

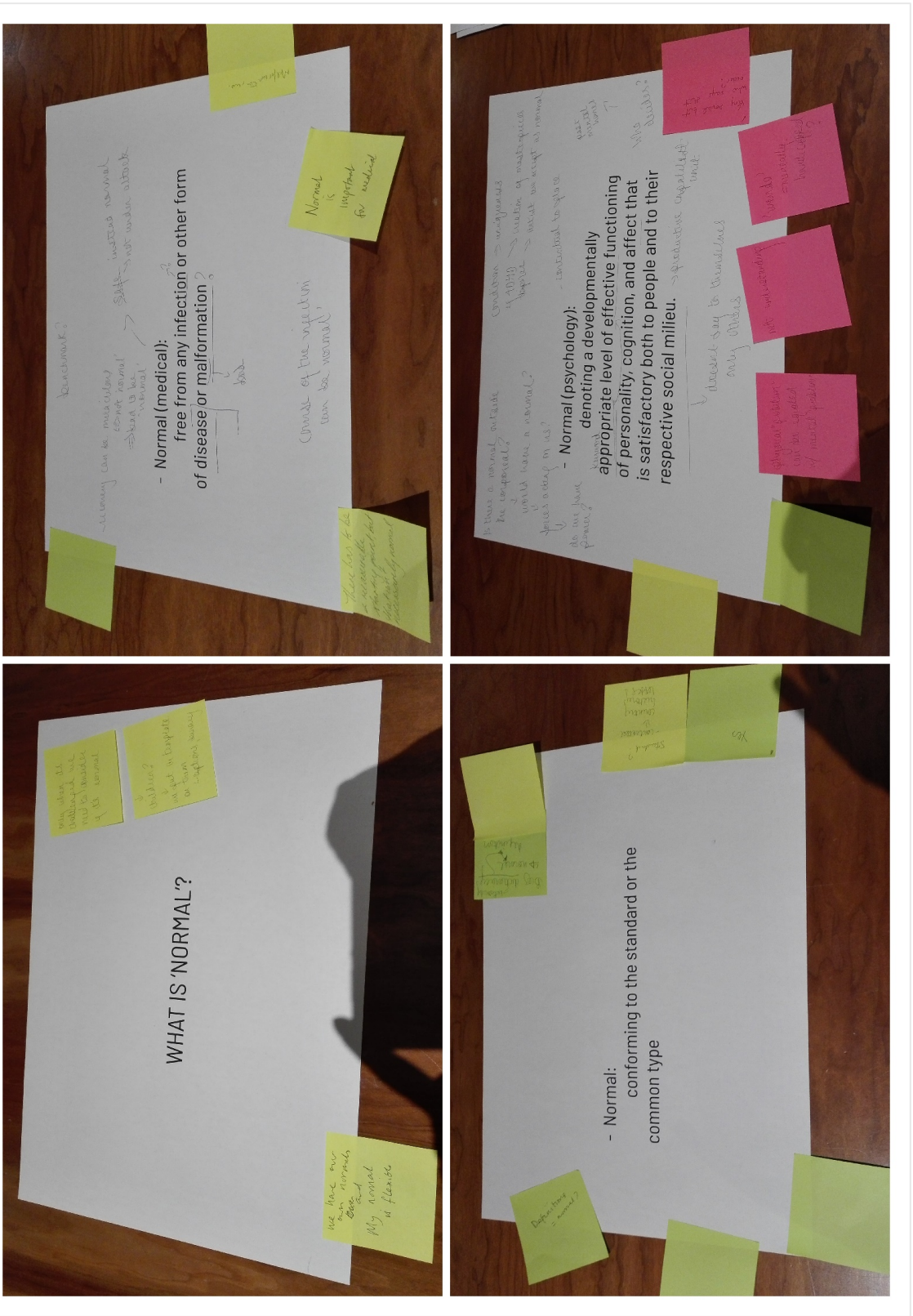


Figure 319 Wellcome Collection Workshop Annotated Worksheets, 2019.

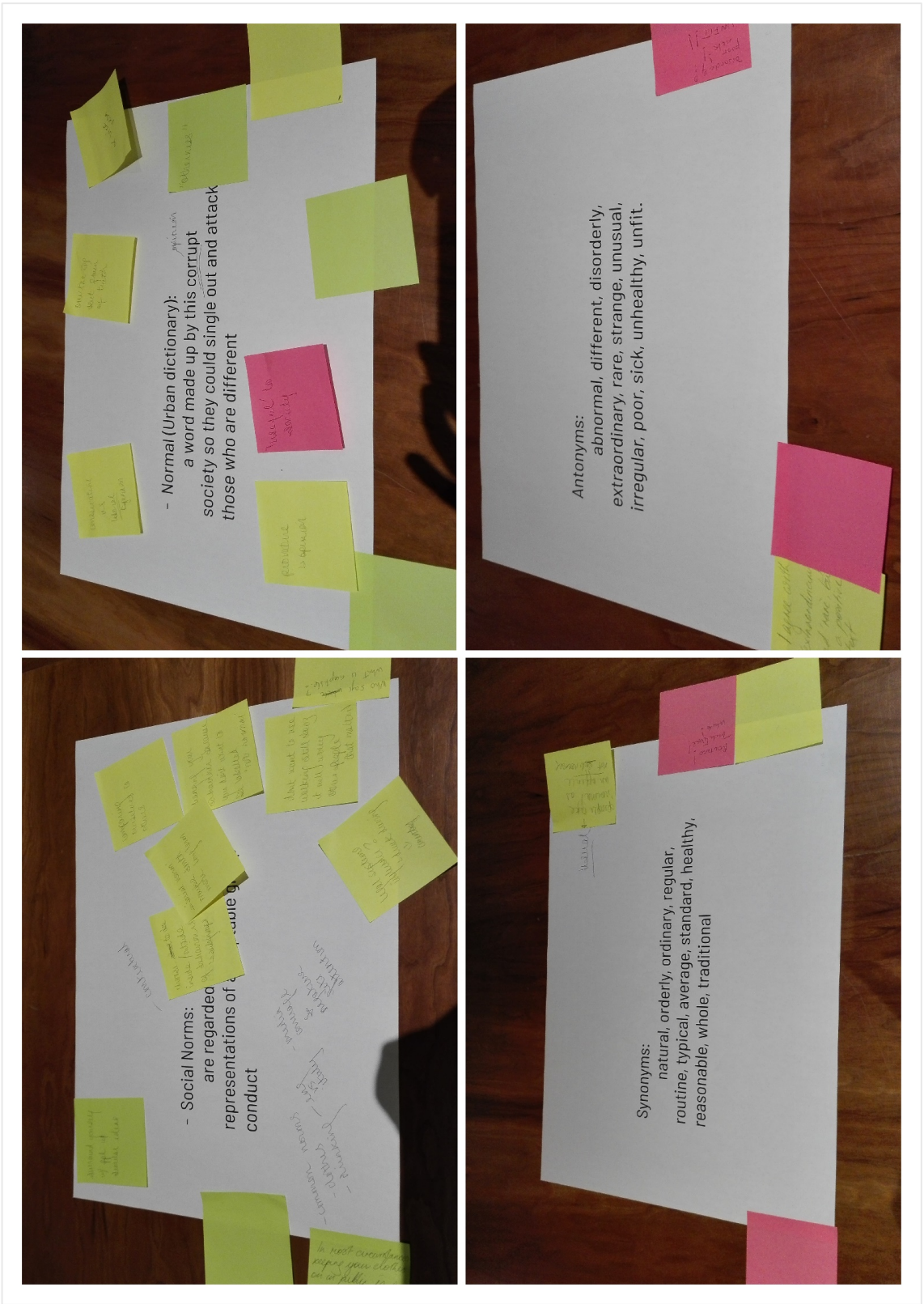


Figure 320 Wellcome Collection Workshop Annotated Worksheets, 2019.

Below are the definitions presented and the reactions to them

Normal (dictionary): *conforming to the standard or the common type*

- *Several agreed with this definition*
- Q: because it's from a dictionary it is itself 'normal' -> has an authority
- Q: what is a 'standard'? – contextual
    - Country, history, looks

Normal (medical): *free from any infection or other form of disease or malformation*

- *1 agreement with definition*
- Medicine needs a measurable starting point – but that doesn't necessarily make it normal
    - Medical benchmark
- 'malformation' has a negative connotation – why?
    - Shouldn't be included in medical definition
- Maybe should be 'safe' -> not under attack
- 'normal' course of a disease can be negative

Normal (psychology): *denoting a developmentally appropriate level of effective functioning of personality, cognition, and affect that is satisfactory both to people and to their respective social milieu*

- *Many disagreements with this definition*
- Physical "problem" can be equated with a mental "problem"
    - They are not the same
- Mental conditions (e.g. ADHD, Bipolar) can be seen as uniqueness
    - Artists use these to create masterpieces
    - This is considered normal for artists
- 'weirdo' equated with mentally handicapped -> not 'normal'
- The definition says satisfactory for others/society
    - But what about normal for yourself
    - Functioning for society = productive capitalist unit
- What is an 'appropriate' level of functioning?
    - Who decides?
- Does the world have a 'normal' that is outside us?
- Contextual to place
- Not 'normal' usually labelled from not understanding the person/condition

Social Norms: *are regarded as collective representations of acceptable group conduct*

- *Some agreement*
- You surround yourself with people who have similar ideas
    - Subcultures
    - Choose to be inside/outside of behaviours/groups
- We compare ourselves to others
- We change our behaviour depending on who is around us

    - Don't want to be labelled 'not normal'
    - Using walking stick worries other people
- Contextual to place
    - Italy vs UK. Different drinking or clothing customs
- Media tends to highlight things outside of the norm which are negative
    - Non normative have a negative connotation
- Who decides what is 'acceptable'?

NB. Participants did not mention what groups are imposed on us

Normal (Urban dictionary): *A word made up by this corrupt society so they could single out and attack those who are different*

- Some people liked this definition because it is combative of 'right wing' ideology
    - Difference when coming from a conservative or liberal perspective
    - Over the top but has a grain of truth
    - Provocative but it is an opinion -> 'corrupt'
- Attacking 'otherness'
- Can be vice versa
    - Those who are 'different' attacking 'corrupt society'
    - Different can be the norm for some

What's missing?

- Gender
    - Straight is/was considered normal
    - Didn't have time to explore this further
- 'normal' is binary
    - Should be flexible
- Only when something is challenged do we start to consider if it's normal
    - Normative practices are not always visible
    - Children are good at challenging what we think is normal
- Normal can be seen as an insult

What is your definition of 'normal'?

This was written by each person privately after having discussed the other definitions

- Normal is a standard that changes by time & place (contextual)
- Normal is flexible, it is a safe place for me, but may overlap with your normal
- Society invents/constructs rules to regulate out of the norm inhabitants
- Normal is the usual – the same for the majority. It is not necessarily negative or positive, just different from the majority
- Normal is whatever is unique or special for an individual (personal) – anything that allows you to be comfortable without distress. Medically -> statistically most common (vit C level).

ANALYSIS OF RESPONSES

From a workshop structure perspective there was not enough time to be able to explore these definitions of normal fully or thoroughly. Ideas and perspectives were voiced but not necessarily deeply explored. Therefor this analysis mainly denotes broad areas of interest or contestation, further workshops would be needed to explore these in more detail and/or gain personal anecdotes or experiences with these concepts. The workshop worked well for participants to question their own, or societies, perception of 'normal' but did not necessarily come to a definitive agreement on what 'normal' should be – except that it is personal.

Questioning of defined terms

Participants questioned the origin of particular terms within the definitions e.g. 'standard' or 'appropriate' which infer a particular measurement criteria that is not explained. What is or isn't 'appropriate', who decides and what authority do they have to be able to decide? This links into the participants perspective that these criteria for 'normal' as imposed by society or a ruling body who wants to regulate or control individuals, especially those who do not conform.

Personal normal

Contrary to the presumption that norms are imposed on them, participants expressed the view that it is an individuals' personal norms that are the most important. It is what makes an individual feel comfortable or safe in themselves, including what helps those with psychological 'problems' feel safe, without causing distress to themselves or others. Our 'personal normal' was defined by participants as 'flexible' and subject to change throughout our lifetimes. Individuality can be produced by conditions that are not considered normal such as ADHD and being Bipolar, for an artist for example this is what may produce their creativity and is normal for them. People being considered as not normal, especially due to psychological 'problems', comes from a lack of understanding or not being able to identify with them– I don't understand their behaviour therefor it is not normal to me – "weirdo". Just because you don't understand it doesn't necessarily make it wrong.

Contextual norms

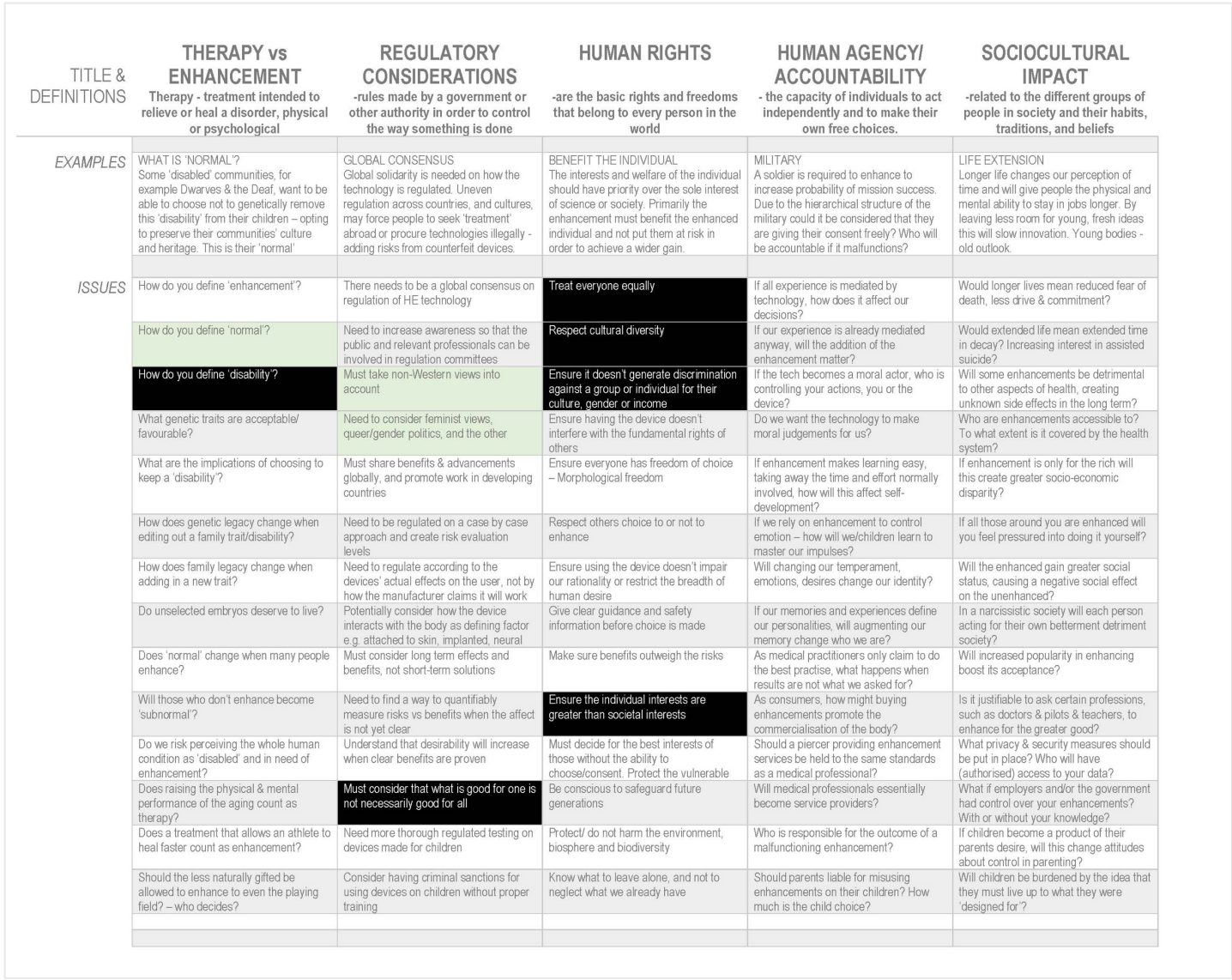
Across each definition it was expressed that these definitions and the behaviours and standards which they imply is contextual – it changes by time and place. What was normal in the middle ages is different to now, and what is normal in Italy is not necessarily normal in the UK. Norms can also change, not by geographical place, but by social spaces e.g. between subcultures. Whereas some norms are imposed on us depending on where and when we live, we can choose to identify with particular groups and behaviours, identifying ourselves with others with similar perspectives. This opinion was also seen to change depending on political and ideological leanings – liberal vs conservative perspectives.

Is ‘normal’ negative?

Participants debated whether being described as normal was a good thing or an insult. Some people change their behaviours by what we think will be considered normal in specific times and places so as not to be labelled at ‘abnormal’. Whereas some people consider being called normal as an insult – rejecting ideas of conformity and old-fashioned ideology in favour of being regarded as unique and self-determining. In both cases there can be cases of rejecting ‘otherness’, rejecting those who are normative or those who are different – participants identified with this idea but thought that this adversarial thought process was not productive to creating a unified public.

Medical normal

Normal in medical terms was one that was kept quite definite – confirming that what is medically normal is regulated by standards within medicine which generally are associated with a majority measurement, a benchmark. For example a normal Vitamin C level is the amount that is considered healthy for the majority of people. Participants challenged the term ‘malformation’ in this definition as it was seen as related to physical/aesthetic deformity which may not have an infectious or disease related ailment. Participants did not think physical differences should be seen as not normal in a negative way.



TITLE & DEFINITIONS	**THERAPY vs ENHANCEMENT** **Therapy - treatment intended to relieve or heal a disorder, physical or psychological**	**REGULATORY CONSIDERATIONS** **-rules made by a government or other authority in order to control the way something is done**	**HUMAN RIGHTS** **-are the basic rights and freedoms that belong to every person in the world**	**HUMAN AGENCY/ ACCOUNTABILITY** **- the capacity of individuals to act independently and to make their own free choices.**	**SOCIOCULTURAL IMPACT** **-related to the different groups of people in society and their habits, traditions, and beliefs**
EXAMPLES	WHAT IS 'NORMAL'? Some 'disabled' communities, for example Dwarves & the Deaf, want to be able to choose not to genetically remove this 'disability' from their children – opting to preserve their communities' culture and heritage. This is their 'normal'	GLOBAL CONSENSUS Global solidarity is needed on how the technology is regulated. Uneven regulation across countries, and cultures, may force people to seek 'treatment' abroad or procure technologies illegally - adding risks from counterfeit devices.	BENEFIT THE INDIVIDUAL The interests and welfare of the individual should have priority over the sole interest of science or society. Primarily the enhancement must benefit the enhanced individual and not put them at risk in order to achieve a wider gain.	MILITARY A soldier is required to enhance to increase probability of mission success. Due to the hierarchical structure of the military could it be considered that they are giving their consent freely? Who will be accountable if it malfunctions?	LIFE EXTENSION Longer life changes our perception of time and will give people the physical and mental ability to stay in jobs longer. By leaving less room for young, fresh ideas this will slow innovation. Young bodies - old outlook.
ISSUES	How do you define 'enhancement'?	There needs to be a global consensus on regulation of HE technology	Treat everyone equally	If all experience is mediated by technology, how does it affect our decisions?	Would longer lives mean reduced fear of death, less drive & commitment?
	How do you define 'normal'?	Need to increase awareness so that the public and relevant professionals can be involved in regulation committees	Respect cultural diversity	If our experience is already mediated anyway, will the addition of the enhancement matter?	Would extended life mean extended time in decay? Increasing interest in assisted suicide?
	How do you define 'disability'?	Must take non-Western views into account	Ensure it doesn't generate discrimination against a group or individual for their culture, gender or income	If the tech becomes a moral actor, who is controlling your actions, you or the device?	Will some enhancements be detrimental to other aspects of health, creating unknown side effects in the long term?
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	How does genetic legacy change when editing out a family trait/disability?	Need to be regulated on a case by case approach and create risk evaluation levels	Respect others choice to or not to enhance	If we rely on enhancement to control emotion – how will we/children learn to master our impulses?	If all those around you are enhanced will you feel pressured into doing it yourself?
	How does family legacy change when adding in a new trait?	Need to regulate according to the devices' actual effects on the user, not by how the manufacturer claims it will work	Ensure using the device doesn't impair our rationality or restrict the breadth of human desire	Will changing our temperament, emotions, desires change our identity?	Will the enhanced gain greater social status, causing a negative social effect on the unenhanced?
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	Will those who don't enhance become 'subnormal'?	Need to find a way to quantifiably measure risks vs benefits when the affect is not yet clear	Ensure the individual interests are greater than societal interests	As consumers, how might buying enhancements promote the commercialisation of the body?	Is it justifiable to ask certain professions, such as doctors & pilots & teachers, to enhance for the greater good?
	Do we risk perceiving the whole human condition as 'disabled' and in need of enhancement?	Understand that desirability will increase when clear benefits are proven	Must decide for the best interests of those without the ability to choose/consent. Protect the vulnerable	Should a piercer providing enhancement services be held to the same standards as a medical professional?	What privacy & security measures should be put in place? Who will have (authorised) access to your data?
	Does raising the physical & mental performance of the aging count as therapy?	Must consider that what is good for one is not necessarily good for all	Be conscious to safeguard future generations	Will medical professionals essentially become service providers?	What if employers and/or the government had control over your enhancements? With or without your knowledge?
	Does a treatment that allows an athlete to heal faster count as enhancement?	Need more thorough regulated testing on devices made for children	Protect/ do not harm the environment, biosphere and biodiversity	Who is responsible for the outcome of a malfunctioning enhancement?	If children become a product of their parents desire, will this change attitudes about control in parenting?
	Should the less naturally gifted be allowed to enhance to even the playing field? – who decides?	Consider having criminal sanctions for using devices on children without proper training	Know what to leave alone, and not to neglect what we already have	Should parents liable for misusing enhancements on their children? How much is the child choice?	Will children be burdened by the idea that they must live up to what they were 'designed for'?

Figure 321 Issues raised by workshop participants that were additional to the issues identified prior to the workshop (black). Lesley-Ann Daly, 2019.

5.5. Workshops Overall Analysis

Method of Analysis

Firstly, each workshop was analysed individually predominantly using affinity mapping and some quantitative methods. Affinity mapping involved noting responses by participants onto colour-coded post-its (coded by group or by participant) and grouping similar responses, which were then given a group label, e.g. 'Consent', 'Money', 'Environment'. Insight can then be drawn from the grouped responses by analysing how they relate to other responses within their group, how it relates to the overall workshop and to the academic literature. Due to the high volume of participants for the V&A workshop different responses to each question were listed, grouped under their theme (Anti-aging, Birth Control, or Physical Enhancement – being treated as three separate workshops from here on) and noted quantitatively how many participants shared the same responses. Similar to affinity mapping, this was then analysed to draw insights from the most frequent responses.

Secondly, the analysis of the six workshops was coded by highlighting the particular responses which appeared frequently across all workshops. For instance, the concept of 'inequality' came up repeatedly within workshops and across the six workshops. Concepts that came up repeatedly by numerous participants - regardless of workshop style, theme, or audience demographic - can be seen as what the participants, or this public, presently consider most important in relation to Human Enhancement ('presently' refers to the consideration that these views are influenced by particular current events – see *Media Influence* section – and may change in the future). Subjects include: Inequality – because of money or other; perceived purity of unenhanced persons; perceived benefits of HE; health and/or therapeutic use of the technologies; influence from the media; questioning existing/old ways; permanence; and the environment (Table 1). These responses to these concepts are sometimes contradictory as they come from numerous participants, and are sometimes intertwined, so will appear within the analysis of other concepts.

The writing below reflects the perspectives and opinions of the workshop participants, not my own, with some added analysis and further notes from myself. For a more detailed analysis of each workshop individually, please see Appendix.

	Brave New World	Design Museum	Wellcome Collection	V&A Birth Control	V&A Enh in Sport	V&A Anti-Aging	Total
Economic Inequality	✓			✓	✓	✓	4/6
Inequality other	✓	✓	✓	✓	✓	✓	6/6
Unenhanced purity	✓		n/a	✓	✓	✓	4/5
Benefits of HE	✓	✓	n/a	✓	✓	✓	5/5
Health + therapeutic use	✓		✓	✓	✓	✓	5/6
Questioning old ways	✓	✓	✓	✓		✓	5/6
Media Influence	✓	✓	✓	✓	✓	✓	6/6
Permanence	✓	✓					2/6
Environment	✓					✓	2/6

Table 4 Table showing which themes were mentioned in which workshop, and total number of instances. Lesley-Ann Daly, 2019.

Inequality

Inequality collectively featured most heavily of the concepts, for ease of analysis I have broken this section into two parts – inequality due to monetary concerns, and other.

- *Economic Inequality*

Inaccessibility to HE technology due to wealth imbalance, featured in most workshops. Participants expressed the view that having more money gave you access to more and better resources, which would give you an advantage over those who can't afford it. For example, more money allows: access to contraceptives and therefor control over procreation; access to Genetic Engineering (GE) technologies allowing the creation of enhanced children; (although diet and exercise are positively accessible to everyone) access to better sporting equipment or coaches can result in better performance; access to 'doping' drugs resulting in much better performance; access to better medical treatments in old age, meaning a higher likelihood to have ailments cured; better access to beauty treatments; and better access to life extension and disease eradication technologies that lead to a longer, healthier life.

Those without the financial capability to afford these things (either a lower income public in the West, or those from developing countries) are left not just without the added benefits, but actively disadvantaged. Participants did not view this inequality kindly, repeatedly noting that these technologies should be accessible to everyone, or sometimes to no-one unless for therapeutic purposes (this will be explored later on).

Interestingly cost, and therefore accessibility to the product, was not mentioned by participants at the *Design Museum* workshop. As the group was predominately designers, or related professionals, discussing the ethics of making a HE device, one would have expected cost to be a question when thinking about the intended user of the device. However this was not the case.

Another concept related to money (but not inequality) was the presumption that if you are rich you are a bad person. Some participants thought that it is the rich who have ruined the Earth and will use the technology for 'bad' purposes, with no mention to the character of the person aside from their wealth. This presumption, when raised, was not challenged by any other participants.

- *Inequality & other*

Other causes of inequality were discussed by participants that were not related to money. For example: having an enhancement may cause inclusion/exclusion within a physical social space – those in the room who cannot communicate via the device are left out; genetic engineering may cause some human characteristics to be perceived as 'wrong' leading to the discrimination of those still with them; women (and not men) carry the burden and responsibility to use contraceptives, but this may be alleviated if couples use artificial insemination for GE, where the child is affected and not the mother (though without external wombs women would still carry the pregnancy); and 'doping' will create an unfair advantage in competitive sports.

Participants identified that in general those who are 'other' or 'different' will be discriminated against (whether enhanced, unenhanced, healthy, disabled) and questioned how we can learn to not discriminate against these groups. Those with the advantage (enhanced, healthy, rich, male) were generally seen as the perpetrator of this inequality as they have the power to impose what should be defined as the 'correct' or 'preferable' way to be on others.

Perceived 'purity' of the unenhanced

Those who are unenhanced were perceived to be 'purer' than those with enhancements. Participants at the *V&A* workshop predominantly defined the term 'natural' as being 'unaltered by humans' - this was mainly in respect to the human body (due to the workshop theme being Human Enhancement) but also included references to man-made materials and humans' intervention in nature. 'Natural', 'pure' and 'original' were terms that were used repeatedly when speaking about those without enhancements (unaltered by humans) always with a positive connotation. At the *Brave New World* workshop participants described the unenhanced as being a 'baseline' or 'control' subject for humanity, who keep the values and history of humanity. In the *V&A* participants expressed: a want for more 'natural' birth control methods (which they believe would be better than technological interventions); a disapproval for 'doping', seen as a form of cheating which undermines 'the spirit of sport' – which celebrates the achievements of human performance unaided by enhancement; and a rejection of anti-aging treatments (mainly beauty treatments) in favour of accepting and valuing the 'natural' aging process.

Some participants questioned this presumption of unenhanced purity, asking why those who are enhanced or 'altered' should not be perceived as 'original'? We have all evolved from the same ancestors, we are all changed from the original source, why discriminate now? Also questioned was the desirability for 'original' humans to be held sacred going into the future – a primitive brain or other negative human traits may prove detrimental, whereas enhancement may give the opportunity to build better posthuman traits.

Perceived benefits of human enhancement

Participants identified potential benefits of HE technology, however this was mainly on a case-by-case basis specific to one technology, as opposed to a wider perspective that encompassed all of HE. This is understandable as they were generally only presented with one technology and therefor considered the positives and negatives in isolation. Perceived benefits identified include: biological camouflage (being able to change your skins appearance) would allow you to adapt to different social situations, and/or hide to listen into others views and whisper the 'right' thing in peoples ear; increased memory capacity could lead to a better imagination – potentially for solving problems; contraceptives give women control over life choices and sexual empowerment; 'doping' could lead to considerably increased performance and pushing of personal performance boundaries; radical life extension (with disease eradication) could lead to a longer, better quality life where you will have more time to do things you find fulfilling or enjoyable, and also more time for researchers to increase their knowledge and find new improvements that can benefit the world.

In particular the participants for enhancement in sport were open to 'embracing how it may improve our lives'. This may stem from an already widespread use of supplements in sports and the growing popularity of the biohacking movement (use of nootropics etc). Both advocate supplement use and provide a plethora of information on correct usage, copious use cases and potential side-effects - which are comparably minor when used properly (Asprey, no date; Sovijärvi et al, 2019).

These benefits, importantly, do not include the health benefits that enhancement may bring (discussed later), they are all associated with the lifestyle and choices of the enhanced individual. In some cases the benefits were explored for their usefulness in a particular situation (creating an off-world colony), but some were purely to benefit the life goals of the individual (delaying having children, advancing sporting career). However, even though the benefits were speculated upon, there were not many found by participants. Statistically more negatives were identified for each technology than positives – many of these negative were equality related.

Contraception is a good example of an enhancement technology that gained approval as it became more accessible to a wider public. What was first used to control the procreation of the lower classes, became a way for women to take control of their lives, to choose when and if to have children, and empower female sexual liberation. Similar to supplement use, it may take these enhancement technologies to become more widely accessible for the public to discover the breadth of benefits that they may provide, particularly benefits that have not yet been identified in the media and academia.

To note, the technology was never labelled by participants as inherently 'good' or 'bad', the negative perception generally came from the potential misuse of the technology. It is the human aspect of its use that either amplifies the benefits of the technology, or drastically amplifies the negatives – people with 'good' traits (kindness, selflessness, morality) will use it for 'good', people with 'bad' traits (arrogance, narcissism and/or the rich) will use it for 'bad'. This binary view doesn't necessarily account for the 'greyness' of human nature, the complexity of individual human lives and the decisions that they make along the way.

Health and therapeutic use

Participants noted that some enhancement technologies could have negative effects on health, for example pharmaceuticals and 'doping' could become an addiction, with the users chasing the high of the enhancement. This could lead to overuse which could cause health issues that parallel the effects of recreational or prescription drug addiction and unhealthy diet and exercise practises. 'Unknown side effects' was noted throughout the workshops also, along with fertility and mental health issues associated with female contraceptives.

However participants repeatedly identified and praised the potential health benefits from these technologies, such as: less time suffering with disease; prolonged, high quality of life; advanced diagnosis; and the elimination of disease altogether. Many participants expressed the view that these technologies should be used solely for health reasons and any enhancements that are not medically related should be banned. This would make these technologies of therapeutic use and not enhancement, apart from disease prevention which borders on enhancement as it is not bringing someone back to health, but eliminating the possibility of the disease in the first place. Therefor these participants are rejecting these

technologies as methods of enhancement, reasons for this have been described in previous sections, including inequality of access and perceived potential for misuse.

Aesthetic enhancement was particularly highlighted as unacceptable in anti-aging and genetic enhancement, with participants believing that this would contribute to unhealthy social beauty standards. However, for GE the enhancement was not considered from the point of view of the genetically engineered child, instead the participants considered it in terms of their own beliefs and what they think should be acceptable in society, therefor rejecting all non-therapeutic enhancements. The child's quality of life, or consequences for the child were seldom mentioned, contrary to academic resources which have a heavy focus on the child's life (Bioethics, 2003; STOA, 2009). Using GE to improve intelligence or grant skills was not mentioned by participants, which are also concepts that appear in academic literature.

Contrary to GE, using enhancement technology for its' non-therapeutic benefits, such as improving quality of life, were more accepted for radical life extension. One participant described a good quality of life as having 'dignity, safety, comfort, fulfilment, stimulation, friendship, interaction and mobility', concepts that are not merely health related. Apart from aesthetics, participants saw the benefit of enhancement for creating a better quality of life if it is to be extended. This disparity in what kind of enhancement is acceptable, for GE or life extension purposes, may be due to the participants being able to imagine the extended life that they would like to lead, but not the life of a speculative child.

Interestingly participants at the *Design Museum* workshop did not mention the health risks that might be associated with the device presented in the vignette. Described as '*permanently connected to the skull',* this was deliberately phrased to evoke visceral imagery of something being drilled into the skull, in order to provoke a reaction. However participants focused much more on the ethics of the device function and not the physical attachment to the body, showing a greater interest in the device rather than the human. This was the only workshop where health issues were not raised, it is unclear why and would take further investigation.

Media influence

The media was stated as influencing participants opinions across all workshops. Influences include the news, scandals, or film and TV shows (particularly from the science fiction genre) although participants did not always document the particular media story to which they were referring. For example, participants noted the media having influenced their opinions on: the importance of data protection when using digital devices – media attention sparked in part by the recent Cambridge Analytica affair (Lapowsky, 2019); Genetic Engineering technologies – this could be in reference to recent news coverage on the controversial twins in China whose DNA was altered in vitro using CRSIPR cas-9 (Normile, 2018); 'doping' scandals – most famously cyclist Lance Armstrong (Wilson, 2013), Russia's recent ban from sporting events by WADA (2019) and the award winning documentary *'Icarus'* (2017) which highlights both cases; and radical life extension and/or immortality – which is publicly advocated by Transhumanists (Humanity+, no date), including Zoltan Istvan who is currently running in the US election (Zoltan Istvan for President 2020, no date), and is a popular concept for sci-fi productions, such as the recent Netflix series *Altered Carbon* (2018).

Some participants noted the prevalence of negative media coverage. They contemplated a potential ploy by news outlets to label anything out of the 'normal' as adverse, and the use of shocking headlines as click bate (Merrick, 2020). Despite the negative press towards these enhancement technologies some participants, and by no means a majority, expressed an openness to the development of the technology and willingness to try it themselves. This response may be partly due the nature of the audiences who attended the events where the workshops took place, with the majority of events being art, science and sometimes future related. The audience who this type of events attract are more likely to be open to progressive ideas in science and technology, having shown a clear interest in it by choosing to attend such events.

To note, when participants were asked what has influenced them to hold a certain opinion on a particular HE technology (mainly in the *V&A* workshop sheets) the overwhelming response was that it was 'their opinion', or because 'they think so'. Many participants did not critically reflect on why they think a certain way about the technology, and instead continued to state their opinion. This may be due to unclear wording on the worksheet, participants not being accustomed to being asked to reflect, and/or participants not being sure why they hold such opinions, just knowing that they do. In conjunction with this, another frequent response was 'because of personal experience' or the 'experience of friends/family', which was also not often elaborated upon. This left a large gap in the research which could skew the findings from these workshops but presents an interesting design challenge which could be revisited later on in another project.

Questioning of existing/old ways

By 'questioning of existing/old ways' I mean this to include terminology, behaviours, ideologies, social norms and practices – a general questioning by participants as to why things are a particular way and if they want that to continue.

Participants at the *Wellcome collection* workshops questioned specific terms used in current definitions of 'normal', such as 'standard', 'appropriate' and 'acceptable' – inquiring what these mean and who decides this? Also challenged were perceptions of disability; participants criticized the equation of physical disability with mental illness; disliked the debilitating perception of certain mental conditions (such as ADHD and Bipolar disorder) and instead noted how they can bring artists their unique creativity and/or contribute to a persons' identity; and asserted that a physical malformation, which may not be detrimental to health, should not be categorized with conditions such as diseases, as this leads to discrimination for not conforming to social beauty norms. The conclusion was that, in general, people reject what they do not understand – 'I do not understand your condition therefore it is not "normal"'.

However, participants did not limit this to disability but extended this misinterpretation to include social groups (sub-cultures), nationality, gender and political views: 'if you are perceived as something "other" than what constitutes my own self then you are not "normal" to me'. Though we did not have time to speak about enhancement during this session these perspectives can easily be mapped onto the rhetoric of HE. Whether it is an aversion to the practices of biohackers, grinders and innovators who are pioneering the technology, or when a saturation point is reached in the future such that those who are unenhanced become those labelled as outside of the norm.

Participants questioned the success of established systems or ideologies such as democracy, capitalism and individualism and whether it would be beneficial to continue these practices in the future. Coupled with this was the criticism of certain 'bad' human traits, such as narcissism and arrogance, and a consideration of how (or if) it's possible for HE technologies to evolve humans beyond having these detrimental traits. No conclusions were made across all considerations.

While thinking about the creation of a speculative device at the *Design Museum,* participants questioned: why would we want this technology at all; why aren't our existing systems good enough; what are the producers' intentions - in respect to who they see benefitting from the production of a device; and how might these devices change our social structures? Here again was the hesitation to create any HE device for purposes other than therapeutic use, as participants struggled to find the necessity of such technology for enhancement purposes. As the symposium was based on design ethics this may have influenced participants perspectives, causing them to reject what may be seen as 'useless' product design which could contribute to waste and lead to further environmental damage (though this was not openly expressed). And/or as an audience primarily of designers, and related professions, participants are likely to have already held such opinions prior to the symposium.

As we have seen in previous sections beauty norms have been challenged by participants in: the rejection of the use of GE to determine aesthetic qualities of a child; the rejection of anti-aging treatments (plastic surgery) to conform to youthful beauty norms instead of valuing the aging process; and rejection of any physical abnormality being labelled as not 'normal'. This may stem from widespread media and social media coverage on body positivity movements which advocate the acceptance and celebration of all body shapes, sizes, colours, genders and identities (Whelan, 2016).

However, participants did not consider that in a future where, for example, genetically engineering a child's looks is possible we may have arrived at a time where these unrealistic beauty norms have already been overcome, making this a non-issue. This shows how participants are thinking about the future from the perspective of the present, rather than considering how else society may have changed alongside the development of Human Enhancement technology. This is where Speculative and Critical Design methods can aid the transportation of the audience into a future scenario, allowing a more immersive and thorough understanding of the speculative issues with the technology. This is where my research will be developed in subsequent projects.

<u>Environment + Permanence</u>

Although both of these subjects were brought up in much fewer workshops than previous concepts, I think they are note-worthy due to the insights from participants, particularly in relation to current events.

- *Environment*

When defining 'natural' for the *V&A* workshops the second most common response was 'being connected to nature', which is in direct opposition to that which is altered by man (the highest response). Nature was equated with 'purity' and 'originality', concepts which were also attributed to unenhanced or unaltered humans. Life extension was seen by participants as a major crisis for the environment as a drastic increase in population would lead to resources being drained and the already damaged Earth being harmed further. Mans' intervention into the natural world and the natural body are both seen as detrimental. This need to protect the Earth was also reflected in the *Brave New World* workshop where participants, additionally to choosing who should continue the species off planet, considered how those left behind could use their skills (enhanced or unenhanced) to save the planet which we have nearly killed.

This attention given to the planets' health is likely influenced by the current 'climate crisis' (European Parliament, 2019), in which we are seeing increasingly devastating natural disasters across the globe: droughts; floods; temperature rise – Australia's forest fires (Morton, 2020); and species extinction. In May 2018 Extinction Rebellion (no date) formed in the UK, raising the climate crisis flag and performing non-violent protests to raise awareness and provoke active change in climate policies by the government. As one of the most talked about issues in the media, climate crisis is critically attributed to the detrimental effect of human actions. For the development of HE technology, along with all other industries, it is crucial to consider the potential environmental impact and develop systems to mitigate against negative effects it may cause. By raising these issues in the workshop's participants are showing a consideration for impacts outside of themselves which also affect future generations.

- *Permanence*

The main issue about permanence raised by participants centred around how beneficial a permanent modification would be. Is it better to have an implant or mechanical alteration which would not be passed onto your children, allowing them the choice to enhance or not? Would it be better to have genetic enhancements so that your children can benefit from the enhancement as well? Is it better to use a non-permanent enhancement technology, for example some pharmaceuticals, as it allows you the choice to start and stop the modification as you please? What about updates, upgrades, policy change and obsolescence throughout the life of a technology? Is permanence a benefit or a limitation?

These thoughts are particularly interesting as these issues are currently being explored in the medical world and can, or will, relate to the majority of enhancement technologies in the future. For example there has been a controversial call to ban germ line editing, which alters the DNA which will be passed onto your children, due to the uncertainty of how it will affect future generations (Cohen, 2019). The obsolescence of devices is an issue that is currently being addressed in prosthetic devices for limb replacement, which need to be altered as a person grows and updated as the technology progresses (Mohney, 2013). What will happen when this mechanical technology is more permanently attached to the body and eventually becomes outdated?

5.6. Workshop Takeaway Booklet

Based on 'Impacts of HEt' posters- simplified to only a few issues. After the first run of making approximately 50 booklets it was decided that they are too labour intensive in this current format.

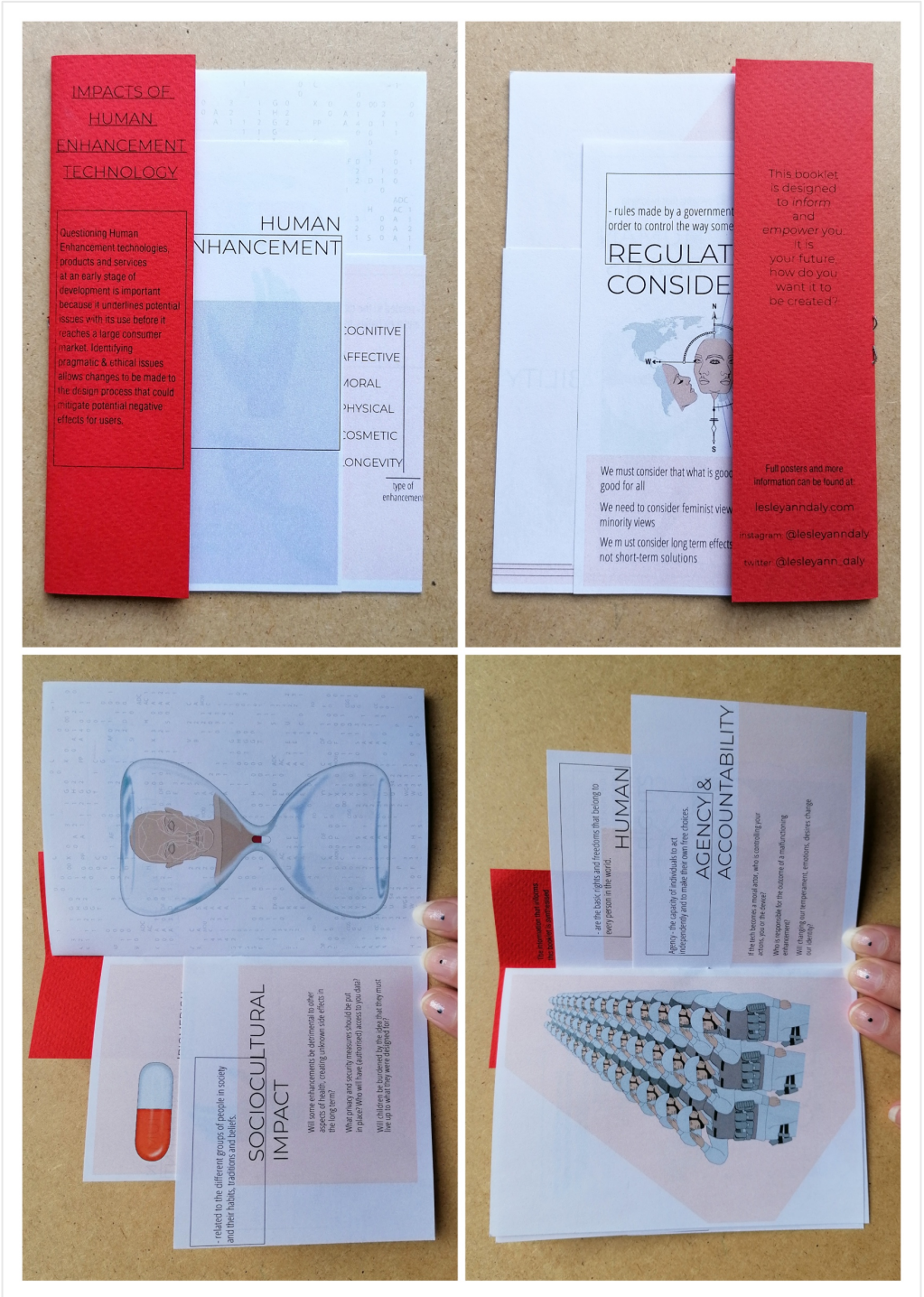


Figure 322 Takeaway booklets for workshop participants. Lesley-Ann Daly, 2019.

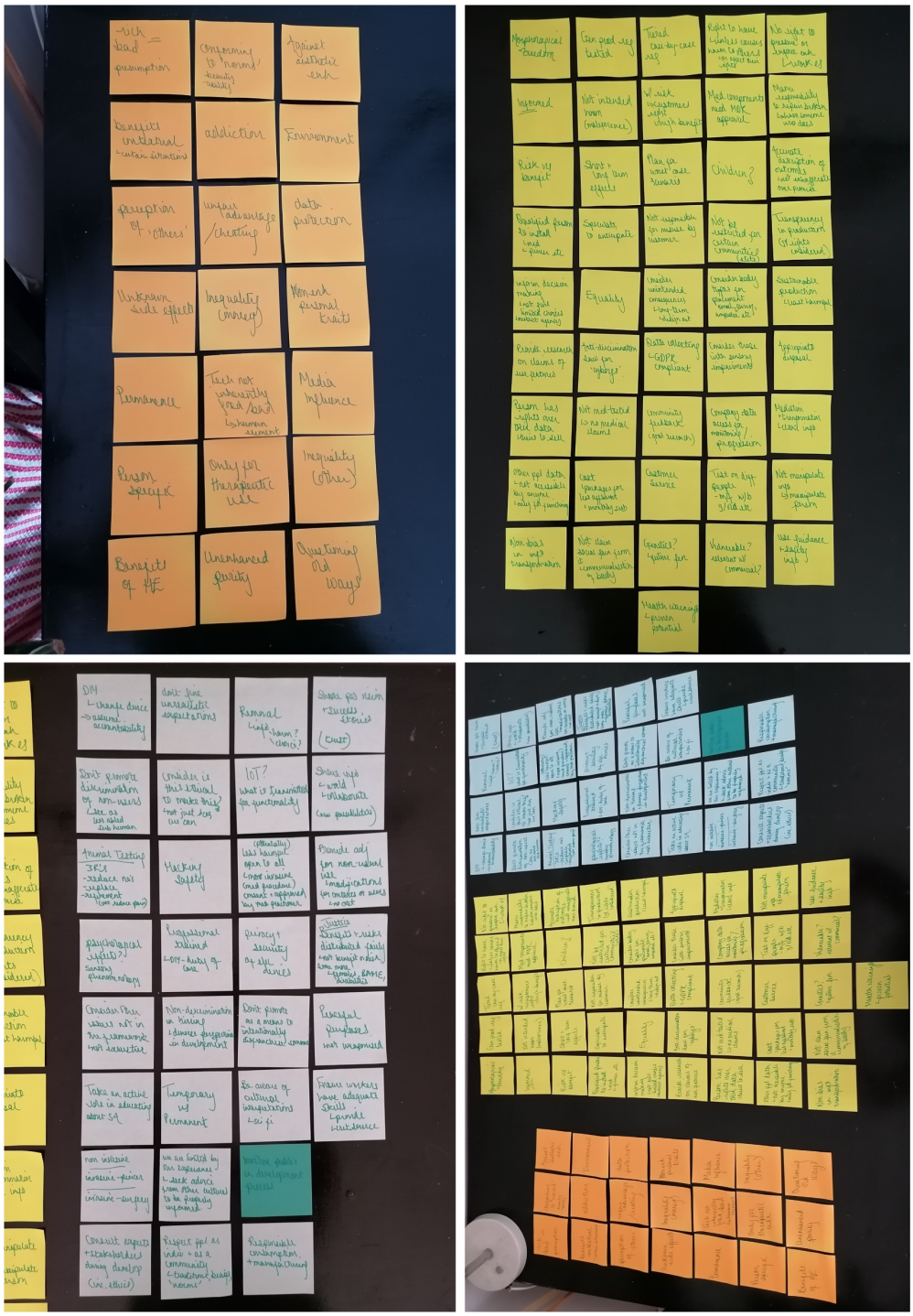
Figure 323 Digital layout of takeaway booklet. Lesley-Ann Daly, 2019.



Figure 324 Digital layout of takeaway booklet. Lesley-Ann Daly, 2019.

6 DESIGN ETHICS FRAMEWORK FIRST DRAFT

Post-its: Orange- insights from workshops. Yellow – insights from HEt literature (Ethics Grid for HEt). Blue – insights from ethical frameworks. Insights were chosen if relevant to SA technology, e.g. those about Gene editing were not used.


Benefit of HE
Unenhanced society
Questioning Old Ways?
Inequality (other)
Only for therapeutic use
Media influence
Person specific
Permanence
Inequality (money)
Women personal traits
Unknown side effects
Data protection
Unfair advantage/ cheating
Addiction
Environment
Against Catholic ethic
Conforming to 'normal' society
Against natural
Perception of 'others'
Risk vs benefit
Short + long term effects
Children?
Equitable
Sustainable evaluation
Data collecting GDPR compliant
Appropriate disposal
Regulation + enforcement + legal regs
Not manipulate regs to manipulate system
Safety
Health warnings + proven potential
Customer service
Genetics? Values for
Unknown? assistive AI (immoral)
Not claim access for non-communicable (e.g. baldy)
Non-discrimination law on 'upkeep'
Not medicalised
Community feedback (and reasons)
Company data access or monitoring/ re-selection
Not intended harm (maleficence)
Weak requirement right benefit
Med components need MDR approval
Open responsibility to inform public + informed consent and data
Accurate description of outcomes (not exaggerated) + non-female
Transparency in treatment (of risks + alternatives)
Not be restricted for certain community (ethnic)
Sustainable evaluation (cost + benefit)
Not manipulate regs to manipulate system
Use guidance + safety info
Informed
Respect + autonomy
Equality
Consider wider impact on relationships, family, society, etc.
Consider those with general impairments
Regulation + innovation (cost + reg)
Cost + damages for (in)ability + inability sue
Not medicalised
Not claim access for non-communicable (e.g. baldy)
Genetics? Values for
Unknown? assistive AI (immoral)
Use guidance + safety info
Health warnings + proven potential
Not manipulate regs to manipulate system
Safety
Regulation + innovation (cost + reg)
Company data access or monitoring/ re-selection
Customer service
Not claim access for non-communicable (e.g. baldy)
Non-discrimination law on 'upkeep'
Not medicalised
Community feedback (and reasons)
Data collecting GDPR compliant
Appropriate disposal
Consider those with general impairments
Sustainable evaluation (cost + benefit)
Consider wider impact on relationships, family, society, etc.
Equitable
Transparency in treatment (of risks + alternatives)
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Respect + autonomy

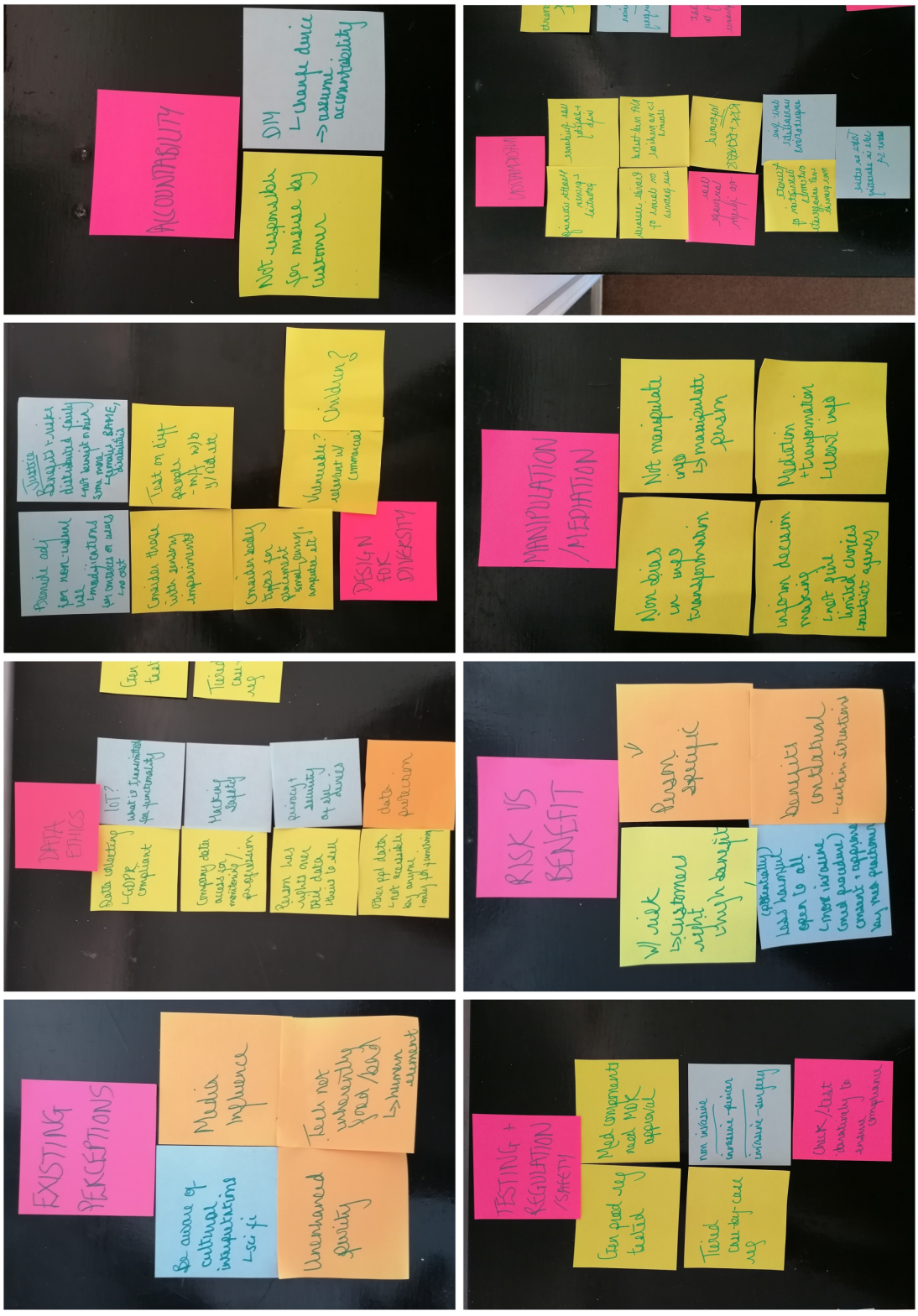


Figure 326 Affinity Mapping for SA framework, 2019.

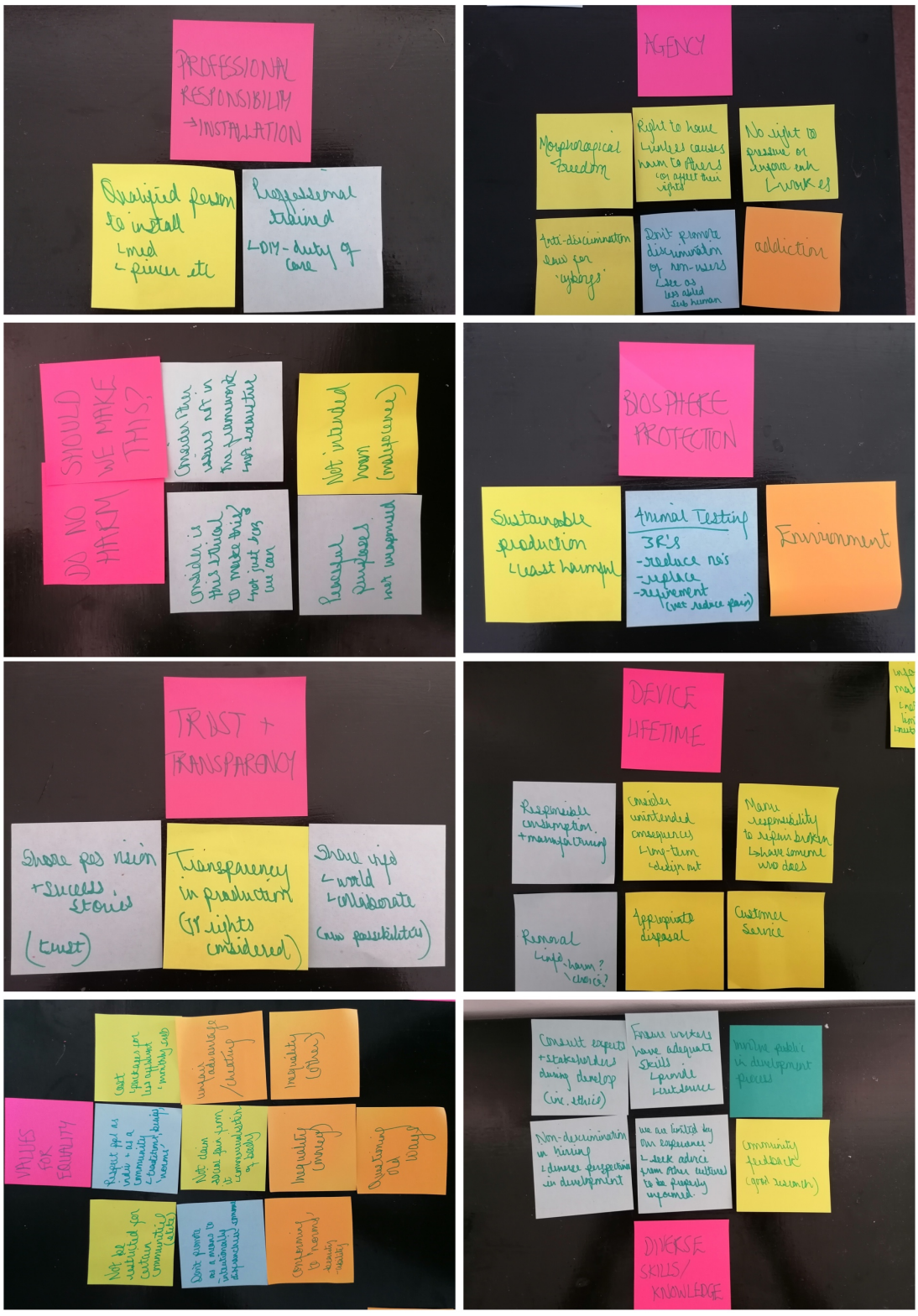


Figure 327 Affinity Mapping for SA framework, 2019.

7. BOOK DEVELOPMENT

7.1. What is a Book?

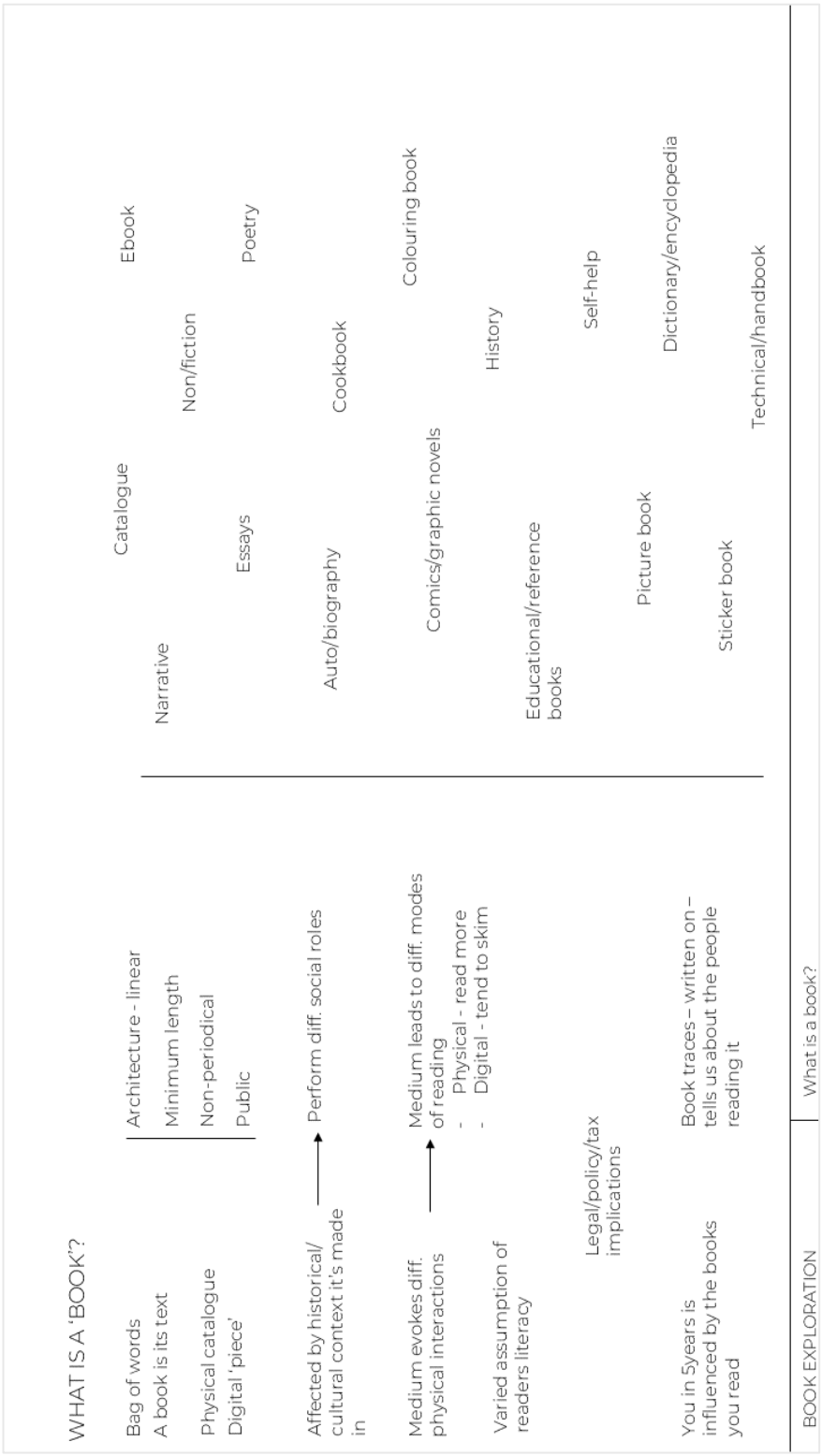


Figure 328 Page from Book Exploration pptx, 2023.

Figure 329 Page from Book Exploration pptx, 2023.

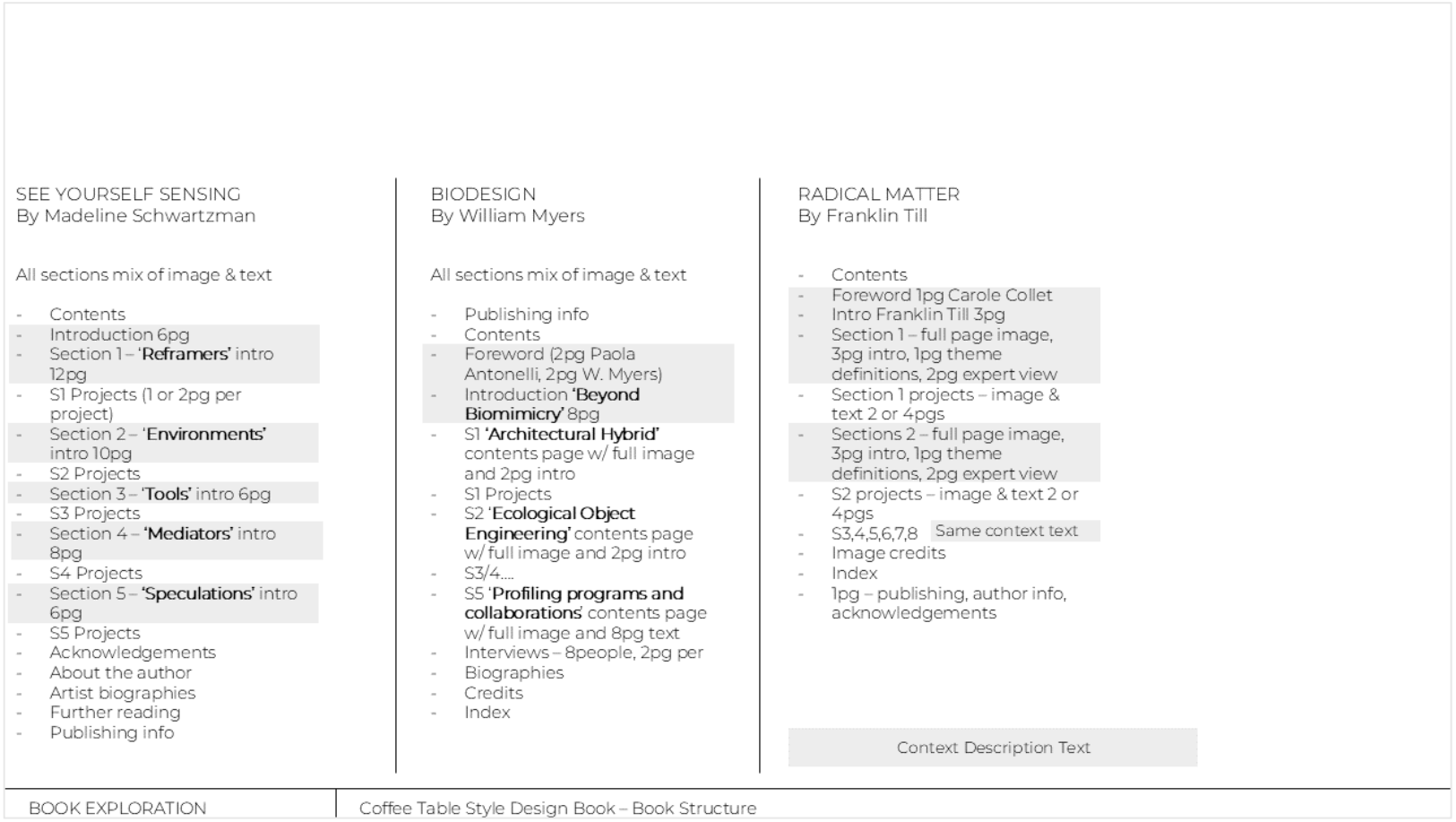


Figure 330 Page from Book Exploration pptx, 2023.

Figure 331 Page from Book Exploration pptx, 2023.

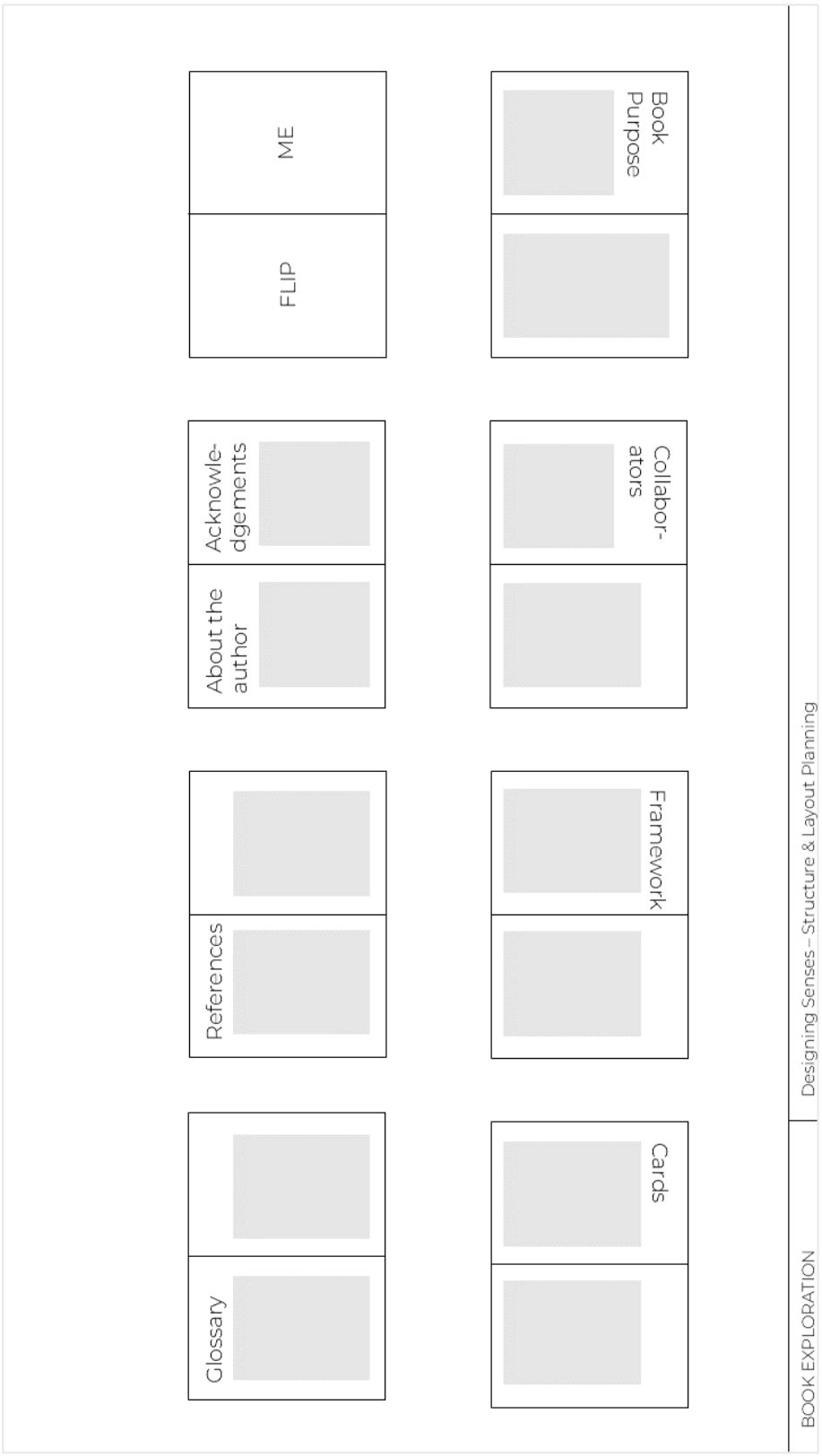


Figure 332 Page from Book Exploration pptx, 2023.

