XENODESIGN

TOWARDS TRANSVERSAL ENGAGEMENT IN DESIGN

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for the degree of Doctor of Philosophy

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LIST OF ILLUSTRATIONS

Images by the author unless otherwise stated.

DECLARATIONS

This thesis represents partial submission for the degree of Doctor of Philosophy at the Royal College of Art (RCA). I confirm that the work presented here is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

I confirm that my research has been conducted in accordance with the RCA code of ethics and that I have received approval for this research from the RCA research ethics committee.

During the period of registered study in which this thesis was prepared the author has not been registered for any other academic award or qualification. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

Johanna Schmeer
August 8th 2020

PUBLICATIONS

Parts of this research have been published, exhibited, or presented as per the following list:

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EXHIBITIONS & AWARDS

Johanna Schmeer, *The Outside Inside*, nominated for the Lumen Prize for Art and Technology, 2020.

Johanna Schmeer, *The Outside Inside*, exhibited as a winner of the Grantham Art Prize, The Grantham Institute for Climate Change and the Environment, Imperial College London, 2019.

Johanna Schmeer, *The Outside Inside*, commissioned for the permanent collection of the Futurium Museum Berlin, 2019.

Johanna Schmeer, *Autonomous Agriculture*, acquired for the permanent collection of the MAK Museum of Applied Arts Vienna, 2019.

Johanna Schmeer, *Autonomous Agriculture*, exhibited as part of the Robotanica exhibition, Transnatural Art & Design, Amsterdam, 2018.

Johanna Schmeer, *Autonomous Agriculture*, exhibited at the 25th Biennial of Design in Ljubljana, 2017.

Johanna Schmeer, *Autonomous Agriculture*, work in progress exhibited at Nida Art Colony of the Vilnius Academy of Arts, Nida, Lithuania, 2017.

TALKS

Johanna Schmeer, "Design & Post-Anthropocentrism," University of the Arts Berlin, 2019.

Johanna Schmeer, "Xenodesignerly Ways of Knowing," PRIMER Conference Europe, Helsinki Design Week, 2018.

Johanna Schmeer, "Conceptual Design between Fiction and Reality," Master of Research in Design Program, Royal College of Art London, 2018.

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ABSTRACT

In a time when the anthropocentrism of Western thinking and acting is under increased scrutiny for its role in the ecological and social crises of our time, new imaginaries and design approaches that question human-centrism, and open up paths towards alternatives, are needed. As a design field concerned with challenging the status quo and discussing ideas, discursive design – which encompasses practices such as speculative design, design fiction, or adversarial design – provides a useful testbed for investigating what these alternatives could entail. Posthumanism, with its history of critiquing anthropocentrism and Enlightenment humanism's dualistic view of the human as separate from "nature," can stimulate much-needed shifts in thinking and acting within this realm.

Xenodesign – Towards Transversal Engagement in Design, a Ph.D. by project, expands discursive design by drawing upon theory from posthumanism and its subfields of xenofeminism and xenoarchitecture and merging these with discursive design. It aims to develop design and engagement approaches that allow new, collaboratively developed posthuman imaginaries to emerge. The practical research achieves this by engaging with diverse human as well as non-human audiences, in contexts including a field in the countryside, a museum, educational and research institutions, and a community garden. It involves three design projects, three workshops, and one event, which are used to develop and test three approaches to xenodesign, thematically engaging with issues related to the posthuman condition – being in a time between technological acceleration and ecological collapse.

The written thesis encompasses six chapters in dialogue with the practice, providing a theoretical framework and a space for reflection and discussion. Chapter 1 outlines the research questions, which are situated in the overlap between the conceptual frames of posthumanism, discursive design, and engagement practices. Chapter 2 introduces posthumanism and xeno theory. It highlights the relevance of the posthuman concept of

transversality for the research, which describes overcoming dualisms, cutting across perceived boundaries, and engaging with entanglement. Chapter 3 gives a brief overview of related work within discursive design. Chapter 4 introduces xenodesign as a discursive design and engagement approach developed through practice. Subchapters 4.2–4.4 each focus on one transversality-enabling and -reflecting concept from posthumanism: object-oriented ontology, alienation, and hyperstition. Chapter 5 reflects upon the practical explorations and positions xenodesign within a broader context, elaborating on how the posthuman methodology developed in my research can help overcome dualisms between human and non-human and between fiction and reality. The development of transversal design and engagement approaches and techniques is the key contribution my research makes. Chapter 6 concludes with a summary of findings, limitations, and an outlook towards further work.

1. INTRODUCTION

1.1. INTRODUCTION

A set of seven strange-looking objects, in bright colors and organic abstract shapes, sits under a glass cabinet at the Boijmans Van Beuningen Museum in Rotterdam in September 2014. A film is projected onto the opaque rear-facing side of the cabinet, showing these objects in use. Food-like liquids are flowing, pastes are being squeezed out, and powder is being touched and licked by a person whose face we cannot see, only their hands and mouth (Figure 1.1). This is the first of what have now been 34 exhibitions globally in which my 2014 speculative design project "Bioplastic Fantastic," about nutrient-producing biological machines, has been shown – my most exhibited project to date, traveling the world without me. After publication, it has taken on a life of its own.

Fig. 1.1 *Bioplastic Fantastic*, exhibited at Museum Boijmans Van Beuningen, Rotterdam, 2014.

Fig. 1.2 *Bioplastic Fantastic*, 2014.

Bioplastic Fantastic (Figure 1.2), as a speculative design project, aims to ask questions rather than provide solutions. It operates by introducing new ideas into culture, in a similar way that novels or films do, for reflection, provocation, inspiration, and as a form of intellectual entertainment.[1] Its light-hearted playfulness and ambiguous uncanny optimism about the future seemed appropriate for a technology and future-focused speculative design practice in 2014. But in the light of the recent reports of the Intergovernmental Panel on Climate Change (IPCC), the visible effects of environmental and extinction crises, increased technological automation and surveillance, and the social and political upheaval of the past years, marked by a global resurgence of nationalism and post-truth politics, the world today feels very different.

1 Anthony Dunne and Fiona Raby, *Speculative Everything* (Cambridge: MIT Press, 2013), 43.

These developments have renewed a sense of urgency in asking what design can and should do. They have increased the relevance of engaging with the implications of a design once it is out in the world, not just in the realm of applied design but also of discursive design.[2] Given the crises of our time, design approaches that aim to address these – either directly, or indirectly by questioning worldviews – must connect more closely with reality due to the need for action and impact. Engagement practices that include following up on a design's implications, and remaining involved in discussions, could help enable and reflect its political aims – "*staying with the trouble,"*[3] as Donna Haraway would say.

Design can no longer ignore the implications of ecological and climate crises. Their origins in capitalism, colonialism, modernism, and Enlightenment thought – a view of the human as separate from and above other entities – have driven a global extractivist technological acceleration. The widespread, unreflected use of human-centered[4] approaches in design is part of this problem.[5] It has many limitations in a time when "users" of designs are increasingly non-human, such as Internet of Things (IoT) devices, robots, or plants embedded within digital farming systems.[6]

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2 Discursive design is an umbrella term used to describe practices such as speculative design, design fiction, or adversarial design. Discursive designs primarily aim at being part of – or causing – discussions and debates, rather than solving problems. See Bruce Tharp and Stephanie Tharp, *Discursive Design: Critical, Speculative, and Alternative Things* (Cambridge: MIT Press, 2018).

3 Donna Haraway, *Staying with the Trouble: Making Kin in the Chthulucene*, Experimental Futures: Technological Lives, Scientific Acts, Anthropological Voices (Duke University Press, 2016).

4 Human-centered design is a useful approach in select contexts, particularly to address pragmatic concerns around the everyday human circumstances a design seeks to address. It can enable the creation of empathetic designs that are intuitive and suited to users' needs. The difficulty with a human-centered approach to design is that it often fails to look beyond the immediate user, toward other effects and consequences of a design, for example on ecosystems, or the laborers producing or enabling a design.

5 See Rachel Beth Egenhoefer ed., *Routledge Handbook of Sustainable Design*, eBook (Routledge, 2017), 203; Johanna Schmeer, "Xenodesignerly Ways of Knowing," *MIT Journal of Design & Science*, no. 5 (2019); and Benjamin Bratton, *The Terraforming*, EPUB e-book (Moscow: Strelka Press, 2019), 51.

6 See Leon Cruickshank and Nina Trivedi, "When Your Toaster Is a Client, How Do You Design? Going Beyond Human Centred Design," *The Design Journal*, Volume 20 (2017); Paul Coulton and Joseph Galen Lindley, "More-Than Human Centred Design: Considering Other Things," *The Design Journal* 22, no. 4 (2019): 463–81; and Liam Young, ed., *Machine Landscapes: Architectures of the Post-Anthropocene* (Hoboken: Wiley, 2019).

But how can design adjust to this new reality? When engagement in design often implies human-centrism, or the even narrower perspective of user-centrism, what could alternative engagement practices look like? How can the perspectives considered in design projects be diversified?

In philosophy, concepts such as posthumanism,[7] and its subsets of xenofeminism[8] and xenoarchitecture,[9] offer stimulus for much-needed shifts in thinking and acting to understand and perhaps mitigate ecological crises, for example, in connection to a reframing of humans not as separate from "nature" and other entities but as inherently entangled. They also offer starting points for developing an awareness of perspectives of the "other"[10] in this entanglement – other humans, as well as "other-than-humans." This raises the primary research questions of my thesis:

What could entail a posthuman / xeno approach to design? How might it employ concepts from this realm within design to enable new imaginaries to emerge? How might it develop strategies to connect with humans and non-humans in order to achieve this?

In the overlap between **discursive design, engagement practices, and posthumanism**, a rich realm for research emerges. These are the conceptual frames through which I conduct my research.

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7 Rosi Braidotti, *Posthuman Knowledge* (Oxford: Polity Press, 2019).

8 Helen Hester, *Xenofeminism* (Oxford: Polity Press, 2018).

9 Armen Avanessian et al., ed., *Perhaps It Is High Time for a Xeno-Architecture to Match* (Berlin: Sternberg Press, 2018), 14.

10 The terms "other" and "otherness" are used in xenofeminism and xenoarchitecture with positive connotations, as to engage with what is beyond the self. This differs from anthropology, where the term can have negative connotations when it is used to differentiate between different social groups or practices, in which some are considered the "norm" and others not, connecting it to hierarchies or value judgements. (See Jean-François Staszak, "Other/Otherness," in *International Encyclopedia of Human Geography* (Amsterdam: Elsevier, 2008), 25.) Engaging with "otherness" can lead to dualisms and oppositions that my research seeks to avoid, which is why a close connection between posthumanism, which seeks to overcome dualisms, and xeno theory is needed, as I explain in Chapter 2.

Discursive design is an umbrella term used to describe approaches such as speculative design,[11] design fiction,[12] or adversarial design,[13] which primarily aim to communicate ideas that are embedded in, or elicit, discussion and debate.[14] The term was defined by Bruce and Stephanie Tharp as an alternative to "conceptual design"[15] to describe these practices, due to the ambiguity of the term "conceptual" and its alternative meaning in the commercial realm, where it is used to refer to unrealized designs. Since my work originates from a speculative design perspective but develops this further through a confrontation with posthumanism and engagement, my research aims to create an approach that can be described as a potential new discursive design species, as part of the wider discursive design genus. This emphasizes that I do not aim to replace or dismiss existing approaches to speculative design but to develop a different, additional approach. As a design approach described as "*designers rethinking design*,"[16] with a history of challenging the status quo,[17] and fewer constraints than applied design practices,[18] discursive design provides an ideal testbed for developing a posthuman approach to design and engagement. This testbed can be used to generate findings that could later also be applied to other design practices. While discursive design typically takes an expert-led approach,[19] my approach is more balanced, sharing agency between human as well as non-human entities involved in the research to

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11 Dunne and Raby, *Speculative Everything*.

12 Julian Bleeker, "Design Fiction: A Short Essay on Design, Science, Fact and Fiction," *Near Future Laboratory*, 2009.

13 Carl DiSalvo, *Adversarial Design* (Cambridge: MIT Press, 2015).

14 Tharp & Tharp, *Discursive Design*.

15 The term is still often used colloquially and has been used as an umbrella term by other designers and scholars such as Dunne and Raby and Matthew Malpass.

16 Daniel Weil, in Tharp and Tharp, *Discursive Design,* 7.

17 For example, in radical / anti-design's questioning of the status quo in the 1960s (Gino Moliterno, ed., *Encyclopedia of Contemporary Italian Culture*, Routledge World Reference (London: Routledge, 2000), 25) and Tharp and Tharp's description of eight ways in which discursive design challenges the status quo (Tharp & Tharp, *Discursive Design,* 23).

18 Although exceptions exist, such as the Philips Design Probes projects, or Maywa Denki's Otamatone, discursive design commonly operates beyond constraints of market pressures or servicing industry (see Anthony Dunne and Fiona Raby, *Design Noir* (Basel: Birkhäuser, 2001, 59) and beyond constraints of industrial production and technological limitations (see Matthew Malpass, "Contextualising Critical Design: Towards a Taxonomy of Critical Practice in Product Design" (Ph.D. diss., Nottingham, Nottingham Trent University, 2012) 27 & 192.

19 Liz Sanders, "An Evolving Map of Design Practice and Design Research," *Interactions* 15, no. 6 (2008): 13–17.

decenter the human and emphasize entanglement. My approach overlaps with experimental design[20] in its explorative and process-oriented nature. However, it can be distinguished from experimental design through its primary motivation, which is not entirely open-ended exploration but a form of (expanded) audience engagement.

Engagement practices are what my research aims to develop through discursive design to allow for new, collaboratively developed posthuman imaginaries to emerge. I borrow the concept of imaginaries from philosopher Charles Taylor, who defines the social imaginary as the imaginations and expectations people have towards their social existence and connection to others.[21] In his analysis of how shifts in imaginaries brought about modernity, he exemplifies how imaginaries, despite their origins in fiction, can have real effects. Consistent with this, my research aims not only to discuss potential futures or alternative presents within the realm of the fictional but to move towards a more active and collaborative way of exploring these, by forging closer connections between the fictional and the "real."[22] This does not imply making fictional designs real but rather the imaginaries these fictional designs generate. Using the term "engagement" as opposed to "participation" allows for a much broader definition and fuzziness ("engagement with" and "engagement in"), which is needed when working with an expanded idea of what constitutes an audience, to decenter the human perspective that is commonly the focal point in design. It also avoids the connotation "participation" may have with participatory design. In its collaborative and iterative nature, but with its negation of a democratization of all aspects of the decision-making process, my work is closer to action research[23] than it is to participatory design. Positioning those engaging with and engaged in my research as co-researchers, rather than as subjects of the research, and conducting the research through action, are further

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20 As Tharp and Tharp state, "*An experimental design agenda centers on exploration. A discursive design agenda centers on audience reflection*." See Tharp & Tharp, *Discursive Design*, 43–55.

21 Charles Taylor, *Modern Social Imaginaries* (Durham: Duke University Press, 2003).

22 The term "reality" can be problematic, given that reality is not singular and depends on perspective. In my research, the term "closer to reality" means design closer to feasibility or use, for instance, functional discursive designs rather than non-functional models.

23 Cal Swann, "Action Research and the Practice of Design," *Design Issues* 18, no. 2 (2002).

overlaps with action research. However, unlike action research, my research does not take a problem-solving approach. It also does not "*link practice and ideas in the service of human flourishing*."[24] Instead, it aims to depart from the anthropocentrism of most engagement practices in contemporary design and research. My work is thus primarily a "research through design" [25] process, which overlaps with action research in some aspects, but not others, and which aims to develop new engagement approaches in the overlap between discursive design and posthumanism.

While my research involves humans, it aims to consistently avoid becoming human- or user-centered to avert reinforcement of the anthropocentrism it seeks to overcome. There is no question that human-centered design can be a valuable approach in specific contexts – it has become the predominant paradigm in design for good reasons.[26] My research does not aim to dismiss human-centered design but to offer something different, which might be more suited to other contexts. Human-centered design methods were not designed for discursive design practice and are of limited use within that realm due to their problem-solving and often needs-driven approach.[27] They are positioned as disparate from discursive design, offering a different contribution to society than that offered by discursive design.[28] The overlap between posthumanism, engagement, and discursive design thus provides an opportunity to develop engagement approaches that are generally more suitable to discursive design practice. My research avoids a problem-solving approach and instead seeks to develop and discuss new ideas and concepts, both on a meta-level (developing a posthuman approach to discursive design and engagement) and on a specific

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24 Peter Reason and Hilary Bradbury, *Handbook of Action Research: Participative Inquiry and Practice* (London: SAGE, 2001), 1.

25 Christopher Frayling, "Research in Art and Design," *Royal College of Art Research Papers*, 1993.

26 For example, in healthcare, where close examinations of patient needs, and their involvement in the design processes of medical products and services, have led to observable improvements in patient care and health awareness. See Winchester, W., 2009. "Catalyzing a Perfect Storm: Mobile Phone-Based HIV-Prevention Behavioral Interventions." in *Interactions,* November + December 2009. pp. 6-12. and Gustafson, D. H., 1999. "Impact of a patient-centered, computer-based health information/support system." in *American Journal of Preventive Medicine*, January 1999. Volume 16, Issue 1. pp. 1–9.

27 Dunne in Malpass, "Contextualising Critical Design," 105–106.

28 Tharp & Tharp, *Discursive Design,* 7.

level (discussing the topics of the design projects, such as future food systems or terraforming, and the connected posthuman imaginaries, in a form of collaborative materialized discourse). Although my research engages with instances of shared agency, my writing uses the first-person perspective to avoid concealing my authorship of the overall project, with all the subjectivities and difficulties this might entail. As a human, it is impossible to fully access the perspective of an "other," and any multiperspectivity is an approximation, filtered through the lens of a personal view and understanding.

Posthumanism and xeno theory[29] are relevant to my research as an epistemology that offers conceptual tools to understand and engage with human and non-human entanglement, to decenter the human and reflect upon what it means to be human in our contemporary world. Originating from a background in design and operating within practice-based research, my work cannot offer an all-encompassing in-depth analysis of posthumanism and xeno theory and its historical underpinnings and interconnections. What my perspective as a designer can contribute, however, is the creation of new interconnections between design practices and specific areas of posthuman and xeno theory. My theoretical explorations thus aim to investigate which theories could be relevant to design and explain this relevance. While several definitions of posthumanism exist, my work draws on Rosi Braidotti's concept of posthumanism, which critiques anthropocentrism as well as Enlightenment humanism.[30] It defines the posthuman condition – what it currently means to be human – as characterized by living in a time of convergence between anthropogenic mass extinction and the Fourth Industrial Revolution, in which technologies that are merging the physical, the digital, and the biological and that are impacting all disciplines and industries.[31] This approach provides a critical lens consistent with a discursive design approach, while

29 I will use this term to refer to theory emerging around the notion of the xeno, such as xenofeminism and xenoarchitecture (see Chapter 2.2.1.).

30 Rosi Braidotti, *Posthuman Knowledge* (Oxford: Polity Press, 2019), 2.

31 The Fourth Industrial Revolution challenges what it means to be human through technologies that are merging the physical, the digital, and the biological and are impacting all disciplines and industries, such as 3D printed artificial organs, driverless cars, and brain-computer interfaces. See Klaus Schwab, *The Fourth Industrial Revolution* (London: Penguin, 2017), 7–10.

simultaneously not dismissing the human perspective, as in other interpretations of posthumanism,[32] which would contradict the aim to engage with humans as well as non-humans. Humans are crucial to developing and enacting new imaginaries that can lead to transformative change. My research does not aim to simply apply posthuman philosophy to design but to create shifts in mindsets and understanding in an approach that allows design to act through posthuman thinking. As subsets of posthumanism with close connections and crossovers into design, xenofeminism and xenoarchitecture, and their focus on alienation and the "other," are also of interest to my research. I investigate modes of understanding, emphasizing, and acting through entanglement – such as transversality,[33] object-oriented ontology,[34] alienation,[35] and hyperstition,[36] – within discursive design and engagement practices. This aims to decenter the human, to take a multiperspective approach, and to connect fiction closer to reality, allowing for new, collaboratively developed posthuman imaginaries to emerge.

