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Re-Imagining Outer Space

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Abstract

In 2019, only 12 men have ever stood on the Moon and around 540 people have ever been to space. For the rest of us, reaching an outer space perspective depends on imagery and fiction, poetic leaps and artistic choices. However, outer space is in need of re-imagining. Fifty years after the first Moon landings, mid-20th century "master narratives" continue to shape popular outer space imaginaries - based on colonial rhetoric, exploration imperatives and belief in technological progress.

Far from "for all Mankind", the dominant imaginations of outer space lack contemporaneity or diversity, and are thus only relatable for the few. With this in mind, public engagement creates important platforms for discourse and exchange between different publics and cultures, toward developing more diverse ideas for shaping outer space futures and Earth-space relations.

This paper discusses the ideas, approaches and outcomes of an educational workshop entitled "Re-imagining Outer Space" - a collaboration between artists and designers Joseph Popper, Sitraka Rakotoniaina and design students from HEAD University in Geneva. With guidance from Popper and Rakotoniaina, the students accomplished a range of design processes to imagine, prototype and produce their personal visions of human futures in outer space. The final results were short science fiction films describing speculative scenarios - from a Moon colony to a crewed spacecraft traveling toward Alpha Centauri. The films centre on future space characters developed by the students, each interpreting possible motivations to go to space: such as survival, progress, profit or environmental concerns.

The imagined scenarios were materialised in different media, from building sets to making props at 1:1 scale. Each step enabled the students to practice different design and filmmaking methods while developing their ideas individually and collectively. By producing their personal visions of outer space futures, the students were able to explore historic themes and contemporary motivations of spaceflight and present ideas in contrast to more "normative" narratives populating space exploration today. Through rapid prototyping and playful storytelling, they created engaging and meaningful reimaginings of outer space.

Keywords: education, film, imaginations, reimagining, science fiction, workshop

1. Introduction

This paper discusses the ideas, approaches and outcomes of an educational workshop entitled 'Re-imagining Outer Space' - a collaboration between artists and designers Joseph Popper, Sitraka Rakotoniaina and design students from HEAD University in Geneva. With guidance from Popper and Rakotoniaina, the students practiced a range of design processes to imagine, prototype and produce their personal visions of human futures in outer space. The workshop approach combined complementary methodological principles from speculative practices and rapid-prototyping. The aims of the workshop were two-fold. First, the students sought to contest the dominant visions of space-based futures by imagining their own alternative scenarios. Second, by creating short science fiction films the students learnt a series of narrative development and film production techniques across a range of media.

Over the course of ten workshop days the students accomplished individual and collective projects based on collaboration, experimentation and hands-on production. Through the iterative development of characters, space habitats and films, they were also able to explore meanings of outer space and critique the values and motives driving contemporary space programmes.

2. Background

Joseph Popper and Sitraka Rakotoniaina are artists and designers with a background in critical and speculative design. In February 2019, they were invited by Rosario Hurtado, leader of MA Space and Communication, to lead a workshop at the Geneva School of Art & Design (HEAD) with students from various programmes. Both Popper and Rakotoniaina have produced projects, and lead workshops, that engage with different aspects and multiple perspectives

of space exploration. Their previous workshops also span a range of media including film, scenographic installations and audio podcasts. Re-imagining Outer Space became a chance to collaborate together on a workshop that combines methodological approaches and also addresses mutual concerns and interests in their respective research. With a focus on space exploration, they share an interest in the potential of art and design practices to critique normative imaginations and to ultimately democratise future narratives. Popper and Rakotoniaina designed the workshop in response to the premise that collective imaginations of outer space have become normalised by particular visions of progress.

3. Historical Premise

3.1 Apollo and Americanism

Accomplished in 1969, the Apollo 11 mission made a profound impact on 20th century popular culture that continues to resonate today. Arguably the greatest technological achievement in history, the mesmerising images of men walking on the Moon also, for a moment, created something unprecedented: a sense of global identity. As millions around the world tuned in to witness Neil Armstrong and Buzz Aldrin's first steps, humankind seemed destined to become a space faring civilisation by the end of the century.