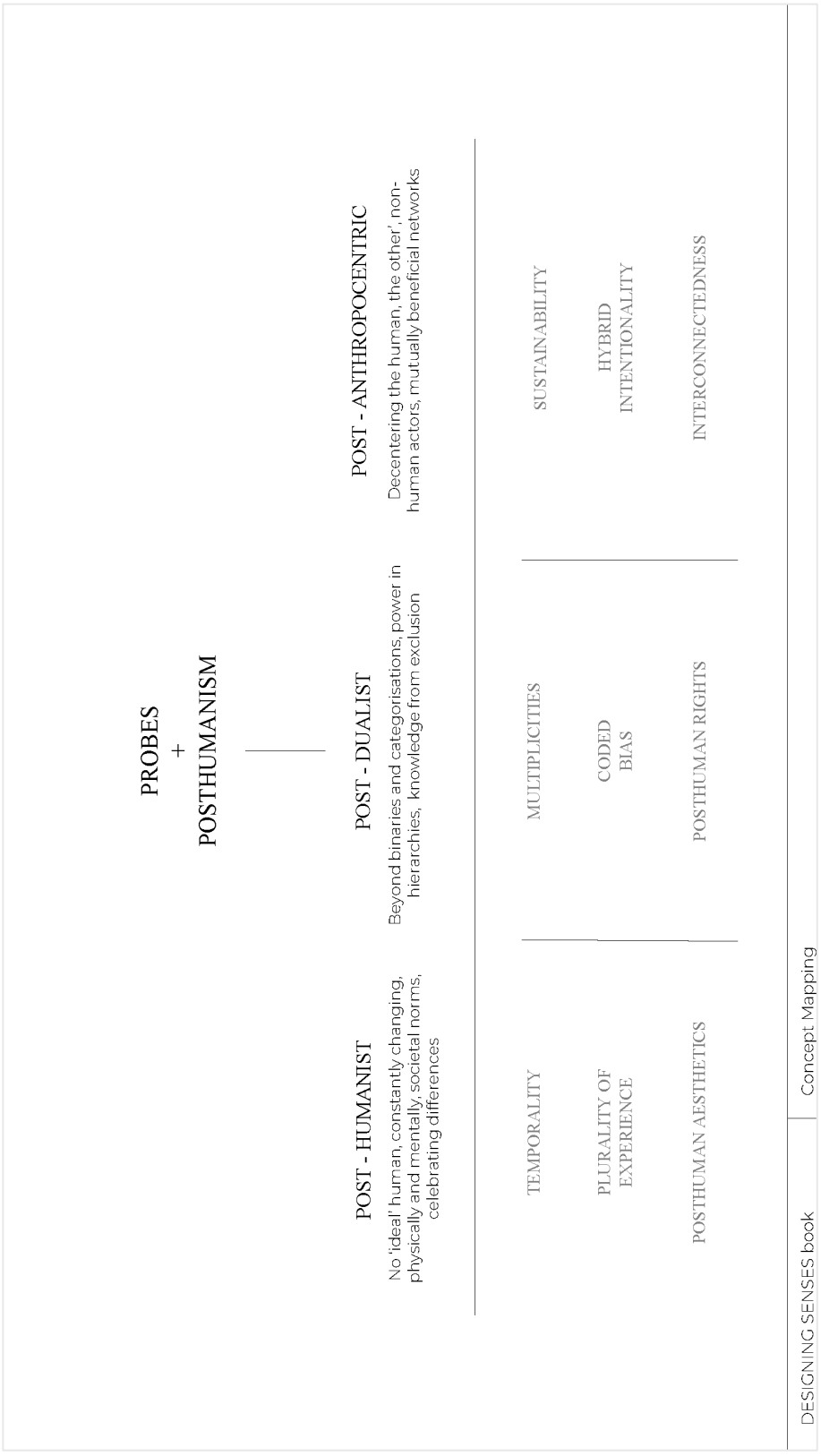


Figure 333 Page from Project Development pptx, 2023.

Post-Enhancement Support Network

By CYBOSENSORY COLLECTIVE

Topic: TEMPORALITY

Collaborator: Hack the Senses, Sammie

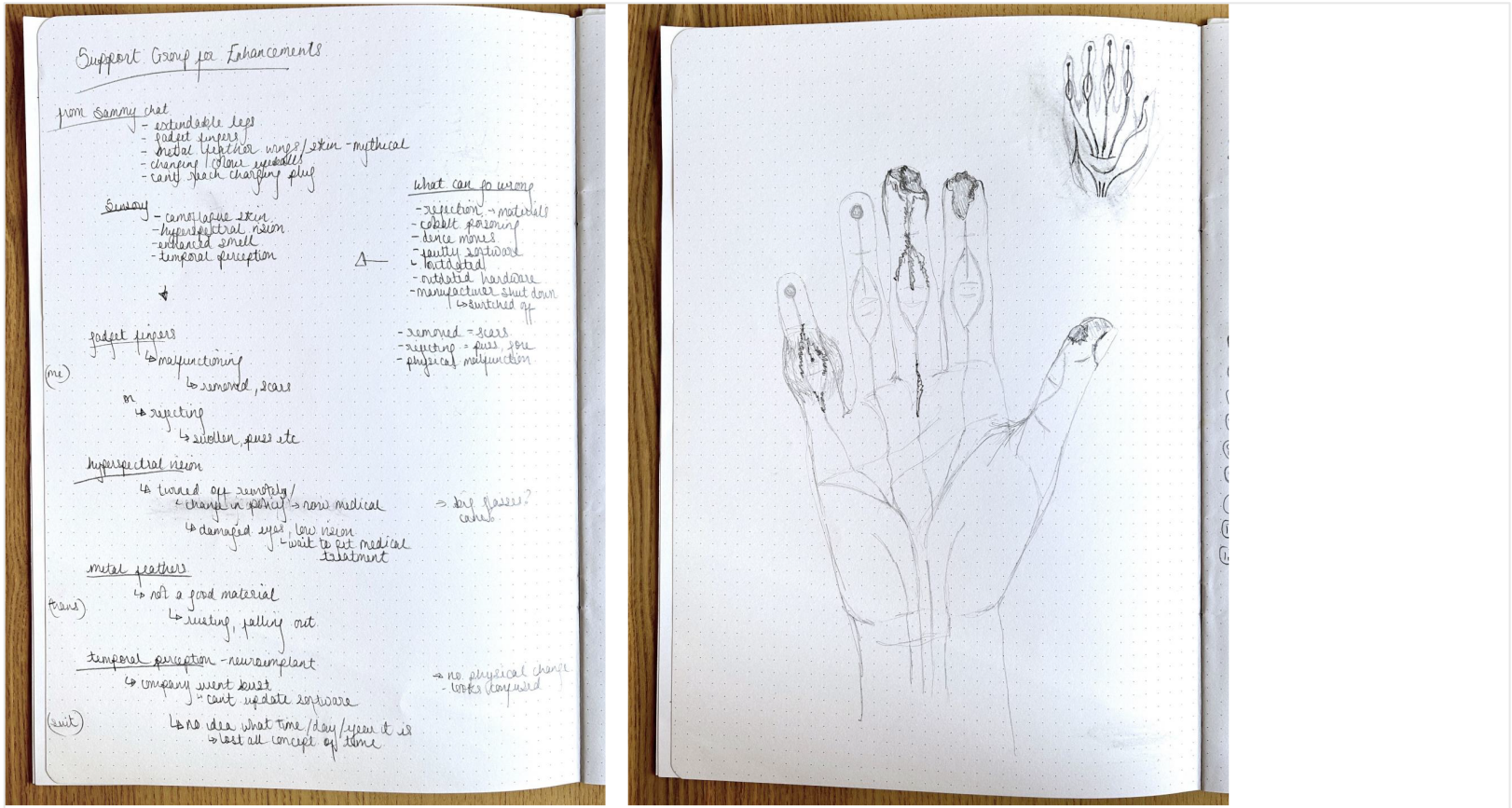
Senses: Vision, Touch

PROBLEM STATEMENT:
Enhancement devices are being created without consideration for incoming/changing regulations, or material or physical changes of people over time.

QUESTION:
How will current day unregulated, short-sighted enhancements affect the people who have them in the future?

PROBE:
Snapshots from a virtual support group where people speak about their malfunctioning enhancements.

Figure 334 Page from Project Development pptx, 2023.



CHAPTER 1: Post-Humanist | PROJECT: Post-Enhancement Support Network

Figure 335 Page from Project Development pptx, 2023.

Figure 336 *Page from Project Development pptx, 2023.*

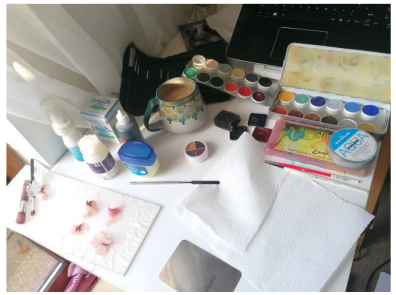
HAPTIC CONTROL HAND

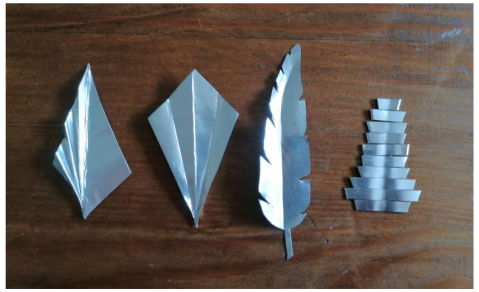
- Embedded sensors to control remote/digital devices, haptic feedback
- > wires and implants start rejecting, not body safe materials
- >> puss, swellings, scarring, removed fingertip etc





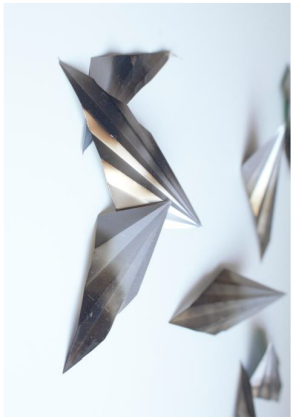






GODDESS FEATHERS

- Amour plating like metal feathers across the skin – protective, strengthen, look fabulous
- > materials degrade over time
- >> rusting, falling out



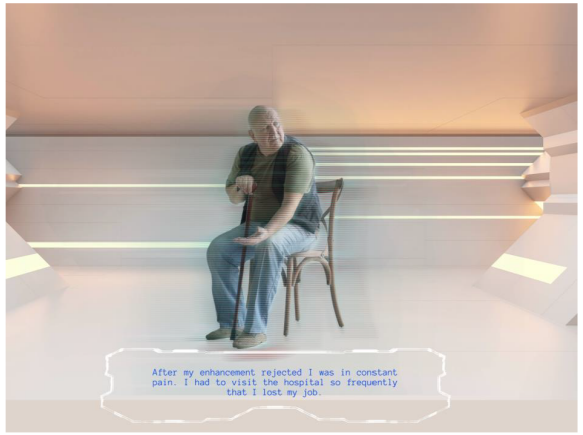




HYPERSPECTRAL VISION

- Eye implants/surgery that allows you to see all light in the spectrum
- > change in policy, now count as medical devices so need to go through testing
- >> remotely switched off as they are not legal – eyes damaged from surgery so now has very low vision
- >>> ironically now have to wait for medical devices to correct vision to at least normal level





VIRTUAL SPACE

- Support group, chairs
- Metaverse
- Replicate the real?

CHAPTER 1: Post-Humanist | PROJECT: Post-Enhancement Support Network

Figure 337 Page from Project Development pptx, 2023.

Enhancing Akansha

By LUCA WEGENER

Topic: PLURALITY

Collaborator: Felix Hundertmark, Akansha Chansoria

Senses: Vision, Hearing

PROBLEM STATEMENT:
People with disabilities are sometimes seen only through that lens and not as complex people, and it is assumed that they want to be 'fixed' through enhancement.

QUESTION:
What if enhancements are designed with/without taking the whole person into account?

PROBE:
Two parallel speculative device designs – one which thinks of technology as the solution and only sees the disability, one that considers her life and her as a person.

Figure 338 Page from Project Development pptx, 2023.

Figure 339 Page from Project Development pptx, 2023.

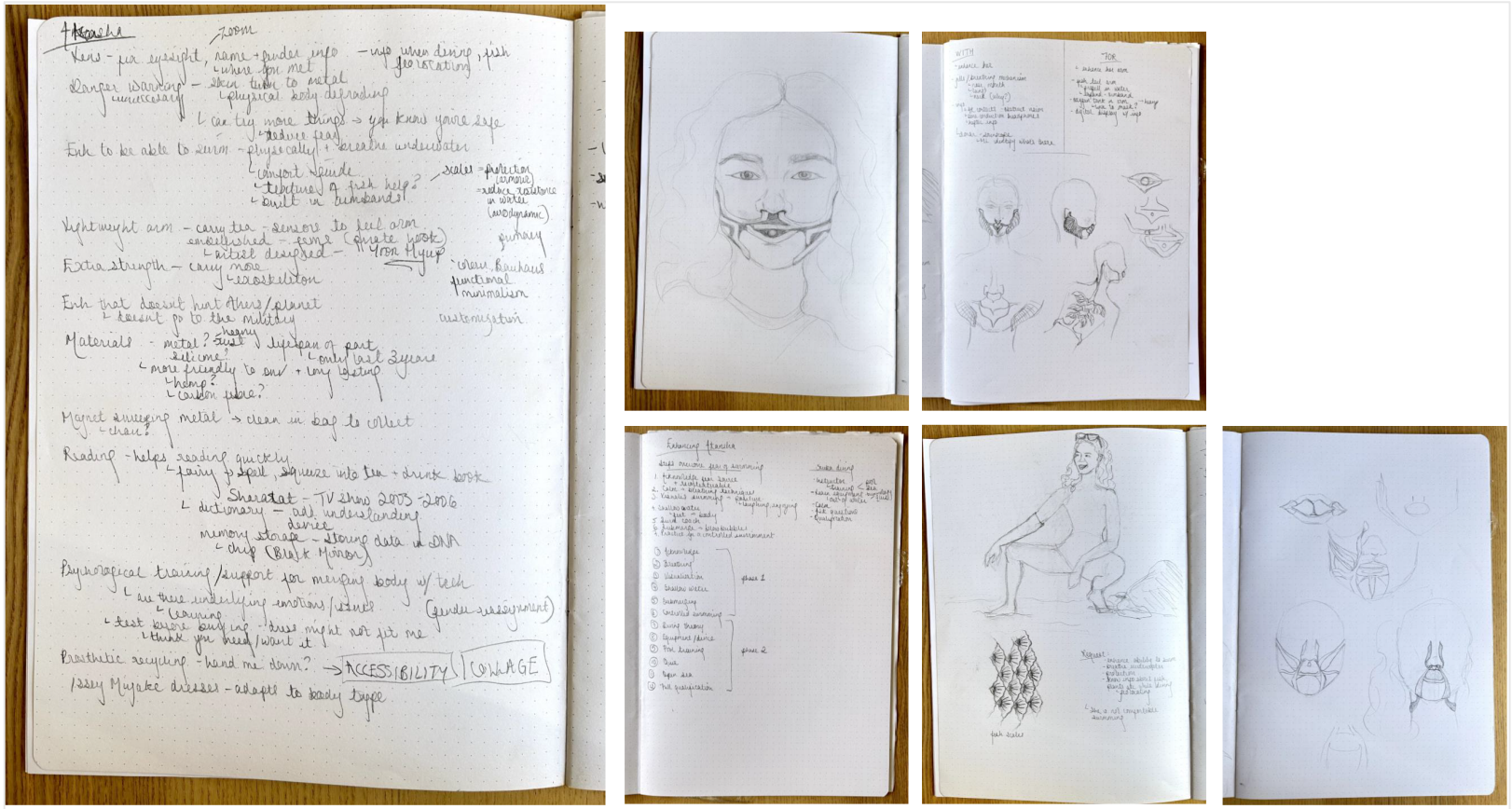


Figure 340 Page from Project Development pptx, 2023.

CHAPTER 1: Post-Humanist	PROJECT: Enhancing Akansha

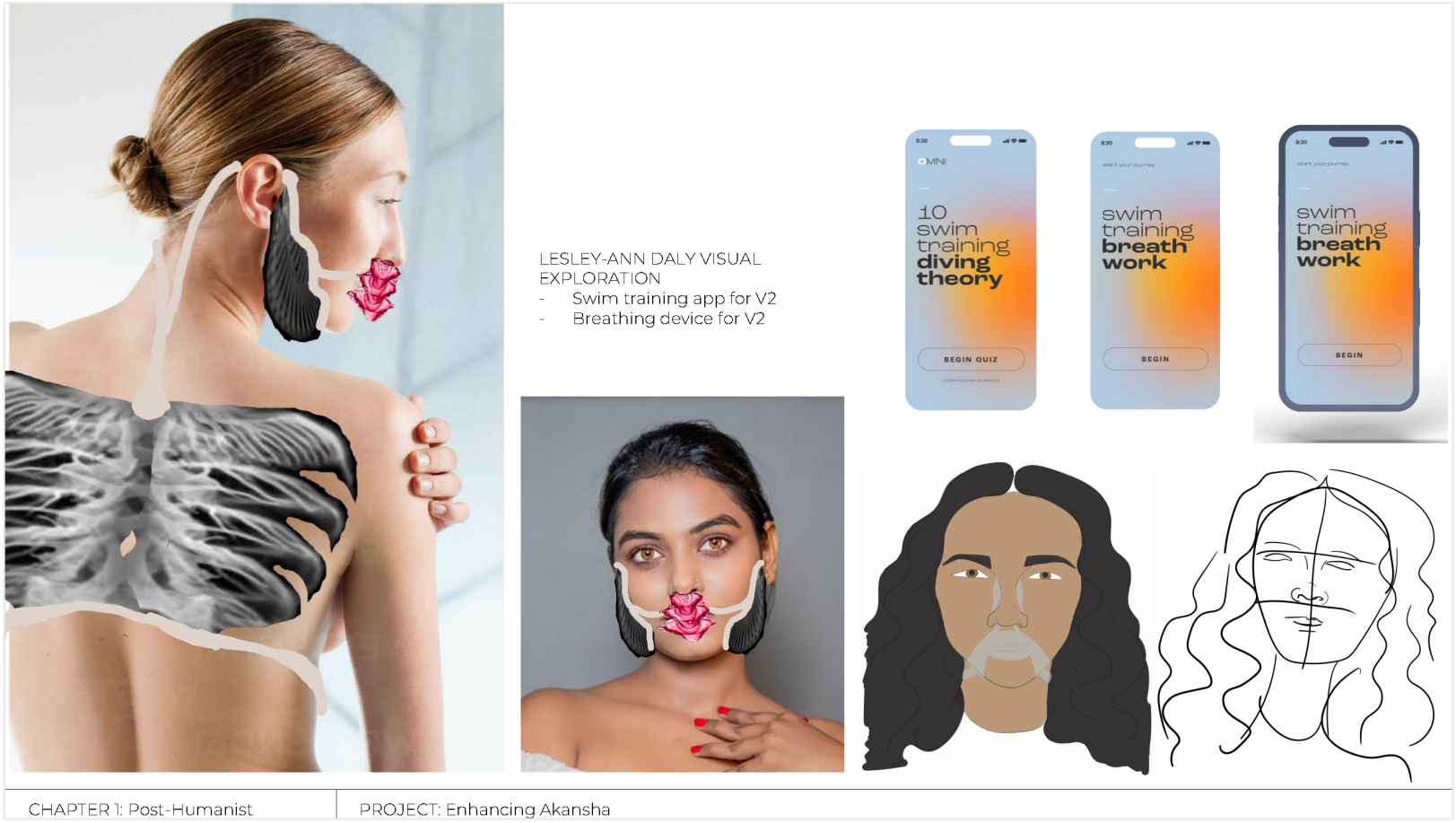


Figure 341 Page from Project Development pptx, 2023.



Figure 342 Page from Project Development pptx, 2023.

Aging [dis]Gracefully
By KATHERINE SCOTT

Topic: POSTHUMAN AESTHETICS

Collaborator: Kate Daly (AKA Mum)

Senses: Hearing

PROBLEM STATEMENT:
There is a general dislike for any aesthetic enhancements and a belief that older women should 'age with grace', to adhere to today's beauty standards.

QUESTION:
What is wrong with aesthetic enhancement?

PROBE:
Media celebrating the breaking of beauty conventions by an older women who has chosen to get an enhancement.

CHAPTER 1: Post-Humanist | PROJECT: Aging [dis]Gracefully

Figure 343 Page from Project Development pptx, 2023.



Figure 344 Page from Project Development pptx, 2023.



CHAPTER 1: Post-Anthropocentric | PROJECT: Aging [dis]Gracefully

Figure 345 Page from Project Development pptx, 2023

I am Cyborg(s)
By LESLEY-ANN DALY

Topic: MULTIPLICITIES

Collaborator: Angela Harrington

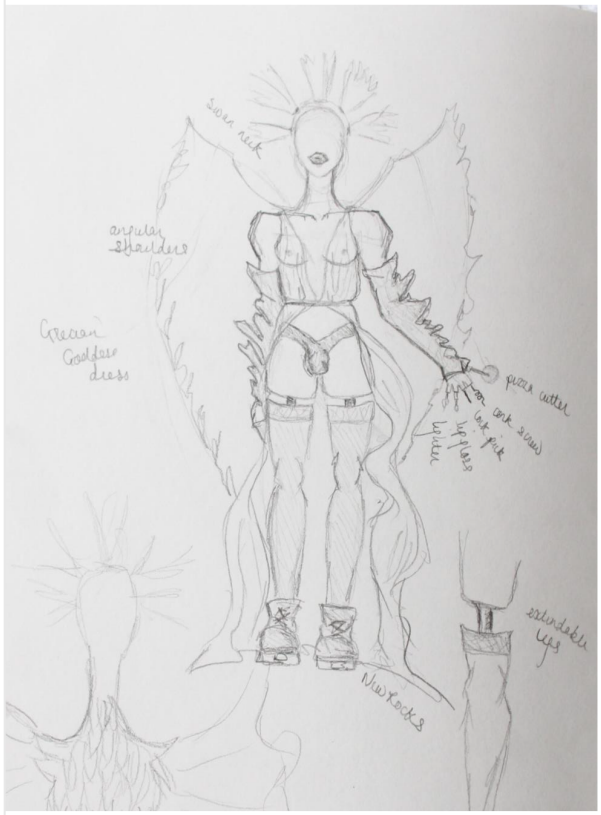
Senses: Taste, Hearing, Proprioception

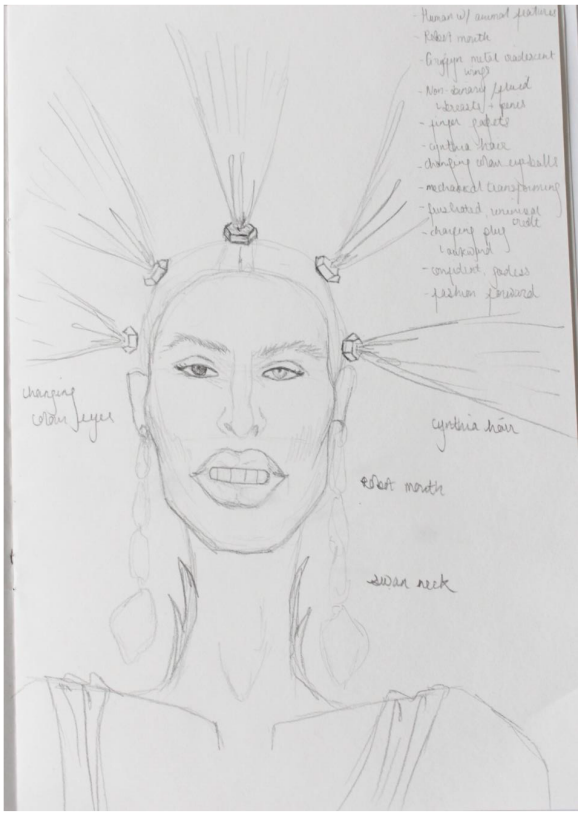
PROBLEM STATEMENT:
There are very narrow prevailing visions of cyborgs as masculine, weaponized or oversexualized women.

QUESTION:
What kind of cyborg would I want to be?

PROBE:
Multiple self portraits of cyborgs with enhancements that would benefit my life.

Figure 346 Page from Project Development pptx, 2023.





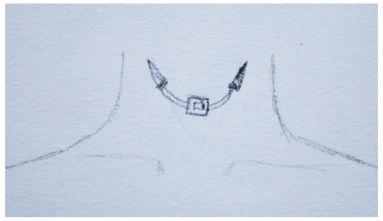
LGBTQIA+borg – Inspiration from Harper (collaborator)

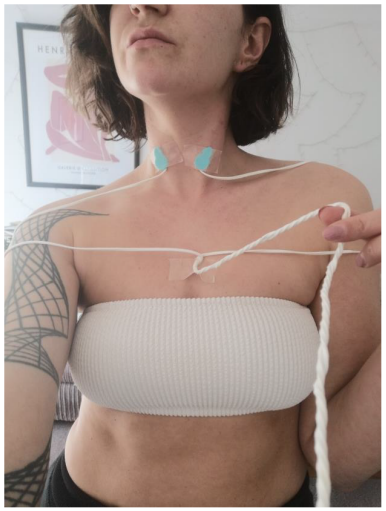
- Non-binary, fluid – breasts & penis
- Confident, Goddess
- Gryffin - iridescent wings, feathers
- Swan neck (Queen of Bavaria)
- Trans history of mythical creatures & gender transforming
- Robot mouth – liquid diet
- Colour changing eyes
- Utility fingers – lighter, lip gloss
- Gadgets but not really necessary/ functional
- Charging lead is too short - Imperfect
- Cynthia hair
- Fashion forward
- Frustrated, on universal credit, doing cash in hand jobs

Figure 347 Page from Project Development pptx, 2023.

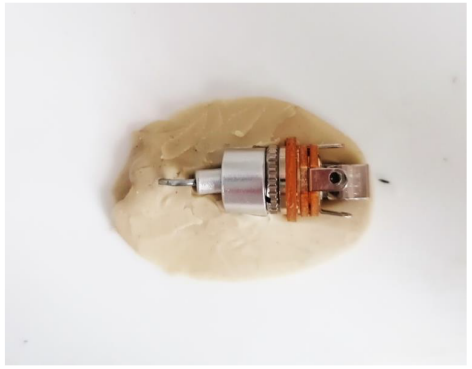
Figure 348 Page from Project Development pptx, 2023.











Vampire phone
Sustainable socialite



Figure 349 Page from Project Development pptx, 2023.

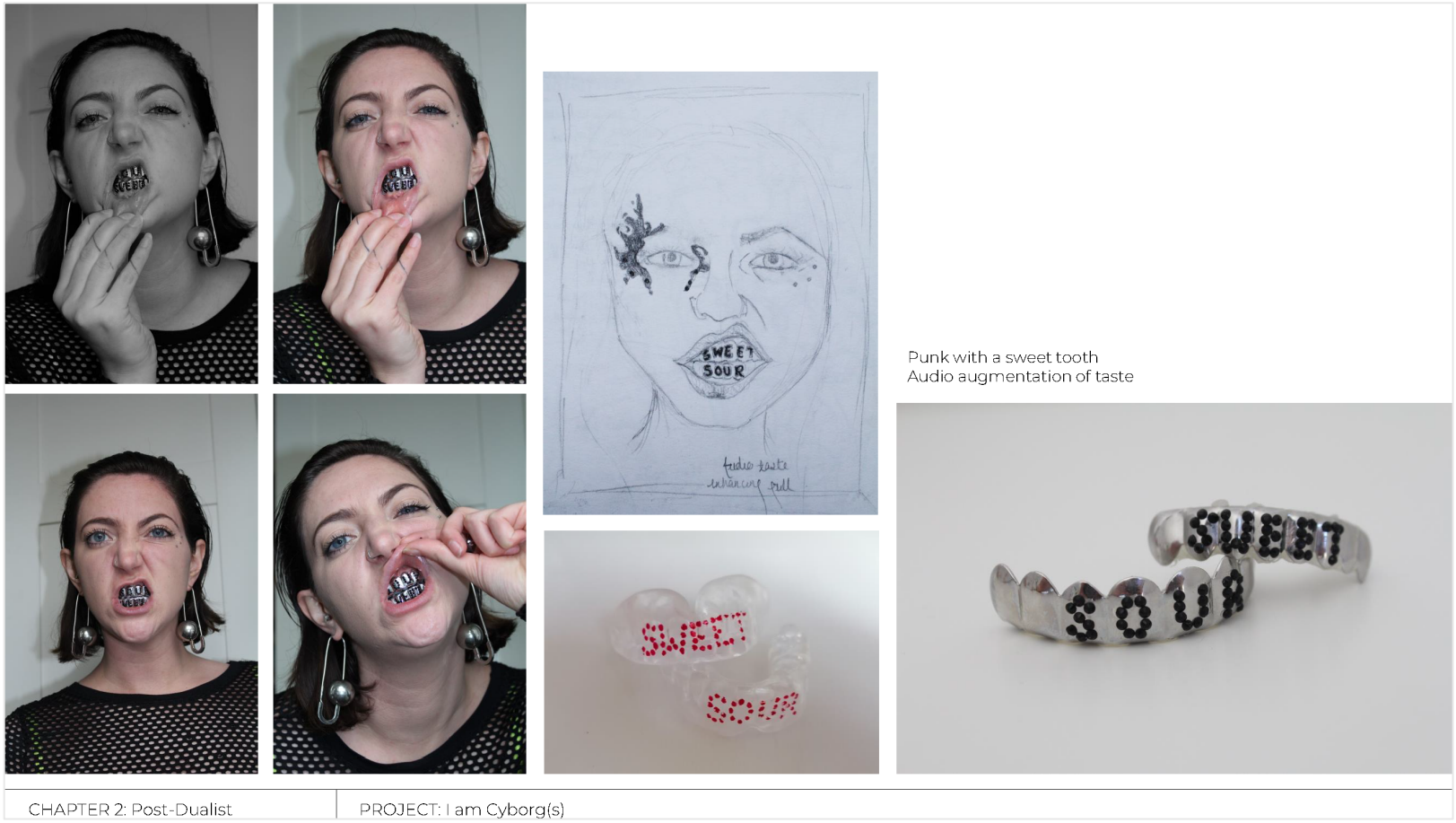
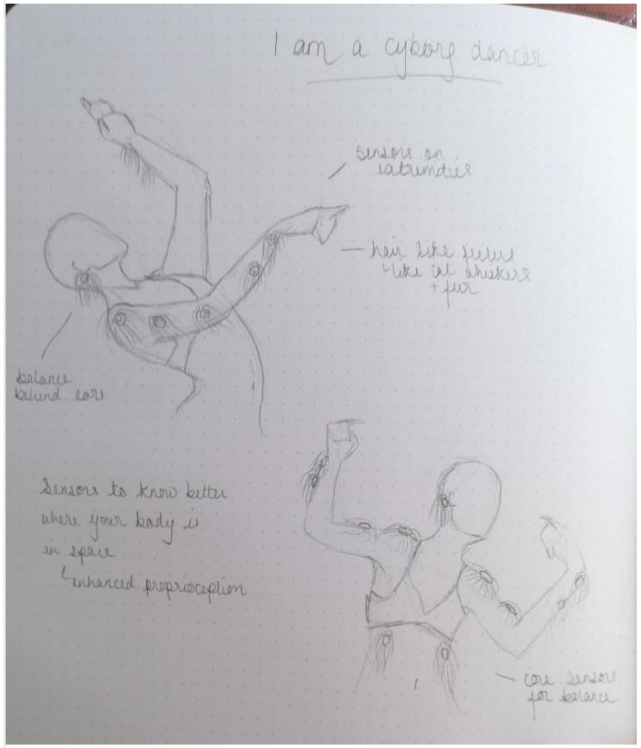


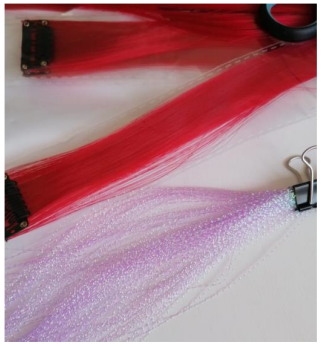
Figure 350 Page from Project Development pptx, 2023.







Dancer with proprioceptive sensors on the skin





CHAPTER 2: Post-Dualist | PROJECT: I am Cyborg(s)

Figure 351 Page from Project Development pptx, 2023.

Feel the Truth
By ALEXANDRE LARSON

Topic: CODED BIAS

Collaborator: Daniel Lyngholm

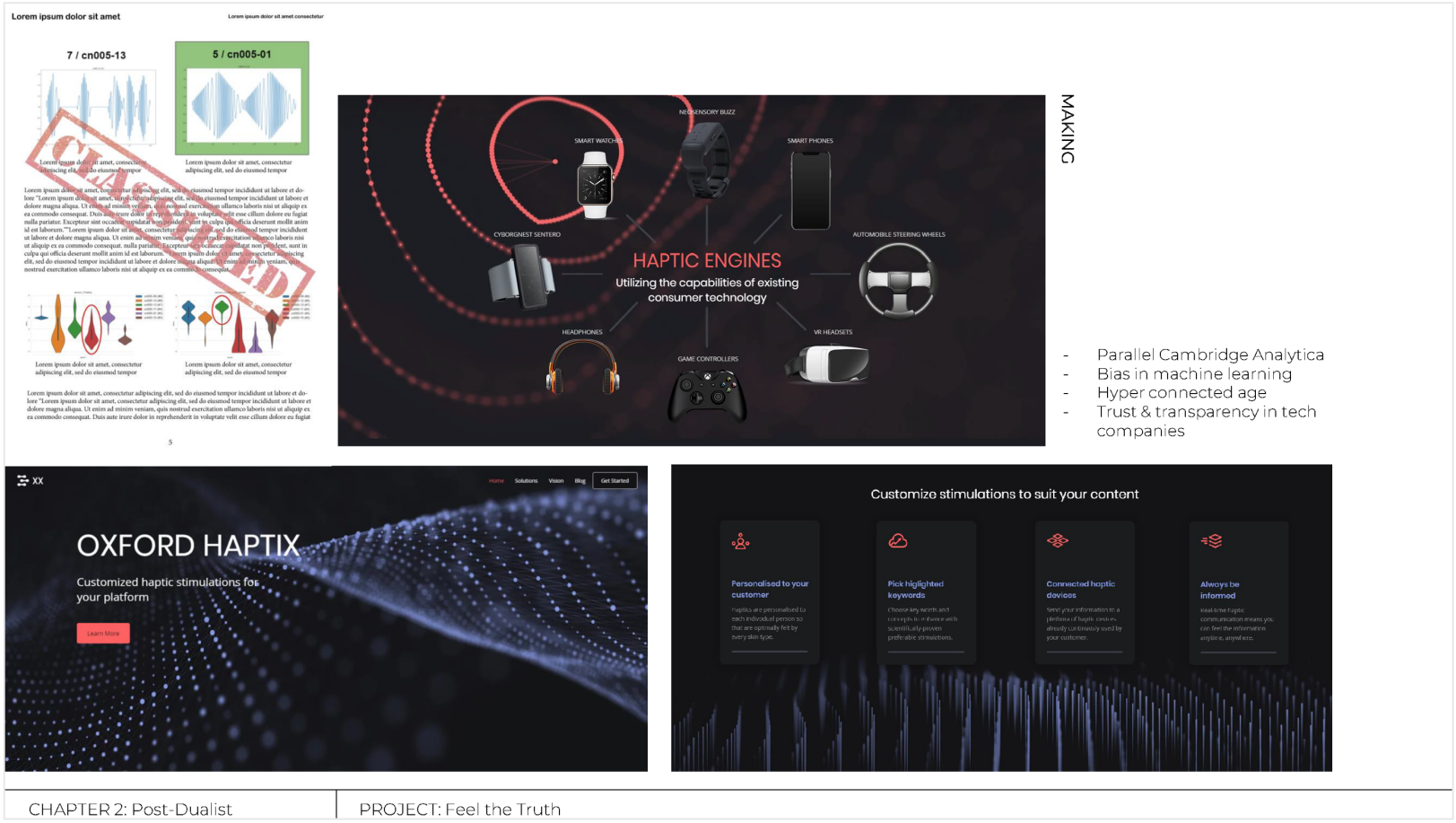
Senses: Touch

PROBLEM STATEMENT:
There is currently an epidemic of misinformation and fake news in text and visual media, the same hidden agendas could extend to other senses when transmitting information.

QUESTION:
What if SA was intentionally coded to be bias?

PROBE:
Website images of a company who curate haptic information so that it can be perceived in a particular way.

Figure 352 Page from Project Development pptx, 2023.



MAKING

- Parallel Cambridge Analytica
- Bias in machine learning
- Hyper connected age
- Trust & transparency in tech companies

Figure 353 Page from Project Development pptx, 2023.

Posthuman Protest
By PIPPA SPARKS

Topic: POSTHUMAN RIGHTS

Collaborator: Daniel Coules, James Daly (AKA Dad)

Senses: Touch, Vision

PROBLEM STATEMENT:
Historically some people have been declined basic human rights, which could potentially be exasperated in a future where some people don't fully identify as human.

QUESTION:
How human do you need to be to qualify for human rights?

PROBE:
Protest imagery of posthumans defending their basic rights utilizing DIY technologies.

Figure 354 Page from Project Development pptx, 2023.

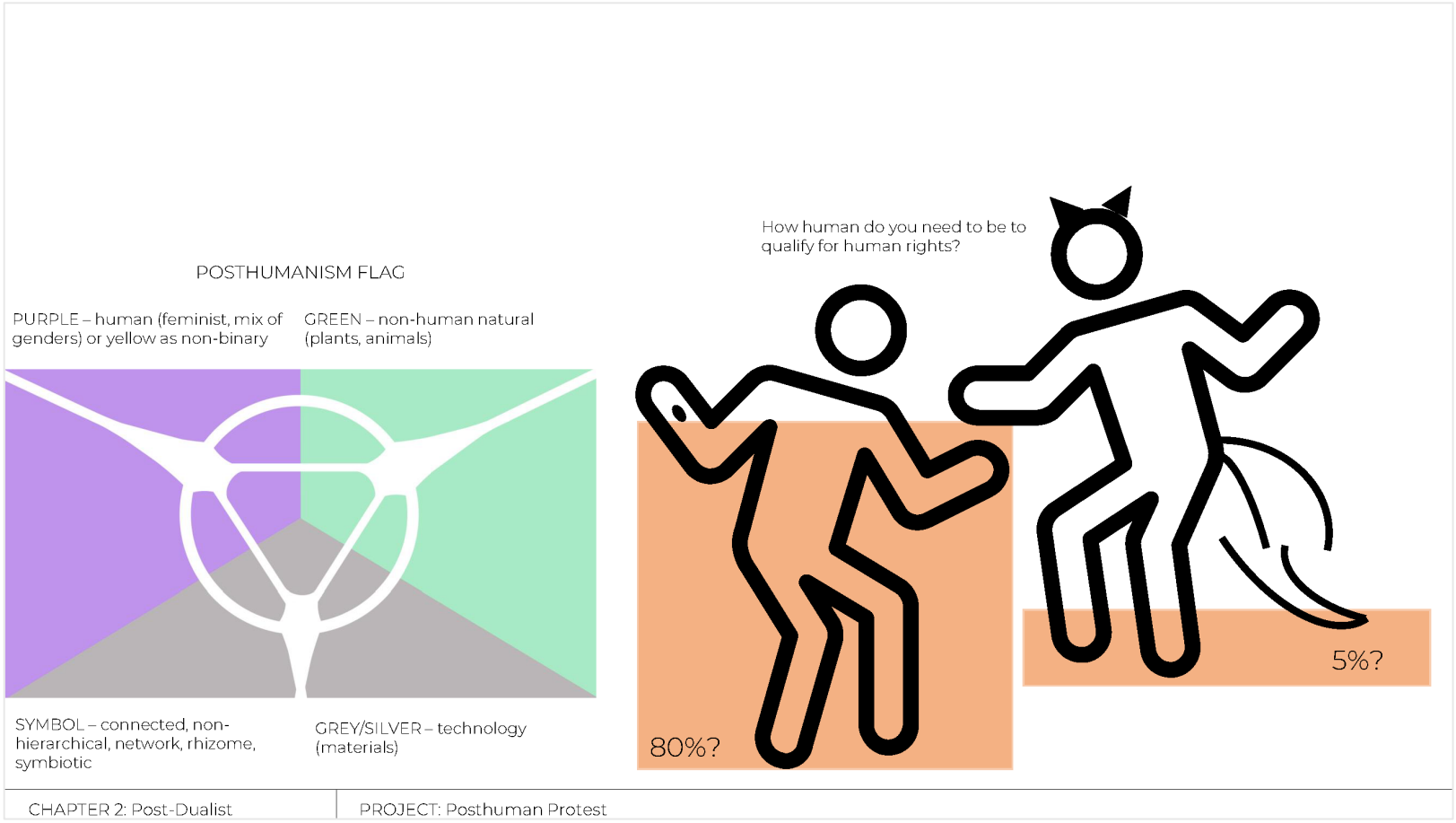
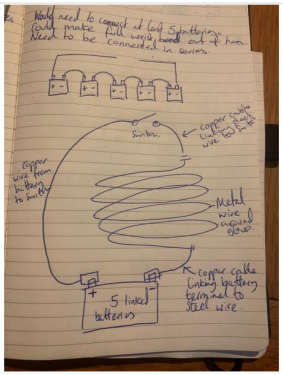


Figure 355 Page from Project Development pptx, 2023.





AR Riot mask
- Recording attackers

Anti-arrest shock gloves
- Shocks police if they try to handcuff them







CHAPTER 2: Post-Dualist | PROJECT: Posthuman Protest

Figure 356 Page from Project Development pptx, 2023.

Plug 'N' Throwaway
By APHREX

Topic: SUSTAINABILITY

Senses: Hearing, Smell, Touch

PROBLEM STATEMENT:
Literature on the ethics of human enhancement technology mainly considers impacts on humans and not also how they will negatively impact the planet.

QUESTION:
What if we designed future enhancement devices by old standards of mass production?

PROBE:
Collages of distant future scenarios showing the planetary impacts of unsustainably made enhancement devices.

Figure 357 Page from Project Development pptx, 2023.

Figure 358 Page from Project Development pptx, 2023.

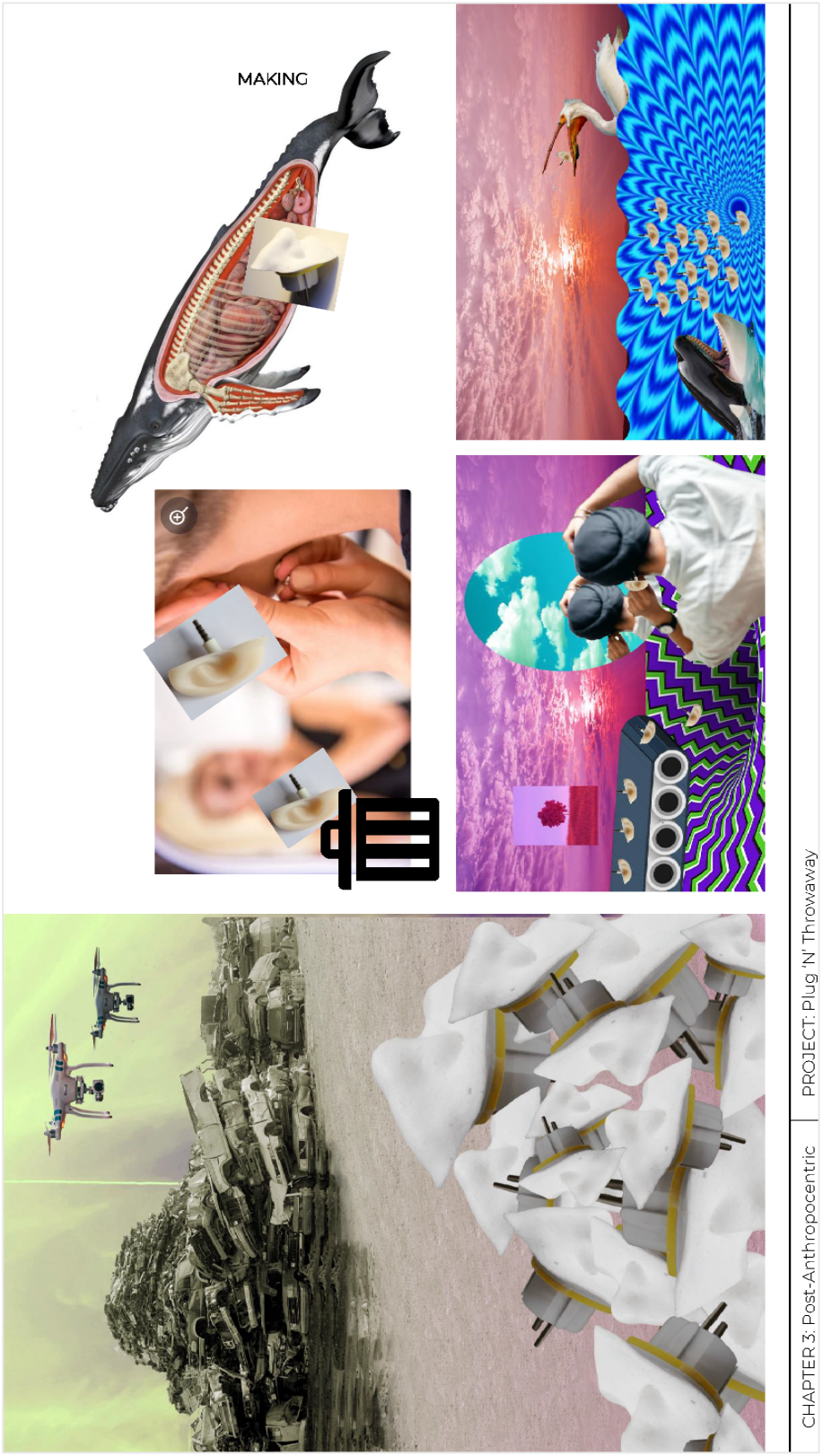


Figure 359 Page from Project Development pptx, 2023.

Ghost in the Tentacle
By TOM HUANG

Topic: HYBRID INTENTIONALITY

Senses: Taste

PROBLEM STATEMENT:
Unlike indigenous cultures, western culture does not consider non-human objects, such as technology, to have its' own 'spirit' or agency.

QUESTION:
What if the human's ethics are different from that of the technology that they are merged with?

PROBE:
Doctors' notes and company correspondence documenting the deteriorating mental health of a man implanted with a disobedient device.

Figure 360 Page from Project Development pptx, 2023.

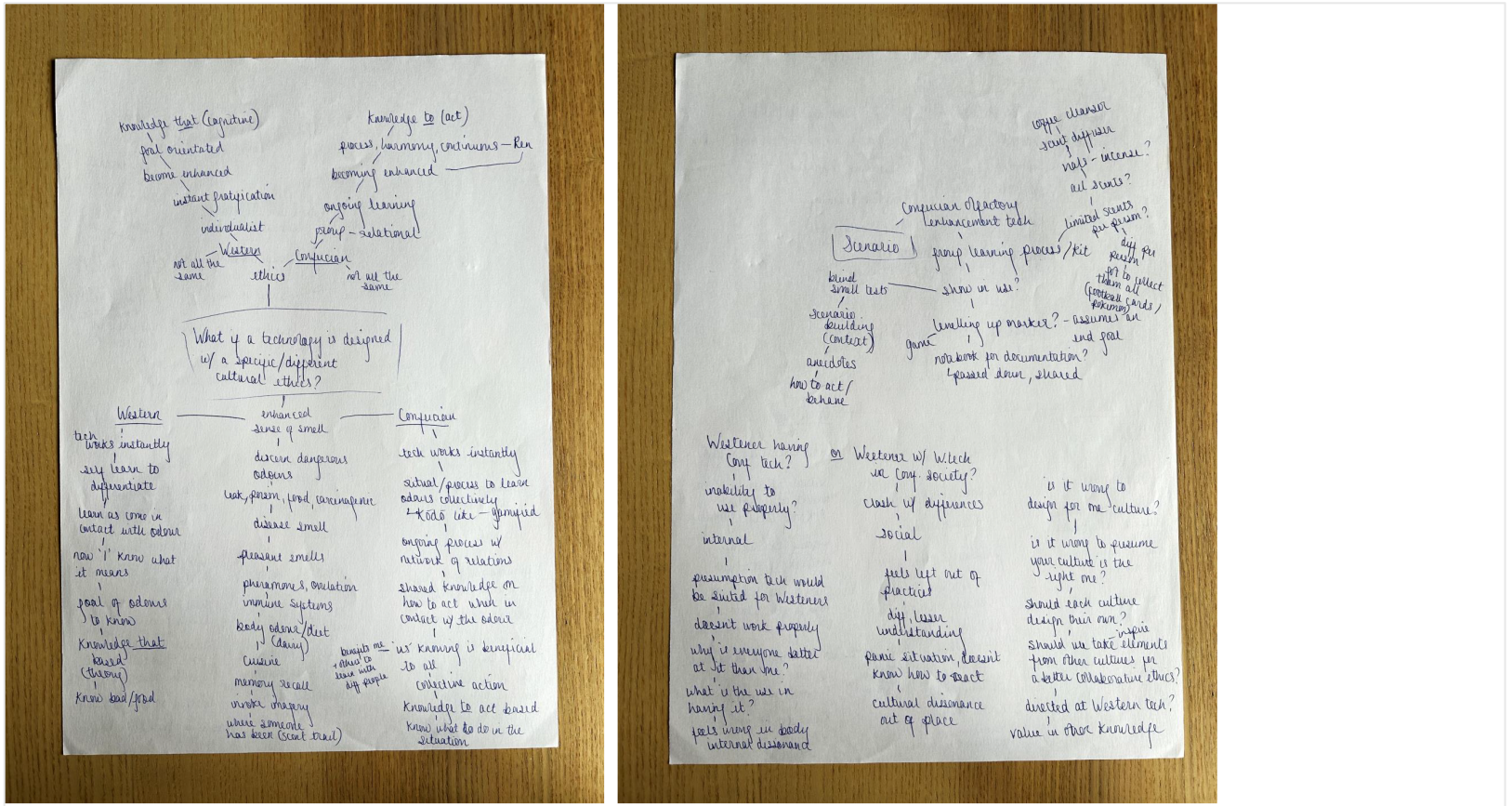
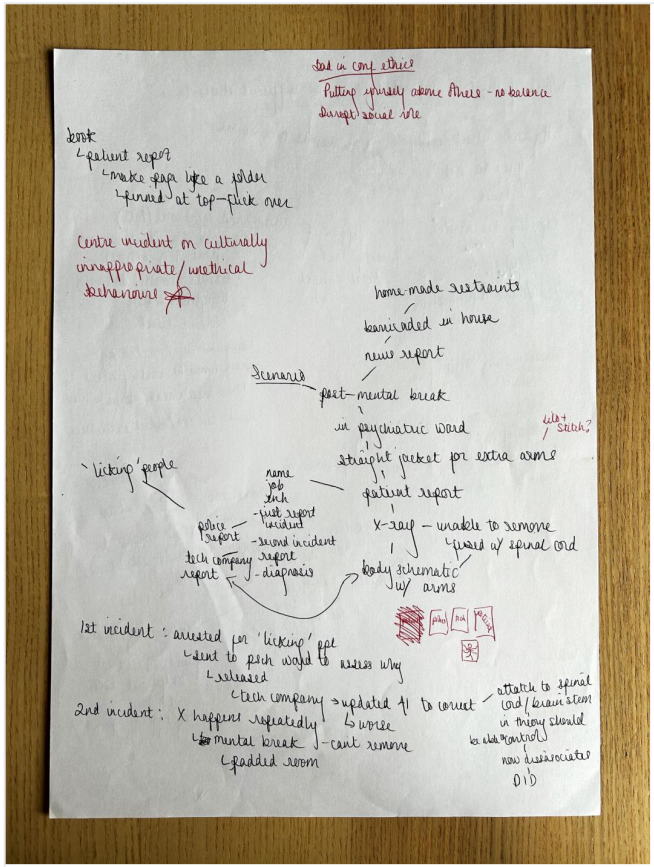
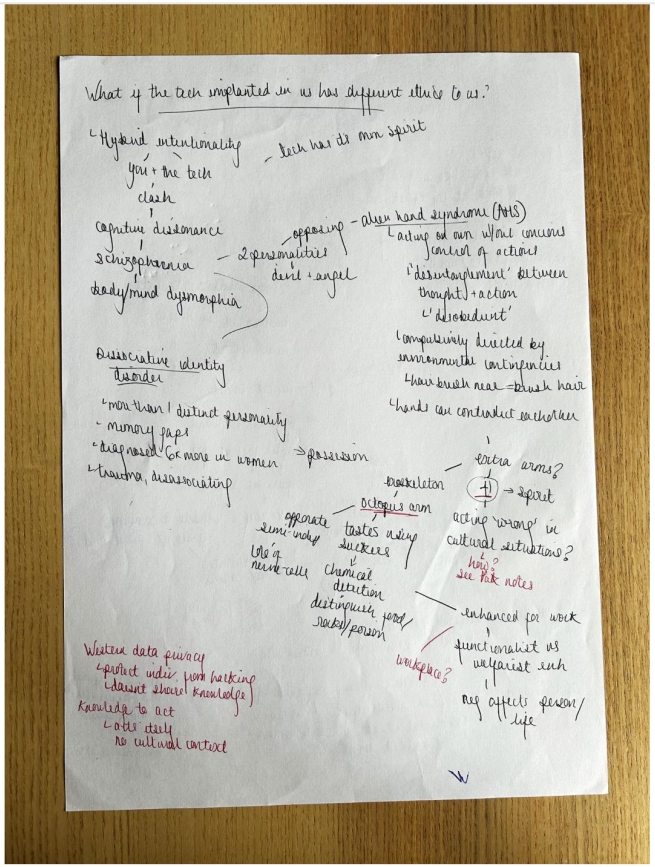


Figure 361 Page from Project Development pptx, 2023.





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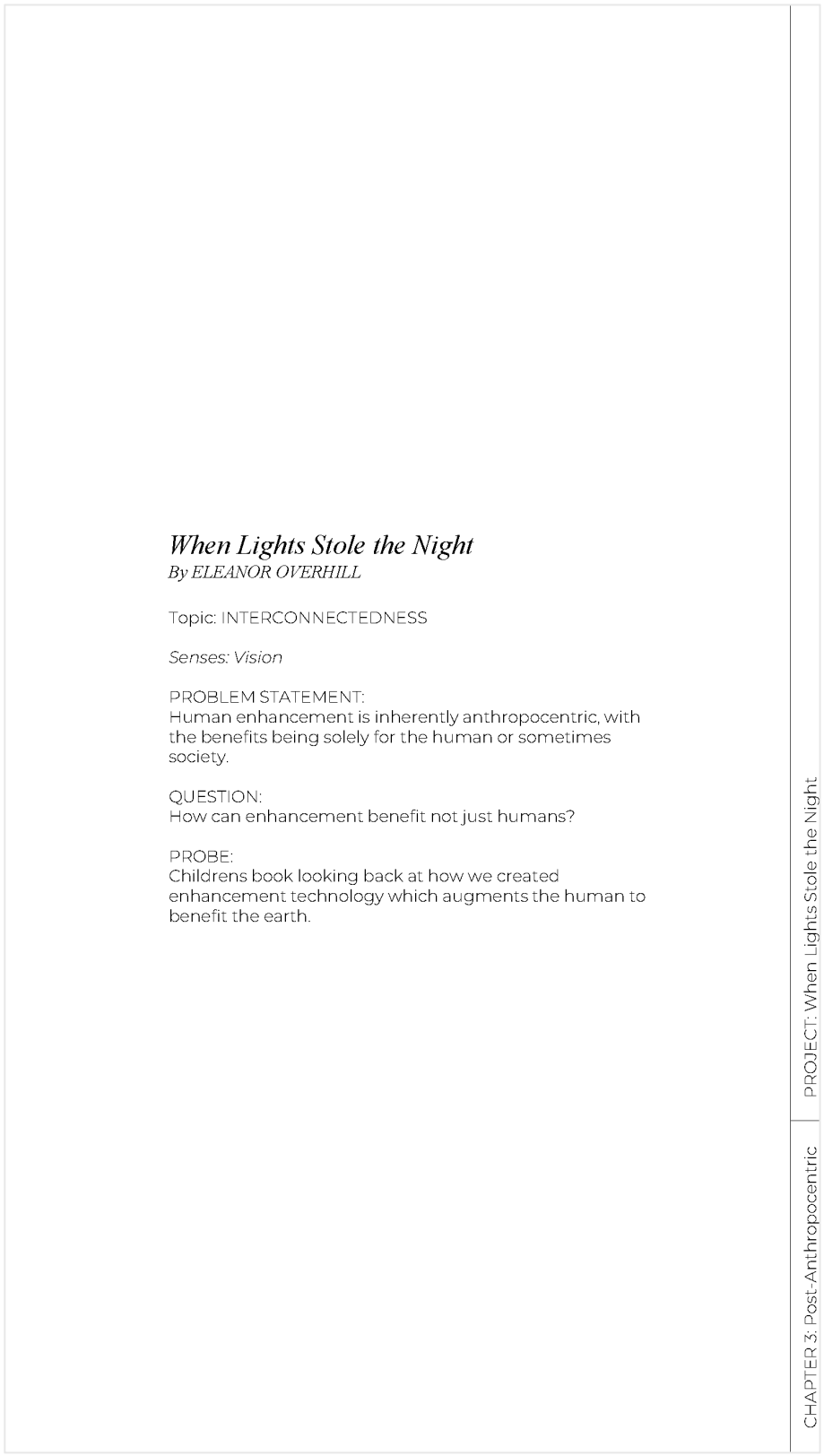

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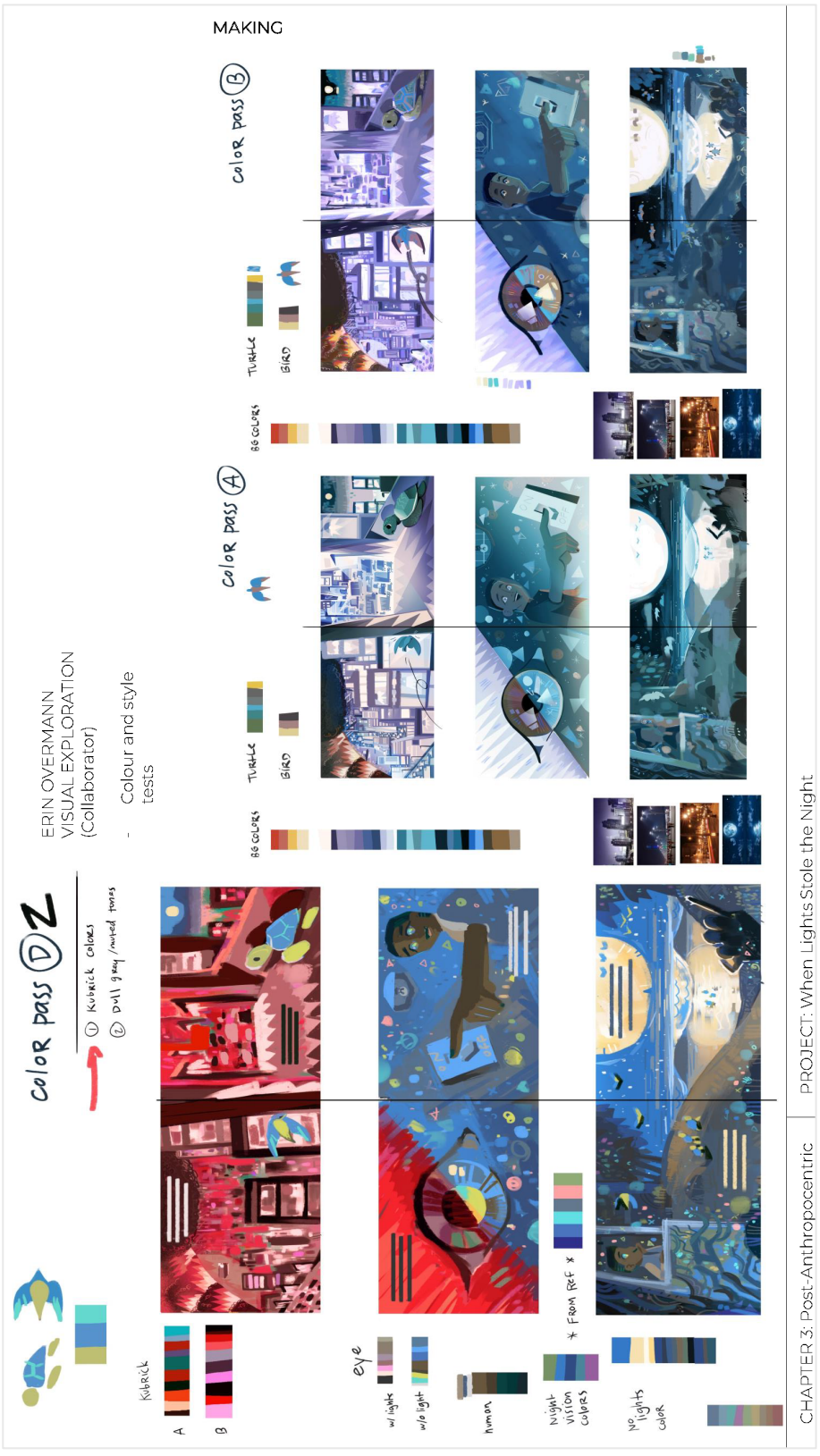

Figure 365 Page from Project Development pptx, 2023.

Figure 366 Page from Project Development pptx, 2023.

AGING GRACEFULLY

Question: What is wrong with aesthetic enhancement?

By Person Personson

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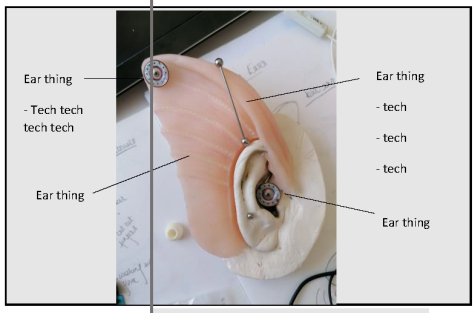

Oxford Haptix are a company which translates information

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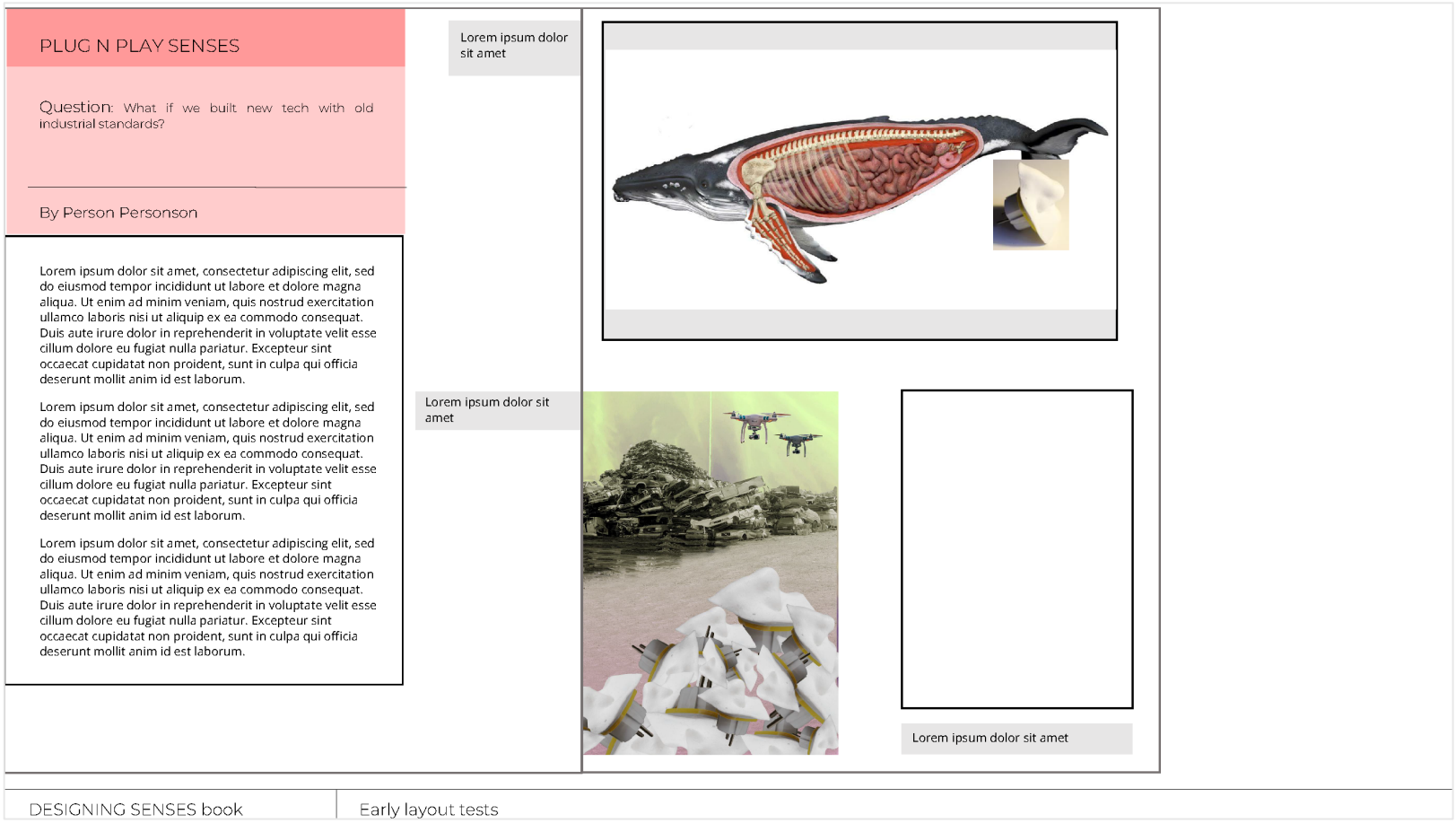

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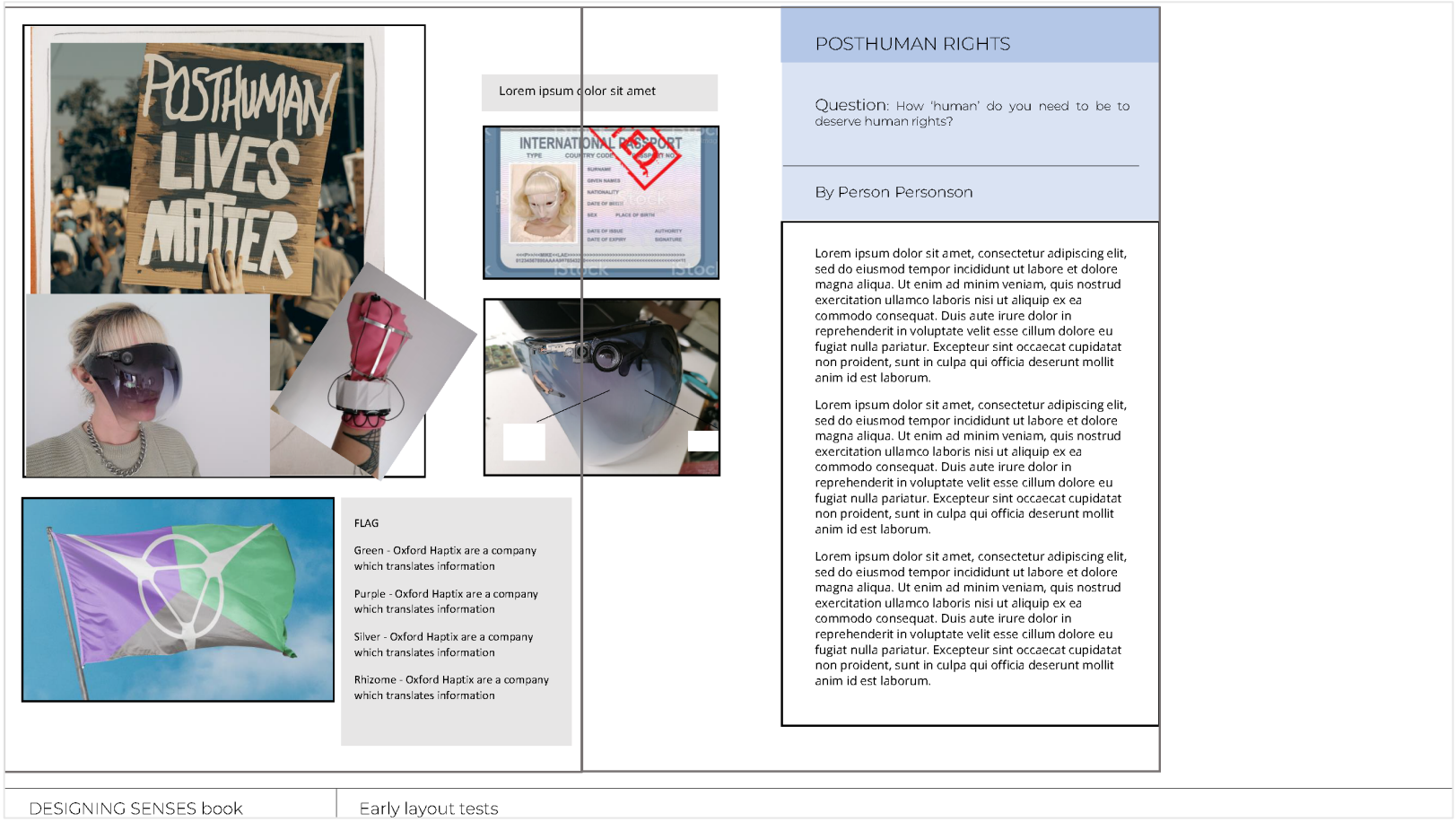


Figure 368 Page from Project Development pptx, 2023.

