

Drawn to think: A step toward decolonising design visualcy

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Abstract: Design students often hesitate to use drawing as a thinking tool, wary of expectations for figurative outcomes and the evaluative traditions that shape the status quo in product design. This study draws on object-oriented ontology (OOO) and vibrant materialism to explore how a drawing tool—specifically the pencil—might act as an agent in rethinking the pedagogy of semiogenic design visualcy. The study proposes micro-camera activities that capture the pencil’s perspective to produce a radically altered visual and auditory encounter with drawing. Tracing the pencil’s entanglements reveals drawing not simply as representation but relation. The line becomes both a mark and an event. In this reframing, authorship and perception blur in the pencil’s quiet acts of resistance. Through small experimental interventions, the pencil invites a reimagining of relationships between tools, space and authorship. This shifts drawing from depiction toward encounter, opening possibility for new pedagogical approaches to visual thinking in design.

Keywords: Visualcy; Decolonisation; Vibrant Matter; Pencil Camera; Design Education; Drawing

1. Introduction

The visual codes of “good” product design are not neutral. Sleekness, order, and restraint—visible in design traditions from the Bauhaus machine aesthetic (Figure 1) and Rams’ minimalism (Figure 2) to the smooth surfaces of contemporary consumer products (Figures 3–4)—circulate as polished ideals. These aesthetics appear as common sense while obscuring their cultural and ideological foundations. In privileging efficiency, control, and technical mastery, such norms marginalise slower, tactile, and uncertain modes of making—and the makers they position as undisciplined.



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Figure 1 Marcel Breuer's Wassily Chair (1925–26)
(photo credit: The MET (2020))



Figure 2 Dieter Rams' Braun SK4 record player (1956)
(photo credit: MOMA (2014))



Figure 3 Phillipe Stark's Juicy Salif (1988)
(photo credit: MOMA (1988))



Figure 4 iPhone Air (Apple, 2025)
(photo credit: Apple.com (2025))

Within design education, this tension endures: studio practices may gesture toward diversity or decolonisation, yet often revert to a monocultural visual language or ways of being grounded in representation, conformity, and authority. This reflects a deeper ontological tension within design itself, where efforts to diversify participation often leave the underlying structures of design practice intact. Similar concerns are raised beyond the localised context of higher education. In *'A Manifesto for Decolonising Design'*, Abdulla et al.

(2019) argue that meaningful change cannot be achieved through inclusion alone, but requires a more fundamental transformation of the structures that sustain design's colonial inheritances:

It is not sufficient for design institutions to simply include a greater diversity of actors or perspectives... our aim should be nothing less than to seek the radical transfiguration of these structures... (Abdulla et al., 2019, p129-132)

Even as calls for diversification and decolonisation grow louder, dominant epistemic and material practices that shape design often remain in place. One site where these inherited visual norms continue to operate is drawing itself.

With calls for design practice and education to interrogate the macro- and micro-behaviours that sustain dominant narratives of "good" design, drawing can be understood as operating at both scales.

Educators, Chris Owen (2019) and separately Michelle Fava, observe connected occurrences in post-16 design education. Owen notes that drawing—once central to visual thinking—has gradually been displaced from the curriculum and is increasingly treated as an optional or specialist skill, often associated with figurative competence rather than exploratory thinking (Owen, 2019, pp. 333-335). Michelle Fava, observes that drawing cultivates attention, observation and reflective thinking, embedding visual cognition within design practice (Fava, 2010/2011, pp. 129–142).

As digital modelling, rendering, and algorithmically driven software assume greater prominence, opportunities to engage with drawing as an open-ended, material mode of inquiry become increasingly limited. The consequence is that students may encounter drawing less as a space for experimentation and discovery, and more as a site of judgement (Fava, 2019, p325) where hyper figurative outcomes are expected in assessment or as peer benchmarking in the latter stages of project work. The expectation for such outcomes consolidate the very visual conventions and hierarchies that contemporary calls to decolonise design seek to challenge.

Fava is not alone in identifying drawing as central to the cognitive work of design. Drawing has long been understood as a process through which designers generate and interpret meaning as ideas unfold through visual marks. In my research, I refer to this process as semiogenic visualcy. Semiogenesis is the generation or development of meaning through signs. It describes how new signs, symbols, and interpretations emerge and evolve in cognitive systems. Research across design, art education, and engineering consistently frames drawing as a generative thinking practice to this end (Ferguson, 1994, pp. 41–47; Goldschmidt, 2014, pp. 39–40; Schenk, 2016, p. 209). However, these accounts rarely consider how individual or cultural context shapes how designers engage with drawing, or how dominant norms influence behaviour within this critical space of design thinking.

One notable exception in making connectivity between dominant discourse and cultural context is academic Lisa Thurlow's work on drawing in design education. In *Designers Who Don't Draw*, Thurlow highlights how dominant cultural assumptions about drawing shape how design ability is evaluated in studio contexts, often privileging particular traditions of sketching whilst marginalising others (Thurlow, 2019, pp. 127–128).

Thurlow's example illustrates how drawing practices are not culturally neutral, but interpreted through dominant norms. It raises an important question: what might happen if drawing were approached differently, beyond the conventions that currently frame it?

My research, covered partially in this paper, approaches drawing as a site where dominant visual norms might begin to loosen. The research question asks: What becomes possible when drawing is no longer centred solely on the human designer, but understood as a more-than-human encounter between hand, tool, surface, and movement?

To trace this possibility, I developed speculative drawing experiments and documented outcomes using a micro-camera attached to a pencil, allowing drawing to be encountered from the perspective of the tool itself.

In shifting the focus of visual authority away from dominant discourse and the designer alone, drawing becomes not a representational skill but a site of inquiry—one that opens space for plural ways of seeing and knowing within product design education. This paper, therefore, explores drawing itself as a site where such norms might be unsettled through speculative practice.

2. Research aim & context

I have reached this stage in my research journey after some years of observation and action research cycles in this field. Figure 5 presents a timeline of the research trajectory, situating the work discussed in this paper within a broader, ongoing programme of inquiry that both precedes and extends beyond the scope of this submission.