Celebrated as it may be, the Apollo programme cannot be separated from its grounding in the geopolitical context of the Cold War, nor from it determined status as a technological demonstration of American national prowess. In this light, Apollo is arguably the most grandiose statement of American exceptionalism: where the United States of America firmly placed itself as the social, economic, technological and moral leader of the world community [1]. Beyond Apollo and exceptionalism, spaceflight in general is seen as bound to an American national narrative that constructs and maintains an ideology of *Americanism*. Here, the ideologies of Americanism and spaceflight advocacy play upon the same cultural myths to serve the legitimacy and potency of each other – with the frontier and progress as arguably the most important myths forming a shared 'ideological bedrock' [2].

The frontier is both a myth and a metaphor where the future in outer space replaces the United States of the past "as a wide-open land of unlimited opportunity" [3]. The space frontier becomes a place for pioneering, free enterprise and rugged individualism - activities and associations that are "persistent" in American history and ideology [4]. Taylor E. Dark further conveys the idea of progress as "central to the American national identity" [5]. Progress can be briefly defined as the inevitable and necessary movement forwards in the direction of a desirable future, one that

is often driven by technological advance. Together, the myths of frontier and progress help to frame spaceflight as not only a natural endeavour but as a moral imperative.

The complementary ideologies of spaceflight advocacy and Americanism help underpin space exploration as part of the American national and international cultural narratives in the West. Building on the legacy of Apollo, spaceflight further consolidates belief in the assumption that the individualist values of a free-market, capitalist democracy are "worth extending into the solar system" [6]. In contrast to a universal vision of a global unity, Apollo was arguably, in hindsight, the crescendo of a very American space programme. However, at the time it was seen as only a beginning of humanity as a spacefaring civilisation: a belief remains held by a small yet increasingly powerful core of 'believers.'

3.2 Astrofuturism

De Witt Douglas Kilgore coins the term "astrofuturism" to describe a historical movement of spaceflight advocacy [7]. The principles of astrofuturism are namely the belief in humanity as a spacefaring civilisation, and in outer space as the key frontier for human progress. Kilgore's survey of the most important astrofuturists of the 20th century helps to trace the roots of spaceflight advocacy to the international rocket societies in the 1920s, 1930s and 1940s - including prominent members Willy Ley and Werner von Braun. From scientists to science fiction writers, the principles of astrofuturism proliferated and reinterpreted by alternating figures throughout the 20th century and into the 21st. Today, the visions of author Robert Heinlein and physicist Gerard K. O'Neill remain influential to the NewSpace movement: comprising private spaceflight industries and other public-facing societies who are advocating the human colonising and commercialising of outer space. Mirroring the historic rocket societies, this contemporary form of astrofuturism is led by a core of increasingly powerful individuals.

3.3 NewSpace

Silicon Valley tycoons Jeff Bezos and Elon Musk are the chief NewSpace protagonists and self-styled pioneers of the 21st century space frontier. In describing their space projects, the imagery and rhetoric of Bezos, Musk and other NewSpacers display a curious melding of confident certainty with ambivalence and ambiguity. Spaceflight is imagined as an endeavour that is both natural and absolutely necessary; whereas the space-based civilisations they envision are projected into futures very, very far away. These deep time

horizons ultimately negate any meaningful critique of the visions they are building towards. And yet, Bezos and Musk continue to build larger and larger rockets, in the belief that technological advance will also bring about a social and moral improvements as an inherent logic of progress, where, as Dark describes: *all good things go together* [8].

The general sentiment, here, infers that that technology is simultaneously then means and the end; the vehicle and the destination, where happiness and "freedom [are] only guaranteed by machines, not by human desire or practice" [9].