Figure 369 Page from Project Development pptx, 2023.



Figure 370 Page from Project Development pptx, 2023.

DESIGNING SENSES book | Early layout tests – Adobe template

Figure 371 Page from Project Development pptx, 2023.

AGING [DIS] GRACE-FULLY

64year-old, retired architect Marie Marsh made waves in the beauty world when PURE magazine featured her on their Spring/Summer 2027 cover, proudly showing off her bat ears. The silicone ears, created by body mod pioneer Steve Haworth, are attached via permanent piercings, and are integrated with a sensory augmentation device which gives her the added ability to hear using echolocation. While wearable and implantable technologies have been growing in popularity over the past 10years, the image of an older woman flaunting her enhancement both shocked and delighted the industry. Trend agencies declared her the face of an 'Aging [dis]Gracefully' campaign, proclaiming that anyone can transforms regardless of their age or enhancement goal. Augmentation is not just for the young.

In this project Katherine Scott questions why we expect the future augmented body to be dystopian, or undesirable, by confronting the viewer with the happily augmented Marie Marsh. Her project builds on research which finds a current trend against aesthetic enhancement. Those surveyed rejected the use of surgery and treatments to attain beauty ideals which are unattainable for most people , with a bias towards appreciating the 'natural' body. This was reflected in a distaste for anti-aging technologies and non-therapeutic enhancement technologies - which have no medical purpose but instead augment the person in ways that they want rather than need. According to those surveyed, the only acceptable forms of enhancement were those for medically beneficial purposes, describing any other augmentations as 'artificial', 'unnatural' and generally undesirable.

If an older woman chooses to modify her body & senses, giving herself the ability to hear as bats do, what is wrong with that? This aesthetic, non-therapeutic, 'unnatural' enhancement represents exactly what people declare they are against. But why? In an age of blossoming radical inclusivity why is this an undesirable future for some? And furthermore, as designers why should we create future technologies by old standards of what is acceptable and beautiful?

In 2027, former architect Marie Marsh crashes into the public conciousness, flaunting her personalised 'bat ears'.



KATHERINE SCOTT

POST - HUMANIST

13

DESIGNING SENSES book | Early layout tests – Adobe template

Figure 372 Page from Project Development pptx, 2023.

ALEXANDRE LARSEN

YEAR: 2023

POST – DUALIST



Oxford Haptix website – a digital platform which converts information into vibrations so that customers can 'feel' the information.

FEEL THE TRUTH

Oxford Haptix translate information, such as the news, into haptic stimulations (vibrations) for companies and media outlets. 'Utilising ubiquitous technologies that already have haptic capabilities – such as phones, smart watches, steering wheels, game controllers and dedicated haptic wearables – the platform can transmit the haptic information directly to billions of people worldwide' [1]. In an age of hyper information consumption, the technology advertises the ability to keep target audiences continuously connected and informed through their skin.

The company saw a boom in uptake after governments around the world announced the UNBIAS DATA Act of 2025. The Act will regulate data streams – such as machine learning platforms, the news, and social media – enforcing the exclusive production and distribution of verifiably unbiased information to publics. Due to a loophole in the regulation, which did not consider haptics as an information source, vibrations will not fall under the act.

Oxford Haptix uses confidential (potentially illegal) methods to code information provided by the 3rd parties. Relevant 'keywords' and concepts can be 'emphasised' as important (with a pleasant feeling vibration), while other words are 'de-emphasised' (made to feel unpleasant). In effect, the haptics potentially bias the opinions of audiences by, for example, making words like 'supremacy' or 'capitalism' feel pleasant – eliciting a positive emotive reaction, and words like 'diversity' and 'equality' feel unpleasant – eliciting a negative reaction. The lack of transparency in coding logic could globally shift opinions of unwitting audiences without their knowledge, or conscious awareness.

The speculative company, created by Alexandre Larsen, illustrates how improperly regulated sensory technologies could bypass legal restrictions potentially coding in destructive biases. With the pace of technology development generally far outstripping the responsiveness of government policies this could be one of many examples of destructive regulatory loopholes.

1 Alexandre website
2 Ref to coded bias info
3 Tech faster than gov

DESIGNING SENSES book | Early layout tests – Adobe template

7.3. ChatGPT Book Foreword - Prompts

You
Write 300 words on 'how speculative critical design provokes discussion on the future and enables us to make changes to design today' in the style of matt malpass, tony dunne and luiza prado

ChatGPT
Speculative critical design is a powerful tool for exploring and discussing potential futures, and for encouraging us to think critically about the design decisions we make today. By creating provocative and often surreal design objects and scenarios, designers can encourage us to think outside of the box and to imagine new possibilities for the future. In doing so, they can inspire us to make changes to the way we design, and to consider the broader social, cultural, and environmental impacts of our work.

At the heart of speculative critical design is a willingness to challenge established norms and assumptions, and to explore alternative perspectives and possibilities. By creating objects and scenarios that are deliberately provocative and often unsettling, designers can encourage us to question our own assumptions and biases, and to consider how our current design practices might be contributing to larger societal problems.

For example, a speculative critical design project might imagine a future in which the impact of climate change has led to widespread water shortages. In response to this imagined scenario, the designers might create a series of objects and scenarios that explore alternative ways of collecting, storing, and distributing water. By doing so, they can encourage us to think about how our current systems for managing water might be improved, and to consider the potential impacts of our current design choices on future generations.

Another key aspect of speculative critical design is its emphasis on collaboration and co-creation. By involving a diverse range of stakeholders in the design process, designers can ensure that their work is grounded in real-world needs and concerns, and that it is responsive to the needs and desires of the people who will be using it. This collaborative approach can help to ensure that speculative critical design projects are not simply flights of fancy, but are grounded in the real-world needs and concerns of the communities they serve.

Ultimately, speculative critical design has the potential to be a powerful catalyst for change. By encouraging us to think critically about the design decisions we make today, and by inspiring us to imagine new possibilities for the future, it can help us to create a better and more sustainable world for future generations. Whether we are designing products, systems, or environments, we can all benefit from the provocative and imaginative approach of speculative critical design.

You
Write 500 words on 'how speculative critical design provokes discussion on the future and technology, and enables us to make changes to design today with a focus on ethical design principles' in the style of luiza prado and matt malpass

ChatGPT
Speculative critical design is a powerful tool for exploring the implications of technology on society, and for imagining new possibilities for a more just and sustainable future. By creating provocative and often surreal design objects and scenarios, designers can encourage us to think critically about the impact of technology on our lives, and to consider the ethical implications of our design choices. In this way, speculative critical design enables us to make changes to design today that can have a positive impact on the world around us.

One of the key ways that speculative critical design provokes discussion on the future and technology is by imagining new possibilities that go beyond our current technological landscape. By imagining alternative futures that are radically different from our present reality, designers can help us to see beyond the limitations of our current ways of thinking about technology, and can encourage us to consider new ethical principles and approaches to design. For example, a speculative critical design project might imagine a future in which biotechnology has advanced to the point where humans can alter their own genetic code at will. By doing so, the designers can encourage us to consider the ethical implications of such a future, and to imagine alternative approaches to biotechnology that are more sustainable and ethical.

Another key way that speculative critical design enables ethical design today is by foregrounding the needs and perspectives of marginalized communities in relation to technology. By creating objects and scenarios that are centered on the experiences of marginalized groups, designers can help to make their needs and concerns more visible and tangible, and can encourage us to think about how technology can be used to promote greater social justice and equity. For example, a speculative critical design project might imagine a world in which technology is designed to be accessible and usable for people with disabilities. By doing so, the designers can help to challenge the assumptions that underlie many of our current design practices, and can encourage us to imagine new possibilities for more inclusive and equitable design.

At the heart of speculative critical design is a commitment to ethical principles such as sustainability, social justice, and inclusivity. By foregrounding these principles in their work, designers can encourage us to think about the broader ethical implications of our design choices, and to consider how we can create a more just and sustainable world through technology. For example, a speculative critical design project might imagine a future in which all electronic devices are designed to be easily repairable and upgradeable, with components that can be easily sourced and recycled. By doing so, the designers can encourage us to think about the impact of our current technology on the environment, and to consider alternative approaches that are more sustainable and ethical.

Ultimately, speculative critical design has the potential to be a powerful force for positive change in the world of technology. By encouraging us to think critically about the future, and by inspiring us to imagine new possibilities for more just and sustainable design, it can help to create a world that is more inclusive, equitable, and sustainable. Whether we are designing new technologies or reimagining existing ones, we can all benefit from the imaginative and provocative approach of speculative critical design, and can use it to create a better world for ourselves and future generations.

You

Write 500 words on 'how speculative critical design provokes discussion on the future and technology, but the method is not an end in itself, it enables us to make changes to design today with a focus on ethical design principles' in the style of luiza prado and matt malpass

ChatGPT

Speculative critical design is a highly effective method for exploring the impact of technology on our future and imagining new possibilities for a more sustainable and just world. However, it is important to remember that the method is not an end in itself. Rather, it is a means to an end – an approach that enables us to make changes to design today with a focus on ethical principles such as sustainability, social justice, and inclusivity.

At its core, speculative critical design is about creating provocative and often surreal design objects and scenarios that encourage us to think critically about the impact of technology on our lives. By imagining alternative futures that challenge our assumptions and push us out of our comfort zones, designers can provoke discussion and debate around the ethical implications of our current design

practices. In this way, speculative critical design helps us to confront our biases and preconceptions, and to imagine new possibilities for more sustainable and ethical design.

However, the true value of speculative critical design lies in its ability to inspire action and change in the present. By imagining alternative futures that challenge our assumptions and push us out of our comfort zones, designers can encourage us to think about how we can create a more just and sustainable world through technology. For example, a speculative critical design project might imagine a world in which all electronic devices are designed to be easily repairable and upgradeable, with components that can be easily sourced and recycled. By doing so, the designers can inspire us to take action to make this future a reality, by advocating for more sustainable and ethical design practices in the present.

Furthermore, speculative critical design has the power to create a sense of urgency around the need for change. By imagining futures that are starkly different from our current reality – for example, a world in which climate change has had catastrophic effects on the planet – designers can help us to see the urgency of the situation and the need for action. In this way, speculative critical design can help to galvanize us into taking action to create a more sustainable and just world.

However, it is important to note that speculative critical design is not a panacea for all the problems we face in the world of technology. Rather, it is one approach among many that can be used to provoke discussion, inspire action, and create change. To be effective, speculative critical design must be grounded in a commitment to ethical principles such as sustainability, social justice, and inclusivity. By foregrounding these principles in their work, designers can help to create a more just and sustainable world through technology.

In conclusion, speculative critical design is a powerful approach for exploring the impact of technology on our future and imagining new possibilities for a more sustainable and just world. However, it is important to remember that the method is not an end in itself. Rather, it is a means to an end – an approach that enables us to make changes to design today with a focus on ethical principles such as sustainability, social justice, and inclusivity. By creating provocative and often surreal design objects and scenarios, designers can provoke discussion, inspire action, and create change in the present. Ultimately, speculative critical design has the potential to be a powerful force for positive change in the world of technology – but only if it is grounded in a commitment to ethical principles and used in a thoughtful and intentional way.

You

5 fake names for speculative critical designers

ChatGPT

1. Maxine Flux
2. Otto Futura
3. Nova Vanguard
4. Lumen Etheridge
5. Neo Atlas

8 LIGHTHOUSE WORKSHOPS

8.1. Preparation Materials

Participant Information Form: [Participant] Date xx /xx/23

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

I am a PhD Research student at Central Saint Martins, UAL. I am researching the ethics of Sensory Augmentation technology design. I am going to give you information about a workshop that I am inviting you to take part in. This form includes important information about the reason for doing the workshop, what I will ask you to do, and the way I would like to use the information, should you choose to be part of the workshop. If you have any questions, or do not understand any of the information in this form, please ask me and I will clarify before you make your decision to take part or not.

Purpose

For my final PhD practice work I have created an ethical card set to be used by multi-disciplinary teams who are creating sensory augmentation devices, which enables them to reflect on their design and inspire next steps. The workshop is to test the validity of the card set I have created, identify how it benefits your team and device development/ implementation, and to gather feedback to inform a final iteration of the card deck and workshop.

Participant Selection

You, [Participant], are being invited to participate in this workshop as you are a developing a sensory device. As a researcher working in academia your participation and feedback will be highly valuable to the refinement of the card deck and workshop process.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Should you want to withdraw at any time you may do so, and any information that you have provided will not be used as part of the research.

Procedure

If you accept, you will be asked to…

- Participate in the Lighthouse workshop, either facilitated by myself or with your team running it independently. The workshop can be conducted in person or online via a group video call.
- One team member will facilitate the discussion - this can be me or I generally recommend a designer on your team.
- Each card is a particular ethical concept (e.g., Interconnectedness) and has on it 2-3 questions. For each card your team (designers, technologists, scientists etc) are asked to

Figure 373 Example Participant Information Form. Lesley-Ann Daly, 2023.

write down responses to these questions thinking about: what you are CURRENTLY doing, potential RISKS, and OPPORTUNITIES for further development.
- These can then be discussed as a team (to include all perspectives) and ACTIONS can be decided on for next steps taken or areas to further research.
- This is done with each card (not all will be relevant).
- At the end/afterwards someone in your team can consolidate the responses so that you have a clear set of ACTIONS to move forward with (this does not need to be completed during this workshop, this can be used as you see fit afterward).
- At the end of the workshop, I will ask you to complete a questionnaire about the workshop process, the cards and general feedback. This information will be used to make any adjustments to the cards and workshop for the final iteration.
- The workshop should take approximately 3hours (approximately 10minutes per card), however as it is still being tested this is only a rough estimate. Some cards may not be as relevant for you and take less time, others may take more.
- The workshop will not be recorded (audio or video), however photographs will be taken of each worksheet.
- NB. The photographs are to be used as supporting materials to illustrate the workshop sessions, the main takeaway for my research will be your answers in the questionnaire NOT your notes on the worksheets. I will be analysing your experience of the workshop not your company or the device.

Expenses

You will not be provided any incentive to participate in the research.

Risks

As the workshop is based around you discussing the design and development of your technology, sensitive information may be written down on the worksheets which you do not want publicly published. I encourage your team to go into as much detail as needed to properly address the ethical questions and to not feel limited by my presence or the documentation of the worksheets.

Therefore, all images of worksheets to be included in my research materials (thesis, talks, articles etc) will be approved by you, [Participant], before inclusion. Any IP or other sensitive information can be redacted from the images. I will also sign an NDA if required.

Benefits

The aim of this project is to create a card deck and workshop which can be used by creators of sensory augmentation technologies to reflect upon their design and identify ethical, contextual, and actionable next steps. This will hopefully benefit both those who are creating the technology and those who will be using it.

Figure 374 Example Participant Information Form. Lesley-Ann Daly, 2023.

Confidentiality

Extracts from the questionnaire may be used in my thesis, conference presentations, reports, journals, or physical work that is developed from the research. Your name and/or your team members names may be included with the research, unless previously discussed and agreed.

The workshop data will be kept for future research purposes. This data may be shared securely with other researchers, for research purposes, during and after the completion of this study. The information collected will not be given to any unauthorised persons, without obtaining your consent beforehand.

Contact Information

If you have any questions about the research, or are unclear about anything in this information form, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

This proposal has been reviewed and approval by the Research Ethics Committee at Central Saint Martins, UAL, to ensure that research participants are protected from harm. If you would like to contact UAL Research Management and Administration, please do so at this email address - researchethics@arts.ac.uk

Figure 375 Example Participant Information Form. Lesley-Ann Daly, 2023.

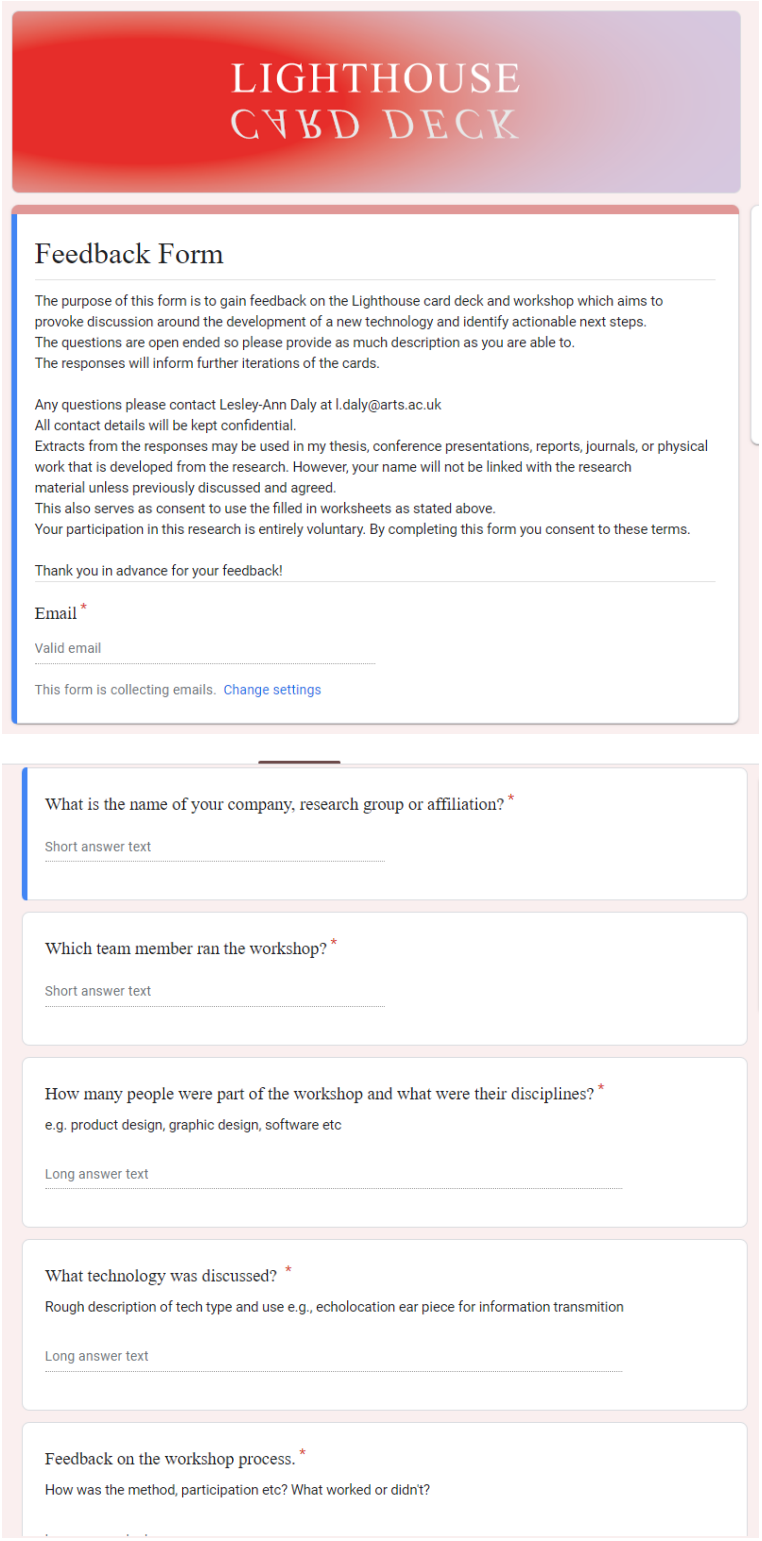


Figure 376 Screenshot of Google Form Questionnaire. Lesley-Ann Daly, 2023.

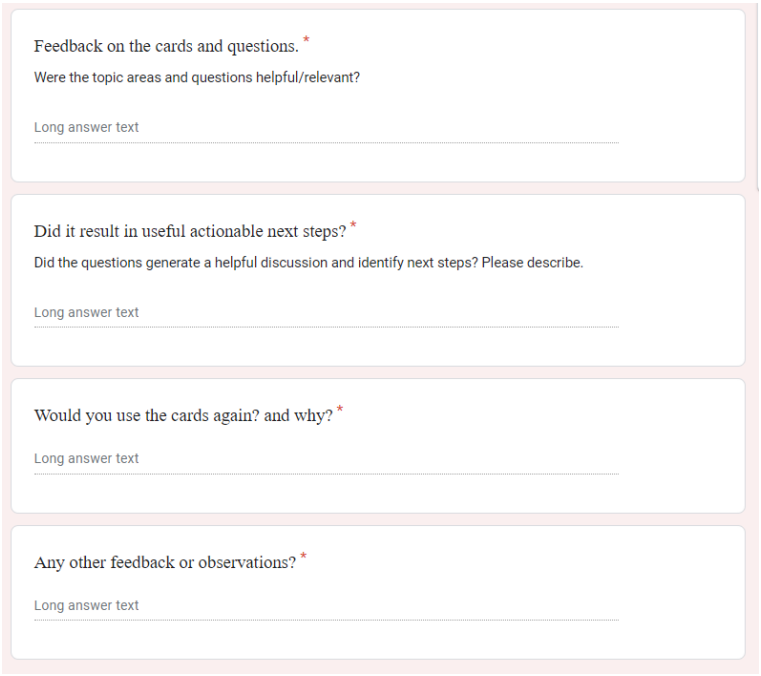


Figure 377 Screenshot of Google Form Questionnaire. Lesley-Ann Daly, 2023.

QUESTIONS	Feedback on the workshop process.	Feedback on the cards and questions.	Did it result in useful actionable next steps?	Would you use the cards again? and why?	Any other feedback or observations?
Participant 1	Too many cards. Need levels of questions or cards (like beginner/ intermediate cards) for better flow of the process.	Yes. It was helpful	Provoked useful discussion about the actual need and use of the product.	Yes. To get different perspective of information from various stakeholders.	Interesting workshop. Lot of thought process went in developing the tool.
Participant 2	We love the workshop, visual is beautiful. The process of putting ourself into a real company scenario really helps us to think and come up with possibilities. Improvement: In the beginning, we were not sure about our stand. (From what point of view to discuss) In the introduction, how we conduct the workshop could be more clear, ex. assigning roles. The order of the actions could be numbered. (Current, opportunity, hazard, action)	Yes! Interesting and expand our imagination.	Yes! The questions are our starting point to look at the current ways of addressing. It's a bit hard to imagine the next steps because the device a new technology, if this workshop is conducted in a company, it should work better.	Yes. Great categories that help us think and question.	Excellent!
Participant 3	The questions on cards are inspiring, let us have a concrete direction of thinking and discussing. We were a bit confused about the imaging your role/identity step before starting discussions. Its a bit hard to keep all the imaginary ideas and scenarios in mind at the same time thinking about answers for questions on cards.	The cards are clear and informative.	Yes, they are helpful. Just feel a bit lost when try to think about the answers from the provided perspective on the template. It takes some time to connect the cards and template together.	Not sure. It takes quite long time for one round of workshop.	If possible, turn the instruction into visualized formats might be helpful for participants to understand. For example, a short video, images, or illustrations.
Participant 4	A worksheet to align the teams understanding of how the tech works, who it's for and why would help before engaging in the card deck. Is it possible to include some mechanism to get participants to help consolidate and communicate outputs? Would be nice to have information about how the outputs of this deck will be used and how it's connected back to a wider context. Wish there were more visuals. Engage us in more ways than just words and questions. The thought process was still very theoretical and language heavy. Could participants' other intelligences be tapped on?	The questions were challenging to be mapped back to the worksheet. The small explanation text under the headers; current, opportunities, hazards, actions, made things more confusing. E.g. the explanation for current is how the question is already being addressed. But sometimes we felt like there was nothing currently being addressed. Also risks felt like a better header than hazards	Yes but they still feel abstract. Some context about how the actions will be considered, who gets to decide what to bring forward, or how can the actions generated be used in the future will be helpful	Not sure	The thought process that I was brought through as a participant relied heavily on theoretical knowledge, language, use of my head. Ethics could also be approached through emotions, heart, as well as body, gut. Would be nice for a holistic experience :)

Figure 378 Feedback from Google Form from MASD Workshop, 2023.

Participant 5	The on boarding was not very clear. Our roles were also not very clear. Also, working on night vision was a bit confusing since we do not know much about it. Maybe its better for the participants to choose a domain theyre familiar with in order to make the most use out of the workshop. It would be easier if the participants had set personas, instead of thinking what persona they could be. Setting them within a set of specific framework makes it less confusing.	It is a very interesting tool and game. However, the number of cards is overwhelming, the questions overlap. Constantly asking about the margins and the broad environment was really good and helpful for us. We were not really able to think of opportunities, but we were able to think about current, hazards and actions a lot. Word choice was a bit difficult for some participants. Maybe using easier words helps. We think each card should just have one prompt instead of several questions (the facilitator loses a bit of purpose since the cards kept going around participants due to the overload of questions).	It did generate a lot of useful discussions for our team in terms of what our own tool for our project could be.	Yes we would use them again. It made us question more than we usually would. Deepens our thinking.	The cards did direct us to risks. It seemed unbalanced between negatives and positives.
Participant 6	Need some breaks. Two hours without breaks easily make people mentally tired...	Yes easy to understand with domain related contents	Yes helpful to brainstorm the ethical issue and next-step plan to make the technology more ethical	Yes it's helpful	No
Participant 7	I might pace the activity a bit more, in terms of visuals and facilitation. For instance, how much time is spent in each card? Can the tool have steps? (Visually understand what things you do first and which you do later, like actions)	Nice design. Missing visuals and maybe too much text and a bit abstract.	Yes, i really liked the actions part. I wonder about the next steps: how do you finish the session? What actions are chosen to follow? What are the first steps of implementation? Are the people in the workshop even the most relevant to have this conversation and make decisions? How many of these questions do you address in the workshop?	I would probably be keen on using then if I was in a company with a specific product	I had some trouble understand the link between the cards and the areas in the template. Especially there was something about temporality (maybe because we are not really the designers of this eye technology), but what is the relation between the current, opportunities and hazards? For example, if I think we need a clinical trial to test our product, does it go to current (because clinical trials are run today), to opportunities (because there are clinical trials but not in this area) or to hazard (because it is actually a barrier of product launch)
Participant 8	For us, who are not working on the tech itself, it was important to establish a scenario to anchor our conversation. Perhaps the action section could be highlighted/differentiated from the other categories so its clearer thats a separate step.	They were relevant but sometimes difficult to link the questions with the categories (current, opportunity, hazard).	Yes, the thoughts placed on each category could be easily linked to future actions, especially when looking at how to promote something seen as an opportunity (so qhich action is needed to get this opportunity off the ground) or to prevent hazards. Although i foresee the need to have someone organizing and prioritizing these actions, which seems like a very important task to complete this activity.	Yes as the cards helps to approach the object from angles you might not have considered.	Thanks
Participant 9	It was really helpful and enlightening. It would help to have pre brainstorming session to envision the tool we will discuss so that we can better understand what is happening currently	Yes they were. We need clarification for some but the examples helped.	Yes they were, but our team focused more on the other parts then the actionable ones	Yes I would to expand the way I would approach a projects	Thank you for your time and effort!

Figure 379 Feedback from Google Form from MASD Workshop, 2023.

Figure 380 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

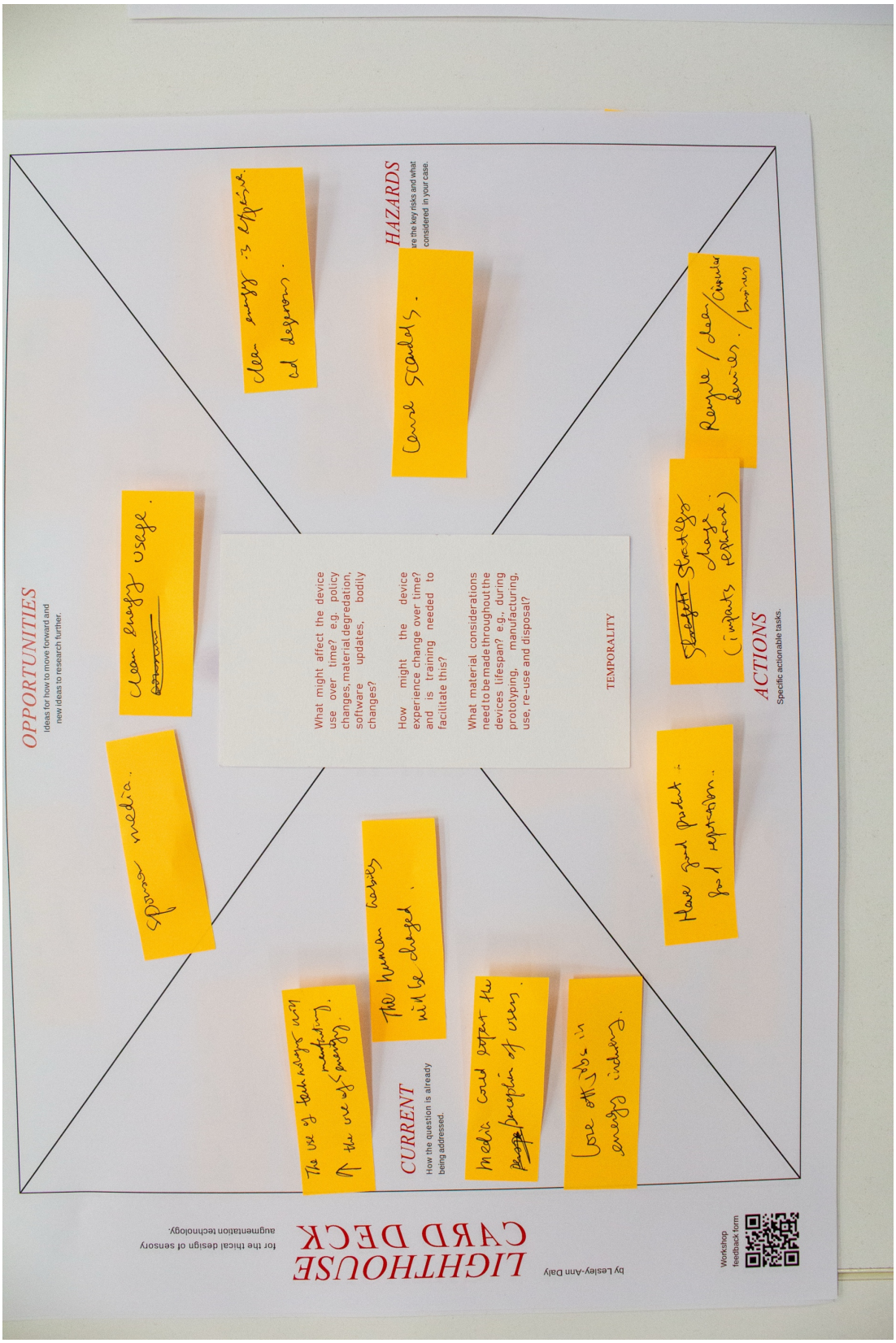


Figure 381 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 382 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 383 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 384 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 385 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 386 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 387 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 388 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

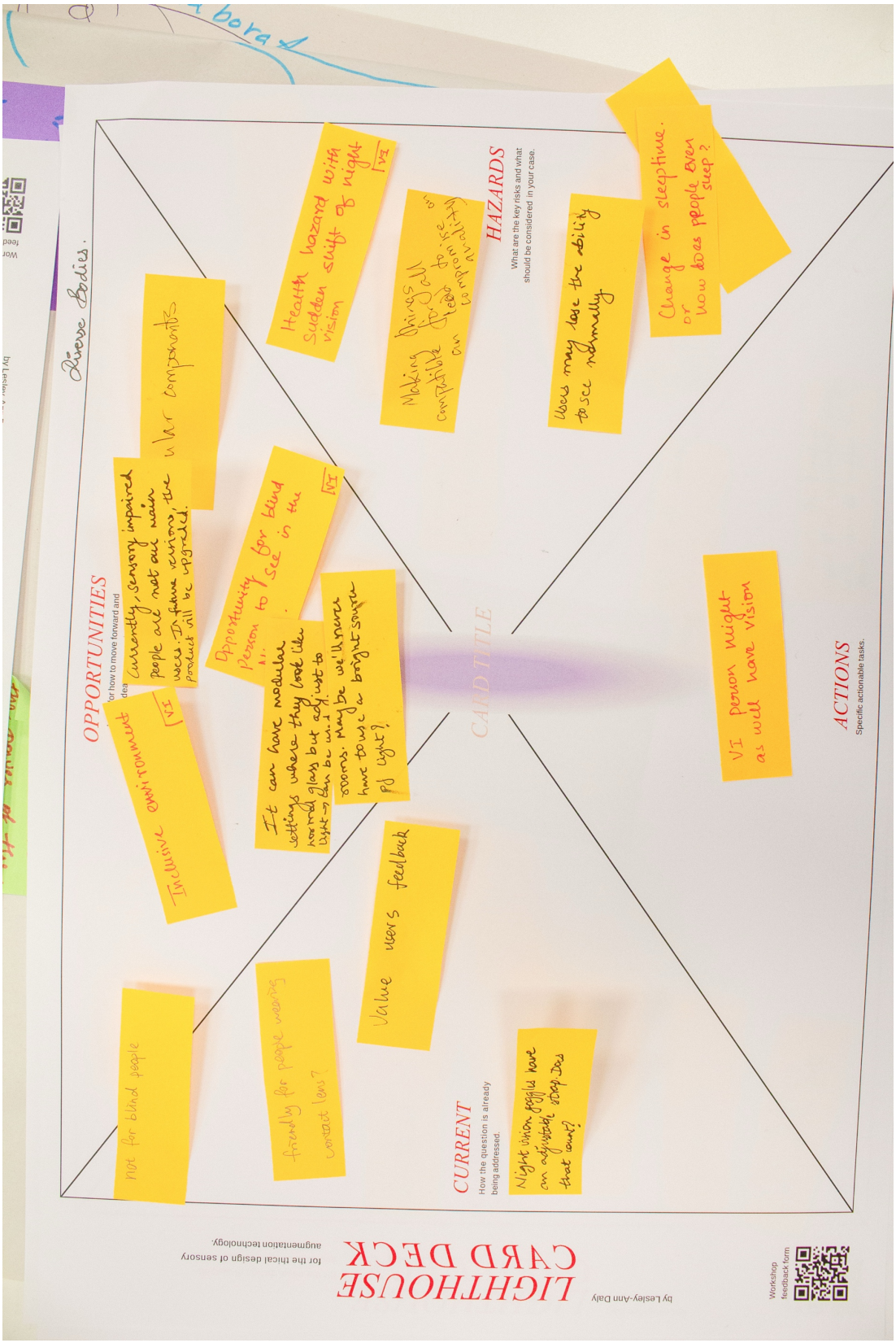


Figure 389 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

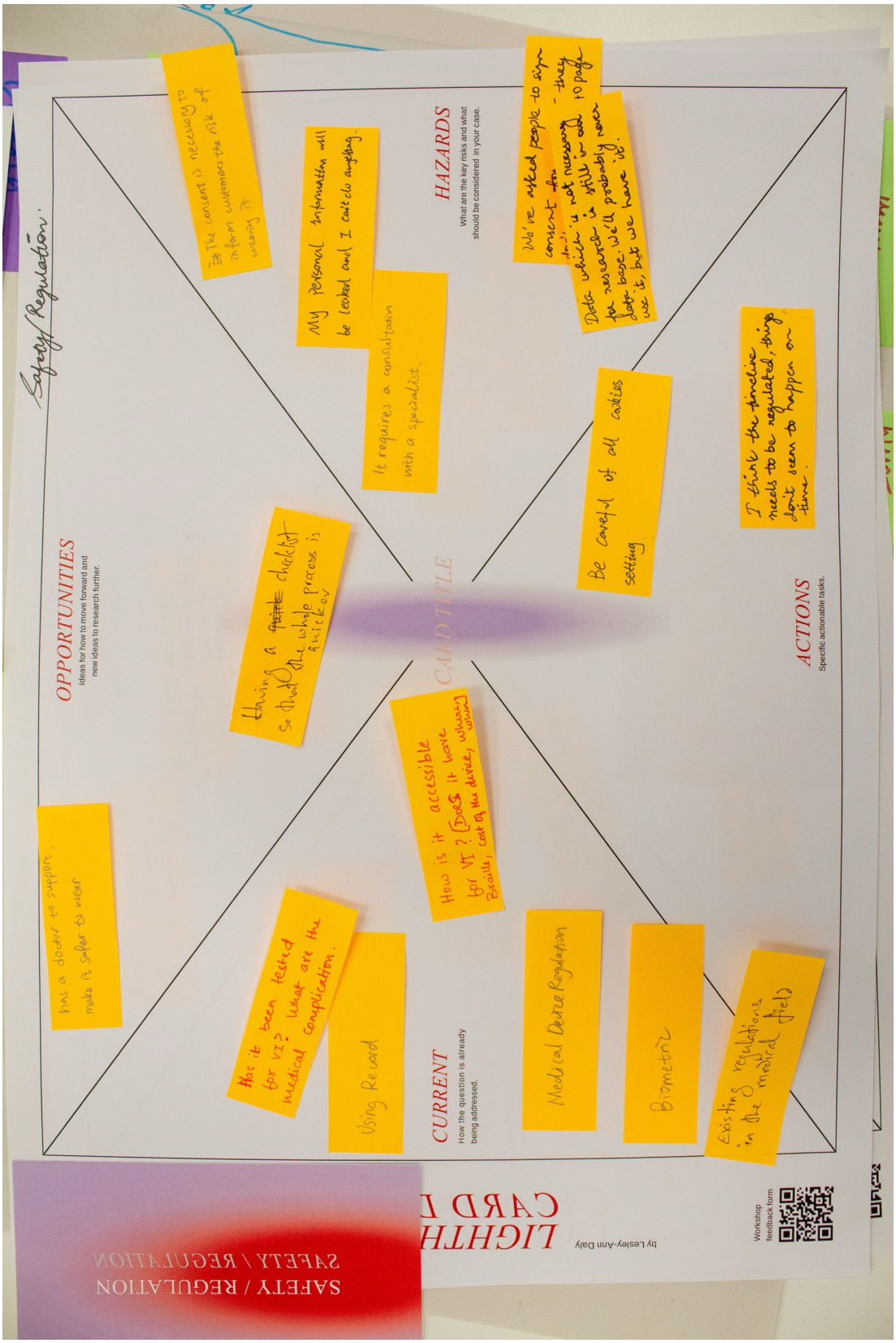


Figure 390 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

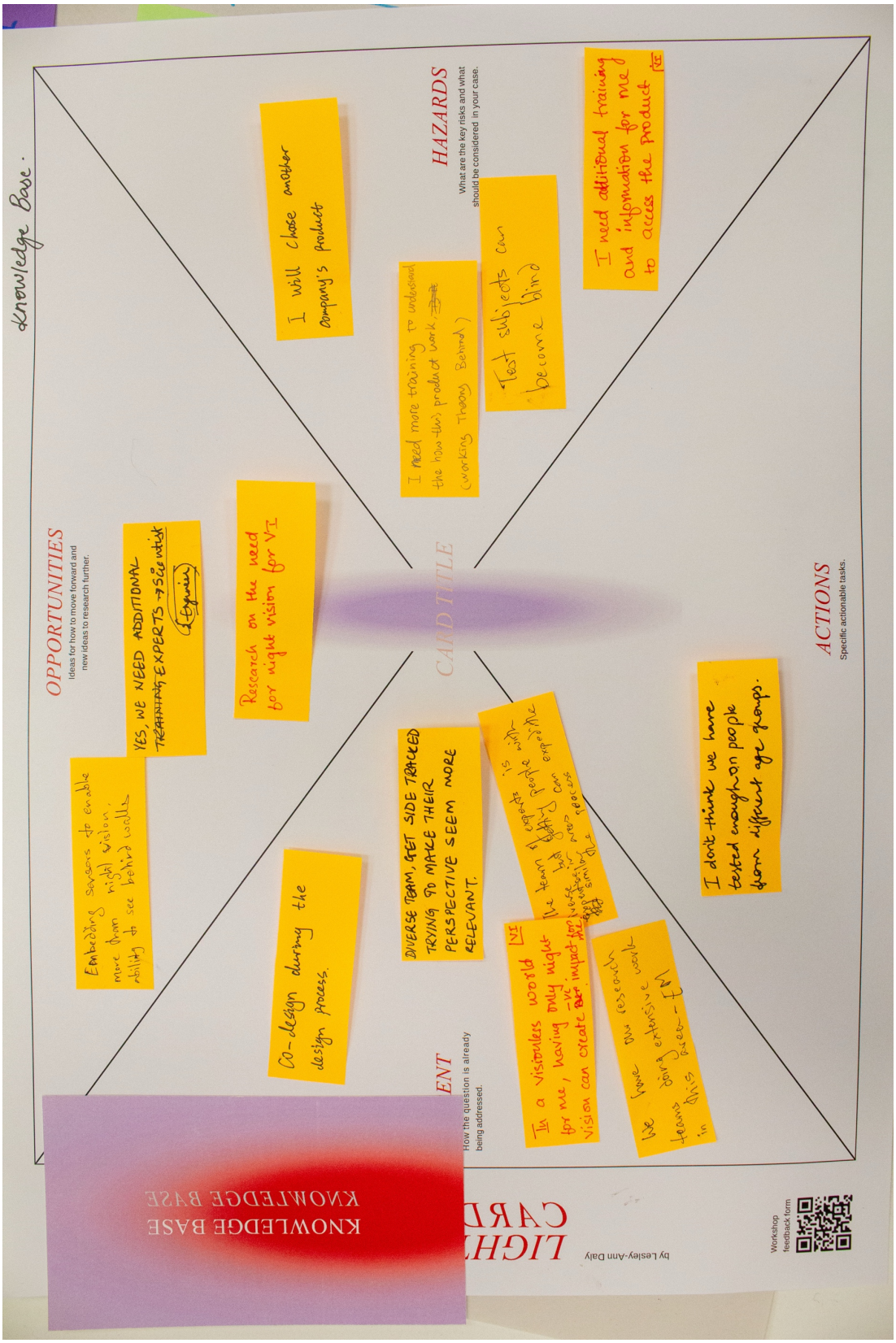


Figure 391 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 392 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

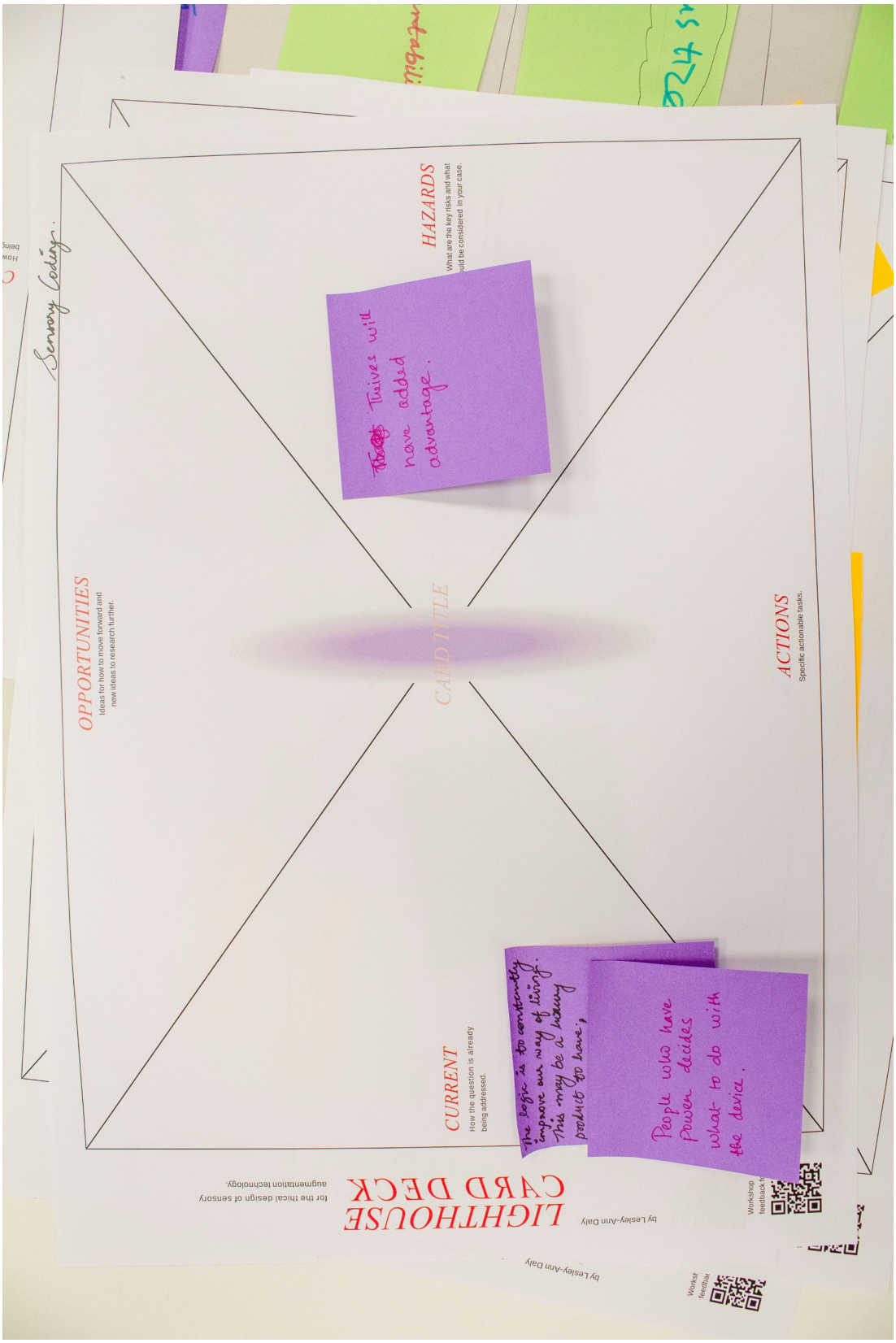


Figure 393 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 394 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

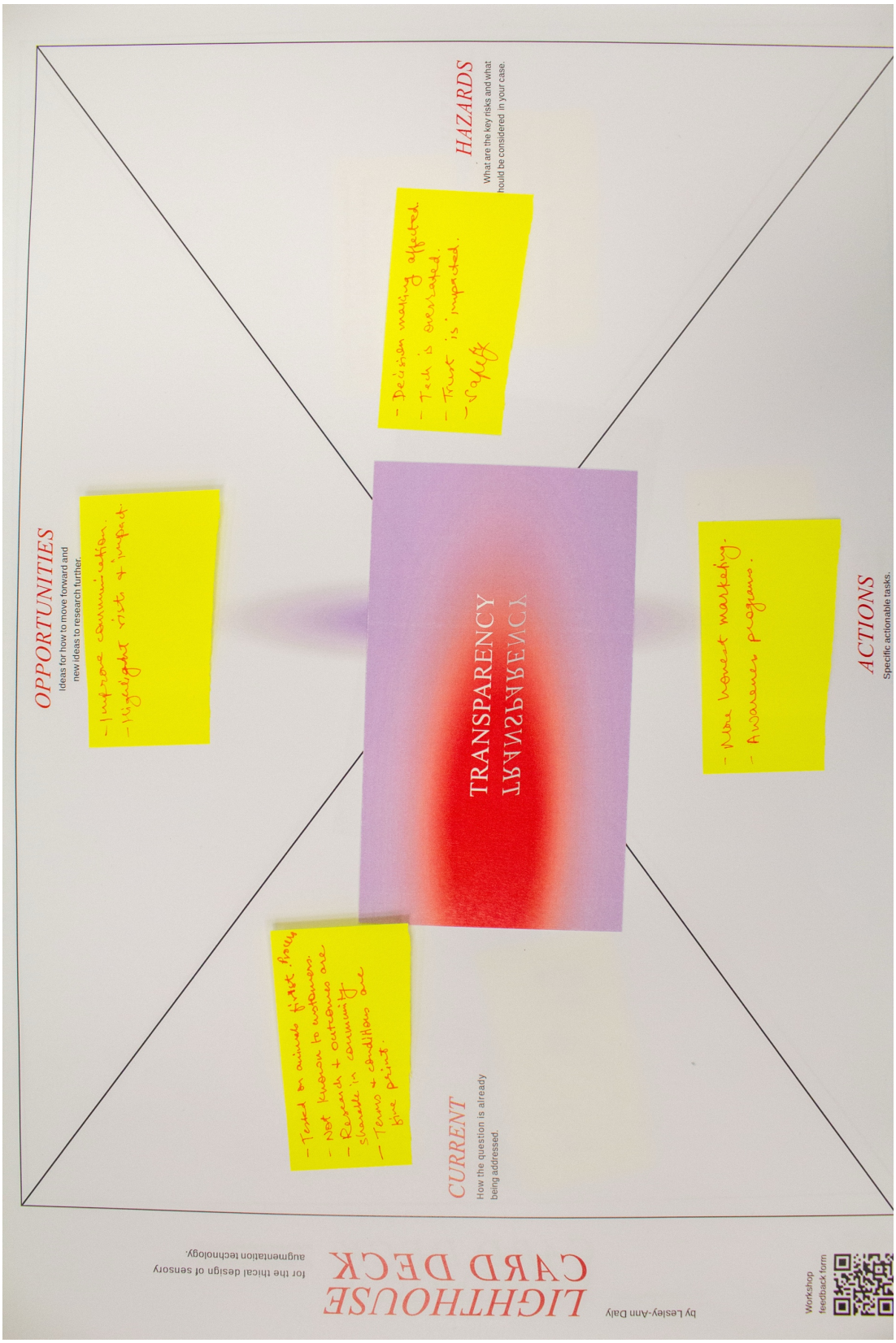


Figure 395 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 396 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

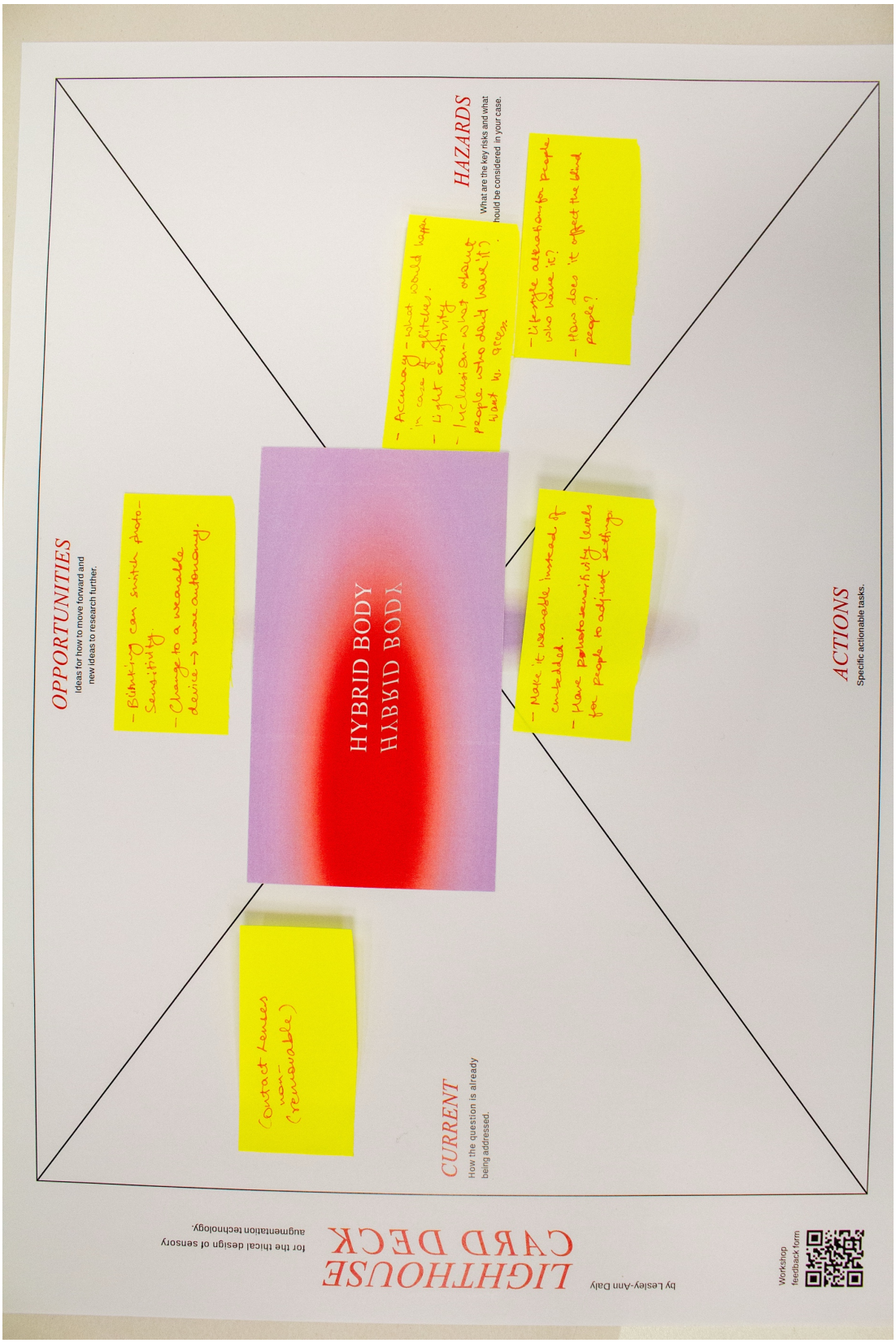


Figure 397 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 398 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 399 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 400 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 401 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 402 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 403 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 404 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 405 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 406 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

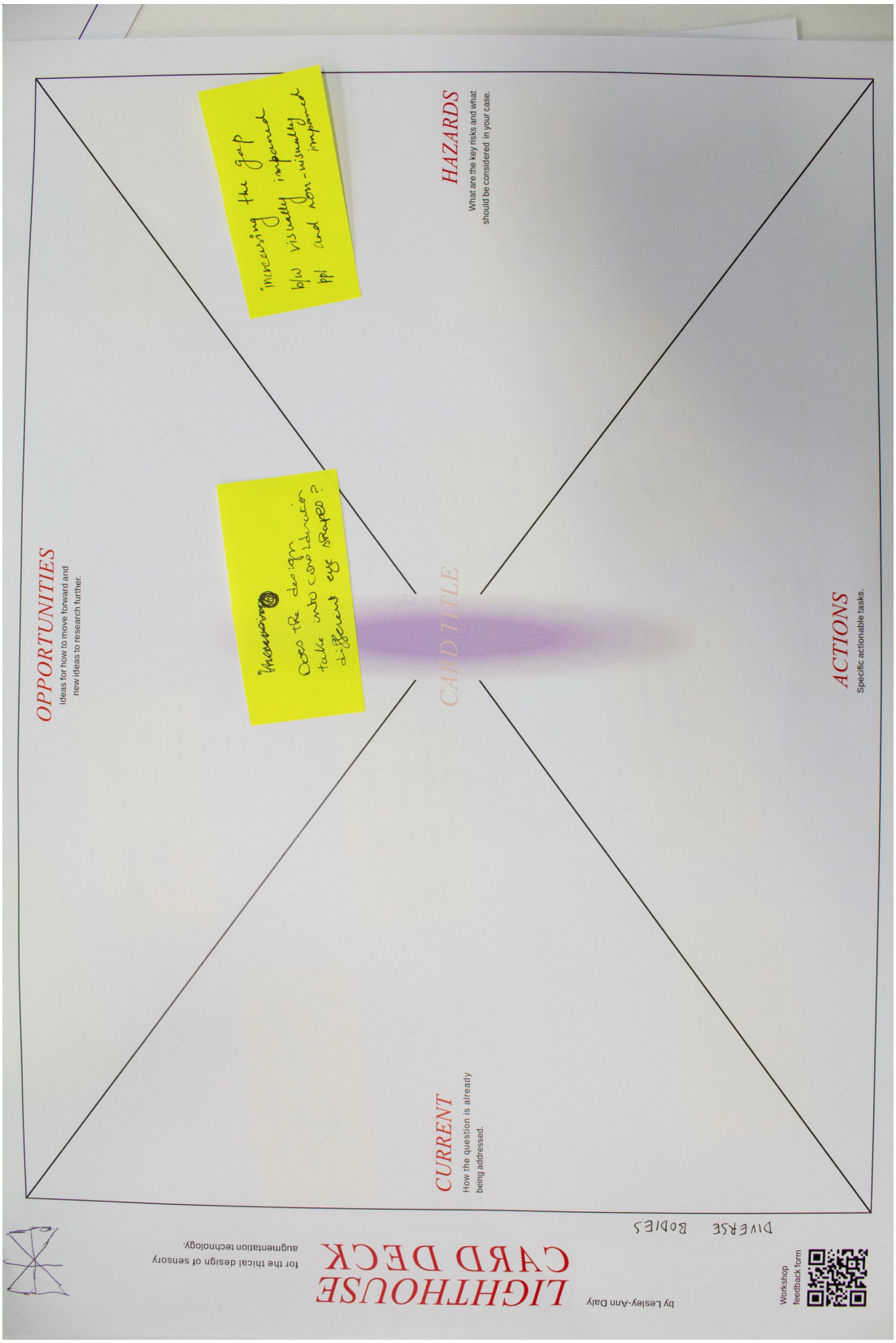


Figure 407 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 408 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

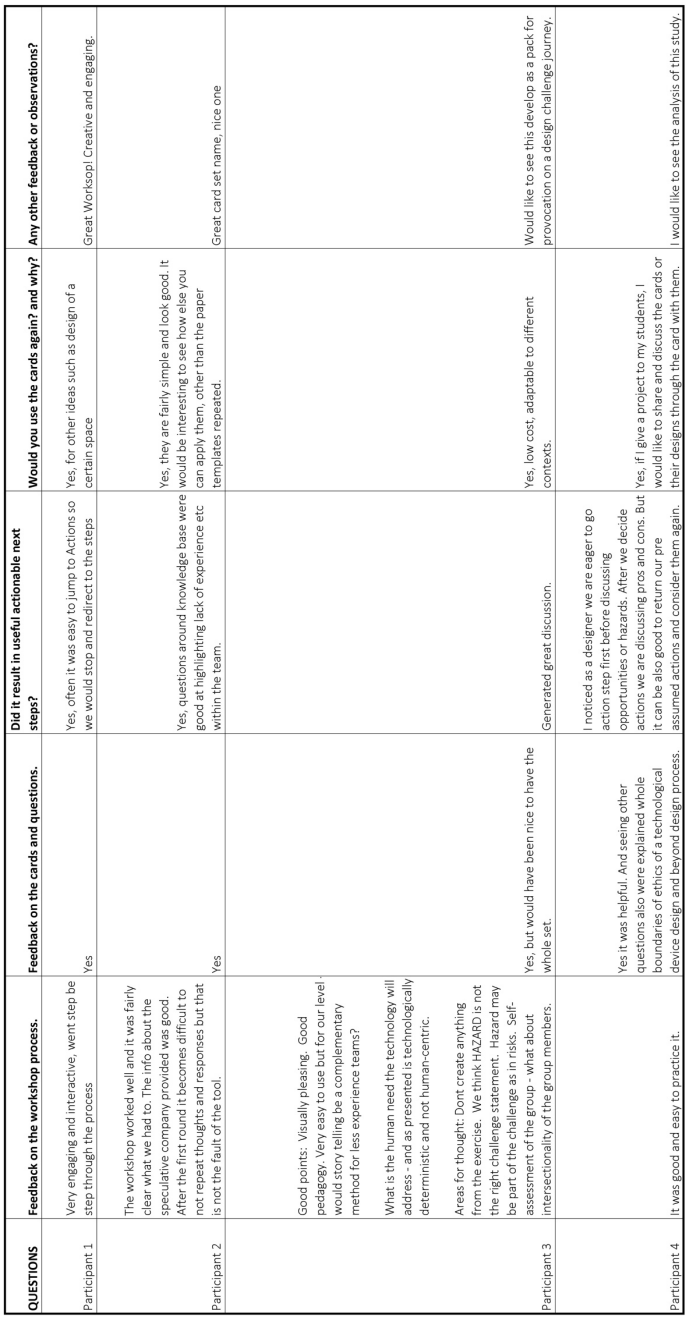
Figure 409 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 410 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 411 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

Figure 412 Lighthouse Card Deck Worksheet from MASD Workshop, 2023.

8.3. Design Conference, Lisbon



QUESTIONS	Feedback on the workshop process.	Feedback on the cards and questions.	Did it result in useful actionable next steps?	Would you use the cards again? and why?	Any other feedback or observations?
Participant 1	Very engaging and interactive, went step be step through the process	Yes	Yes, often it was easy to jump to Actions so we would stop and redirect to the steps	Yes, for other ideas such as design of a certain space	Great Worksop! Creative and engaging.
Participant 2	The workshop worked well and it was fairly clear what we had to. The info about the speculative company provided was good. After the first round it becomes difficult to not repeat thoughts and responses but that is not the fault of the tool.	Yes	Yes, questions around knowledge base were good at highlighting lack of experience etc within the team.	Yes, they are fairly simple and look good. It would be interesting to see how else you can apply them, other than the paper templates repeated.	Great card set name, nice one
Participant 3	Good points: Visually pleasing. Good pedagogy. Very easy to use but for our level would story telling be a complementary method for less experience teams? What is the human need the technology will address - and as presented is technologically deterministic and not human-centric. Areas for thought: Dont create anything from the exercise. We think HAZARD is not the right challenge statement. Hazard may be part of the challenge as in risks. Self-assessment of the group - what about intersectionality of the group members.	Yes, but would have been nice to have the whole set.	Generated great discussion.	Yes, low cost, adaptable to different contexts.	Would like to see this develop as a pack for provocation on a design challenge journey.
Participant 4	It was good and easy to practice it.	Yes it was helpful. And seeing other questions also were explained whole boundaries of ethics of a technological device design and beyond design process.	I noticed as a designer we are eager to go action step first before discussing opportunities or hazards. After we decide actions we are discussing pros and cons. But it can be also good to return our pre assumed actions and consider them again.	Yes, if I give a project to my students, I would like to share and discuss the cards or their designs through the card with them.	I would like to see the analysis of this study.

Figure 413 Feedback from Google Form, Design Conference Workshop, 2023.

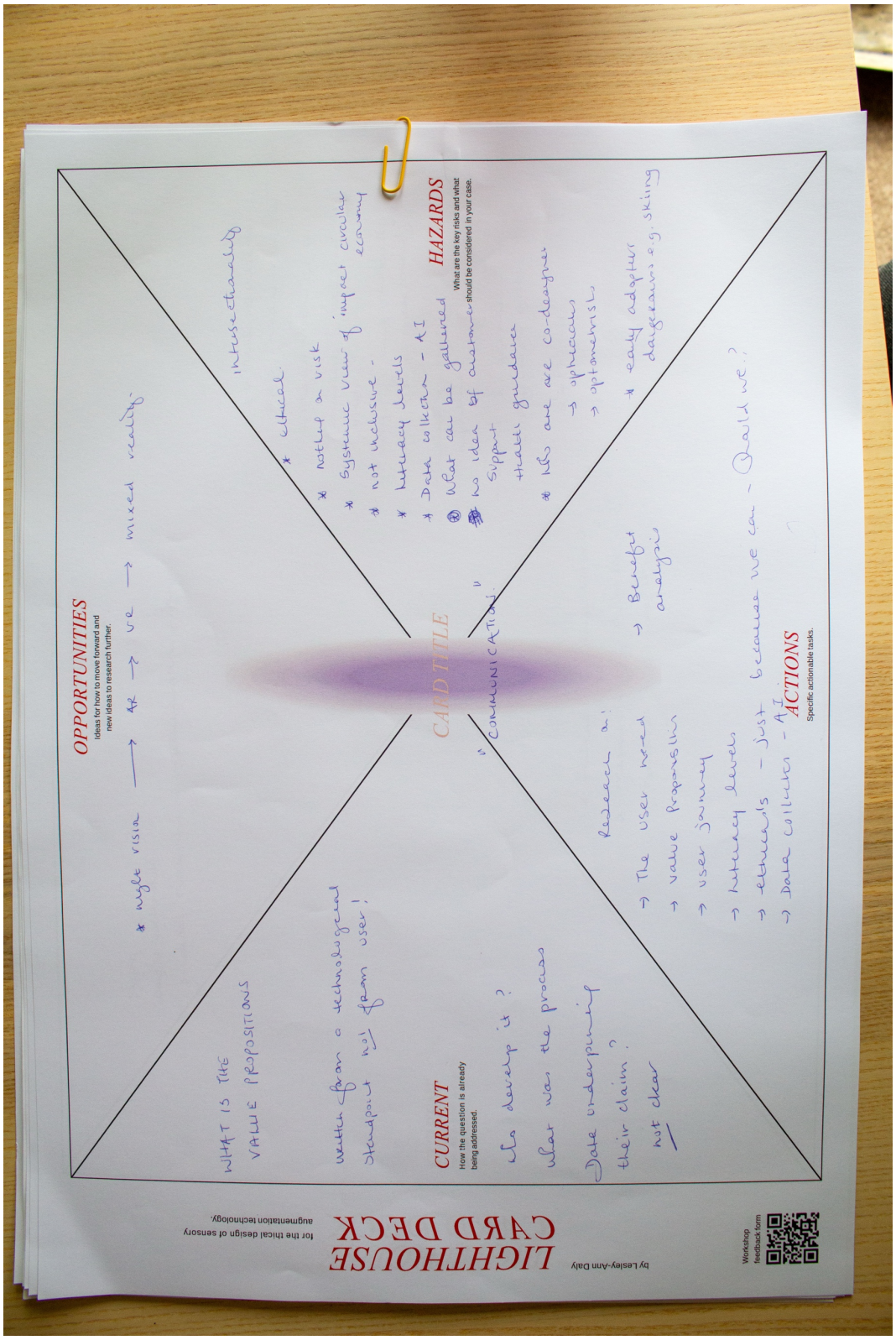


Figure 414 Lighthouse Card Deck Worksheet from Design Conference Workshop, 2023.

Figure 415 Lighthouse Card Deck Worksheet from Design Conference Workshop, 2023..