What becomes possible when drawing is no longer centred solely on the human designer, but understood as a more-than-human encounter between hand, tool, surface, and movement? The pencil here becomes a deliberately improbable partner for rethinking design drawing. To foreground the pencil is almost ironic: a kind of forbidden tool in contemporary product design. Long eclipsed by fine liners, CAD programs, and AI workflows, the pencil inhabits a quieter terrain: a space of tentative gestures, delicate traces, and subtle resistance. Its graphite marks carry the memory of touch, pressure, and pause, offering a way into the rhythms of making that often escape the speed and certainty of contemporary design culture.

This paper specifically questions how a humble tool—the pencil—might help us notice these dynamics differently. More exactly, it asks how speculative, more-than-human drawing practices might disrupt normative expectations of precision, clarity, neatness and control in design education and open space for more plural ways of seeing and knowing. Howard Riley describes this broader pedagogical capacity for seeing and knowing as *visualcy*—the ability to generate knowledge through visual thinking and drawing (Riley, 2021, p324).

Michelle Fava-Darlington notes that many design programmes assume rather than actively cultivate this capacity in visualcy most readily connected to drawing (Fava, 2019, p. 327). I argue that when visualcy pedagogy is narrow or underdeveloped, early design cognition becomes shallow and dominant paradigms remain intact.

To probe plural ways of being in design visualcy, I introduce the pencil camera: a speculative research partner recording image and sound from the tool’s perspective. Designed to be lightweight, wireless, and mounted in custom-made cradles, the pencil becomes a **conjectural research partner**—an instrument through which human intention and material resistance co-evolve. Through micro-encounters of everyday design activity, the device invites drawing to be understood as a relational practice between human and nonhuman participants. The pencil camera, therefore, becomes not only a recording device but a pedagogical provocation—an instrument through which drawing can be reconsidered as relational and more-than-human.

My research is informed by object-oriented and new materialist perspectives, particularly the work of Graham Harman (2018) and Jane Bennett (2010), alongside relational approaches to care and pluriversality developed by Puig de la Bellacasa (2017) and Escobar (2018). These frameworks challenge anthropocentric assumptions about agency and knowledge, encouraging attention to the lively participation of tools, materials, and environments in creative practice.

This paper contributes to design research by advancing a speculative, practice-based method that repositions drawing tools as co-agents in visual thinking. In doing so, it proposes a pedagogical shift from representational mastery toward drawing as relational inquiry, extending the concept of visualcy toward a more plural, care-based orientation to seeing and knowing in design education.

The research emerges from lived tensions between industrial design practice and pedagogical responsibility. My experience has sharpened an awareness of the ethical and political dimensions of design education, compelling me to adopt more culturally responsive and environmentally attuned approaches to teaching and making.

3. Product design drawing in education: A pedagogical paradox

Within my teaching context, the pedagogy of design drawing is often strikingly compliant, rarely rebellious, and hesitant to challenge entrenched norms. It appears constrained by the imperatives of neoliberal academic governance, focused on producing industry-ready graduates. This governance dictates what counts as valuable knowledge and legitimate practice. There is little room for critical, reflective, or experimental engagement.

Product design drawing occupies a paradoxical position. On the one hand, it serves as a technical language—a means of communicating design intent to manufacturers, clients, and marketers. This communicative function is bound by conventions of accuracy, proportion, and standardisation: visual codes inherited from Eurocentric traditions of measurement and control, where mastery of line equates to authority and truth. Yet in its earliest stages, drawing also operates as a speculative and affective act—a space where designers make sense of uncertainty, emotion, and cultural identity. When students are taught to prioritise precision over exploration, their individual positionalities and affective ways of seeing risk being silenced.

Western product design drawing traditions are deeply entangled with extractive industrial practices. Drawing has long enabled complex systems to be made legible to the state (Scott, 1998, pp. 2, 83–84), and continues to play a role in rendering an expanding, digitally mediated design society as visible and governable.

The industrial revolution extended logics of precision and control into the factory system, embedding drawing within the apparatus of production (Ferguson, 1992, p. 4). These conventions persist in contemporary design education, continuing to define what counts as “skilled” or “correct” practice.

Instructional texts widely used in product design education help codify these conventions (see figures 6-8). Books such as Kevin Henry’s *Drawing for Product Designers* (2014) and Koos Eissen and Roselien Steur’s *Sketching* (2019) reinforce the view of skill as technical mastery rather than as a relational or interpretive practice.

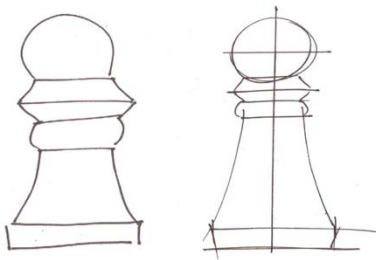
Construction lines

Intelligent design.

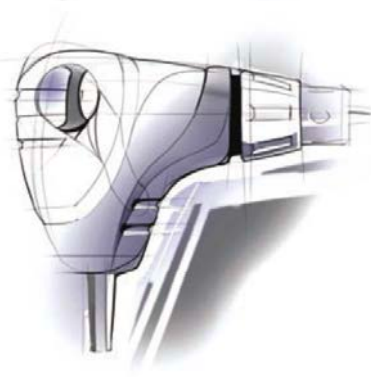
Drawing is visual communication. It allows you to communicate important suggestions. Visible construction lines suggest that your sketch is the result of an intelligent creative process.

Construction lines tell the story of how the drawing was created. That is why a sketch with construction lines is much more interesting and meaningful than one without them.

These extra lines also help orientation as you start to draw. They hide minor inaccuracies and strengthen the illusion of accuracy even if your drawing is not perfect.



- 1) The first drawing doesn't communicate anything more than what you see.
- 2) Construction lines suggest that the second drawing is the result of an intelligent design process.



The initial sketching process involves quick gestural ghost lines to flesh out the basic geometry while maintaining a sense of immediacy. Refining such a sketch requires darkening outlines and defining secondary and tertiary details. Adding some cool gray to help define the geometry will assist the eye in reading the form (TEAMS Design, Chicago).

Figure 6 *The Exceptionally Simple Theory of Sketching*, (Hlavács, 2022, p13). Describing sketching as visual communication and that visible construction lines are the result of 'intelligent' creative process.

Figure 7 *Drawing for product designers* (Henry, 2014, p123). Describing an initial sketching process and how a sketch can become more 'readable'.