Influential movements and practices of discursive design have historically emerged during times of impactful social and technological shifts: in the 1960s, Radical Design emerged during an anti-establishment sociocultural revolution in the West, frequently being impacted by or referencing shared political aims.[37] Critical Design emerged in the 1990s during a pivotal time in which digital technology was increasingly impacting people's

32 Charlesworth, J. J. "The End of Human Experience." *ArtReview*, 2015.

33 Transversality, a term from geometry describing intersecting lines, is frequently used in posthumanism to refer to a condition as well as a relation, in which entities are not separate but intertwined. See Rosi Braidotti and Matthew Fuller, "The Posthumanities in an Era of Unexpected Consequences," *Theory, Culture & Society* Transversal Posthumanities Special Issue (July 31, 2019), 17.

34 Object-oriented ontology uses flat ontologies to understand the world; it considers all entities to have the same degree of beingness. See Graham Harman, *Object-Oriented Ontology: A New Theory of Everything* (London: Pelican, 2018).

35 Estrangement, or to be made strange, as a productive way of engaging with "otherness" and the unknown and not accepting conditions as given. See Helen Hester, *Xenofeminism* (Oxford: Polity Press, 2018).

36 Fictions that enable the conditions to make themselves real. See Cybernetic Culture Research Unit [website], 1997, www.ccru.net.

37 For example, UFO's happenings and activism using inflatables during the student protests. See UFO, *Urboeffimiro Nr. 5*, 1968, https://floatingutopias.org/en/stories/lapo-binazzi-artur-van-balen/.

everyday lives,[38] providing an alternative to commercial design's ideas concerning electronic products and their use. Today, a renewed expansion, questioning, and rethinking of design is needed in times of ecological crises and technological acceleration and convergence.

1.2. METHODOLOGY

To address the process-oriented research questions, an emerging methodology is required, in which methodological approaches related to the above-mentioned three conceptual frames can be tested and adjusted based on new findings and reflections during the research. This allows for an openness that does not limit the possibilities and potentials of design, with its explorative, tacit, intuitive, contingent, and generative qualities.[39] In my work, the methodology is viewed not only as a means of conducting the work but as a site of investigation and reflection. Thus, methodological decisions, reflections, and findings are discussed intermittently in later chapters as they emerge throughout the research, particularly in Chapters 4 and 5.

My research aims to investigate the research questions through a combination of theoretical and practical research, which adopts a qualitative, exploratory, and interpretive approach. Theory and practice are not understood as distinct forms of research in my work but are considered as inextricably linked and interwoven. They form an ongoing dialogue by developing practice influenced by theory, and researching theory influenced by practice, over the course of several projects. My conceptual frames of discursive design, engagement practices, and a posthuman epistemology are connected to all three types of design research, as described in Christopher Frayling's influential 1993 paper, "Research in Art and Design."[40] Part of the literature and projects review, as well as later references that draw

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38 Tharp & Tharp, *Discursive Design,* 89.

39 William Gaver, "What Should We Expect from Research through Design?" (Proceedings of the SIGCHI Conference on Human Factors in Computing Systems 2012, Austin, TX, New York: ACM, 2012), 1–10. and Donald Schön, *The Reflective Practitioner* (London: Temple-Smith, 1983).

40 Christopher Frayling, "Research in Art and Design," *Royal College of Art Research Papers,* 1993.

parallels between posthuman theory and existing design practices, encompass "research into art and design." The practical projects are "research through design" and aim to develop new design and engagement approaches. They achieve this by drawing upon theoretical research and concepts from the realm of posthumanism, which can be considered "research for art and design."

Adhering to the rules of academia, such as rigor and formulating and following a methodology, may be a balancing act in discursive design practice. It is a practice which embraces openness and ambiguity, in which it is believed that following a strict methodology could de-radicalize it[41] and that it is an approach and a mindset, rather than a method.[42] Even when operating in a research context, discursive design can aim at producing more questions than finding answers.[43] However, as a practice, discursive design continues to change and evolve, opening up paths for more traditional fields of research and knowledge production to also change and evolve. Subjectivity and tacit knowledge are part of this, as elements of design's specific ways of knowing,[44] when knowledge is not only describable and rationalizable but also inherent in the objects of design.

41 Malpass, "Contextualising Critical Design," 3.

42 Anthony Dunne and Fiona Raby, *Speculative Everything* (Cambridge: MIT Press, 2013), EPUB e-book, 262.

43 Johann Redström et al., "STATIC! The Aesthetics of Energy in Everyday Things" (IADE Design Research Society International Conference, Lisbon, 2006), 13.

44 Nigel Cross, "Designerly Ways of Knowing," *Design Studies,* Volume 3 (4) (1982): 221–27.

2. A POSTHUMAN / XENO EPISTEMOLOGY FOR DESIGN

2.1.1. THE POSTHUMAN

The Enlightenment concept of human exceptionalism positions the human centrally, separate from "nature" and above other entities. Western design history reflects this world-view, using the human as a central point of reference and focus. Consistent with a discursive design approach of challenging the status quo, confronting design with posthumanism allows to question this by asking, "why the center?" but also "which human?" and "how is this human entangled in the world?"

Posthumanism is an umbrella term for an extensive range of theories and ideas, some overlapping and some oppositional. Braidotti's definition of posthumanism,[45] which I employ in my research, overlaps closely with philosophical posthumanism[46] and feminist posthumanism.[47] It is a posthumanism that is not primarily concerned with what comes "after" the human, which is a key difference to other types of posthumanism, such as transhumanism,[48] posthumanisms concerned with human extinction,[49] or Hayles' concept of the human dispersed by digital technology.[50] Instead, it foregrounds the question of what it means to be human. For Braidotti, the posthuman is both a sign of our contemporary time – the posthuman condition – and a navigational tool for understanding the kind of

45 Rosi Braidotti, *Posthuman Knowledge* (Oxford: Polity Press, 2019), 2.

46 Francesca Ferrando, *Philosophical Posthumanism* (London: Bloomsbury Academic, 2019).

47 Braidotti considers herself a feminist posthumanist. The work of Donna Haraway and more recently the work of the collective Laboria Cuboniks on xenofeminism (see Chapter 2.2.1.) can also be defined as such, as well as the explorations in Richard Grusin, ed., *Anthropocene Feminism* (Minneapolis: University of Minnesota Press, 2017), and Cecilia Åsberg and Rosi Braidotti, eds., *A Feminist Companion to the Posthumanities* (Berlin: Springer, 2018).

48 Which aims at overcoming human limitations in an extended humanism by technologically enhancing human abilities and prolonging lifespans. Scholars in the field include Nick Bostrom, Ray Kurzweil, and Aubrey de Grey.

49 See Claire Colebrook and Jami Weinstein, eds., *Posthumous Life: Theorizing Beyond the Posthuman* (New York: Columbia University Press, 2017).

50 N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999).

subjects humans are becoming.[51] In a discursive design approach concerned with engagement and multiperspectivism, it can assist in reframing the human perspective rather than rejecting or avoiding it.

According to Braidotti, posthumanism is a paradigm shift that entails two central aspects – a critique of humanism and a critique of anthropocentrism. [52] While critiques of humanism and anthropocentrism are often conflated, critiques of humanism have long existed separate from critiques of species supremacy.[53] Historically, critiques of humanism have often originated from feminism, activism, and gender, decolonial, disability, or queer studies. They are connected to posthumanism through their history of questioning the category of the human, due to being historically excluded from it,[54] when some humans are considered more human than others.

These fields, which Braidotti refers to as the first generation of "studies" have been in dialogue with design for several years. Disability studies and design converge in the discourse around universal design, which is regularly published in the context of disability studies.[55] Feminist perspectives on design emerged in the 1980s, ranging from critiques of the omission of women's work in the field[56] to more recent investigations of how data bias leads to a focus on men, for example, in safety testing of cars, which disadvantages and even endangers women.[57] More recently, decolonial thought has been explored,

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51 Rosi Braidotti, "Posthuman Knowledge" (Lecture, Harvard Graduate School of Design, March 2019).

52 Braidotti, *Posthuman Knowledge*, 2.

53 Braidotti, "Posthuman Knowledge" (Lecture).

54 Braidotti, "Posthuman Knowledge" (Lecture).

55 A quick search in the journal Disability Studies Quarterly yields 101 results for papers related to universal design, dating back to the year 2000. See www.dsq-sds.org.

56 For example, see Cheryl Buckley, "Made in Patriarchy: Toward a Feminist Analysis of Women and Design," *Design Issues* 3, no. 2 (1986): 3–14 and Judy Attfield and Pat Kirkham, eds., *View from the Interior: Feminism, Women and Design* (London: Women's Press, 1989).

57 Caroline Criado Perez, *Invisible Women: Data Bias in a World Designed for Men* (London: Chatto & Windus, 2019).

for instance, in the realm of design anthropology and innovation[58] and in the work of the Decolonizing Design group, which aims to strengthen the inclusion of non-Western perspectives and foster awareness of how class, gender, and race impact and are impacted by design today.[59]

Design has engaged less with some of the "studies" which have subsequently evolved in the posthumanities, such as critical plant studies,[60] ocean studies,[61] multispecies studies,[62] or animal studies[63] – although this has started to change recently, as I discuss in Chapter 3. I engage with these fields in my practice-based work in Chapter 4. These "studies," referred to as the "second generation of studies," critique not only humanism and the idea of a universal human, like the first generation of studies, but also anthropocentrism.[64] The subject is not understood as separate from other entities but as transversal and entangled in a web of human and non-human agents. Boundaries between humans and the "other," such as animals or plants, are broken down, for instance, in Michael Marder's work on plant-thinking, which he describes as "*the non-cognitive, non-ideational, and non-imagistic mode of thinking proper to plants, as much as the process of bringing human thought itself back to its roots and rendering it plantlike*."[65] This line of thought resonates with Haraway's non-dualist stance that "*we have never been human,*"[66] which acknowledges the entanglement of humans with other species, the environment, and technology, as part of complex systems. It also overlaps

58 Elizabeth Tunstall, "Decolonizing Design Innovation: Design Anthropology, Critical Anthropology, and Indigenous Knowledge" (London: Bloomsbury Academic, 2013), 232–50.

59 Ahmed Ansari et al., "Decolonizing Design Editorial Statement," 2016., https://www.decolonisingdesign.com/.

60 See Michael Marder, ed., "Critical Plant Studies" 1–5 (2018-2013).

61 Sometimes also referred to as the "blue humanities," see Elizabeth DeLoughrey, "Toward a Critical Ocean Studies for the Anthropocene," *English Language Notes*, 57, no. 1 (2019): 21–36, and Stacy Alaimo, "Introduction: Science Studies and the Blue Humanities," *Configurations,* 27, no. 4 (2019): 429–32.

62 Thom Van Dooren, Eben Kirksey, and Ursula Münster, "Multispecies Studies: Cultivating Arts of Attentiveness," *Environmental Humanities* 8, no. 1 (May 2016).

63 Cary Wolfe, "Human, All Too Human: 'Animal Studies' and the Humanities," *PMLA* 124, no. 2 (2009): 564–575.

64 Braidotti, *Posthuman Knowledge*, 104–114.

65 Michael Marder, *Plant- Thinking: A Philosophy of Vegetal Life* (New York: Columbia University Press, 2013), abstract retrieved from https://cup.columbia.edu/book/plant-thinking/9780231533256.

66 Donna Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008), 165.

with new materialist theory, which understands the world through intra-acting forms of agency that result in co-productions of human and non-human matter.[67]

The second generation of "studies" and their decentering of the human and boundary breakdowns are especially relevant to design in a time when designers are increasingly confronted with hybridity, working in fields such as artificial intelligence, synthetic biology, or digital farming. Braidotti emphasizes this hybridity in her argument that in a time of convergence between the phenomena of the Fourth Industrial Revolution and the sixth mass extinction and climate breakdown, posthumanism and post-anthropocentrism become inextricably linked.[68] Nevertheless, her perspective focusses on questioning what it means to be human while engaging less explicitly with the "other" and the connection with or between the "other:" the non-human or other human.

Philosopher Francesca Ferrando partially addresses this by proposing to add a third aspect in her variant of philosophical posthumanism, in addition to Braidotti's posthumanism and post-anthropocentrism: post-dualism.[69] Rather than engaging with "otherness," she proposes to overcome it. Dualisms are central to humanism and anthropocentrism, which are based on defining what constitutes the human by what it is not, for example, not animal and not nature. Posthumanism, according to Ferrando, shows that dualisms are insufficient to define the human. A post-dualist stance also informs Donna Haraway's 1985 Cyborg Manifesto, one of the earliest and most influential texts of the field of feminist posthumanism. In this manifesto, she positions nature-culture dualisms as discredited.[70] She elaborates on three crucial boundary breakdowns in the light of scientific and technological advances: between human and animal, between human / animal and machine, and between physical

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67 Karen Barad, "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter," *Journal of Women in Culture and Society* 28, no. 3 (2003).

68 Braidotti, "Posthuman Knowledge" (Lecture).

69 Francesca Ferrando, *Philosophical Posthumanism* (London: Bloomsbury Academic, 2019), 22.

70 Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature* (Routledge, 1991), 151.

and non-physical. She states that her text "*is an argument for pleasure in the confusion of boundaries and for responsibility in their construction*."[71]

While the posthuman critique of humanism can translate into an awareness of issues such as feminism, decoloniality, and disability in design, and the critique of anthropocentrism can translate into a decentering of the human in design by taking a multiperspective approach, the concept of post-dualism may be more difficult to convey. Post-dualism is feasible in theory: one can decide to understand things not as separate but intertwined. However, design is so closely linked to the tangible and perceivable material reality of the world (such as objects and media) that boundaries cannot be entirely broken down when humans and human perception are involved. Transversality – cutting across boundaries with intersecting lines – might be a more useful concept when working with the material realities of design, where overcoming dualisms is not entirely achievable. Engaging with "otherness" thus remains relevant in the material practice of design and cannot be as easily dismissed in practice as it might be in theory. Therefore, "otherness" is investigated in the next chapter (2.2.) through xeno theory.

The term transversality is frequently used in posthuman discourse but not distinguished from "post-dualism" or "boundary breakdown," which are sometimes used interchangeably. However, its origin in mathematics hints at a key difference: In geometry, transversality describes two separate lines with a transversal line intersecting both. Boundaries are not entirely broken down; they only become permeated or "leaky,"[72] to use a Harawayan term. In Western theory, the concept was popularized in 1974 by Felix Guattari, who borrowed it from Sartre to describe his approach to psychotherapy, in which the boundaries between patient and therapist are dissolved in a form of collective group therapy.[73] Transversality

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71 Haraway, "A Cyborg Manifesto," 150.

72 Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature* (Routledge, 1991), 151–153.

73 Felix Guattari, "Transversality," in *Molecular Revolution: Psychiatry and Politics* (Prescott: Peregrine, 1984), 11–24.

describes a condition as well as a relation.[74] This characteristic makes it a promising tool for a posthuman design approach, which aims to both reflect entanglement and foster it through engagement practices.

When developing a posthuman transversal design approach, it is important to note that the popularization of theory beyond anthropocentrism is relatively recent in Western thought and that much of the discourse around transversality and decentering of the human originates at least partially from non-Western and indigenous thought. This is often unacknowledged, and must be recognized and reflected in design's engagement with posthumanism so that colonialist practices that are partially responsible for the current ecological and social crises are not reinforced. The work of indigenous scholars Zoe Todd and Kim TallBear is particularly relevant within this realm. Todd describes how posthumanism, with its current Euro-Western centricity, risks erasing the non-Western and indigenous epistemologies and ontologies it relates to or originates from, although it could be a promising tool of decolonization in academia if structural issues faced by indigenous scholars are addressed.[75] She illustrates this through the example of Bruno Latour's work on the Gaia hypothesis,[76] an understanding of Earth as a synergistic self-regulating system, in which he fails to reference similar notions within indigenous knowledge, such as Sila, a well-known Inuit transversal concept of climate and the environment.[77] Kim TallBear similarly contends that indigenous cosmologies have always avoided nature / culture or human / animal

74 Rosi Braidotti and Matthew Fuller, "The Posthumanities in an Era of Unexpected Consequences," *Theory, Culture & Society* Transversal Posthumanities Special Issue (July 31, 2019), 17.

75 Zoe Todd, "An Indigenous Feminist's Take On The Ontological Turn: 'Ontology' Is Just Another Word For Colonialism," *Journal of Historical Sociology* 29, no. 1 (March 2016): 4–22.

76 The Gaia hypothesis was originally developed by James Lovelock in the 1970s, see James E. Lovelock, "Gaia as Seen through the Atmosphere," *Atmospheric Environment* 6, no. 8 (1972): 579–580, and Latour's discussion of it in Bruno Latour, *Facing Gaia: Eight Lectures on the New Climatic Regime* (Cambridge: Polity Press, 2017).

77 Todd, "An Indigenous Feminist's Take On The Ontological Turn," 5–6.

dualisms, as does posthumanism, and that they also include non-human others that receive minimal attention in Western ontologies, for example, objects and forces such as stones, thunder, and stars.[78]

One exception is the theory of object-oriented ontology (OOO),[79] which is considered a subset of posthumanism.[80] It introduces an approach into Western theory that has long existed in non-Western knowledge practices, as Dylan Rainforth illustrates in his essay on the OOO of Aboriginal thought.[81] Object-oriented ontology uses flat ontologies, in which all entities are considered to have the same degree of beingness in the world. Due to its focus on objects and their relations, it can assist in engaging in the material realities of design in a non-anthropocentric manner.[82] In the overlap between OOO and transversality, my first explorations in posthuman design practice emerge (see Chapter 4.2.).

2.1.2. CONCLUSION

From posthumanism, we learn that the world is becoming increasingly entangled; convergence is its central premise. The concept of humans as separate from other entities is thus no longer adequate. Posthumanism assists in understanding this and can become a resource for theory and concepts that allow design to act within this entanglement. To achieve this, the notion of transversality is particularly worth exploring in design practice, as are, within that frame, theories that might enable it, such as OOO (see Chapter 4.2.) and concepts from the second generation of studies, such as plant studies and multispecies

78 Kim TallBear, "An Indigenous Reflection on Working beyond the Human/Not Human," *GLQ: A Journal of Lesbian and Gay Studies* 21, no. 2–3 (June 2015): 230–235.

79 Graham Harman, *Object-Oriented Ontology: A New Theory of Everything* (London: Pelican, 2018).

80 Francesca Ferrando, *Philosophical Posthumanism* (London: Bloomsbury Academic, 2019), 1.

81 Dylan Rainforth, "How Aborigines Invented the Idea of Object-Oriented Ontology," *UN MAGAZINE*, n.d., http://unprojects.org.au/magazine/issues/issue-10-1/object-oriented-ontology-web-only/.

82 In this regard, it shares overlaps with Latour's actor-network theory. However, key differences also exist, such as that OOO is more interested in things in themselves, while ANT focusses on actions. See Chapter 4.2.

studies (see Chapters 4.2. and 4.3.). Rather than a separate concept to be investigated, transversality could become an overarching frame. If successful, a transversal design approach could potentially unite a posthuman decentering of the human, its reframing within a multiperspective approach, and non-dualist thought. It can become an epistemological tool as well as an aim for design, to address the current state of the world. Dualisms cannot be entirely overcome, given the material realities of design, but transversality is feasible.
This raises the question of the "other:" who or what is this "other" that the human is in a transversal relation with, and which "others" are in relations with each other? Engagement with the human "other" is well established in design, but how can design engage with the non-human "other"? This question must be addressed if the aim is to develop a multiperspective design approach. To achieve this, in the next chapter, I investigate xenofeminism and xenoarchitecture as posthuman theories engaging with the "other" – the xeno – which are closely connected to the practice of design.