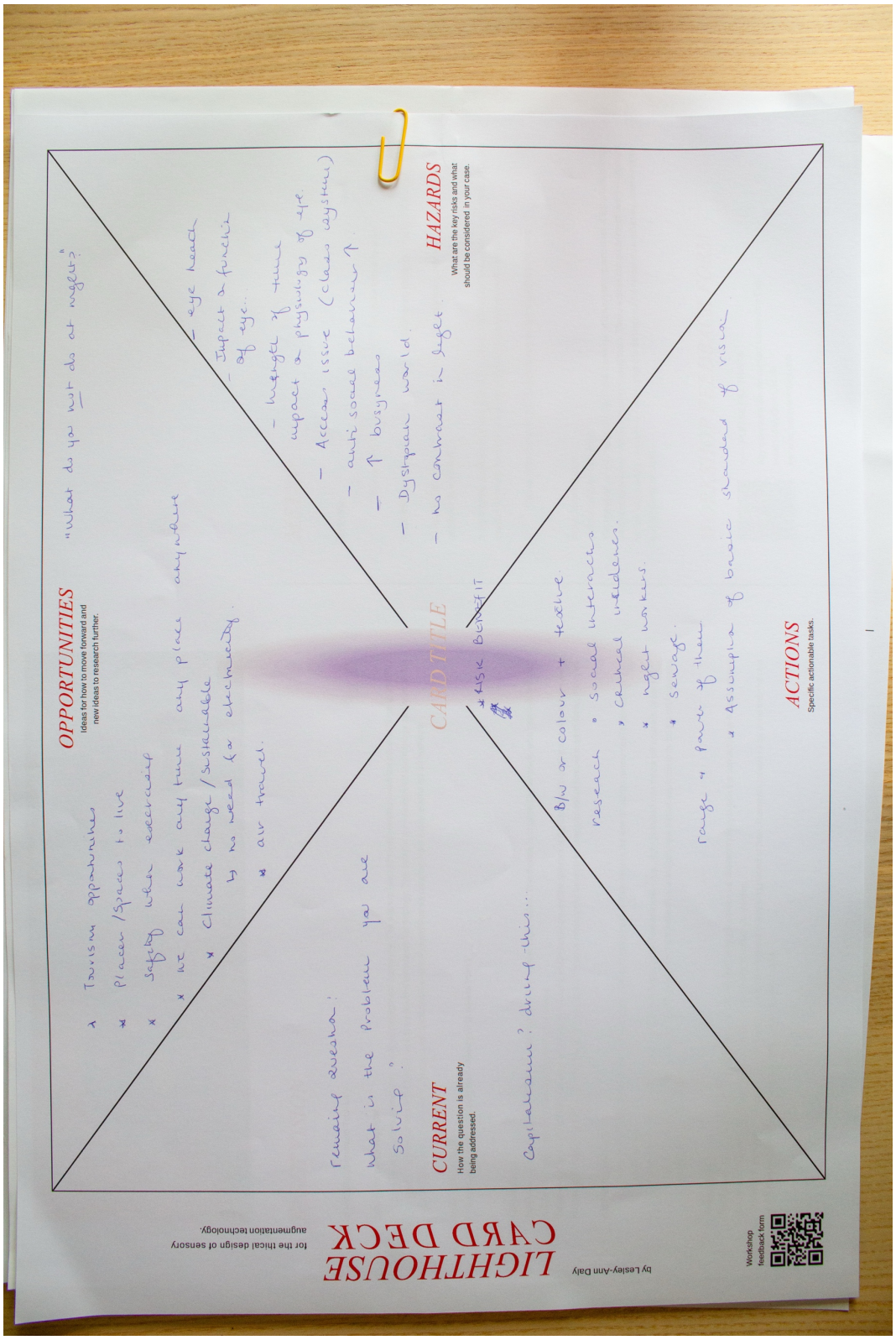


Figure 416 Lighthouse Card Deck Worksheet from Design Conference Workshop, 2023.

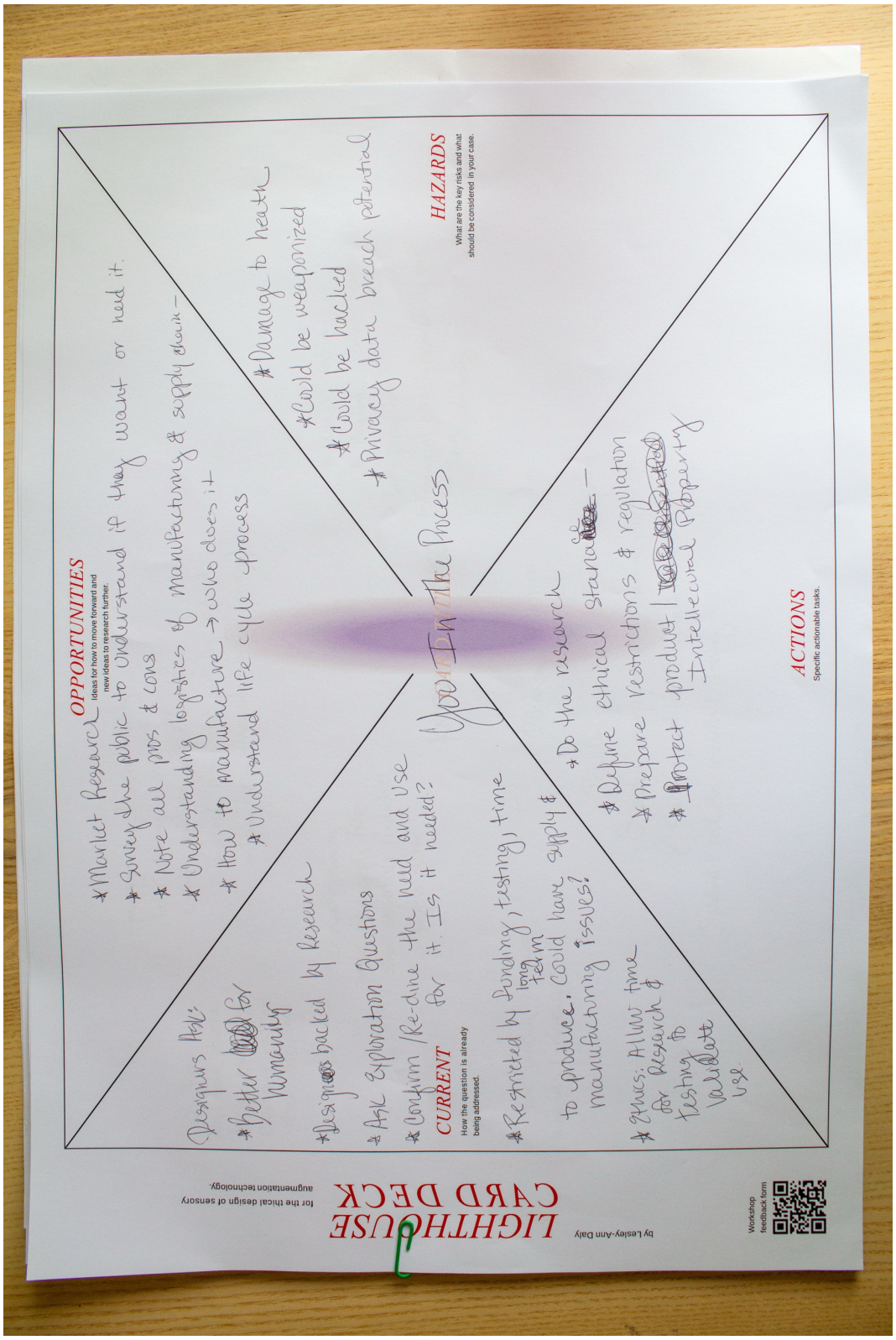


Figure 417 Lighthouse Card Deck Worksheet from Design Conference Workshop, 2023.

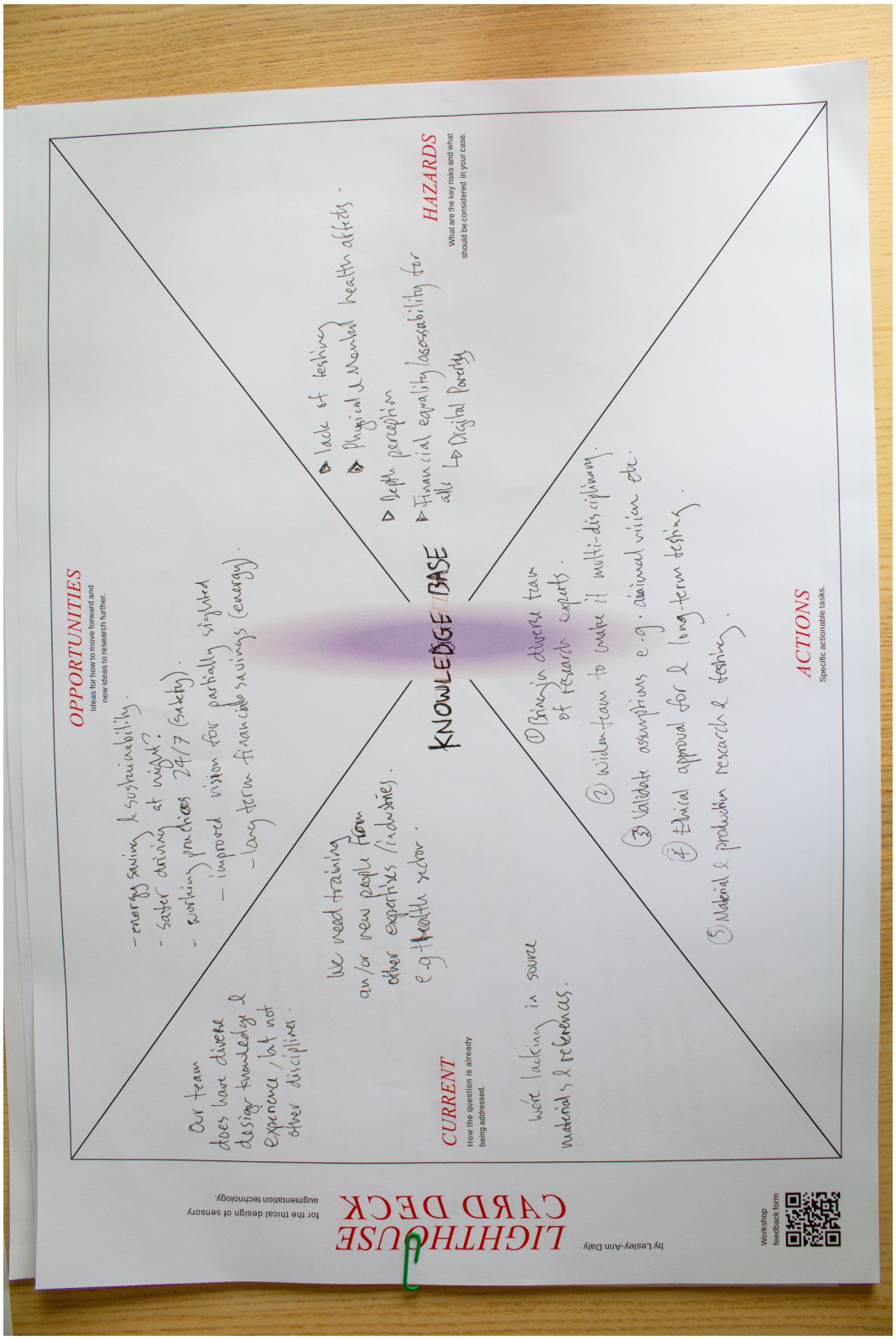


Figure 418 Lighthouse Card Deck Worksheet from Design Conference Workshop, 2023.

Figure 419 Lighthouse Card Deck Worksheet from Design Conference Workshop, 2023..

Consent Form: Dr. Giles Hamilton-Fletcher Date 17 /05 /23

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 17/5/23 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by you, Dr. Giles Hamilton-Fletcher, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Giles Hamilton-Fletcher	Jun 18, 2023	Lily Hamilton-Fletcher
Participant Name	Date	Signature
Lesley-Ann Daly	18/6/23	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 420 Participant Consent Form Signed by Dr Giles Hamilton-Fletcher, 2023

QUESTIONS	Feedback on the workshop process.	Feedback on the cards and questions.	Did it result in useful actionable next steps?	Would you use the cards again? and why?	Any other feedback or observations?
Participant 1	Exploring questions with respect to the App was useful and sparked new thoughts or reminded me of thoughts I have had over the course of the App's development. So it works in terms of expanding thoughts and refreshing them. I completed this as a solo developer with a digital sheet, and I would consider myself a detail-orientated writer. Under these circumstances this took a lot longer than the 10 minutes were card specified, and as a solo-writer the effort and time required to complete a card took longer than a team would. An alternative for solos would perhaps make more sense, as after completing 2 cards I realized the total time required would be closer to a full day, rather than a couple of hours. This initially impacted my motivation since time dedicated to this aspect competes against development/testing/writing time required for the project. A smaller version of this (say 5 cards), where the cards have minimal overlap, might be good as a quicker time efficient primer for people in a similar situation to myself. The style of input as typing got increasingly tiring. I believe that a verbal input would both be easier and be closer to mapping out 'trains of thought' that the questions are trying to elicit. Similarly, generative AI approaches such as ChatGPT might be able to customize questions to reflect the users' specific project, and turn this experience into a more conversational style.	Sensory coding was the most directly relevant to my project, but they also expanded my thought process the least because I regularly think of these questions anyway. The most useful were prompting questions that were 1 step away from what I normally consider in my work. For instance, 'knowledge base' is important for me because I need to consider my limitations and what assistance would be the most helpful or crucial for the success of the project as a whole. The others that were the most useful were diverse bodies, risks/benefits, you in the process, and hybrid mind.	The consideration of the risks and benefits of expanding / focusing the project was important in understanding that not all expansions are pure positives and that simplicity can have several ethical/privacy benefits. The main benefits to next steps are identifying how clarification of things that the users will need to know to have a good user experience and the team/development next steps to fulfil the projects' potential.	I think I would consider using the cards again on a different project with a team. For different solo projects I think I would select a smaller amount of cards. I am most likely to revisit my answers to the cards to help flesh out a range of thoughts when it comes to describing my project in a long-form format to new people.	Lowering the effort barrier is probably the most important aspect to change. I would like to engage with this in terms of a shorter conversational format.

Figure 421 Feedback from Google Form for Dr Giles Hamilton-Fletcher Workshop, 2023.

Figure 422 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

TRANSPARENCY



Are you transparent about your research, production methods and outcomes?

Are you sharing research to foster knowledge in the field and community?

Is the information provided to the community accurate and truthful? e.g., does not exhaggerate effects or benefits.

TRANSPARENCY

OPPORTUNITIES
Ideas for moving forward, aspirational

Continue to develop App in response to user feedback, gather data to compare with other similar Apps.

Publish findings from user feedback. Publicize in relevant user communities.

Update App more regularly on GitHub. Move towards preparing for iPhone AppStore release, look into Android version support opportunities.

The code for the iPhone App is provided as open-source on GitHub to share with the developer community. The AI model used in our technology is publicly available and pre-exists the research.

CURRENT
What are you already doing to address this?

Our development of future AI-models is publicly published as scientific research to share with the developer community. The design of the model is based on prior research with the core community of users.

Overselling what situations the App is suitable for or what users it might be suitable for (e.g. users who are less tech savvy).

Use in unsafe situations despite warnings.

RISKS
What are the main risks?

Human research involves recruiting from the core community and involving them in the design process for the technology.

Feedback from users keeps expectations around the technology grounded and realistic.

Develop a realistic blurb that captures the abilities but most importantly the limitations of the App.

Go for public scientific paper describing the App, update GitHub more often to increase App code accessibility, and keep involving the end user community in design decisions.

ACTIONS
Next steps

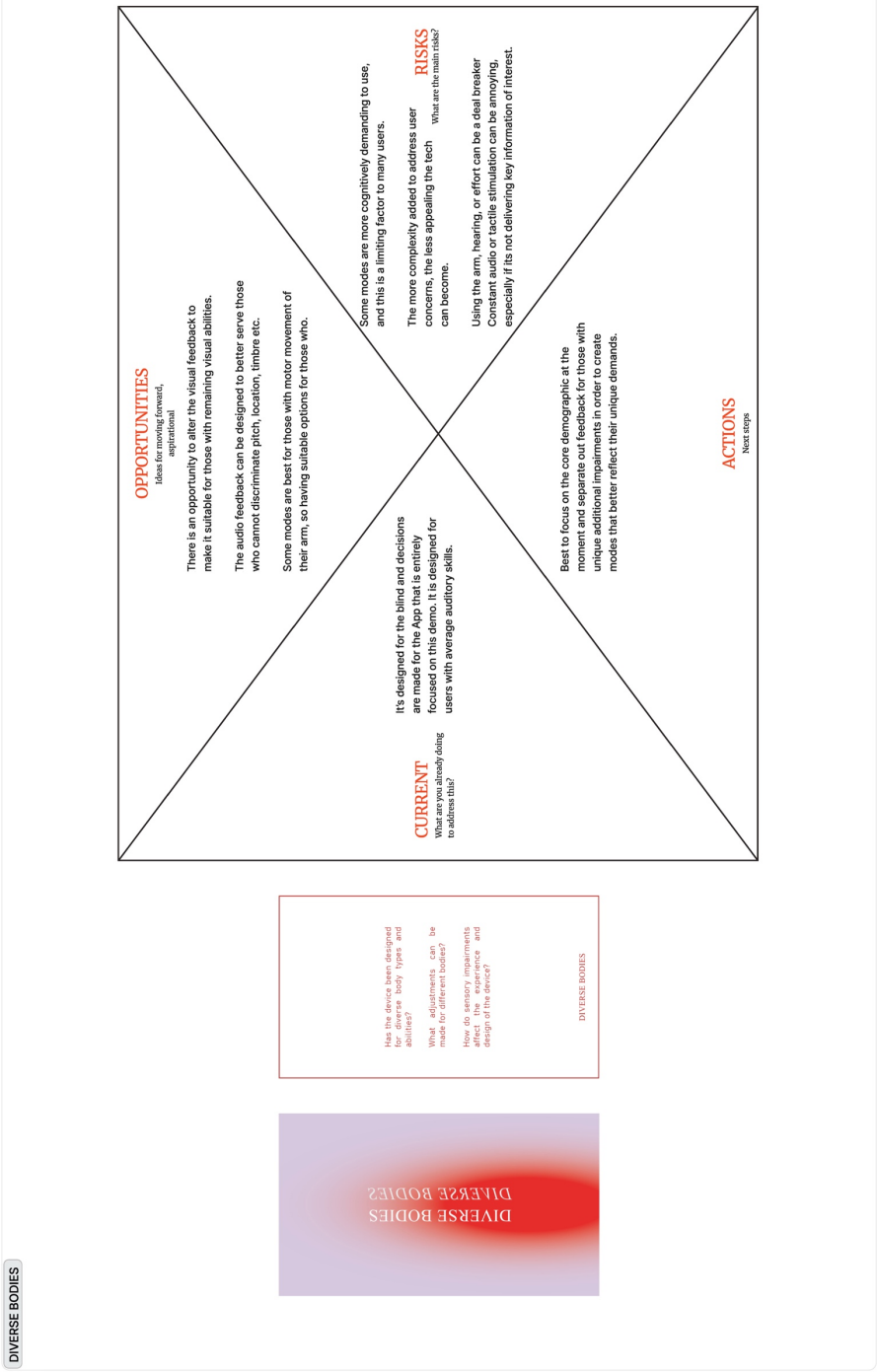


Figure 423 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

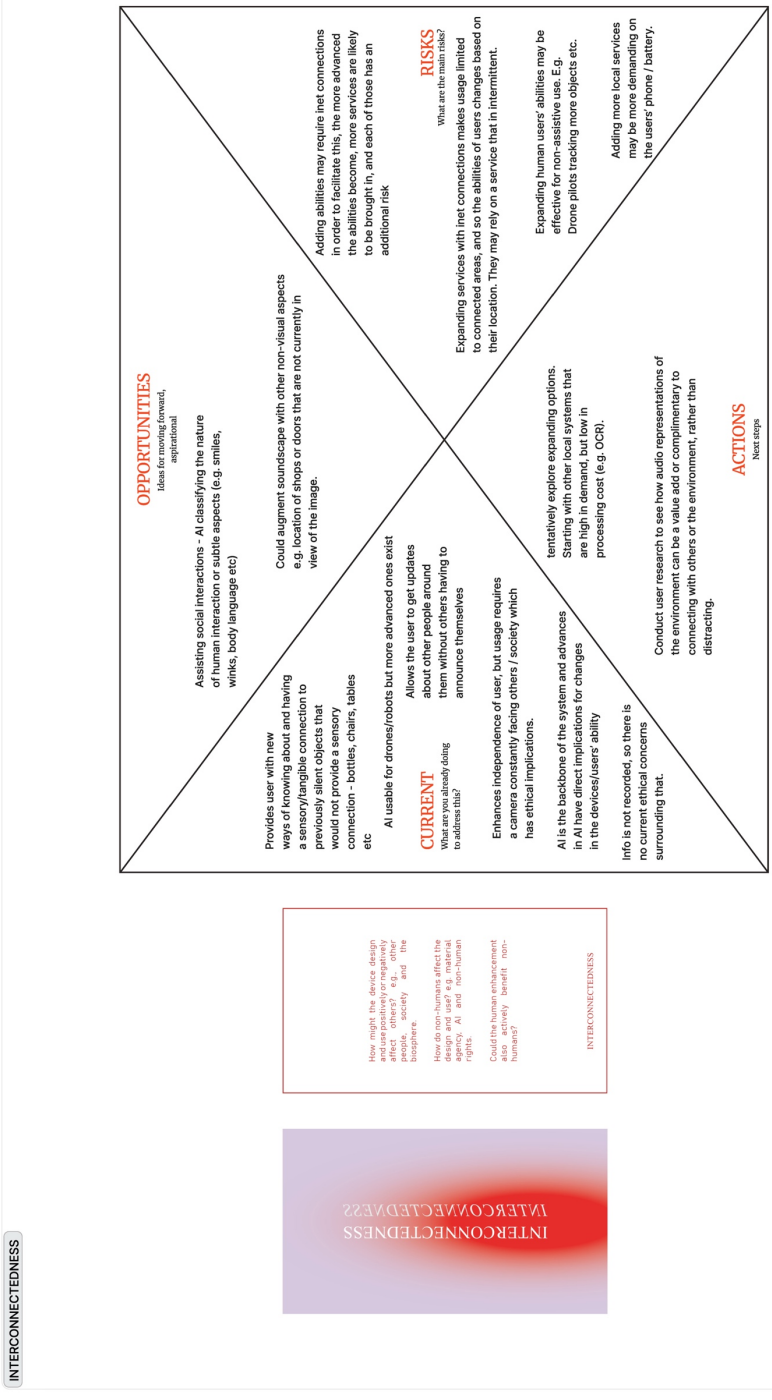


Figure 424 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

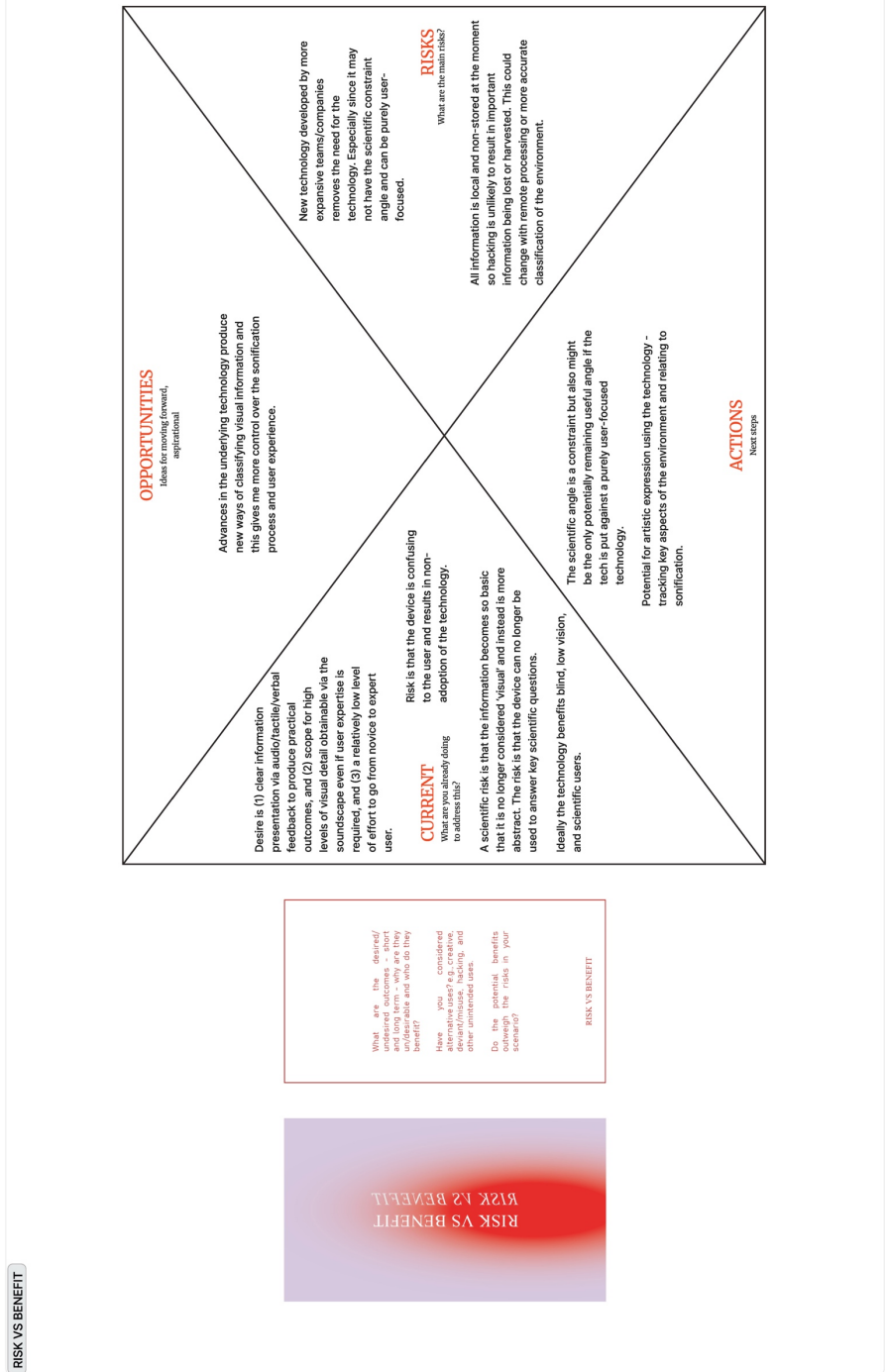


Figure 425 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

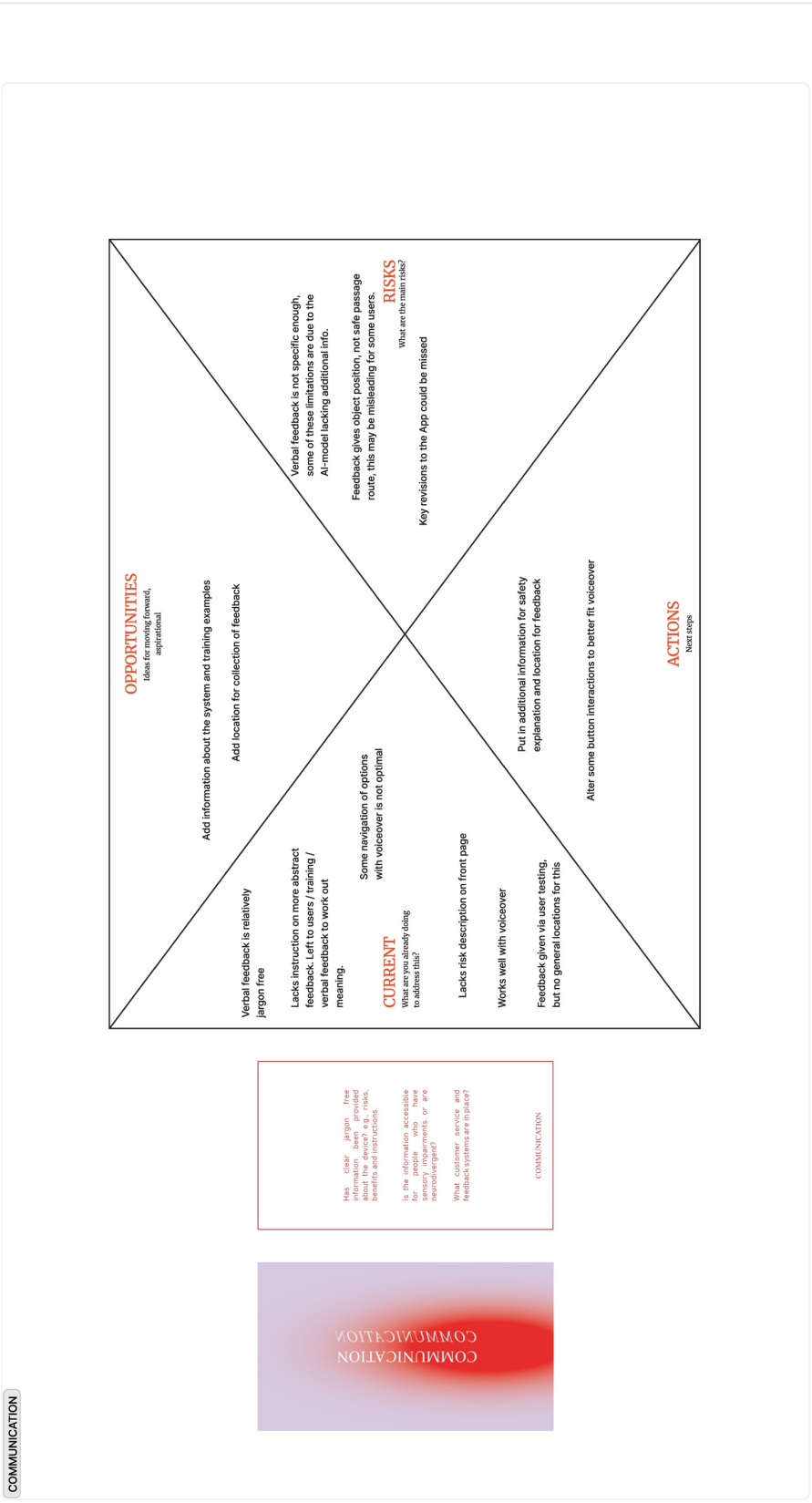
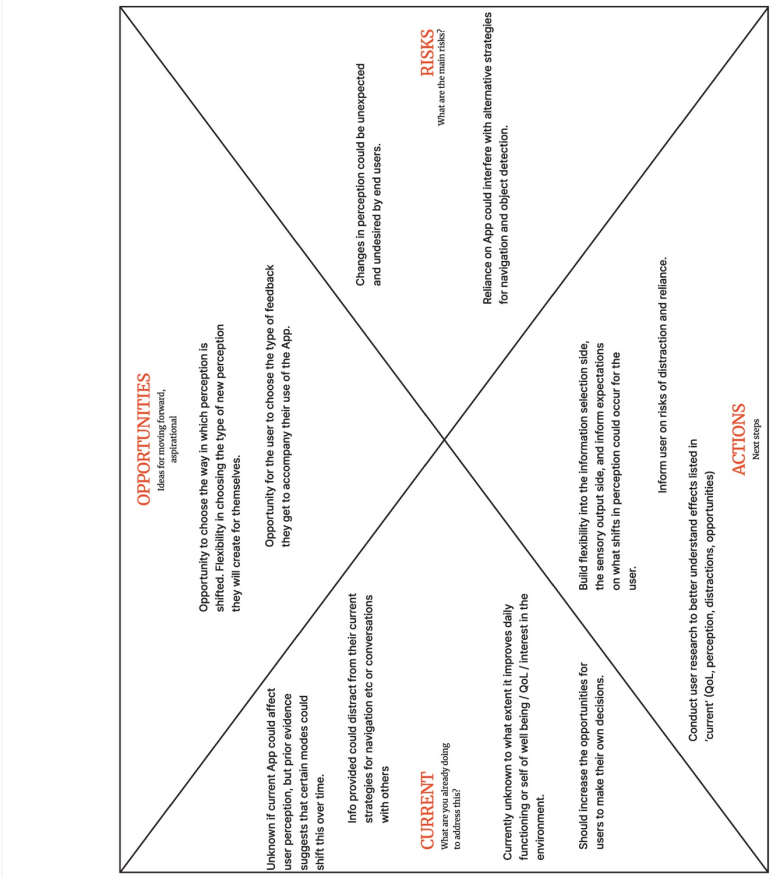
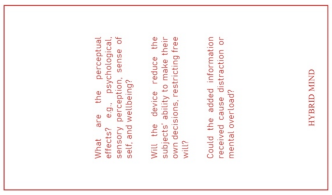


Figure 426 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.







HYBRID MIND

Figure 427 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

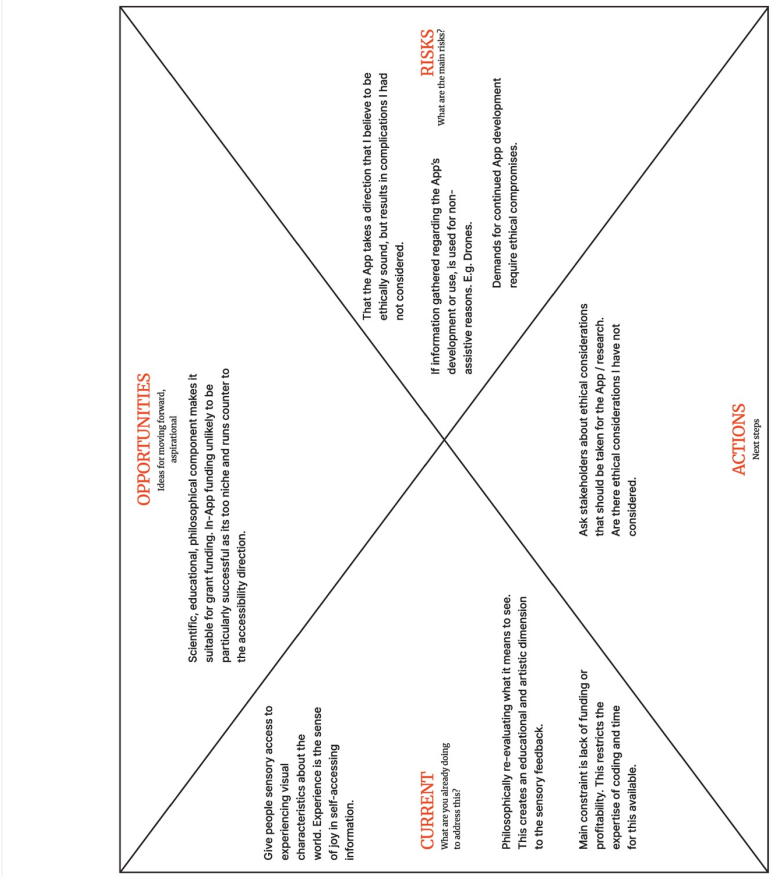


Figure 428 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

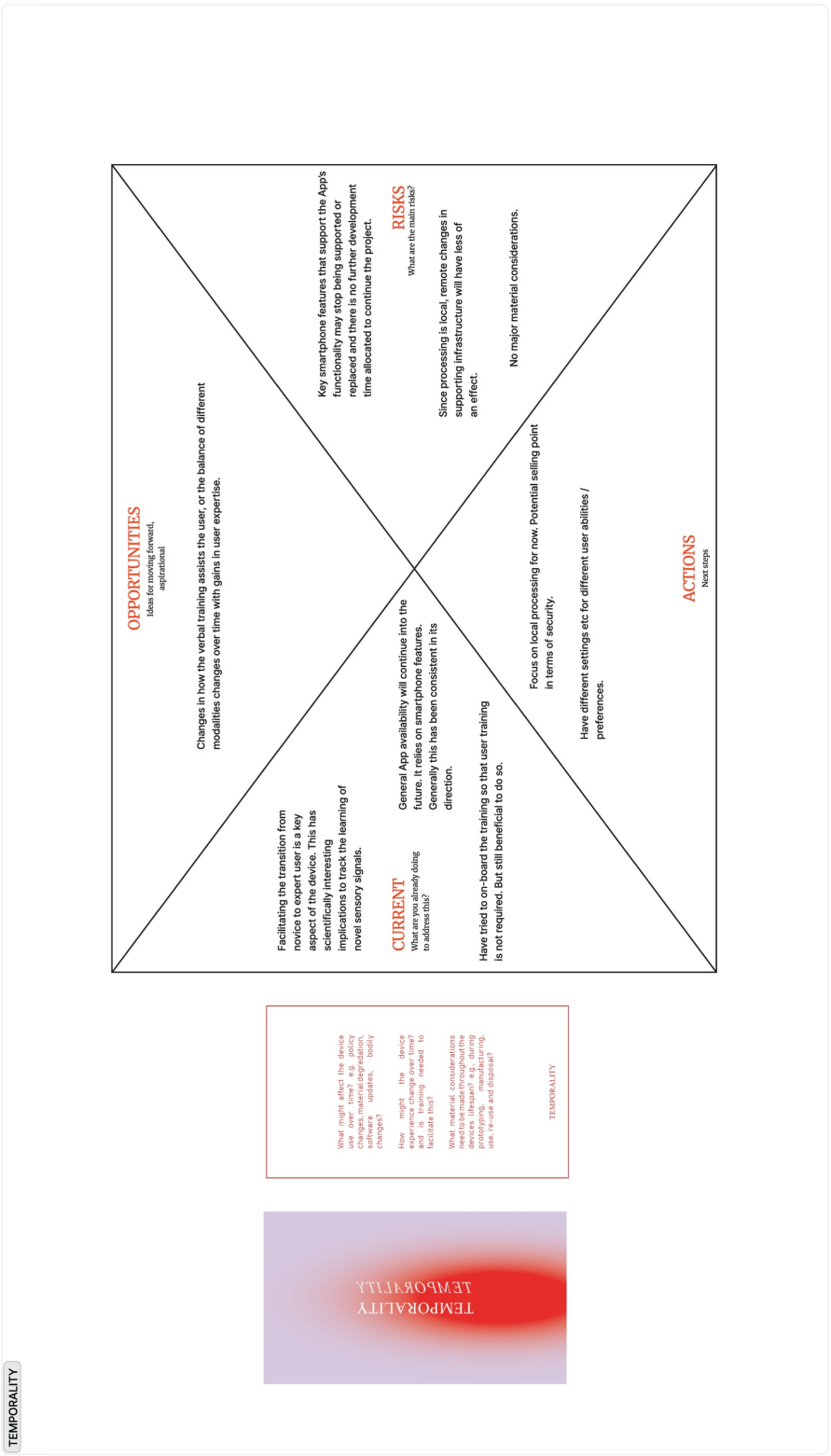


Figure 429 *Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.*

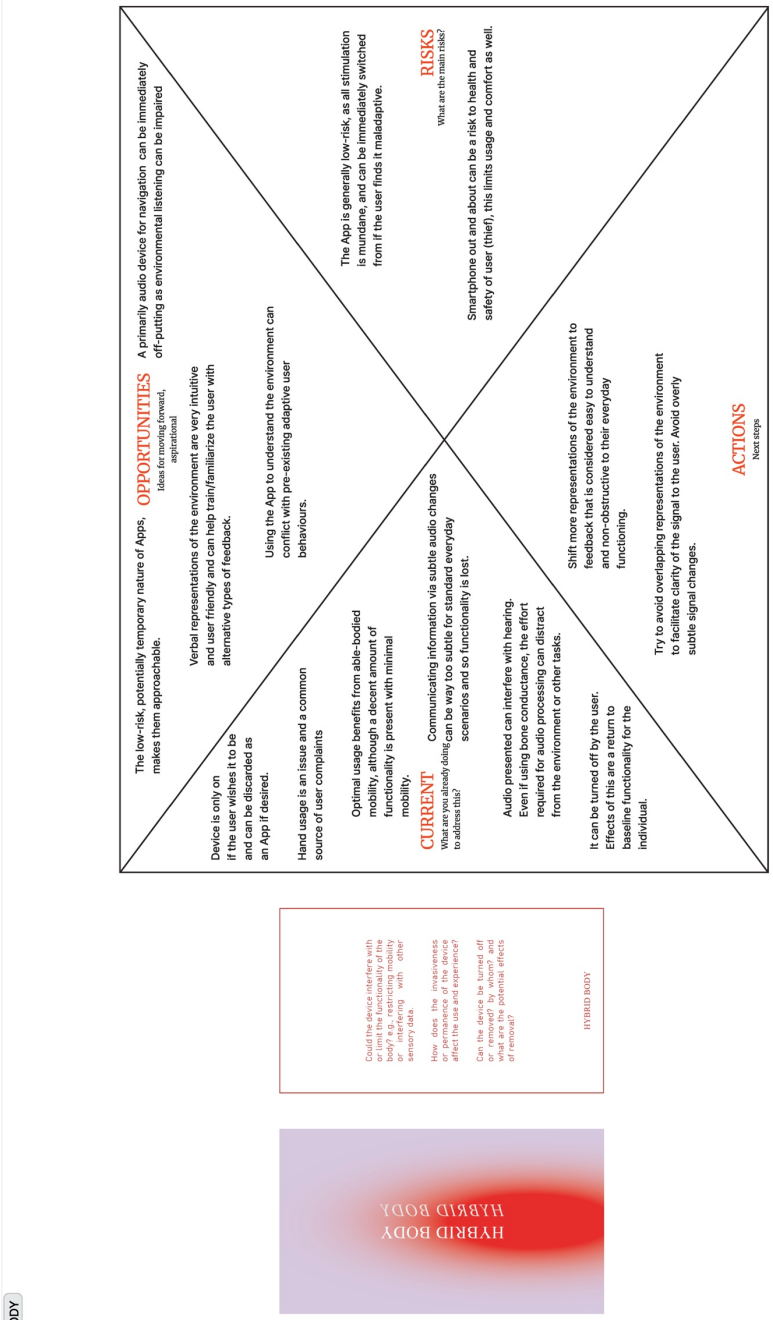


Figure 430 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

Figure 431 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

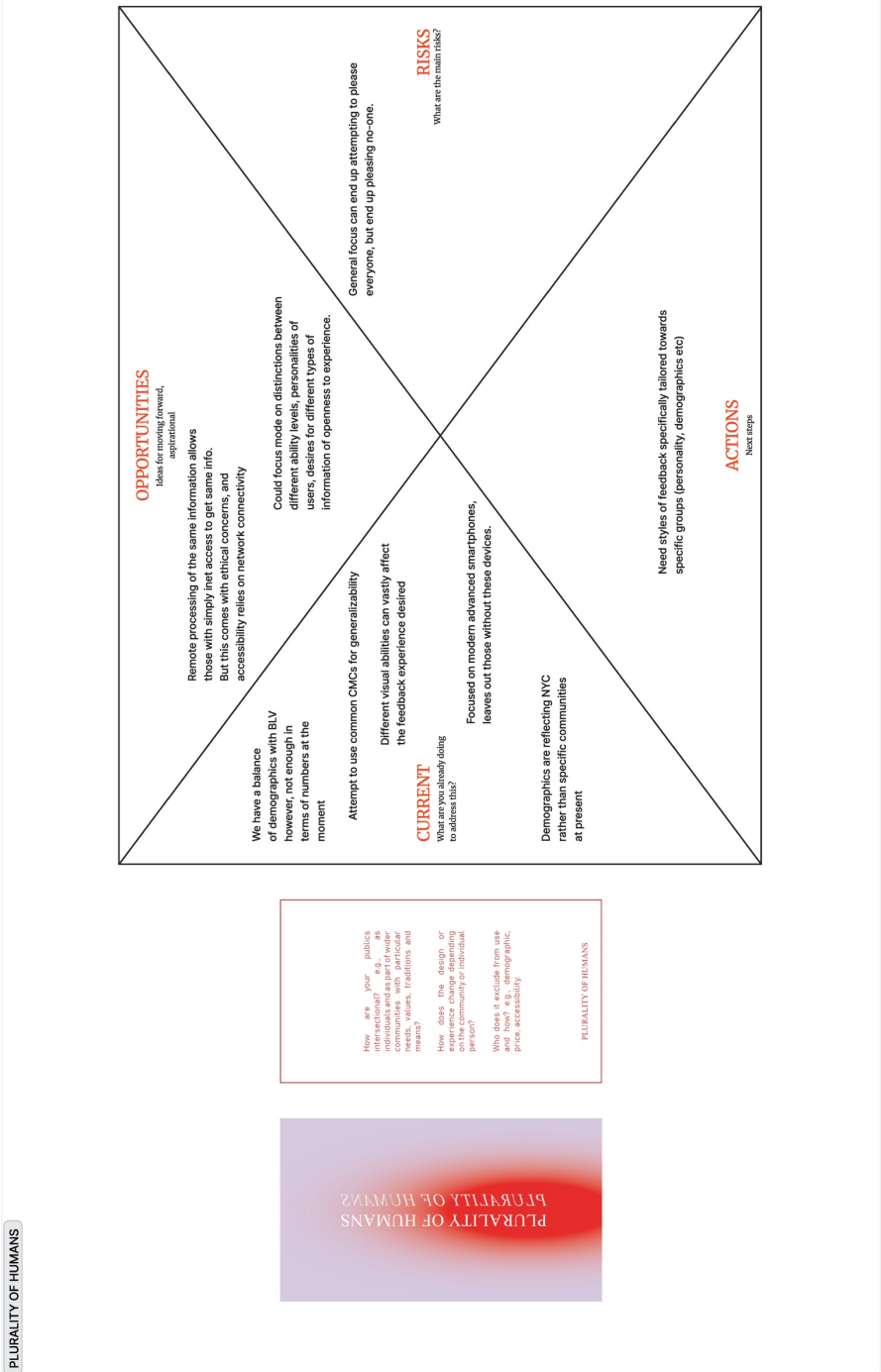


Figure 432 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

Figure 433 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

Figure 434 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

Figure 435 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

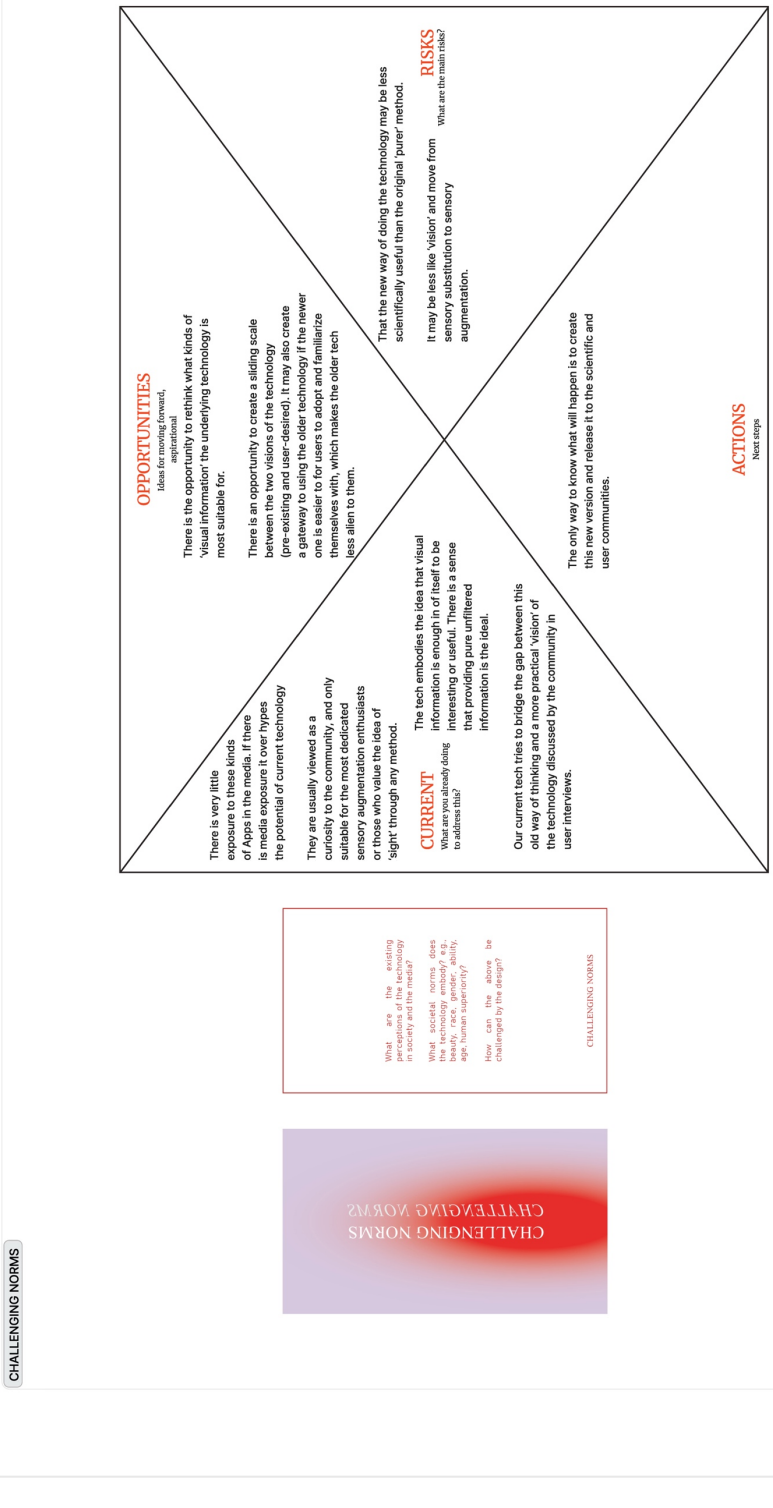


Figure 436 Lighthouse Card Deck Worksheet from Dr Giles Hamilton-Fletcher Workshop, 2023.

Consent Form: Valence Vibrations Date 07 /05 /23

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 07/5/23 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Valence Vibrations, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Chloe Duckworth	May 18, 2023	Chloe Duckworth Chloe Duckworth (May 18, 2023 00:42 PDT)
Participant Name	Date	Signature
Lesley-Ann Daly	20/5/23	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 437 Participant Consent Form Signed by Chloe Duckworth, Valence Vibrations, 2023.

Consent Form: Valence Vibrations Date 07 /05 /23

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 07/5/23 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Valence Vibrations, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Shannon Brownlee	May 20, 2023	Shannon Brownlee Shannon Brownlee (May 20, 2023 20:04 PDT)
Participant Name	Date	Signature
Lesley-Ann Daly	20/5/23	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 438 Participant Consent Form Signed by Shannon Brownlee, Valence Vibrations, 2023.

Consent Form: Valence Vibrations Date 07 /05 /23

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 07/5/23 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Valence Vibrations, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Vedant Sathye	May 20, 2023	Vedant Sathye Vedant Sathye (May 20, 2023 14:37 PDT)
Participant Name	Date	Signature
Lesley-Ann Daly	20/5/23	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 439 Participant Consent Form Signed by Vedant Sathye, Valence Vibrations, 2023.

QUESTIONS	Feedback on the workshop process.	Feedback on the cards and questions.	Did it result in useful actionable next steps?	Would you use the cards again? and why?	Any other feedback or observations?
Participant 1	I think the process was super helpful in helping us think through elements of sensory tech and AI ethics and how each topic relates to each other.	The cards were comprehensive and I think the choice of topics was solid. I do think there were too many cards to go deep into each in one sitting, and 3 hours of a session wasn't most conducive to optimal focus. I would have liked to break this up into multiple meetings over a week to ensure we can go deep on each topic without losing focus.	Yes, we have added multiple action items from the sheet into our Jira, particularly the data collection and diversity sensitivity test.	Yes, but I would break them up into different sessions. It would be interesting to repeat this activity after our next round of fundraising and see what has changed.	Nope!

Figure 440 Feedback from Google Form for Valence Vibrations Workshop, 2023.