Bezos; Musk and their companies display a technological power that suggests their "decisions may affect history" [10]. This thought is further troubling when speculating on such decisions through their ideological basis. Jeff Bezos and Blue Origin's recent "pastiche" [11] renderings of floating space colonies, imitating the "suburban diasporas" first envisioned by Gerard O'Neill in 1976, is a foremost example of a NewSpace troping of ideas and precedents from earlier science and science fiction. This tactic, of repurposing imagery and stories about other meanings and intentions, negates the historical and social contexts within which 'utopian' futures, such as O'Neill's, were imagined. What this repetitive troping also does, is reveal a profound disconnect of NewSpace narratives of spaceflight advocacy with their contemporary cultural environment.

Billings describes spaceflight and its advocacy as "out of sync" with the present: a modern phenomenon that has "outlived the modern era" [12]. The realities of 21st century throw the master narratives of space advocacy into sharp relief. Beyond spaceflight, there is a confusion of meaning and purpose in historical ideas of frontiers and progress. Billings and Pyne argue that the ideologies of spaceflight advocacy also reflect those of the "dominant social order:" a lop-sided one that, as poet Wendell Berry says, is responsible for "the forces that have produced our crisis" [13]. The failure of spaceflight to resonate in the 21st century further relates to Rob Coley's idea of a "glitch" that is found where familiar narratives "no longer function as they should." [14] Returning to Berry, Coley argues pertinently that the spaceflight dreams of the twentieth century can be reflected upon today as "nightmarish" [15].

3.4 The Premise

Americanism and astrofuturism provide the ideological foundations of spaceflight advocacy and the dominant imagination of outer space. The ideologies, and the myths they embody, combine to create a curious and troubling belief-system that is driving the materialisation of a particular space future - one that has

become monolithic, and far from diverse or inclusive for all. The future visions projected by NewSpace and others actively play upon Apollo imagery to address a notional 'global identity.' However, the future manifestations they offer are as narrowly monocultural as they are critically unresolved. Here, a techno-centric determinism is found shaping a human destiny that is bound to the cause of progress.

In 2019, the most powerful spaceflight protagonists appear uncritical of the normative values and orders their projects are consolidating on Earth and extending into the cosmos. Conversely, we would argue that a critical reimagining of cultural narratives is where the real space exploration starts, no matter how difficult this may be. This is a culturally informed exploration of collective imaginations; of a diverse set of perspectives on outer space - as opposed to a singular, technocratic vision of one 'utopia' that is held to be a universal vision.

4. Problem Statement

As Billings and others suggest, the rhetoric of spaceflight advocacy has not changed significantly since the 1960s. The collective imagination of outer space this rhetoric shapes is, therefore, increasingly at odds with a radically different social, cultural and political context in 2019. However, their persistent potency renders the ideologies advancing human expansion, exploitation and settlement in outer space as not only out-dated but problematic. Furthermore, the actions of NewSpace leaders Elon Musk and Jeff Bezos, are materialising a path towards a determined future tied to selective cultural and historical ideas; a future that is built upon what Patricia Nelson Limerick describes as a "deeply flawed understanding of the past" [16]: one that, as Berry adds, avoids the imperative of addressing Earthly crises through "meaningful change" [17].

The historical premise outlined above led the workshop to pose the following questions to the students:
What alternative human space futures can we imagine? Who can or will go to outer space in the future? And, how can we reach outer space perspectives through making imagery and fiction?

5. Workshop Principles

The workshop was guided by methodological principles based upon practices of speculative design and speculative fiction. Also central to the methods was the principle of making as a productive and creative mode of thought - where iterative, hands-on prototyping forms the basis for developing concepts and generating meaning through materialisations.