2.2.1. THE XENO

In philosophy, the speculative turn[83] signifies a shift away from the correlationist view of the construction of the world, centered around human cognition, which was predominant in Western thought since Kant. Speculative realism,[84] similarly to posthumanism, challenges this anthropocentrism. It seeks to expand philosophical thinking to reconsider what

83 Levi Bryant, Nick Srnicek, and Graham Harman, eds., *The Speculative Turn: Continental Materialism and Realism* (Melbourne: re.press, 2011).

84 It is important to note that the field of speculative realism is heterogeneous, comprising partially contrasting theories, and contains unresolved disputes. Some even reject its existence as one coherent field. See Levi Bryant, "Speculative Realism Does Not Exist," *Larval Subjects* (blog), July 4, 2009, https://larvalsubjects.wordpress.com/2009/07/04/speculative-realism-does-not-exist/ and Ray Brassier, quoted in Peter Gratton, *Speculative Realism: Problems and Prospects* (London: Bloomsbury Academic, 2014), 3.

Quentin Meillassoux describes as the "great outdoors:"[85] things as they are in themselves, and perspectives and notions of the "other," including that which lies beyond human experience and perception.

The "xeno-" prefix has recently been used in the context of speculative realism-related theories and posthumanism to describe techniques of alienation and "othering" as productive ways to broaden perspectives and think about the "other" and the unknown, or the "outside," a concept similar to Meillassoux's "great outdoors." This thinking has generated concepts such as xenofeminism[86] and xenoarchitecture[87] within the broader realm of posthuman theory.

While it is impossible, as a human, to fully adopt an "othered" perspective, it is possible to approach it, or at least to depart from the human perspective and venture into less familiar territories. This can be useful in order to include a variety of viewpoints in the design process, but it can also create engaging design outcomes. Such outcomes can be designed products or interactions that invite an audience to explore an "othered" perspective. While speculative realism's impact on fine art has been critiqued for leading to a rejection of the role of human experience,[88] a xeno approach does not dismiss the human perspective but seeks to reposition it as one amongst others.

Xenofeminism was conceived by the group Laboria Cuboniks as a result of their collaborative work at a conference at Haus der Kulturen der Welt in Berlin in 2014. According to Helen Hester, a member of the group, xenofeminism is a form of "*bricolage, synthesizing cyberfeminism, posthumanism, accelerationism, neorationalism, materialist feminism.*"[89] It draws upon

85 Quentin Meillassoux, *After Finitude: An Essay on the Necessity of Contingency* (Continuum, 2009).

86 Helen Hester, *Xenofeminism* (Oxford: Polity Press, 2018).

87 Alison Hugill, "Interview with Lietje Bauwens, Wouter De Raeve and Alice Haddad – Xeno-Architecture: Radical Spatial Practice and the Politics of Alienation," *Archinect*, February 17, 2017.

88 J. J. Charlesworth, "The End of Human Experience," *ArtReview*, Summer 2015.

89 Hester, *Xenofeminism*, 1.

a range of theories, ideas, and concepts from these fields, assembling them in new ways to address contemporary political conditions.[90] Diann Bauer, another Laboria Cuboniks member, defines it as a "*gender abolitionist, anti-naturalist, technomaterialist form of posthumanism.*"[91]

Fig. 2.1 Del-Em, an open-source tool for menstrual extraction developed in the 1970s. Photograph by Lorraine Rothman, Feminist Women's Health Center.

Alienation, as a key approach of xenofeminism, describes an estrangement, or being made strange, as a productive way of engaging with "otherness" and departing from what is accepted as given. Hester positions the Del Em menstrual extraction tool as a xenofeminist technology.[92] This is a DIY tool developed in the 1970s that allowed women to exercise control over their bodies by extracting menstrual blood immediately rather than waiting for it to be expelled naturally over several days (Figure 2.1). It is a problem-solving tool and can also be used to perform early-term abortions. However, it is simultaneously a discursive tool for highlighting the need for more bodily autonomy for women[93] and questioning what is otherwise accepted as a given. It offers an estrangement from the natural process of

90 Hester, *Xenofeminism*, 1.

91 Diann Bauer, "Xenofeminism," Xenofeminism, n.d., http://diannbauer.net/xenofeminism.

92 Hester, *Xenofeminism*, 70–138.

93 Hester, *Xenofeminism*, 79.

menstruation through a confrontation with the "other," in this case, a DIY technology. This use of estrangement, questioning givens, as well as xenofeminism's approach to technology and tools – as an embodied critique but also as an emancipatory means – overlaps with practices of speculative design as technology-oriented forms of discursive design. However, the details of potential different strategic uses of strangeness in discursive design, and how these might enable transversal engagement with the "other" in design, remain unexplored. This renders an investigation of alienation through design practice a worthwhile pursuit, which I focus on in Chapter 4.3.

Related to xenofeminism, and even closer to design, is xenoarchitecture. Xenoarchitecture currently exists only as a theoretical concept. Thus, its implications for practice are not yet clearly defined. The discourse around xenoarchitecture mainly emerged from a curatorial research platform[94] inspired by Armen Avanessian's coining of the term "xenoarchitecture" in the preface of Markus Miessen's book on critical spatial practice.[95] The platform aimed to research how those working in the field of architecture in the broadest sense might use alienation to confront global problems and create new ways of knowing within the spatial realm.[96] Xenoarchitectural alienation involves including perspectives of the "other" in the spatial domain and using "othering" as a form of knowledge production.[97] It also describes a deliberate strangeness, a radicality of ideas that creates new possibilities.[98] This resembles discursive design and has long been imperative in Dunne and Raby's approach to speculative design. Similarly to xenoarchitecture, speculative design positions design as a means of asking "what if" questions, and speculating about what could be, to discuss the "*kind of future people want*."[99] Despite these similarities, xenoarchitecture exceeds the scope of

94 See http://www.perhapsitishightimeforaxenoarchitecturetomatch.org/.

95 Armen Avanessian, "Preface: New Names and Nomoi," in *Crossbenching: Toward Participation as Critical Spatial Practice*, by Markus Miessen (Berlin: Sternberg Press, 2016), 16.

96 Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match* (Berlin: Sternberg Press, 2018), 9–10.

97 Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match*, 23.

98 Alison Hugill, "Interview with Lietje Bauwens, Wouter De Raeve and Alice Haddad – Xeno-Architecture: Radical Spatial Practice and the Politics of Alienation," *Archinect*, February 17, 2017.

99 Anthony Dunne and Fiona Raby, *Speculative Everything* (Cambridge: MIT Press, 2013), 2.

speculative design in aiming to transcend "*what is*" and "*what could be*" to also engage with "*what actually happens*."[100] In contrast to this, speculative design projects are usually ends in themselves rather than a means to an end.[101] In xenoarchitecture, the concept of hyperstition is invoked as a potential frame for engaging with the effects of a project.[102] Hyperstition describes fictions that enable the conditions to make themselves real,[103] which in terms of transversality could be understood as a relevant approach to forging transversality between fiction and reality. I investigate this in Chapter 4.4.

When working with hyperstition in design, it is crucial to understand its origins and address potential problematic connotations, which can also partially exist for xenofeminism and xenoarchitecture. Originally developed at the Cybernetic Culture Research Unit, which existed at Warwick University's philosophy department from 1995–1997, the concept of hyperstition has recently gained popularity again in the wake of the challenges facing the world today.[104] It originates from accelerationist theory, which, simplified, relates to intensifying the deterritorializing[105] tendencies of capitalism and using technology towards emancipatory ends (left-accelerationism) or towards a state of technological singularity[106] (right-accelerationism). A connection between xenofeminism or xenoarchitecture and accelerationism exists but is not always made explicit, due to the frequent misinterpretation,

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100 Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match,* 14.

101 As James Auger notes: "[…] *as long as the idea is out there in the public domain and people are thinking about it, our job has kind of been done*." See Auger in Malpass, "Contextualising Critical Design," 130. Similarly, Tobie Kerridge argues that the process and outcomes of speculative design are ends in themselves and that they do not "*explicitly link into some later mechanism*" but are a form of collaborative exchange and discussion. See Kerridge, "Designing Debate: The Entanglement of Speculative Design and Upstream Engagement" (Ph.D. diss., Goldsmiths, University of London, 2015), 177.

102 Alison Hugill, "Interview with Lietje Bauwens, Wouter De Raeve and Alice Haddad – Xeno-Architecture: Radical Spatial Practice and the Politics of Alienation," *Archinect*, February 17, 2017.

103 Cybernetic Culture Research Unit [website], 1997, www.ccru.net.

104 Armen Avanessian and Christopher Roth, *Hyperstition*, Documentary film, 2015.

105 Uprooting or moving to produce change. Frequently referenced within accelerationist discourse, it is a concept that originates from Deleuze and Guattari. See Adrian Parr, ed., *The Deleuze Dictionary* (Edinburgh: Edinburgh University Press, 2005), 69.

106 Artificial computational superintelligence that bypasses human intelligence and results in profound changes to human civilization. See Shuja Haider, "The Darkness at the End of the Tunnel: Artificial Intelligence and Neoreaction," *Viewpoint Magazine*, March 28, 2017, https://www.viewpointmag.com/2017/03/28/the-darkness-at-the-end-of-the-tunnel-artificial-intelligence-and-neoreaction/.

reinterpretation, and diversity of contradictory positions within accelerationism,[107] including a problematic adoption of the term by the far-right.[108] Braidotti describes xenofeminism as a form of post-accelerationism that forges a critical and upbeat response to the posthuman condition and credits it with addressing the lack of knowledge or appreciation of feminism, postcolonialism, and indigenous philosophies within accelerationist discourse.[109] While this is true for feminism, apart from aiming to provide emancipatory politics for all those oppressed and emphasizing the importance of intersectionality,[110] its connection to post-colonial and indigenous theory is less clear. Within that realm, xenofeminism has been critiqued for appropriating alienation as a productive, positive force without clarifying its connection to the figure of the alien as a discriminatory category with regard to colonialism and race, and the destructive tendencies of a dehumanization of humans in these contexts.[111] This could be addressed through a stronger alliance with the critical / philosophical / feminist posthumanisms I explore in the previous chapter.

Investigating the previously drawn connections between xeno theory and posthumanism is also relevant for further research, as it can be a source of confusion given the multitude of types of posthumanism that exist. All xeno theories reference posthumanism or inhumanism as a key theoretical foundation for their approach. While Armen Avanessian and Bauwens et al. position inhumanism in opposition to posthumanism (without specifying which definition of posthumanism this statement is based on),[112] in practice, the two terms

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107 Macon Holt, "What Is Xenofeminism?," *Ark Review* (blog), February 13, 2018, http://arkbooks.dk/what-is-xenofeminism/.

108 The history of accelerationism is tied closely to the CCRU (Cybernetics Culture Research Unit), which existed at Warwick University from 1995–1998 and continued as an informal research group until 2003. Nick Land, one of its key members, has since developed accelerationism into what is termed right-accelerationism, which is connected to the far-right neo-reactionary movement. Xenofeminism stands in opposition to this and instead draws on ideas from left-accelerationism (Srnicek and Williams 2013).

109 Braidotti, *Posthuman Knowledge*, 88.

110 Laboria Cuboniks, "The Xenofeminist Manifesto – A Politics for Alienation," 2015, https://www.laboriacuboniks.net.

111 Annie Goh, "Appropriating the Alien: A Critique of Xenofeminism," *Mute* (blog), July 29, 2019, https://www.metamute.org/editorial/articles/appropriating-alien-critique-xenofeminism.

112 Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match,* 9.

are often used interchangeably.[113] Xenoarchitecture's definition of the human as fluid, in need of a constant redefinition in its relation to an "outside," resonates with some definitions of posthumanism (e.g., Braidotti) but not others (when posthumanism is taken literally as meaning "after the human," or transhumanism).

The term inhumanism is used as a nod to Lyotard,[114] or to Reza Negarestani, whose concept of the inhuman is referred to by Patricia Reed in the context of xenoarchitecture.[115] Lyotard's concept of the inhuman refers primarily to a dehumanization, commodification, and alienation of the human through capitalism and to a critique of humanism due to its way of defining and limiting what a human is.[116] Inhumanism, as described by Reza Negarestani, is an extended humanism that treats the human as a "*constructible hypothesis, a space of navigation and intervention*."[117] Reed describes this as "*a mode of seducing this radical outside – [...] the infection of alien perspectives*."[118] Anke Hennig also makes this connection between the xeno and inhumanism, and defines the "xeno" as a "*very specific form of the inhuman in the human*."[119]

Hennig's definition hints at a certain transversality that, outside the previously discussed concept of hyperstition, is sometimes missing from xenofeminism or xenoarchitecture due to its strong focus on the "other" and the "outside." When xenofeminists describe themselves as "*Haraway's disobedient daughters*,"[120] this references the overlap of their anti-naturalism, positioning of technology as an emancipatory means, and rejection of

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113 For example, the members of Laboria Cuboniks inconsistently refer to one or the other, Braidotti states that the discourse overlaps, and Yuk Hui writes about posthumanism but declares that he prefers to call it inhumanism.

114 For example, in Yuk Hui, "Anders, Simondon and the Becoming of the Posthuman," in *Classical Literature and Posthumanism*, ed. Giulia Maria Chesi and Francesca Spiegel (London: Bloomsbury Academic, 2019).

115 Patricia Reed in Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match,* 29.

116 Jean-François Lyotard, *The Inhuman* (Oxford: Polity Press, 1991).

117 Reza Negarestani, "Labor of the Inhuman Part I," *e-flux Journal* #52 (2017).

118 Patricia Reed in Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match,* 9.

119 Anke Henning in Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match,* 58.

120 Hester, *Xenofeminism*, 20.

reproduction limited to the form of the nuclear family with Haraway's thinking. However, transversality, and dismantling of borders and dualisms, one of posthumanism's key tropes, is less well developed in xenofeminism and xenoarchitecture. Here, a contradiction can occur: a strong focus on the "alien" and the "other" might emphasize rather than overcome dualisms. This point requires careful consideration when developing a transversal design practice based on xeno theory through the concepts of alienation and hyperstition, which is another reason for strengthening its connection to other approaches within posthumanism.

2.2.2 CONCLUSION

Xenofeminism and xenoarchitecture sit within the larger realm of posthumanism but offer their own theories and concepts, some of which overlap in their aims with discursive design practice: engagement with strangeness, questioning the status quo, using technology as an emancipatory means, and asking "what if." Two concepts that are particularly relevant in the context of transversality move beyond this, offering a path to develop discursive design practices further: alienation and hyperstition. Alienation can act as a concept for understanding and creating transversality with the human or non-human "other" by using "othering" as a mode of knowledge production. However, how this theoretical idea could translate into design practice is unclear and needs further investigation (see Chapter 4.3.). In creating transversality between fiction and "reality" through design, hyperstition could be a useful concept and is investigated in Chapter 4.4. To address the limitations of xenofeminism and xenoarchitecture and their invocation of the alien and accelerationist theory without addressing the potentially problematic implications of both, xenofeminism and xenoarchitecture could benefit from a closer alliance with the theories from posthumanism discussed in Chapter 2.1. Before investigating how these concepts could help to develop a posthuman design practice, I briefly outline related work in discursive design, which transcends the previously mentioned overlaps between discursive design and xeno theories.

3. RELATED WORK IN DESIGN

3.1. POSTHUMANISM, ENGAGEMENT, AND DISCURSIVE DESIGN

The previous chapter discussed overlaps between discursive design and the aims of xeno theory: engagement with strangeness, questioning the status quo, using technology as emancipatory means, and asking "what if." I now investigate existing overlaps between discursive design, engagement, and the wider field of posthumanism.

Bruce and Stephanie Tharp position their extensive review of the practice and theory of discursive design as an investigation into "*differently imagined relationships with and for designed objects*."[121] Implicitly, this appears to imply relationships between humans and objects. The aim of their discursive design review is to "*challenge the status quo with regards to eight particular impediments: functionalism, formalism, commercialism, individualism, rationalism, positivism, realism, and ethnocentrism*."[122] Despite human-centeredness being a key paradigm in Western design, they do not include posthumanism or post-anthropocentrism in their challenging of the status quo. This may be because invoking the posthuman within the realm of design is a new and emerging practice. Many discursive practices, including speculative design, have been somewhat human-centered despite not deploying human-centered or user-centered methods: One of speculative design's primary aims of debating people's preferences regarding the future – "*the kind of future people want*"[123] – conveys a significant connection to the human perspective, while other perspectives are less accounted for.

In discursive design practice, this human-centeredness has recently started to change. Since the start of my research in 2016, when designs engaging with posthumanism were rare, several projects have emerged within this realm. However, many do not make their

121 Tharp & Tharp, *Discursive Design*, 6.

122 Tharp & Tharp, *Discursive Design*, 23.

123 Dunne & Raby, *Speculative Everything*, 2.

connection to posthumanism explicit. For example, Amy Haigh's 2019 work, "A Series of Intermediate Artefacts," comprises a series of objects designed to be equally used by both humans and birds, to explore similarities and differences in their social behaviors. Following a "*re-written version of a human-centered design process*,"[124] she engages directly with birds in a type of "user testing" to evaluate the designs[125] (Figure 3.1) and documents her work through photography and video. While Haigh references posthuman philosopher Timothy Morton's book, "Dark Ecology – For a Logic of Future Co-Existing,"[126] as an inspiration, she does not clarify which concepts from the book impacted her work.

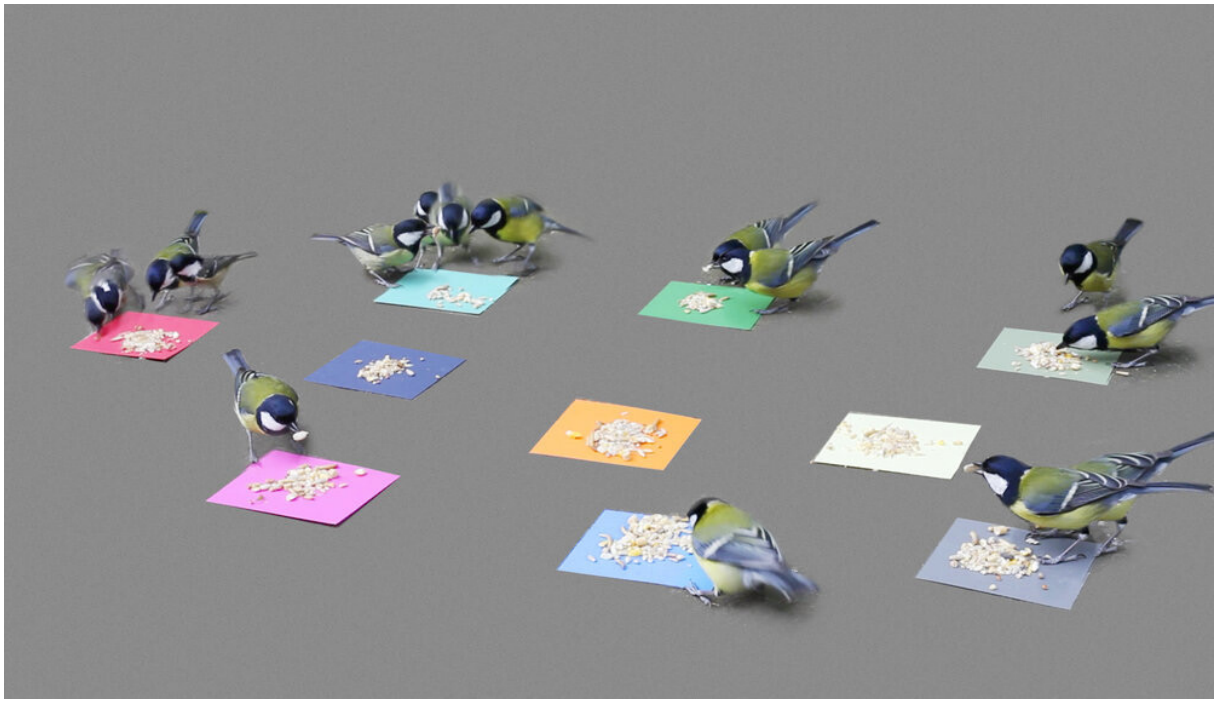

Fig. 3.1 Amy Haigh, *A series of Intermediate Artefact*s. Diagram: Individual wild Paridae birds choosing to eat on certain colors, 2019.