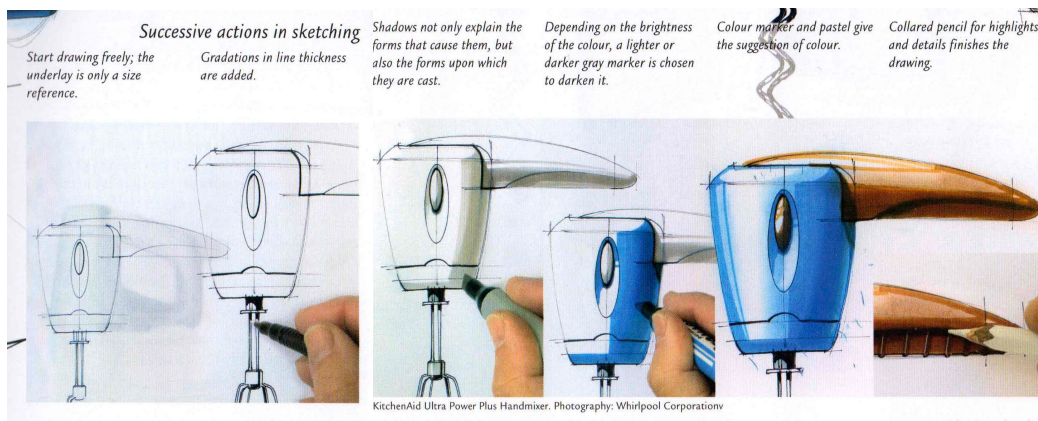


Figure 8 *Sketching: Drawing For Product Designers* (Eissen & Steur, 2019, pp. 10-11) The image shows what is described as successive actions in sketching showing progression from a line drawing.

Codification of neutrality is far from benign. Critical scholars have long written that statements of neutrality are themselves embedded in systems of power. Donna Haraway and Michel Foucault have each argued that claims to objectivity are never value-free. Haraway critiques what she terms the "god trick" (Haraway, 1988, p. 587) —the illusion of an all-seeing, neutral viewpoint detached from embodied experience, whilst Foucault questions what we know as truths.

Truth is a thing of this world: it is produced only by virtue of multiple forms of constraint. And it induces regular effects of power. (Foucault, 2002, p131)

While acknowledging difference can be unsettling, bell hooks reminds us that confronting the myth of sameness is necessary for opening space to diverse ways of thinking and seeing:

They have a deep emotional investment in the myth of 'sameness,' even as their actions reflect the primacy of whiteness as a sign informing who they are and how they think. (hooks, 1992, p. 176)

By treating dominant visual norms as natural or universal, pedagogical materials risk perpetuating hierarchies of seeing—privileging particular bodies, histories, and epistemologies while marginalising others.

Design academic Lisa Thurlow observes that many undergraduates are acutely aware of what they believe they are “meant to be doing” when sketching (Thurlow, 2019, p.183). Rather than functioning as a space for exploratory thinking, drawing often becomes a reluctant or sometimes completely invisible performance of compliance with established visual norms — what Thurlow terms “sketch inhibition”.

Beyond formal education, these conventions circulate widely through digital media (Figure 9). Platforms such as Instagram and YouTube now operate as informal pedagogical spaces, where tutorials in “good sketching” often privilege speed, accuracy, and clean linework (see figure 8). While these platforms democratise access to design skills, they also reinforce a narrow aesthetic standard, rewarding polished outputs over the messy, iterative processes through which design thinking unfolds.

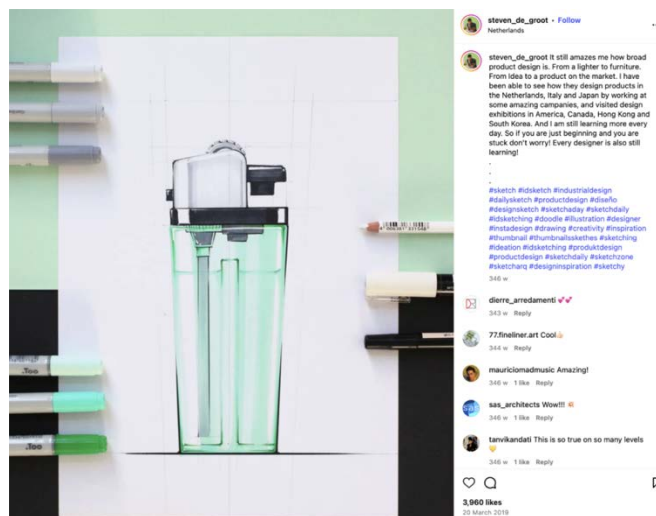


Figure 9 Steven De Groot on Instagram. De Groot, (2019). DeGroot notes his global experience whilst showing a hyper-real hand-rendered sketch of a cigarette lighter

Within my teaching practice as a Stage Leader on the BA Product & Industrial Design at Central Saint Martins, formal drawing instruction occupies only a small portion of the undergraduate programme and typically focuses on communicating resolved forms. Students frequently report learning sketching techniques through online tutorials or external

courses that promise “industry-ready” skills, reinforcing the perception that drawing exists primarily to communicate finished ideas rather than to explore them.

Yet research suggests that drawing plays a far more significant cognitive role within design practice. Architecture academic Gabriela Goldschmidt’s work on *Design Representation* (Goldschmidt & Porter, 2004) and *Linkography* (Goldschmidt, 2014) demonstrates that sketching functions as a generative thinking process, externalising reasoning and enabling designers to negotiate complex problem spaces (Goldschmidt, 2014, pp. 32-39). When design education neglects this speculative and interpretive dimension of drawing, it risks silencing the intuitive, exploratory, and affective processes through which designers make sense of the world.

How, then, can students meaningfully explore and articulate the emotional, ethical, and experiential dimensions of design—such as safety, trust, care, or joy—when pedagogy of such a foundational thinking tool as drawing is primarily oriented toward the articulation of manufacturable form?

4. Visuality, visualcy and seeing otherwise

The term *visuality*, as described by visual culture theorist Nicholas Mirzoeff (2015), and Howard Riley’s pedagogical counterpart *visualcy* (2021), both concern the human capacity “to see and be seen.” Mirzoeff speaks to the politics of vision—how seeing orders the world, sustaining hierarchies of power and visibility. Riley, meanwhile, turns inward, exploring how meaning is made through the act of seeing and drawing as a semiogenic process within learning. Brought into dialogue, *visuality* and *visualcy* invite reflection on how design education decides what is legible, valuable, or true. To see differently, we must learn to hold both: the structural gaze of *visuality* and the embodied seeing of *visualcy*.