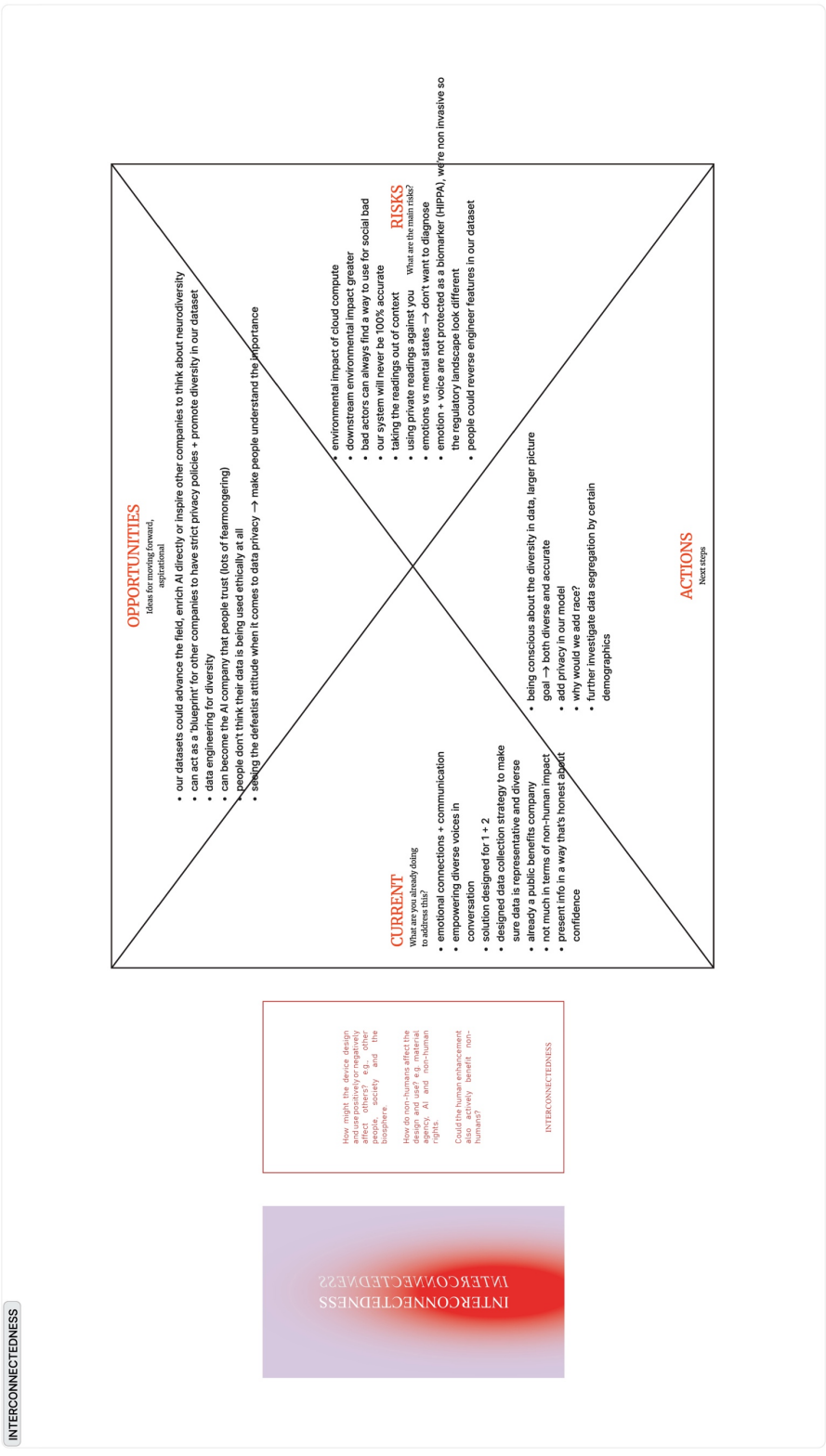


Figure 441 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

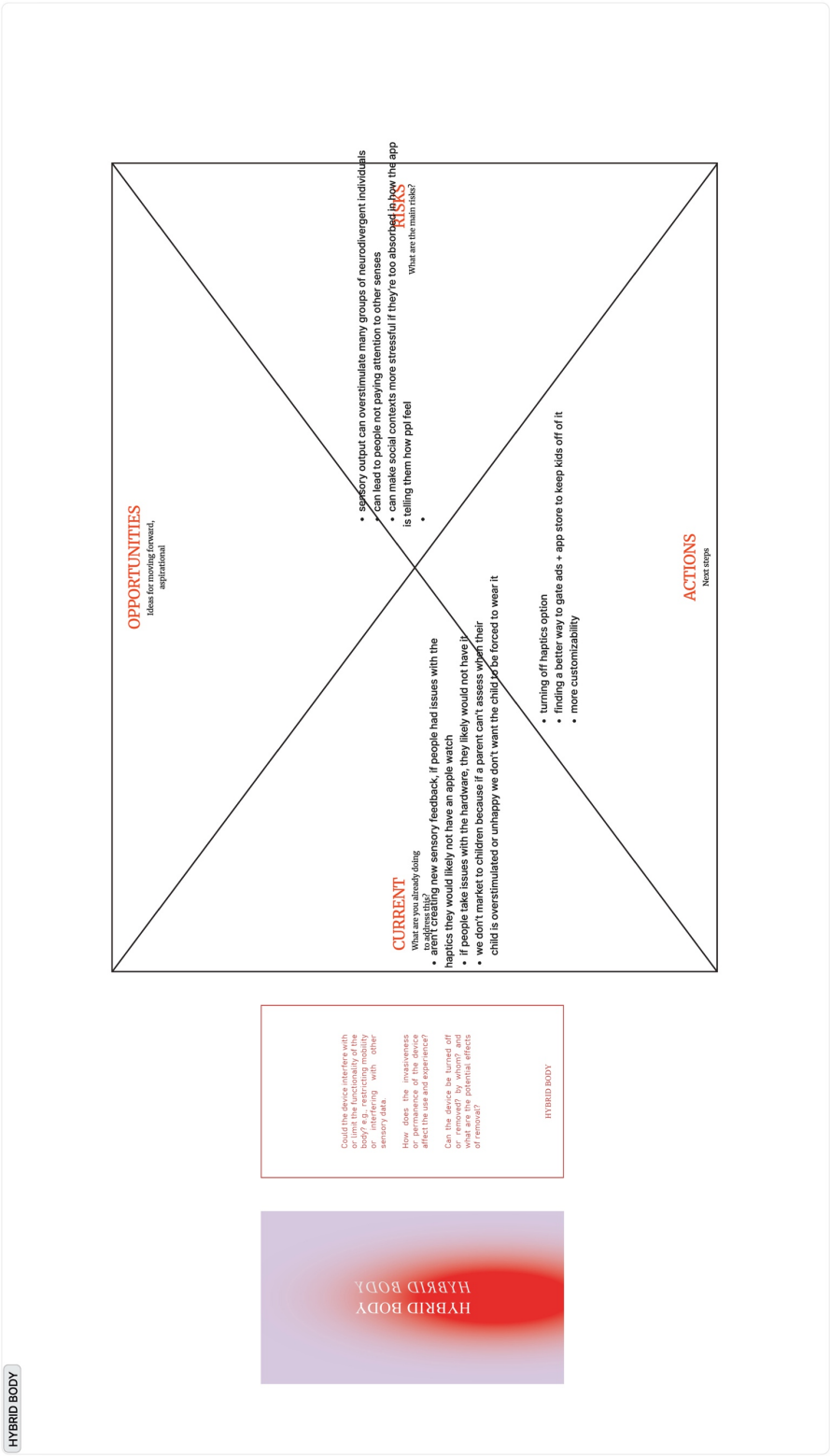


Figure 442 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

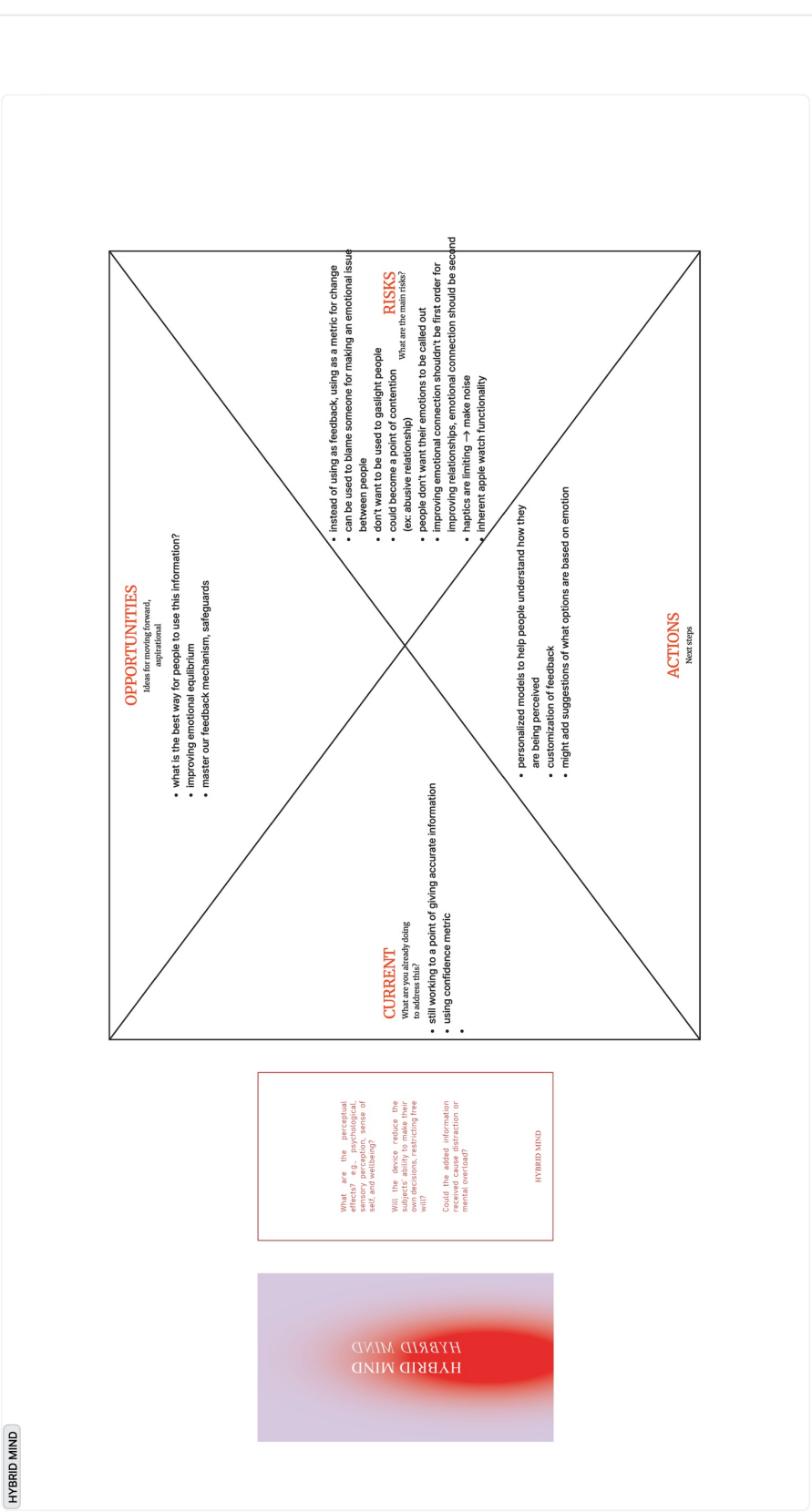


Figure 443 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

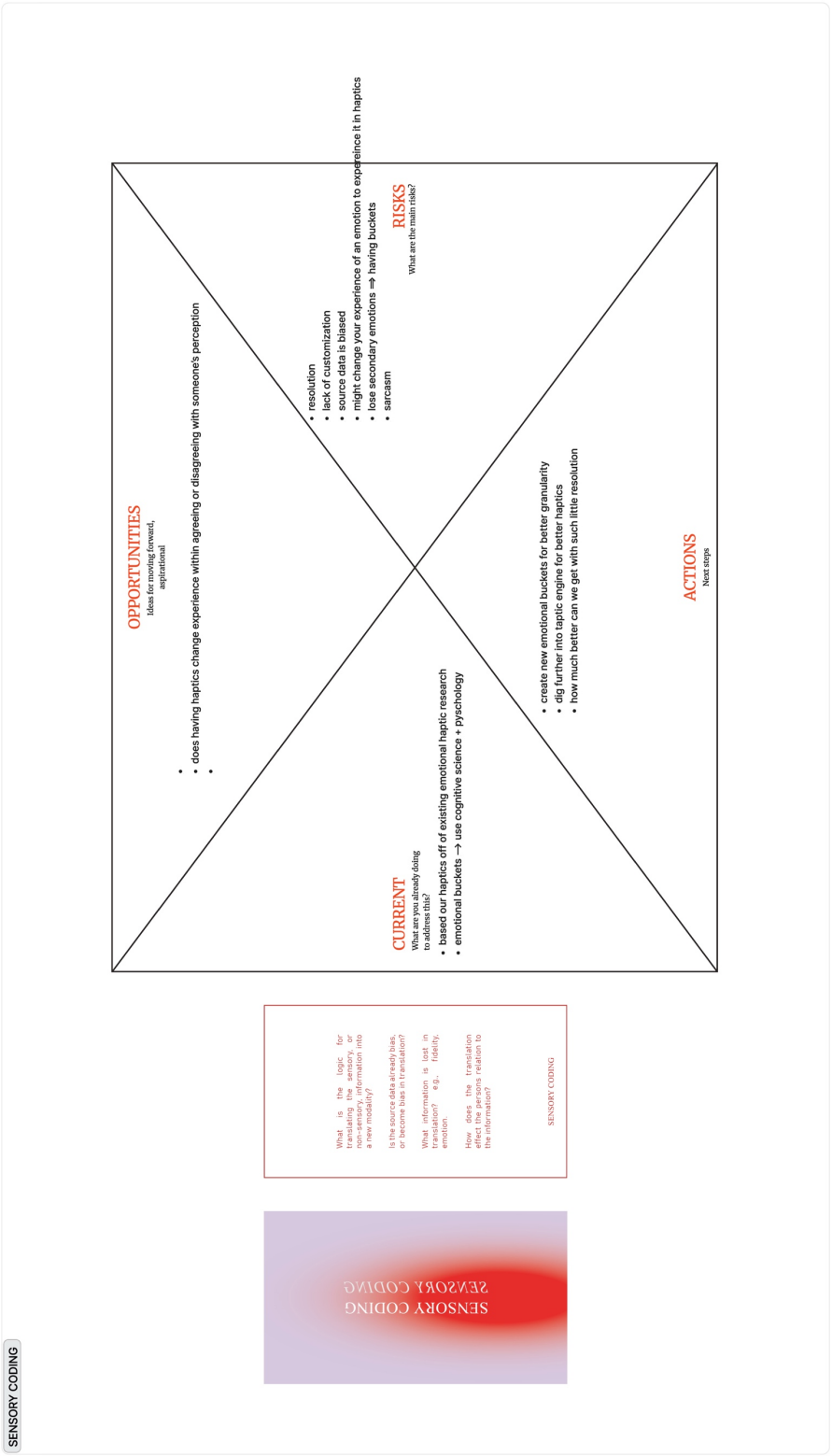


Figure 444 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

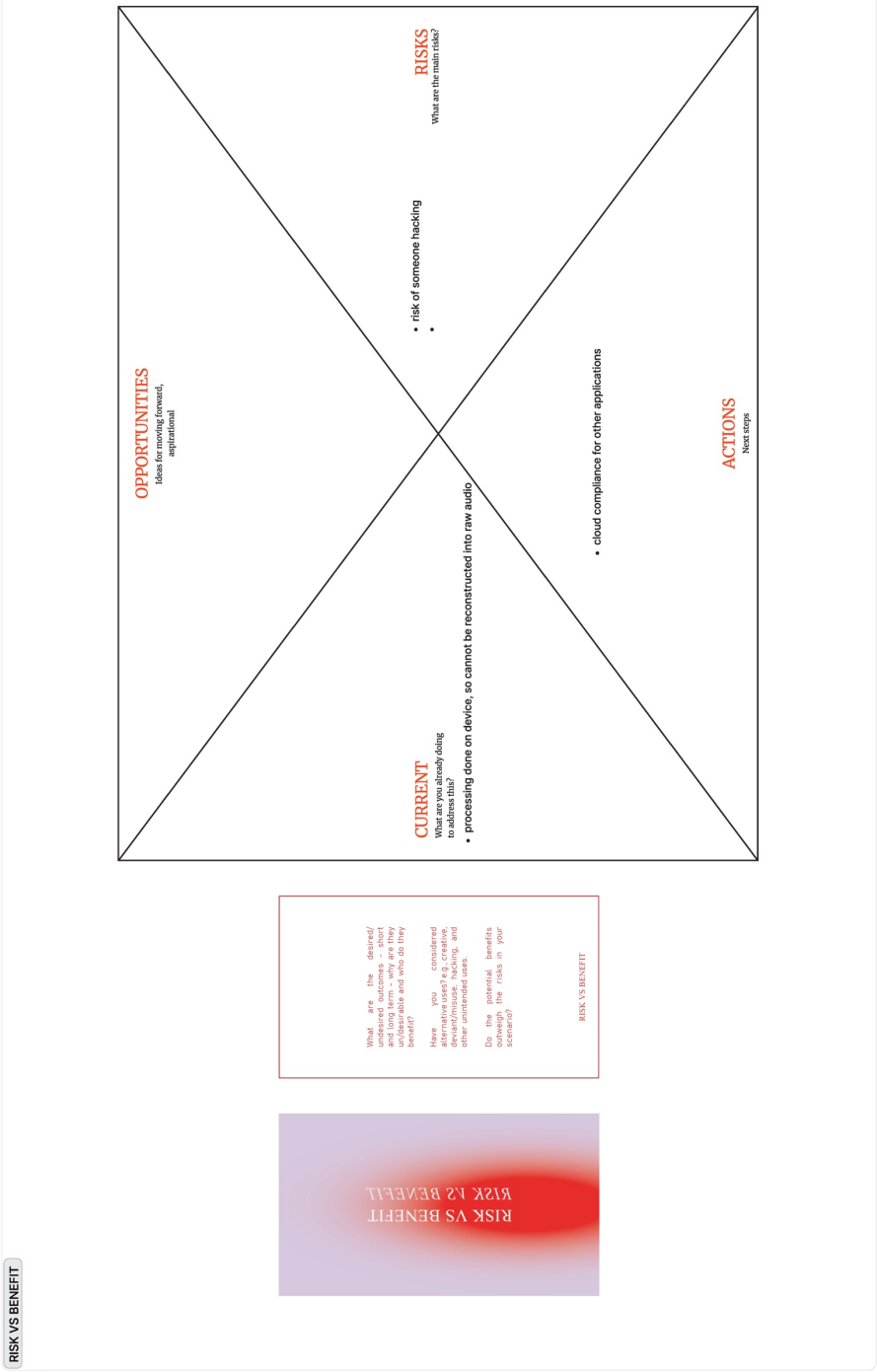


Figure 445 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

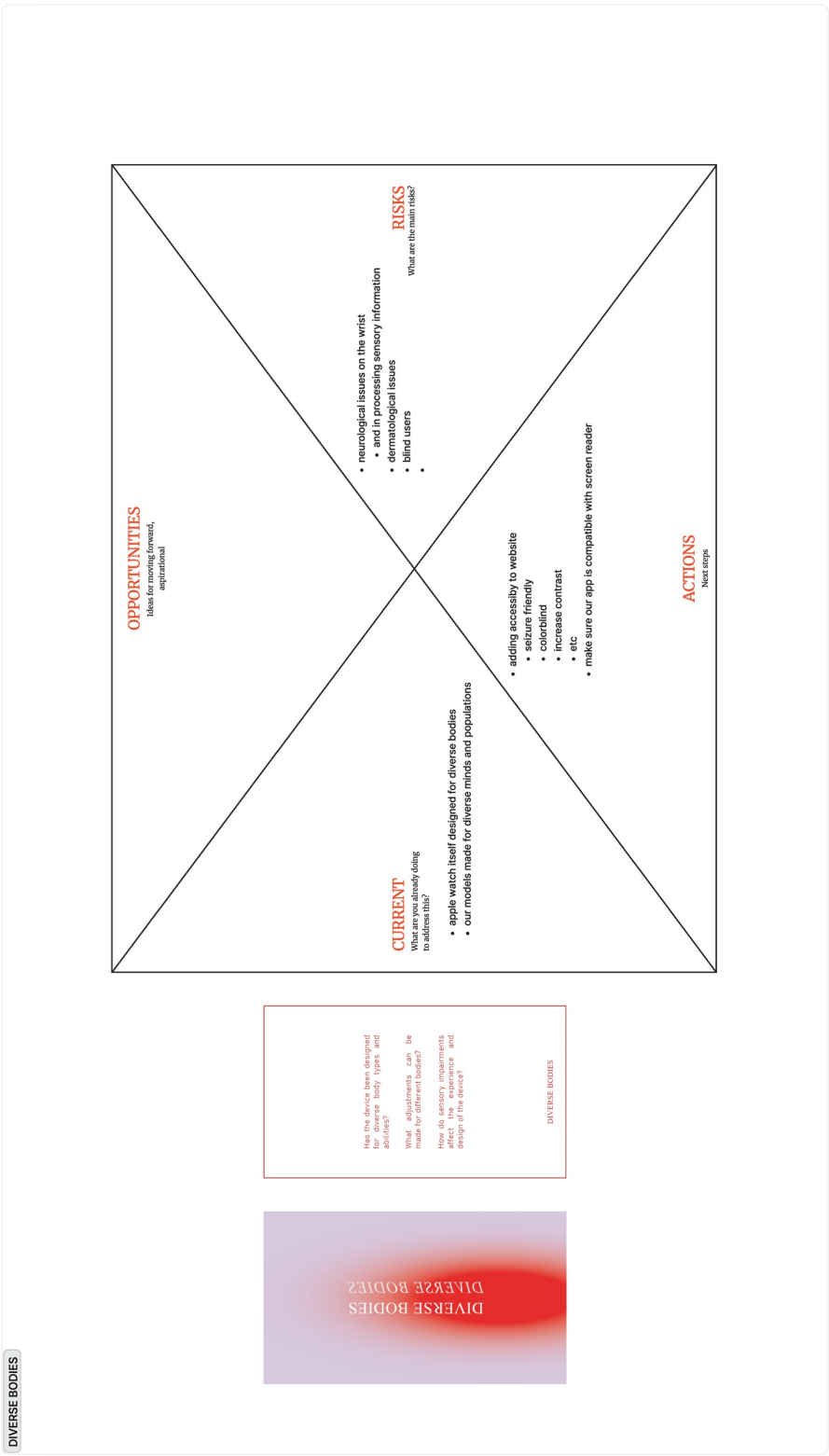


Figure 446 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

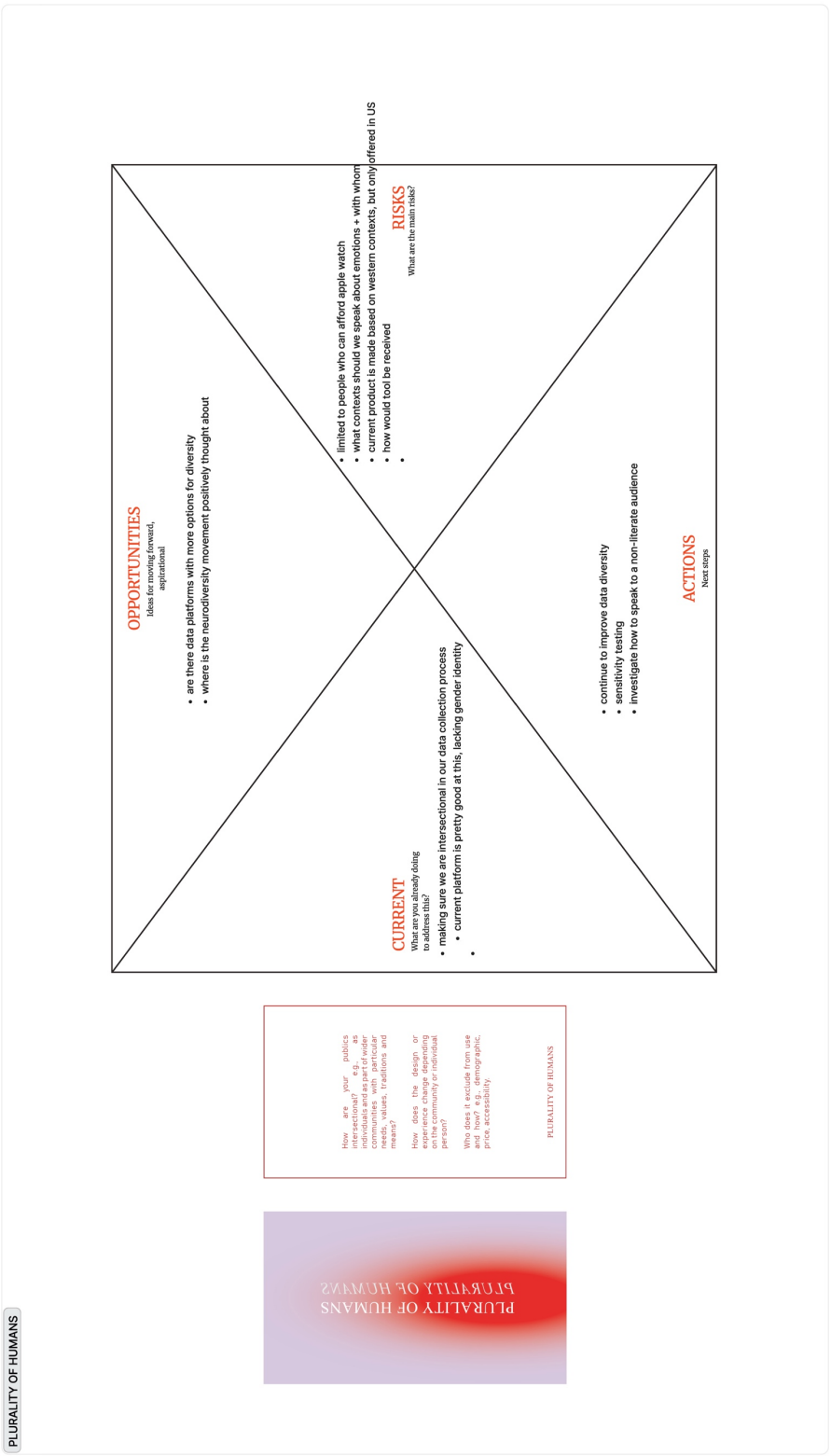


Figure 447 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

Figure 448 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

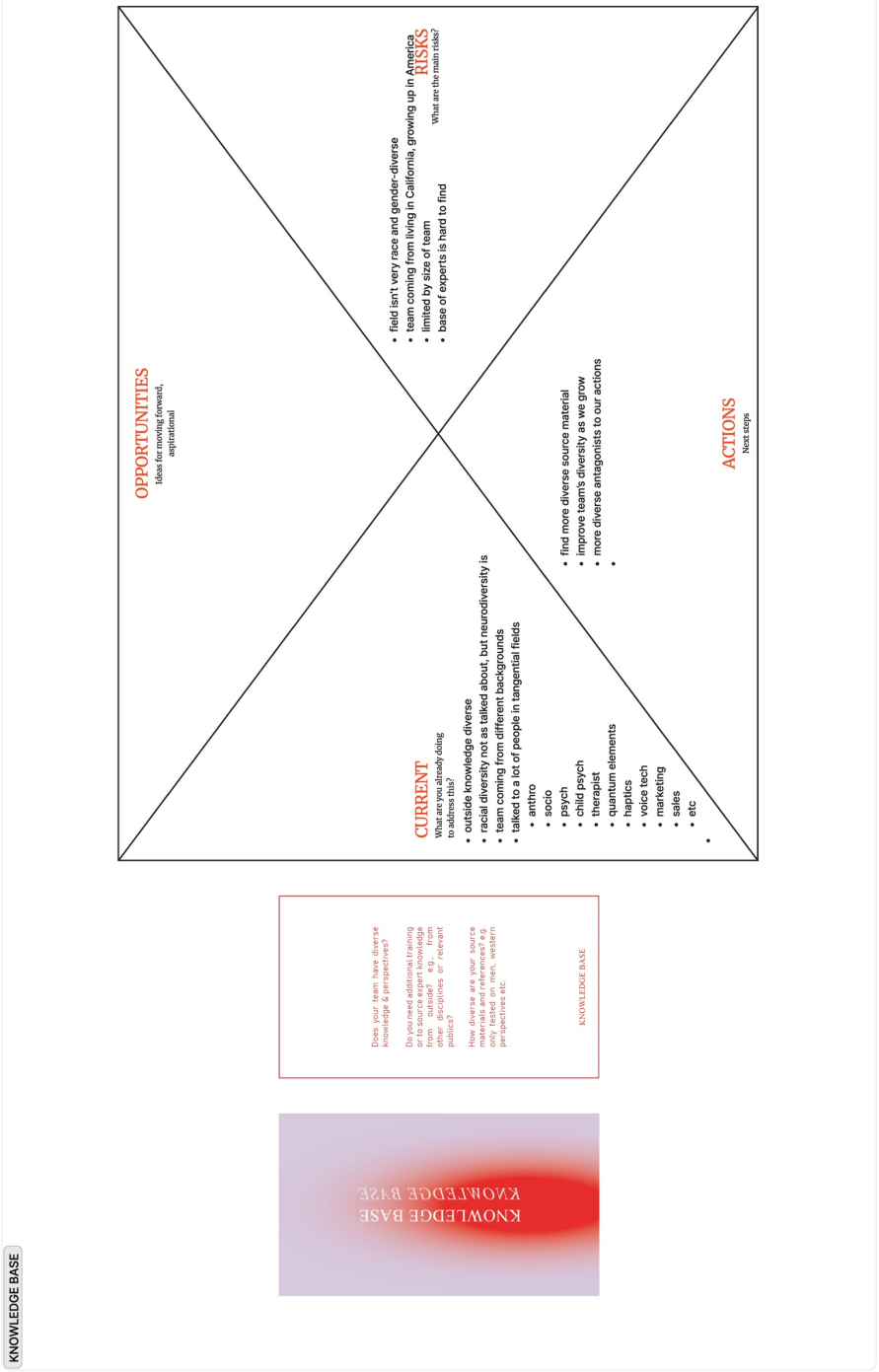


Figure 449 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

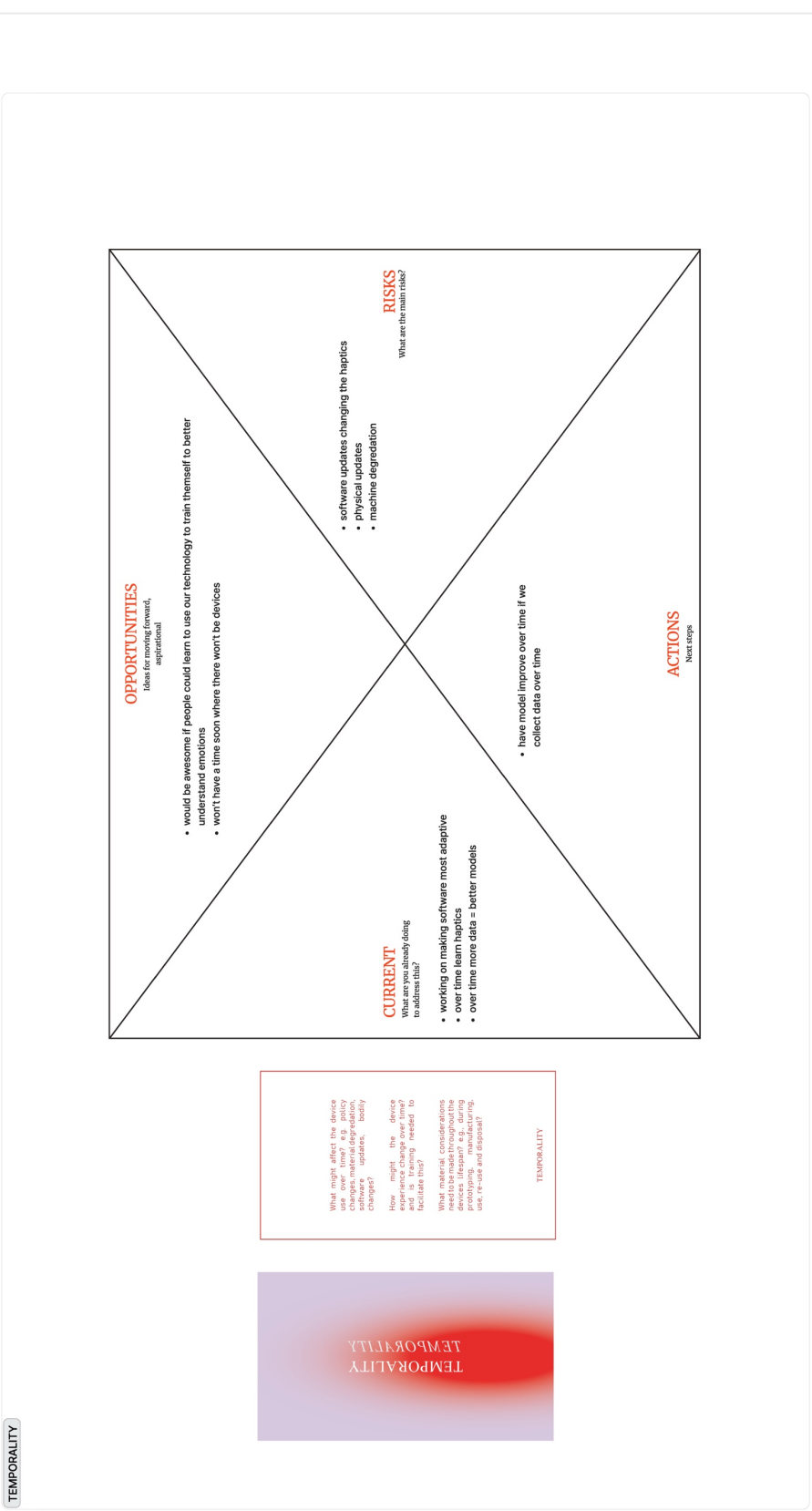


Figure 450 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

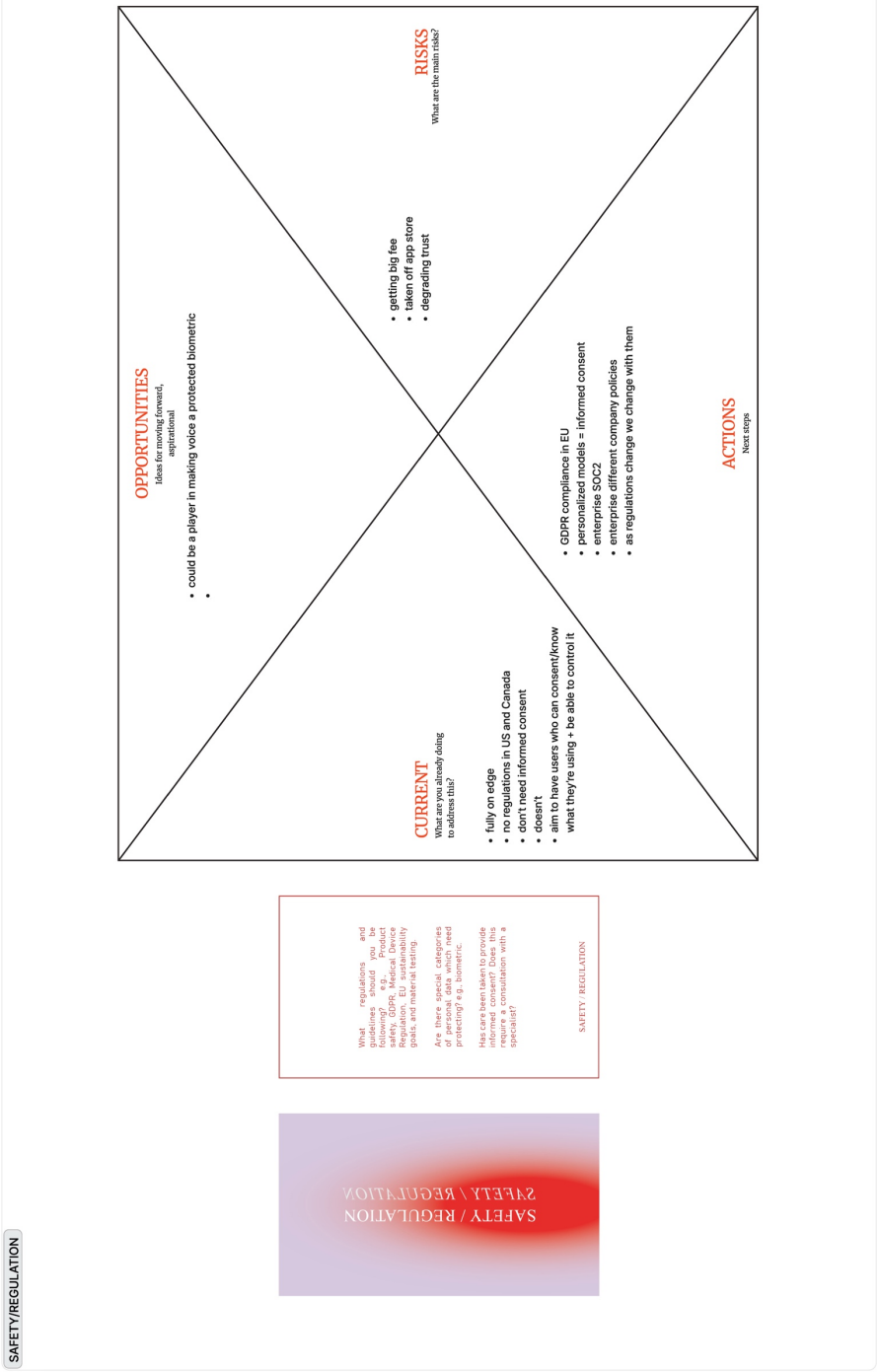


Figure 451 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

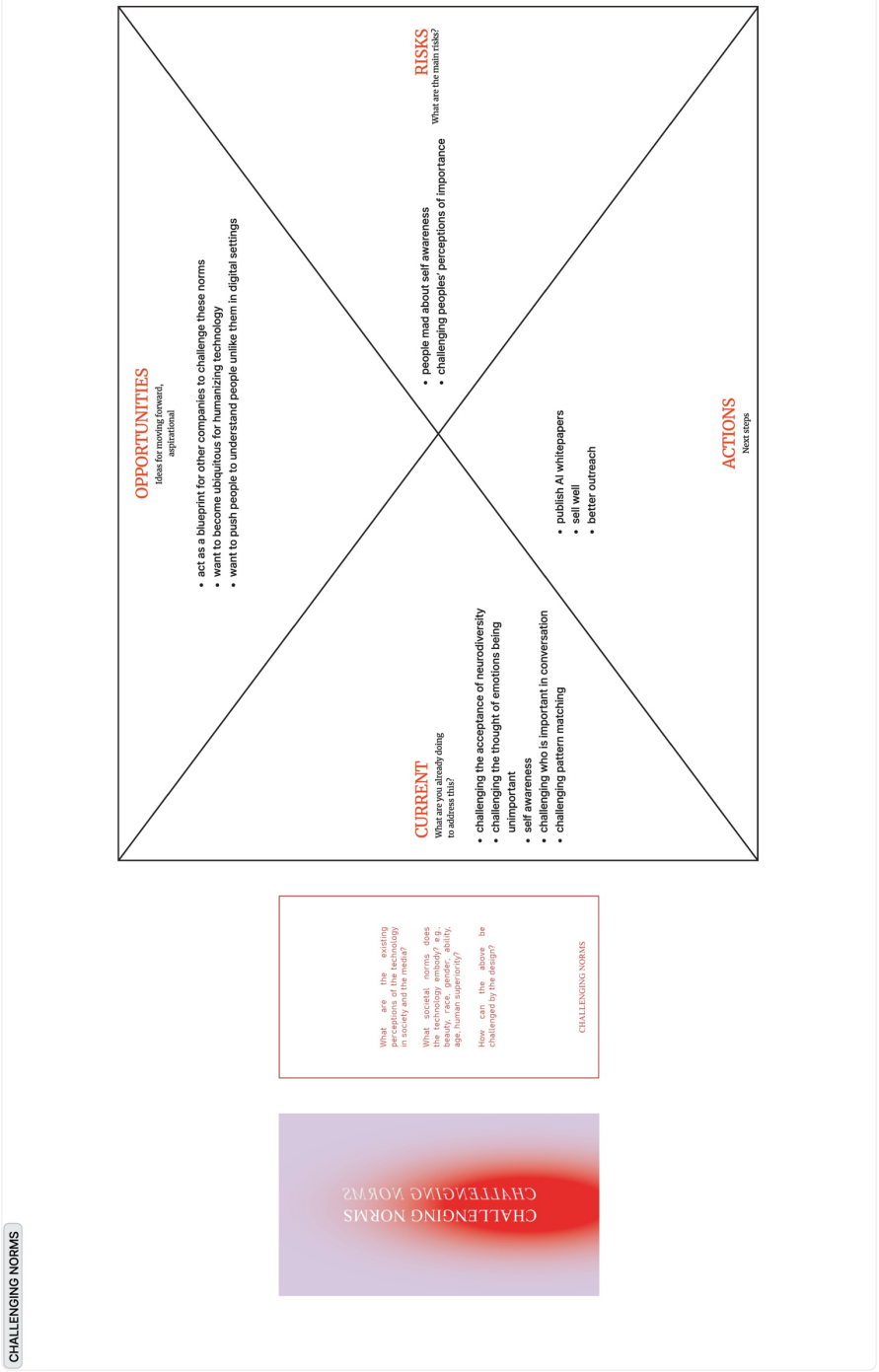


Figure 452 Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.

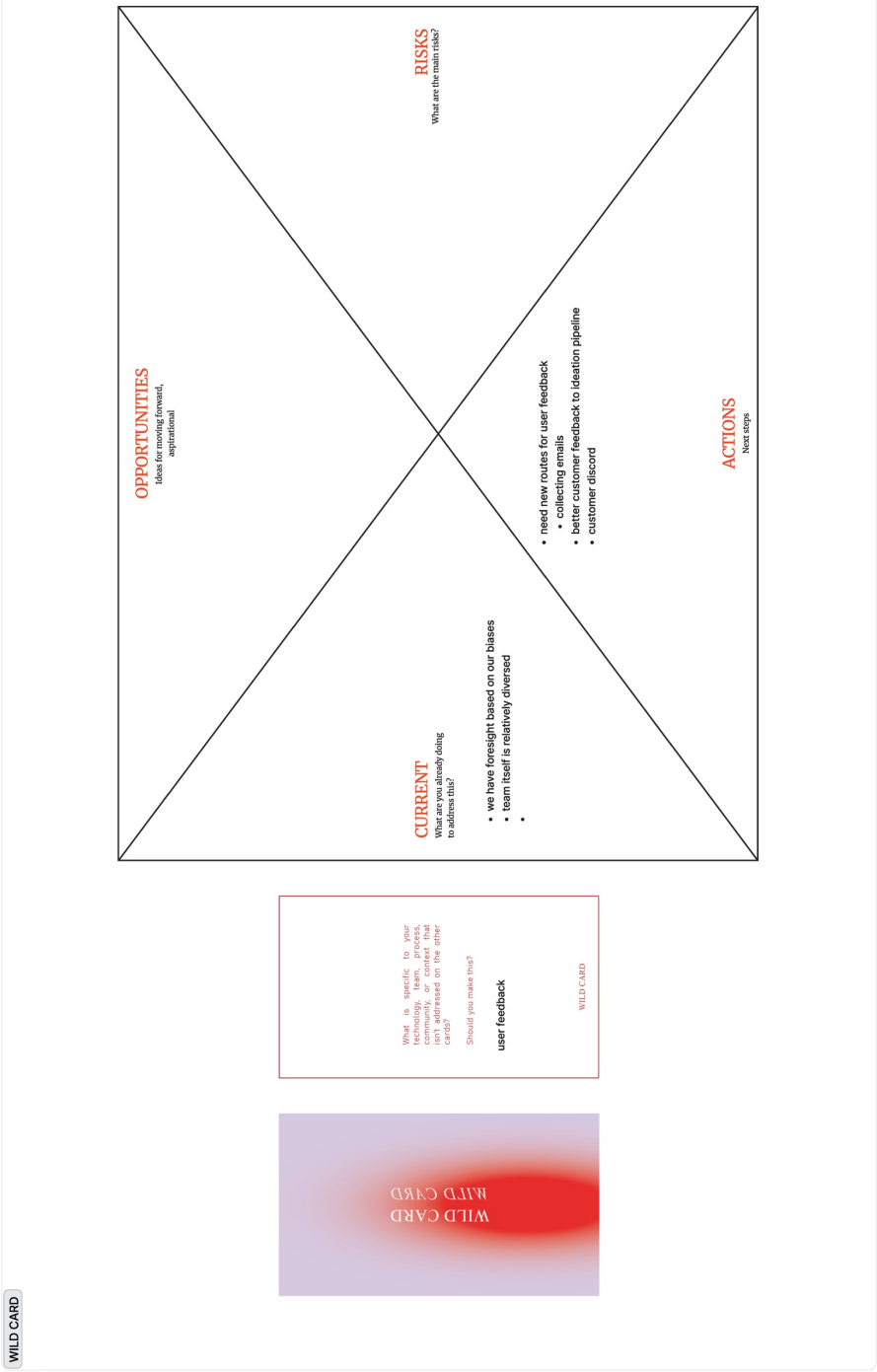


Figure 453 *Lighthouse Card Deck Worksheet from Valence Vibrations Workshop, 2023.*

Consent Form: Sensae — Date 02/07/2023

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 02/07/2023 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Sensae, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Alessandro Gasbarroni	Jul 4, 2023	Alessandro Gasbarroni Alessandro Gasbarroni (Jul 4, 2023 14:03 GMT+1)
Participant Name	Date	Signature
Lesley-Ann Daly	02/06/2023	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 454 Participant Consent Form Signed by Alessandro Gasbarroni, Sensae, 2023.

Consent Form: Sensae Date 02/07/2023

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 02/07/2023 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Sensae, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

András Nagy	Jul 4, 2023	András Nagy András Nagy (Jul 4, 2023 11:11 GMT+2)
Participant Name	Date	Signature
Lesley-Ann Daly	02/06/2023	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 455 Participant Consent Form Signed by Andras Nagy, Sensae, 2023.

Consent Form: Sensae Date 02/07/2023

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 02/07/2023 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☑ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Sensae, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Bertrand Delvaux	Jul 10, 2023	Bertrand Delvaux Bertrand Delvaux (Jul 10, 2023 09:57 GMT+1)
Participant Name	Date	Signature
Lesley-Ann Daly	02/06/2023	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

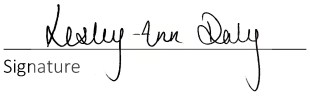
Figure 456 Participant Consent Form Signed by Bertrand Delvaux, Sensae, 2023.

Consent Form: Sensae Date 02/07/2023

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 02/07/2023 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Sensae, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Daniel Lyngholm	Jul 7, 2023	
Participant Name	Date	Signature
Lesley-Ann Daly	02/06/2023	
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 457 Participant Consent Form Signed by Daniel Lyngholm, Sensae, 2023.

Consent Form: Sensae Date 02/07/2023

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 02/07/2023 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	■ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	■ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	■ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Sensae, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	■ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	■ ☐
I agree to take part in this workshop.	■ ☐

Faidra	Jul 10, 2023	Faidra Faidra (Jul 10, 2023 13:59 GMT+2)
Participant Name	Date	Signature
Lesley-Ann Daly	02/06/2023	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 458 Participant Consent Form Signed by Faidra, Sensae, 2023.

Consent Form: Sensae Date 02/07/2023

Project Title: Lighthouse card deck workshop

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I have read the Information sheet dated 02/07/2023 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☑ ☑
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	☐ ☐
I understand that the name of the company, and participant names & roles may be included with the research materials, unless previously discussed and agreed.	☐ ☐
I understand that the workshop will be documented using photography of the session and each worksheet. I understand that these photographs will be approved by the company, Sensae, before inclusion in the thesis, or any conference presentation, report, journal, or physical work that is developed from the research.	☐ ☐
I agree that the workshop data (images and questionnaire) will be kept for future research purposes. I understand that this data may be shared securely with other researchers, for research purposes, during and after the completion of this study.	☐ ☐
I agree to take part in this workshop.	☐ ☐

O de Simone	Jul 16, 2023	O de Simone (Jul 16, 2023 00:04 GMT+2)
Participant Name	Date	Signature
Lesley-Ann Daly	02/06/2023	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 459 Participant Consent Form Signed by Olivier De Simone, Sensae, 2023.

QUESTIONS	Feedback on the workshop process.	Feedback on the cards and questions.	Did it result in useful actionable next steps?	Would you use the cards again? and why?	Any other feedback or observations?
Participant 1	All in all, it was alright. At times, the subject of discussion felt a bit "irrelevant" to the card, but that one is on us - we all had our own agenda.	The questions were well thought out, they greatly helped in facilitating the discussion	They did help in generating discussion, as well as to create future steps	Sure! It prompted us to think practically, and to not just stay in the abstract	nothing
Participant 2	Good method. It's important to ask the right questions and the cards are very well suited for that. It was difficult to capture all the output of the workshop on the cards as it's difficult to both capture and participating in the conversation. Workshop is maybe too lengthy and it would have been better if it was more split into shorter sessions. e.g. 3 sessions of 1 hour would have been better than a single session of 3 hours. The reason is that the conversations are actually very dense of content, and after a while it is difficult to concentrate and be productive.	Yes, they were all relevant.	I think that the questions were good for a generic wide-spectrum brainstorming. Helpful to not lose sight of things that might be relevant for the future, but eventually everything needs to be in view with the commercial aims of the company. In summary, a good planning tool.	Yeah, good to do on regular basis (6-months/yearly) to make sure everything is kept in view in the growth of a company.	No
Participant 3	The workflow going from current > opportunities > risks > actions worked well, although for some questions there was maybe a lot of focus on the risks. One suggestion could be to name this challenges, as it felt like that was the focus for this section in a lot of the areas. The workshop was quite long, so a suggestion could be to split it up into 2 or 3 sessions and after the first 3-4 cards, to choose which areas to focus on instead of trying to fill in all of them.	Most of the topics were relevant, but as mentioned above, it may be good to build in a step after 2-3 cards where the group chooses which ones are the most relevant for the rest of the workshop	It helped in making sure that the whole team is on the same page with the challenges and opportunities and could be a good tool going forward for making sure that the right things are prioritised in the development roadmap	I think this would be a good exercise to do at regular intervals, maybe every 6-12 months to both assess whether priorities have changed and whether any of the items have been actioned.	It was an interesting exercise and I think we will try to keep it up. Thanks

Figure 460 Feedback from Google Form for Sensae Workshop, 2023.

Figure 461 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

Figure 462 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

Figure 463 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

Figure 464 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

Figure 465 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

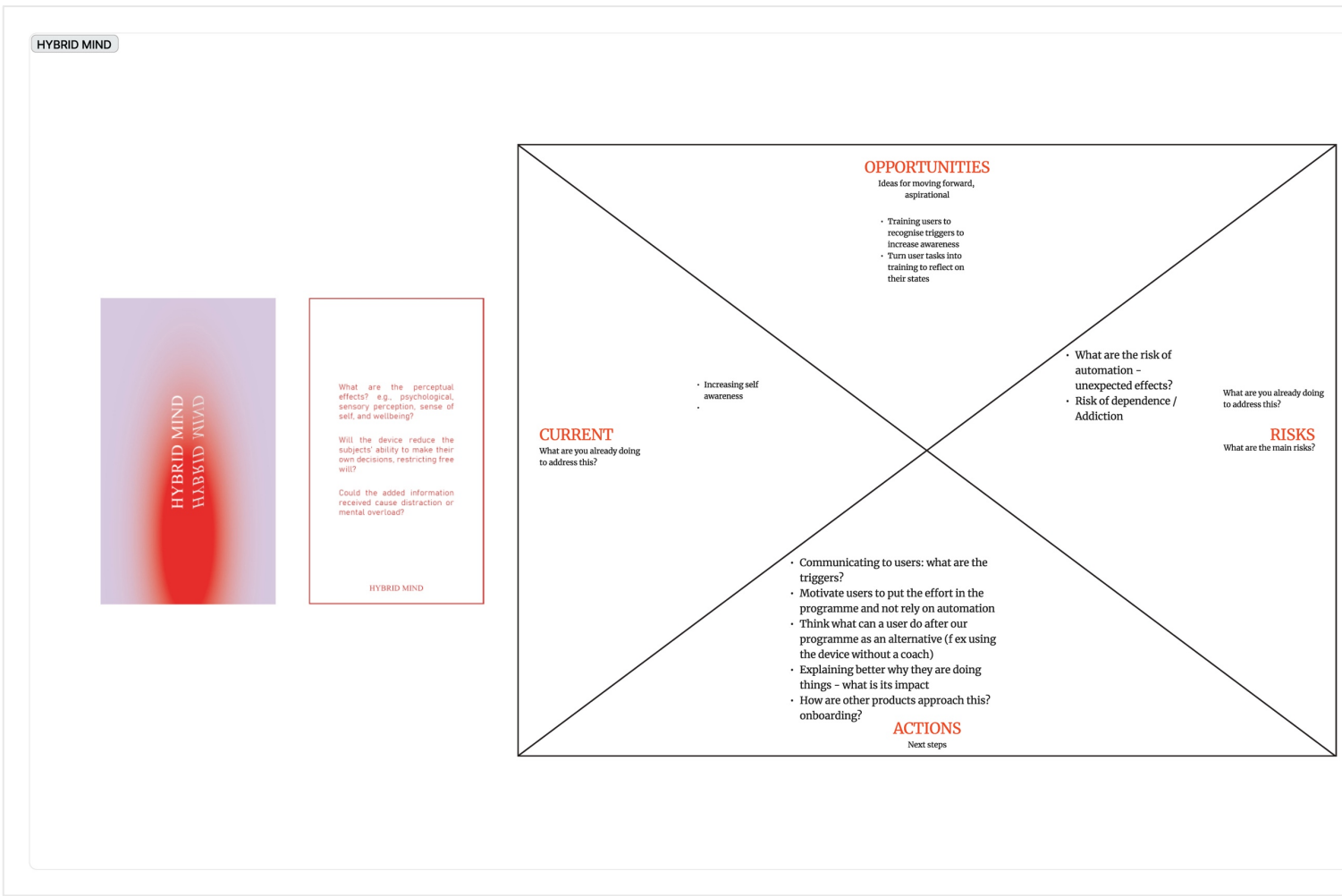


Figure 466 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

Figure 467 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

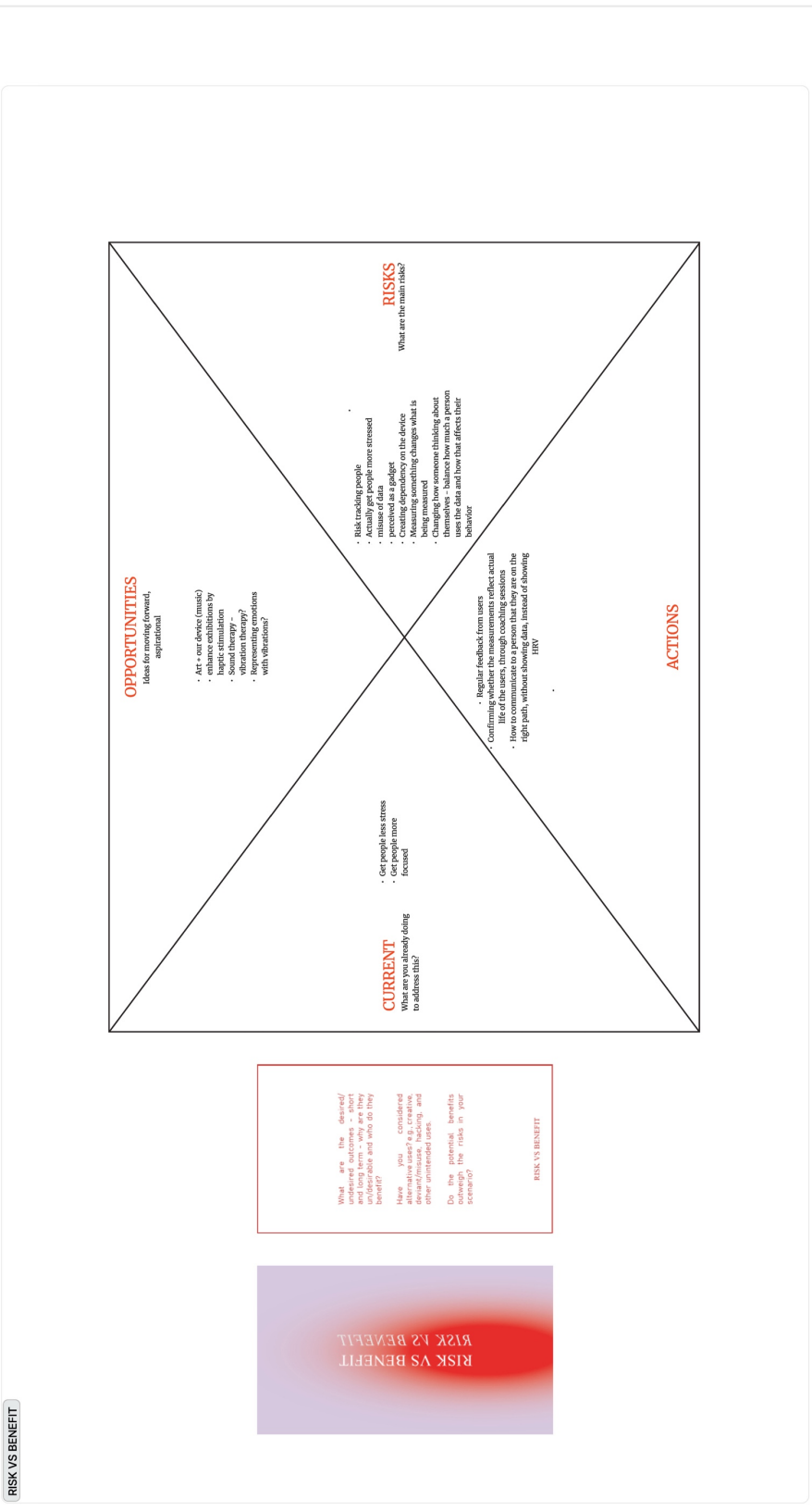


Figure 468 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

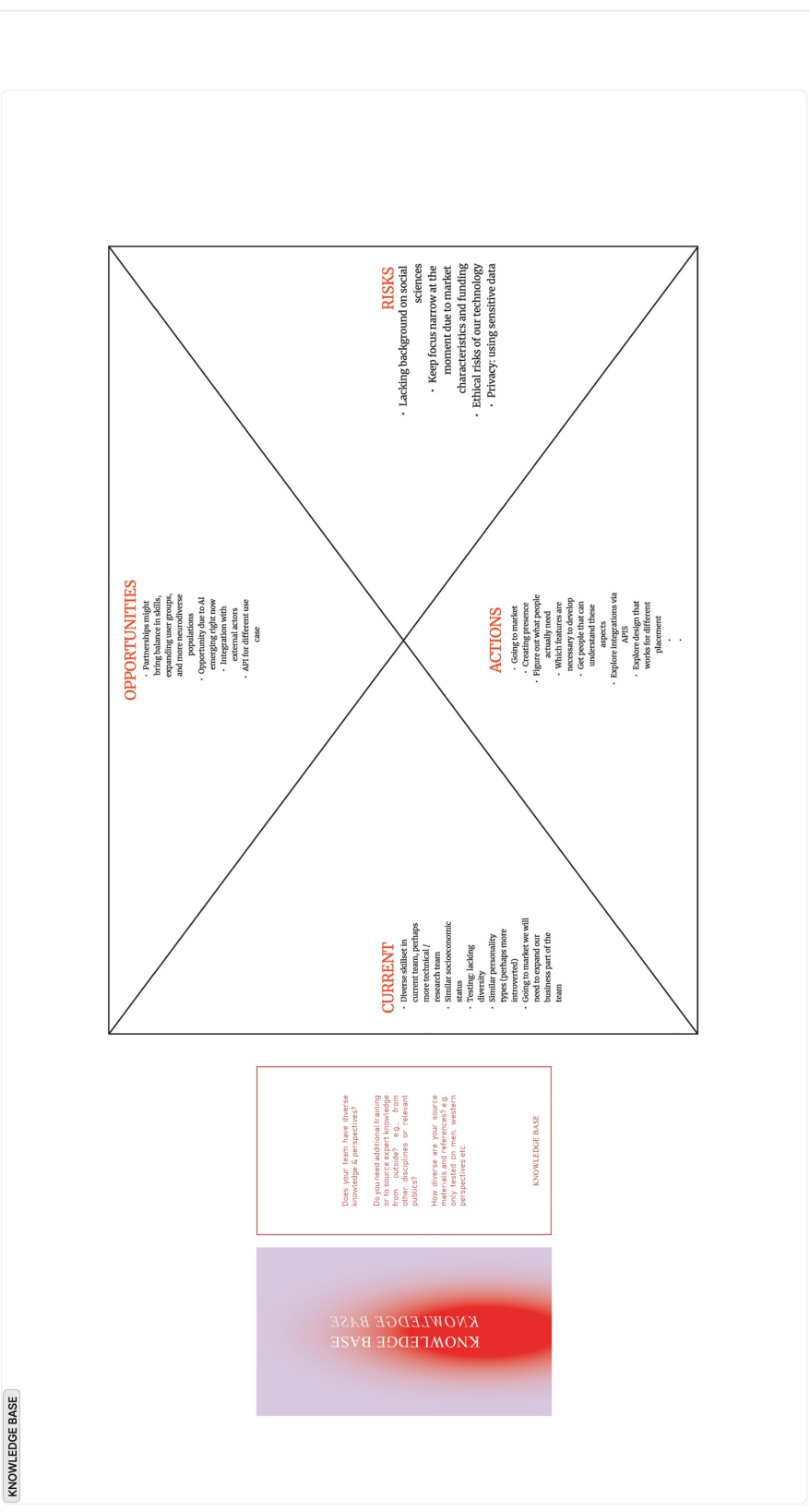


Figure 469 Lighthouse Card Deck Worksheet from Sensae Workshop, 2023.

9 *DESIGNING SENSES* REVIEW

9.1. Review Request Documents

Request Email

Subject: Invitation to Review Book: "Designing Senses: The Ethics of Sensory Augmentation" by Lesley-Ann Daly

Dear [Reviewer's Name],

I hope this message finds you well. My name is Lesley-Ann Daly, and I am a PhD Design Researcher at Central Saint Martins, UAL. For my final practice I have curated a book titled "Designing Senses: The Ethics of Sensory Augmentation," which ventures into the realm of sensory augmentation, examining its ethical, societal, and environmental implications through contributions from experts across various fields.

Your expertise in [specific field & achievements relevant to the reviewer] makes you an ideal candidate to provide a review of this work. I believe your perspective would be incredibly valuable and I would be honoured if you could take the time to review this book and provide your candid feedback.

My research:
'*How can design methodologies be used to examine the impact of Sensory Augmentation, and assess ethical issues related to the design and use of the technology?'*
Sensory Augmentation (SA), which extends our sensory abilities beyond current limits, offers exciting possibilities for enhancing our lives and interactions. However, its lack of governmental regulation creates potential risks stemming from poor design, misuse, or unforeseen consequences. This book serves as a design provocation for SA creators, who I believe play a pivotal role in shaping a responsible industry from the inside. It aims to prompt critical thinking by emphasising the importance of ethics in SA and encourages creators to actively make their practice more ethical.

Review:
Your review should assess the book's content and methodology in the context of my research. Attached are an indicative set of questions to assist you in your review. These questions are designed to capture your thoughts on various aspects of the book, from its ethical considerations, visual presentation, and potential impacts. Also attached are the book blurb and contents list.

Should you accept this invitation to review "Designing Senses," I will send a physical copy of the book to your postal address. Your feedback can be given in one of two ways: either in written form or via a 1hour online interview.

I would appreciate receiving your review by [specified date].

Consent:
As part of your review, I would like to request your permission to use your responses for various purposes. This may include, but is not limited to, inclusion in my PhD thesis, in academic presentations, and in publications related to my PhD research work. If you agree, I

will ensure that your comments are used respectfully and accurately, maintaining the integrity of your views.

NB: This work is currently not scheduled for publication, though this is the eventual aim. If it does become scheduled, I will reach out to you to seek permission to use any review comments as promotional material or in other contexts.

I kindly ask you to inform me of your decision to accept this review invitation by [a shorter specified date] and preferred method for feedback (written or interview). Upon confirmation, I will promptly send the book to your provided address.

Thank you for considering this opportunity to review "Designing Senses." Your insights are extremely valuable and would greatly contribute towards the achievement of my PhD.

Warm regards,

Lesley-Ann Daly
Designer & Researcher
PhD Candidate at Central Saint Martins, UAL

Email Attachment: Book Blurb and Contents

File name: *Book blurb 'Designing Senses' – Lesley-Ann Daly, PhD Research project, CSM, UAL.*

Designing Senses presents an exploration of the uncharted world of sensory augmentation that emerged in the 20th century. With the advent of wearable and integrated devices, humans were able to experience a whole new range of sensory delights, from perceiving information through touch to hearing colors and feeling the magnetic field of the earth. However, while the complexity of this technology has advanced rapidly, our understanding of its profound impact on our lives remains limited.

This book brings together the visions of leading practitioners in art, technology, neuroscience, and other fields to imagine alternative sensory futures. Each project offers a unique perspective on the ethical implications of augmenting our bodies and delves into how this could fundamentally transform our existence on individual, societal, and planetary levels. Thought-provoking questions are raised, challenging readers to consider the consequences of perceiving enhanced individuals as something other than "human," the potential obsolescence of our new senses, and the possibility of designing human enhancement technologies that benefit not only individuals but also the biosphere.

Lesley-Ann Daly curates this unique collection of speculations to emphasize the importance of considering the long-term impacts of technology design. Throughout the book, she provides insightful analysis of key concepts and offers guidance on how both creators and users can drive positive change in the field of emerging technology design while embracing the extraordinary possibilities that sensory augmentation brings. 'Designing Senses' compels readers to recognize that the decisions we make today regarding technology will shape the world we inhabit tomorrow.

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Email Attachment: Review Questions

File name: *Review questions for 'Designing Senses' – Lesley-Ann Daly, PhD Research project, CSM, UAL.*

Reviewer name: [please complete]
Reviewer position/affiliation:

1. Ethical Exploration: How effectively do the projects explore the ethical implications of sensory augmentation technologies on humans, society, and the world? Are there specific projects that stand out for their relevance and deep ethical inquiry?

2. Speculative Elements: How are speculative elements used to explore possible futures of sensory augmentation? How do Speculative Critical Design methodologies, such as the use of the uncanny, deception and provocation, contribute to the overall impact of the book?

3. Visual and Narrative Clarity: Are the concepts and ethical implications of sensory augmentation presented in a way that is both visually engaging and easy to understand? How does the book structure contribute to the narrative?

3. Creators' Responsibility: How does the book reflect on the creator's responsibility in creating sensory augmentation technologies? Are there sections or projects that highlight responsible design practices?

4. Academic and Industry Impacts: What potential impact do you envision this book having within academia and industry, particularly in terms of influencing the design and development of SA technologies? How might it shape ethical discussions and consideration for real-world implications?
- How might it impact your own practice?

6. Accessibility and Diversity: How accessible is the book's content to its intended audience, which includes designers, ethicists, and technologists? Does it incorporate diverse, interdisciplinary perspectives to enrich the discussion?

7. Comparative Analysis: How does this work compare with existing literature in the field, what unique contributions does it make, and are there areas in the book that could benefit from further development?

9.2. Reviewers Consent Forms and Transcripts

Alex Pearlman

Consent Form: Alex Pearlman Date 05 /04 /24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	☒ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	☒ ☐
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	☒ ☐
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	☒ ☐
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	☒ ☐
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	☒ ☐
I agree to review this book.	☒ ☐

Figure 470 Alex Pearlman Co-Signed Consent Form, 2024.

Alex Pearlman	4/16/2024	
Participant Name	Date	Signature
Lesley-Ann Daly	__16/4_/24___	
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 471 Alex Pearlman Co-Signed Consent Form, 2024.

Designing_Senses_book_review_–_Alex_Pearlman_(2024-04-05_17:34_GMT+1)_–_Transcript_–_Google Meet

Attendees

Alex Pearlman, Lesley-Ann Daly

Transcript

This editable transcript was computer generated and might contain errors. People can also change the text after it was created.

Text has been reviewed for typos and structure.

Lesley-Ann Daly: Okay, so it should say it started recording now.

Alex Pearlman: It's recording. Yes. You got it. Yeah,

Lesley-Ann Daly: First off thank you for taking the time to read the book as well. It's scary putting something out for the first time. But yeah,…

Alex Pearlman: Of course.

Lesley-Ann Daly: So I'll start with question number one, which is all around ethical exploration. So the question is how effectively do you think the projects explore the ethical implications of sensory augmentation Technologies on human society and the world and are there any specific projects that stand out for their relevance and deep ethical inquiry?

Alex Pearlman: Yes, great questions. So actually, I think it really hits a high mark. It's very challenging to deeply investigate the sort of hypothetical ethical issues that can emerge from sensory augmentation because we can only look at it through a future tense lens. We're not really there yet. But because there are a lot of examples to sort of sit upon and elaborate on in terms of other kinds of enhancements. There are some interesting ways to take that kind of ethical investigation.

I think this book really does a great job looking holistically at a lot of the issues that we face now and how those might be exacerbated in various directions through sort of policy and through even on an individual level when it comes to sort of enhancing bodies and looking at it through a disability lens and disability ethics lens. Even looking at it through an image lens and how we perceive sort of a beauty and bodies, I think it's a really well-rounded not focusing with one specific take and it's really trying to take in a whole number of ethical issues, and I think it does it really well. I was very successful.

I think the one that stood out to me the most as a concept was the idea of the post human rights activists and the post- having human rights taken away from people who have become a speciated and sort of post-human that is a really scary one that I think, definitely is inspired by the events of the past four years or so, and certainly we're seeing echoes of it even in these abortion rights rallies and stuff like that. It's a really interesting take on this issue, that

one stood out to me a lot because I had never really thought about it that way and I was like, my God, this is terrifying.

But from a design perspective, I really thought the woman with the Echolocation bat ears was particularly striking because I think by the time I am that age probably some of this will have become mainstream and actually accessible and not just sort of hypothetical ideas. And so, I'm gonna be that old woman like the Echolocation right now we present right we think of a lot of the folks that you see that are dabbling and sensory augmentation or our leading companies that are investigating it our very much young white men and that is sort of a stereotype whether it's totally true or not. That's definitely the medias and sort of mainstream idea of the transhumanists and sort of biohackers are and I think yeah making it an old woman who's just f*** it. I'm gonna do what I want with my body. so awesome because when we get to be that age, hopefully this technology will be there and that would be me being like I don't care. I'm gonna have bat ears and a cattail. It's gonna be awesome. so, I thought that was visually and from a design perspective very striking and cool. Oh.

Lesley-Ann Daly: awesome, right We went to the second question. I've got lots to say about that, So the second question is around the speculative elements.

Alex Pearlman: Okay.

Lesley-Ann Daly: And so how are speculative elements used to explore possible futures of sensory augmentation, how do speculative design methodologies such as the use of the uncanny, deception or provocation contribute to the overall impact of the project?

Alex Pearlman: Yeah, I think that's a really good question. So, Speculative design is key for this kind of thing because obviously it's very much in the future and I think it was successful. I think that the projects that you pulled together were a really excellent fit and then in terms of the speculative design of your own project, I think it was really cool looking at the ways. I really liked the grill that enhances sweet tastes, that was a really cool one. That's taking a bunch of stuff that already exists and looking at how it could fit together in the future. That's cool.

Alex Pearlman: Sorry, what was the second half of the question?

Lesley-Ann Daly: How did speculative critical design methodologies like the use of the uncanny, deception, and provocation contribute to the overall piece?

Alex Pearlman: So I think so a thing that actually did strike me as really interesting was the way the design of the chapters and the way that the projects were organized was actually I think a very intentional design choice and I think in the introduction you talk a little bit about how it's like someone imperfect because all of these things really could be in any of them and they're all under this umbrella of sort of design fictions, but I think that the way that they were organized from a critical lens in the way that you fit them into their various sort of pieces was provocative because any of them could be argued but I think that they fit.

I really liked the one with the swimming arm swimming the design for how to help someone swim and I think that that project really takes on. It's sort of like a critical lens of speculative design where the first project is rejected because it focuses too much on solving a technical problem. The idea is that it's trying to attempt to solve what they perceive to be a technical problem with more technology. But actually it's an emotional problem that can be solved

with technology and enhanced sensory enhancements and it's not a technical problem that needs to be solved and I think that's in a really important piece of this puzzle where not all of this is about solving problems with technology and enhancements are not necessarily meant to be problem solvers instead, they're enhancing other things and I think that that project with the arm, Really got there. I think it made that point really well.

Lesley-Ann Daly: Thank you. And I'm moving to the third one. So, it's around Visual and narrative Clarity. So, the question is are the concepts and ethical implications of sensory augmentation presented in a way that's both visually engaging and easy to understand?

Alex Pearlman: Yes, I thought that the visual representation was breathtaking. It was super well organized. I loved the different color palettes and the way that they Blended and merged from one to the other. I think that the design of the book and the way that the introductions did touch on all of these in a very, I don't want to say simple because it's a very complicated topic, but in a accessible way where the writing was crisp and short and really hit the points home and drove the questions that readers could take with them or I don't even know if a reader is the right way- experiencers, people who are experiencing this work could take with them. walk through their experience and then at the end sort of following that It's not like questions and answers but it's certainly a follow-up to put sort of a cap on. here's what you could go take away from this and this is like some of the lessons we were trying to show and so it's almost

Alex Pearlman: it's almost like a tutelage right where you're guiding someone who might not be familiar with this through the feelings and questions and conclusions that they might come to because someone who's coming to this work unfamiliar with it could just be so overwhelmed and Blown Away by it that they have too many thoughts and I think this project organized a lot of potential emotive reactions very clearly. I showed it to my kid, I thought and he's seven and he totally was taken by it was like this is wild and even reading the questions at the end and going through sort of these it's almost like a learning guide was really helpful and definitely drove the accessibility of engaging with these really tough ethical questions for anyone who wanted to.

Lesley-Ann Daly: awesome and just add on to that how does the structure of the book contribute to the narrative?

Alex Pearlman: Yeah, so I think yeah, the organization of the projects into the three categories. I don't have it in front of me. m So it was post-human was the last one?

Lesley-Ann Daly: Humanist, post-dualist and then post-anthropocentric.

Alex Pearlman: Yes, Okay. Yeah, again, but really interesting categories because again, I think what they needed to be organized they needed to be some kind of organization certainly three is the right number for the amount of projects because that's enough to give after the amount of heft that it needed and none of them were left out. But I guess from a high level diving into it you might want to argue that they were all just post humanists and then maybe go on down from there, but I think you're right that the post anthropocentric was like it's a very specific different side of the coin, right and so is post-dualist which is I think a contemporary categorization that were really dealing with in society right now is this ideal of dualism and sort of spectrumization of formally dualist categories and I think that's a very much of this time way to organize the book. And yeah.

I think it works and I feel like if there were more projects though, it might break. And if there had been double the amount of projects, there might have needed to be different categories or more categories to sort them in if you only wanted to keep it to be three chapters, so that was only my worry, but I also think that if there were more projects that would be okay because there would be ways to sort of I think you could change post-humanist is quite a broad one. And so that one could probably be more specified.

And I also think something that I was really left with was I don't want this to be a book. I want this to be an immersive experience. I wanted to see it in a gallery. I want to see these projects in person and have a way to interact with them in the real world and from a curatorial perspective in terms of a real-world version of This project I think yeah, the categories work very well and would be great in terms of if you were actually doing a gallery show of some kind or an interactive work. going through three different rooms or sections is really the ideal situation for a curated project.

Alex Pearlman: I want to go back and I add something to the first question because I remember that when you said the Post-anthropomorphic. It dragged in my head that I loved the ethical approach to light pollution and sort of human pollution with the children's book as someone with kids. I think twisting it around on its head of, we don't need to, that we could edit ourselves by just being more conscious of the way that we interact with the world around us and putting really the onus on us to turn off the lights for a different reason than just it's bad. That was a really really cool one. I really liked the children's book a lot too that engaged with some pretty heavy ethical questions in a way that I had not considered before and I loved it.

Lesley-Ann Daly: Moving on to the next one. It's around the creator's responsibility. The question is how does the book reflect on the creator's responsibility in creating the sensory augmentation technologies and other sections or projects that highlight responsible design practices.

Alex Pearlman: Okay, Yeah, I think that creators of all technologies have a responsibility to care about the way that their technologies are used and that goes beyond intent and it necessitates a more consistent touch on the actual technologies and those goes beyond responsible design and goes even further towards sort of responsible leadership and sort of, I want to say I'm searching for a specific concept, and it's alluding me right this second and I'm thinking of being as almost a steward of technology. Right that the creators of these technologies have a responsibility not only to responsible design and to make sure that they are not off the bat harming people, but also to continue to steward their technologies and to even consider making the hard choice of making them inaccessible if they are used in harmful ways that were unintended and not predicted and I think that keeping that touch point on your technologies is really really critical.

I'm not sure that the projects really engaged heavily with that or at least I wasn't something that came up for me when I was reading them, but I'm thinking about, I'm thinking about the political protesting one. And thinking about the ways that those Technologies might be misused and how some of these are very fine lines. Echolocation also could be weaponized, that's the kind of one where that's an enhancement that when it's used in terms of fashion or sensory enhancement for just a regular woman who's a senior citizen who wants to do something fun to her body. That's one thing but the Dual use ramifications of soldiers who

are in places that they could have sensory enhancement at that are ultimately used to assist in doing harm to other humans is something that the developers of that technology should be very wary of and be able to sort of protect against and be very cautious about the ways that their technology is used and who else copies them. And these are really important questions.

These are also evolving ethical questions in terms of how much of the responsibility is on the Creator and how much of the responsibility is on sort of external Policymakers, Regulators, consumers and where those lines blur where they end where the Baton gets passed and whether everything that happens with the technology is the responsibility of its creator or is there at some point when an unintended use occurs that is potentially harmful, can a Creator be blamed for that if there's no possible way they could have known or even if they can't prevent it. So yeah, that's a hard question. I'm not sure if the project really explicitly grapples with it.

Lesley-Ann Daly: I would say just that one also addresses the backside of the book.

Alex Pearlman: Okay. the playing cards. Yeah. So those are questions that you could just be talking about for hours, days, like years. I don't know you can make a whole career out of it like some people do. Yeah. Sorry that you're right. I totally forgot about the whole backside which was so fun and cool. I was thinking about the projects and forgetting that the entire second half is a project. In itself. Yeah, you're right.

Lesley-Ann Daly: is there anything around the creator's responsibility and how like that side of the book?

Alex Pearlman: Yeah. I think that that's when you say the creator's responsibility it makes me also think about these Technologies don't exist even in a corporate vacuum. Right? So, one of the other things that came up for me was like these are gonna be if they're startup companies or something like that. Is it not only the creator's responsibility but is it like a company's responsibility? And how is that different from a technology that's invented at an institution or by a government and how the sort of ethical questions for self-regulation are addressed when these things are independently developed and we're seeing some of that now with social media.

And until now sort my body augmentations of any kind of been a medical procedures and so we haven't really seen it yet. And I think like that there will be some interesting questions that come up and I'm not sure I recall whether or not that was in any of the playing cards. but yeah, I remember this thread of debate in the cards, but I don't remember any specific questions. I'm sorry.

Lesley-Ann Daly: Okay, and what we're going to the next one, so the next is around academic and Industry impacts. What potential impact do you envision this book having within academia and industry particularly in terms of influencing line and development of sensory augmentation technologies and how might it shape ethical discussions and consideration for real-world impacts?

Alex Pearlman: I would hope that it shaped the ethical discussions in real world impacts of these technologies and through their development and design. One thing that I worry about, and this is not with this book in particular, but sort of like any project that's trying to take on

the mantle of addressing the ethical questions of the technologies with their creators and developers. Is that in my experience the commercial side or the sort of technological developers who want to commercialize these technologies are, it's a really a crap shoot. Some of them are very very interested and feel like a deep responsibility to answering and really grappling with these ethical questions around their technologies and some of them, they just cannot be forced to care and that to me is a very scary piece of this puzzle. Which is that there are creators of sensory and enhancing technologies for genetics, so not only just sensory enhancing physical augmentations but also genetic ones and biological ones which sort of branches off from where this book goes. But some of these creators just cannot be made to care about ethical issues and feel like a very strong drive to enhancement at all costs. And that to me is a very scary thing to grapple both in a real-world sort of commercial sense and whether there should be any regulations that are put on these technologies. On the other side, there's certainly an innovators like freedom and freedom of consumer rights and individual freedoms to do what you want with your body and morphological freedoms that come up.

Further it also raises questions about trade and international relations because we are starting to also see that in countries where there are starting to be regulatory protections, specifically I'm thinking of genetic technologies, that other countries with less well-developed regulatory systems and certainly for high technologies. People are just going in and taking advantage of the vulnerabilities of less developed regulatory systems. And just making dangerous things potentially potentially unethical and potentially negatively impactful or harmful things somewhere else just because they don't care. So I think that's something that I could say Academia can grapple with all day and it's just not going to make a difference and I think that is really hard to hear for academic they just don't like to hear that they can write papers about why it's bad all day, and it's just doesn't matter and so It's more about preparation for the inevitable harm and how we deal with it then. So, it's not an ‘if’ but ‘when’ question that academics and the commercial industry are going to need to deal with.

And hopefully rights, the hope is that the ones who find that the regulatory burden of doing it and in a way that is, helpful to society and positively augmenting and not harmful outweighs and so that the ones who would otherwise go elsewhere because of regulatory burdens don't, right, and that we figure out a way to make it possible for enhancing technologies to exist without people just throwing ethics out the window because it's too hard to do a good job. That's the hope, whether that's realistic, I don't know.

Lesley-Ann Daly: And you think that it could have any impact on that?

Alex Pearlman: It's so difficult to say because we're in such a terrible place in terms of body autonomy and the body autonomy debate here in the US. It's awful because I feel like we've moved so far backwards. It's like we have to just get up to where we were 20 years ago to even start to consider what we might do to move past the body autonomy questions for enhancement because we can't even get body autonomy for therapeutic reasons at this point and there are all of these stop gaps and hurdles that have been put on body autonomy for therapies let alone enhancements so it's just horrifying. So I actually don't know and that's why I say that I don't know that it's realistic because I don't know if our regulatory systems can handle this and this is the kind of thing like a lot of high technologies that are moving so much faster than regulations can keep up with them. That by the time people look

around and are f***. This is terrible, no we should do something to maybe put limits on this kind of thing because look it's gotten out of control. Or it's too expensive and all these rich people are enhancing themselves and making their bodies healthier and we're not putting any limits on should Insurance be paying for this so everyone can access it that sort of thing by the time that happens like a lot of damage gets done, right? And so I'm not optimistic at all that this will work out and I actually think it's more likely that the first scenario that I described where a lot of this technology moves overseas and becomes just mostly inaccessible to most people is actually the first part of this what will be a very long arc, but that will be the beginning. That's my prediction. I'm pessimistic.

Lesley-Ann Daly: Yeah, that's okay. Think how might it impact your own practice?

Alex Pearlman: My own practice. I don't really practice anymore. I'm not doing this as much anymore. I mean I think my practice right now and my work in general relating to this is just about telling the stories of how not to be afraid of this technology and how it really can be beneficial in a lot of ways and flipping the script on the “ick” factor that seems to come from people who are just like wait. What are you talking about? It is not a mainstream concept and I think the way that something like this and this book in particular which is why I love it so much is that it is super accessible for the uninitiated and really can be supplemental to my just having dinner table conversations friends at pubs, whatever having something like this that I can turn to people and show that “scary” sensory enhancement is not just for weird bros and Silicon Valley and there's these whole other side of the consideration for these kinds of technologies in their potential impacts. And I think something like this goes a really long way to making it accessible and acceptable.

Lesley-Ann Daly: Thank you. And so second to last question, so this one's around accessibility and diversity. How accessible is the book’s content to its intended audience which includes designers, ethicists and technologists? And does it incorporate diverse interdisciplinary perspectives to enrich the conversation?

Alex Pearlman: Thank you, I think that's a really easy question that I've answered multiple times already, which is I think it's very accessible to its intended audience in a way that I just want to share it with more people. And usually when I see something on this topic, it's not accessible or fun at all because as an ethicist, I just get a bunch of boring papers with no pictures and it’s terrible, so this is way better.

Alex Pearlman: Sorry, what was the second half of the question?

Lesley-Ann Daly: Does it incorporate diverse perspectives?

Alex Pearlman: But yeah, I think it does. Yeah, I know and I think it grapples, I mean in a short amount of time and a short collection of ideas and projects, it raises a lot of questions about different perspectives and diversity of thought it incorporates even in the characters that are shown in the projects that were curated, a diversity of ages, backgrounds, technology, political diversity. So I think It does a good job sort of going across the spectrum of sensory enhancement technologies and who might benefit or be harmed by them for sure.

Lesley-Ann Daly: Thank you. And then the last one is around comparative analysis. So how does this work compare with existing literature in the field, what unique contributions does it make and any areas in the book could benefit from further development?

Alex Pearlman: I am going to abstain from answering the first one because I'm not a designer and I'm not familiar with many other works that I could compare this to.

Lesley-Ann Daly: In your field. So, if you're talking about ethics and things like you just said.

Alex Pearlman: Yeah, okay, so comparatively this is much more accessible and in a lot of ways even more comprehensive of the debates because in the way that ethicists usually approach problems, they have to write a whole book about it to fit in their arguments. And I think that for sensory augmentation in particular "show not tell" is of much better design decision to sort of illustrate the many issues, so I think comparatively this gets to the same place in a way that's more easy but just as rigorous.

And I think that's really key and is one of the reasons that multi-disciplinary collaboration is important because of doing a sort of applied ethics research and then having that taken up by designers and applied for their own practice to results in something like this is the reason that multi-disciplinary collaboration is necessary for any kind of critical thought around any emerging technologies. So yeah, I think it does a comparatively better job.

Alex Pearlman: Projects that I see in my own field, which honestly the other piece of it is like the target audience, right? So, for ethicists it is often the designers and the technologists. So, this project is for designers, technologists and ethicists, and ethicists are generally trying to teach lessons to the designers and the technologists and that is A: close-minded and B: usually unsuccessful because they don't care to read an ethics paper.

Lesley-Ann Daly: Thank you. And are there any areas that you think it could do with further development?

Alex Pearlman: Yeah, I mean, like I said, I think that you should take this show on the road and do an actual pop-up Gallery. I think you should collect all of the projects in the book and either publishing it as a book because I've had three people try to buy it from me, and so you need to be selling this. You should absolutely publish it as a coffee table book, it's so good, and you should consider doing an actual experiential version of it. These are three-dimensional ideas that deserve and in a way for dimensional because their futuristic and they also come with it's thinking component that goes on inside of your head that geospatially doesn't have a place right but then I think encountering these ideas in the real world in a tangible tactical way like tactile away it would really, I move that it's already I think a really accessible thing and I think a really interesting way that you've designed the book but, it even enhances its accessibility right because you're gonna be able to reach people who maybe don't want to sit and read a book or aren't interested in sitting and reading a book and absorb information in a different way. You're then gonna be able to capture a whole other audience. And yeah, I think that. Would be awesome.

Lesley-Ann Daly: Cool you but one last question that isn't on the list, but it's specifically looking at the flip side of the book. So, the point where it says to flip it upside down and then it speaks about the back half of the book. What was your impression of that?