124 Amy Haigh, *A Series of Intermediate Artefacts Part 2*, 2019, https://www.amyhaigh.com/projects/intermediate-artefact-02.

125 Amy Haigh, *A Series of Intermediate Artefacts*, 2019, http://www.amyhaigh.com/a-series-of-intermediate-artefacts.

126 Timothy Moreton, *Dark Ecology – For a Logic of Future Co-Existing* (New York: Columbia University Press, 2016).

Moovel Lab's "Who Wants to Be a Self-Driving Car?"[127] can also be considered part of an emerging lineage of design work that engages with posthuman thought, albeit without making this explicit. The project aims to create empathy for autonomous systems by inviting humans to steer a cart through traffic using a VR headset that shows what a self-driving car would "see." It allows people to experientially approach the difficulties and conflicts that artificial intelligence may encounter (Figure 3.2).

Fig. 3.2 Joey Lee et al., *Who Wants to Be a Self-Driving Car?*, 2017.

Both "A Series of Intermediate Artefacts" and "Who Wants to Be a Self-Driving Car?" appear to be inspired by overarching themes discussed within posthumanism. They take a multispecies approach and the accessibility of experiences of the "other" as starting points

127 Joey Lee et al., *Who Wants to Be a Self-Driving Car?*, 2017, https://lab.moovel.com/projects/self-driving.

rather than being based on specific theories or concepts. These themes are not theoretically discussed by the designers but embodied in the design work, creating a form of tacit knowledge, which is an essential part of developing a posthuman approach to design. However, practice without theoretical contextualization – or using theory as a form of initial inspiration to develop a design, rather than as a conceptual framework – forgoes an opportunity to build posthuman ideas into a design approach that can be clearly communicated, positioned, and discussed, while being made more accessible to other designers. This would involve moving beyond using themes from posthumanism as an inspiration and working towards outlining a posthuman design methodology.

Currently, few projects emerging within the overlap between design and posthumanism contribute to a theorization of this type of design or the development of a posthuman methodology. An exception is Laura Forlano's 2017 paper, "Design and Posthumanism," [128] which presents theories and concepts related to the posthuman – actor-network theory, new materialism, OOO, non-representational theory, and transhumanism – which she argues could be relevant to design. However, she does not examine how these theories might be used in design, apart from introducing their overarching themes and ideas around "*the non-human, posthuman, and more-than-human*"[129] into design, similarly to how this is achieved in "A Series of Intermediate Artefacts" and "Who Wants to Be a Self-Driving Car?".

Michaela Büsse's work also develops starting points towards theorizing a posthumanism approach to design. In a research note published in 2018, she argues for an alternative construction of what it means to be human in speculative design using the term xeno design. Despite using the term "xeno," her work does not explicitly reference xenofeminism or xenoarchitecture. Instead, it employs new materialist philosophy (particularly Barad, Bennett, Haraway, and Tsing), which she proposes could inform design processes and

128 Laura Forlano, "Posthumanism and Design," *She Ji* 3, no. 1 (August 2017): 16–29.

129 Laura Forlano, "Posthumanism and Design," *She Ji* 3, no. 1 (August 2017): 29.

outcomes that enable new perceptions concerning scale.[130] However, this approach has not yet been tested in practice. She illustrates it through the example of a city seen not as a human-built organized infrastructure but as "*a temporary accumulation of minerals, metabolisms, and algorithms*."[131]

Fig. 3.3 Anne Galloway et al., *Counting Sheep – The bone knitter*, 2016.

Another example is Anne Galloway's work with the More-Than-Human Lab[132] in the School of Design at Victoria University of Wellington. Originating from a background in anthropology and sociology, she "*explored how the production and consumption of New Zealand merino wool and meat might be (re)shaped by emerging technologies like the Internet of Things*"[133] in her 2014 "Counting Sheep" project, which merges speculative design, animal studies, and

130 Michaela Büsse, "Towards Xeno-Design Cultures," Research note (Basel: European Centre for Arts, Design and Media Based Research, Basel, 2018).

131 Büsse, "Towards Xeno-Design Cultures," 5.

132 Anne Galloway, More-Than-Human Lab, School of Design, Victoria University of Wellington, http://morethanhumanlab.org/

133 Anne Galloway, "More-Than-Human Lab: Creative Ethnography after Human Exceptionalism," in *The Routledge Companion to Digital Ethnography* (New York: Routledge, 2016), 471.

multispecies ethnography. The project used ethnography within the realm of sheep breeding and meat production to develop four speculative designs that were then used to gather feedback from the public. While in theory, the project aims to move beyond human-centeredness, the speculative designs were rather human-centered: for example, a device that can help knit casts for broken (human) bones using merino wool (Figure 3.3), a kit that provides the choice of growing a lamb in vitro or in vivo for meat consumption, and a technology that allows humans to communicate with lice and ticks on a sheep's body.[134] Nevertheless, the aims of the More-Than-Human Lab, which Galloway elaborates on in framing it within the concept of an ethics of care,[135] have inspired recent design work to incorporate a similar more-than-human aim, such as Superflux's 2017–2019 "Mitigation of Shock"[136] project (Figure 3.4).

Fig. 3.4 Superflux, *Mitigation of Shock*, 2017–2019.

134 Jesse Hirsch, "Using Sheep To Test the Boundaries of Science (No Sheep Were Harmed)," *Modern Farmer*, 2014, https://modernfarmer.com/2014/02/internet-wooly-things/.

135 Galloway, "More-Than-Human Lab: Creative Ethnography after Human Exceptionalism," 475.

136 Superflux, *Mitigation of Shock*, 2017-2019, https://superflux.in/index.php/work/mitigation-of-shock/#.

"Mitigation of Shock," initially designed for an exhibition at the CCCB cultural center in Barcelona, imagines and prototypes what an apartment in London could look like in 2050, when people's ways of living have adapted to ecological crises. It is centered around potential consequences for humans and their lifestyles. However, the project partly focusses on the other-than-human, aiming to provide optimal designs for plants and fungi to grow in this apartment – albeit ultimately for human purposes, as a food source.

In design research projects such as these, when academic conventions must be adhered to, it may be challenging not to rely too closely upon established audience engagement or qualitative methods, such as public surveys in the case of the "Counting Sheep" project,[137] which might consciously or unconsciously lead to an at least partially anthropocentric design or engagement approach due to the constraints of these methods. The same holds true when institutional conventions require measuring "impact," which can also occur with museum or gallery exhibitions, as this inherently implies focusing on the human perspective. The experience of the human audience visiting an exhibition is commonly a central point of discussion when curators are commissioning new work, and it may be challenging to receive support for work that breaks with these conventions or aims to subvert them.

As the examples discussed earlier show, there can often be a disconnect between theory and practice in posthuman approaches to discursive design. Both exist separately but do not always entirely intertwine, even in design research contexts that incorporate both theory and practice. An exception is work, which is emerging at the intersection of discursive design, post-anthropocentrism, OOO, and the Internet of Things. This may be related to the fact that in human-computer interaction (HCI) and IoT research outside of discursive design, a recognition of the limitations of human-centered design and proposals to use a post-anthropocentric approach have existed for a longer time and date back to at least

137 Galloway, "More-Than-Human Lab: Creative Ethnography after Human Exceptionalism," 473.

2009.[138] Within discursive design, Paul Coulton and Joseph Lindley propose to use an approach based on OOO and the metaphor of constellations to develop a post-anthropocentric design approach that is relevant to the field of IoT because it allows to understand and design for "*complex interdependencies between human and non-human actants*."[139] As an example, they introduce a project in which they tested four different designs of an IoT door lock and processes of gaining consent for data collection. They visually mapped (Figure 3.5) the interrelations between all human and non-human actants involved in the process, enabling designers to consider multiple perspectives to understand potential data flows.[140]

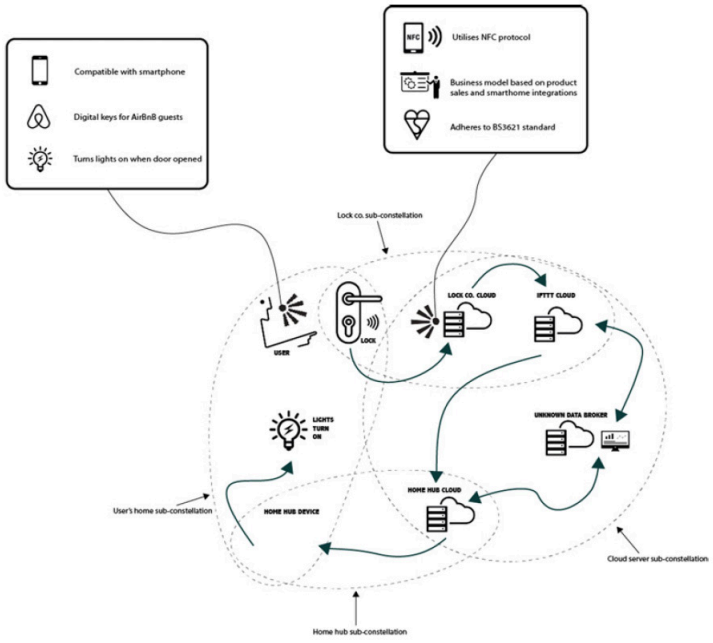

Fig. 3.5 Data flow and constellations for an IoT smart lock, in Paul Coulton and Joseph G. Lindley, "More-Than Human Centred Design: Considering Other Things," *The Design Journal* 22, no. 4, 2019, 476.

138 Jan Rod, "Post Human-Centered Design Approach for Ubiquity" (UC Irvine: Digital Arts and Culture 2009, University of California Irvine, 2009).

139 Paul Coulton and Joseph Galen Lindley, "More-Than Human Centred Design: Considering Other Things," *The Design Journal* 22, no. 4 (2019): 463–81, 463.

140 Coulton and Lindley, "More-Than Human Centred Design: Considering Other Things," 476.

Elisa Giaccardi et al. share an approach along a similar line of thought, employing ethnography rather than OOO.[141] Their work on objects as co-ethnographers in an IoT context involved attaching autographers[142] to a kettle, a fridge, and a cup, investigating not only relationships between objects and humans but also those between objects through the object's "perspective" (Figure 3.6) – although this is, of course, an approximation, filtered through the human perspective.

Fig. 3.6 Format of the photographs taken by autographers (from a cup's perspective), in Elisa Giaccardi et al., "Things As Co-Ethnographers: Implications of a Thing Perspective for Design and Anthropology." In *Design Anthropology Futures*, edited by Rachel C. Smith et al. London: Bloomsbury Academic, 2016, 5.

141 Elisa Giaccardi et al., "Things As Co-Ethnographers: Implications of a Thing Perspective for Design and Anthropology," in *Design Anthropology Futures*, ed. Rachel C. Smith et al. (London: Bloomsbury Academic, 2016).

142 Small cameras equipped with a range of sensors that automatically take photos when changes in movement, temperature, and other variables are detected.

Positioning objects as co-ethnographers is nevertheless a direct form of engagement with the "other." It recognizes their potential to have agency, which is imperative in a time when invisible technological interconnections and data flows increasingly impact algorithmic decision-making that has real-world consequences, be it tailored product recommendations and search results on the Internet, algorithms pre-scanning and sorting job applicants' CVs, or "smart" security cameras attempting to learn and analyze which humans are acting suspiciously.

A proposal for a new approach towards objects that have agency in IoT interactions is also found in the work of Betti Marenko and Philipp van Allen. They introduce animistic design as a means of considering interactions, not from the perspective of the user or the object but from the perspective of the interaction.[143] Using animism as a "*trigger to rethink the role and the agency of both humans and non-humans*,"[144] they position their work in relation to speculative design due to its aim to generate discussions and its use of designed speculations. The approach was explored through design practice in two projects that prototype speculative technological devices, which become collaborators in a designer's creative process. For example, their AniThings project consists of five devices with unpredictable, quirky characteristics that do not streamline design processes but instead inspire, provoke, disrupt, and challenge their user[145] (Figure 3.7). The project explores how engaging with non-human agency can lead to new design outcomes, both within this scenario and as a design approach.

143 Betti Marenko and Philip van Allen, "Animistic Design: How to Reimagine Digital Interaction between the Human and the Nonhuman," *Digital Creativity* 27, no. 1 (2016), 2.

144 Marenko & van Allen, "Animistic Design," 4.

145 Marenko & van Allen, "Animistic Design," 8–15.

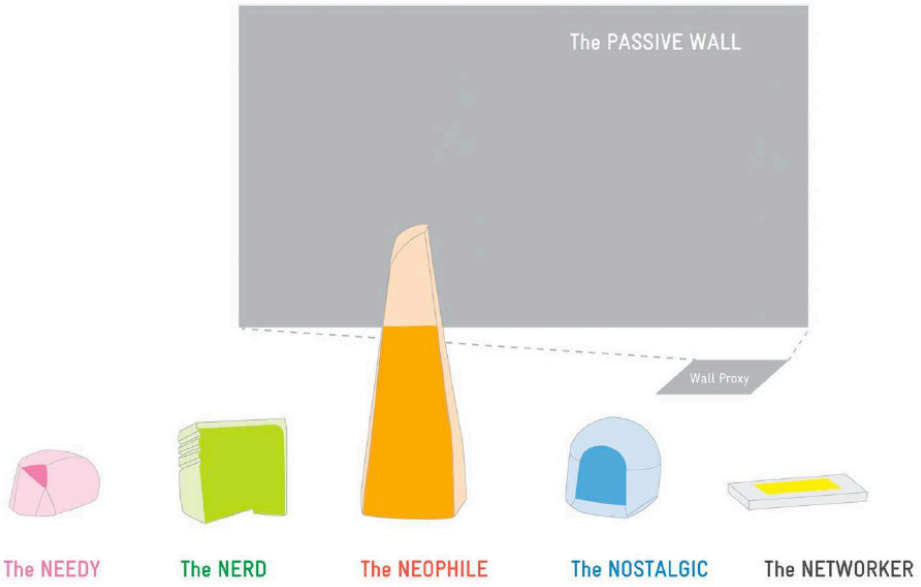

Fig. 3.7 AniThings project diagram, in Betti Marenko and Philip van Allen, "Animistic Design: How to Reimagine Digital Interaction between the Human and the Nonhuman," *Digital Creativity* 27, no. 1, 2016, 9.

3.2. CONCLUSION

Work within the overlap between posthumanism, engagement, and design is still emerging; its key concepts and approaches are yet to be established. Perhaps as expected in an emerging field, there is currently no umbrella term to describe this type of work, and a disconnect between theory and practice can exist in some work. An exception is design and research emerging in connection with the IoT, which has a history of questioning human-centeredness due to the technological conditions it implies: The effects of things that have agency become increasingly visible in everyday life, while their ways of doing so often remain invisible.

However, to fully commit to a posthuman approach to design, recognizing agency in interconnected technological devices is not enough. It raises the question of how design can engage with perspectives beyond both the human and the technological, in the entanglement

of humans, technology, environments, animals, minerals, plants, etc., which all have agency. Nevertheless, using a technological paradigm shift as a starting point may be a helpful route to a posthuman design approach, since artificial intelligence and the IoT make the significance of a posthuman perspective almost imperative. My first design project discussed in the next chapter, "Autonomous Agriculture," thus engages with the IoT and OOO but broadens its theoretical underpinnings to include aspects from multispecies studies and investigate and create transversality in its design and engagement approach (see Chapter 4.2.).

Intricately connecting theory and practice and naming these practices can further the field by establishing key ideas, approaches, and techniques and making work emerging from multiple designers and researchers traceable and connectable. This involves working towards developing a posthuman methodology for design rather than using themes of posthumanism as inspiration. A key challenge in achieving this is developing approaches to engaging with both human and non-human audiences while not relying on human-centered qualitative research methods or adhering to institutional expectations that might steer a project towards a more anthropocentric trajectory. Using the term xenodesign – as design engaging with the "other" but also being an "other" design, which transcends the anthropocentric paradigm – my explorations in design practice conveyed in the following chapters extend exploration of the posthuman concepts of OOO, alienation, and hyperstition in discursive design practice and also provide a brief theoretical discussion of their background. They are investigated in their potential contributions to developing transversal design and engagement approaches.

4. DEVELOPING XENODESIGN THROUGH PRACTICE

4.1. INTRODUCTION

In this chapter, I develop three approaches to xenodesign in a "research through design" process, based on the theoretical concepts of OOO, alienation, and hyperstition, which are connected to discursive design and engagement. The relevance of these theoretical concepts emerges over time within an ongoing conversation between theory and practice, in which design projects, workshops, and events are set up as micro-studies, each used to explore specific aspects of merging these concepts within design practice. My work starts with OOO and an aim to overcome dualisms between fiction and reality. The relevance of the concepts of alienation and hyperstition evolves only later, as new questions and insights emerge from design practice, which I then connect to other theoretical concepts and ideas in the realm of posthumanism, from which, in turn, new approaches to practice develop.

Starting with theory as a foundation upon which to build and evolve design practice, not only in terms of approaches and techniques but also concerning the themes the design projects explore, allows for a strong interlinking of design processes and outcomes with theoretical ideas and concepts, building a posthuman design methodology. This aims to address the aforementioned gap between theory and practice that exists between some of the work evolving in the overlap between discursive design and posthumanism. It also conveys the essential shifts from humanist towards posthumanist thinking that have impacted the humanities in the world of design.

Rather than defining a fixed set of needs or requirements for theories, design approaches, or techniques beforehand, my work starts with a relatively open-ended exploration of posthuman theory, investigating aspects that imply a decentering of the human and a transversal overcoming of dualisms, which could be connected to design. These are then experimented with in discursive design practice, in a process which shares commonalities

with experimental design. The way my research employs experiments is, however, neither in the sense of entirely open-ended experimentation without a theoretical basis or question to build upon, nor exclusively a departure from established design aesthetics or uses, which are other approaches the term "experiment" is used for in design practice.[146] Instead, experiments in my work are strongly connected to theory and are used to generate new knowledge, similar to how experimentation has been described in the context of design research, [147] combining both scientific and artistic approaches to experimentation.

As mentioned in Chapter 1, the approach to engagement my research differs from action research in that it does not aim to solve problems and strives to depart from human-centeredness. However, it overlaps with action research in its collaborative, iterative nature and in that it views those involved with and in the research as co-researchers.[148] This emerged from the first practical experiment, the Autonomous Agriculture project, in which analytical, explorative discussions with the participants of a walking tour and dinner shaped the subsequent projects and experiments (see Chapter 4.2.). However, contrary to some types of action research, such as participatory action research (PAR),[149] I do not involve the participants in all aspects of the research. Thus, their positioning as co-researchers is mainly on a level of discussing and developing themes and ideas, or testing which approaches to xenodesign work well in which contexts, rather than drawing overall conclusions, building theory from these, and furthering the practice. As the subsequent chapters show, my design experiments connect the three conceptual frames of discursive design, posthumanism, and engagement, thus evolving xenodesign as a practice. Xenodesign's approaches and techniques emerge through practice by building upon new combinations of existing design methods and theoretical concepts.

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146 Dagmar Steffen, "New Experimentalism in Design Research," *Artifact* III, no. 2 (2014): 1.6–1.8.

147 Dagmar Steffen, "New Experimentalism in Design Research," *Artifact* III, no. 2 (2014): 1.13.

148 Lisa M. Given, *The SAGE Encyclopedia of Qualitative Research Methods* (Thousand Oaks: SAGE Publications, 2008), 599–600.