The politics of seeing are inseparable from broader questions of knowledge and ontology within design. Today, neoliberal logics of efficiency and market readiness perpetuate patterns of domination that echo those of colonial extraction. As anthropologist Arturo Escobar argues in *Designs for the Pluriverse*, modern design thinking often sustains what he terms a “one-world world” (OWW) (Escobar, 2018, p. 86)—a singular vision of progress that marginalises plural, relational, and place-based ways of knowing. Rather than reproducing these logics, design education must cultivate the pluriversal *visuality* that Escobar describes, in which multiple epistemic and cultural standpoints shape how design problems are understood. As Escobar further suggests, “in designing tools (objects, structures, policies, expert systems, discourses, even narratives) we are creating ways of being” (Escobar, 2018, p. 4). Recognising visual bias as described above opens a space for critical reflection and transformation.

To decolonise design drawing pedagogy is not simply to diversify content but about reimagining what counts as skill, value, and knowledge in the first place. Educators must create environments where students can question who authorises visual norms, whose knowledge is validated, and how drawing might become a site of inclusive and ethically attuned practice. This reframing of *visualcy* as relational and situated provides the conceptual ground for the speculative drawing practice that follows.

In this reimagining, drawing can operate as an act of collaboration rather than control—as a relational encounter between human and nonhuman forces. The line can be reclaimed from its colonial legacy of measurement and instead become a means of sensing, connecting, and

thinking in our own individual and internal voices. From here, the emerging pedagogy acknowledges that to draw is not only to represent but to relate; not only to render form but to make visible one’s position within a wider ecology of materials, histories, and meanings.

5. Theoretical framework

Human-centred design (HCD) has long shaped the context of my professional practice. Only recently have calls for planetary or more-than-human centred design become part of the discourse, but even so, these are not yet dominant design thinking for industry (Grotzer & Cao, 2023).

HCD has a rhetoric entangled with capitalist values and sustained by the commercial priorities within industry. It is through my academic research that alternative theoretical perspectives have emerged. Notably, OOO, as articulated by Harman (2018), informs the theoretical starting point for this research. The human-centred hierarchies that govern dominant approaches to design are brought into sharp focus, prompting this research to reconsider how knowledge, agency, and materiality are able to intersect differently in design practice.

OOO challenged the methods of this research (See figure 5), prompting a shift to think of all objects - living and non-living – as possessing their own autonomy. In OOO objects have withdrawn capacity for existence beyond human perception or use. Each trace of a pencil emerges through a dialogue of resistance and compliance between material components, surface, and environment.

The assertive precision demanded by industrial design conventions is countered by the pencil’s softness and impermanence. Encouraging tentative initial gestures, possibilities of revision, and nurturing care, the pencil is a paradoxical partner in design. As an object, the pencil negotiates its own presence within the act of drawing - sometimes compliant, sometimes unruly - forcing the designer to respond rather than command. In recognising the pencil’s autonomy, drawing can become an act of relational negotiation rather than execution, cultivating an attentiveness and humility within the design process.

Jane Bennett’s *Vibrant Matter* (2010) deepened this conversation in my theoretical framing by positioning matter itself as lively and agentic. In challenging a divide between human intention and inert materials, the concept of vibrant matter has poetic resonance with the intentions of this research.

Through this combined lens, my theoretical readings foreground the possibility of entangled agency to co-produce meaning. I have assembled a framework that understands drawing not simply as human intention, but as the result of friction, texture, and resistance between multiple participants. There is then a material conversation that happens far beyond the limits of human perception. This conversation becomes a vital pedagogical tool for my research, inviting and valuing encounter and responsiveness over any visual mastery for the human eye. In this way, drawing takes on a messy meaning of shared energies, arising through collision and exchange. *Vibrant Matter* is crucial in ensuring that I think *with* the pencil rather than simply theorising about it. This is a point academic Sonia Hazard, founder of the More-than-Human Religion project, emphasises as key in research like mine. She highlights that scholars should “learn from their objects of study and not only about them” (Hazard, 2019, p. 629). In this case, the designer is never the sole author of a drawing; instead, drawing should always be an energetic inter-objective conversation.

Feminist philosopher María Puig de la Bellacasa extends this material sensitivity into an ethics of care. She argues that attending to the affective, relational, and temporal dimensions of material engagement is a political act (Puig De La Bellacasa, 2017, p38). Care, in this sense, is not sentiment – rather a method for this research - a pledge to maintenance, reciprocity, and attentiveness.

This lens helps reframe drawing, such that any pedagogy should promote caring with materials rather than extracting from them. It recognises the act of negotiation within material relations, understanding an exchange that surfaces mutual vulnerability and dependencies. Inviting ethics like these might allow for a slower, more personal and responsive engagement, not just with drawing but with the world. In design pedagogy, it carries the possibility of revaluing uncertainty and situated knowledge over efficiency and control.

In this context, the camera-enabled pencil is an enactment of these ideas: a speculative research partner that decentres human vision and invites seeing with and through the object itself. By positioning the pencil as a sensing, co-creating participant, the research foregrounds how knowledge can emerge through entangled material experience rather than through detached observation.

This synthesis challenges the capitalist priorities embedded in design education, where neutrality and control can mask dominant norms and anthropocentric values. Instead, it gestures toward a pedagogy with its foundations in mutual care, attentiveness, and co-agency - one that honours the autonomy of both human and non-human participants in design practice. The camera-enabled pencil is much more than a methodological tool; instead, it is a philosophical provocation: it renders visible the unseen relations that shape drawing, teaching, and knowing, reconfiguring visualcy as an ecology of shared becoming.

6. Speculative investigations

This study adopts a speculative, practice-based research approach, combining iterative prototyping, reflective documentation, and visual artefact analysis to explore how drawing changes when agency is redistributed between the human and the tool. This approach conforms with research-through-design traditions in which artefacts are developed as speculative probes to explore and reflect on design practices and assumptions. My study, which informs this paper, generated data in the form of video footage, still images, sketchbook documentation, prototypes and reflective notes as an assemblage.

The data enabled reflective questioning about what happens when the limits of design are no longer the limits of human perspective. The challenge, then, is how to decentre the human when the human initiating the study is, indeed, human?