5.1 Speculative Practices

Both Popper and Rakotoniaina share an interest in the tools and approaches of speculative design and science fiction for rendering futures (and futurological propositions) tangible, relatable and questionable. What distinguishes both modes of practice, in terms of what they do and why they are valuable, is in their capacity to use fiction to *describe* [18]. Describing objects, schemes or worlds is a means for investigation - for posing questions, uncovering complexities, and ultimately contesting what futures are desirable, possible or preferable. Through imagining ideas in high resolution, speculative practices can focus on a small scale to address larger narratives or concerns. By describing, fiction brings us to futures in media res - in the midst of things. Whether as designers or an audience, we can land right in the middle of the proposed scenario, without any preamble. In this way, the 'what if?' is imagined 'as if.' In other words, the power of describing enables the crafting and conducting of productive thought experiments [19].

Science fiction and speculative design are different modes of practice, yet both share a hypothetical approach to storytelling, along with very similar methods. Both create fictional worlds where futurological propositions are situated, animated and reflected upon. The scenarios rendered are often set in an imagined future or explore a place and time other than the present. However, and most importantly, this exploration of otherness becomes a vehicle to critique the here and now.

In an outer space context, Regina Peldszus provides a concise and helpful summary of speculative designs primary motives and its potential to "introspect" space-based designs and future visions from the "bottom up" [20]. Peldszus uses speculative design to connect actual and analogue space habitats with science fiction film sets, where the three environments each enable inhabitants and audiences to immediately experience or envision human space-based futures in hi-fidelity. Furthermore, she describes this connection along with a post-Apollo shift in how outer space is imagined: from place to territory; from exploration to exploitation. For Peldszus then, speculative design becomes a way of adopting a position "outside" the space station and other space infrastructure, to critique the values and motives of the sociotechnical programmes they embody [21]. In doing so, Similar to Le Guin's science fiction "thought experiments," [22] Peldszus frames space habitats and film sets as "architectural experiments" [23] that can ultimately question the pervasive and problematic rationale shaping given space-based futures as desirable. For the workshop, the film set becomes the site for imagining and performing alternative or non-affirmative imaginations of human spaceflight – where positions

and perspectives are made manifest in their design, detail and character.

The Seeker Project, co-lead by artist Angelo Vermeulen, is an important reference where the speculative space station is a site for experimental prototyping of space-futures through co-creation and bottom-up design [24]. Participants from different cultural backgrounds build large-scale Starship installations for simulating interstellar missions, co-habiting in isolated and self-sustaining systems. Seeker is interesting for our project, for the impressive Starship prototypes made from recycled and re-used materials, and also for its emphasis on diversity and inclusivity in the design process as a means for transcending what Vermeulen calls a "constrained imaginary" of outer space [25].

5.2 Rapid Prototyping

Rapid prototyping formed the basis for the students to develop ideas, characters and environments for producing short fiction films. To work at 1:1 scale offers a unique way of producing, experiencing and exploring ideas. It is a way of moving through resolutions, with an immediacy that encourages play and improvisation while embracing material constraints, the accidental and the unexpected.

The students were prompted by different mini-briefs to produce the props and sets required, working consistently at 1:1 scale through different levels of ambition. The changing scales also created opportunities for individual making and group-based collaboration. Cardboard was the main material of choice for its pliability and also its 'non-precious' quality, thereby encouraging students to prototype in a playful and dynamic atmosphere, where successes and failures can be addressed and responded to easily and flexibly. Working in this way also enables the students to produce detailed and descriptive props, and large scale, immersive environments in a short time. There is a process of *zooming in* that occurs where simple shapes at macro-scale are hand-rendered into higher resolutions with a layering of visual information, aesthetic quality and attention to detail.

The nature of cardboard is also important concerning its particular aesthetic qualities, as well as its material constraints and limitations. By default, students are faced with boundaries of cardboards articulacy, which means they must be inventive in bridging the gaps separating the environments they imagine and the materials they have to work with. Making things by hand leads to particular aesthetic and artistic choices, with a confidence to improvise and experiment. Furthermore, the workshop experience is designed to be informative and inspiring

for considering how to develop their future design projects.