149 Sara Kindon, *Participatory Action Research Approaches and Methods: Connecting People, Participation and Place*, Routledge Studies in Human Geography (London: Routledge, 2008).

4.2. OBJECT-ORIENTED ONTOLOGY

4.2.1. INTRODUCTION

Object-oriented ontology can be considered a subset of posthumanism,[150] which uses flat ontologies to understand reality. In OOO, everything is described as an object, including humans, bacteria, roads, clouds, theories, ideas, and fictional objects. Their consideration within a flat ontology means that all objects – living and non-living entities and sometimes even fictional objects – are considered to have the same degree of beingness in the world. In this sense, OOO can foster an engagement with Meillassoux's "great outdoors,"[151] or what in the context of the "xeno" is often described as the "outside," by engaging with the beingness and perspectives of the "other." Despite criticisms that the discourse around object-oriented ontology lacks philosophical rigor,[152] it provides useful starting points for explorations in posthuman design and engagement practices. In xenodesign, OOO enables research, analyses, and an understanding of the complex transversal relations between objects and creates an awareness of other perspectives. This is a crucial step in developing a multiperspective approach and decentering the human in design and engagement.

Much debate exists concerning the details of OOO among its theorists, one of these details being the differentiation between "real" and "fictional" objects. Graham Harman posits that while all objects are equally objects, they should be differentiated between "real" and "sensual" objects, despite it being impossible to be sure which objects are "real."[153] Conversely, Levi R. Bryant argues for an approach in which fictional objects are treated entirely as equal by

150 Francesca Ferrando, "About Philosophical Posthumanism," Bloomsbury, 2019, https://www.bloomsbury.com/us/philosophical-posthumanism-9781350059498/.

151 Quentin Meillassoux, *After Finitude: An Essay on the Necessity of Contingency* (New York: Continuum, 2009).

152 Peter Wolfendale, *Object Oriented Philosophy: The Noumenon's New Clothes* (Falmouth: Urbanomic, 2014).

153 Graham Harman, "Infrastructure," *Object-Oriented Philosophy* (blog), September 25, 2010, https://doctorzamalek2.wordpress.com/2010/09/25/infrastructure/.

considering them "real."[154] This perspective is particularly relevant to developing or discussing discursive design projects: When fictions become materialized in objects that directly engage with an audience, their beingness in the world becomes real and can be actively experienced.

In its flat ontologies, recognition of non-human agency, and interest in relations between objects, OOO overlaps with Bruno Latour's actor-network theory (ANT).[155] There are, however, key differences. Some of these, such as Harman's discussion on differentiating between "real" and "sensual" objects, which he lists as a fundamental difference between his version of OOO and ANT,[156] may be less relevant or even counterproductive to developing a design approach related to overcoming dualisms between fictional and real, and human and non-human, decentering the human, and adopting a multiperspective approach. However, a significant difference that makes OOO better suited to this endeavor than ANT is OOO's emphasis on objects (plants, humans, robots, ideas, etc.). This stands in contrast to ANT's focus on actions and alliances, which de-emphasizes objects – or actants, as they are called in ANT – and instead focusses on the network of action.[157] This focus on a particular act, or set of actions, hinders consideration of the (speculative) potential of objects for other possible relations and actions, such as new relations and actions within the posthuman imaginaries that my research aims to develop. These other possibilities can emerge from an in-depth engagement with objects and their qualities and relations, which may not be immediately visible or accessible to humans.

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154 Levi Bryant, "Fictional Objects Again and Some Differences Within OOO," *Larval Subjects* (blog), September 14, 2009, https://larvalsubjects.wordpress.com/2009/09/14/fictional-objects-again-and-some-differences-within-ooo/.

155 Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2007

156 Graham Harman, "Infrastructure," *2010*.

157 Ian Bogost, *Alien Phenomenology, or What It's Like to Be a Thing* (Minneapolis: University of Minnesota Press, 2012, 7.

Within OOO, the concept of ontography, described by both Ian Bogost and Graham Harman, can assist in developing this in-depth engagement with objects, understanding some of the less visible entangled relations between various entities, and imagining new ones. It encompasses techniques of gaining awareness of different objects, their relationships, and typologies.[158] These techniques include word-based ontography, visual ontography, and ontographic machines. Word-based ontography encompasses writing non-hierarchical lists of all objects related to an object or descriptions of an object taken from various perspectives[159] (see Chapter 4.2.2.). Visual ontography, being closer to the world of design, describes visual catalogs, such as mappings, documentary photography, or exploded-view drawings, that enable an understanding of object relations[160] (see Chapter 4.2.2.). Ontographic machines describe objects that directly help speculate about how objects relate[161] (see Chapters 4.2.3. and 4.2.4.). Through these techniques and the thought experiment of understanding all objects as equal – bacteria, air, minerals, humans, and algorithms, etc. – OOO can enable designers to go beyond what they might typically consider points of contact or impact between a design and the world, real or imagined. A view of entangled complexity opens up, enabling a decentering of the human and a multiperspective approach. In the following subchapters, I introduce a design project and two collaborative design workshops that adopt an OOO mindset and adapt and experiment with ontographic techniques in design as a step towards creating transversal design and engagement practices.

158 Graham Harman, *The Quadruple Object* (Alresford: Zero Books, 2011), 124–135.

159 Ian Bogost, *Alien Phenomenology*, 17–18.

160 Ian Bogost, *Alien Phenomenology*, 45–52.

161 Ian Bogost, *Alien Phenomenology*, 52–59.

4.2.2. AUTONOMOUS AGRICULTURE

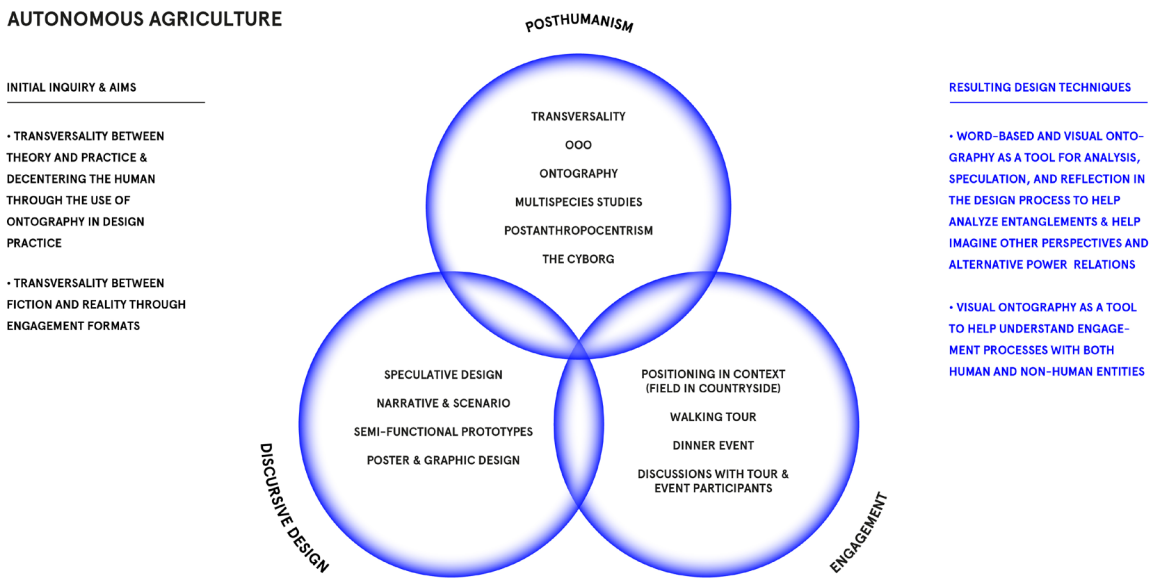

Fig. 4.1 *Autonomous Agriculture,* process diagram, 2020.

In September 2016, I was invited to join the 25th Biennial of Design in Ljubljana as part of a group of designers and artists,[162] directed the design studio mischer'traxler. The concept of the Biennial, curated by Angela Rui and Maja Vardjan, was to invite several groups to create projects situated in a variety of local contexts across Slovenia, such as a sandstone mine, a forest, and the shores of the Mediterranean. Our group's task was to work on the theme of the countryside and to present several interconnected projects though an exhibition or event in the eastern Slovenian village of Lendava in May 2017. In our collaborative work, developed during several weekends in the Slovenian countryside, and evolved further separately after we traveled home, food production emerged as a central theme through which the past, present, and future of the countryside could be explored.

162 Sara Evelyn Brown, Lucia Massari, Nina Mršnik, Giulia Soldati, Jakob Travnik, Elisa Polner, Bernd van Riel, and Klemen Košir.

The project provided a rich context to explore the initial aspects I had identified within posthuman theory that were potentially relevant to developing xenodesign in practice. At the beginning of the research, these were primarily OOO and particularly ontography, to decenter the human and overcome dualisms between fiction and reality (Figure 4.1). I used my main contribution to the Biennial, the project Autonomous Agriculture, as an inquiry into the use of ontography in the design process. The dissemination format our group developed became the first step in my inquiry into overcoming dualisms between fiction and reality, by developing a fictional discursive design into a semi-functional prototype that functions in situ, in the countryside.

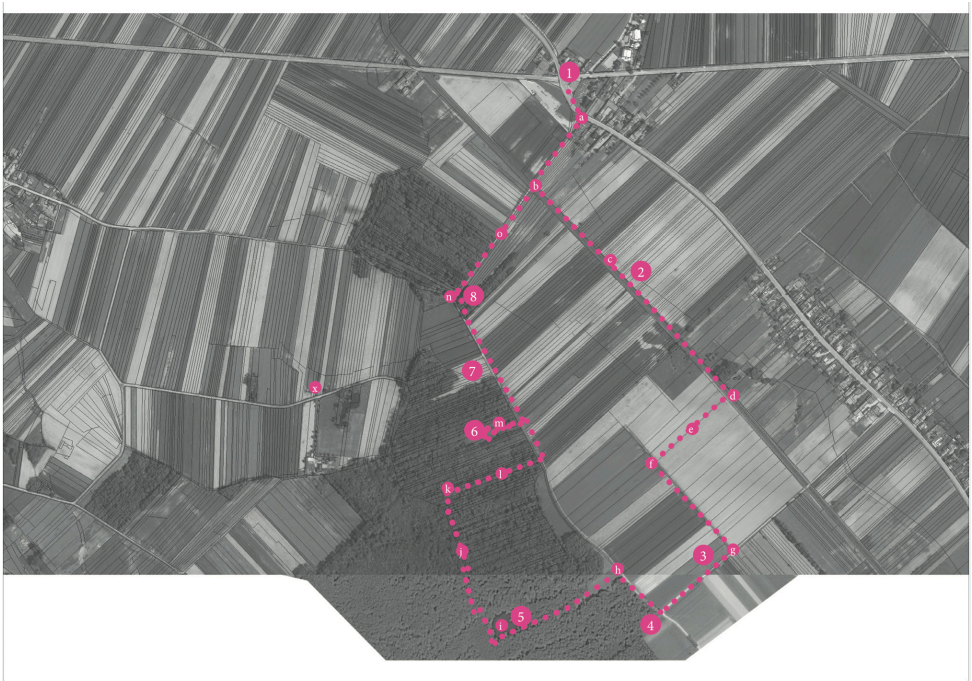

Fig. 4.2 Path of the designed walking tour in Lendava as part of the 25th Biennial of Design, Ljubljana, 2017.

Rather than exhibiting the results in a local gallery or museum, we explored an engagement format closer to the theme and developed several discursive design projects that could be integrated into the landscape of the countryside, on fields and in the forest. These projects, designed by us individually, became part of a walking path (Figure 4.2) that started and ended at an abandoned supermarket, where we hosted community dinners (Figure 4.3) together after guided tours along the path.

Fig. 4.3 Remodelled abandoned supermarket for community dinner, for the 25th Biennial of Design Ljubljana, 2017.

My project positioned along the walking path, Autonomous Agriculture (Figure 4.4), explores agency in technologically augmented ecologies. It consists of three snail-collecting robots, using the Internet and blockchain technology to form part of an autonomous network of agricultural machines, operated by an algorithm. This is based on the concept of a Decentralized Autonomous Organization (DAO),[163] an organizational structure developed

163 For further details on the concept of a DAO see Christoph Jentzsch, "Decentralized Autonomous Organization to Automate Governance," White Paper, November 2016.

in the context of blockchain technology that can be governed entirely by algorithms without necessarily requiring human intervention. It also draws upon Donna Haraway's Cyborg Manifesto, in which she discusses a blurring of boundaries between animals and machines.[164]

Fig. 4.4 *Autonomous Agriculture*, prototype installed in field, 2017.

The robots work as an independent business with no human employees, planting and harvesting crops, controlling pests, and foraging what is deemed profitable, according to predictive algorithms. The network makes profits by selling locally collected and produced goods, including selling the collected snails to humans, eventually buying the land it

164 Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature* (Routledge, 1991).

operates on and expanding toward other areas, managing but also protecting and rewilding them. The project concept is speculative, but it is communicated through semi-functioning robot prototypes that collect snails in a field along the walking path in Lendava, interconnecting fiction and reality. The funnel-like shape of the robot, which is positioned below the ground, collects humidity and attracts and retains snails through its humid environment and by being coated with yeast, which produces smells that attract snails.[165] The robots are connected to a bitcoin wallet with which people can buy the collected snails as a food delicacy. The broader narrative of the project was communicated via a poster installed at the start and endpoint of the walking path (Figure 4.5), which conveys how technologies and systems such as the blockchain and the IoT enable the machines to operate, communicate, and make transactions independently. The project explores the concept of non-anthropocentric agriculture, in which the power structure is changed, and the question of agency is raised. Humans also become a tool for the machine, rather than the machine being merely a tool for humans.

165 Donnachadh McCarthy, *Saving the Planet Without Costing the Earth: 500 Steps to a Greener Lifestyle* (London: Fusion Press, 2004), 103.

Fig. 4.5 *Autonomous Agriculture,* poster installed on supermarket wall (start / endpoint of walking tour), 2017.

The project idea and design were developed through research into current developments in agricultural technologies both online as well as through research visits to farms, in combination with the use of ontographic techniques as a research tool. Agriculture is currently undergoing rapid digitalization and automation within the context of the Fourth Industrial Revolution. Part of the design process involved listing and mapping the relationships between two existing and two fictitious agricultural technologies and other entities. This aimed to understand and speculate upon the entanglement and transversality between objects, decenter the human, and increase awareness of other-than-human perspectives. Starting with word-based ontography, I wrote lists of objects related to these technologies, while transcending both the human and the technological perspective through a multi-

species approach (Figure 4.6). This entailed taking cues from multispecies studies[166] – understanding that species are multiple, such as humans in symbiosis with their gut bacteria – while using Ian Bogost's technique of ontographic perspective descriptions.[167] Perspective descriptions aim to describe and imagine objects from various viewpoints. In my research, they were used to broaden the scope of word-based ontographic lists. For example, the Lely milking robot (Figure 4.6) could be described as follows:

- A flow of data on a herd of cows and their individual health and lactation phase parameters, impacting a connected system of milking, feeding, and cleaning robots in direct cow-technology interactions.

or

- A flow of milk and its bacterial microecologies from cow udders through a set of interconnected pipes, valves, and pumps that collect, store, and prepare it for human consumption.

or

- A fully automated dairy production system that moves a farmer's workplace from the cowshed to a computer desk by limiting the direct engagement needed with cattle and allowing tracking of all processes in a management application.

These perspective descriptions resulted in the following list (Figure 4.7).

166 Thom Van Dooren, Eben Kirksey, and Ursula Münster, "Multispecies Studies: Cultivating Arts of Attentiveness," *Environmental Humanities* 8, no. 1 (May 2016).

167 Ian Bogost, *Alien Phenomenology,* 17–18.

Fig. 4.6 Image of a Lely Astronaut milking robot taken on a research trip to a farm in south Germany, 2016.

Existing:
Lely Astronaut

- Cows
- Cowshed
- Milking robot
- Cleaning brushes
- Manure
- Udder
- (Raw) milk
- Lactic acid bacteria
- E. Coli
- Salmonella
- Pump
- Valves
- Pipes
- Gates
- Barriers
- Steel
- Plastic / silicone
- Electricity
- Computers
- Farmers
- Cleaning system
- Rfid
- Collars
- Lactation phases
- Cow database
- Automatic feeding system
- Algorithms
- Management app
- Calfs
- Water
- Vacuum

Existing:
Agribotix FarmLens

- Drone
- Lithium-ion batterires
- Fields
- Plants (healthy vs stressed)
- Agricultural plants vs "weeds" (non-agricultural plants)
- Soil
- Infrared Camera
- NDVI (Normalized Difference Vegetation Index)
- OSAVI (Soil-adjusted vegetation index)
- Soil humidity
- Cloud servers
- Weather data
- Field Manager App
- Algorithmic Analysis
- Temperature
- Maps
- Seeding
- Tire tracks
- Tractors & machinery
- Farmers
- Fertilization
- Irrigation
- Protection / Spraying
- "Pests" (Insects, Fungi, Bacteria, etc.)
- Yield
- Tracking points
- Drone flight paths
- Visualization Tools
- Geotagged Images
- GPS

Fictional:
Snail Collecting Robot

- Fields
- Snails (as species, as pests, as food)
- Insects
- Birds
- Soil
- Weather
- Humidity
- Agriculture
- Grass
- Water
- Temperature
- Plaster
- Electronics
- Glass
- Plastic
- Solar Power
- Sun
- Electricity
- Robotic trap
- Snail pheromones
- Farmers
- Landowners
- Villagers
- Visitors / tourists
- Hikers
- DAO (Decentralized autonomous organization)
- Blockchain
- Servers
- Bitcoin
- Bitcoin wallets
- Mobile phones
- Food

Fictional:
Birch sap collecting robot

- Birch trees
- Tree sap
- Insects
- Weather
- Humidity
- Water
- Spring time
- Temperature
- Plastic
- Electronics
- Sound
- Solar Power
- Sun
- Electricity
- Landowners
- Villagers
- Visitors / tourists
- Hikers
- DAO (Decentralized autonomous organization)
- Blockchain
- Servers
- Bitcoin
- Bitcoin wallets
- Mobile phones

Fig. 4.7 Word-based ontography of two existing and two fictional agricultural robots, 2017.

I then developed the four lists into visual ontographic mappings that added another layer of information through the need to decide how close or far the individual objects would be from each other on their map of entanglements. In the mappings of the two existing and two fictional agricultural technologies, the two fictional versions experiment with shifting agency towards an ecosystem in symbiosis with technology (Figures 4.8–4.11). This contrasts with agency being concentrated around the human, as it usually is in design, or around technology, as has been debated in IoT contexts (see Chapter 3). This shifted agency, enabled by mappings of entanglements, allowed new ideas to emerge: It created the question of potential new economic and social systems in the countryside, dominated by symbioses between ecosystems and digital technology. This process, based on an OOO approach to design and research, is how the concept for Autonomous Agriculture evolved.