Alex Pearlman: So, I wanted to play, so I'm having a regret right now because I wanted to play it at a dinner party and do some of the cards and actually try it out and I didn't get a chance to do that. And I hope to at some point they use it. But yeah, I think it's meaningful in the way that you are forcing the person who's experiencing this work to do their own work, and I

think that's really effective and important instead of it's like I said, there's a deep learning component here that's less about lecturing. I don't feel like it's a lecture. I feel like it's a friendly guiding hand that helps anyone who's experiencing this work to think about it in new ways that they probably wouldn't have before in a way that is not patronizing and it's not egotistical in the way that professors and academics often really puts the burden on the user not on you the Creator to get everything that they can out of it. it gives you another opportunity to experience even deeper.

Alex Pearlman: And it creates an interactive that I think real world visions of these technologies are important in having that psychological, thought-based component is a really important piece of it. And I think that the flip side does help nurture it. Yeah.

Lesley-Ann Daly: Just so the one last one is on the back, I make it a reveal about the book that. Did you get that?

Alex Pearlman: I don't know, I don't think so. What was the reveal did I not look at it closely enough.

Lesley-Ann Daly: And so the reveal is that all of the projects that I curated were all actually done by me.

Alex Pearlman: I did not, I missed that.

Lesley-Ann Daly: instead of having nine designers

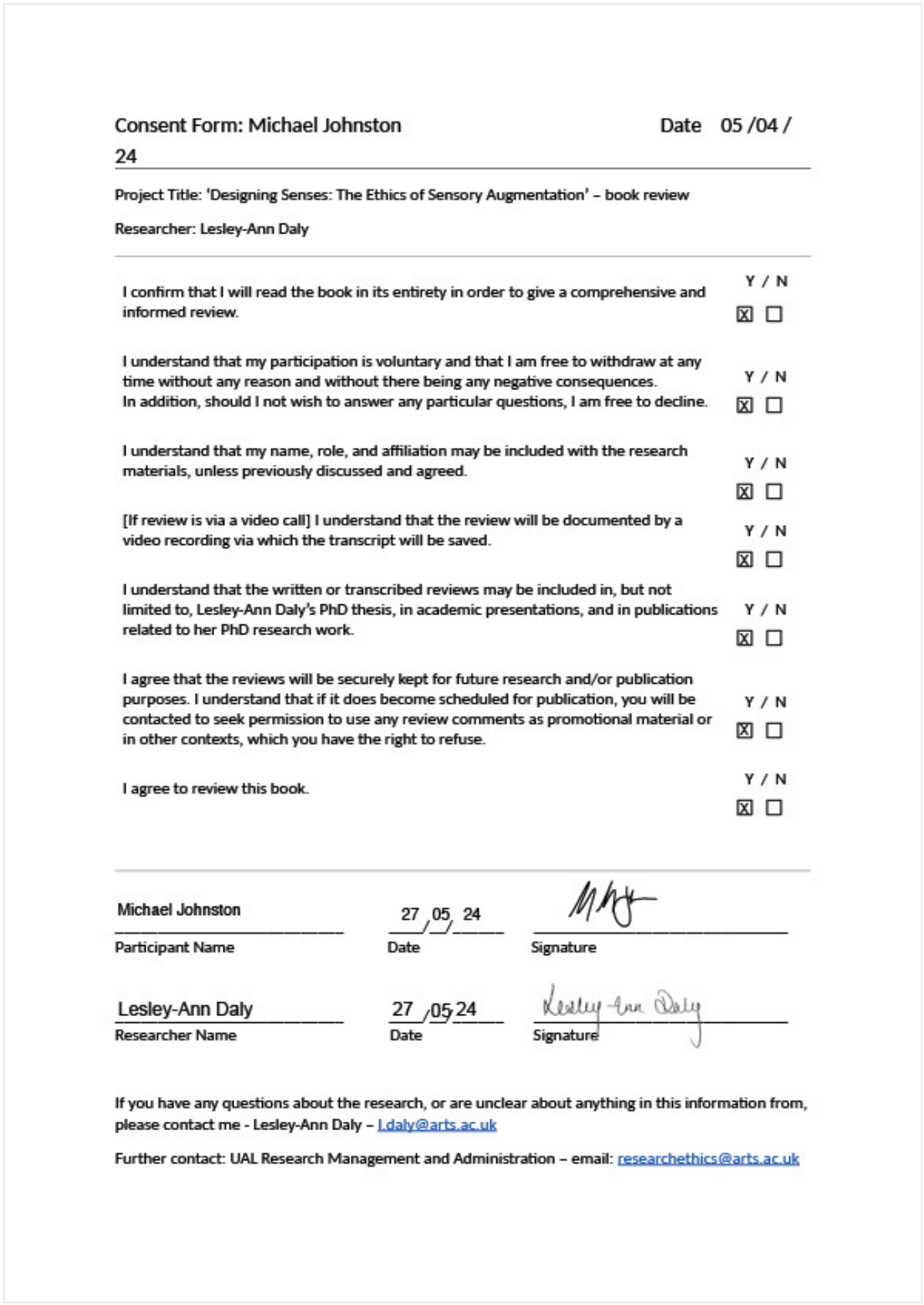
Alex Pearlman: my God, you're so brilliant. Why don't you make a gallery show. This is so good. You're a lone artist.

Lesley-Ann Daly: So, they were all in collaboration with other people. So, the idea is to still have diversity of perspectives, but so each of them I made. Thank you

Alex Pearlman: But that's so good. I really admire this so much I have to tell you it really blew my mind. I've never seen anything like it. And because I'm not in design school. So also, I'm like a perfect audience for you just being like it's okay.

Lesley-Ann Daly: Thank you so much

Alex Pearlman: Yeah, no, but I didn't get that, and I am yeah, you did a great job and you also did a good job choosing collaborators. So, in as much as the diversity of thought, and influenced your choices and design choices and how to frame the projects but really, really cool.



Consent Form: Michael Johnston Date 05 /04 / 24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	☒ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	☒ ☐
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	☒ ☐
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	☒ ☐
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	☒ ☐
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	☒ ☐
I agree to review this book.	☒ ☐

Michael Johnston	27/05/24	
Participant Name	Date	Signature
Lesley-Ann Daly	27/05/24	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 472 Michael Johnston Co-Signed Consent Form, 2024.

Designing Senses review- Michael (2024-05-28 19:34 GMT+1)- Transcript

Attendees

Lesley-Ann Daly, Michael Johnston

Transcript

This editable transcript was computer generated and might contain errors. People can also change the text after it was created.

Text has been reviewed for typos and structure.

Lesley-Ann Daly: Perfect. It should be transcribing. So, the first question is around the ethical exploration. So how effectively do the projects explore the ethical implications of sensory augmentation Technologies on humans, society, and the world? And are any specific projects that stand out for the relevance and deep ethical inquiry?

Michael Johnston: I mean, I think all of the projects. I mean in their kind of theme one, after ethical questions and what they were doing. and I think the way that the format was utilized to almost pull you into the story, split it I think in two different ways, so you go into the experience yourself and feel like participant. So it allows the reader or the person experiencing to actually start to question the ethical part of it themselves. So it feels like that is at the first step of the experience of going through that and then the summary that you included which looked at the different ethical considerations that you included? I think gives you an ability to reflect and go but what about mine that I thought through as that process, so I think it's a great balance of having both the ability for the reader to go through and dig through their own but also the structure that you included at the end, I thought this quite good and to do with my example. Yeah, so that ethical kind of framework structure that you had at the end was strong and kind of good to reference, but also question yourself and it kind of was almost what's the next layer of consequence beyond that? So an example I give is looking at the Enhancing Akansha one where it was looking at kind of, is there a view of empowering on a long one? Sorry?

I think one of the elements was a more social impact of I think it was Marie, the woman with the enhanced ear. It's almost like there's a social impact then of the role of older women in kind of broader society and things like that. So it felt like there were almost the first order consequences, but there's a kind of space for broad consequences within that. And the other one was around it was the underwater one. When you would kind of utilizing it, it feels like there's a real interesting I guess health consequence around mental health. Could it be a positive mental health, could be a negative so I think as much as you framed it very well with your own it starts to make you think of your own which I think is a good process.

Lesley-Ann Daly: Thank you. The next question is around the speculate development. So how respective elements used to explore possible futures a sensory augmentation? And how do

speculative critical design methodologies such as the use of the uncanny, deception, and provocation contribute to the overall impact of the book?

Michael Johnston: I think it's everything the book. I think the whole process sucks you in to the experience. It makes you feel it, which I think is crucial for speculative design. I don't think it's about just telling a good story. I think the person needs to feel it which I think that the way that the book was structured and pulling you through that was a great way of bringing speculative elements together. Which I had the same before, you've done very well and trying to balance the speculative story and the artifacts, the accessibility, but also framing it in a way that, that's not quite the right word, but things like exploring the ethical implications, but also the broader themes that were in there I thought was done exceptionally. I think even just you do it from the very beginning which is framing the book with a forward from a so-called expert that the reading that straight away you thought it's kind of like okay, we're off. And I guess even from my perspective of realizing that I was a reviewer I just literally read it back to front. And I had to step back and realized that it wasn't real.

Michael Johnston: And it took me a while because I really did get sucked into it, which I think was perfect as amazing and I keep calling an experience not just reading because I think it was so many things in there. So I think there was a very good mix of everything from a trends website that kind of sucked you in to I think it was like a hospital assessment and I think the design of each of them made you kind of think it must be real and even down to the handwriting and things like that the thing very broad spectrum of artifacts very broad spectrum of stories. And then characters look at the character references were very good in terms of warming you to either like them or not or play along. So I feel like a lot of speculative yeah, elements are examples tend to be not one sided, but they use a small kind of palette. I think the breadth of palette was helped bring nuance to the story lines, which really helped bring it forward. It's updated. Yeah, it says I think getting caught up in the detail almost made me forget what I was doing, which was reviewing. Which I think it's important. And then that Kind of line of is this real or I think is the key and it was done really well. You've got to run the line. And I think that's what makes people feel like because it's like wow is it not and that questioning, I think is the power of it in terms of actually starting to question your reality your ethics or things like that. So, yeah well done.

Lesley-Ann Daly: Thank you. The next question is around Visual and narrative clarity. Are the concepts and ethical implications presented in a way that is both visually engaging and easy to understand? And how does the book structure can contribute to the narrative?

Michael Johnston: Yes, this is a set of things, there's a wide use of narratives, which I think is good. It shows breath and I think it really did feel almost a level of complexity with the ones that you chose in the order that you chose them at. It almost felt like the first one was a bit easy and then you kind of pushed a little bit further, especially with the third topic just because it's so difficult, the post-Anthropocene I think. By almost felt like you were getting the method and you're playing along with it with the process. So, by the time you got there you were playing along. So, I think the real life characters like Marie Marsh, like a studio or the scenario around stealing the lights you could put yourself in that scenario as much as it

was looking in the future. There are elements that make it accessible now. So, the way you use different visuals within that and I said before the trend website almost like magazines style and then, even your passport in there and the visualization of something, a bit more stretches this kind of line between you want it to be accessible but there's also kind of a whimsical pocket of push there trying to balance that was difficult.

But as it said, I feel like you almost got confidence as you kind of went through the stages and it's like we're in it now by the time we got to post-Anthropocene. It was a little bit more difficult, but you're kind of where I trust you, but it's almost like I trust where I'm going with this which is done well. The children's book was fantastic even in the way that the visualizations almost would have been easy but to get the wording kind of that simple as well. I thought was a tough move and it kind of feels like it stops you for being a passive reader and it makes you want to participate. So, I think if we're always just a reader, text and what background and stuff like that? I'd be like, okay, but I almost feel like the visuals and the style and everything to pull me into one and participate. It made me have that feeling of, is this is wrong, is this is right or whatever my personal vantage point on that was. And yes, everybody drawn into I feel like I'm a participant now.

Lesley-Ann Daly: Thank you. And the next one is around the creator's responsibility. So how does the book reflect on the creator's responsibility, so this is the creator of technologies, so the designers, the technologists, and ethicists? And again, are the new sections or projects that highlight responsible design practices?

Michael Johnston: I mean one of the things I focused on was the fact that the writer put themselves in the position of the creator and I think even trying to live that experience was a really interesting take on it because it breaks through conceptual or imagination, and kind of lives through that process. And so, I'd almost say what would be the output of that to help kind of question from other people are going to create for us. Yeah, that's a hard one because I didn't write it in the context. I think what? I tend to think with most technology things that I've seen and even just working with someone recently is they only see the good. And the view of the creation and its impact on humanity tends to be quite narrow. And I actually think the power of storytelling and narrative and characters and tools you use in design that you used quite well here will broaden their own perspective of it. Because it's just my assumption and my experience of working with lots of people who create technology, I tend to find that they're quite narrow. And so when you say the word creator here for me, it's like they have a picture of the world. That's one of the important things is how can we look at more vantage points? And I think the style in which you've done this as I've said is not only the vantage point for the creator, but for others to bring their vantage points as well. And it's about how you open up the discussion around that to say I thought this is all this perspective and how you could use this as a tool then for the creator to either take that as feedback or want to carry on.

So yeah, so I think that the book itself is a speculative experience in itself and so If I was to look at other books, I've in that space or academic or, not much academic literature, but more academics writing books. It tends to be very theory case study. And that's a similar model, right? You're out of theory you write a case study. I've seen the idea of using

speculation to suck you into the process and feel it out but why is it not been thought of before? You know what I mean? That's the point and pulling that experience in so that I think would shift up for Academia is to think about how other ways we can evaluate situations or evaluate work. As opposed to just having I don't know 10,000 words and I'm sure you have to do that to a certain extent, but I think that's really interesting way of going from an academic perspective. How do we evaluate that right? So, it's the writing or is it now the impact it's had on the reader? That's super interesting right? So, I would say that this would have a greater impact on more people, it's more accessible than reading a 10,000 word let's say thesis, so I think that kind of plays on that and also probably brings more of emotive point to it than just a rational analysis. Which I think is often missed.

I think women in industry, industrial perspective for circular industry, for both sides, I think the book offers really usable structures and frameworks. Each section as I said, the flow of I go through my experience and have my perspective and then I get to this point where there is a framework and either I can work within that, or I can push it against it. And I like that flow works and I think that's a really interesting way to work with policy or industry when industry trying to make governance and things like that. It doesn't always work when it's just purely a framework. So, I think that the balancing act of those two could work quite well. It's particularly when it comes to technology and often looking at quite a narrow perspective of what could happen or what they want to happen is probably a bit about putting it.

Lesley-Ann Daly: And then how might it impact your own practice?

Michael Johnston: and then for my own practice I think it's a hard reminder of the power of using the tools of speculative design to have an impact on a large group of people. Just from my own perspective I've done it in certain ways, but this is the way that, this is put together is really succinct, really well done on that balance of really pulling you into the story but framing it in something quite specific and thought out, so I like the balance. I've never really thought about I guess my focus in mind works always been about how do I get them to feel something? I think where you've done is you've got the feel and then moved on to how do I get them to question? And bring their own questions which I really like because that is the whole point. And so I do feel like from my practice, I'll probably been one short, just that was an expectation where I think the way you've structured this is let them go through the experience. What their own ethical questions are within that, and I think that's really nice way to expand a speculative designs impact on a broader group of people.

Lesley-Ann Daly: Amazing. The next one is around accessibility and diversity. So how accessible is the book's content to its intended audience, which includes designers, ethicists, and technologists? And does it incorporate diverse interdisciplinary perspectives to enrich the discussion?

Michael Johnston: So, I think if I was to take it from the audience that I understand which is designers and maybe to a certain extent if this is almost gonna put philosophers in there, I think it's a fantastic use of the tools design artifacts. I feel like it's accessible to that group. I feel like I know a few technologists, but I don't feel like I can make a call about whether it's accessible for technologists. I do feel like the language might be a little jarring. But I don't know it's a pure assumption. As I said before I think that they tend to focus on quite rational

and specific views of now or something can work or will work should work so I kind of almost don't want to speculate too much because I feel like that would be an interesting exploration in itself. And I guess the question is how accessible to who as well because I feel lots of other areas that this could be accessible to as well. More I guess decision makers in Government, organizations things like that. So, I feel like it could be accessible, and what I find is when people think in concepts or imagination, they just sometimes need something tangible. And I think this makes concepts tangible. Thinking of the intended audience immediately is designers, it is accessible, and it does have that interdisciplinary perspective. But I am speculating about the rest.

Lesley-Ann Daly: Thank you. How does it compare with existing literature in the field? What unique contributions does it make and where could it benefit from further development?

Michael Johnston: As I've said, I think I find that the existing literature tends to be a concept structure and then a case study, for example. Your framed as reviewing. Where I think the real shift here and the real unique contribution, is breaking that and completely sucking them into the experience and making them feel. That I think by going through the process itself you come out I think with them better view than just kind of reading a rational piece and looking at different objects or case studies within that. So, I think that is a massive difference and I think that's in essence the whole point of speculative design. So, I think that's fantastic and pulling that I guess participation in whatever so I feel like I'm now participating in and I feel like a sense of ownership over it.

Michael Johnston: And I think I'll have more impact in what you're trying to put I'm doing this and then I think, I do, feel like you've kind of balanced it off with simplifying frameworks, that could be very difficult because ethical questions are the heart. But actually, I think just structuring a few questions to keep that process going, I think you kind of come out of with your own. And there's a structure which is done really well, which I think is about kind of continuing to drive the discourse in how you're doing that. The only other area I think already highlighted. This is further development, I think kind of using it to gain broader perspective, so whether kind of more technologists or people kind of making key decision makers in I think tanks governments or kind of any agencies within that space. I think would be more out of interest to see if it does if it helps them kind of bring stuff to light, but also, I think would make it show its impact beyond an audience that might have an understanding or a maturity in the tactics or the use of artifacts and that stuff already.

Lesley-Ann Daly: Thank you.

Consent Form: Scott Novich Date 19 /04 /24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	[x] [ ]
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	[x] [ ]
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	[x] [ ]
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	[x] [ ]
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	[x] [ ]
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	[x] [ ]
I agree to read and review this book.	[x] [ ]

Scott D. Novich, PhD	04 /19 / 2024	
Participant Name	Date	Signature
Lesley-Ann Daly	19 /4 /24	
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 473 Scott Novich Co-Signed Consent Form, 2024.

Designing Senses review- Scott Novich (2024-04-19 15:35 GMT+1) – Transcript – Google Meet

Attendees

Lesley-Ann Daly, Scott Novich

Transcript

This editable transcript was computer generated and might contain errors. People can also change the text after it was created.

Text has been reviewed for typos and structure.

Lesley-Ann Daly: So, we're recording. I'm gonna start the question set. So, the first question is around ethical exploration and how effectively do the projects explore the ethical implications of sensory augmentation technologies on humans, society, and the world and are there any specific projects that you felt stood out for their relevance?

Scott Novich: Yeah, so there was pretty, how do I put it, I enjoyed the kind of the breadth of the projects in terms of Rightly cucumbers stuff. That was I guess you'd call more near-term to way more kind of. Out there and again, I'm not articulating this, but an example would be I think I'll just start by saying the one that I think most resonated with me as someone who has an engineering background. In terms of the ethics was definitely the enhancing account. Akansha kind of pronouncing her name correctly.

Lesley-Ann Daly: Yeah.

Scott Novich: That one was kind of I guess felt obviously most relevant to my experience in terms of putting I guess this all get back the concept of user research. I guess more specifically in the importance of doing really user research with people and I guess ethics is something that I never really thought of but in some ways is baked into that and I'm maybe being a little vague here. So I'll give some concrete examples with neosensory that came out of my PhD work. And again, I was very much engineering background and during my..

Lesley-Ann Daly: Just before you I just want to caveat that this transcript will be in the thesis. So, if there's anything protected, yes.

Scott Novich: Yeah, there's nothing sensitive. Yeah, I'm actually very high the more people who hear this tale. Probably the better. it's something too bad right thing sensitive like that, but I appreciate you caveat that we're just cleaning that.

Scott Novich: so right so my background was very much engineering and I think during my engineering studies both in probably PhD and undergrad there was very little emphasis placed on ethics and user research throughout that. I think the only recollection I have about ethics was maybe towards the end of my undergrad one of our we had to do something that was required is super vague because there's a while ago. I just remember one Professor it was just one maybe class session with one Professor towards the end of our undergrad were professors said don't harm people with what you create, technology can be used for good or bad and that's kind of that.

Scott Novich: And then I was first posed. So, then I joined David Eagleman's new Lab working on sensory perception research and that's where we had the initial idea for the Augmentation device that's kind of general purpose like give yourself any senses using sensory substitution through Called the VEST, versatile extra sensory transducer.

Scott Novich: that also I mean my first exposure I think to ethics a little bit was in his research group with having to do IRB training, right? Because then we started working with subjects and that was still kind of like not how would I put it right kind of blown over a little bit or a slash Really boring you're her better, right? I appreciated it, but that was between ethics as far as ethics go and I guess you could call empathy and maybe this is a second question. I forget in your set, but

Scott Novich: That was kind of about the extent of my exposure with these things. And yeah, I guess I'm getting more into empathy rather than ethics. I hope that's okay. I'm gonna be jumping around a lot here. Lesley-Ann. But whatever. so yeah, we designed the VEST and then we're trying to figure out what are great applications for this that we can test and we came up with we, read the literature, we figured we needed probably the most effective application to build on top of this platform would be something where you get immediate sensory motor feedback, right? You put some motor output into the world.

Scott Novich: You get some immediate sensory feedback, which is how probably the most powerful way you can train your senses and that's when he came up with sound to touch for people who are deaf or hard of hearing. And because at that point it wasn't a totally new idea like it had been done before but no one had really I think attempted. In a while, a device of the scale that we were talking about with the processing power that we were talking about at the time before that there was a few multi-channel tactile hearing aids and the 90s through early 2000s, but that was about it. So anyways, we made this thing and just kind of David gave a TED Talk he sees through money at us, right which is insane and we kind of got started off in building it without kind of really

Scott Novich: understanding or talking to the deaf Community or listening to their needs too much out the gate. I mean eventually I mean we did and we ended up, right, building a bunch of really expensive vest prototypes. For this application and kind of recruited the subjects before doing any real user research, which is great. I mean and they gave it to them. This is cool and all but we get by just finals the sign language in ASL it's understand speech through this best like that was the original intent of this thing is to provide enough audio tactile resolution to understand and learn speech. So that was kind of a bit of an, a moment that man, we need to

Scott Novich: We need to be running that's when we kind of learned there's this area, I don't know if you call it area, whatever called doing user research really the people put yourself into their shoes and trying to understand their actual needs. But out of that right? We learned the VEST is cool and all but we're the main benefit we were getting out of just enjoying the sound of hearing our children laughing or knowing if I left the water running, that's sort of thing. It was like if that's the case, you don't need a giant vest you can get by with a wristband. And that's how I ended up kind of.

Scott Novich: Moving that into respect I guess that's not so much on the ethics though. I'm sorry. So, let's go back to the original question the ethics. Can you repeat the question again? I got Way Off Track and…

Lesley-Ann Daly: Yes, of course.

Lesley-Ann Daly: It's how effectively do the projects address the ethics of sensory augmentation in regards to humans, society, and the world and then any specific ones that you think were really good for the ethical inquiry.

Scott Novich: Yeah, okay, so I got off track. So I think the enhancing Akansha shows it was more to me about the importance of empathy and user research and putting yourself in the person's shoes and Necessarily about ethics and now I don't have a deep academic background on ethics. So I'm sure there's an ethical component to that but that was the one that just the most resonated with me. So I know I didn't really answer your question. I guess the more dystopian ones right like the Post Enhancement Support Network, that one really stood out to me because you probably know about this that one's actually not so science fiction, right? There was the name of it the vision implant. The Argus was that what is called this is back in 2016-2017. There is a startup that made

Scott Novich: a visual whatever for blind people implanted the visual perception device whatever and they went out of business and those people have all sorts of issues with their implants after that. So, I think that was very real but I think the thing I liked about that one and where was the other one? I mean, I guess this gets into The water so in terms of Ethics the ones that probably resonated the most right? We're like that one the Ghost and the tentacle is pretty hilarious as well. As of course where was it? The one that makes fun of was a Cambridge analytica that you called Oxford something. I'm guessing that was whether you were alluding to

Lesley-Ann Daly: Yeah.

Scott Novich: Network the Oxford haptics, there you go. I have to say that so the concept of using I guess you're calling it speculative critical design or the concept of creating these stories that I guess they're allegories is that the right term? Parables, allegory fine but I think that's a really powerful methodology for driving home.

Scott Novich: in the importance and understanding of why ethics should be really deeply thought about in the process and makes it really fun. Right, this is the kind of thing, I wish I had and read, during my undergrad or Graduate Studies, I think something this kind of methodology that you're talking about for Learning and understanding ethics at a really deep level where it's not just something you're trying to kind of check off I think it's a great concept. so

Scott Novich: in terms of the more specific ones, So the one about I have so many terms. You'll have to forgive me. I just have so many terms in my head. that just between this and all the biotech stuff is just I have to post enhancement support now. Yeah, that one I think was very real and I think the ones that were super effective as far as the story is going General to me. We're the ones that really strapped that were either this is where I was like, this is something that

Scott Novich: this is actually a real story this is an actual thing that's already happened, which is the case with whatever that post enhancement Support Network right or the ones that

Scott Novich: the ones that were kind of I guess this is less than the ethics but the ones that were more ambiguous in terms of you had some stories that were, maybe provocative is too

strong of a word, and this is also before I realize these are all fake. Right, I love that you made these, it wasn't clear necessarily out the gate, especially when you're just browsing through the book. But some of these were fake and I think when you think that 'Is this a real thing?' I think it really drives it home. I think for example the Aging Disgracefully.

Scott Novich: the Aging Disgracefully when you have here I've didn't quite again when I did the first pass was initially browsing it, right? I didn't catch that. You're on their spring summer 2027 cover right? You have it like in one of the columns, but when I hadn't caught that. I was Okay, I actually thought it was a real case study at first when I first cracked open the book and was browsing. Gosh, it's of course, this is totally believable. And of course, this is a thing and this is amazing, why haven't I heard of this before?

Scott Novich: I think it's being able to straddle it's which is a really tough thing to do things that are right. These are story when you can create stories that are

Scott Novich: those kind of provocative but also makes people think it's real close enough to be reality. That's the really difficult meal to eat. I think that's where things were most effective as far as getting needs think about things more deeply I guess but that's less closely related to the ethics. Specifically right, so I guess all this is to say let's take a critical design at the whole concept here kind of speculative fiction as applied to a tool for thinking through the ethics of a design problem or challenge I think is a really powerful concept that turns this from a boring philosophical thing to a really fun exercise. It's actually enjoyable and really you doesn't even force you, you just naturally start thinking about this stuff. I think that's great. So that's where all even on that.

Lesley-Ann Daly: I think you kind of answered the second question anyway, which is all around the speculative elements. So, I'll read it out just in case there's anything else you want to say.

Scott Novich: Yeah.

Lesley-Ann Daly: So, it's how we're speculative elements used to explore possible futures of sensory augmentation. And how does the speculative methodology use things like The Uncanny, deception, and provocation to contribute to the book?

Scott Novich: Yeah, Yeah, I think that's probably what I have a lot more to talk about. The other thing is I don't think, yeah, I don't think there's any reason why this framework has to apply specifically to sensory augmentation. That's the only other thing I was thinking about and would add to this but the sensory augmentation I think is a great kind of theme and focus as far as bringing this into practice.

Scott Novich: Yeah, let's see. What else on the concept. I mean, I think yeah, I'll just leave it at that for now. What's the next question you got for me?

Lesley-Ann Daly: Sure, the third one is around Visual and narrative Clarity. Are the concepts and ethical implications presented in a way that's both visually engaging and easy to understand?

Scott Novich: yeah, I mean how would I put it, all the examples were pretty concrete. I don't know what else to say they were I mean, let me see you wanted to plug it through there's a few that I feel like I kind of lost the thread on.

Scott Novich: Maybe only one I think the one I kind of just didn't spend too much time thinking about where was it? Sorry things like a one pager. Yeah, the plug and throw away, that one that one is cool that one, I didn't really think too much about this. I can go down shop and get a thing and then through it out, but... Yeah. Sorry. anyways Cool go on.

Lesley-Ann Daly: That's okay.

Scott Novich: That question again was about can you?

Lesley-Ann Daly: And visually engaging and easy to understand and...

Scott Novich: yes.

Lesley-Ann Daly: so how does the whole structure of the book work towards that?

Scott Novich: Yeah, super visually engaging I would say for obvious reasons the artwork and design in this is absolutely gorgeous. And I forget so I know have you mentioned some collaborators in the back for the actual artwork itself. Is that your art or was that with some friends of yours?

Lesley-Ann Daly: It depends on the project.

Scott Novich: Depends on the project. Either way I thought visually it was all really fun, really stunning. It's super engaging, reminded me a lot of do you know the UK Design Group tomato at all? Okay there and they are do know, you probably know Underworld? Maybe yeah, so Underworld that's their Design Group that does all their design stuff. So, Underworld was involved with them. It's an Art Collective. And anyways, they have a lot of these really fun design books that they've released they're a little bit more avant garde, than what this is in terms of having a concrete concept. I guess you could say but they have this sort of o, first of all, I don't know what you call beautiful contemporary design...

Scott Novich: Aesthetic which I think I don't know what you call but you captured it. I found it engrossing and engaging and they have the sense of humor in it as well, which I don't know what you call the sense of humor. It's like kind of like cheeky, I don't know what the term is but it's so yeah. I know. There was I don't know you call this kind of subtle underlying humor that was also in this and I really enjoyed it. That as well this is actually one of their pieces behind me. This is one of their posters and it says 'I have cried for so many years that my tear ducks are partially blocked with a lime scale buildup on it.' What I mean, it gets kind of avant garde humor. I don't know what you call it. So, I found that to be very enjoyable I think the

Lesley-Ann Daly: yeah.

Scott Novich: Initially I usually do things like passes rights my first pass was a bit like this it all felt a bit confusing on my very first pass by opening. That's not really like a problem.

Scott Novich: Just in part because if you just flip this open right for so the images capture a lot of your attention, right? And then I think the introduction is, I know why you've got it, you have to read through the body of text to get the context really, what's going on, which I think it's fine. I think it was all straightforward, very cool so I think yeah. I'll stop with that. Yeah.

Lesley-Ann Daly: Okay, the next questions are on the creator's responsibility and how does the book reflect on the creator's responsibility in creating the Technologies? And again, are there any sections or projects that highlight that practice?

Scott Novich: Yeah, I mean, I think the most explicit example is probably that Akansha story and I think that's actually by the way that's a great example of where you have some of that subtle sense of humor with the team that doesn't listen here proposes some arm with It's like a propeller on it. I thought that was hilarious right. And I think the rest are more like, some of them are just not a 'bad' way, but just obvious kind of here's what could happen if you don't think about these things which is good for getting people think about stuff. Like the whole post-human protest, like that that reminded me a lot by the way of what deus ex video game, there's a whole thing like people who are augmented being treated as lesser-than, I think it's somewhere in there.

Scott Novich: Yeah, so as far as the creator's responsibility and then I thought I did actually the other one that really struck me that I actually really liked was When Lights Stole the Night. That kids story about designing ourselves instead engineering ourselves to fit the environment rather than trying to make the environment fit us. I thought was, I like that you had a more I guess utopian story in there as well to kind of balance it out because I think usually when we think about, I know again I don't have a deep background ethics, but my impression of the field is it's largely thing about all the terrible aspects of what could go wrong if you don't pay attention to things. So, I think it's also great, I think it's also really important to talk about more thinking about through what are the ways things could go right? And that one in particular I really loved because as a concept. I think the more dystopian ones are okay, this is the more dystopian stories are more how to put it here's some hypothetical example of what could go wrong with things in the future? Whereas the utopian story was

Scott Novich: Had something more at the core of it, which you could kind of apply to just this concept of designing in a way that's like you're adapting yourself to your environment, is something that you can apply to any kind of technology that you're developing, I think any problem that you're kind of trying to solve. So, I just love how widely applicable that story was in terms of, I think I would carry that with me if I were designing a new product in the future. It's something I would think more about that concept of how can I designed myself fit into the world in a way that's healthier than trying to yeah. That's what the world itself. So that was super cool.

Scott Novich: Although I guess I have to think about how much that applies specifically, how much you could take that outside of Sensory augmentation for example? I guess I'm getting to, in some sense that story might be more specific to sensory augmentation, right because that's kind of.. Anyways, super neat and it looks like you did have plug-and-throwaway and maybe starting to no, okay plug and throw away was not juxtaposed right next to when stole the night because I was gonna say that's more about just kind of yeah, a world scattered with disposable body parts the outlive Humanity in all our vices. I feel like a possible mild missed opportunity to putting that next to one light stole the night, by the way, I think that would have juxtaposed it well. But neither here nor there. So right I mean it all comes down to for me that the story about the children's story I think that was really inspiring that something that I'll probably take with me in the future andI think the concept of doing what I call it more like proper user research I guess is what I call it. I think that's something I'm not like having

engineering background right? I don't have a design background, but I can see I imagine most designers have to do through training about user research no, which is not something that's taught in engineering and I feel like that is something like the concept of user research is something that does need to be taught a lot more in the field of people being educated in engineering because people who do engineering a lot of times are designers, they're just untrained designers, right like a lot, most people you do engineering nowadays, unless you're doing some I don't know, I mean, I guess yeah, but definition of Engineers you almost are a designer, right? You're putting technology to work in some way that people are going to interact with. And so I think this is I could see this being really valuable for people in like the engineering discipline who aren't getting real lessons on ethics and user research and empathy in terms of empathetic design. I'm just making up terms now all these things in there in their education, so

Lesley-Ann Daly: No, it's really good.

Scott Novich: I'm sorry. Are you really rambling Lesley and I'm just hot off getting the kids off to school on being a play last night working on stuff.

Lesley-Ann Daly: It's really interesting.

Scott Novich: So, you'll have to forgive me.

Lesley-Ann Daly: There's nothing to forgive.

Scott Novich: You can actually continue, distill it down for you so you can get through my gobbledygook.

Lesley-Ann Daly: So that was the question around the creators responsibility and how the book reflects on that also looks at the back side of the book. And the reflection in that part.

Scott Novich: Yeah, yeah, so this is one where you'll have to forgive me, we hadn't the time, Neosensory, to go through this workshop with you because I think this would have been a lot of fun. Also, maybe in some ways slightly too late for us. Just really bad timing for us over there because we had our products. Not to say we can do it. But we had our product kind of out and thought through to some degree already and then the team was running around, not that I was gonna say running around like chickens with their heads cut off but that's not true. Just like everyone just so, anyways, so I love this framework. All this is saying I wish I had a chance to actually go through an actual workshop with you on this because it looks like a lot of fun. I mean, I think that's the big thing here. I know I don't know if there's two vapid, but I think

Scott Novich: I don't know there's so much. Again, this is my impression as an engineer coming into the space who's little background in ethics and have only learned about the importance of user research Etc. Through just my own personal missteps and I've never had real formal training on this I think having some methodology like this would like. Having something like this workshop that you've put together and this book are, they're really powerful potential tools for people who aren't designers specifically, I mean, I'm sure this is great for designers, too. I just don't have a good intuition for what training designers really go through. But I think the biggest thing is people like me whatever we want to get building and it's just like ethics is the last thing it kind of on our mind, we want to get building. We've been

inspired, what I think people who like to build have been inspired largely by stories? In ways that are getting, some ways that are bad. What's his name? There's some famous quotes

Scott Novich: We went and built something we read about the department Nexus in the science fiction story. So, we went and built it or something. There's just a lot of I think people get inspired by things that they read, but don't really think about the implications of those things. People they read cyberpunk, something like this type, think the technology available is cool, let's make it happen. And that's kind of about where things stop right in terms of thinking about things. So, the point is I think having a workshop that to me look, again, this is just I feel that is simply calling it fun, but something that I would love to try like I think this framework is something where, again, I'm speaking like hypotheticals because I haven't actually done it.

Scott Novich: I think you need to have this sort of accessibility, kind of enjoyable elements to the process be able to get people to think more about their ethics and the risks of what they're doing when they're designing right or when they're building things if they don't have that sort of that training I think these sorts of tools, I guess is what I'm saying are really really important to have out there and we need more of these. So, I know this is super high level and I'm just kind of rambling but

Scott Novich: Yeah, it's hard for me to speak about, I wish I could speak more in depth about kind of the specifics. I read through all the cards; I think they're all great questions.

Scott Novich: And they all sound fun to answer with the group. It’s just without actually having gone through it as a workshop I guess is what I'm saying is it's tough for me to have more in-depth critical feedback without having experienced the workshop I guess is what I'm saying. So, I really hope there is another opportunity for me to be able to try this out as it's intended. Is what I'm getting at. Yeah.

Lesley-Ann Daly: Thank you. The next one is around academic and industry impacts. So what potential impacts do you think that the book could have on either academia or industry particularly in terms of influencing how sensory augmentation technologies are designed?

Scott Novich: Yes, I guess I touched on this, kind of, this is mainly what I've been talking about. I guess this whole time which is just I think again going back to my personal experiences like a lot of this stuff just really isn't not brought in really in any sort of real or engaging way in either Academia or industry. I think again the only exposure I had, I mean, I wouldn't even call it the only real training or exposure I had, in my formal education was having to deal with IRBs right for running a study and leading to at some point take human subject protection training, which I'm guessing you have some equivalent of in the UK. Do you have IRBs for when you run studies and stuff like your institutional review or so, is that concept over there?

Lesley-Ann Daly: We might do a bit of ethics training for particularly interviewing or working with vulnerable participants. But that's from design.

Scott Novich: Okay.

Lesley-Ann Daly: I don't know about from engineering or any other fields.

Scott Novich: Gotcha, maybe after. yeah, so at least how it works. And I think do you a lot of the US is in the engineering discipline specifically, there's practically nothing like there's almost nothing. Like I said, I think things may have changed. but it was just like a box that we checked and kind of like a professor kind of mentioned it in passing or whatever and that I think was during undergrad and there's probably nothing at all during my PhD as far as requiring this training and then the only other exposure I had was like I said, in the site when I started working a scientific research group. In the US at least any time you run a research study.

Scott Novich: Especially involving any sort of human participants in particular. It's not like a legal requirement but it's usually like an Institutional requirement and most journals, most academic journals have this requirement is that the study needs to then approve by what's called an Institutional review board or an IRB. There's a lot buried under that you can tell by the way, you can tell me if you like, know all this already and I won't.

Lesley-Ann Daly: No.

Scott Novich: Right, so studies are and so with the IRB then it's supposed to be an independent group of people who aren't related to your study at all. It's usually the IRB requirements. There's again the only kind of legal sense of the definition is if you're applying for a certain government grants through the NIH they'll have more specific legal requirements for I guess I kind of legal threat term but if you want to get a study funded by the NIH I think IRBs have to legally be comprised in special ways. They need to have someone who's independent who has no academic background or is in some other, basically you have to have someone on the committee who doesn't have any sort of real scientific affiliation right so it could be like a lawyer, a priest or whatever right? Like someone like that.

Scott Novich: And then you're required to have obviously a certain number of people who are kind of versed in what you're doing. Anyways, you're supposed to run that by the committee and they're supposed to kind of look at and try and understand, they look at your proposed protocol for the research study and then try and look at kind of the risks and the potential benefits like what you're paying people and they're trying to think about that really in terms of the ethical implications. And that reminds me there's something I know if you've ever encountered this thing, it's called the Belmont report?

Lesley-Ann Daly: Um, no..

Scott Novich: have you heard of that? Yeah, maybe so that's kind of like this really famous report from the 1970s. And that kind of really is I don't know what you call it. It's not like a Bill of Rights. That's kind of the major documents a bunch of scientists got together, whatever looked at the past history of all the terrible unethical things that hurt people that happened right like Hitler and Henrietta Lacks, I think if you know about her? Basically came together and they finally kind of formalized an ethical framework. That I think the concept of IRBs these kind of came out of human subject protection training. So it’s this really famous report from when a bunch of these academics that got their heads together.

Scott Novich: Anyways, all that is to say right the only time I've ever had any exposure to this formally was just in the context of right. We wanted to run a study at our Neuroscience research lab and I had take human subject protection training and we had to submit our study right in writing and get them to sign off on it. I think the sad thing is I mean I think IRBs

will sign off on mostly, I'm cynical, I think IRBs will maybe sign off on just about mostly anything unless there's something obviously kind of egregious going on. But I don't know how deeply they're thinking about the future ethical impact especially the future implications of what's being studied, right? They're mainly thinking about

Scott Novich: Here and now and maybe some of the potential benefits so all that is to say I think we need, and I'm repeating probably previous a lot, but impact definitely in Academia there needs to be.. I think Academia would definitely benefit a lot more from some more formal education in this area particularly especially in engineering sciences maybe, Lez. I mean it's dry like the human subjects protection training and all that stuff, it does get you to think about the stuff a little bit but there's nothing in engineering and that to me is actually kind of maybe the most dangerous almost area right because that's like where people are. I think we don't feel like engineers, designers, but they're basically untrained designers, right you're like teaching them how to build stuff right? So, then they can build stuff but they don't have any actual, how do I put it, design thinking training is maybe a good way of putting it. Right, enough to be dangerous and that's maybe not great.

Scott Novich: Having a conceptual course where you're required to do a course on speculative critical design right where there's a project, we're project-based, you have to come up with the story, like a speculative story or two around the thing that you're designing or something. I think would be really cool, interesting. So that's on the Academia side. I think. Industry is probably a tougher nut to crack in such a capitalist Society, other than, right, we learned the hard way.

Scott Novich: At Neosensory right through spending way more time and resources then we probably needed to. Instead if we had just gone and done more talking to actual people who we're designing for early on.

Scott Novich: I guess so I guess in that sense there is kind of a cap. There isn't an alignment right with capitalist incentives in the sense of if you don't do your user research and this is kind of separate from ethics to some degree really, if you don't do your user research at least and you have empathy to some degree right for your users you're going to think you could be walking in trouble, because you're gonna waste a lot of company resources on things. The ethics piece

Scott Novich: and maybe this is where there is someone for speculative critical design thinking, I think is positioning this sort of training in a way. I guess there's a few things, so one I think most employees at a company to at least are not sociopaths and like to think that they're trying to make the world a better place. Maybe you could argue, maybe with the management right, you could be a little bit more jaded and cynical about things but at least at an individual contributor level, I think that's probably the case.

Scott Novich: But I think I'm just trying to think in terms of incentives what are ways to incentivize people to take on this training and think about things? In a capitalist framework and not just the user research element, which is more about designing things that people actually want to buy but more than that designing things that

Scott Novich: People want to buy and isn't going to make the world like a worse place or harm those people in the future if they don't realize that. And so, I guess what I'm saying is the individual incentives, I think are, for most people again as an individual contributor in a

company, are probably pretty aligned there but they may not be thinking about it. And so, the question is it's almost like he's near so I'm just trying to think back to me a century ago as a case study. If you like a few months ago or last year or whenever it was with the workshops. You're trying to get us to do,

Scott Novich: how I'm just trying to think how do you position this in a way? How do you position this or how do you sell people to spend their time to think about this stuff and do a workshop or read this book. There's a lot to introspect in there. I think making it accessible and I think the concept is Design through these stories, I think that's really powerful, right, it makes things enjoyable for people. So, I think there's a lot more for me to digest on there. There's definitely something here, if we could get plenty of people in the space that I know, I think plenty of the people that I know that I went into the field of sensory augmentation, right, were largely inspired independent of ethics, my gosh, indulging in cyberpunk media I guess right. And so if there's a way to do that, that's a little bit.. Healthier, I don't know how to put it.

Scott Novich: Yeah, sorry. There's a bajillion things floating around in my mind on the subject. I'm thinking back to, have you read Accelerando at all by Charles Stra Carl Strauss? It is awesome. He's a really great Vlog, also remind me to send you, to follow up with a blog post. He was the one who, he wrote a whole blog post in the whole 'we built a torment nexus' thing. He wasn't the original person came with that concept but I think of him especially is more outspoken about it but I think a lot of these famous cyberpunk authors are kind of at that stage, right? They're seeing what they wrote about become a reality and they're kind of like, my God, what have I done? Right, I created this really fun cyberpunk story that inspired all these people but not in the right way, right?

Scott Novich: Which almost makes me wonder if storytellers are kind of like, how to put it, the main influencers of the stories and storytelling being the main influences of the human psyche? Is actually speculative critical design thinking something that not necessarily just engineers should be reading but if you want to get to the root of it, should aspiring authors be reading this? Right and thinking about if there's the people who are creating the media, it's I don't know. Yeah, but on the flip side, I think a lot of these cyberpunk authors knew it their, the whole point was what they're writing about it's terrible is just people were not and maybe they gave their readers too much credit in the sense of

Scott Novich: the ethical components of their stories were much more like, they're implicit. They're in the background right? You're not being beaten over the head. With the concept so I don't know there's a lot swim around in my brain on the subject, especially on the Academia side. I think the academic side is there's a lot of I could see this not being a hard thing to

Scott Novich: integrate into what you call not a rubric but what you're required to fulfill your requirements for your degree or whatever. Anyways going on, what's next?

Lesley-Ann Daly: Here as a kind of on the same thing as well. How do you think the book will impact your work going forward? or your practice?

Scott Novich: Yeah, I mean I think it's a framework I would have an enjoyable time like trying to put to work the next time I try to design whatever that thing is. I think it's really fun to think about stories and storytelling and putting your technology, trying to set your

technology into a story and then creating a story around it and trying to and using that as a framework for thinking through the implications.

Scott Novich: I think the workshop piece is definitely more a team exercise I guess. So, I don't know but Yeah, no, I'd love it. I'd take a crack at it. I think it could be fun almost as a more meta, I don't know as meta experiment. If you can get some group of, right, designers, and I don't mean designers only, any makers, hackers. Whatever.

Scott Novich: Trying to also apply this framework, these processes, especially if you had the concept of creating these kind of these stories it'd be cool to compile this somewhere in some websites, some repository, some database kind of like gosh, what's it called? It was really popular a few years ago. Was it was kind of like a sci-fi monster Wiki? Hang on. That's called SCP. Yeah, I hope you heard of the Secure, Contain, Protect. That's so it's this really easy. I highly recommend checking out. It's called SCP Secure, Contain Protect Foundation. And it's basically this massive distributed, I guess you call it, speculative fiction Wiki project thing where..

Scott Novich: It's kind of hard to describe but the idea is this world with creatures, monsters, whatever and people put these, it's hosted as a Wiki, and there are Wiki Pages for both these creatures and then their stories surrounding the creatures and anyone can participate and post up a creature. It's really cool. I don't know how I think it's maybe still probably pretty popular. It looks like they're pretty active. Point is I could see some of, having something that's a little putting together some more globally participatory framework around this. That makes it more of a fun storytelling exercise, could be really cool. And I think that could be kind of all right for people.

Scott Novich: Yeah.

Lesley-Ann Daly: I'm definitely gonna look that up afterwards. I realized the time we're on the hour. I don't know how much more you have.

Scott Novich: I can go over a little bit.

Lesley-Ann Daly: Okay, cool.

Lesley-Ann Daly: So, these are the last two so the first one is around accessibility and diversity. So how accessible is the book's content to the intended audience? So, this is the ethicists, technologists Etc. And does it incorporate diverse perspectives for the discussion?

Scott Novich: All right.

Scott Novich: Any Braille in here? I don't know maybe the blind users are gonna have a difficult time Lesley-Ann. I'm being a little facetious obviously, but yeah, I think yeah, except just in terms of I think I was gonna say I wish I got this autograph by you because he's nice little note here that I just saw. I mean, yeah overall accessibility I mean there's a certain implicit assumption right the people that this book is written for people with a college level education with no sensory deficits which is fairly standard. I think in terms of past that I think digesting and understanding it is super straightforward.

Scott Novich: Yeah, I like really cool. Yeah.

Lesley-Ann Daly: I know I said I wouldn't reply but on that page, you can scan the QR code and...

Scott Novich: Uh-huh.

Lesley-Ann Daly: you get descriptions of every page. There's a QR code on every page.

Scott Novich: Okay. Yep.

Lesley-Ann Daly: So, everything in here has Alt text, it can be read through a screen reader as well.

Scott Novich: There you go. Okay, so you do have it, my apologies! All right, so someone could hook up on those fancy Braille devices or whatnot. Okay. Yeah. Sorry. I was being facetious for fun.

Lesley-Ann Daly: Okay, it's okay.

Scott Novich: All right. I wasn't actually like yeah. So no, I don't think there's any issue. I mean in, I mean that case that's well done for thinking through that and sorting that. I think no issues. Other than right. I think the audience, it's the content and the audience for is for obviously right probably someone undergraduate or above for them to go to what's being gone for so.

Lesley-Ann Daly: And do you think it incorporates diverse perspectives?

Scott Novich: I mean in the sense of I mean, we're all these, I mean Yes. From just a story content standpoint, I guess. I mean I think you touched on a lot of and I think.. Were all these stories created by you, or did you also collaborators who came up with the stories? I don't not that it necessarily, I guess if maybe in some metaway does kind of matter but I mean you definitely touched on a bunch unlike both I guess not so much gender issues, but you didn't touch on cultural issues with yet conscious story and age issues with there was a diversity right I guess in that sense in terms of the stories right? There was a diversity in perspectives.

Scott Novich: And I mean you did kind of more explicitly. Yeah, I think with those two stories in particular like you did kind of explicitly touch on and I guess also the post human protest also is a little bit talks about identity a bit too. And at some point, I think I feel like you had a note on that about that it was inspired by the transgender flag or something like that. I don't work. yeah, so I mean. So yeah, you covered age, gender and yeah, man like culture I guess. So good you touched on it and I think in an effective way well done. Yes. Yeah, you got all covered. Good job.

Lesley-Ann Daly: Thank you. Very last question, this is a comparative analysis. How do you think this work compares to existing literature or work in the field? Do you think there's any unique contributions or...

Scott Novich: Yeah.

Lesley-Ann Daly: there's anywhere that it could be developed?

Scott Novich: I guess that's tough for me to answer just because I don't have an academic background.

Lesley-Ann Daly: so by field, it's your field in…

Scott Novich: Yeah, in my field particularly in engineering.

Scott Novich: There's definitely nothing quite like this. And from what I've seen, I mean, I think there's some of them are obvious, media I can think about it, it's not as explicit as what this does right. Yeah, everyone knows the Valley area talks about whatever. Yeah the atom bomb and Oppenheimer and all that stuff right in engineering. And then maybe I think the story about Henrietta Lacks is also pretty popular as well as the Tuskegee stuff. I think those are kind of the big three that is never even necessarily explicitly touched, just stuff you kind of pick up implicitly along the way.

Scott Novich: And then the other, the other literature out there, right, obviously is like the required, at least in the US, the required human subjects protection training you're required to go to if you're a scientist, not an engineer. And so like, I think in that regard, I think what you're doing is very important. There's like a, there's a place for what you're doing and I think it's very important to these fields and I think the approach is done in a, yeah, is done like a really fun and accessible way. I'm trying to like, you know, it's oh gosh, I don't want to be like, so yeah, no, I think it, I'm trying, I'm trying not to be like too cynical, but like as you know, like in the US everything is so politicized and polarized right now. It's like, and I actually don't know how much of that is just based on like what we see online or based on what people actually think in real life if that makes sense,

Scott Novich: Like as far as like if you were to look at, you know, yeah, the online it's like I just goes like everything. It's either like you're part of the whatever, woke, woke, left or you're on the right and some you know it's somehow like for whatever reason like being empathetic and trying to like take different perspectives on like diversity as far as like you know, age, gender and culture. For whatever reason, like automatically places you in this like left column, which is really dumb for obvious reasons. But I guess the point is like just thinking about this book, like would would it be like that in the US at least? Like would this book be seen as polarizing in the field of engineering? Engineering is like one of those weird fields. Like when I went into it, I I don't know why. Like, I mean just because of my upbringing being like more like from the Northeast to not you know be liberal coastal elite Northeastern like I was. I've actually been surprised like how many more like conservative leaning people there are like in like the sciences of engineering and like in particular engineering which I guess like makes sense because you people working for like defense contractors and, right. Like like I know a number of colleagues from, yeah, whatever my like undergraduate went to like work for defense contractors and whatnot or even like in NASA. Like I've never. I never I like I've heard stories from friends who like worked at NASA who like wouldn't tell me, like you know, there's like, yeah, a bunch of there. There are right leaning people and even in NASA, right. I know, I know.

Lesley-Ann Daly: Yeah?

Scott Novich: They exist. So, you know it does make me wonder like how how polarizing would this book be with with some of the stories. I mean I think the one that alludes to like a little bit to, I don't know, Yeah. I think the one that like that alludes like to gender like with the trans flag a little bit would probably fly under the radar because it wasn't so explicit. I don't know it's just weird to I'm just it's just something I'm like I wonder how. I don't know. I have no idea. But definitely has like a which like a more. Yeah, it definitely had. This book definitely

has like a lean, like a leaning to it, I think as far as how it would be perceived or received in the US and not in any way like I, there's like I by the way just to be clear like I completely agree with like kind of the I am a huge fan of this book. Let me just say that I'm just, it's just interesting to think about how, how this would be received, how this would be received in like certain, I guess you'd call it communities or disciplines over here. So yeah, I guess.



Consent Form: Matt Hayler Date 20/05 /24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	X ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	X ☐
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	X ☐
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	X ☐
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	X ☐
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	X ☐
I agree to read and review this book.	X ☐

Participant Name	Date	Signature
Dr Matt Hayler	20/05/2024	
Researcher Name	Date	Signature
Lesley-Ann Daly	20/5/24	Lesley-Ann Daly

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 474 Dr Matt Hayler Co-Signed Consent Form, 2024.

Design Senses review- Matt H (2024-05-20 16:38 GMT+1) – Transcript – Google Meet

Attendees

Dr Matt Hayler, Lesley-Ann Daly

Transcript

This editable transcript was computer generated and might contain errors. People can also change the text after it was created.

Text has been reviewed for typos and structure.

Lesley-Ann Daly: So, first question is around ethical exploration. So how effectively do the projects explore the ethical implications of sensory augmentation Technologies on humans, society, and the world? And are there any specific projects that stood out for their relevance and deep ethical inquiry?

Dr Matt Hayler: Yeah, okay, so the project uniformly ask at least one distinctive ethical question with each project. This is couched within a specific section that then adds up to this kind of overarching question of kind of what could ethical design look like. So, in that they are incredibly effective as provocations. And I can't imagine that anybody would, who was new to this kind of area of discussion, would not find something in here that they haven't thought of before and that's where the real strength is for me is the sheer range of kind of thought experiments and provocations.

So, people that are really attentive to race for example might not be attentive to the kind of quite subtle things you're saying about age as well, which I think is a critically under explored in this area. So, you kind of the, I don't know, axes of discrimination is a bit and strong perhaps feel like an axes of marginalization. Maybe the kind of things that tend to be left out and forgotten. There's that really nice Ruha Benjamin quote where she's like, you don't need to kind of have a squad of giggling programmers kind of Designing inequity and that a lot of this stuff is done by accident and by lack of thought and I think that that is the kind of deep ethical concern that underpins this project is the danger of what happens if we don't think and here's how we can think is the kind of questions that we could ask. But here's why it's gonna difficult because these are the kind of foundational assumptions that you need to be considered which is difficult.

So yeah, I think that they all explore these kind of ethical implications of sensory augmentation, that question of human society and the world is also picked up on at those different levels at those kind of different strata. So, there's the kind of human concerns that might come from kind of like the sensory malaise of having an extra tentacular arm something like that. And that's like a real human subject that might be impacted in a very particular way or somebody that is able to express themselves and, thinking of the bat ears piece, I can't remember her name but she's great the architect who has bat ears now and that possibility than what kind of come, those are kind of human concerns. Then there's that wider societal impact which is kind of that axis of marginalization material and then the world. I guess that really came across most in the post anthropocentric section where we're

kind of thinking about the effect that these technologies might have on a planetary scale. And having images of trash picked up in space really stood out there. Yeah, I'm trying to think about whether that world scale was kind of engaged again. I guess the hiving off of knowledge into dominant communities in the global North also starts to come up as well.

And then you said 'Are there specific projects that stand up for their relevance and inquiry?' I dug them all. I want to pick one out because that would be a nice thing to do. I don't know. It's the deepest ethical inquiry per se but I really appreciated the multiple Design Studios looking at the breathing apparatus for the woman who was scared of swimming, in Enhancing Akansha. That seemed to me a really great example of what putting this way of thinking into practice would actually look like and so I guess yeah, actually I'm going to stick with that one in keeping with the themes of this project as a whole. Showing how you could be led astray with certain kinds of assumption. Even when aspiring to do good was really then the kind of played out on the page by another company that was asking these questions in that rigorous way that you wanted them to coming up with a completely different result. There's actually far more humane and thoughtful and genuinely supportive than this kind of aspirational tech pro version.

Lesley-Ann Daly: Thank you. So, the second question is around the speculative elements. How are speculative elements used to explore possible futures of sensory augmentation? And how do speculative critical design methodologies such as the use of The Uncanny, deception, and provocation contribute to the overall impact of the book?

Dr Matt Hayler: So that idea of speculating is another kind of one of the key things of the project. And what does it mean to imagine in a way which is tied to reality but not necessarily tied to realism like the things that are grounded in present. The concerns are grounded in present-day technologies, they're not impossible. And it's a speculation that does not need to come to past to be impactful. So really appreciate that idea of speculation and that scariness, weirdness, unsettlingness is part of this kind of speculation. And that is a really nice way of doing that rethinking and, what am I trying to say, be familiarization taking the things that look quite familiar and then looking at them again in really unfamiliar ways.

Those speculative elements explore a wide range of sensory augmentation. So this isn't just about expanding vision and hearing which is where we tend to go the idea of expanding and kind of touch and also just kind of how we're seen and then biomimicry elements like mixing with animals and to have capabilities that are well outside of the human and that idea that speculation doesn't just have to be a deepening of what is already happening in what might happen and quite a transhumanist way, but this feels like, this feels like a post humanist transhumanism. So, my reason for saying that is Harraway is kind of idea of transhumanism as humanism on steroids just kind of doubling down on humanist impulses. I think you can have a post humanist transhumanism where there is still a desire for change and a recognition of what technology can bring and a recognition that technology has always underpinned human experience, there is no culture in the world that is not kind of thriving with technology. But it's not used in that kind of doubling down kind of way. So that's speculative post-humanist transhumanism makes sense, I think.

'How to speculative critical design methodologies that use the uncanny, deception, provocation contributed over impact to the book?' The deception bit is interesting. Obviously, there is in theory a bait and switch at the middle of the book and I think I clocked

it. Was it impactful for a project as a whole? I think it showed more than anything else it showed that one designer can hold all of this in mind. And that is really significant. If this was just an act of curation where you'd gone around and looked at all this amazing work that people were doing and then kind of put a hashtag on all of them and just said this is part of speculative critical design, that would be one kind of project and it'd be really interesting and it would show that you could be thoughtful. The fact that you can do it all shows that the other designers don't have an excuse. It's not just to everyone's silos often focuses on one thing. You can keep this all in mind and if you ask the kind of questions that you set up in the second half of the book rigorously and continuously you can kind of do this so debate and switch does kind of work in that regard.

Provocation, uncanniness looking a bit about The Uncanny so provocation. I think it is really effective. When is it most effective, when the imagery makes you take a step back and you realize because of static you are not recoiling your reprocessing and then you're drawn back into it. I think that that's what good design kind of does. I think for some people the cybertruck does that which weirds me out? But that idea of a truck but maybe this is what the truck could look like? And that's obviously been opinion for some people simply like that idea of human body shouldn't look like that, we shouldn't be able to do that. But what if we could? I think there is an inviting in that goes with the provocation, it doesn't push you away. Invites you in often in quite a glamorous kind of way and I found that really effective with what you do. Is this enough for these questions? I hope I'm doing all right.

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Lesley-Ann Daly: This is perfect. Thank you. So, the next one is on the visuals. Are the concepts and ethical implications of sensory augmentation presented in a way that's both visually engaging and easy to understand? And how does the structure contribute to the overall narrative?

Dr Matt Hayler: It looks like a coffee table book, feels like a coffee table book. I put that I love the texture pages at the beginning, there is a very clear design sense and an awareness of the kind of books that it is attempting to.. It's not even mimicking, it's just doing that thing. And so yeah, I really think that the presentation is incredibly engaging in that regard it's a book that people have picked up while I've just left it out. So that definitely works and the engagement of it Sorry, the easiness to understand stuff that would easiness to understand. I definitely buy it, set out really clearly and you can read it on a couple of different levels which is engaging and easy to access. So you can just flip through it and be provoked to think about things visually that you might not considered. Then you can start to read some of the annotations and they explain what you're looking at. I think that's really nice. And then if you want to take that deep dive you can start contextualizing it by reading it from beginning to end. And starting to understand for thinking that you're putting together and the book structure this kind of react structure helps to understand your interpretation of posthumanism.

A growing sense of what designers might consider then there's that move from the human to society to the world. So, there's a kind of mimicking there within the structure of the book. And then that flip to the back half physically turning the book over is always kind of nice as well and as representing a change in thinking. And then you're kind of like here's how you could put this into action within a particular setting or within a design team setting and it's

not impossible to ask these questions and I'm Gonna Hold Your Hand a bit at first. Also, with things like the Wild Card you're kind of encouraging people to start asking their own questions as so there is a continual questioning to the reader. Why aren't you thinking about this? What would it look like to think like this for you? What would be the effect of that? Why might it be important to you? What might you have missed and it's already kind of open and generous questioning and I think that the visual design assist all the way through.

Lesley-Ann Daly: Thank you. So, the next question is on the creators responsibility. How does the book reflect on the creator's responsibility in creating sensory augmentation technologies? Are there sections or projects that highlight responsible design practices?

Dr Matt Hayler: And 'professional creators' responsibility?' I mean kind of in every way which is really nice and so it's asking from the ground up what those responsibilities might look like and thinking about them within quite traditional frameworks like GDPR and kind of data privacy, but also thinking about them in terms of the responsibility to society and think about the entailed effects of launching these kind of technologies. And then in the more not subtle, but the more kind of complex, relationship between kind of institutionalized and formal ethics and personal ethics as well. I think that's really important for designers that just because the current law and the current society might say that something is okay, that doesn't mean that you are ethically obliged to think that it's okay. And so these different kind of levels I think really matter reminds me of just kind of want to think about kind of the difference between

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Dr Matt Hayler: Institutional ethics in the University disciplinary ethics and then my personal ethics and how often they don't align and so it's totally okay for me to quote tweets from 16 year olds talking about Nazis, but it's also not okay for me because that person if the book got big might end up in some awful culture or when they were a minor and all this kind of stuff. Like the framework of what public speeches is something that is debated in my field, I think that that's something that's going on here as well. There are different kinds of ethics at different levels. And this is a work which engages those ethics at those different levels and that idea of responsibility is deeply tied into that highlight responsible design practices. So, at the end of each section, you're very clearly asking those questions and what would this look like to, what would it mean to think in this kind of way? It's got that really generous questioning again and you're asking those questions within the context of these different projects. Is that a project I can tell that particularly highlight responsible design practice? What's going to say the same thing twice but enhancing Akasnha does do that?

Dr Matt Hayler: I like the plug and throw away projects for that idea of entailed effects and that I plug in and disposable apparatus. On the one hand might seem deeply equitable because it makes it accessible to more and more people and that idea kind of modular design and upgrading and not being left behind. But if you don't think about the entitled effects of think about what that looks like out in the world you end up with a trash problem that no one could have conceived of and so having a series of noses being collected like that actually it's a whimsical speculative image. But then you're but think about how many masks we discarded during covid and things like that. That issue is something that is really resonant with the people now and single-use plastics that is kind of a resonant issue. So, what would be entailed effects of the disposability of your new thing that you're designing? I think that's

a really responsible question that people could ask and we just get promoted here really useful.

Lesley-Ann Daly: Thank you. Next, what potential impact do you envision this book having within academia and industry, particularly in terms of influencing the design and development of SA technologies? How might it shape ethical discussions and consideration for real-world implications?

Dr Matt Hayler: So, I can be direct with one in there. I'm hoping that, I wanted to ask if I can have a pdf version of this that I might use to teach this with students at Birmingham? So, I teach a human enhancement course and we ask these kind of questions and I don't have a good resource for thinking about design and posthumanism and human enhancement and suddenly there is one available. That's a very direct thing that I can kind of put that in front of 60 students a year and just be like we should think about this and we can talk about this and the way that it is set out makes it ideal for third year undergraduate students. They would be able to get into this particularly with the framework that I'm kind of pursuing and with that in mind. I think there is the potential. Or kind of a crossovery kind of publication, probably not a trade publication but a crossover publication. So I mean that is a publication from an academic imprint that actually people outside of Academia would be really interested in. And that to me is where the work kind of sits is between the academic and the practical is asking rigorous academic questions that grounded in current cutting edge literature in these fields, but it's also designed to actually be provocatively used within industry spaces. What kind of influence could it have? It could stop designers making stupid decisions and that is kind of the best thing that it could do by reopening and certain assumptions and thinking it kind of goes back even to

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Dr Matt Hayler: Engineers love returning to First principles. This is the assumptions that allows you to have first principles. And I think that that's really kind of an interesting space to be in. And so yeah asking from the ground up what we, what are we missing out? If we do it in the ways that we have planned it should have an impact and I think that there are also corollaries beyond hardware design as well. And so, I'd be really interested as to what software designers would also make of this as well because I think a lot of the questions are the same and if there was anything kind of missing from the project it would be that software side perhaps of thinking of these questions around human enhancement. We tend to think about breaking the Skin Barrier or about wearables and things like that. I think in the immediate term these are questions were also going to have to ask AI assistant in particular and kind of what phones are doing and the kind of the rapid change that's about to occur in software interaction. So, I think that's actually a lot of crossover with a host of changes that are literally just about to come.

‘How many shaped ethical discussions consideration for real world implications, and how might it impact my own practice?’ And so I'm really interested in what therapy apps are going to look like in particular and the role of AI in kind of therapy to interventions, but also in therapeutic training and so I've already been kind of playing around with chatGPT. Not mimicking therapists, but mimicking patients and thinking about what does that look like to kind of interact with these? As they become increasingly good at natural language rapport and the nice thing about GPT design is a using natural language can start to put some

assumptions into the personalities that underpin those kind of conversations and so I can certainly see This impacting me and thinking what questions or what kind of assumptions do I want to be baked into these AI respondents. So they feel more fully in the full range that humanity can be and then what kind of things am I trying to inculcate in? kind of therapy students And what kind of questions am I trying to inculcate in them such that they might start to kind of question their fundamental assumptions about to kind of be human what it means to be anti-oppressive with an instantly supportive. So yeah, this is what I mean about having a lot of crossover appeal in terms of the kind of questions. That might be asked.

Lesley-Ann Daly: Awesome Okay. The next one is about accessibility and diversity. So how accessible is the book's content for its intended audience which includes designers, ethicists, and technologists?

Dr Matt Hayler: It feels very accessible. For a few different ways. so, the design is very clear and attention grabbing. The language is plain without being overly simple. I guess it would be fairly hard to engage for somebody with kind of language or reading problems, but by providing the QR codes and a link to a website all of that, all of the words at the very least and I would presume descriptions of the illustrations as well and are available for machine reading as well. So that should hugely improve accessibility for anybody that can't engage with the book on its own terms.

There is nothing inherent here that's means that it should only be available for designers or academics. And I think you're able to introduce design to academics and an academic language to designers and that is a difficult balance. So I think that is really effective here. You do that when you're introducing a design language, you show how that then impacts the projects when you introducing an academic language you show how that shapes, that could shape the design decisions and the kind of questions that a designer might ask. And 'does it use diverse interdisciplinary perspectives from which of the discussion?' Yeah, yeah. And it certainly is engaging with a lot of different perspectives on trans and post humanism. it certainly bringing in a diversity of assumptions from design theories and integrating those two together

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Dr Matt Hayler: there is philosophy, humanities and social sciences kind of going on here. I guess there could be more from hardcore computer science and design but that feels kind of beyond the scope of the project again. There might be kind of an addition that a software section might engage with that's the only real absence. I kind of felt and diverse perspectives. Yeah. There certainly like an attentiveness to a greater diversity of humans across different kinds of protected characteristics. I wonder whether there could be examples of more diverse voices through the project. I don't know inherently where that might fit in but I guess we could hear from. So, one way to do it would be to perhaps include in the same way as you've got annotations for the pictures. And some quotations from key figures in relevant fields. That came from diverse backgrounds. That would be the only way that I could see to integrate it into the form as it was so that you just had more voices on the page from bipoc designers, disabled designers something like that or people like working within disability theory or postcolonial studies like that thinking so clearly underpins all of the assumptions here. Having those voices present on the page would maybe just increase that range of

diverse voices appearing because range of diverse voices are still there because they haunt every word like it's clearly coming from that anti oppressive place.

Lesley-Ann Daly: Okay last question, which is comparative analysis. So how does this work compare with existing literature in your field? And what unique contributions does it make and is there any areas in the book that could benefit from further development?