Fig. 1. Investigative Journalist: Space helmet prototype

6. Workshop Process

6.1 Places, Pillars and Timelines

The workshop ran over the course of two weeks, or ten workshop days. In this time, the students covered a range of conceptual and production-based exercises. In accumulation, these various steps helped them to build towards making their final science fiction films.

First, we organised the students into groups as research clusters. In their clusters, they paired four outer space locations with four key concerns – or 'pillars' - that each pointed to a range of issues relating to possible space-based futures. The locations were: a space station in Lower Earth Orbit; a Mars colony; a Moon colony; and a crewed spacecraft on a 100-year voyage to Alpha Centauri. The four pillars were governance, economics, ethics and community. Though the pillars were broad, by pairing them with the locations, we sought for the students to use these environments of outer space to stimulate alternative thinking about familiar, earthbound concerns and experiences.

To begin, the students placed the locations and concerns in a dual axis timeline, where the x axis reached from the past into the future; and the y axis along a spectrum of utopia and dystopia. The students were tasked to chart and explore the timelines together - plotting ideas, questions and scenarios through history, in positions corresponding to futures that are either desirable or undesirable. The inclusion of a past axis also enables the trace of a historical lineage or bridge to an imagined future -this detail helps to make sense of where or what such a future may come from.

To encourage the sense of a collaborative effort, we organised the clusters to rotate between the timelines, ensuring that each group had a chance to contribute to each other's and so delay a sense of ownership or preciousness about a particular scenario until later. At the end of the day, once the timelines were looking more populated with notes, the students were invited to return to a scenario or concern they found most interesting. These choices would form the basis for imagining and developing their individual characters to be prototyped on days two and three.

6.2 Prototyping Characters and Environments

Days 02 and 03 moved from the conceptual timelines into physical prototyping. The objective was for the students to begin crafting a character from their chosen scenarios, using prototyping processes to test out ideas through the making. The first task was to design and build a space helmet. As arguably the most iconic object of spaceflight, we chose the helmet as a meaningful way to represent a designed character, their situation and motivations. Whether in form or function, the students found many opportunities to introduce significant aspects of the characters, and their wider scenarios, through the detailing of their helmets. The next step was to augment the space helmets with an additional prop that could further detail the characters interactions, motivations and perspectives. The props ranged from a pair of binoculars, an urn, a map to a communication device. This was another opportunity to be inventive in describing speculative scenarios through designed objects, be they practical, aesthetic or poetic.

By the end of day 03, the students were materialising and exploring a series of imaginative and unexpected characters, themes and motivations. The characters included an Instagram influencer; a guerrilla farmer; a reality TV contestant; an investigative journalist; a homeless man; a mourning relative; a space-station serviceman born in space. In their development, the characters were already stimulating interesting conversations around complex issues – such as death; celebrity; survival; corruption and evolution. By prototyping ideas and designing scenarios, the students were colliding familiar, earthbound issues with speculative conditions of human spaceflight.
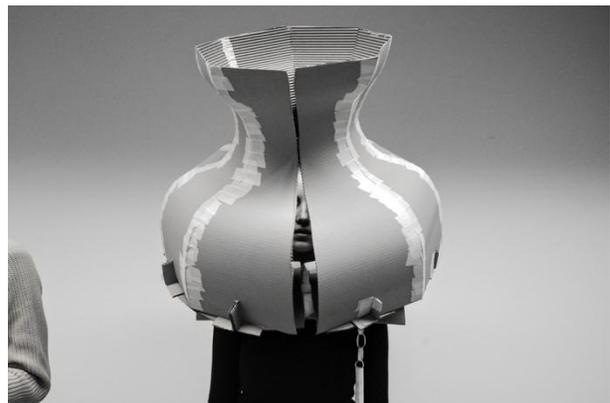
Fig. 2. Lunar Euthanasia: Space helmet prototype

Fig. 3. Martian Greenhouse: Film set detail

For the set-building stage, the students were organised into groups according to the placement of their individual characters, in spaces and locations where their different stories could co-exist. The locations were a greenhouse on Mars, a Lunar Hotel and the corridor of the spacecraft on a long duration space voyage. The next steps were to construct the basic frames out of timber, and then render the environments out of cardboard and other simple materials. Each group was given a list of basic but specific elements to include in their given sets and elaborate upon - such as a hotel reception desk or a spacecraft communications system. The building of multidimensional sets presented an opportunity for making at different scales, a process of zooming-in from larger, sculptural shapes to high-detail components; transforming simple materials into tangible objects.