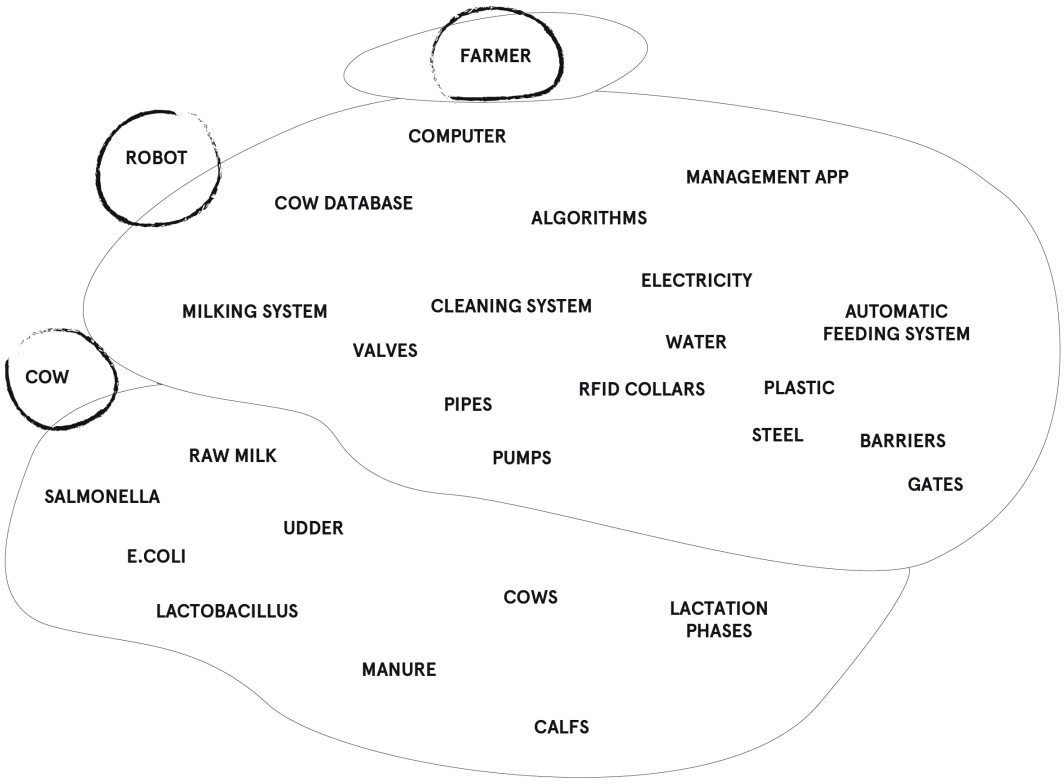

Fig. 4.8 Visual ontography: Lely Astronaut Robot, 2017.

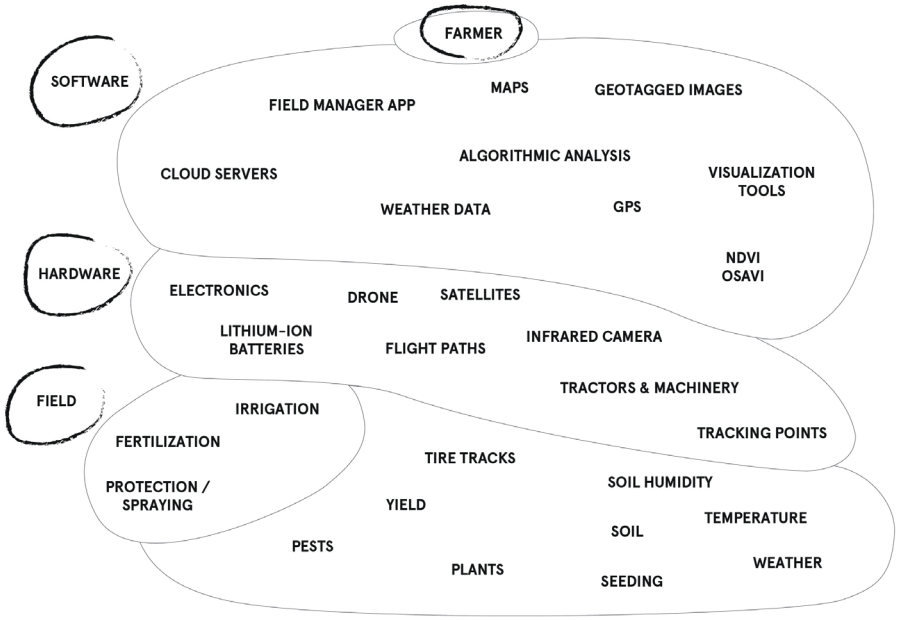

Fig. 4.9 Visual ontography: Agribotix FarmLens, 2017.

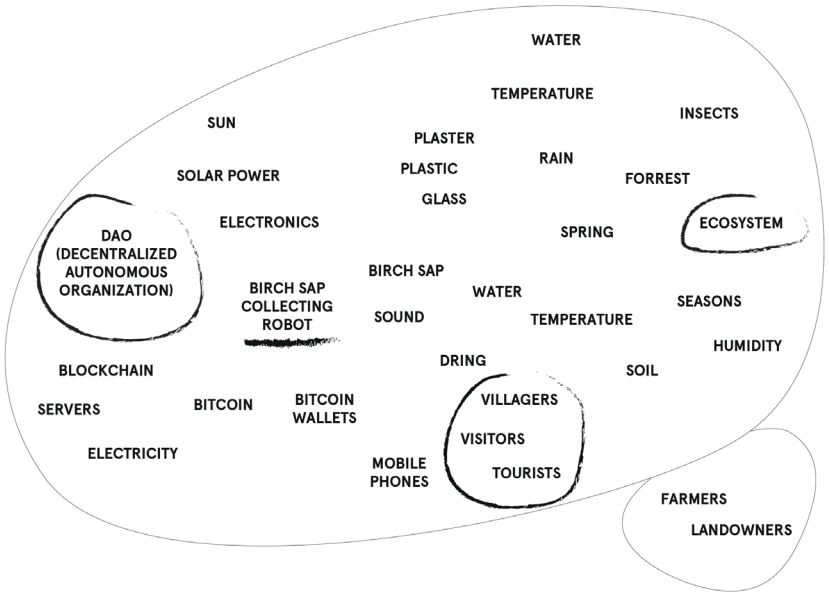

Fig. 4.10 Visual ontography: Birch Sap Robot, 2017.

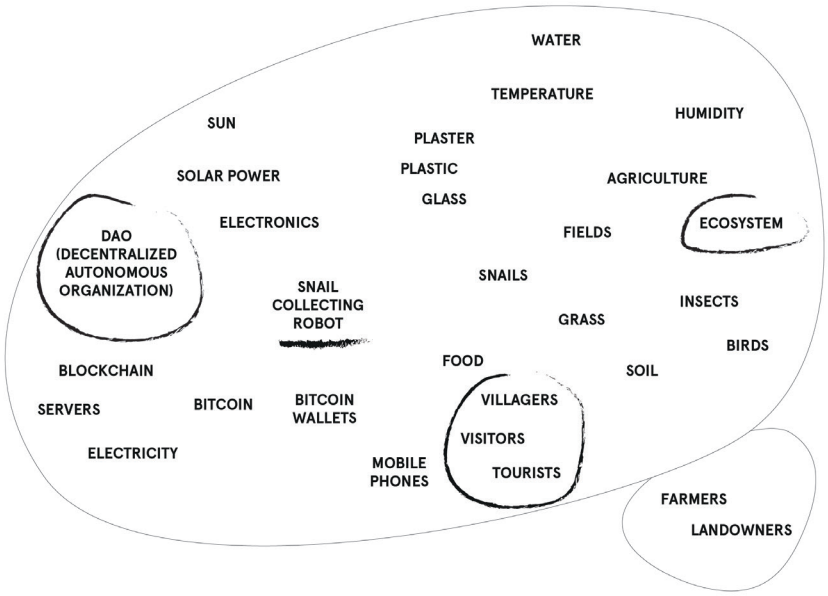

Fig. 4.11 Visual ontography: Snail Robot, 2017.

The form and aesthetics of the robots were developed with the aim to create a visually interesting design that departs from learned aesthetics of what form a robot can or should take. This was intended to draw people's attention to the project but also to communicate – not only through explaining the concept but also through its aesthetics – that this is an alternative type of technology compared to most robots in use today, based on a set of different values influenced by posthuman thought. Initial tests I conducted with existing robotics kits during the design process were thus dismissed, and a new aesthetic developed through visual research into abstract sculptural shapes. Visual and materials research enabled making the robots both functional in their snail-collecting function and suitable for being left outside in a field in the countryside for several weeks, during which the walking tour with the projects installed along the path remained open. The final design thus consists of a funnel-like shape, which can be dug into the ground, with slits to drain excess water when it rains and a heavy 10 kg ring placed on top to keep it in place. The technology is attached and integrated into a waterproof solar panel that supplies it with electricity. The design of

the informational poster displayed at the start and endpoint of the walking tour was developed in collaboration with graphic designer Anna-Luise Lorenz, based on work-in-progress materials and sketches from the ongoing design process.

As discussed earlier, ontography was used as a key technique in the design process, which helped to develop the idea for Autonomous Agriculture. However, it also became a tool to understand and build engagement practices when installing the project on the field in Lendava and engaging with people on site. While ontography in the design process can create transversal mental engagement with other entities by investigating their transversal interrelations, a materialized design project results in actual transversality between all entities in contact with or affected by the project. This can subsequently be investigated through ontographic techniques and was explored in the case of Autonomous Agriculture through a mapping of the dissemination and engagement process (Figure 4.12).

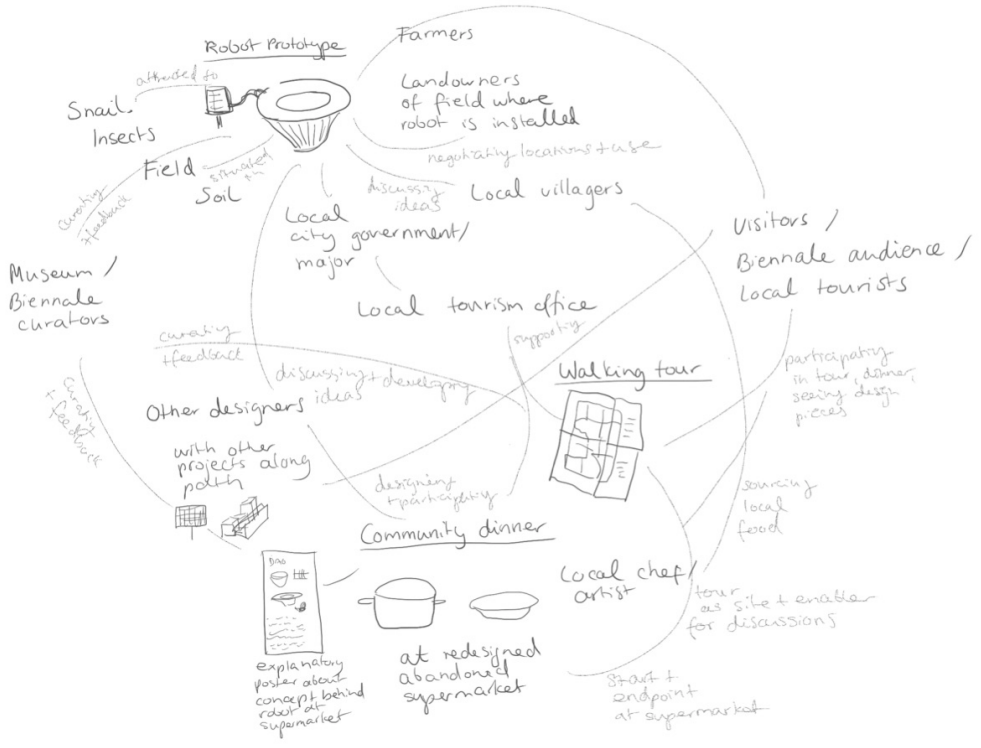

Fig. 4.12 Engagement process mapping, *Autonomous Agriculture*, 2017.

It can simultaneously be understood as a mapping of where and how fiction connects to reality and starts to overcome fiction and reality dualisms. Positioned in the location the robots were designed for – in a field of grass, interacting with insects, snails, and soil – the design directly engaged with non-humans, which were observed in their contact with the robots, and humans, who were involved in conversations about the design and their interactions with it.

Fig. 4.13 Walking tour in Lendava, 25th Biennial of Design, Ljubljana, 2017.

During a two-hour walking tour (Figure 4.13) and an ensuing dinner event at the abandoned supermarket (Figure 4.14), which was the start and endpoint of the tour, the prototype was discussed and tested with a diverse human audience of local village residents, curators, other designers, and external visitors. Farmers and local government employees were involved in installing the project, engaging in questions about the general logistics of the project as well as the thematic narrative. Each of these audiences was entangled in

different relations with the project, and the resulting conversations and observations revealed cross-audience misunderstandings, agreements, disagreements, and interests. During the design and setup phase, discussions about the project were mostly of a practical nature, related to feasibility and logistics. However, the final positioning of the project in the field resulted in discussions focused on the broader themes it explores, which were recorded through notetaking for later use and reflection (see Appendix Figure A25, A26). Overall, the two-hour walk through the countryside worked well as a format to develop focused conversations with the participants about food production and technology in the countryside. However, it is unclear whether the specificity of the conversations was related to the unusual walking format, which provided two hours to think and talk, or the positioning of the project embedded in the "reality" of the countryside it explores, or both in combination. This question warrants further exploration and is investigated in Chapter 4.3., in exploring engagement with a similar design project both inside and outside a museum context.

Fig. 4.14 Community dinner in abandoned supermarket, 25th Biennial of Design, Ljubljana, 2017.

Despite not defining the participants of the walk and the dinner as co-researchers at the beginning of the project, this role emerged organically during analytical, explorative conversations about the project as well as the themes of food production and technology in the countryside (see Appendix Figure A26). The resulting conversations impacted the themes explored by my subsequent design projects, and this cross-linking of themes and ideas throughout my collaborative, iterative research process is discussed in detail in Chapter 4.4.

Autonomous Agriculture was successful in decentering the human perspective in the design process through ontography, which revealed relations between objects that are not always immediately visible or accessible to humans, enabling them to be rethought and redesigned. The process shifted and broadened my view as a designer, resulting in a designed agricultural technology with alternative power structures centered around a symbiosis between ecosystems and technology.

However, the diversity of human perspectives engaged by the work was less accounted for in the design process and outcome and only emerged in its dissemination. This revealed a significant limitation of using OOO-related techniques to build a posthuman approach to design and engagement: OOO, particularly in Bogost's interpretation, categorizes humans as objects and decenters the human amongst other objects, but it does not distinguish between humans on a level beyond tangible characteristics. His notion of a "tiny ontology" highlights the need for simplicity to describe being.[168] This focus on simplicity and tangible characteristics can lead to a reductionist view of an object, not considering characteristics and complexities that might not be immediately visible, for example due to limits in perception, or because of a researcher's own bias. Eliminating complexity holds the danger of considering the human almost a universal human, the criticism of which is a key tenet of posthumanism. It also does not enable questioning what constitutes the human, as it does not decon-

168 Ian Bogost, *Alien Phenomenology*, 21.

struct what a human is. By reengaging with posthuman theory, the concept of questioning what it means to be human through alienation emerged, which I explore in Chapter 4.3.

In terms of transversality between theory and practice, ontography proved successful in offering a new mode of analysis, speculation, and reflection in the design process, which helped to decenter the human. However, it remained a relatively theoretical part of the design process, based on making lists and mappings, even if it offered insights that directly impacted the design. The two workshops that followed the Autonomous Agriculture project, which are discussed in the following two chapters, thus experimented with linking theory and practice more closely, through action and experience.

4.2.3. DESIGNING FOR NON-HUMANS

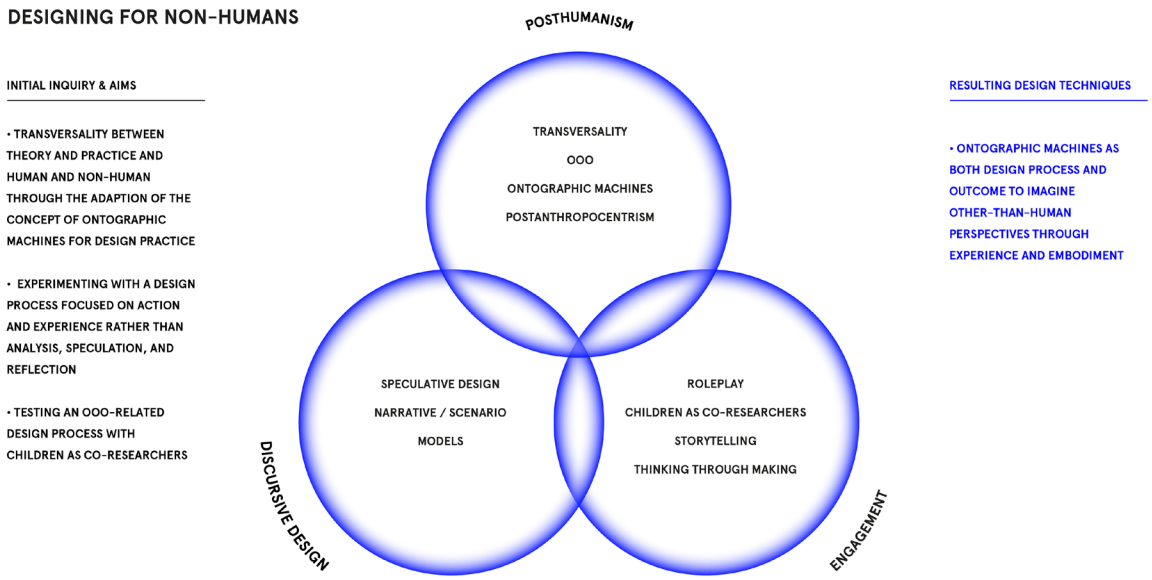

Fig. 4.15 *Designing for Non-Humans*, process diagram, 2020.

After investigating the use of word-based and visual ontography in design and engagement processes in Autonomous Agriculture, I explored the concept of ontographic machines[169] and experimented with developing a role-play-based version of the ontographic technique of perspective descriptions. This was done as an inquiry into what a process focused on action and experience, rather than analysis, speculation, and reflection (as in Autonomous Agriculture), can contribute within an OOO approach to design (Figure 4.15). Another aim was to explore the use of an OOO approach in a collaborative context, with workshop participants as co-researchers who are not only involved in discussing the outcome of a design project and the themes it explores, as in the Autonomous Agriculture project, but who are actively involved in the practice of xenodesign. In the "Designing for Non-Humans" workshop, this was conducted with a group of 18 elementary school children aged 9–10 in Berlin

169 Ian Bogost, *Alien Phenomenology*, 52–59.

Weissensee in September 2018. A similar approach was tested with adults in the "Airology" workshop, which is discussed in Chapter 4.2.4., to explore the specificity of working with people of different age groups and backgrounds. This aimed to account for the diversity amongst people's perspectives that are normally less considered in an OOO approach to design, when the "human" is seen as a universal human and not questioned as a category, as discussed earlier.

Designing for Non-Humans was conducted as a three-hour workshop in collaboration with Anna-Luise Lorenz and comprised four phases. The first was an introductory phase to explain the reasoning and idea behind the workshop, including that it was part of a research process that would lead to further projects, one of which could be viewed at the Futurium Museum in Berlin the following year. In the introductory phase, the participants were also introduced to a large map, which was plotted on the floor and depicted several different landscapes. In the second phase of the workshop, participants were split into groups and given cards with factual information about one character each *(*an apple tree, an eel, a butterfly, a cloud, or a stone*,* Figure 4.16).

Rather than producing written descriptions of other potential perspectives on an object through reflection, analysis, and imagination, as in the Autonomous Agriculture project, the aim was to create these "other" perspectives through improvisation, unexpectedness, and interactions with others using a in a thinking-through-making, storytelling-based approach. The students were guided to shift their perspectives into these characters using the map on the floor as a stage for role-playing exercises, helping them to imagine and contextualize their characters within landscapes and environments and enabling speculations about

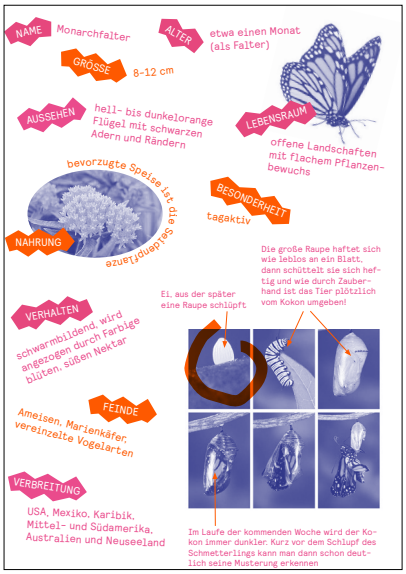

Fig. 4.16 *Designing for Non-Humans*, character card, 2018.