To understand the pencil's perspective through anthropocentric terms of reference, the pencil needs to be assigned senses - and even an anatomy - based on how, as humans, observation and experience are understood through these means. It's a flawed, temporally speculative frame, but it's the only one available for this study.

Initially, investigations involved recording actions, thoughts, and decisions, which evolved into what can now be recognised as speculative inquiry. It began with the question: What is the pencil's point of view? See figure 10. This question required a translation between human and object — a mediation of perspective.

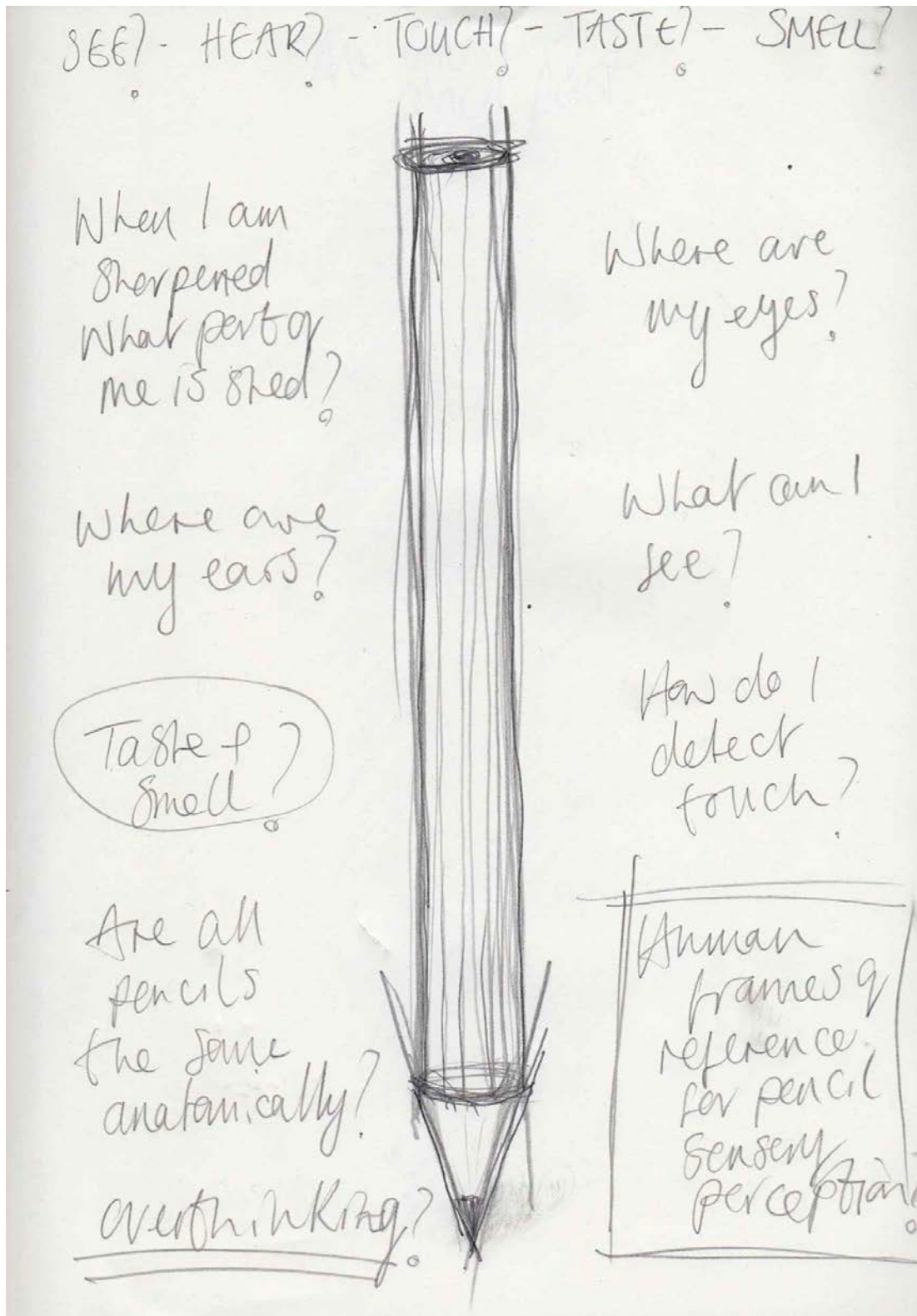


Figure 10 Excerpt from the author's sketchbook, ideating areas of sensory perception to be considered on behalf of the pencil.

It is a process that was grappled with, see Figures 11-12, querying how it was really possible to achieve the level of reconciliation that allowed a human interpretation of what was not a

human language or a way of being that dominant paradigms have historically sought to understand.