Dr Matt Hayler: Nice, how's the whole compare with existing ethics literature in the field? So on the one hand there just isn't a ton of literature in the field when it comes to post humanist design in particular. I know this mostly from working with the post humanism and practice and series, we get a lot of art practice and design sorry a lot of art practice and posthumanism we don't get a lot of design and post humanism submissions. So that's kind of reflected in the field in terms of the submissions that we're getting to the series. I think it's quite hard to practical design questions with an underlying philosophy that at least is very new in the format and in the form that you're laying out. So I think there is currently a real gap there and I think that will slowly start to be filled. But I do think that there are unique contributions here that will mean that it remains kind of field leading for a while. One is the range and the sheer range of kind of interest and the kind of meticulous understanding of what post humanism and it's practical implications might be I think that also the deep understanding of design is also something that is rare the breadth here stands out. And that in not specializing you kind of do specialize. In not specializing but showing how this can make its way into such a wide variety of areas.

It's gonna stay out ahead or people that are going to look at post humanism and implantation post humanism and clothing post humanism and architecture and the, that blending together of this diversity of perspective that deeply grounded in both the design and the philosophy that feels really unique to me and I can't see that kind of being competed with very soon. 'Other areas of the book that can benefit from further development?' I guess the breadth is also potentially a weakness in some people's eyes by not specializing you end up having to say about lots of different things. And so there is the potential I guess for a couple more deep dives into specifics which is why I've come back to a several times, but it's why the Enhancing Akasnha one is so good because it runs through the same thing a couple of times.

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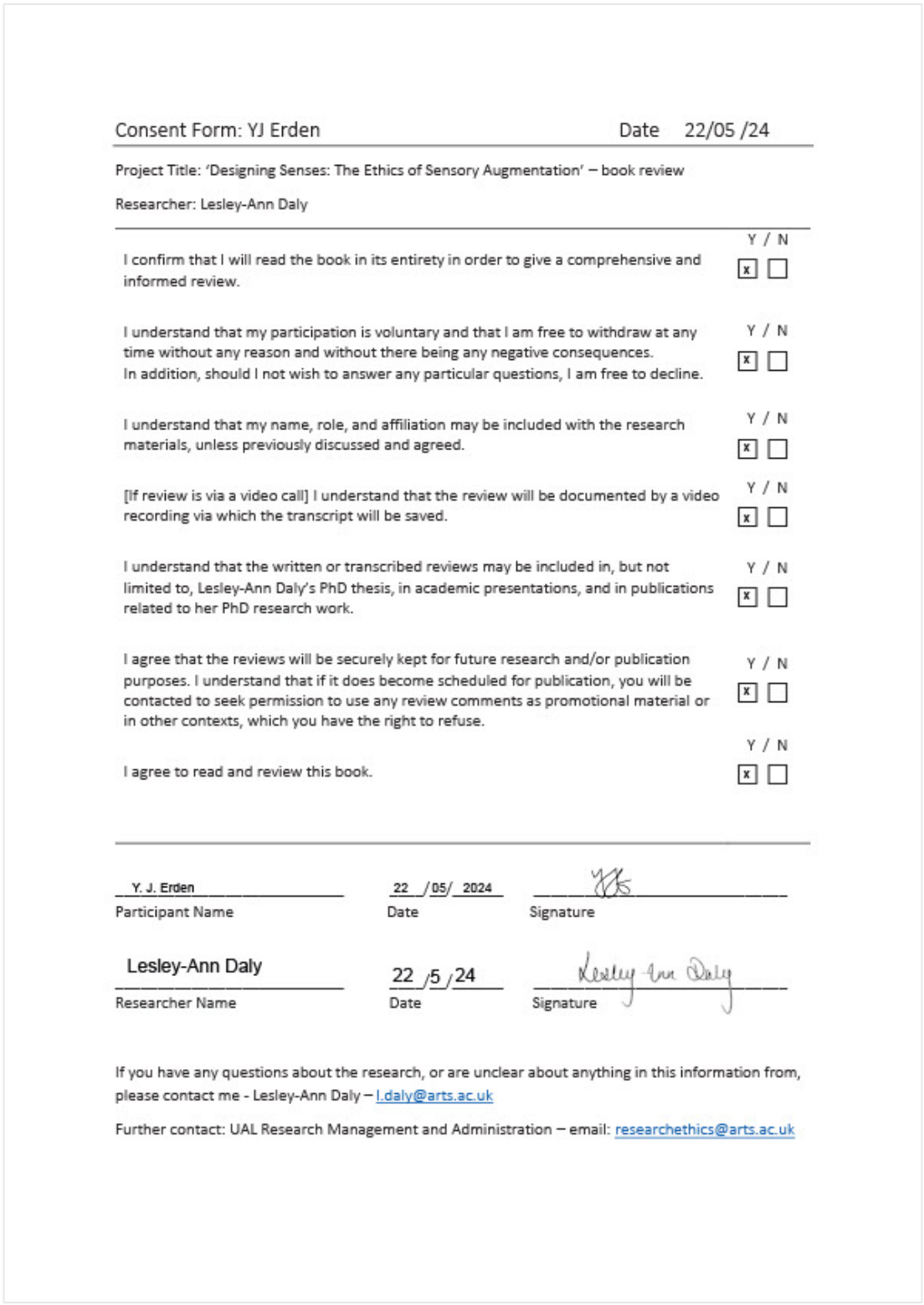
Dr Matt Hayler:: That depth and that comparison enables you to do some really interesting work and I think that that could have happened maybe one more time within the piece and just thought that was so effective that would enable you to kind of drill down and I wonder whether that could have been done again in a slightly different way maybe in the post-anthropocentric section and looking at this from, in to look at the human body from a machine perspective and animal perspective of one perspective that could be a way of going in a little bit deeper. And I guess the other way would be to do a case study from scratch maybe of kind of working from brief to product or something like that. I think that could be really effective and that you kind of hint at some of that but actually talking through that process in the flip side of here's me talking to you as Lesley Ann Daly, like this is what I would do to do this thing, this is what I have done to do this thing. I think that that would be a nice way to kind of show people, not an imagination of what someone else might do but really

saying this is what I would do and talking through the steps of that process that would be another potential way of kind of showing how this could go into practice.

Lesley-Ann Daly: Thank you. That's all my questions. Thank you so much for all the amazing feedback.



Consent Form: YJ Erden Date 22/05 /24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	[x] [ ]
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	[x] [ ]
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	[x] [ ]
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	[x] [ ]
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	[x] [ ]
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	[x] [ ]
I agree to read and review this book.	[x] [ ]

Y. J. Erden	22 /05/ 2024	
Participant Name	Date	Signature
Lesley-Ann Daly	22 /5 /24	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 475 Dr YJ Erden Co-Signed Consent Form, 2024.

Design Senses review – Dr YJ Erden – Transcript – Microsoft Teams

Attendees

Dr YJ Erden, Lesley-Ann Daly

Transcript

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Text has been reviewed for typos and structure.

Lesley-Ann Daly: So, the first question is around ethical exploration. So, how effectively do the projects explore the ethical implications of sensory augmentation technologies on humans, society and the world? And are there any specific projects that stood out for their relevance and deep inquiry?

Erden, Yj: To be clear, the projects are the 9, yes. Yes. So, I thought they were very effective actually. I think that they give a broad range of perspectives, cover a range of different types of technologies and techniques and are thought provoking. Really liked how concrete it was, but also how exploratory.

The projects that stood out for me were in Chapter 3. The post anthropocentric, I thought the second one, in particular the ghost and the tentacle, was especially effective. To yeah, show how different perspectives on on the use of a technology, autonomy, influencing and such, it really came across. And I thought the story was also very nice the 'when lights stole the night' I thought that was OK, that would maybe a little bit more simple in terms of the idea, but effective.

Lesley-Ann Daly: Awesome. Thank you. And the second question is around the speculative elements. So, I mean, I don't know how much you know about speculative design. So, you're free, you don't have to answer any of the questions if you don't want to. But so how are the speculative elements used to explore possible futures of sensory augmentation and how do methodologies such as using the uncanny, deception and provocation contribute to the overall impact of the book?

Erden, Yj: Yeah, I may not have as much to say about this. I thought the deception was interesting and I enjoyed the ethical reflection on it. I didn't mind it. I have to admit it. I didn't, I don't expect the author of a work to be speaking truth, and I thought your point that they're already kind of speculative stories means that you're already inviting the reader to suspend some disbelief, I believe. So, I guess I found that interesting, but I didn't have much to say about it. I'm not sure what I took your argument about a way to draw together these different narratives, but I don't know what, whether the deception was needed to do that. I guess we could talk about that. I found it interesting, and I found your thoughts on it interesting.

I yeah, I probably don't have quite so much to say on the uncanny. I'm not sure. I'm not sure what I think about that in general. The provocation? Yeah, I guess that that probably struck me more than the uncanny, but I probably don't have much to say about that either. It's, I can imagine people being provoked by some of these topics or stories or perspectives, but I found it all pretty reasonable. So then, that was it.

Lesley-Ann Daly: Perfect, So the next ones are on visual and narrative clarity. So, are the concepts and ethical implications presented in a way that's both visually engaging and easy to understand?

Erden, Yj: Yes, yes, I thought so. I suppose the easy to understand falls down a little bit in some of the stories where, like the feel the truth one for example, I wasn't sure exactly what was happening there. And and I wonder if partly it's to do with how the ideas are structured or what the words mean? Perhaps maybe some things are taken for granted there about what people will understand by those words and by those concepts, again we can discuss that in more detail.

I also thought the in 'Enhancing Akansha' it wasn't until the end of the story that I understood where it was going. So I yeah, I guess, I guess those two were a little bit less clear to me early on, but then I'm only mentioning 2 because I would say the other seven were very clear. And easy to follow and engaging, yeah.

Lesley-Ann Daly: Awesome. And to follow that up, how does the structure of the book contribute to the narrative?

Erden, Yj: I found it a clever idea to flip the book and in so doing ask people to flip what they their engagement with it. I thought that was quite effective. I wasn't sure once I flipped the book where I was supposed to start from because you don't just flip the book, you also flip your manner of engaging with the book. You have to go backwards. And I wondered whether you'd intentionally not spelt that out. Did you want people to discover that for themselves? I wondered, what does that mean to go backwards and once I got to the end having gone backwards, I then thought would it be possible to read it forwards from the back and it be a different experience because that would mean the deception would come very much at the end. Though you will have expressed it a little bit in that first page of the back. The first page, if you read it forwards. Yeah, it's quite. I feel like I'm tying myself up to explain it, but I suppose I understood that as contributing to the narrative because it it makes it clear that this is not a single linear story, but a range of views and perspectives and interests that knit together in complicated ways. Which I suppose is mirrored in that structure.

Lesley-Ann Daly: Awesome. Thank you. The next one is around the creator's responsibility. So how does the book reflect on the creator's responsibility in creating the technologies? And again, are there any sections or projects that highlight responsible design practises?

Erden, Yj: So, I wasn't quite sure I understood this question. Is is the question about the creator of this book or the person that creates the technology? Oh, OK. Right. Yeah. I think that became much clearer to me in the the the cards that they in the second-half. Like I could see at the end of the different chapters, there were questions but I wasn't sure how effective that would be because, you know, people are reading the stories and then they come to the questions and because the questions were grouped separate to the stories, I then didn't feel very engaged with them. But when I came to the cards and I could see the get the possibility for a game, I thought yes, that that seems to me a really effective way to think about responsibility and yeah, responsible design. Yeah. So, I think the book, I could see it reflecting on it in practise, both in the stories that are told from the different perspectives. And then in the practise of the game and the cards.

Lesley-Ann Daly: Awesome. And then looking at academic and industry impacts. So, what potential impacts do you envision this book could have within academia and industry, particularly in terms of influencing the design and development of the technologies?

Erden, Yj: It's hard to say. I think my sense of of artistic objects and ideas is not the same is not representative. So, I'm drawn to a book like this because I'm interested in what it shows me, both in terms of the content, but also what an artist who creates this sees of the world and what they want to demonstrate or pick out. So, it's hard. Yeah, but it's hard for me to imagine whether people that design would have that same impulse. I would like to think that they would. But I I'm not sure. Yeah, I think I think academics in creative areas might be drawn to this book. In terms of impact, is, yeah, it's helped me to judge.

Lesley-Ann Daly: That's OK. And then how do you think it would, might impact your own practise?

Erden, Yj: Yeah, I would, I would certainly give this to students when thinking about these topics and even when thinking about methods. So, ways of thinking and ways of sharing thought and dialogue. Yeah, as a work of art or as a book or both. It's yeah, creates dialogue with a reader in a very interesting way, and I guess that would be something I think students would like to yeah. Find very interesting, very thought provoking, unusual.

Lesley-Ann Daly: Awesome. The next one is around accessibility and diversity. So how accessible is the books content to the intended audience so that includes designers, ethicists and technologists? And does it incorporate diverse interdisciplinary perspectives?

Erden, Yj: It is. I think it is both accessible and yeah inclusive. There are a number of points where I have some doubts about what people will understand or what, yeah, what people will be, what people will understand what they'll do with it. Perhaps we can discuss those in the discussion part because they're not necessarily simple formed ideas. I'll give you one example on page 52, when you're talking about the ‘ghost and the tentacle’, and you've mentioned dissociative identity disorder, I think, well, if someone in psychiatry or someone in philosophy or philosophy of psychology or or in neuroscience reads this, they're going to

have a very different perspective on what that means in relation to this new technology. Yeah, but, but that's not a law or a problem. It's more just. It means that you give a lot of space for people to do anything they want with that in lots of ways, do you see? And that's I'm interested in the fact that you picked such a controversial theory of a disorder. Yeah, but again, that's probably one for discussion.

Yeah, I think it's very diverse. There was there was one little point where I thought something was assumed that was a little bit odd to me. But I can't down. I'd need to go through the book to find it. So, Oh yes, the card on the plurality of humans. You talk about intersectionality. How are your public's intersectional? And again, that word means so many different things now. Not always related to its meaning according to was it Crenshaw? Kimberly Crenshaw, who? Who coined it? So, I just wonder what will, what does that mean to someone who doesn't study, I don't know, Gender studies or identity theory or philosophy of identity, any of those topics? So, I wondered, what does that mean? If accessibility making it accessible by not making it too wordy, but then on the other hand you leave out the definition, which means I could go anywhere with it and end up with something meaningless which people do with intersectionality. Oh well, I've got this complex history of my own therefore everyone's intersection. Everything's intersectional. And then you miss out on the yeah, on who isn't being represented in those conversations? Yeah.

Lesley-Ann Daly: Interesting, cool. And then the last one is around comparative analysis. So how does this work compare with existing literature in your field, there was a typo, it was the field before. It's your field specifically, and what unique contribution does it make? And then is there anything that it could benefit from development?

Erden, Yj: Yes, well, OK. In my field in philosophy. I think it offers, in terms of content on enhancement or augmentation, it offers some new ways to think about familiar perspectives. It offers some new perspectives. I think the main thing it does is offer a new, or at least an unusual method to do those things. And I think the unusual method in terms of design and the structure of the book and the case studies or the stories presents a lot of scope for thought, and putting that thought into practise. So, I think it could make some interesting contributions to how we think about these difficult but also interesting topics.

Yeah, suggestions for further developments I I have, I have some, but then I'd need to go through the book. So, and I yeah, would that be the point where we just start the discussion or?

Lesley-Ann Daly: If you want like if there's anything off the top of your head like, feel free to say it. If not, we can. Yeah, go on to discussion.

Erden, Yj: Yeah, OK. Well, I mean, it's yeah, it's up to you, but it would probably make more sense if we if I could go through the book and then.

Consent Form: Katherine Templar Lewis **Date 09/06 /24**

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	YES
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	YES
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	YES
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	YES
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	YES
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	YES
I agree to read and review this book.	YES



Katherine lewis	9/06/24	
Participant Name	Date	Signature
Lesley-Ann Daly	09 /6 /24	Lesley-Ann Daly
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 476 Katherine Templar-Lewis Co-Signed Consent Form, 2024.

Design Senses review – Katherine Templar-Lewis (2024-06-06) – Transcript – Voice Note

Attendees

Katherine Templar-Lewis

Transcript

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Text has been reviewed for typos and structure.

AUDIO FILE: Part 1 notes LAD.m4a

Katherine Templar-Lewis: Overall, I absolutely loved it. I know this is really crazy. I love the size of it and sort of my, my top notes. Why I thought it was really lovely and really brilliant and really unique and unusual in everything that it, it presents. I liked the device of flipping it over. I like it halfway, you know, 2/3 of the way through. I like it because you're right, it gives you a frame shift. I'm impressed you got away with that with, with the publishers. I've tried that and they didn't like it so. I know it's not recording transcript bollux. OK, I'm sorry about that. You might just have to transcribe this. I don't think you have to flip it over at all, but I, I really like the second half.

Katherine Templar-Lewis: The reason why the second half to me was stronger was because it made it very clear who it was for. You know, it's, it's for the creator themselves of the creative process. My feeling is that you don't want to alienate either half of your audience. You don't want the first people to read it. You know, read the first half and and think, well, I'm not, you know, I'm just reading this out of interest, but I'm not a creator kind of use the second half. So, I would be really clear that both halves are for everybody. One is it more about thinking about the concepts. And Part 2 is really putting that into, into practice with questions. Because what ends up happening is the first half, the questions are sometimes there and they're sometimes not. So, I never really knew if I was being led to, to apply it or, you know, use it as use. Is it active exercises or not? And I think clarifying that these, these two halves were coming, I know you'd missed the device of flipping it over halfway through, but you would know that this was like the thinking part with more provocations rather than exercise questions and then the sort of application questions. Obviously, by now it's probably gone to print because I've taken so long to say this. So, if nothing changed, it would be absolutely brilliant.

Katherine Templar-Lewis: So, I think that was, yeah, that was my sort of first thing, a few tiny notes only because, you know, I'm working with with with Pam at the moment and I've been pulled up on this but but this differs for you. They tell me not to use dates because it will age the book and how you know how age do I want this the book to be? In your case that is different of course, because you're talking about the future and the future will become the present. So, there is a sort of timeline on on this book, but potentially you might just want to say in the next 10 years or in 20 years time and that will just give you a bit more leeway with the books life as well. It's interesting to have a a date at the front because people can look

back. So, it's going to be such a best seller and be like, isn't that interesting that in 2024 we thought X would happen in 20 years, but you don't necessarily have to use dates like 2030 so.

Katherine Templar-Lewis: I think who's who's Nova Vanguard is that you as well? I should know who that is. No, it's not you. Sure, it's not you. I love the forward. And again, I think to give this clarity of, of, of what the purpose of this book is, almost the last couple of paragraphs in in the forward in both cases are the most powerful. You always want to start there, really laying out, you know. What speculative design is why it's catalyst for change. Why this book is a catalyst for change? You know why it's focusing on you know, design paradigms that that are focused on positive change as well and what that means. I love your forward because it's really lovely and personal. And because I know you and because you know, it's got your voice coming through, which I think is really nice.

Katherine Templar-Lewis: Again when you have questions like in on page two, you put questions in the body of the text. It's never clear if they're just musings or whether they're actual pull-out questions in boxes, I think at one point. Let's see where it is it sit. You know, what can we do to support good practices in early-stage development, things like that. You know, there's a lot of text here. Obviously there's a lot of images elsewhere even pulling out questions like that, to stand alone, just to give the reader a moment to pause and think, and I know this is the second-half that becomes more practical applied bit, but just giving the breather a bit of space, I felt that there was a lot of stuff in the forward and maybe just by pulling out those questions and giving it a bit of like Visual space could give you a bit of thinking space around it.

Katherine Templar-Lewis: Yes, and the three chapters. I mean, I'm not answering questions I might answer, so I will. I will get on to them, I promise. I love the post humanist and I think you can really pull out that idea that you know about diversity, plurality experiences and something I would say to to students when they say they're not going to vote, I'm like, well, they don't know how to vote. I say, well, think of the person you know and like that is that is the most disadvantaged and vote for them. I think some of the framing is in that like the lived experience, who do you know who does really struggle or who is has diverse needs and things like that. Is really nice there. It's really fun seeing all these pictures of you as well.

Katherine Templar-Lewis: Hang on. A second chapter 2 post Dualist is again is is really good. Perhaps needs a little bit more context on a start about about why this, because this one feels chapter 2 feels like it's slightly different to chapter one and three, which are very clear on the need for designing around it. Or or their need for a new type of design paradigm as well. You know, one. Maybe that's because people know more about these these topics, you know, and I'm thinking this is like the everyday person. But of course, not everybody, well, it depends, as you say for everyone is going to pick up this book, probably people who are more into design and creatives and things like that. But I think to the everyday person, chapters one and three make more sense because we all sort of know that we need to rethink about diversity and design. And we also know, as per chapter 3, that we need to think about connection to sort of nature things like this. So, chapter 2 doesn't fit into that sort of need state, it's more of a sort of conceptual discussion, so that I think some context around that. Really good as well. But again, like I said like I'm really nitpicking, I think it's absolutely brilliant and if you.

Katherine Templar-Lewis: Change nothing it would be really good as well. I'm going to pause this my phone to ringing in a sec.

AUDIO FILE: Part 2 Notes LAD.m4a

Katherine Templar-Lewis: Right, Part 2 So also, I love the QR code. I really love that. But then I use QR codes and stuff like that and I love all the stories and the visuals. I've just been what's? Hold on five. 42 I need to hold off.

Katherine Templar-Lewis: I just thought I am, and I produced a report the other day and they told me that it was hard to see for colour blind people because I'd use lots of red colors and things like that. So that and they said did I do a grayscale check on it or could I produce a grayscale thing? And I hadn't even thought about it. I had to say I had a really, really visual report done with design. So that's just just a heads up before we thought about it. It's probably great, but I was really caught out on that and had to just apologize, and it couldn't be made into a proper grayscale thing.

Katherine Templar-Lewis: I love, I love the stories. I almost feel that that you could have more like narrative and and and more description of the people the stories are about. You know, some of the early ones talk about like, let's find one. About like a client, you know, 20s, early female or. That's the one that talks about Pippa. I always want more detail to who these people are just a little bit so that I really understand their needs. And again, the same thing I feel that I'm not sure what the questions in them are sort of designed toolkit or whether they're provocations or they're just questions to be posed and thought about as well. You know, I I love the narratives like I love ghosts and the tentacle because I love the sort of narrative that that goes through it and I love I feel the truth because I think also that's going to, you know, obvious. That's obviously very easy one to engage in. It feels hyper relevant as well and I obviously love all the pictorial designs. Sometimes I think also did you do the the beautiful illustrations that are based sort of collagey with like you know, the cockroaches with Lego with chips on and stuff like that and the noses. I love them. They're my my favourite pictures and the whole thing.

Katherine Templar-Lewis: I think somebody's a little bit more signposting like the letters on 50 to 52. But then again, maybe that's, you know, you we talk, you talk about sort of the uncanny and disconcerted and, and actually there's a place for that as well. You know, I didn't know. Maybe I was looking for narrative because there wasn't enough me. And that's in itself really good. You know, I was looking for you to give your own view, but then I realized that you know that maybe that's not part of it as well.

Katherine Templar-Lewis: Right. So, let's talk about the different questions for about 15 minutes and then I might come back to this. I'm not finished it at all. So, ethical explorations. How effective the projects for the Ethical Implications... You know your questions are the specific projects that stand out in their relevance and their deep ethical inquiry, right? Let's go to my notes.

Katherine Templar-Lewis: What would the standout projects for me the when the lights stole the night I think is the standout, the standout project is really highly accessible. You know, it goes straight to the heart of like environmental impacts of human centered technologies. And so it becomes an advocate piece for sustainable design practices. And obviously you cover a lot of ground, and I was aware the things that you didn't cover, you do make this clear. That could be clear as well that, you know, you are just picking out, you do make it clear

that you're picking out certain elements to study. You don't clarify why necessarily. That could just be through time or, you know, as a reader, I'd be happy for you to say this is where my own interest lies as well. I like feel the truth, obviously, because I love haptic feedback. So obviously I'll try hard not to be biased in the ones that I've picked out. But I really like that because it feeds in this idea of sexual diversity, you know, and the ethics of that. That's what Anil Seths work does as well. And also, the post enhancement support network because you know, I think there are elements of this book both visually and in its structure that do sort of shock and scare a bit. I think that's a good one for that because obviously it's, you know, it's about unregulated technologies and there's a lot of hype around that as as well.

Katherine Templar-Lewis: Again, I love the questions, but I was never quite sure whether they were just sort of running with the text and whether they were to be pulled out. Obviously, you get to the end and then you realize, well, the second half is, is where you actually have those questions. So, I felt a bit in in between in that. So yes, sometimes it's hard because sometimes I felt your voice wasn't there going through the, the different case studies, but of course it was there. And that's the point.

Katherine Templar-Lewis: And I know that you're, you're not like suggesting ways through this. You're putting lots of provocations. You know, there could be moments where you could say that you would, you know, encourage more discipline like collaboration or implement regular ethical audits. You know, this is a book very much of questions and less solutions. Maybe that needs to be clarified as well. So, I think that that I feel a bit more guided and held and I know what to do. That's why I'm, you know, almost don't know whether you should tell people that it's a book of two halves and one is just to to think and one is to act on. And that you're not fighting answers, you're fighting important questions. What was? What are my other notes on the ethics? OK.

Katherine Templar-Lewis: I've got more here as well. Oh yeah, I put you sort of you talk about the importance of regulation guidelines, but again, never talk directly about how to navigate sort of regulatory like landscape, obviously that I know that that's hard because it's changing and and there isn't that much and this is a book about questions, but I don't know if you ever want to touch on things like actual practical steps that people could actually, don't go to compliance. I'm taking that out of my notes. Well, and you can't really put down, you know, standards as they stay in because I know they're changing. Maybe that just needs mentioning as well.

Katherine Templar-Lewis: Then I have notes around speculative elements. These are obviously my favourites. And the uncanny deception provocation. I really like that in terms of the illustrations, the cockroaches and noses. On to the questions I thought you could be wanting to get on with the questions and clear on how, but you can even be punchy at like you can scare people more of the questions. The questions were quite gentle compared to some of the like visual elements. Obviously, I love ghost in the tentacle because it's super uncanny and the deception. Did I feel that deception is a meta narrative worked? I when you realize that they're all you, what do you feel slightly cheated? I'm not sure. I like the fact that it was all all you in the pictures and it sort of slightly gives the game away. I don't think I'd mind for you to say that these are all you or they've come out of conversations you've had or real-world examples, but you definitely have that like emotional response. And I think if you are going to create a sort of uncanny, maybe that's why I wanted your voice to be there a bit more, because you're going to create that sort of uncanny provocations. You need to hold

your audience quite well. You know, I love like the dystopian future and and plug in the throw away and things like that.

Katherine Templar-Lewis: So, yes, and there's a lot again to sort of, I know there's lots of space around the, the copy, but there's a lot to get through. And maybe by putting those questions out, you could give a bit more space to to the sort of. reflection as well. How nice do I have? Yeah. When it comes to in in terms of diversity, I've got a note on diversity. You do cater to like a wide range view as I think sort of you mentioned with different disabilities, cultural backgrounds. I just want a bit more of their stories so I could really sort of have it more empathy for them as well. You don't mention any real projects, do you? Because you could like show success stories, but that again, that's not really in this book at all so yes. OK, I thought that was that was lovely.

Katherine Templar-Lewis: Do you mention outright sort of frameworks as we use engagement like co-design, participant design, inclusive design? You could give more sort of techniques involving users of diverse backgrounds and needs, but I think you do make that actually clear that this is that's the work that the reader has to do as well, because you do make it really clear this about user centred design practices.

Katherine Templar-Lewis: Then we have the visual narrative clarity. So yeah, I, I mean, like, I love the way that you have all these different visually engaging mediums, really easy to understand from like top portraits to sketches to artifacts. You know, the visual narrative is very, very rich. And it, it makes it sort of what is actually very complex, a very difficult discussion, really accessible. So, I really love that. Again, the three chapters I think is really good. The second one doesn't fit as well and perhaps needs a bit more context because the 1st and the 2nd are about addressing direct needs. The third one is about addressing. It's not, it's not addressed. It's not written in such a context that there is a need to stop this sort of binary dualism. What you talk about, you talk about the problem, not the need. So rather than the need of like a more, you know, diverse, varied, nuanced conversation. So, it just it it it stands out a little bit in the structure, it's harder to understand the the purpose of it as well where?

Katherine Templar-Lewis: Are my other notes Oh visual clarity? Well, I've I've labelled all my favourite ones.

Katherine Templar-Lewis: Yeah, for the questions reading, is this real or not like questioning myself. Yes, so enhancing is it Acas, Akansha, I love this sort of the notes and then you have the the blueprints and things like that. And I believe it's on that one it's just the notes and then it's the the device itself, yeah, I sort of lost the individual story a bit in that because there's a lot going on there. But I do think it is, I do really like its core to designing for device, bodies and like that sort of plurality. I think that's why I felt that it's both sides of the creator in a way, because sort of talking about things like, you know, question. Like how are your publics intersectional? Does your team have diverse knowledge in perspective? It's very clear that it's it's to a creator or designer or creative team as is the second half. That's why I feel as a as a creator, I would feel more relieved with the first half. I was like, OK, this is my thinking and gathering ideas and information. And even if I was told you didn't have to read this in like a linear way and then the second half right now is my application.

Katherine Templar-Lewis: So yes, where's the other ones I wrote down that I really liked, I will come back to. It. OK. What was the next question?

Katherine Templar-Lewis: The creator's responsibility. So how does it reflect the creative responsibility? Are the sections of ones that just design. Yes, I think, I think by the fact that you give a lot of questions and not not so many answers you make it, you know, you imply that it's creative responsibility. You can make that clearer I suppose. In one way, but you often talk about this need situation, the ethical consideration again in enhancing Akansha, it's really clear there, but there's some different design approaches. Just perhaps needs a bit of signposting because there's a lot going on there. And yeah, I really liked that as well. So yes, I think you, I think it does. It could could do a tiny bit more clarity in that.

Katherine Templar-Lewis: Then those questions about academic industry impacts. Yeah, I think it's really impactful. I think it's really a call to action for designers. I think that's why with the questions you can be even more like, you know, what would happen if X that's really scare people to adopt, you know, more ethical and piece of design practices and make it really clear that there are very few. You know, I suppose, you know, you could easily see this as reading on an academic course. Perhaps in that case, it might need more reference to what's going on, but that would date the book and I think could even further promote this idea, this need for sort of human first interdisciplinary collaboration. But I think it's all there. And you know, you look at the interconnectedness with ethical, social, environmental issues as well. So, I think it's really inspiring like the integration of speculative of method, methodologies to explore these really diverse features and really challenged normative assumptions in in tech design, those things really good like that in that case as well.

Katherine Templar-Lewis: Yeah. And I mean that there. The Lighthouse card deck obviously is like a practical tool. Absolutely. Yeah, you're giving someone a tool to use as well. So, I think that's really important and powerful.

Katherine Templar-Lewis: Accessibility, diversity. Yes. Yes. In terms of the people, you talk about designing for, not as much perhaps the audience, because again, I was clear, I was unclear reading it, if it really was for me as just an everyday person. I know you want to span as big as demographic as possible, but in the first half there's lots of things I wouldn't have known about unless I was a creator or designer. So, I think you need to be more clear that or you you or you sort of make it the have to have some more narrative and in the first half. So, I think that yes, in terms of it is all about collaboration with different people and the inclusion diverse voices and scenarios. And you touch on ethical, social, environmental issues, you know, almost the point, which is really this, which is why it's so wide in a way. And you really do like bring input from all different sides as well. But you know, I'm a born collaborator, so I'm really, really into that you, you don't suppose there's no direct talk about how these design practices feed into different stakeholders. But that's again, I don't really feel that's what this book is about, and you can't include everything. So, I think that's also absolutely fine.

Katherine Templar-Lewis: Let's go check. I'm still recording. OK, yes, I can hear the plane as well.

Katherine Templar-Lewis: Comparative analysis, how does this work compare with the existing literature in the field? And there is in the book that could work from now. I obviously don't know as many books in this field, so I can't really compare it, although I read lots of academic papers and you know, I work a lot with designers themselves. What I love about this is that it's is really food for thought, really makes you think. It really poses lots of scenarios and it makes me think in different ways. So, I don't know any book like this of

anything I've come across. But then I'm not deep in this academic niche, so it's not a niche. So again, it it sort of depends whether this is an interesting, you know, I'm trying to think it's Kinda, me and Robin would we buy this book and we would buy this book and read it and have it on our shelf of interesting books that we feel we should have in new aesthetics and and design and creative And things like that.

Katherine Templar-Lewis: And the talk, it would be really interesting to us as well. We could potentially bring it into projects that we were working on and explorations as a book. I would more suggest to creators and designers directly that I work with, which again, is why I think the first half can be you don't have to segregate your audience as much from first and second half. Make sure so the questions or provocations in the first half with lots of space reflection and can be even more provocative and in the second half they become the the application and the sort of the, you know, the tool kit itself.

Katherine Templar-Lewis: But I really love it in that I think it's really unique in its format. It's really exciting. It's kind of it's an exciting book. That's how I would say it. It's a really exciting and inspiring book as well. I look at what other notes that I have here. I wrote one note here again, one of the case studies is, is that could you scale these? Do you ever mention like could you scale and and implement some of these solutions and maybe these be some provocations around how would you scale these? What happens if you try to scale these and and and problems on implementation as well? I always have about, you know, sustainability considerations super high, which I really like and again, this is not a book about solutions. It's a book about questions as well. So, I think it's fine that you don't necessarily tell people how you Implement them or give them like analysis tools or anything Like that, you don't really need to.

Katherine Templar-Lewis: What else I'm just going to flip through. And find out what notes are the. Notes I got. Is that these ones are now upside down. Funny. Yeah, I'm just putting the cards on the table. Just needs a real clarity as to what those two sections are for and if they're both for me. And I love so on page. Oh, I don't. There's number page, because it's upside down but it's on. It's on the the 1st 2 pages for cards on the table it says design tools for collective action, and you have this I leave you with a call to action. “I ask you to consider who you are in the designing process to consider what ethical issues you'll care about and the power you have to effect change. It's not necessarily the government's responsibility onto you know, we need to advocate the future we want to see.” I think this is so powerful it can be pulled out. It should be put at the front. You know, it's your real mission statement and I feel it gets a bit lost for that as well. Me, I put glossary interoception. Question mark. That's just me.

Katherine Templar-Lewis: Oh, I love also chapter 3. I love the line. You know, basically reduce, reuse, recycle is not going to work, I like that. Can really, you can really highlight that we know we're all bit fucked if we we need to rethink this. And yeah, I loved one of the phases when light stole the night. Really like that, I put you could even put your own view or more sort of prompts in it as well. Absolutely love the plug and throw away images if they are yours. Can I please have a print and buy one off you put on my wall?

Katherine Templar-Lewis: I think that's it from my notes. Yeah, post human protest again really stood out. Oh, that was it. So, where you sort of said Pippa Sparks's project? I think what gave the game way to me was I was like, but who is this person? You don't tell me anything about her? Other than what she she does, she explores post-election world I

wanted like a sense of who she was. So, I could really believe there's a real person called Pippa Starks. And yeah, that. That, again, like posting protest, feels present right now. So, I really liked that. It feels, yeah, very now. Obviously love you with proprioception hairs, some of that conversation that we had. Is absolutely brilliant.

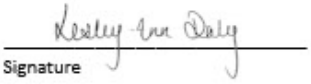
Katherine Templar-Lewis: So, yeah, and again, there's a a circle some dates, you know, do you need to be like like 20 years from now or, or clarify what's now, what's near, what's far future that's. Just an editorial choice, right? Viewing your editor to to chat through. I think that's it. I think it's really ace. Obviously, I haven't answered directly in in all the columns and the questions against you're meant to have, but I really love it and I'm happy to just want to get this over to you with all my notes while it I had them. And I know that you're pressed for time, but if you want to go back over any of this as well and like dive into any of these bits in a bit more detail obviously, I'm happy to to do that.

Consent Form: James Auger Date 29/05 /24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	X ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	X ☐
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	X ☐
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	X ☐
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	X ☐
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	X ☐
I agree to read and review this book.	X ☐

James Auger Participant Name	29/05/2024 Date	 Signature
Lesley-Ann Daly Researcher Name	29 /5/24 Date	 Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 477 James Auger Co-Signed Consent Form, 2024.

Designing Senses review (2024-05-29 14:07 GMT+1)- Transcript

Attendees

James Auger, Lesley-Ann Daly

Transcript

This editable transcript was computer generated and might contain errors. People can also change the text after it was created.

Text has been reviewed for typos and structure.

Lesley-Ann Daly: Which would be great. We just tick and sign and send over.

James Auger: Yeah, no problem.

Lesley-Ann Daly: Okay, All right, so we'll start with the first question which is around the ethical exploration. So how effectively do the projects explore the ethical implications of sensory augmentation on human society and the world and are there any specific projects that stand out for their relevance and deep ethical inquiry?

James Auger: a big question that it's hard to summarize with the, I mean the whole point of this is to be super honest. I found the text actually more interesting than some of the projects. The challenge I had with some of the projects and I'm sure you remember I know you were there with a Speculative Edu book and did you read bits of it Speculative Edu?

Lesley-Ann Daly: No, I've read some of the interviews online, but not the actual book.

James Auger: Yeah, the book itself. we do get into a little bit of the state of speculative design. That was the whole point of the project. And so for me a few of the projects were a bit too fictional. It's something my own PhD was on speculative design, and I call it crafting the speculation and some of the terms you're using I talked about The Uncanny in my PhD. Provocation I think is interesting. I'm looking down the question too here. I'm jumping forward and I think one of the points that we made in Speculative Edu was that the role for such design projects has been a bit challenge since the release of Black Mirror, and the success of film and the kind of narrative that comes through these filming TV scenarios allows for that particular category to get much deeper into the scenarios than the speculative design project can with typically a singular image in either a photographed artifact and for me that it's something we did talk about in the Speculative Edu, but it does pose a challenge for that type of speculative design.

James Auger: In really engaging an audience with the complexity of the scenario, for me when Black Mirror came along it made it very difficult to continue with that particular approach to speculative design. So for me this scenarios that work are the ones that are a little bit more subtle where it's not a fiction built on a fiction. So you've got the fictional future world of the post-human and then we've got to try and imagine what this post human world is like and then we're starting to imagine the kind of more societal implications of that before we truly understand what the first level of fiction. Does that make sense? So for me,…

Lesley-Ann Daly: Yeah.

James Auger: I mean, I'll be honest my favorite one. I think was the children's book because it was simpler and I think maybe the language of the children's book and the audience of the children, perhaps made the scenario a little bit more simple. But that one I found much more interesting for example than a swimming pool idea. Which the brief that you gave your fictional companies was already a very complicated brief. So, I was left wondering who is the person in the scenario were why is it to do with detecting different types of fish for example, and so for me is it again? There's a question of managing the fiction that if the scenario itself is already very removed from my current idea of reality. If the brief though fictional in any project that follows from that is going to be another level of fiction beyond for me. That's the problem here is you've got 10 years of teaching speculative design and I don't want to come at this a kind of tutorial, these and the kind of comments so would have been giving students that they are RCA during that period we don't do that kind of design so much anymore. Where I'm currently teaching in France, it's a different curriculum. We don't do that kind of work, but the comments I'm making for me a very familiar of teaching at the RCA, which is not so much building fiction on fiction and really trying to, I called it a perceptual Bridges, is thinking about our contemporary reality. This is why for me Black Mirror is quite powerful is it's always latching on to something, a contemporary form of behaviour something that we relate to and then extrapolating that to exaggerate it and make the point the kind of Black Mirror the reflection of the kind of darker side of human behaviour is mediated by technology.

James Auger: I think that would be my key critique of some of the ideas and as a result. I think it potentially reduces the impact of those more fictional ones to create a strong audience reaction. Perhaps other than experts in the field and I think this is where it might be interesting to reflect. I mean, maybe this is a reflection in the PHD who would be the audience for this body of work and I think you address that obviously through the workshops and who's in the workshops. And I think if this isn't really a form of more general public engagement, but you're talking at specific audiences already. Somehow in how could I put engaged with the particular subject of whether it's ethics or augmentation Etc. They might have the knowledge that first fictional jump that I'm talking about is not there. So that would be I think an important thing to reflect upon it's obviously in a book like this. You don't talk about who the audiences within the PHD you certainly can.

Lesley-Ann Daly: Yeah, I will say on that one. It is for more Specialists. So, it's for the creators of those technologies as opposed to more general public.

James Auger: Yeah, I think I mean I'm supposed my job is just talk about the book, but it's more interesting to talk about in the context of the PHD. So Maybe it's in the book and I kind of miss that clarification but I do think that audience is super critical.

Lesley-Ann Daly: This is perfect. It’s great to get your views. Also, a teacher.

James Auger: No, no, I don't want to feel like I'm giving a tutorial but it's on a difficult to get out of the habit.

Lesley-Ann Daly: Do you want to do question two or do you feel like you've covered the kind of the speculative?

James Auger: Let's have a look how respective elements used to explore possible futures of sensory augmentation contributed to the overall impact of the book. So, I think this is again. Yeah. I've kind of covered that to a large extent. I think The Uncanny is it requires huge amounts of precision. I did a lot of reading on The Uncanny and the description of Frankenstein's monster and Charlie's book is an Exquisite description of the monster that creates this kind of uncanny feeling. It's something familiar and unsettling at the same time. And I think that's the bid I missed a little bit was the familiar. I got the unsettled nature, but I didn't relate to quite a few of the concepts as much as I might have done. The thing with the ears to get the Eco location. I was left. What, what would that experience be? It's a matter of almost one thing having a post human envy, one thing to be in that scenario to truly feel what the experience of that augmentation would be like and I think again, it comes back to that question of managing the fiction a little bit and really trying to draw your audience into the content again. It's what Black Mirror does so well.

James Auger: So, again for me it was a bit hit and miss some of the concepts. I thought were much stronger than others. And it comes a little bit back down to again. It might be my lack of understanding of some of these kind of sensory augmentation capabilities and where that particular type of technological development is heading. So you're getting a response from a designer rather than an ethicist from the field. So it's probably a little bit loaded by that.

Lesley-Ann Daly: That's perfect. And just go back to the first question. Was there any specific projects that you think stood out for ethics?

James Auger: I probably should have read the questions again. I did read them but I think the, the Feel the Truth one poses some interesting questions again it's the same critique of a lot of the speculative edges stuff that it's easy to slip too far into dystopias. And a few of the ideas for me felt a little bit too dystopian. It would have been nice to see something that was less hard to in terms of a dystopia or the complexities of possible future. So I think all of them posed super interesting ethical questions, but it was reading the text that got me into the ethics rather than looking at the project. Does that make sense? I thought the texts were.

Lesley-Ann Daly: Yeah.

James Auger: We're raising a lot of super interesting questions. Some of the ideas didn't push those questions as far as they might have done. A lot of the time is it's a classic critique of Utopias is that they're often are from here, and the question is how do we get there? And I have the same question with a few of the scenarios. I was wondering the one about you post a lot of human lives matter and these kind of images here. I was left wondering how did we get to this particular world in whose had their rights revoked, to it's a large stretch when the notion of post-human is still not that familiar within society and the idea of taking on board implants and augmenting ourselves in these complicated ways is not really started to a great extent. So, I've got to buy a lot into the fictional element to then start to imagine that world. So that's why, for me, what was written in the text was getting me very much into the ethics. But I had to use a leap of faith or a kind of a jump of the imagination to start to imagine the scenarios and that plausibility.

Lesley-Ann Daly: Thank you. And so the next question is around Visual and narrative Clarity. So if addressed this a little bit already, but are the concepts and ethical implications presented in a way that's both visually engaging and easy to understand and How does the structure of the book contribute to the narrative?

James Auger: To start and end on this the narrative was quite refreshing and original. I did enjoy the flipping back and forth and almost the reveal at the end of what this is about I think was a good way of organizing your thoughts and the development of the project. They are visually engaging. And the images are easy to understand but the difference between being able to understand what's happening and then relate to what's happening? If you see what I mean, so I think visually the provocative and engaging but then there's a question of are they successful in communicating the complexity of the concept and I think that's where it's still suffers a little bit against the complexities that the Black Mirror afford because here you've got a long sprawling narrative over half an hour or an hour that really allows complex stories about the future to be told and when that's reduced into a singular image or two. The challenges is much much higher. so I think yes, they start to tell a good story but just to repeat what I've already said, I don't think the visual images are enough on their own. I think they work much better together with the text. The text is allowing you to do the complicated bit of the story that I kind of longer narrative like a TV shorts series whether they need to do.

Lesley-Ann Daly: Thank you. And the next one is around the Creator's responsibility. So how does the book reflect on the Creator's responsibility in creating the Technologies and other sections or projects highlight responsible design practices? So when I say creators, this can be designers, scientists, anyone that's going to go into making a piece of technology.

James Auger: That is a strange question for me because I'd find the whole approach that you're developing is a responsible approach to technological development any project that's posing questions of ethics and technological developments is being responsible. So that's why it's a bit of a strange question because I totally understand and agree with what you're trying to do or what the purpose of the project and the PHD behind it. I think and again it's difficult to judge this outside of the context of the full PhD but things like approaches from I don't know Science and Technology studies where we understand we can understand better why certain technologies become funded and how emerging technologies eventually enter into everyday life and the current debate around artificial intelligence and how we don't control future is related to that. It makes your whole approach extremely topical and important right now.

James Auger: I think addressing and this again is probably a thing for the PHD is to really look at where decisions are made. And the role of lobbying and the role of Corporations and pushing particular technological agendas. I'm thinking about Elon Musk and electric vehicles and the lobbying that goes behind that. I think the more systemic decision-making processes and where power lies would be critical when we think of, the Creator can create but I think unless you get legislation passed and funding for research development and all of the complicated factors like that then such projects in and this is again another critique of speculative design from a few years ago. They kind of remain in their own academic bubble and it's breaking that this is where I think it's really important to talk more about the workshops and I think it would have been good. Maybe not in this book, but definitely in the PHD to see the outcomes of that because yeah, it's interviewing people about the book is one thing but for me the outcomes of the interviews and the outcomes of the discussions and the round tables that are potentially fed by or inspired by the ideas and the cards the approach that you developed. That's for me is the critical thing that tells us much more about the creator's responsibility. So, how do you engage with policymakers within the EU or the corporations that might be pushing such technologies to encourage them to do it more responsibly rather than just thinking about the market. So I don't think it answered that

question very well. I do think the book reflects very well on your responsibilities. And I think it's critical that anybody developing a technology finds ways of doing that in more responsible ways and if this is an example of that and it's working and that's a big step forward.

Lesley-Ann Daly: Thank you and the next question is around the impacts. what potential impact do you envision this book could have in academia and industry particularly in terms of influencing the design and development of sensory augmentation technologies?

James Auger: Again, it comes down to the workshops themselves, I think and curating those so you have the proper actors around the table. That's a little bit what's missing at the moment? I think the other thing that not in your project, I mean and how we develop and implement technology, I think. And it's often the case is that the economy is a bit of an elephant in the room because it's still the economy and growth that seems to dictate decision-making processes and technologies are simply released until they become so problematic that legislation is forced upon them. We see that with smartphones and teenagers at the moment where people are starting to realize these things are highly problematic and regulating their use for young people. So I think we're realizing as a culture quite quickly that such things do need to be regulated and particularly as the technology becomes increasingly invasive and profound. And so I mean, I think that's your major challenge is the impact thing. I don't think the book impacts enormously on its own. I don't mean that in the critical sense. I don't think people read such books because they're interested elsewhere. But I do think the organization, running of workshops with the right people around the table is a very, very powerful way of hopefully impacting. And then the projects there and the cards that you're using I think are ways of driving or managing that discussion into some very interesting and important terrains.

Lesley-Ann Daly: Cool. Thank you and then on to that how might it impact your own practice.

James Auger: This comes back to I think I've already answered this not so much and I don't mean that in a rude way, but I don't call myself a speculative designer anymore. I'm working less with Futures and emerging technology and more with a kind of I guess low tech approach is and kind of rethinking existing configurations of technology. So, it wouldn't impact on me so much but simply because I've moved slightly in a disciplinary sense. Yeah.

Lesley-Ann Daly: And the next one is around accessibility and diversity. So how accessible is the book's content to its intended audience so which is the designer's ethicists and technologist. So any of the creators of the technology. And does it incorporate diverse interdisciplinary perspectives?

James Auger: Yeah, I mean, I guess it's very accessible. It depends I can talk from a design point of view. I find it quite accessible. It's difficult for me to talk about ethicists. I would be nice to have an ethicist in the meeting just to hear more from their point of view and what it encourage them to think about because I can't speak for them. But that for me would be far more interesting than talking to other designers. Talking to ethicists, media, psychologists, even people from tech companies who have got an eye on the future how they see this particular form of augmentation going and how the debate around ethics could be encouraged within their own environment because that's where it really needs to happen. It's no point just having these discussions within academia. So how to bring these discussions to the places where power exists and decisions can be made is critical. So I think for that

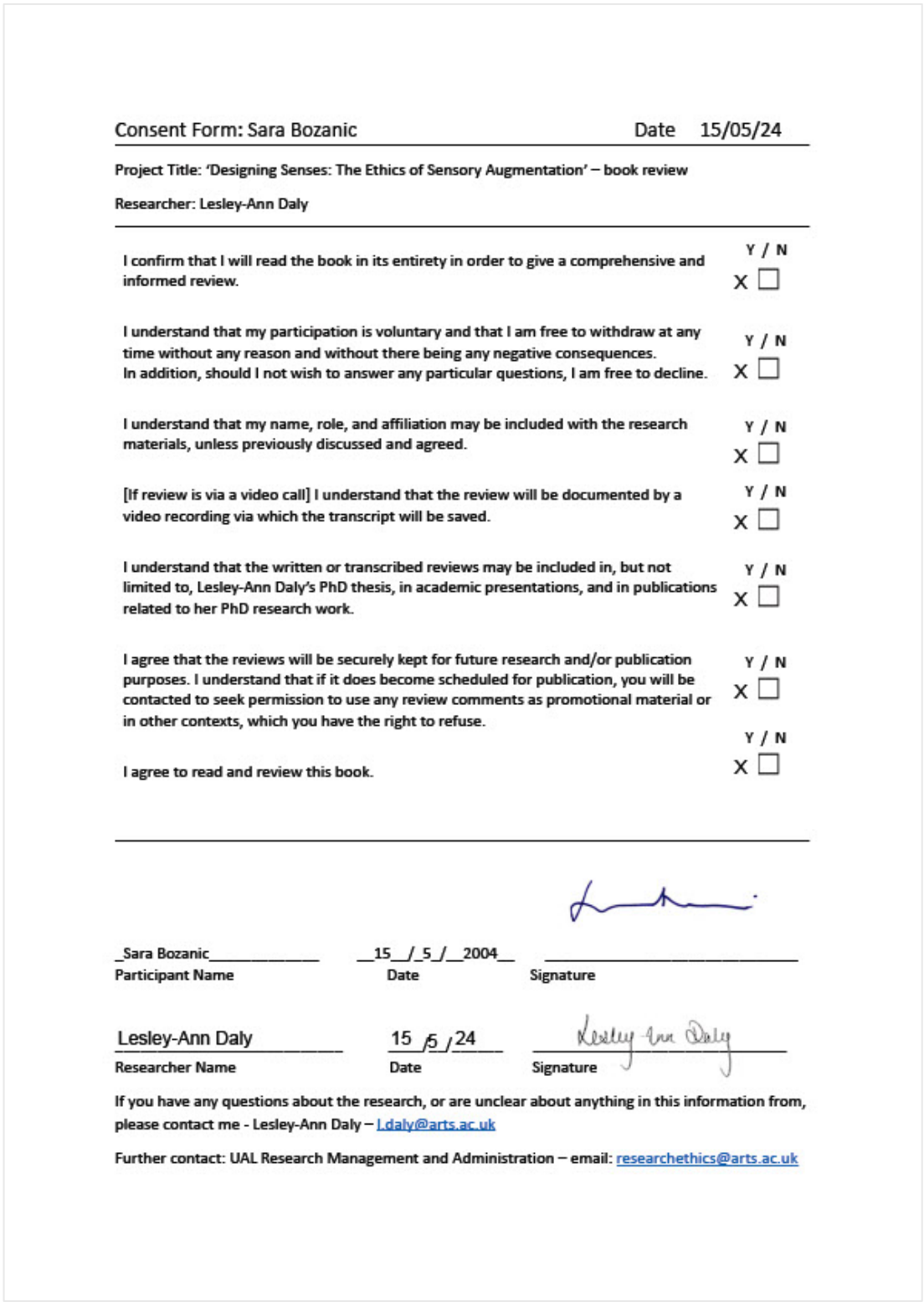
audience would be quite successful. I've not been too involved. We did a project a few years ago commissioned by the EU on blockchain and used speculative design approaches to talk about the future of blockchain that was in I think 14, 10 years ago. And that for me was a bit of an eye opener. It was really positive experience in really the potential of this form of speculative design but that had been curated by these designers within the EU who are working very closely with policymakers. So I think if you could get those kind of people involved and run the workshop with them, we did a similar kind of workshop on blockchain. I think It could be very successful.

Lesley-Ann Daly: Thank you. And then the last one is comparative analysis. So how does this work compare with existing literature in your field What contributions does it make and where can it benefit from further development?

James Auger: I think I've answered bits of that if you were to do another iteration, I would work on the scenarios a little bit and find a way of grounding them a little bit more or they're not stretching reality so much that it becomes fictional. So, there's a lot of work on that element of speculative design. I think as I mentioned before Matthew Jerabini's early work on the ethics of driverless vehicles, I think would be an interesting thing to look at because he really did work a lot on the Dilemma. So it wasn't just a future scenario as a future dilemma. And you're left like that person with the trolley lever. If you pull the lever you're going to kill that person. You'll be responsible for his death.

James Auger: If you don't pull the lever the train will naturally go that way and kill 20 people. So do you want to be a murderer of that one person or let the bait take its course and kill 20 and it's the power of that ethical dilemma I think inspired him to develop these scenarios around the decision making of driverless cars. And it was very relatable because you're taking the decision making away from a human being behind the steering wheel. And you're still there without the steering wheel, but seeing the car make a decision that has implications and it was really for the designers of the cars and the designer of the algorithms how do we delegate decision-making to machines when complicated scenarios and ethics are involved. So I think there may be maybe in your PhD you get into this, but to talk to ethicists and how they encourage consideration, thought around particular themes would be interesting to look at because I think a little bit of that the crafting of those ethical dilemmas apply to scenarios around those humanism could just refine the concepts a little bit more. So there are a little bit more plausible so if you were going to benefit further, I think that would be just a little bit more crafting of the scenarios would be good. I think in terms of speculative design I've not seen and this isn't a critique but these type of projects. I've not really experienced them too much in recent years this approach kind of disappeared for a while and to see it coming back again is interesting it makes me wonder where the potential is if you continue the development of these kind of things and I think what's different with your book to the work of let's say 10 years ago.

James Auger: The text is much more contemporary. So it's bringing the methods that I think we're a little bit isolated before through the text and what you're talking about regarding the ethics and the complicated possible futures that emerge, but that together with the benefits of or the thing, like the dualities the post-humanism addresses bringing that into the scenarios, I think was important and so it comes back to what I said. I personally found the text a lot more provocative and thought provoking than the actual projects that were sitting next to.



Consent Form: Sara Bozanic Date 15/05/24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	X ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	X ☐
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	X ☐
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	X ☐
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	X ☐
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	X ☐
I agree to read and review this book.	X ☐

Participant Name	Date	Signature
_Sara Bozanic_____	__15__/_5_/__2004__	_____
Researcher Name	Date	Signature
Lesley-Ann Daly	15 /5 /24	Lesley-Ann Daly

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 478 Sara Bozanic Co-Signed Consent Form, 2024.

Designing Senses review- Sara (2024-05-31 09:03 GMT+1)- Transcript

Attendees

Lesley-Ann Daly, Sara Bozanic

Transcript

This editable transcript was computer generated and might contain errors. People can also change the text after it was created.

Text has been reviewed for typos and structure.

Sara Bozanic: So first of all, really, once again, huge congratulations.

Lesley-Ann Daly: Thank you.

Sara Bozanic: On the overall, I love the design, the book, especially the feeling of the book. I loved how you approached and made it accessible to the wider audience, not just so-called 100% healthy. And I really like the projects and the way especially the concept that you do. If I was acting like an editor, I would suggest just few upgrades when you start because it's a flip flop book and it has two sides. And from my point of view, the first side is completely devoted to the subject matter and then the second side as I see it is the methodology or the methodological approach and your tool on how other designers or anyone else can approach and design speculative design project based on your method.

Sara Bozanic: From that point of view, when I see what I would enhance would be an introduction. Why you start very nice like with your insight. For me, it's beautiful because you really given not just like a theoretical aspect, but emotional aspect why you're doing this. What I would suggest is also in a far front, add a concept on what post humanist mean because you're not in that sense like touching what did the period means from that sense, I wouldn't start with a Nova and without speculative design as a methodology, but rather from the overall subject matter of the overall culture aspect of the Today that you are approaching. And I would just flip it why I would add Nova on the back of the book. Why? Because she's a tool. She's speaking about the tool you're using and from my point of view, like explaining speculative design at the beginning is not as important as explaining the cultural context of the nowadays that we live on the topic you're approaching.

Sara Bozanic: So that would be maybe my suggestion then. What wasn't clear, and I saw you obviously also struggled, was do you present yourself as an author or do you present yourself as a creator? I understood at the beginning, and I was like, what? Whoa, what it is? Is it an author, or a character? So it was a confused for me. You're definitely an author. And I wouldn't mind that if you say it from the very beginning, not revealing that you also designed all the projects, but saying I'm the author of the book. Why? Because otherwise I'm a bit confused now. It's not a clear message because sometimes you say I'm a curator, sometimes you say them at the end, OK, I'm the outer of everything. And I had a question mark on that. Then wait a little bit. My notes.

Sara Bozanic: Yes, I have a personal opinion on speculative critical design and also had that thought. And I called Evita and said, look, I really if it's a mistake and I said, really I have this issue on speculative critical design as a buzzword and I do mind it, but I want to hear your opinion. And I said my opinion is it's like when we I'll make a comparation like we speak about the mothers, right? This is for me like the speculative design and it's normal that the mothers give birth because it's a mother and rarely in less situation they like adopted someone. So, if we say the mothers, we don't say the mothers that gave birth. And this for me, speculative design or speculative critical design, critical design needs to be an essence of each good project. If it's not, it's not a good project. So, for me it's just speculative design. And speculative critical design is maybe more some kind of buzzword that everybody's now using because from some of the projects, critical component either vanished or isn't that strong, or it went to complete utopia, dystopia or whatever.

Sara Bozanic: But in essence, for me, speculative design is just enough to say, I would love if you can again also reflect my thoughts. So, to see then the element at the back. What I still didn't understand was if you used your own methodology with the cards to develop all the projects you are presenting in a book or not. No, OK, then maybe if you did use it for some just AI don't know a note in order.

Sara Bozanic: If you want to make the forefront even more convincing, then I would suggest that when you name studios or when you name people, just add one sentence like the scientists or the most innovative. So we even why? Because why I love this book so much because it's full of the surprises. Like the first part, I read it really as extracting the knowledge, understanding of augmentation and everything. And then on the other side, it's like, wow, this is a surprise. I didn't know it was such a build. So this had a big emotion. And that's why I would say, OK, make it even more convincing. So make up who those scientists or people are.

Sara Bozanic: That's it. From the aspects of accessibility, visual and hearing impairment, the only thing I would add would be also an audio transcript. But otherwise, the way you did it, it's like really huge congrats you took so much care on, yeah, being accessible to all. That's my editorial note.

Lesley-Ann Daly: Thanks.

Sara Bozanic: You would you want to reflect and shall we then go to your question?

Lesley-Ann Daly: Yeah, I will say about the the back half, So the methodology is for creators of sensory technologies. It's not to create sensory or it's not to create speculative projects. It's like say I'm developing a wearable. You then use this methodology to reflect on how you're producing the wearable and making sure it's ethical. So it's not about making the speculative projects, which is why I didn't use it for the speculative projects.

Sara Bozanic: OK. And maybe just a note on clear because like the connection to me when I was reading and going through the connection wasn't that clear like with between the methodology and this, but maybe that was me also because I'm not native in English. So reach out that please.

Lesley-Ann Daly: Yeah, of course. It's really good to hear like all of the comments, they're like all totally valid. I get where you're coming from, the speculative critical design. It is, it's kind

of coming from a theory perspective and to show that both are involved and a lot of the critique around speculative design that it's actually not really that critical when it like should inherently be. But I'm just kind of like calling out as like that is part of the practice. Like you can't speculate without being critical or you can be critical without speculating. And these are supposed to do both. So that's why it's it's there as one, it's how I talk about it in the PhD, in the thesis as well. So it's just to align it.

Sara Bozanic: Yeah, it's nice. I mean, I know it's been all around present and a lot of discussion is on it, but yeah, maybe just another point to see where where this field will go.

Lesley-Ann Daly: Yeah, that's the thing. It's like it changes name depending on he's doing it as well. So it was kind of pick one and roll with it.

Sara Bozanic: That was so early. And also wondering, did you really tackle this posthumanistic approach from the side of the content? Like that was one of my observation that maybe this forefront should be written by you or by a sociologist on the cultural context we live in. And then flopped, you know, change. So the method is back. Do you maybe already have something that you are tackling on a general topic through the PhD?

Lesley-Ann Daly: So posthumanism goes through the whole PhD as well. So the first section is very much about like understanding academic and public views of human enhancement and the ethics around it and the lack of regulation. And then to create a framework of how we can make the technology better as the people creating it. So like in lieu of there being regulation and policy, but that the current literature is quite limited, like it's very human focused and it's only about the benefit to the human and it doesn't really think about, you know, particularly the rest of the planet and sustainability and stuff like that. So I wanted to take that posthumanist approach to bring in research outside of human enhancement and to bring it in to make a more kind of like holistic framework or you know, methodology for doing it. So that posthumanism is what kind of like informs like what I'm bringing in.

Sara Bozanic: Oh, but nice. I love the topic. It's so me also. And such sensibility to yeah, to the future, especially to all the people, but especially with special needs, because I really think that rarely anyone tackles that subject matter. Well done.

Lesley-Ann Daly: Thank you.

Sara Bozanic: To the questions.

Lesley-Ann Daly: Yeah. So what is? I can ask them and then you can.

Sara Bozanic: I'll yeah, you can ask them.

Lesley-Ann Daly: So the first one is around ethical exploration. So how effectively do the projects explore the ethical implications of sensory augmentation technologies on human society and the world? And are there any specific projects that stand up for their relevance and deep ethical inquiry?

Sara Bozanic: Yes, indeed. I mean, I love the diversity of the projects presented and how they at the end interval. What I one of the projects that I like the most was the one with swimming. That's let me just find a name.

Lesley-Ann Daly: Enhancing Akansha, Yeah.

Sara Bozanic: Enhancing Akansha because by providing two different briefs and two different approaches, the communication and the ethical aspect of what speculative design and what designing technological enhancement means. The proposal first one doesn't at all tackle the safety of people with, we don't say with disabilities especially what's the correct language.

Lesley-Ann Daly: Either people with disabilities rather than disabled people. There's people of determination. There's a couple of different ones. It kind of depends on the person. Like some people like to say they're disabled as a way of saying like, yes, this is me, this is my identity. It's not something I should be ashamed of. So it's, yeah, it depends.

Sara Bozanic: They use with disabilities because in Serbian language that completely went out. So yeah, they don't want to be called. So that's why I'm asked. So this aspect of how in the first brief or in the first proposal the safety of that person wasn't tackled at all, gave a special notion to me and I really loved it. How then the second proposal also highlights like, yeah, the importance of participatory creation those to providing the solutions that are in line with assuring the basic need for them. And that same that's what I did like the diversity project. Why? Because it goes from the basic needs and basic technological enhancement to also our visual manifestation and style. Like I really liked your project. I'm a Cyborg also why? Because it highly tackles also the current problem that we have among youngsters. Youngsters today have a huge challenge with identifying the gender. That's why we also have this huge pop culture of youngsters being animals. I'm not familiar and I don't know the same thing is going on in London. But in Ljubljana, we have a group of youngsters that go around with tails, funny ears, and you can't touch them. And this aspect, as I see, is also critically, nicely really defined through your through your projects and also especially through the Cyborg that leading me back. That's why I also find it really important that when you start the book, you start with this aspect of humanity today in order to maybe better understand what's coming. Also, the project that stands out for me is the garbage around plug in, throwaway, find it very quality.

Sara Bozanic: As we are now pressed also with this greening and solving like the garbage on the planet, we also need to be aware of this past fresh industry. And I believe that this is just my head on that. If we make an auction, if we clean a little bit of space and make an auction, we can make a huge money out of that place also me dreaming. So did I answer the ethical exploration like it really goes, the variety and diversity of the projects go really well in depth on all the challenges that we have from the human side, technological side, and also people to people of relations side. Speculative elements, Sensory augmentation is the future everything implies. In that I commented on a speculative critical design. Do you think I covered that or do I do you think I need to repeat a little bit?

Lesley-Ann Daly: No, that bit's fine.

Sara Bozanic: That's look fine. And then the visual and narrative clarity. Visually, I love the design. It's beautifully designed really from the side of the colour, from the side of how do you call it black and white is for visually like with for people with special visual disabilities like impairment, how do you find contrast? So you took special care on a contrast so it can be read by everybody. Then the font, the typography that you choose, it's also like special care that is taken to the book design so it allow everybody to read it. I really loved it. The enhancement that I proposed was only an audio, so that's it, a narrative clarity, really clear, except the aspect that I wasn't sure if you're the creator or the author, which reveals at the

end that you're actually the author and the inventor of all the project. That wasn't clear. And how the methodology is used that you propose creators of responsibility, Oh my, if everybody was so responsible as you, half of the problem from the world would disappear.

Sara Bozanic: So dumb. But academic and industrial impact based on my awareness, what's on the market from the speculative design and it's more or less we all tackled more what the field is trying to define the field defining some major characteristics, identifying some majors, pioneers, key players and where this field could go. But you went completely one step forward.

Sara Bozanic: Why? Because you're choosing a narrow, not so narrow, but you narrow the field to a specific interest that you have. So I find it the relevance, it's really huge and not only for the academic sector and for the future designers, but I found this book really relevant for any business player that is in the field of technology and innovation. So it has a broad use, accessibility and diversity.

Lesley-Ann Daly: Go back. Could you expand on why you think it would be good for people in business or like how do you think it could be used?

Sara Bozanic: Could be used because in business we often search for methodological approaches or for the tools for help in which we can through fast brain brainstorming sessions, design innovations. And that's definitely a need today. Business sector doesn't have awareness and doesn't understand design in depth as we understand it, but they can use if it's really, we have tools that are really well pre designed by business sector and teams. They can be really, really well used. And as, as I see this method you're that you're proposing which is so clear and so understandable that even if you use it in example in the milk production business sector in milk, we need augmentation today, agree or not?

Lesley-Ann Daly: So how do you think about the milk?

Sara Bozanic: It's OK, it doesn't matter, but it was just the basic in milk industry. Also there's a lot of technology from the feeding the animals, from them, how we take the milk out, then how the milk goes through the processes. And I believe that future, I usually joke that in milk industry or in any, it would be nice to just have Alexa and say, you know, cow, I'm joking a little bit and then preserve it, put it on that temperature. So it can also be like driven by the voice. But as I'm saying, like augmentation needs to go into any business in order to enhance and also this human aspect of the augmentation that doesn't separate us but unite us all with all different diversities, essence of the future. And This is why I find really why this book doesn't have only academic approach but can be used in any other business sector where the augmentation is something that needs to be think of in the future.

Lesley-Ann Daly: Awesome. Thank you.

Sara Bozanic: Did I answer?

Lesley-Ann Daly: Yes, OK, perfect.

Sara Bozanic: Accessibility and the diversity, I tackle it a little bit, but I believe that we live in a separatistic society where so-called healthy people are separated from the people with visual or hearing impairment. If I believe in a responsible future and I believe the separation needs to be minimized. And also on the level of school, on the level of work, on the level of

accessibility of information. And that's why I find this book really one step forward to everything I see. Honestly, if I now go back and take a look of the three books of my colleague, if it's a manuscript which also I cooperated on one, we didn't think about it and it's our mistakes, big mistakes. Why? Because not, not all of us are healthy or even if we seem to be healthy, there is a lot of mental health issues that a lot of people us are facing that also have special aspects on how we approach them. And that's why I also really love this book, how responsible it is to everybody.

Lesley-Ann Daly: Thank you.

Sara Bozanic: For the future, you can technologically augment it. So if you want more participation, just one add on, like I really loved how you pose question to all of us, like on the topic, on the narrative aspect of the project, of the responsibility, of the technological, of the broader human aspect. So maybe if you just want to have the results, also think on when you scan it augmented, is there a way that you can also receive our participation? But that's really just a little add on.

Lesley-Ann Daly: Thank you.

Sara Bozanic: Questions, Reflections?

Lesley-Ann Daly: No, there's one more at the bottom then, which is comparative analysis. So how does the work compare with existing literature in your field? What unique contributions does it make, and where could it benefit from further development? So we've covered a little bit of this already, but.