Fig. 4.17 *Designing for Non-Humans*, prototyping, 2018.

connections between these and between the different characters. This technique is related to LARPing, live-action role-playing, in which participants take on the role of one character each and interact without predetermined scripts in a form of cultural improvisation.[170]

Following this explorative phase of perspective-switching, the workshop continued with the design of ontographic machines, objects that help speculate about how objects relate. While the concept was originally explored in Ian Bogost's work through examples from game design,[171] designed objects or interactions can also become ontographic machines.
The participants were tasked with a design exercise, for which they were asked to design devices or tools specifically for their non-human characters' imagined needs within a future climate scenario, based on the ideas and insights developed through the perspective-switching exercise. Cardboard, tape, and pens were used to build prototypes of these

170 Marjukka Lampo, "Ecological Approach to the Performance of Larping," *International Journal of Role-Playing*, No. 5 (2016).

171 Ian Bogost, *Alien Phenomenology*, 52–59.

designs (Figure 4.17), which were then presented and brought to life, again through role-play on the large map. The participants were asked to speculate not only on how their protagonists relate to the designs they developed but also how they relate to the other protagonists on the abstract map of the planet, which symbolized different regions and landscapes. Through this, their designed devices became ontographic machines. The prototypes they created entailed specific and imaginative solutions for the characters, including a device for clouds to control their movement, devices to transform stones into habitats for other species, and an augmented cyborg flower (Figure 4.18). In both the design process and the role-play, the empathy towards the non-human developed by the workshop participants became clear. It triggered emotional responses in the improvised interactions between the different characters.

Fig. 4.18 *Designing for Non-Humans*, role-playing with cardboard models, 2018.

The workshop focused on transversal relations between non-humans, with the human mainly playing a role in imagining these transversal relations but becoming marginal or even invisible in the fictional imaginaries, as if these imaginaries were for a world without humans (see Appendix Figure B9). The potential relations of the designs and protagonists to the human were not an explicit focus of the workshop, and it could have been interesting to connect the scenarios back to what these might mean for humans. The posthuman imaginaries that evolved are thus only explicitly social in their imagined interconnections between the non-human characters around which the workshop thematically revolved. Their connection to the human is implicit and only exists in creating an awareness for other perspectives. The technique of attempting to approach other-than-human perspectives, or at least departing from the human perspective through imagination and ontographic machines, worked particularly well in the workshop, creating transversality between theory and practice. This hinted at the role experience and embodiment could play in designs that decenter the human and create an awareness of other agencies and perspectives, rather than remaining in the realm of analyses, even if it was an imagined or roleplayed experience in this case.

4.2.4. AIROLOGY

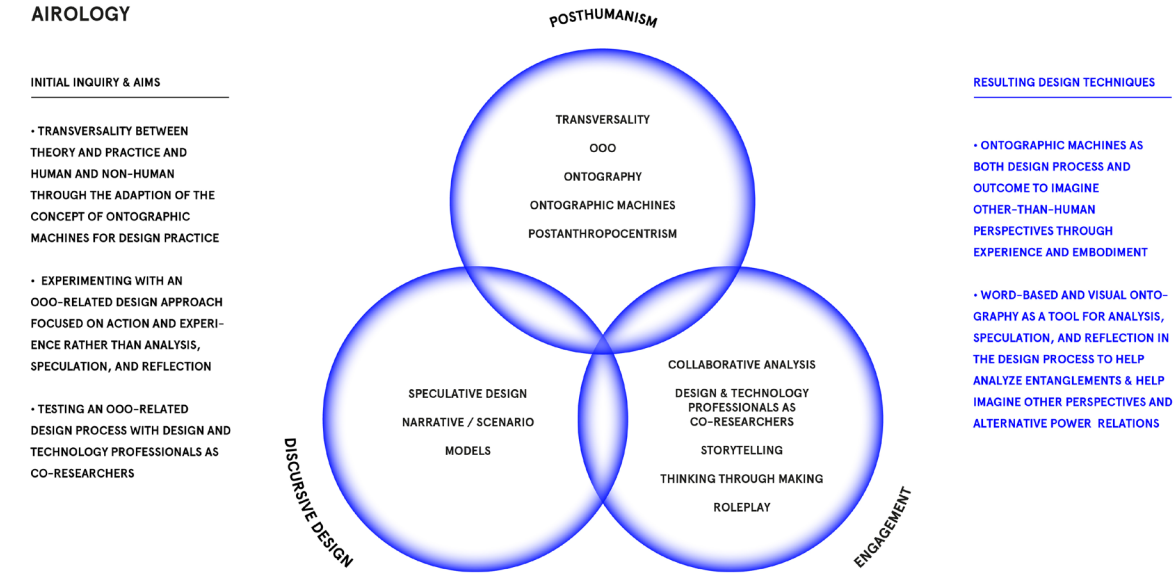

Fig. 4.19 *Airology,* process diagram, 2020.

Following the Designing for Non-Humans workshop, together with Anna-Luise Lorenz, I conducted another three-hour workshop using similar techniques, this time with adult participants. This aimed to involve diverse participants in exploring ontography, as well as ontographic machines, as part of the practice of xenodesign (Figure 4.19). The Airology workshop was part of the Retune Art and Technology Festival in Berlin in September 2018, a biennial event that emphasizes interdisciplinarity and consists of talks, panels, workshops, and an exhibition through which it "*explores the speculative futures of our digital society.*"[172] Attendees could sign up for workshops based on their interests through the festival website, where they found a short text about the workshop, which stated that it aims to "*use the design of inflatables as a vehicle to investigate the poetics, challenges, and politics of air in the context of the climate crisis, considering both human and non-human perspectives*."[173]

172 "Retune Festival," 2018, https://retune.de/.

173 Airology Workshop, "Retune Festival," 2018, https://retune.de/.

The workshop's 16 participants were mainly people with a background in the design and technology (either working as designers, in coding, or project management). Again, we started with a short introduction about the workshop as part of a collaborative research process. We continued with an introductory talk about discursive design and showed examples of projects from that realm related to the topic of air. These included examples from radical architecture from the 1960s and 1970s, such as Haus Rucker Co's airtight encapsulated spaces[174] (Figure 4.20), as well as more recent examples, such as the Center for Genomic Gastronomy's "Smog Tasting"[175] project.

Fig. 4.20 Haus-Rucker-Co, *Oase No. 7*, 1972.

Fig. 4.21 *Airology*, sample from prepared workshop materials, 2018.

Subsequently, the participants split into four groups and were given four different scientific phenomena to research, assisted by articles that were collected and preprocessed specifically for this task (Figure 4.21). The four topics were the release of ancient bacteria into the air in regions of thawing permafrost, the mechanism of winds carrying dust across the planet

174 Haus Rucker Co., *Oase No. 7*, 1972.

175 The Center for Genomic Gastronomy, *Smog Tasting*, 2011, http://genomicgastronomy.com/work/2011-2/smog-tasting/.

and their impact on local ecosystems, airborne microbiomes including plumes of bacteria surrounding living beings, and the impact of air pollution on the brain. This aimed to guide the workshop participants through a discursive design by building fiction through an inquiry into scientific research and imagining its implications for design. One change we made to this process was that before developing fictions, the groups were tasked to map out the phenomena they were researching, attempting to consider and list all beings, objects, or systems connected to these in an ontographic approach.

Based on their research, they were then tasked to design and prototype fictional devices that interact with air, using heat-sealable film and balloon foil, turning insights from their ontographic mappings into ontographic machines – objects that help imagine how objects relate. The participants were encouraged to think beyond human needs and to keep in mind that they could also design for bacteria, clouds, or ecologies. By distributing small figurines of people, and a 50cm metal circle that represented the diameter of a hair, we encouraged them to imagine their prototypes in other-than-human scales. The designed devices were intended to enable new interactions with air in a thinking-through-making approach as well as to help understand and communicate the phenomena they had been researching (Figure 4.22).

Fig. 4.22 Airology workshop process, 2018.

The prototypes acted as ontographic machines in the sense that they drew on the analyses and reflections about how air, bacteria, soil, humans, and other species relate, which the participants developed in their ontographic mappings. They were materialized to assist in communicating and exploring these connections. For example, one group designed a prototype which allows its wearer to collect air from various places around the world and store it on their body in wearable sealed air pockets. By opening these pockets, the air can then be given to others to alter their microbiome, which is linked to changes to physical and mental health (Figure 4.23).

Fig. 4.23 Airology Workshop, air collecting and transporting prototype, 2018.

At the end of the workshop, the prototypes were presented, demonstrated through role-play, and discussed amongst all the participants. Perhaps unsurprisingly, it appeared easier for the young participants of the Designing for Non-Humans workshop to decenter the human and engage with how other species and objects relate than it was for the adult

participants of the Airology workshop. Even though the Airology workshop equally set out to decenter the human and engage directly with bacteria, air flows, and dust in the designs – rather than focusing too much on the human – all designs developed in this workshop were centered around human needs. The resulting prototypes were nevertheless ontographic machines. However, they focused heavily on the relations between human and non-human rather than also considering relations between non-human and non-human (see Appendix Figure C8). They were all designed to be used on a human scale, with human needs in mind. For example, the theme of collecting and transporting air emerged in several projects, particularly in the context of keeping and sharing airborne bacteria beneficial to humans. Learned processes from the design and technology industry may have made it difficult for the participants to break with these habits in a three-hour workshop. Although ontography was used, as well as objects that encourage designing on non-human scales, there was a disconnect between theory and practice, of discussing moving away from the human perspective, to producing prototypes tailored to human needs. This reveals the limitations of ontography and ontographic machines in decentering the human, in that they may not work in all contexts and with all audiences. This showed a need for a combination with further posthuman approaches suitable to a broader range of contexts. The resulting prototypes also provided an insight into the importance of the human body and relating the non-human to the self when aiming to engage a human audience in abstract concepts of "otherness" and the "outside." This insight was later used to develop the design project "The Outside Inside." Some of the discussions that emerged during the workshop centered around the uncanniness of invisible aspects of air, such as pollution or bacteria (see Appendix, page 17). This led to an inquiry into using the uncanny and strange in a directed way through the concept of alienation in subsequent design projects (see Chapter 4.3.).

4.2.5. CONCLUSION

Object-oriented ontology and the related techniques of ontography and ontographic machines can help understand transversal relations between objects. They enable a departure from the perspective of the human, even if fully switching to an "other" perspective is not possible. They reframe the human perspective as being one of many, creating cross-entity awareness and affect. They can also assist in creating designs situated within posthuman imaginaries that take a multiperspective approach while decentering the human. The posthuman imaginaries in the projects differ from scenarios in being overarching shifts in thinking or power relationships. For example, in Autonomous Agriculture, the posthuman imaginary is a world in which ecologies are technologically augmented to have more agency, while the scenario is a system of autonomous agricultural robots connected via the blockchain. While ontography is an analytical and theoretical approach and lends itself well to the design process, the technique of ontographic machines can function both in the design process and as a design outcome, based on experience and embodiment. Ontography can also help enable and analyze engagement practices, in mapping interconnections with those entangled in a project (humans and non-humans). However, these OOO-related techniques neither facilitate a critical analysis of differences in human perspectives nor enable questioning what it means to be human, despite this being a key tenet of posthumanism. Object-oriented ontology can be useful as a starting point and allows designers to shift their perspective and broaden their view. However, other approaches and techniques are necessary to go beyond this, particularly in the realm of questioning and deconstructing the human. After considering these limitations that emerged from practice, a re-engagement with theory revealed the possibility of questioning and deconstructing the human through alienation. This is investigated through practice in the next chapter. However, before shifting an audience's perspective on the human through alienation, designers must question and shift their own perspectives. Object-oriented ontology can enable this through object-oriented analytical, speculative, reflective and experiential investigations in the design process, as well as in workshops and events as an engagement practice.

4.3. ALIENATION

4.3.1. INTRODUCTION

In decentering the human and taking a multiperspective approach in xenodesign and engagement practices, to allow for new, collaboratively developed posthuman imaginaries to emerge, alienation can become a key approach. Through practice, my research reveals five transversal techniques of alienation that can assist in achieving this: switching power relationships between human and non-human, making perceivable or experienceable what is normally at the border of or beyond human perception and experience, emphasizing the inhuman within the human (all three discussed in Chapter 4.3.2.), alienation through – or amplified by – context-switching (Chapter 4.3.3.), and alienation from what is taken for granted in a design process through fiction (Chapter 4.3.4.).

My inquiry into alienation starts with an overview of its use in posthumanism and xeno theory. This feeds into a practice-based investigation of its potential for developing techniques that address the main shortcoming of an OOO approach to design identified in Chapter 4.2., which is that it can assist in decentering the human but not in questioning or deconstructing the human. My research then continues with an inquiry into techniques of alienation that can be used towards ends other than deconstructing the human, which emerged from practice and further contribute to the aim of collaboratively developing new posthuman imaginaries. In the previous chapter, the practical OOO-related explorations began by adapting techniques theoretically described by Ian Bogost and Graham Harman to the practice of design, which provided a suitable entry point into developing a practice of xenodesign. With alienation, my research takes a step further and to develop new techniques by interconnecting more abstract theoretical concepts and practice.

Many of the theories of xenofeminism and xenoarchitecture are based on alienation as an approach, to the extent that the Xenofeminist Manifesto is subtitled "*a politics for alienation*."[176] An engagement with its origins and mechanisms is therefore central to developing any form of xenodesign, to gain awareness of the difference between a positive, productive use of alienation in the context of xeno theory and the history of the concept, in which it often had negative connotations. It is also crucial to investigate existing overlaps with discursive design and what new ways of engaging with alienation could contribute to these.

James Williams' definition of alienation in Rosi Braidotti and Maria Hlavajova's Posthuman Glossary[177] begins as follows:

"Alienation is to be rendered alien, or to be estranged from something. We can be alienated from home (exile), from a fictitious world (in the theatre, in the arts), from ourselves (according to Marx, as alienation from our productive force, creations and work)."

In the context of xeno and posthuman theory, Marx is frequently mentioned in relation to alienation. However, the first uses of the concept date back to Christian, Hindu, Muslim, and Buddhist theology, where it describes an objectionable separation of an individual from God[178] or the path of Buddha. In the late 18th century, the concept was introduced to the social sciences and philosophy in the context of Enlightenment theory. Jean-Jacques Rousseau used the concept to describe a desirable surrender of an individual's rights and control for the benefit of society.[179] Building on this, Hegel developed his theory of alienation, in which he characterizes it as being of a dual nature, comprising alienation as

176 Laboria Cuboniks, "The Xenofeminist Manifesto."

177 Rosi Braidotti and Maria Hlavajova, *Posthuman Glossary* (Bloomsbury Academic, 2018).

178 Hamid Sarfraz, "Alienation: A Theoretical Overview," *Pakistan Journal of Psychological Research* 12, no. 1–2 (January 1997): 45–60.

179 Johannes Kopp and Anja Steinbach, eds., *Grundbegriffe Der Soziologie* (Springer, 2018), 87–90.

externalization (Entäußerung) and alienation as estrangement (Entfremdung).[180] Karl Marx then prominently used the term to describe the alienation of workers from the means of production. He positioned it as a troublesome effect of capitalism and later as a useful tool for its analysis,[181] mentioning four modes of alienation: from the products of one's labor, from the process of production, from species-being or humanity, and from other people.[182]

With a few exceptions, such as Rousseau's desirable alienation as part of a social contract, alienation is described as problematic in the social sciences and philosophy. In contrast to this, xenofeminism aims to use it in a productive, liberating way, creating new possibilities:

"XF seizes alienation as an impetus to generate new worlds. We are all alienated – but have we ever been otherwise? It is through, and not despite, our alienated condition that we can free ourselves from the muck of immediacy. Freedom is not a given – and it's certainly not given by anything 'natural.' The construction of freedom involves not less but more alienation; alienation is the labour of freedom's construction. Nothing should be accepted as fixed, permanent, or 'given' — neither material conditions nor social forms. XF mutates, navigates and probes every horizon."[183]

Examples for this can be found in Helen Hester's book on xenofeminism, in which she positions the body as a "*reworkable platform*."[184] Here, alienation signifies a shift in perspective from a non-questioning, normative perspective on the body to understanding bodies, gender, and biology as malleable, as something that can be changed through the use of technology. She elaborates this point by framing the Del-Em, an open-source tool for menstrual extraction developed in the 1970s, as a xenofeminist technology (see earlier discussion in Chapter 2.2.).

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180 Gavin Rae, "Hegel, Alienation, and the Phenomenological Development of Consciousness," *International Journal of Philosophical Studies*, Volume 20, no. 1 (2012): 23–42.

181 Johannes Kopp and Anja Steinbach, eds., *Grundbegriffe Der Soziologie* (Springer, 2018), 87–90.

182 Paul Gingrich, "Marx on Alienation," Lecture Notes, *Introduction to Social Theory* (personal website), 2002, http://uregina.ca/~gingrich/s3002.htm.

183 Laboria Cuboniks, "The Xenofeminist Manifesto," 0X01.

184 Helen Hester, *Xenofeminism* (Polity Press, 2018), 23.

While xenofeminism is occasionally positioned in connection to the Marxist concept of alienation,[185] Hester states that this is only one form of alienation that xenofeminism engages with and that many others are possible, such as alienation through technology or abstract reasoning.[186] Experimental poet and theorist Amy Ireland, another author of the Xenofeminist Manifesto, defines alienation as what results from a confrontation with alienness – the xeno – alienness being the "*genesis of novelty and change*,"[187] which involves an often unsetting amount of unknowability and unpredictability that can cause a mutation or transformation.[188] She emphasizes the use of alienation as a productive force, stating that "*we fear the different and the strange, yet we require these things in order to evolve*."[189]

This use of alienation in creating a shift in perspective, from what is given to what could be, in the context of making reality more malleable, has parallels to approaches to discursive design. This often entails a redesign of everyday objects with unfamiliar aesthetics and functions, as in Dunne and Raby's "Technological Dream Series: No. 1, Robots"[190] project (Figure 4.24), which questions assumptions of what a robot is or could be by giving robots unexpected characteristics and needs rather than familiar utilitarian functions. The estrangement involved in this context is similar to Bertolt Brecht's concept of alienation (the V-effect, from the German word *Verfremdung*), which draws on methods from Chinese theatre, in which actors act to appear as alien, and "*everyday things are removed from the realm of the self-evident*."[191] It is also close to Viktor Shklovsky's concept of defamiliarization, which describes the presentation of familiar things in an unfamiliar or strange way to gain new

185 See Ana Llurba, "Xenofeminism: Alienation and Accelerationism," *A*Desk*, October 12, 2018, and Postfuturum, "Mirror: A Few Thoughts on Xenofeminism," Blog, *Postfuturum* (blog), 2015, http://postfuturum.com/2015/06/14/a-few-thoughts-on-xenofeminism/.

186 Robert Barry, "Doing Gender: Helen Hester On Xenofeminism," *The Quietus*, March 31, 2018.

187 Amy Ireland, "Alien Rhythms," Blog, *0AZ* (blog), April 10, 2019, https://zinzrinz.blogspot.com/2019/04/alien-rhythms.html.

188 Ireland, "Alien Rhythms."

189 Ireland, "Alien Rhythms."

190 Anthony Dunne and Fiona Raby, *Technological Dreams Series: No. 1, Robots*, 2007.

191 Bertolt Brecht and Eric Bentley, "On Chinese Acting," *The Tulane Drama Review* Volume 6, no. 1 (1961): 130–36.

perspectives on the familiar.[192] Dunne references both these types of alienation when discussing intentional user-unfriendliness in critical design.[193] Tharp and Tharp do not explicitly reference these concepts in their analyses of discursive design but explain this approach through "*dissonance,*" which is created through the "*strangely familiar*."[194]

Fig. 4.24 Dunne & Raby, *Technological Dream Series: No. 1, Robots*, 2007.