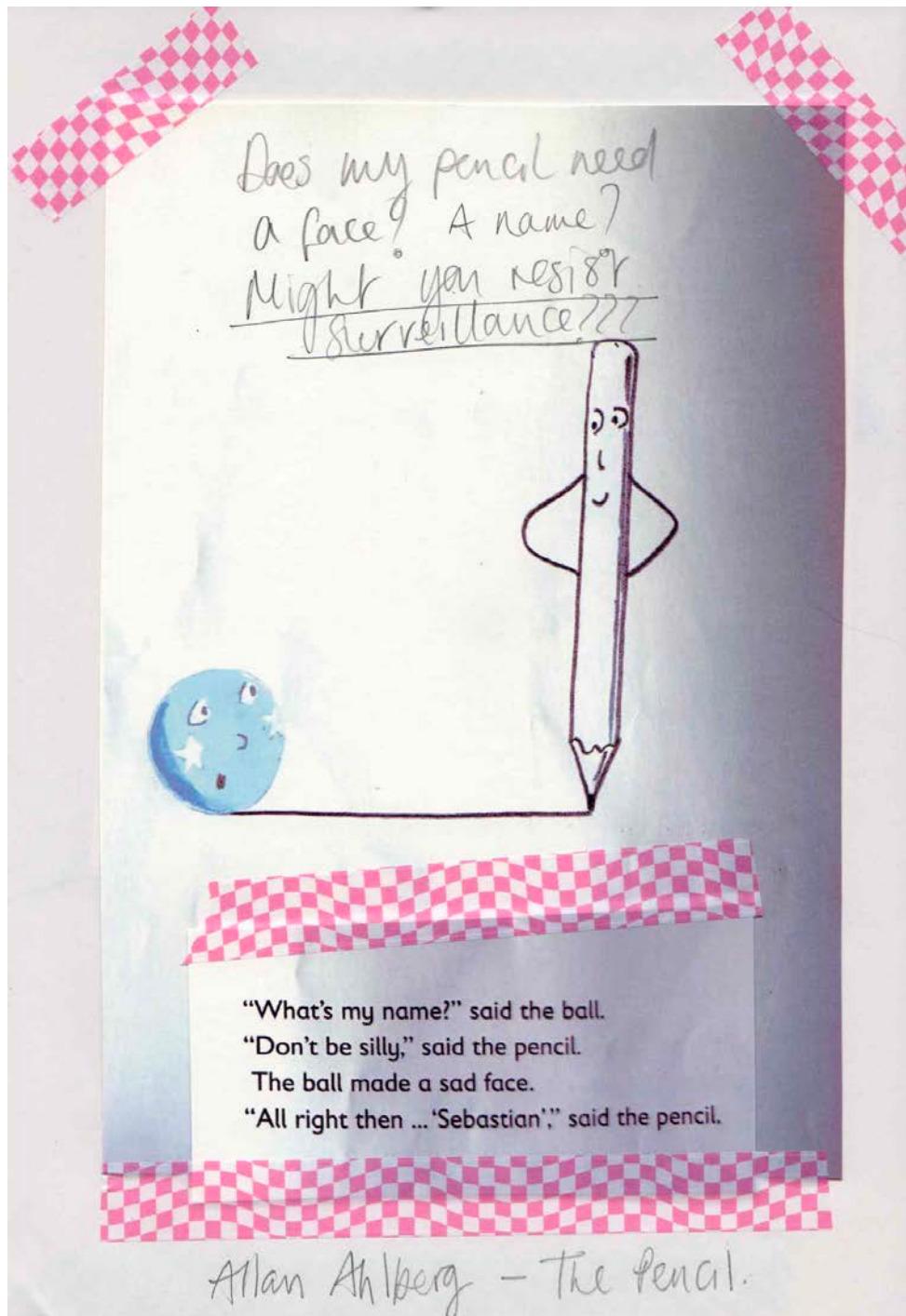


Figure 11 Excerpt from the author's sketchbook, showing an annotated clipping from Alan Ahlberg's book 'The pencil' (Ahlberg, 2009, pp. 18-19) – playfully provoking questions around the speculative vibrancy of the pencil.

Amongst all the other considerations of the project, finding the ‘right’ micro camera became a significant task to reflect such considerations; it demanded iterative, critical testing at every stage. How is it possible to legitimately dictate what the pencil sees?



Figure 12 Excerpt from the author’s sketchbook, contrasting possible fields of vision feasible to assign the pencil.

The approach in this paper departs from conventional studies of drawing by introducing a speculative, object-oriented twist. Rather than using the camera to document human activity, it captures the experience of the tool itself — inviting the pencil to ‘speak back’ through its own visual and auditory registers. This is consistent with research in speculative and material culture, where devices are constructed not to measure but to provoke. Practice such as this is evident in the body of work from Dunne & Raby, their most recent publication is a call to action for more; “This “will to imagine” needs to be more strongly encouraged, facilitated, and celebrated in design.” (Dunne & Raby, 2025, p11).

The camera-pencil is thus both a data collection tool and a speculative intervention. It troubles the boundary between user and object, implying a more entangled understanding of agency and authorship in drawing. With this in mind, considering not just how the apparatus worked, but what it was designed to provoke was key — curiosity, empathy, or disorientation?

In order to understand the ‘vibrant’ pencil, the pencil required this study to undertake design in the realms of modelmaking and electrical engineering, neither of which was in the skill repertoire of the researcher. In this sense, the method itself performed its philosophy: the object demanded new skills and sensitivities, and the researcher, obliged (figures 13-17).

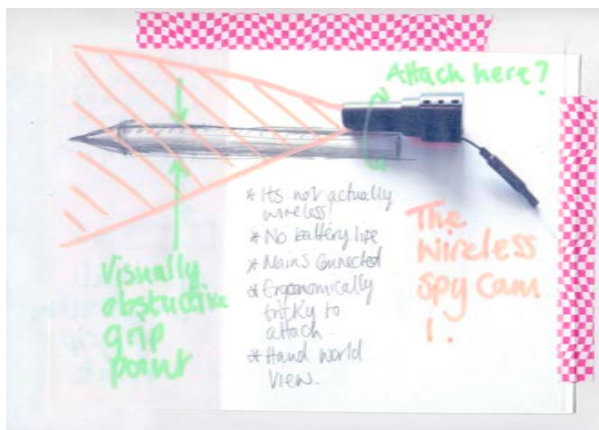


Figure 13 Excerpt from the author's sketchbook, detailing experiments with miniature spy camera type 1.

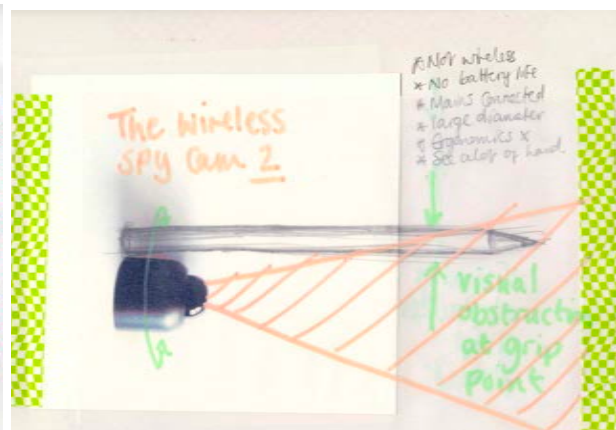


Figure 14 Excerpt from the author's sketchbook, detailing experiments with miniature spy camera type 2.



Figure 15 Excerpt from the author's sketchbook, detailing experiments with miniature spy camera type 3.



Figure 16 Excerpt from the author's sketchbook, detailing experiments with a miniature spy pen.