Sara Bozanic: Yeah, I think the biggest contribution is definitely on having people with disabilities, how to say, can't say forefronted, but I would say that you really take special care of all of us. So it's not just putting one group aside. So for me, that's the biggest benefit of the book, like your responsibility as a designer and really putting it in front. Then the other thing is that because speculative design and the literature that I'm familiar with tackles all the field, so it forefront projects and responsible creative practice, but it covers everything from nature to building to a little bit of utopia, dystopia, biotechnology, whatever. But this one really has a strict line and goes directly into someone else's interest. So from that sense, I really see it more applicable to anybody who will tackle augmentation in the future.

Lesley-Ann Daly: Perfect.

Sara Bozanic: Yeah, did I cover it all? Let me check my notes.

Lesley-Ann Daly: One that I just want to follow up a little bit on.

Lesley-Ann Daly: So we talked about like academic and industry impacts, but how might it impact your own practice?

Sara Bozanic: To me, to me, it's a definitively reminder that whatever book or whatever website or whatever tool I launch on the market, it can’t be without having a notion on accessibility means that from the design, from the contrast, from the way we read it, from the size of the letters, from its enhancement in audio form or even in sign languages is a must for the future. And not any tool that comes out of our studio or my work shouldn't go without taking care that it's accessible to all and that can be read by all.

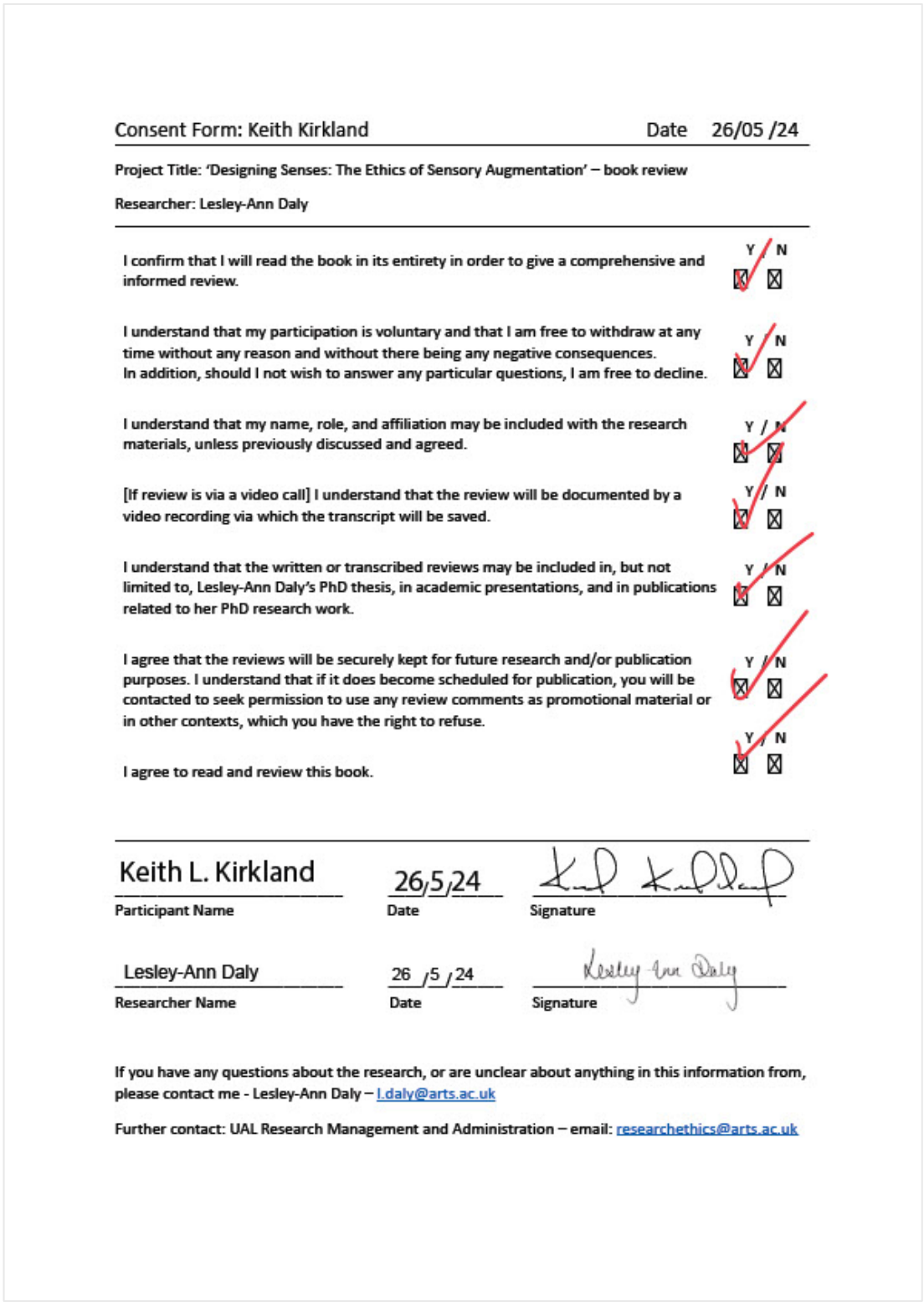
Lesley-Ann Daly: Amazing. That's all of my questions.

Sara Bozanic: Yes, sure. If you think still that we haven't, that I haven't tackled enough, maybe let me just go through the questions.

Lesley-Ann Daly: I think we covered pretty much everything.

Sara Bozanic: Yeah, no, but really huge Congrats. I enjoyed the book all the time. It went with me to a ferry, to a plane, to everywhere, really. And that surprise was one of the really huge benefits because I was, you know, when you read, I was wondering like, where did you get all those projects? And then it was all designed by you. Congrats.

Lesley-Ann Daly: Thank you so much.



Consent Form: Keith Kirkland Date 26/05 /24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	Y / N ☒ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	Y / N ☒ ☐
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	Y / N ☐ ☒
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	Y / N ☒ ☐
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	Y / N ☒ ☐
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	Y / N ☒ ☐
I agree to read and review this book.	Y / N ☒ ☐

Keith L. Kirkland	26/5/24	
Participant Name	Date	Signature
Lesley-Ann Daly	26 /5 /24	
Researcher Name	Date	Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 479 Keith Kirkland Co-Signed Consent Form, 2024.

Design Senses review – Keith Kirkland (2024-05-26) – Written Review

1. Ethical Exploration: *How effectively do the projects explore the ethical implications of sensory augmentation technologies on humans, society, and the world? Are there specific projects that stand out for their relevance and deep ethical inquiry?*

Keith Kirkland: Designing Senses is effective in delivering ethical empathy for future sufferers of our current design (in)considerations. The inquiry of looking into the world, not full of hope and optimism that technology will inherently save everything, but in a way that sees and feels from the point of view of those who may not be positively impacted by the advancements.

Oxford Haptix and "Feel the Truth" were especially powerful. As a serial entrepreneur and educator in the haptics space, I have often dreamt of a world where haptics are as ubiquitous as headphones and touch screens. The possibility of encoded positive and negative tactile associations within one context being able to influence large scale behavior in another are questions we should run towards headlong, not away from.

The reframing of ethics as a pillar of creativity instead of a hindrance was also a very powerful shift. Without constraints, you cannot have "Good Design". Therefore embracing the constraints of ethics, the way we have begun embracing constraints of diversity and sustainability, will like have transformative effects both on our business and the people they are ultimately built to add value to (aka serve).

2. Speculative Elements: *How are speculative elements used to explore possible futures of sensory augmentation? How do Speculative Critical Design methodologies, such as the use of the uncanny, deception and provocation, contribute to the overall impact of the book?*

Keith Kirkland: The speculations used to create the work were effective in an initial probing of consideration. As an inspirational palette of things to think about, it does well getting one to open doors and cross bridges one may not have thought, or had the courage, to navigate on one's own. Yet here I found the most to be wanting. The initial probs felt compelling, but they felt as if there could have been more context and presented research.

Here I wonder in a second or third version, how might it be to have a prompted call to writers and have them create fuller fictional worlds (or bring worlds they have already created) into the mix. I agree with the challenge of curation, but I also believe that the reflected complexities from each person going super deep may fill in some of those piece where the brief and info behind it felt "light".

3. Visual and Narrative Clarity: *Are the concepts and ethical implications of sensory augmentation presented in a way that is both visually engaging and easy to understand? How does the book structure contribute to the narrative?*

Keith Kirkland: I had a bigger challenge than I would like to admit with the book presenting deceptively about a curation when the focus of the book is about ethics. I understand deception and outright fiction is a tool. Under any subject other than ethics, it may have felt creative. But here it created an unnecessary questioning of is it ok to be deceptive in a book about ethics? And while I had some very interesting self dialogue about what that means, or not. I feel it may not serve the end goal to the reader.

As a second part to the non-clarity or reality of fiction of the narratives, I felt challenged at first to understand whether I was reading a fictional curation of works or a curation of real works that were fiction. It almost feels like it could read more clearly if the statement that is at the end is told at the beginning. I also am not sure that the narrative benefits from the big reveal as it does with being consistent in transparency and ethics.

Visually some of the example material was hard to read and didn't take full advantage of the negative space and size available for increased readability. The "classified" document. While digital text was provided of the descriptions on the QR Code, the actual written text wasn't and was thus a challenge to read, even with full sight. It may prove inaccessible to those with a visual impairment. Also the contrast of the text falling into the spine and changing colors (when there is so much space toward the edge of the book being underutilized).

Finally I think the flip over, while fun didn't add a huge value to the reading experience while it may make thing more challenging from an accessibility point of view. A digital version wouldn't need to be flipped, so that likely solves that challenge, but I wanted to bring it up as that is my space of experience in case it was useful.

4. Creators' Responsibility: *How does the book reflect on the creator's responsibility in creating sensory augmentation technologies? Are there sections or projects that highlight responsible design practices?*

Keith Kirkland: The book requires that each creator or creative team to take a deep look at their pipeline of potential biases, both explicit and implicit. And it ask us, the future creators of those new technologies, to take full responsibility for the exploration and development of the ethics in relation to the applications of the technology we are creating. As most grassroots organizations understand, getting enough individuals to take responsibility, and thus action, can be a powerful tool. As a counter-balance to why it is not currently the norm, "groupthink" and "mob mentality" are also very powerful tools. The reader would benefit from a bit of context some explorations of how to deal with ethics when there is a larger forces that are not prioritizing it, or even worse, actively looking to suppress it. It is a wonderful framework for teams, who are already in alignment and interested in shifting the conversations to use. And I think an accompaniment of how to move when the regime is not so supportive would be a welcomed expansion.

5. Academic and Industry Impacts: *What potential impact do you envision this book having within academia and industry, particularly in terms of influencing the design and development of SA technologies? How might it shape ethical discussions and consideration for real-world implications? How might it impact your own practice?*

Keith Kirkland: For academia, it is a wonderful opportunity to engage students, while early in their careers on the idea of ethics. It is only when we have to confront ethical dilemmas that we are, often ill-prepared with no prior practice and in the face of overwhelming pressure, forced to confront them. Learning and sharing our ethical preferences earlier, before there is pressure to act and be held accountable, may help in the same way that having a shopping list before leaving for the market can keep you stay accountable to your budget. In my own practice I hope to use the card as a prompt to get students to get into the habit of considering the impacts or their work more deeply than their target customer.

6. Accessibility and Diversity: *How accessible is the book's content to its intended audience, which includes designers, ethicists, and technologists? Does it incorporate diverse, interdisciplinary perspectives to enrich the discussion?*

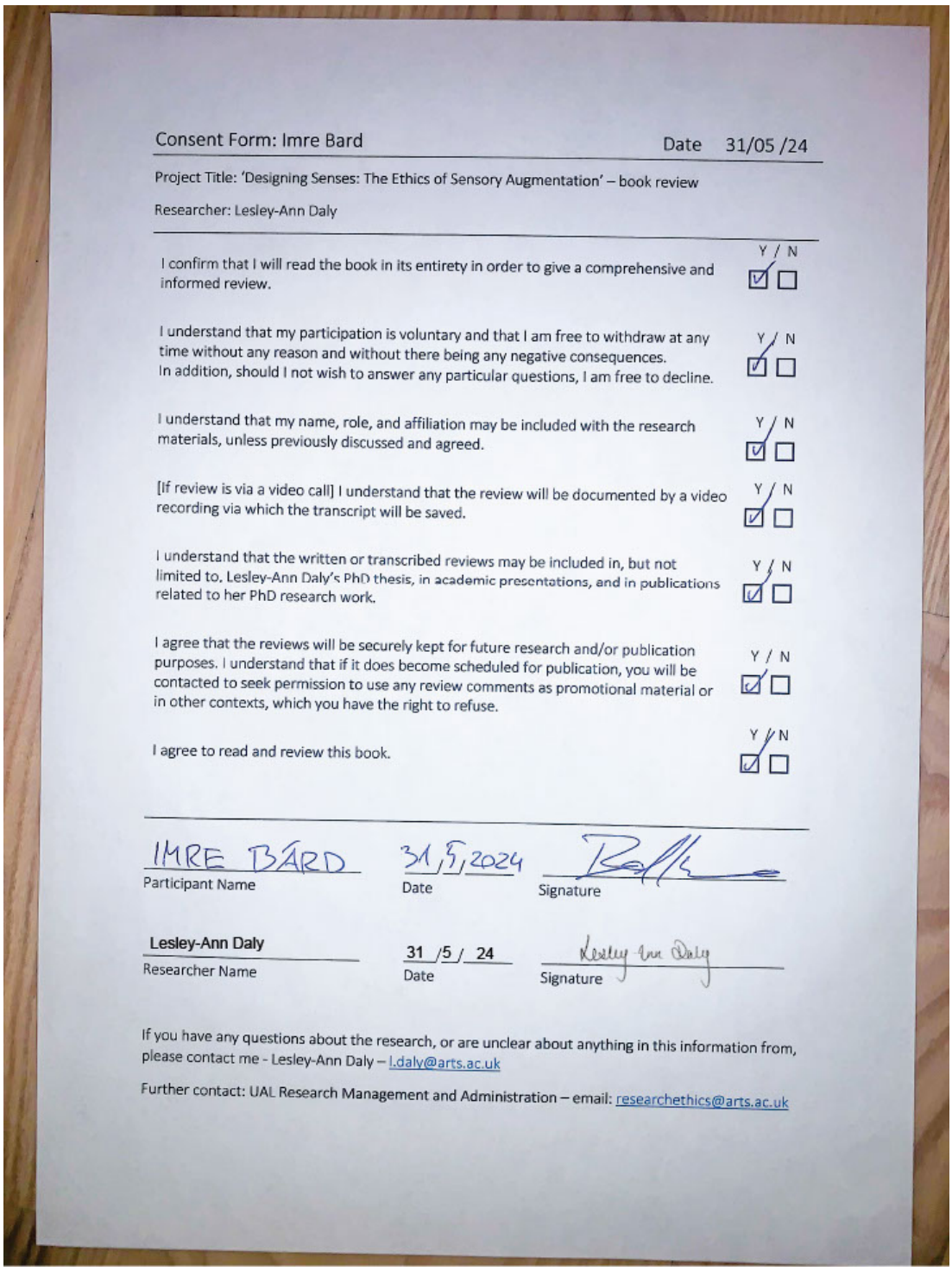
Keith Kirkland: The book shines in how it not only considered diverse human perspectives, but in the way that it expanded, and further diversified, which perspectives are worthy of consideration.

The focus on perspectives beyond humans and the need to decentralize the human as the most significant benefactor is a powerful call to reframe the way we have historically designed for the world. And as we evolve technologically and become even more symbiotic, the expansion on the inclusion of intelligences to consider, nonbiological along with nonhuman, is a necessary step to ensure our new futures don't become highly-efficient, high-scalable replicas of models that exploit opportunities for “us” at the cost of “others”.

The stories are simple and yet complex. They give easy access to understand and empathize with impacts. Like the story of the Radium Girls, who, after being told to lick the paint brushes so that they could paint glow-in-the-dark watch dials with finer accuracy, died of radium poising. We have an opportunity to use our creativity as futurist to consider all impacted by our work, and while we will never be able to see the future, we can imagine the future and pose those questions to how we are working now.

7. Comparative Analysis: *How does this work compare with existing literature in the field, what unique contributions does it make, and are there areas in the book that could benefit from further development?*

Keith Kirkland: The unique contribution this book makes is it is a deep consideration of ethics in the creation of future technologies and experiences. It shows the reader the implication that we can feel all too familiar with the after effects of want-to-be-billionaires running toward promised lands that aren’t fully considerate of the people beyond their stakeholders. And by showing these stories it does a good job of creating “future empathy”, empathy for the worlds not yet existent.



Consent Form: Imre Bard Date 31/05 /24

Project Title: 'Designing Senses: The Ethics of Sensory Augmentation' – book review

Researcher: Lesley-Ann Daly

	Y / N
I confirm that I will read the book in its entirety in order to give a comprehensive and informed review.	☑ ☐
I understand that my participation is voluntary and that I am free to withdraw at any time without any reason and without there being any negative consequences. In addition, should I not wish to answer any particular questions, I am free to decline.	☑ ☐
I understand that my name, role, and affiliation may be included with the research materials, unless previously discussed and agreed.	☑ ☐
[If review is via a video call] I understand that the review will be documented by a video recording via which the transcript will be saved.	☑ ☐
I understand that the written or transcribed reviews may be included in, but not limited to, Lesley-Ann Daly's PhD thesis, in academic presentations, and in publications related to her PhD research work.	☑ ☐
I agree that the reviews will be securely kept for future research and/or publication purposes. I understand that if it does become scheduled for publication, you will be contacted to seek permission to use any review comments as promotional material or in other contexts, which you have the right to refuse.	☑ ☐
I agree to read and review this book.	☑ ☐

IMRE BARD — Participant Name
31/5/2024 — Date
Signature

Lesley-Ann Daly — Researcher Name
31/5/24 — Date
Signature

If you have any questions about the research, or are unclear about anything in this information from, please contact me - Lesley-Ann Daly – l.daly@arts.ac.uk

Further contact: UAL Research Management and Administration – email: researchethics@arts.ac.uk

Figure 480 Imre Bard Co-Signed Consent Form, 2024.

Design Senses review – Imre Bard (2024-06-01) – Written Review

1. Ethical Exploration: *How effectively do the projects explore the ethical implications of sensory augmentation technologies on humans, society, and the world? Are there specific projects that stand out for their relevance and deep ethical inquiry?*

Imre Bard: The 9 projects described in the book do a very good job of presenting a diverse range of ethical issues related to sensory augmentation. They accomplish to do this in an exciting, fun and unpredictable way. The chapters are short and the point, which helps to keep the reader's interest highly engaged, and allows one to linger on each project and consider the scenario. In my understanding, the purpose of the volume was not to advance or defend any particular ethical theory or to engage in deep analysis of any particular ethical issue in relation to enhancement, rather, to serve as a provocation, primarily intended for the designers of such technologies to think more carefully and systematically about the ramifications of their practice. The book very much succeeds at this and offers a really refreshing take on the subject. It is also a virtue of the project that it seeks to consider sensory augmentation in an expanded frame of reference, looking at its individual, societal, and (broadly construed) environmental aspects, as well as addressing key conceptual rearrangements that are implicated by the technology.
My 'favourite' project was perhaps *Feel the Truth*, because it managed to convey in a truly visceral way how deep the manipulative power of data-driven technologies may be and how risky it is to give unchecked power to market mechanisms to shape our experiential horizons. A powerful warning about the present, skilfully depicted as a speculative future.

2. Speculative Elements: *How are speculative elements used to explore possible futures of sensory augmentation? How do Speculative Critical Design methodologies, such as the use of the uncanny, deception and provocation, contribute to the overall impact of the book?*

Imre Bard: Reading this book has been a genuine delight that was full of surprises, even until the very end, when the author revealed herself to be the source of all projects covered in the volume. The book presented the concept of Speculative Critical Design clearly and well, and throughout each chapter, it drew successfully on some speculative component to convey the ethical uncertainties surrounding sensory augmentation. Almost every chapter draws on provocation as a method to prompt the reader to engage critically with the values that may be underpinning their practice, and sensory augmentation itself sometimes seems as a mere vehicle or technological prop to shine a light upon and question societal trends we may all be unwillingly propagating. All in all, the author's use of Speculative Critical Design methods seems competent and effective.

3. Visual and Narrative Clarity: *Are the concepts and ethical implications of sensory augmentation presented in a way that is both visually engaging and easy to understand? How does the book structure contributes to the narrative?*

Imre Bard: The theoretical framework inspiring the author's perspective was presented briefly but well at the beginning, and I believe it was a good idea to structure the book around 3 core concepts, posthuman, post-dualist, and post-anthropocentric. The book's aesthetic qualities are highly pleasing, and it reveals great care and attention to detail. The visual layout and overall quality of the work is appropriate to the topic of sensory augmentation for the book itself is an exciting sensory experience with its visual imagery, haptic qualities, and unusual 'flip over' idea at the end. The quantity of text is minimalistic, tight, and to-the-point, helping the reader to engage with the core ideas without unnecessary verbosity. In addition, the decision to present the key idea of each chapter at the beginning, followed by individual projects, and concluded by a brief structured recapitulation of some key ethical issues at the end offers a good way repeat core ideas, slightly differently and with shifting emphases at each time. The striking and vivid visual imagery helps to anchor ideas about sensory augmentation and makes them more tangible and relatable. Overall, the visual material and book structure play a key role in supporting the author's intention to help designers deepen their capacity for ethical reflexivity.

4. Creators' Responsibility: *How does the book reflect on the creator's responsibility in creating sensory augmentation technologies? Are there sections or projects that highlight responsible design practices?*

Imre Bard: The significance of tech creators' responsibility is a key thread that runs throughout the entire work and is emphasised in several different ways. In a sense, I believe it is the core message of the work to draw attention to the fact that designers unavoidably make ethically laden choices in their practice, and that being attentive and thoughtful about the values embedded in design can lead to more desirable futures. Perhaps the two variants of the 'Enhancing Akansha' projects demonstrate this in the most direct way, by offering examples of how prioritizing different sets of values can lead to fundamentally different outcomes. In addition, the author's own toolkit for furthering ethical reflection offers a good practical instrument to help put these ideas into practice.

5. Academic and Industry Impacts*: What potential impact do you envision this book having within academia and industry, particularly in terms of influencing the design and development of SA technologies? How might it shape ethical discussions and consideration for real-world implications? – How might it impact your own practice?*

Imre Bard: This question is somewhat difficult to answer for one must balance idealistic aspirations with the everyday reality of technology development and its driving incentive structures. Ideally, the book could find a place in design and engineering curricula for it offers an easily digestible opportunity to deepen reflexive capacities and provides a tool to implement in practice. Its use in such educational curricula could help sensitize coming generations of technologists and designers to be more mindful shapers of the experiential worlds we will come to inhabit. In my own work, I sometimes have to work

with stakeholders from very different background and explore together what the potential implications of a yet-to-be-developed technology might be, and convey to them how every technology unavoidably expresses and reinforces certain values, while downplaying others. This book can serve as an excellent resource to convey that idea in a tight, compact and thought-provoking format.

6. Accessibility and Diversity: *How accessible is the book's content to its intended audience, which includes designers, ethicists, and technologists? Does it incorporate diverse, interdisciplinary perspectives to enrich the discussion?*

Imre Bard: As already mentioned in response to other review questions, the book is very well-structured, and the content is presented in a straightforward and easily understandable manner. This should make it broadly accessible, and can be particularly useful for designers, educators, and perhaps technologists. I believe professional ethicists may find the book useful as an unconventional –at least for the discipline – method to address familiar ethical issues and to help convey the significance to ethical issues to the representatives of other disciplines. I believe the book also holds value to social researchers, where recent years have seen a growing interest in using non-traditional data to study societal attitudes and perspectives. Drawing on the outputs of Speculative Critical Design can offer valuable resources to study public attitudes in novel, creative and engaging ways.

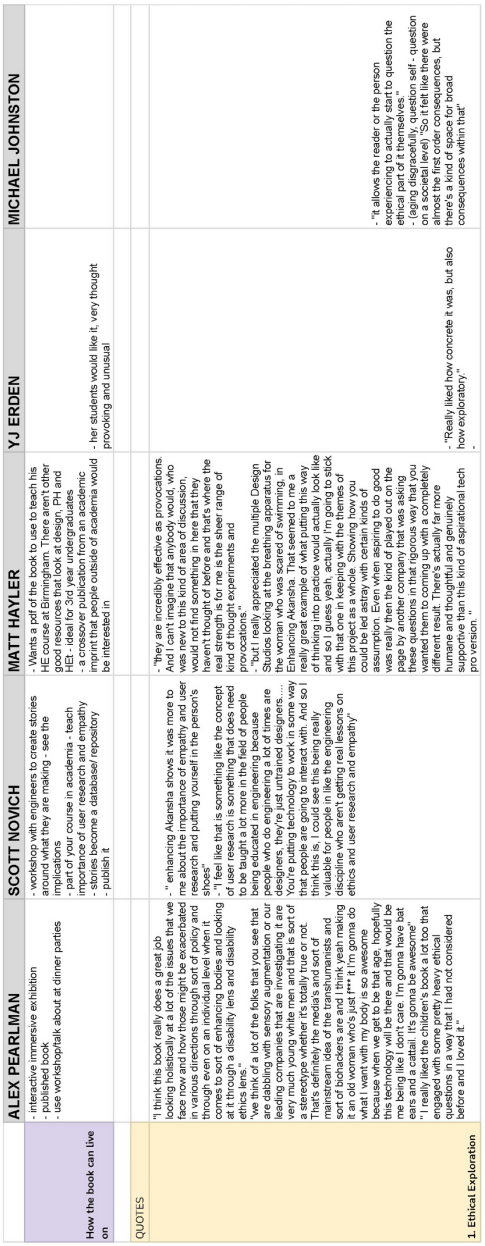
7. Comparative Analysis: *How does this work compare with existing literature in the field, what unique contributions does it make, and are there areas in the book that could benefit from further development?*

Imre Bard: I believe the book makes several unique contributions that are attributable both to its structure and content, which I have already alluded to in response to earlier questions. The decision to structure the discussion of sensory augmentation around 3 relevant posthumanist concepts offers an original way to frame the issues. The projects themselves are highly original creative pieces that foreground different ethical issues, and they do so in a way that reveals the complexity and simultaneous presence of multiple issues in each case, while the final Lighthouse card set offers a novel toolkit to practically move ethical reflexivity along.
In closing, I want to draw attention to two absences that I believe are important to mention. First, while the work discusses several ethical issues in relation to sensory augmentation, I believe there is one aspect that is largely missing, namely, the element of peer/societal pressure and competitive motives driving the adoption of enhancement technologies. This aspect receives a lot of attention in the broader academic ethical literature on human enhancement and some questions pertain equally to sensory augmentation as well. What is the degree of autonomy people have in relation to opting into the use of enhancements? Although some chapters gesture toward the question of individual autonomy once an augmentation is already in use, tackling how the technology blurs the boundaries of a clear-

cut ‘self’, but the question of societal, economic, and peer pressure to engage in augmentation in the first place is left largely unexplored.
Second, the author provides a novel toolkit to help designers and technologists address the ethics of sensory augmentation technologies. This work is highly valuable, however, the author could have placed greater emphasis on the importance of ongoing reflection during the entire cycle of technology development and the creation of mechanisms and instruments for continued engagement.

9.3. Reviews Analysis

Quotes Matrix



	ALEX PEARLMAN	SCOTT NOVICH	MATT HAYLER	YJ ERDEN	MICHAEL JOHNSTON
How the book can live on	- interactive immersive exhibition - published book - use workshop/talk about at dinner parties	- workshop with engineers to create stories around what they are making - see the implications - part of your course in academia - teach importance of user research and empathy - stories become a database/ repository - publish it	- Wants a pdf of the book to use to teach his HE course at Birmingham. There aren't other good resources that look at design, PH and HEt. - ideal for 3rd year undergraduates - a crossover publication from an academic imprint that people outside of academia would be interested in	- her students would like it, very thought provoking and unusual	
QUOTES					
1. Ethical Exploration	"I think this book really does a great job looking holistically at a lot of the issues that we face now and how those might be exacerbated in various directions through sort of policy and through even on an individual level when it comes to sort of enhancing bodies and looking at it through a disability lens and disability ethics lens." "we think of a lot of the folks that you see that are dabbling with sensory augmentation or our leading companies that are investigating it are very much young white men and that is sort of a stereotype whether it's totally true or not. That's definitely the media's and sort of mainstream idea of the tech innovators and sort of biohackers are and I think yeah making it an old woman who's just f*** it I'm gonna do what I want with my body is so awesome because when we get to be that age, hopefully this technology will be there and that would be me being like I don't care. I'm gonna have bat ears and cat eyes. It's gonna be awesome" "I really liked the children's book as a tool that engaged with some pretty heavy ethical questions in a way that I had not considered before and I loved it."	- " enhancing Akansha shows it was more to me about the importance of empathy and user research and putting yourself in the person's shoes" -"I feel like that is something like the concept of user research is something that does need to be taught at some point in the field of people being educated in engineering because people who do engineering a lot of times are designers, they're just untrained designers.... You're putting technology to work in some way that people are going to interact with. And so I think this is, I could see this being really valuable for people in like engineering disciplines who aren't getting real lessons on ethics and user research and empathy"	- "they are incredibly effective as provocations. And I can't imagine that anybody would, who was new to this kind of area of discussion, would not find something in here that they haven't thought of before and that's where the real strength is for me is the sheer range of kind of thought experiments and provocations." - "but I really appreciated the multiple Design Studios looking at the breathing apparatus for the woman who was scared of swimming, in Enhancing Akansha. That seemed to me a really great example of what putting this way of thinking into practice would actually look like and so I would have liked to see more work stock with that one in keeping with the themes of this project as a whole. Showing how you could be led astray with certain kinds of assumption. Even when aspiring to do good was really then the kind of played out on the page by another company that was asking these questions in that rigorous way that you would like to see them coming up with a completely different result. There's actually far more humane and thoughtful and genuinely supportive than this kind of aspirational tech pro version. "	- "Really liked how concrete it was, but also how exploratory."	- "it allows the reader or the person experiencing to actually start to question the ethical part of it themselves." - (aging discussion) "It's not the self - question on a social level." So it felt like there almost the first order consequences, but there's a kind of space for broad consequences within that"

Figure 481 Quote Matrix for Reviewers 1-5, Lesley-Ann Daly, 2024.

	ALEX PEARLMAN	SCOTT NOVICH	MATT HAYLER	YJ ERDEN	MICHAEL JOHNSTON
3 Visual & Narrative Clarity		- " I have to say that so the concept of using I guess you're calling it speculative critical design or the concept of creating these stories that I guess they're allegories is that the right term? Parables, allegory fine but I think that's a really powerful methodology for driving home the importance and understanding of what you should be considering when thinking about in the process and makes it really fun. Right this is the kind of thing, I wish I had read, during my undergrad or Graduate Studies, I think something this kind of methodology that you're talking about for learning and understanding ethics at a really deep level where it's not just something you're trying to kind of check off that's a really important concept - "this is also before I realize these are all fake. Right I love that you made these, it wasn't clear necessarily out the gate, especially when you're just browsing through the book. But some of these were fake and I think when you think that 'is this a real thing? I think it really drives it home for example the Aging disgracefully." - "so I guess all this is to say let's take a critical design at the whole concept here kind of speculative fiction as applied to a tool for thinking through the ethics of a design problem or challenge I think is a really powerful concept that is from a boring philosophical thing to a really fun exercise. It's actually enjoyable and really you doesn't even force you, you just naturally start thinking about this stuff. I think that's great." - "I found it engrossing and engaging and they have the sense of humor in it as well, which I don't know what you call the sense of humor. It's like kind of like snarky, I don't know what the term is but it's so yeah. I know There was I don't know you call this kind of subtle underlying humor that was also in this and I really enjoyed it."	- "this feels like a post humanist transhumanism. So, my reason for saying that is Haraway is kind of idea of transhumanism as humanism on steroids just kind of doubling down on humanist impulses. I think you can have a post humanist transhumanism where there's still a degree of hope and a recognition of what technology can bring and a recognition that technology has always underpinned human experience, there is no culture in the world that is not kind of thriving with technology." - [on the reveal that I made all the projects] "the fact that you can't do it all shows that the other person doesn't have an answer. It's not just you, everyone's silos often focuses on one thing. You can keep this all in mind and if you ask the kind of questions that you set up in the second half of the book rigorously and continuously you can kind of do this so debate and switch does kind of work in that regard." - "I think these are worthy topics to grapple with the provocation: it doesn't push you away. Invites you in often in quite a glamorous kind of way and I found that really effective with what you do. "	- "I thought the deception was interesting and I enjoyed the ethical reflection on it. I didn't mind it. I have to admit it. I didn't, I don't expect the author of a work to be speaking truth, and I thought your point that they're already kind of speculative stories means that you're already kind of setting the reader up with some disbelief. I believe. So I guess I found that interesting, but I didn't have much to say about it" -	- "from my perspective of realizing that I was a reviewer I just literally read it back to front. And I had to step back and realized that it wasn't real. ' And it took me a while because I really did get sucked into it, which I think was another testament to how engaging and immersive the experience not just reading because I think it was so many things in there." - "I think the breadth of palette was helped bring nuance to the story lines, which really helped bring it forward. " - "Where I think the way you've structured this is let's through the anecdotes and the stories that their own ethical questions are within that and I think that's really nice way to expand a speculative designs impact on a broader group of people."
2. Speculative Elements	[swimming project]." It's sort of like a critical lens of speculative design where the first project is rejected because it focuses too much on solving a technical problem." "I think that the design of the book and the way that the introductions did touch on all of these in a very, I don't want to say simple because it's a very complicated topic, but in a accessible way with the writing was crisp and short and easily it the points home and drove the questions that readers could take with them or I don't even know if a reader is the right way - experiencers, people who are experiencing this work could take with them" - "it's almost like a learning guide was really helpful and definitely drove the accessibility of engaging with these topics through critical questions for anyone who wanted to" "you might want to argue that they were all just post humanists and then maybe go on down from there, but I think you're right that the post anthropocentric was like it's a very specific different side of the coin, right and so is post-post-human is a very specific kind of speculation that we're really dealing with in society right now is this ideal of dualism and sort of spectrumization of formally dualist categories"	- "super visually engaging I would say for obvious reasons the artwork and design in this is absolutely gorgeous"	- " It looks like a coffee table book, feels like a coffee table book. I put that I love the texture and the feel of the book. I think it's kind of books that it is attempting to. It's not even mimicking, it's just doing that thing." -	- " I found it a clever idea to flip the book and in so doing ask people to flip what they their engagement with it. I thought that was quite effective. I wasn't sure once I flipped the book where I was supposed to start from because you don't just flip the book, you also flip your mind of, of engaging with the book. You have to go backwards. And I wondered whether you'd intentionally not spelt that out. Did you want people to discover that for themselves?" - " I understood that as contributing to the narrative because it it makes it clear that this is not a single linear story, but a range of views and perspectives and interests that knit together or connect with each. - "maybe some things are taken for granted there about what people will understand by those words and by those concepts"	- "Yes, this is a set of things, there's a wide use of narratives, which I think is good. It shows breath and I think it really did feel almost a level of complexity with the ones that you chose, the order that you chose them at. I almost felt like that's how it was laid out and then you kind of pushed a little bit further, especially with the third topic just because it's so difficult, the post-Anthropocene."

Figure 482 Quote Matrix for Reviewers 1-5, Lesley-Ann Daly, 2024.

	ALEX PEARLMAN	SCOTT NOVICH	MATT HAYLER	YJ ERDEN	MICHAEL JOHNSTON
4 Creators Responsibility	"These are also evolving ethical questions in terms of how much of the responsibility is on the Creator and how much of the responsibility is on sort of external Policymakers, Regulators, consumers and where those lines blur where they end where the Baton gets passed and whether everything that happens with the technology is the responsibility of its creator or is there at some point when an unintended use occurs that is potentially harmful, can a Creator be blamed for that if there's no possible way they could have known or even if they can't prevent it. So yeah, that's a hard question. I'm not sure if the project really explicitly grapples with it."	..." as the creators responsibility and then I thought I did actually the other one that really struck me that I actually really liked was When Lights Stole the Night. That kids story about designing ourselves instead engineering ourselves to fit the environment rather than trying to make the environment fit us. I thought it was a really interesting, and I've used that story in there as well to kind of balance it out because I think usually when we think about, I know again I don't have a deep background ethics, but my impression of the field is it's largely thing about all the terrible aspects of what could go wrong if you don't pay attention to things. So I think it's also great, I think it's also really important to talk about more developing, I think any problem that you're kind of trying to solve. So I just love how widely applicable that story was in terms of, I think I would carry that with me if I were designing a new product in the future." ..."I think people get inspired by things that they read, but don't really think about the implications of those things. People they read cyberpunk, something like this type, think the technology available is cool, let's make it happen. And that's kind of about where things stop right in terms of thinking about things."	-"I think that's really important for designers that just because the current law and the current Society might say that something is okay, that doesn't mean that you are ethically obligated to do that. It's sticky, so these different kind of levels I think really matter reminds me of just kind of want to think about kind of the difference between Institutional ethics in the University disciplinary ethics and then my personal ethics and how often they don't align"		-"..I mean one of the things I focused on was the fact that the writer put themselves in the position of the creator and I think even trying to understand somebody else's reality is interesting take on it because it breaks through conceptual or imagination, and kind of lives through that process. " -"I tend to think with most technology things that I've seen and even just working with someone recently is they only see the good And then, you know, the creation and its impact on humanity, tends to be quite narrow. And I actually think the power of storytelling and narrative and characters and tools you use in design that you used quite well here will broaden their own perspective of it." -"So it's the writing or is it now the impact it's had on the reader? That's super interesting ground. So would that be what you said, have a greater impact on more people, it's more accessible than reading a 10,000 word let's say thesis, so I think that kind of plays on that and also probably brings more of emotive point to it than just a rational analysis. Which I think is often often missed." -"...No, that's really thought about I guess my focus in mind really, you've been about how do I get them to feel something? I think where you've done is you've got the feel and then moved on to how do I get them to question? And bring their own questions which I really like because that is the whole point."

Figure 483 Quote Matrix for Reviewers 1-5, Lesley-Ann Daly, 2024.

	ALEX PEARLMAN	SCOTT NOVICH	MATT HAYLER	YJ ERDEN	MICHAEL JOHNSTON
5 Academic & Industry Impacts	"in my experience the commercial side or the sort of technological developers who want to commercialize these technologies are, it's a really a crap shoot. Some of them are very very interested and feel like a deep responsibility to answering and really grappling with these ethical questions around their technologies and some of them, they just cannot be forced to care and that to me is a very scary piece of this puzzle." "People are just going in and taking advantage of the vulnerabilities of less developed regulatory systems. And just making dangerous things potentially potentially unethical and potentially negatively impactful or harmful things somewhere else just because they don't care. So I think that's something that I could say Academia can grapple with all day and it's just not going to make a difference and I think that is really hard to hear for academic they just don't like to hear that they can write papers about why it's bad all day, and it's just doesn't matter and so it's more about preparation for the inevitable harm and how we deal with it then. So it's not an 'if' but 'when' question that academics and the commercial industry are going to need to deal with." " this book in particular which is why I love it so much is that it is super accessible for the uninitiated and really can be supplemental to my just having dinner table conversations friends at pubs, whatever having something like this that I can turn to people and show that "scary" sensory enhancement is not just for weird bros and Silicon Valley and there's these whole other side of the consideration for these kinds of technologies in their potential impacts. And I think something like this goes a really long way to making it accessible and acceptable."	- "I think the only recollection I have about ethics was maybe towards the end of my undergrad one of our we had to do something that was required is super vague because there's a while ago. I just remember one Professor it was just one maybe class session with one Professor towards the end of our undergrad were professors said don't harm people with what you create, technology can be used for good or bad and that's kind of that." - "I don't think there's any reason why this framework has to apply specifically to sensory augmentation. That's the only other thing I was thinking about and would add to this but the sensory augmentation I think is a great kind of theme and focus as far as bringing this into practice." - " I wish I had a chance to actually go through an actual workshop with you on this because it looks like a lot of fun." - "Having something like this workshop that you've put together and this book are, they're really powerful potential tools for people who aren't designers specifically" - "Having a conceptual course where you're required to do a course on speculative critical design right where there's a project, we're project-based, you have to come up with the story, like a speculative story or two around the thing that you're designing or something. I think would be really cool, interesting. So that's on the Academia side." - "I think most employees at a company to at least are not sociopaths and like to think that they're trying to make the world a better place. Maybe you could argue, maybe with the management right, you could be a little bit more jaded and cynical about things but at least at an individual contributor level, I think that's probably the case."	- "So I teach a human enhancement course and we ask these kind of questions and I don't have a good resource for thinking about design and posthumanism and human enhancement and suddenly there is one available. That's a very direct thing that I can kind of put that in front of 60 students a year and just be like we should think about this and we can talk about this and the way that it is set out makes it ideal for third year undergraduate students." - "a crossover publication. So I mean that is a publication from an academic imprint that actually people outside of Academia would be really interested in. And that to me is where the work kind of sits is between the academic and the practical is asking rigorous academic questions that grounded in current cutting edge literature in these fields, but it's also designed to actually be provocatively used within industry spaces."	- "I'm drawn to a book like this because I'm interested in what it shows me, both in terms of the content, but also what an artist who creates this sees of the world and what they want to demonstrate or pick out" - "	- ", I think the book offers really usable structures and frameworks" - "I like that flow works and I think that's a really interesting way to work with policy or industry when industry trying to make governance and things like that. It doesn't always work when it's just purely a framework. So I think that the balancing act of those two could work quite well. It's particularly when it comes to technology and often looking at quite a narrow perspective of what could happen or what they want to happen is probably a bit about putting it."
6 Accessibility & Diversity	"I think it's very accessible to its intended audience in a way that I just want to share it with more people. And usually when I see something on this topic, it's not accessible or fun at all because as an ethicist, I just get a bunch of boring papers with no pictures and it' s terrible, so this is way better." " in a short amount of time and a short collection of ideas and projects, it raises a lot of questions about different perspectives and diversity of thought it incorporates even in the characters that are shown in the projects that were curated, a diversity of ages, backgrounds, technology, political diversity. So I think It does a good job sort of going across the spectrum of sensory enhancement technologies and who might benefit or be harmed by them for sure."		- "There certainly like an attentiveness to a greater diversity of humans across different kinds of protected characteristics." -	-	- "creator here for me, it's like they have a picture of the world. That's one of the important things is how can we look at more vantage points? And I think the style in which you've done this as I've said is not only the vantage point for the creator, but for others to bring their vantage points as well. "

Figure 484 Quote Matrix for Reviewers 1-5, Lesley-Ann Daly, 2024.

	ALEX PEARLMAN	SCOTT NOVICH	MATT HAYLER	YJ ERDEN	MICHAEL JOHNSTON
7 Comparative Analysis	"comparatively this is much more accessible and in a lot of ways even more comprehensive of the debates because in the way that ethicists usually approach problems, they have to write a whole book about it to fit in their arguments. And I think that for sensory augmentation in particular "show not tell" is of much better design decision to sort of illustrate the many issues, so I think comparatively this gets to the same place in a way that's more easy but just as rigorous." " multi-disciplinary collaboration is necessary for any kind of critical thought around any emerging technologies. So Yeah, I think it does a comparatively better job." "ethicists are generally trying to teach lessons to the designers and the technologists and that is A: close-minded and B: usually unsuccessful because they [designers, techologists] don't care to read an ethics paper." "I've had three people try to buy it from me, and so you need to be selling this. You should absolutely publish it as a coffee table book, it's so good, and you should consider doing an actual experiential version of it."	- " would this book be seen as polarizing in the field of engineering?"	- "there just isn't a ton of literature in the field when it comes to post humanist design in particular. I know this mostly from working with the post humanism and practice and series, we get a lot of art practice and design sorry a lot of art practice and posthumanism we don't get a lot of design and post humanism submissions" - "I think there is currently a real gap there and I think that will slowly start to be filled. But I do think that there are unique contributions here that will mean that it remains kind of field leading for a while. One is the range and the sheer range of kind of interest and the kind of meticulous understanding of what post humanism and it's practical implications might be I think that also the deep understanding of design is also something that is rare the breadth here stands out. " - "that blending together of this diversity of perspective that deeply grounded in both the design and the philosophy that feels really unique to me and I can't see that kind of being competed with very soon." - "be to do a case study from scratch maybe of kind of working from brief to product or something like that. I think that could be really effective and that you kind of hint at some of that but actually talking through that process in the flip side of here's me talking to you as Lesley Ann Daly, like this is what I would do to do this thing. this is what I have done to do this thing. I think that that would be a nice way to kind of show people, not an imagination of what someone else might do but really saying this is what I would do and talking through the steps of that process that would be another potential way of kind of showing how this could go into practice."	- ". In my field in philosophy. I think it offers, in terms of content on enhancement or augmentation, it offers some new ways to think about familiar perspectives. " - ". I think the main thing it does is offer a new, or at least an unusual method to do those things. And I think the unusual method in terms of design and the structure of the book and the case studies or the stories presents a lot of scope for thought, and putting that thought into practise. So I think it could make some interesting contributions to how we think about these difficult but also interesting topics."	- "Where I think the real shift here and the real unique contribution, is breaking that and completely sucking them into the experience and making them feel. That I think by going through the process itself you come out I think with them better view than just kind of reading a rational piece and looking at different objects or case studies within that. So I think that is a massive difference and I think that's in essence the whole point of speculative design. So I think that's fantastic and pulling that I guess participation in whatever so I feel like I'm now participating in and I feel like a sense of ownership over it."
Other	"I don't feel like it's a lecture. I feel like it's a friendly guiding hand that helps anyone who's experiencing this work to think about it in new ways that they probably wouldn't have before in a way that is not patronizing and it's not egotistical" [like academia]				

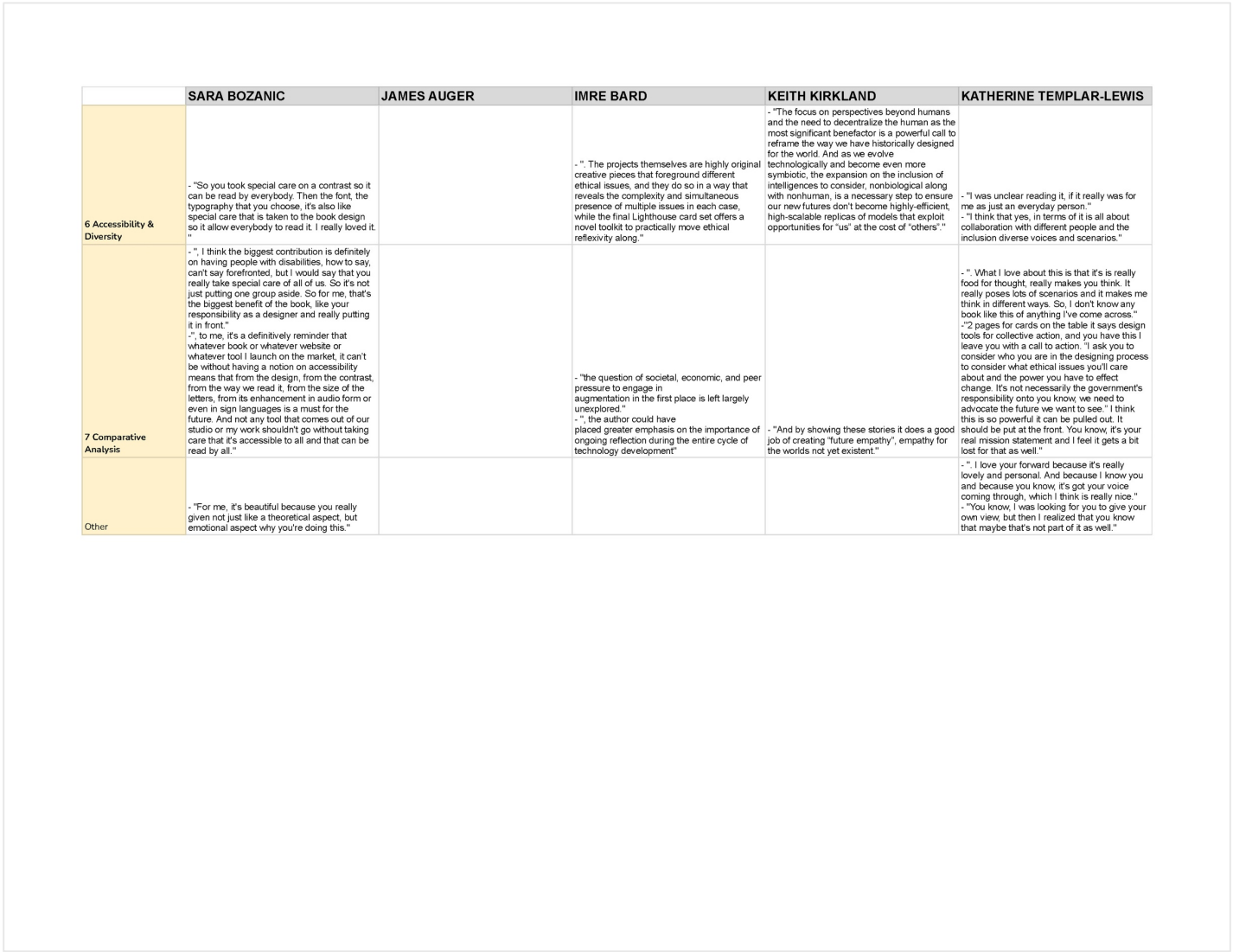
Figure 485 Quote Matrix for Reviewers 1-5, Lesley-Ann Daly, 2024.

	SARA BOZANIC	JAMES AUGER	IMRE BARD	KEITH KIRKLAND	KATHERINE TEMPLAR-LEWIS
How the book can live on	- publish		- design and engineers curricula to deepen reflexive capabilities, and as a toll to implement in practice - use with stakeholders to explore yet-to-be-designed technologies - proffessional ethicists use to convey importance of ethical issues to representatives of other disciplines	- for students to learn about ethics before the pressure to tackle it in market/real world - use with his students to get them into the habit of considering others than their target customer	- academic text - published
QUOTES					
1. Ethical Exploration	- "How then the second proposal also highlights like, yeah, the importance of participatory creation those to providing the solutions that are in line with assuring the basic need for them. And that same that's what I did like the diversity project. Why? Because it goes from the basic needs and basic technological enhancement to also our visual manifestation and style. Like I really liked your project."	- ". It might be my lack of understanding of some of these kind of sensory augmentation capabilities and where that particular type of technological development is heading. So you're getting a response from a designer rather than an ethicist from the field. So it's probably a little bit loaded by that."	- ". It is also a virtue of the project that it seeks to consider sensory augmentation in an expanded frame of reference, looking at its individual, societal, and (broadly construed) environmental aspects, as well as addressing key conceptual rearrangements that are implicated by the technology." - "My 'favourite' project was perhaps Feel the Truth, because it managed to convey in a truly visceral way how deep the manipulative power of data-driven technologies may be and how risky it is to give unchecked power to market mechanisms to shape our experiential horizons. A powerful warning about the present, skilfully depicted as a speculative future."	- "Designing Senses is effective in delivering ethical empathy for future sufferers of our current design (in)considerations." - "The possibility of encoded positive and negative tactile associations within one context being able to influence large scale behavior in another are questions we should run towards headlong, not away from."	- "What would the standout projects for me the when the lights stole the night I think is the standout, the standout project is really highly accessible. You know, it goes straight to the heart of like environmental impacts of human centered technologies. And so it becomes an advocate piece for sustainable design practices." - "You know, this is a book very much of questions and less solutions. Maybe that needs to be clarified as well. So, I think that that I feel a bit more guided and held and I know what to do. "
2. Speculative Elements		- "think one of the points that we made in Speculative Edu was that the role for such design projects has been a bit challenge since the release of Black Mirror, and the success of film and the kind of narrative that comes through these filming TV scenarios allows for that particular category to get much deeper into the scenarios than the speculative design project can with typically a singular image" - "I'll be honest my favorite one I think was the children's book because it was simpler and I think maybe the language of the children's book and the audience of the children, perhaps made the scenario a little bit more simple." - "There's a question of managing the fiction that if the scenario itself is already very removed from my current idea of reality. If the brief though fictional in any project that follows from that is going to be another level of fiction beyond for me" - "uncanny feeling. It's something familiar and unsettling at the same time. And I think that's the bid I missed a little bit was the familiar"		- ", how might it be to have a prompted call to writers and have them create fuller fictional worlds (or bring worlds they have already created) into the mix. I agree with the challenge of curation, but I also believe that the reflected complexities from each person going super deep may fill in some of those piece where the brief and info behind it felt "light"."	- "you can even be punchy at like you can scare people more of the questions. The questions were quite gentle compared to some of the like visual elements" - "you look at the interconnectedness with ethical, social, environmental issues as well. So, I think it's really inspiring like the integration of speculative of method, methodologies to explore these really diverse features and really challenged normative assumptions in in tech design"

Figure 486 Quote Matrix for Reviewers 6-10, Lesley-Ann Daly, 2024.

Figure 487 Quote Matrix for Reviewers 6-10, Lesley-Ann Daly, 2024.

	SARA BOZANIC	JAMES AUGER	IMRE BARD	KEITH KIRKLAND	KATHERINE TEMPLAR-LEWIS
3 Visual & Narrative Clarity	-"why I love this book so much because it's full of the surprises. Like the first part, I read it really as extracting the knowledge, understanding of augmentation and everything. And then on the other side, it's like, wow, this is a surprise." - " I wouldn't start with a Nova and without speculative design as a methodology, but rather from the overall subject matter of the overall culture aspect of the Today that you are approaching"		- "The visual layout and overall quality of the work is appropriate to the topic of sensory augmentation for the book itself is an exciting sensory experience with its visual imagery, haptic qualities, and unusual 'flip over' idea at the end." -	- "I had a bigger challenge than I would like to admit with the book presenting deceptively about a curation when the focus of the book is about ethics. I understand deception and outright fiction is a tool. Under any subject other than ethics, it may have felt creative. But here it created an unnecessary questioning of is it ok to be deceptive in a book about ethics? "	- "I think to the everyday person, chapters one and three make more sense because we all sort of know that we need to rethink about diversity and design. And we also know, as per chapter 3, that we need to think about connection to sort of nature things like this. So, chapter 2 doesn't fit into that sort of need state, it's more of a sort of conceptual discussion, so that I think some context around that" - ", I've got a note on diversity. You do cater to like a wide range view as I think sort of you mentioned with different disabilities, cultural backgrounds. I just want a bit more of their stories so I could really sort of have it more empathy for them as well." - "the visual narrative is very, very rich. And it, it makes it sort of what is actually very complex, a very difficult discussion, really accessible."
4 Creators Responsibility	- "if everybody was so responsible as you, half of the problem from the world would disappear." [in how the book is designed, and my framework]	-" think and again it's difficult to judge this outside of the context of the full PhD but things like approaches from I don't know Science and Technology studies where we understand we can understand better why certain technologies become funded and how emerging technologies eventually enter into everyday life and the current debate around artificial intelligence and how we don't control future is related to that. It makes your whole approach extremely topical and important right now." - ". I think the more systemic decision-making processes and where power lies would be critical when we think of, the Creator can create but I think unless you get legislation passed and funding for research development and all of the complicated factors like that then such projects in and this is again another critique of speculative design from a few years ago. They kind of remain in their own academic bubble and it's breaking that this is where I think it's really important to talk more about the workshops and I think it would have been good." - " I do think the book reflects very well on your responsibilities. And I think it's critical that anybody developing a technology finds ways of doing that in more responsible ways and if this is an example of that and it's working and that's a big step forward"	- "I believe it is the core message of the work to draw attention to the fact that designers unavoidably make ethically laden choices in their practice, and that being attentive and thoughtful about the values embedded in design can lead to more desirable futures"	- "The reader would benefit from a bit of context some explorations of how to deal with ethics when there is a larger forces that are not prioritizing it, or even worse, actively looking to suppress it." - ": The book requires that each creator or creative team to take a deep look at their pipeline of potential biases, both explicit and implicit. And it ask us, the future creators of those new technologies, to take full responsibility for the exploration and development of the ethics in relation to the applications of the technology we are creating."	- ". So, I would be really clear that both halves are for everybody. One is it more about thinking about the concepts. And Part 2 is really putting that into, into practice with questions" - " I think by the fact that you give a lot of questions and not not so many answers you make it, you know, you imply that it's creative responsibility."
5 Academic & Industry Impacts	-"I find it the relevance, it's really huge and not only for the academic sector and for the future designers, but I found this book really relevant for any business player that is in the field of technology and innovation. So it has a broad use, accessibility and diversity."		- "Ideally, the book could find a place in design and engineering curricula for it offers an easily digestible opportunity to deepen reflexive capacities and provides a tool to implement in practice. Its use in such educational curricula could help sensitize coming generations of technologists and designers to be more mindful shapers of the experiential worlds we will come to inhabit." - " I believe professional ethicists may find the book useful as an unconventional –at least for the discipline – method to address familiar ethical issues and to help convey the significance to ethical issues to the representatives of other disciplines"	- ". It is only when we have to confront ethical dilemmas that we are, often ill-prepared with no prior practice and in the face of overwhelming pressure, forced to confront them. Learning and sharing our ethical preferences earlier, before there is pressure to act and be held accountable, may help in the same way that having a shopping list before leaving for the market can keep you stay accountable to your budget."	- "I think it's really a call to action for designers."



	SARA BOZANIC	JAMES AUGER	IMRE BARD	KEITH KIRKLAND	KATHERINE TEMPLAR-LEWIS
6 Accessibility & Diversity	- "So you took special care on a contrast so it can be read by everybody. Then the font, the typography that you choose, it's also like special care that is taken to the book design so it allow everybody to read it. I really loved it. "		- ". The projects themselves are highly original creative pieces that foreground different ethical issues, and they do so in a way that reveals the complexity and simultaneous presence of multiple issues in each case, while the final Lighthouse card set offers a novel toolkit to practically move ethical reflexivity along."	- "The focus on perspectives beyond humans and the need to decentralize the human as the most significant benefactor is a powerful call to reframe the way we have historically designed for the world. And as we evolve technologically and become even more symbiotic, the expansion on the inclusion of intelligences to consider, nonbiological along with nonhuman, is a necessary step to ensure our new futures don't become highly-efficient, high-scalable replicas of models that exploit opportunities for "us" at the cost of "others"."	- "I was unclear reading it, if it really was for me as just an everyday person." - "I think that yes, in terms of it is all about collaboration with different people and the inclusion diverse voices and scenarios."
7 Comparative Analysis	- ", I think the biggest contribution is definitely on having people with disabilities, how to say, can't say forefronted, but I would say that you really take special care of all of us. So it's not just putting one group aside. So for me, that's the biggest benefit of the book, like your responsibility as a designer and really putting it in front." -", to me, it's a definitively reminder that whatever book or whatever website or whatever tool I launch on the market, it can't be without having a notion on accessibility means that from the design, from the contrast, from the way we read it, from the size of the letters, from its enhancement in audio form or even in sign languages is a must for the future. And not any tool that comes out of our studio or my work shouldn't go without taking care that it's accessible to all and that can be read by all."		- "the question of societal, economic, and peer pressure to engage in augmentation in the first place is left largely unexplored." - ", the author could have placed greater emphasis on the importance of ongoing reflection during the entire cycle of technology development"	- "And by showing these stories it does a good job of creating "future empathy", empathy for the worlds not yet existent."	- ". What I love about this is that it's is really food for thought, really makes you think. It really poses lots of scenarios and it makes me think in different ways. So, I don't know any book like this of anything I've come across." -"2 pages for cards on the table it says design tools for collective action, and you have this I leave you with a call to action. "I ask you to consider who you are in the designing process to consider what ethical issues you'll care about and the power you have to effect change. It's not necessarily the government's responsibility onto you know, we need to advocate the future we want to see." I think this is so powerful it can be pulled out. It should be put at the front. You know, it's your real mission statement and I feel it gets a bit lost for that as well."
Other	- "For me, it's beautiful because you really given not just like a theoretical aspect, but emotional aspect why you're doing this."				- ". I love your forward because it's really lovely and personal. And because I know you and because you know, it's got your voice coming through, which I think is really nice." - "You know, I was looking for you to give your own view, but then I realized that you know that maybe that's not part of it as well."

Figure 488 Quote Matrix for Reviewers 6-10, Lesley-Ann Daly, 2024.

Lesley-Ann Daly prompt:

10 experts have been asked to do a review on a book called 'Designing Senses'- this is the book blurb, contents and the review questions that they have been asked.

With this as context please analyse the 10 reviews and give insights in relation to each of the 7 questions. Please be thorough and include both commonalities in response and views that differed.

Please go more into depth and pull out quotes from specific reviews to back up the insights.

ChatGPT

1. Ethical Exploration

Commonalities:

- Effectiveness: Reviewers praised the book for its exploration of ethical implications.
    - Keith Kirkland: "Designing Senses is effective in delivering ethical empathy for future sufferers of our current design (in)considerations"【18†source】.
    - Imre Bard: "The 9 projects described in the book do a very good job of presenting a diverse range of ethical issues related to sensory augmentation"【19†source】.
    - Matt Hayler: "The project uniformly asks at least one distinctive ethical question with each project"【52†source】.
    - Sara Bozanic: "I love the diversity of the projects presented and how they at the end interval"【36†source】.
    - Alex Pearlman: "The book really does a great job looking holistically at a lot of the issues that we face now and how those might be exacerbated in various directions"【46†source】.
- Highlighted Projects: Specific projects like "Enhancing Akansha," "Feel the Truth," and the "Post-Humanist" project were frequently mentioned for their deep ethical inquiry.
    - Keith Kirkland: "Oxford Haptix and 'Feel the Truth' were especially powerful"【18†source】.
    - Imre Bard: "My 'favourite' project was perhaps Feel the Truth because it managed to convey in a truly visceral way how deep the manipulative power of data-driven technologies may be"【19†source】.

- Alex Pearlman: "The idea of the post human rights activists... is a really scary one that I think definitely is inspired by the events of the past four years or so"【46†source】.
- Scott Novich: "The Post Enhancement Support Network that one really stood out to me because you probably know about this that one's actually not so science fiction"【53†source】.

Differing Views:

- Approach:
  - Keith Kirkland: Appreciated the creative reframing of ethics【18†source】.
  - James Auger: Felt some projects were too fictional, reducing their impact【37†source】.
- Depth:
  - Imre Bard: Emphasized that the book serves as a provocation rather than defending a particular ethical theory【19†source】.

2. Speculative Elements

Commonalities:

- Engagement: Reviewers found speculative elements to be highly engaging and crucial for exploring possible futures.
  - Imre Bard: "Reading this book has been a genuine delight that was full of surprises even until the very end"【19†source】.
  - Michael Johnston: "The whole process sucks you into the experience. It makes you feel it which I think is crucial for speculative design"【21†source】.
  - Alex Pearlman: "Speculative design is key for this kind of thing because obviously it's very much in the future and I think it was successful"【46†source】.
  - Scott Novich: "The concept of using speculative critical design or the concept of creating these stories... is a really powerful methodology for driving home the importance and understanding of why ethics should be really deeply thought about"【53†source】.
- Surprise: The reveal that the author created all projects added a layer of surprise.
  - Imre Bard: "The author revealed herself to be the source of all projects covered in the volume"【19†source】.

Differing Views:

- Deception:

- **Keith Kirkland:** "Under any subject other than ethics it may have felt creative. But here it created an unnecessary questioning of is it ok to be deceptive in a book about ethics?"【18†source】.

- Depth of Speculation:
  - **James Auger:** Some projects felt too fictional, making it hard to relate【37†source】.

3. Visual and Narrative Clarity

Commonalities:

- **Engagement:** The book is visually engaging and well-structured.
  - **Imre Bard:** "The book's aesthetic qualities are highly pleasing and it reveals great care and attention to detail"【19†source】.
  - **Michael Johnston:** "The visuals and the style pull me into one and participate. It made me have that feeling of is this wrong is this right?"【21†source】.
  - **Alex Pearlman:** "The visual representation was breathtaking. It was super well organized"【46†source】.
  - **Sara Bozanic:** Praised the visual design for its accessibility【36†source】.
  - **Matt Hayler:** "It looks like a coffee table book feels like a coffee table book. I put that I love the texture pages at the beginning there is a very clear design sense"【52†source】.
  - **Scott Novich:** "Super visually engaging I would say for obvious reasons the artwork and design in this is absolutely gorgeous"【53†source】.
- Aesthetic:
  - **Katherine Templar-Lewis:** "The visual narrative is very very rich. And it makes it sort of what is actually very complex a very difficult discussion really accessible"【45†source】.

Differing Views:

- Complexity:
  - **Dr. YJ Erden:** Found certain stories less clear due to assumed knowledge【20†source】.
  - **James Auger:** Critiqued some visuals for not fully communicating the complexity of the concepts【37†source】.
- Presentation:
  - **Keith Kirkland:** Suggested optimizing visual elements for better readability【18†source】.

4. Creators' Responsibility

Commonalities:

- Emphasis on Responsibility: The book highlights the responsibility of creators in designing sensory augmentation technologies.
    - Keith Kirkland: "The book requires that each creator or creative team to take a deep look at their pipeline of potential biases both explicit and implicit"【18†source】.
    - Imre Bard: "The significance of tech creators' responsibility is a key thread that runs throughout the entire work"【19†source】.
    - Katherine Templar-Lewis: Felt the book implied creator responsibility effectively but could use more clarity【45†source】.
    - Alex Pearlman: Stressed the importance of creators being stewards of technology【46†source】.
    - Matt Hayler: "It's asking from the ground up what those responsibilities might look like and thinking about them within quite traditional frameworks"【52†source】.
    - Scott Novich: "I think the most explicit example is probably that Akansha story and I think that's actually by the way that's a great example of where you have some of that subtle sense of humor"【53†source】.

Differing Views:

- Practical Application:
    - Keith Kirkland: Additional guidance on navigating ethical challenges in unsupportive environments would be beneficial【18†source】.
    - Alex Pearlman: The book could do more to explicitly grapple with the evolving responsibilities of creators【46†source】.

5. Academic and Industry Impacts

Commonalities:

- Educational Value: The book is seen as a valuable resource for academia.
    - Keith Kirkland: "For academia, it is a wonderful opportunity to engage students while early in their careers on the idea of ethics"【18†source】.
    - Michael Johnston: "I would certainly give this to students when thinking about these topics and even when thinking about methods"【21†source】.
    - Katherine Templar-Lewis: "It's really inspiring like the integration of speculative methodologies to explore these really diverse features and really challenge normative assumptions in tech design"【45†source】.
    - Matt Hayler: "I'm hoping that I wanted to ask if I can have a pdf version of this that I might use to teach this with students at Birmingham"【52†source】.

- **Scott Novich:** "I think Academia would definitely benefit a lot more from some more formal education in this area particularly especially in engineering sciences"【53†source】.

Differing Views:

- Real-World Application:
  - **James Auger:** Felt that while the book is valuable, its impact on industry might depend on its broader adoption【37†source】.
  - **Alex Pearlman:** Expressed skepticism about the practical influence on commercial developers who may not prioritize ethics【46†source】.

6. Accessibility and Diversity

Commonalities:

- **Inclusivity:** The book is praised for its accessibility and incorporating diverse perspectives.
  - **Keith Kirkland:** "The book shines in how it not only considered diverse human perspectives but in the way that it expanded and further diversified which perspectives are worthy of consideration"【18†source】.
  - **Imre Bard:** "The content is presented in a straightforward and easily understandable manner, making it broadly accessible"【19†source】.
  - **Sara Bozanic:** Praised the book for making it accessible to a wide audience【36†source】.
  - **Alex Pearlman:** "It's very accessible to its intended audience in a way that I just want to share it with more people"【46†source】.
  - **Matt Hayler:** "It feels very accessible. For a few different ways. so the design is very clear and attention grabbing. The language is plain without being overly simple"【52†source】.

Differing Views:

- Jargon:
  - **Michael Johnston:** The language might be challenging for technologists who are less familiar with speculative design concepts【21†source】.
  - **Matt Hayler:** Suggested that including quotations from key figures in relevant fields could enhance the diversity of voices【52†source】.

7. Comparative Analysis

Commonalities:

- **Unique Contributions:** The book makes unique contributions by framing discussions around posthumanist concepts and using speculative critical design.

- Imre Bard: "The decision to structure the discussion of sensory augmentation around 3 relevant posthumanist concepts offers an original way to frame the issues"【19†source】.
- Michael Johnston: "The book makes a unique contribution by completely sucking the reader into the experience and making them feel"【21†source】.
- Katherine Templar-Lewis: Found the book unique and exciting in its format and content【45†source】.
- Alex Pearlman: Praised the book for being more accessible and rigorous than traditional ethics papers【46†source】.
- Matt Hayler: "On the one hand there just isn't a ton of literature in the field when it comes to post humanist design in particular"【52†source】.

Differing Views:

- Further Development:
  - Imre Bard: Suggested addressing additional aspects, such as societal and peer pressures in the adoption of enhancement technologies【19†source】.
  - Katherine Templar-Lewis: Felt the book could benefit from clearer signposting and more narrative context in some chapters【45†source】.
  - Alex Pearlman: Suggested creating an immersive experience to complement the book and enhance its impact【46†source】.
  - Matt Hayler: Suggested including more case studies or deeper dives into specific projects【52†source】.

These detailed insights provide a comprehensive understanding of the reviewers' perspectives, highlighting both the strengths and areas for improvement in "Designing Senses" based on their feedback.