6.3 Filmmaking

A collaborative, prototyping atmosphere extended into the filmmaking process - facilitated by punctuating the filmmaking with moments for sharing work-in-progress and feedback. The students were given a basic introduction to fiction filmmaking techniques and were encouraged to experiment in animating the sets and props through imaginative camerawork and lighting. The films were each about two minutes in length, and shot with a final black-and-white grade in mind. This aesthetic choice was designed to mask the general cardboard colour-scheme and to emphasise the textures and details of the built environments and costumes – giving them a more concrete appearance through the camera lens. In terms of lighting, many of the students adopted a film noir-type aesthetic: where strong contrasts in light and dark worked to complement the covert, subversive activities that are described in some of the films.

7. Conclusion

7.1 Summary

Outer space is in need of reimagining. Artists, designers and scholars continue to argue that the repetitive, normative imaginations of space-based futures are in need of disruption in order to renew perceptions and perspectives of what outer space is and what a human presence there can mean. This workshop sought to both contest and critique dominant visions for spaceflight through enabling the students to develop and materialize their own personal visions through inventive and collaborative methods.

The students' films described characters and scenarios that were unusual and unexpected, while the themes they explored stand at odds with the pervasive master narratives of pioneering explorers, settlers and human technical ingenuity. Instead we found themes of death, loneliness, corruption and crime. The outer space futures imagined by the students were populated by issues and conditions that were earthly, mundane and ultimately very human.

Through their films, the students were colliding familiar, earthbound issues with speculative conditions of human spaceflight. Their projects demonstrated how space exploration can be a lens for addressing current and terrestrial values and attitudes that may impact how futures may be imagined and materialised. As Howard E. McCurdy puts it, "the anticipation of cultural impacts provides the motivation to undertake the activities necessary to produce the change" [26].

7.2 Results

The ten-day timeframe enabled the workshop to introduce the students to, and for them to combine, a range of different design, prototyping and filmmaking processes. There was also opportunity for iterative development of their outer space visions. The helmet-making exercise on day 02 was particularly successful – because it enabled the students to experiment with representing characters and scenarios at 1:1 scale, and to develop narratives from the details they created: after one day, their visions were already becoming tangible. In general, the students responded best to the production-based exercises, where basic scenario and character outlines provided reference points for the making to develop ideas further. The high level of detail translated into the set-building - which in

turn elevated the resolution of, and creative opportunities for, the filmmaking. The use of lighting further animated the sets and props, which were activated on camera in various ways. The end films comprised a range of atmospheres about their individual narratives, through imagery with a cinematic depth and a sense of humour. The final screening of the films at the Sputnik Cinema was a fitting and rewarding experience to end the workshop.

7.3 Potential

The workshop demonstrated the potential of physical prototyping of ideas to develop meaningful, engaging and alternative imaginations of space-based futures. The imaginative and idiosyncratic characters designed and visualised by the students also expose the one-dimensionality of the pervasive pioneers who populate in the normative imaginations of outer space. The results of 'Re-Imagining Outer Space' are further promising, for the various outcomes suggest alternative space futures can be both imagined and rendered in hi-fidelity, and in short timeframes. Through a diverse set of tools and processes, the students were able to transform simple materials, such as cardboard, to describe their visions of outer space. These visions further became valuable thought experiments, architectural and cinematic, for questioning why outer space is normalised in collective imaginations; why are the dominant imaginations as they are; and exploring why is it important they are disrupted.

Acknowledgements

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