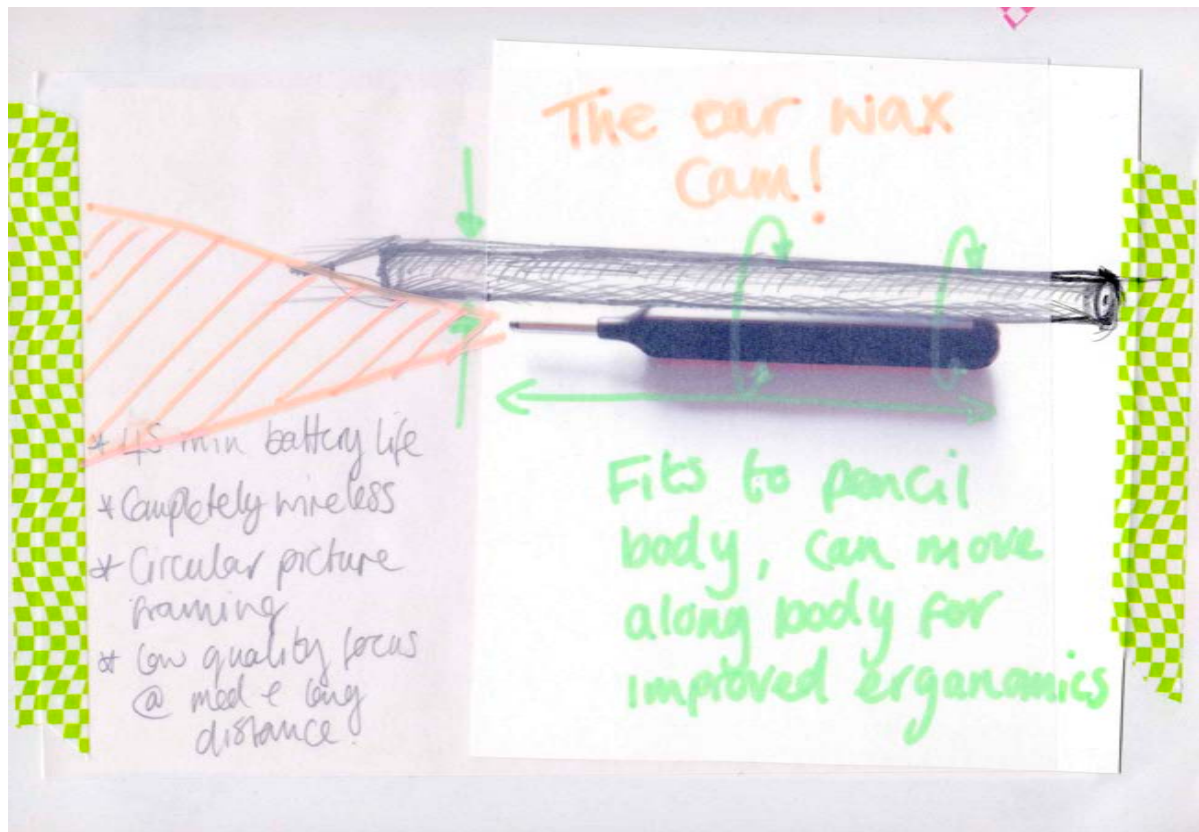


Figure 17 Excerpt from the author’s sketchbook, detailing experiments with a wireless otoscope (ear canal/ear wax camera).

An unexpected discovery was a wireless otoscope camera (figure 17) whose small size and soft focus proved conceptually useful. Designed to inspect ear canals, the device produced blurred images beyond close range, creating a narrow field of vision that unexpectedly aligned with the speculative premise of approximating a pencil’s perspective. To stabilise the device, a series of mounting experiments followed. Using lightweight, non-toxic air-drying clay and miniature elastic bands, various configurations were tested for comfort, balance, and image steadiness. Each rigging iteration was documented and reviewed through film footage (figures 18-23).



Figure 18 Excerpt from the author's sketchbook, detailing rigging design 1 for wireless otoscope.



Figure 19 Still from film test outcome - rigging design 1 - full film available here (double click link):
<https://youtube.com/shorts/ZEVHkPktGBs?feature=share>



Figure 20 Excerpt from the author's sketchbook, detailing rigging design 2 for wireless otoscope.

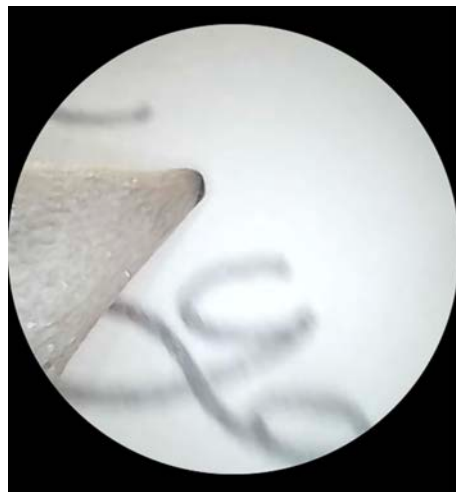


Figure 21 Still from film test outcome - rigging design 2 - full film available here (double click link):
<https://youtube.com/shorts/R8IOiMf4frI?feature=share>



Figure 22 Excerpt from the author's sketchbook, detailing rigging design 3 for wireless otoscope.



Figure 23 Still from film test outcome - rigging design 3 - full film available here (double click link): <https://youtube.com/shorts/Tnd6NpVV8wQ?feature=share>

As the prototypes evolved, so too did the ethics of attachment. What does comfort mean for the pencil as much as for the human hand that holds it? When trials with prefabricated silicone grip aids (for children or users with fine-motor disabilities) couldn't sufficiently support the camera (figure 24), custom-making a 'cradle' using a material kin to the pencil - wood - a gesture of care toward the pencil's ontology was the next step (figure 25).



Figure 24 Excerpt from the author's sketchbook, detailing silicone grips.



Figure 25 Photograph of the otoscope mounted to the pencil in a custom made wooden cradle.

The current wooden iteration is the most effective to date, providing stability for the camera, comfort for the pencil and hand that holds it, whilst also being materially sympathetic.

The footage from these initial trials is unexpectedly expressive. The pencil's movement across the page appears jittery and rhythmic, punctuated by blurs of human fingers or shadows (see film links in the captions of figures 26-27). At times, the footage becomes almost unwatchable, inducing a kind of motion sickness which reflects the discomfort of trying to inhabit a nonhuman perspective. Beyond the primary interest of this study in drawing, the footage captured has also shown a surprising life beyond mark-making for the pencil (figures 28-29).

Far from detracting from the work, these imperfections stress its speculative power. They reveal the impossibility of fully seeing through an object's eyes, while still opening a poetic space for imagining how an artefact might perceive its own participation in human creativity.

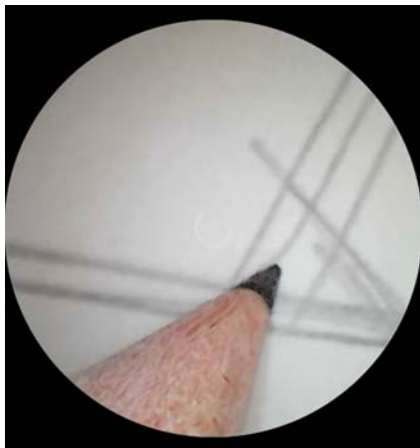


Figure 26 Still from filming of a simple geometric line drawing. Full film available here (double click link): <https://youtube.com/shorts/Tsml9-TviMI>



Figure 27 Still from filming of a 3 minute blind contour self portrait drawing. Full film available here (double click link): <https://youtube.com/shorts/PuloIkZ0fB8>

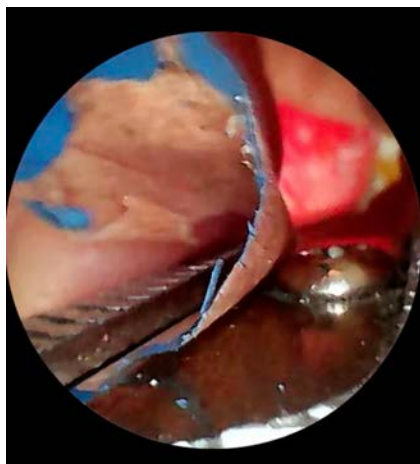


Figure 28 Still from filming of pencil during sharpening. Full film available here (double click link): <https://youtube.com/shorts/hLYZikOGZv8?feature=share>



Figure 29 Still from filming of cat encounter. Full film available here (double click link): <https://youtube.com/shorts/3dWLvKww278?feature=share>

These initial trials involved multiple short drawing sessions in which the camera-mounted pencil was used to produce marks on different surfaces while recording image and sound. The footage and artefacts generated as part of this study were reviewed through iterative reflective observation and material readings with attention to how movement, sound and framing revealed material interactions between hand, tool and surface. Even at this early stage of the study, the footage has yielded compelling compositions: graphite textures, accidental framings, fleeting gestures and unexpected artefacts documenting a pencil’s life. The pencil’s ‘vision’ privileges intimacy over totality, attending to strokes, surfaces, and micro-moments, revealing redistributed relations. These experiments explore how speculative visual methods can expand empathy toward tools, allowing drawing to be understood as a site of shared, more-than-human cognition.

Aligned with Tim Ingold’s (2007) notion of lines as traces of movement, the pencil is not just an instrument but a participant in unfolding thought — a living line that draws as much as it is drawn. Within a practice-as-research framework, iterative testing, awkward lash-ups, and improvised riggings become the method itself: a material conversation with uncertainty. Echoing Erin Manning (2016), the work resists closure and productivity, embracing hesitation and fragility as productive conditions. Variability is foregrounded: each student’s interaction will shape a unique experience.

7. Drawing otherwise: findings and pedagogical interventions

Returning to the research question — what becomes possible when drawing is no longer centred solely on the human designer — the camera-pencil experiment suggests that drawing can be understood as a relational negotiation between bodies, tools, and materials. The footage generated by this speculative practice is both disorientating and compelling. By shifting visual authority away from the designer and toward the tool, the camera-pencil disrupts entrenched assumptions about mastery, control, and authorship that shape dominant models of design drawing. While the camera pencil cannot truly represent a nonhuman perspective, the value of this study lies in provoking reflection on how agency and perception are usually assumed in drawing practice. Unlike writing, where language follows structured codes, drawing unfolds here as an unpredictable encounter. The image trembles and slips in and out of focus, shaped by pressure, pause, friction, and the choreography between graphite, surface, and hand. Ambient sounds—clock ticks, distant voices, and graphite against paper—enter the recording, revealing drawing as a sensory ecology of vibration, resistance, and texture.

These recordings reveal drawing not as it is dominantly taught and perceived—an individual’s act of representation—but rather as a collaborative event—an unfolding negotiation. Ingold’s notion of the line as a living trace (2007) becomes visible. The films show movement behind the mark: the moment when thought, gesture, and material remain entangled. The line emerges not simply from a human design intention but from correspondence between body, mind, tool, and surface.

This perspective unsettles conventional authorship. The footage positions the pencil as an active collaborator, redistributing agency away from the designer’s hand. The human no longer directs but participates, sharing perceptual authority with a tool whose vision is partial, unstable, and contingent. Drawing becomes a site of co-agency rather than control. Recognising this relational dynamic has important implications for design drawing pedagogy. The camera-pencil practice this paper advocates reframes drawing not as representational

output but as a practice of attentiveness—an encounter that foregrounds listening, sensing, and negotiation with materials. Building on this insight, I propose a pedagogical intervention that invites students to pause production-oriented work and engage in speculative, more-than-human drawing, framing drawing as inquiry rather than performance. Hesitation, imperfection, and sensory noticing become legitimate modes of being. Such practice may also invite a reconsideration of how drawing is encouraged to be shown for evaluation in education, shifting emphasis from hyper-real representational outcomes toward outlining personal and exploratory thinking processes.

Such practices challenge the speed and polish heroed in producing ‘industry-ready’ graduates. Instead, cultivating a slower, care-based attentiveness to materials, contexts, and relations where students are encouraged to develop counter-visualities—ways of seeing that resist inherited hierarchies of skill and value (Mirzoeff, 2015). Drawing in this way becomes an encounter with the world rather than its replication.

Further iterations of this research (See figure 5) invite students to collaborate with the camera-pencil, extending its speculative agency across multiple hands. Still images and short clips will be gathered as visual artefacts, serving as both data and discussion provocations. Care, in this context, operates as method. Through slowness, attentiveness, and sensory engagement, drawing becomes correspondence rather than control. The pencil, long eclipsed by digital tools, re-emerges as a quiet agent of speculation. To draw with the pencil in this way is to imagine differently—to cultivate relational ways of thinking, seeing, and designing worlds yet to be made.

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