A key technique Brecht uses in his V-effect involves disruptions in acting, such as breaking character, using a narrators off-voice, or unveiling stage technology, to stop audiences from being drawn too much into a narrative and identifying with the characters being played. Rather than emotionally manipulating the audience through a piece of theatre, he thus

192 Viktor Shklovsky, "Art as Technique," 1917, https://warwick.ac.uk/fac/arts/english/currentstudents/undergraduate/modules/fulllist/first/en122/lecturelist-2015-16-2/shklovsky.pdf.

193 Anthony Dunne, *Hertzian Tales: Electronic Products, Aesthetic Experience, and Critical Design* (Royal College of Art, 1999), 35–36.

194 Tharp & Tharp, *Discursive Design*, 26.

creates a distance that triggers a critical rather than an emotional response.[195] In discursive design, this distance could be maintained by clarifying that designs are fictional or intended to be discursive.

But merging discursive design and engagement with xeno theory means going beyond alienation as a form of distancing and defamiliarization, taking another step away from the familiar towards the "other" and the "outside." It involves not only a reimagining of everyday objects but an engagement with the agency of an "other," with what is at the border of – or beyond – human perception and experience, and with the inhuman in the human.[196] This is developed in the next chapter through the project The Outside Inside. Alienation, as the aforementioned "*genesis of novelty and change,*"[197] is explored in relation to its potential to create new posthuman imaginaries, which includes questioning categories otherwise perceived as fixed and separate, especially human and non-human.

195 David Barnett, ed., *Brecht in Practice: Theatre, Theory and Performance* (London: Bloomsbury Methuen Drama, 2015), 30–31.

196 I continue using the term "inhuman" here, rather than "non-human," to refer to the idea borrowed from xenoarchitecture as cited above. The terms can be used interchangeably, however, as the meaning is the same.

197 Amy Ireland, "Alien Rhythms."

4.3.2. THE OUTSIDE INSIDE

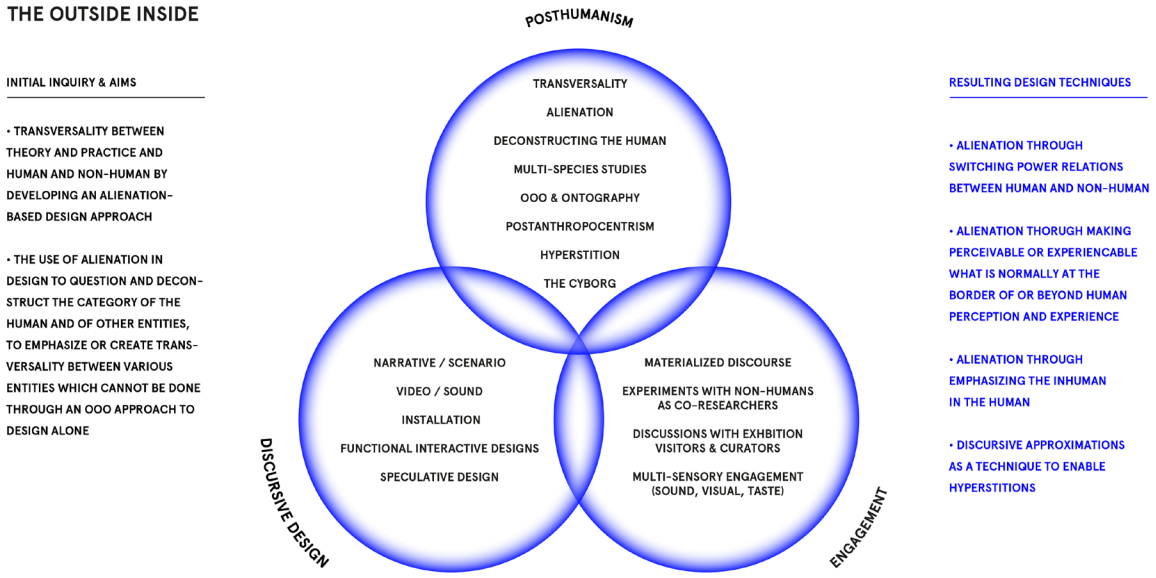

Fig. 4.25 *The Outside Inside,* process diagram, 2020.

4.3.2.1. INTRODUCTION

My project, titled The Outside Inside, which was commissioned for the permanent collection of the Futurium Museum Berlin, explores how transversal techniques of alienation can be developed through discursive design (Figure 4.25). It aims to develop an approach to xenodesign that involves OOO-related techniques but also transcends them, particularly in addressing their shortcomings of not questioning or deconstructing the category of the human. The primary inquiry of the project relates to how this questioning and deconstructing of the category of the human, as well as of categories of other entities, can be achieved through alienation in design practice by highlighting their transversality.

The project was developed from September 2017 onwards and was installed in the museum in June 2019 (Figure 4.26), three months before its opening in September 2019. It is part of the "Futurium Lab" (Figure 4.27), a part of the museum that explores futures through art, technology, and design exhibits as well as through events and workshops. Apart from spatial constraints and the condition that the work was required to be a discursive design piece that engaged with the topic of biology and design, the museum set no thematic limitations.

Fig. 4.26 *The Outside Inside*, full view, 2019.

In the iterative process of my research, two layers evolve and iterate throughout the projects. The first includes insights into techniques and approaches that emerged from the OOO-related explorations, which led to the concept of alienation to address their shortcomings. The second includes evolving themes and discussions, which also iterate from one project to the next. The work thus forms an ongoing materialized discourse, which is discussed in more detail in Chapter 4.4.3.

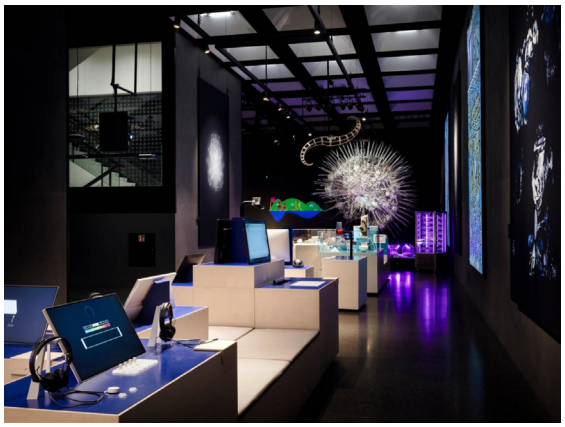

Fig. 4.27 View of Futurium Lab, photograph by David von Becker, 2019.

4.3.2.2. DEVELOPING A TRANSVERSAL THEMATIC FOUNDATION

Apart from being based on theoretical research into alienation, The Outside Inside evolved from themes that emerged during the discussions of the Autonomous Agriculture project. These were non-human agency and systems that operate separately from human interference, the climate crisis, the Half-Earth concept by E. O. Wilson,[198] and the future of work and labor. It was also influenced by the collaborative process of the Designing for Non-Humans and Airology workshops, from which it draws the theme of a cyborgization of the non-human and the importance of relating discussions of the xeno to the human body. The Outside Inside is thus, in part, a form of materialized discourse with its origins in previous explorations.

The resulting installation consists of is a series of interconnected works that imagine, prototype, and question contemporary and potential future relationships between environments, the species that inhabit these (humans and non-humans), and technology through the lens of terraforming. This specific thematic foundation, on which the project was built, was based

198 Edward O. Wilson, *Half-Earth: Our Planet's Fight for Life* (New York: Liveright Publishing Corporation, 2016).

on the above-mentioned themes from previous projects. These were developed further through research into posthuman entanglement, which started with anthropologist Anna Tsing's book from the realm of multispecies studies, "The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins."[199] In her book, she uses the matsutake mushroom as a non-human subject to investigate its entanglement in landscapes that have been fundamentally changed by humans. She describes how the mushroom also changes these landscapes and discusses its entanglement in social and economic constructs that emerge through its use as a commodity.

The theme of landscapes changed by humans, which in turn change humans, is also central to the topic of terraforming, the intentional design of the environment of a planet, through methods such as geoengineering. In terraforming, human entanglement and the fact that we are not separate from nature but transversally connected becomes highly visible, creating ways to address a deconstruction of the human and other entities not only through specific techniques but also through the theme the project engages with. Another transversal aspect that made terraforming a relevant subject for the project is that it is a historical example of how fiction can become reality.

Terraforming, originally described as the design of a planet to make it earth-like, has its origins in science fiction and later became a field of research in space science. Thematically, it is highly relevant to xenodesign as a historical example of transversality between fiction and reality (or a "hyperstition," a fiction that makes itself real, see 4.4.). It is also an example of a productive use of alienation. Initially developed as an idea in science fiction narratives about habitats in space, the word "terraforming" can be traced back to Jack Williamson's 1942 short story "Collision Orbit,"[200] where it refers to the creation of artificial biospheres on other planets. Kim Stanley Robinson later popularized the term in his science fiction novels

199 Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015).

200 Jack Williamson, "Collision Orbit," *Astounding Science-Fiction*, 1942.

about Mars colonization. Mars is terraformed by "*fast lichens*" [201] in his book, Red Mars.[202] In his books, Robinson uses terraforming as a "*Brechtian estrangement device to open up a space for thinking about the organization of the Earth*."[203] Later, NASA started investigating the feasibility of terraforming. Currently, the US military's Defense Advanced Research Projects Agency (DARPA), is said to be researching terraforming through the use of genetically engineered organisms to make other planets habitable to humans.[204] Increasingly, terraforming is also discussed in relation to Earth, particularly within the context of mitigating the effects of climate and ecological crises.[205] Cyanobacteria, algae, and plants terraformed Earth millions of years ago, creating the oxygen-filled atmosphere we breathe today. Such species, or potential new ones, can conserve or transform ecologies, environments, and landscapes today and in the future.

In parallel with these theoretical thematic explorations into entities' entanglements in landscapes and terraforming, and the preceding theoretical explorations into alienation as an approach, I experimented with growing mushrooms, plants, and lichen in my studio (Figures 4.28 and 4.29). I used a variety of growing media and simulated environmental conditions by controlling the amount of light, water, and humidity. These species became almost like non-human co-researchers, demonstrating their ability to change their micro-environments in ways that could not always be predicted.

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201 Derek Woods, "Terraforming Earth, or Climate and Recursivity," *Diacritics*, September 2019.

202 Kim Stanley Robinson, *Red Mars* (New York: Random House, 1993).

203 McKenzie Wark, *Molecular Red: Theory for the Anthropocene* (London: Verso, 2015).

204 Carl Engelking, "DARPA Is Supposedly Engineering Organisms to Make Mars Livable," *Discover Magazine*, June 26, 2015.

205 For example, in the case of the "Great Green Wall," the African effort to grow an 8,000 km long forest across the entire continent to halt desertification. For more information, see "The Great Green Wall," https://www.greatgreenwall.org, or the work of Joanne Chory's Harnessing Plants Initiative https://www.salk.edu/harnessing-plants-initiative/.

Fig. 4.28 Growing fennel in a hydroponic system, 2018.

Fig. 4.29 Growing oyster mushrooms on wood substrate, 2018.

Through these experiments, the project title The Outside Inside emerged. It makes the project's connection to the "outside" from xeno theory explicit and takes cues from a posthuman worldview that engages with multispecies and environmental studies. It also references both the "other" with which alienation aims to create transversality and the impact of external environmental conditions on species such as plants, lichen, and fungi, which ultimately also influence humans. For example, plants growing in saline soil or exposed to higher levels of CO_2 not only taste different but can also contain higher levels of antioxidants[206] and lower levels of protein,[207] which directly affect the human body when ingested. However, as is common in the biosphere, the relationship is reciprocal: plants, lichen, and fungi also shape their environment.

206 Umakanta Sarker, Tofazzal Islam, and Shinya Oba, "Salinity Stress Accelerates Nutrients, Dietary Fiber, Minerals, Phytochemicals and Antioxidant Activity in Amaranthus Tricolor Leaves," *PLOS One* 13(11) (2018).

207 Matthew R. Smith and Samuel S. Myers, "Impact of Anthropogenic CO_2 Emissions on Global Human Nutrition," *Nature Climate Change 8 (9)*, 2018.

Ecological and environmental interactions have long been a key part of posthuman dicourse, connected to its critique of anthropocentrism and human / nature dualisms (see Chapter 2.1.). Addressing the climate and ecological crises of our time will involve transformation of attitudes towards, and relationships with, the non-human, as part of decentering the human. Rather than providing answers, the project aims to discuss its ideas as part of a possible posthuman imaginary with a museum audience. It also aims to open up questions about posthuman imaginaries in general and how they could emerge: How can design assist in reframing the human as not separate from and above "nature," but as part of it? Which new relationships and approaches to interspecies collaboration could replace current practices of using the bio- and geosphere for exploitation and extraction? Which role do non-Western thought and knowledge practices play in this? If human activity has inadvertently already shaped the planet so far as to constitute a new geological age, should further interventions be made to mitigate its effects and reshape ecologies, environments, and landscapes with intent? If so, how will the design decisions be made, and who gets to decide?

4.3.2.3. DESIGNING ALIENATION INTO THE OUTSIDE INSIDE

THE OUTSIDE INSIDE – FORMING EARTH, FORMING BRAIN

In The Outside Inside, alienation is investigated in a variety of ways in the three different parts of the installation. The first part, "Forming Earth, Forming Brain," developed in collaboration with sound artist Sam Conran, aims to create an alienating effect on its audience by switching the power relationships between humans and plants, lichen, and fungi through sound. This idea emerged through the experiments with growing plants in my studio and investigating how to sense their activities beyond what is immediately visible to the human eye. While alienation was a theoretical basis in all my practical experiments, the five techniques of alienation in design all emerged through practice.

In the interactive installation, which takes the shape of a highly technologized indoor garden, three different potential future environmental conditions of the year 2100[208] are simulated in a total of nine terraria (Figure 4.30). Plants, lichen, and fungi with special terraforming abilities grow within these microenvironments, transforming them in the process. The first set of terraria contains amaranth plants that can grow and sequester carbon dioxide in saline and dry conditions[209] while removing a small amount of salt from the ground (Figure 4.31). The second simulated environment relates to the thawing of Arctic permafrost and the idea of an insulating layer of reflective lichen to cool the soil that covers it, based on recent scientific research in vegetation-permafrost interactions.[210] The third group of terraria contains oyster mushrooms, which can remove heavy metals and other contaminants from their environment,[211] preparing it for other species.

208 Based on the United Nations IPCC climate scenarios RCP 2.6, RCP 4.5, and RCP 6.

209 Elizabeth N. Omami, P. S. Hammes, and Petrus Johannes Robbertse, "Differences in Salinity Tolerance for Growth and Water-Use Efficiency in Some Amaranth (Amaranthus Spp.) Genotypes," *New Zealand Journal of Crop and Horticultural Science,* Volume 34, Issue 1 (2006): 11–22.

210 Philipp Porada, Altug Ekici, and Christian Beer, "Effects of Bryophyte and Lichen Cover on Permafrost Soil Temperature at Large Scale," *The Cryosphere,* Volume 10, (2016): 2291–2315.

211 Meena Kapahi and Sarita Sachdeva, "Mycoremediation Potential of Pleurotus Species for Heavy Metals: A Review," Bioresources and Bioprocessing 4 (1):32 (2017).

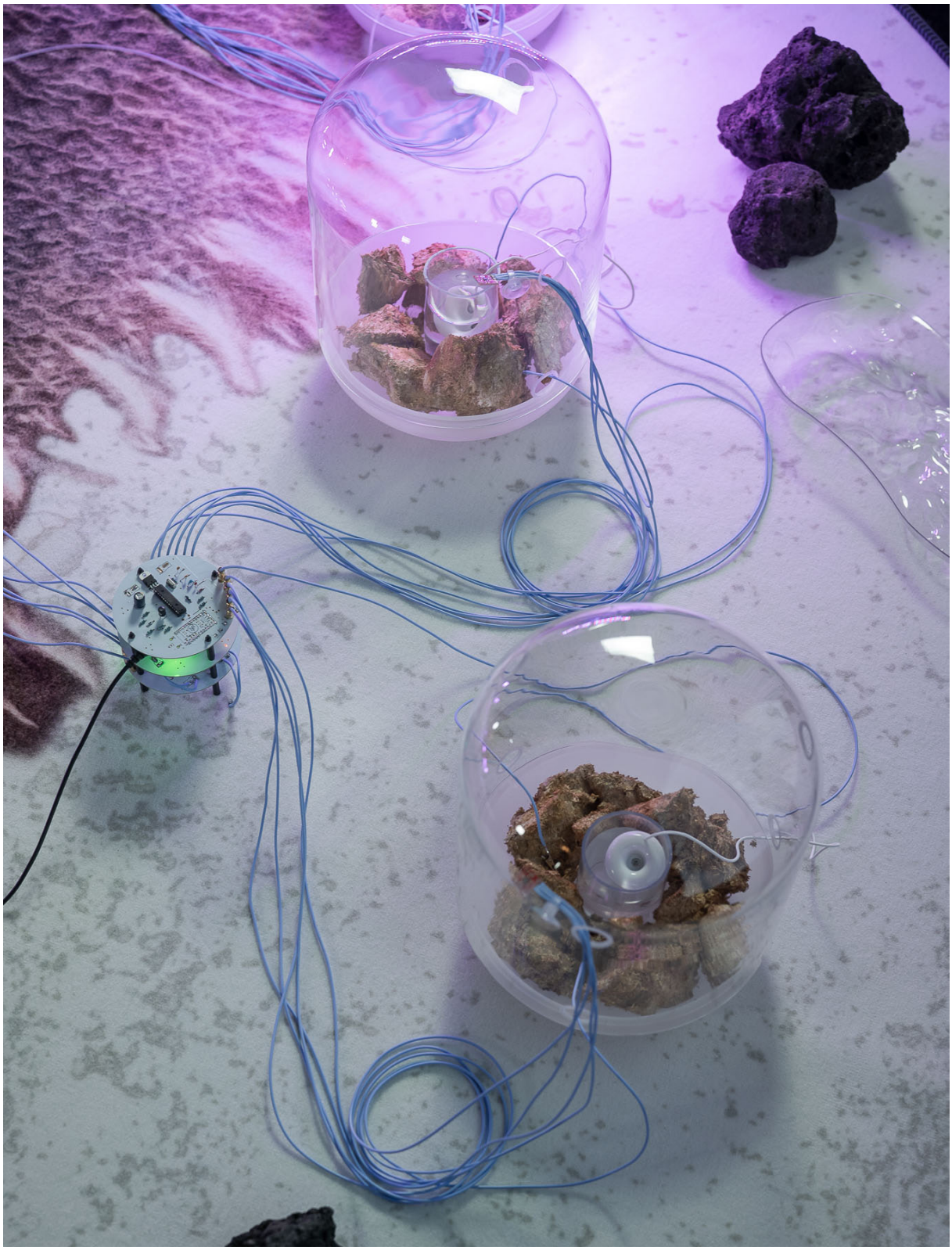

Fig. 4.30 *The Outside Inside – Forming Earth, Forming Brain*, oyster mushroom terraria, 2019.

Fig. 4.31 *The Outside Inside – Forming Earth, Forming Brain*, Amaranth terraria, 2019.

In the installation, technology is not only used to simulate certain aspects of potential environmental futures and ecological interactions but also to enable new connections and communications between humans and other species. The activities and communicative processes of the plants, lichen, and fungi and their microecologies are tracked using capacitance, carbon dioxide, methane, and volatile organic compound sensors. The data is processed by a custom computational system (Figure 4.32) and turned into sound frequencies[212] that create binaural beats, which are said to induce a relaxed, meditative state in humans.[213] Although these sounds have a subtle effect, discussions have occurred concerning their ban and classi-

212 The method draws on John M. Chowning, "The Synthesis of Complex Audio Spectra by Means of Frequency Modulation," *Journal of Audio Engineering,* Volume 21, Issue 7 (September 1973): 526–34.

213 See Xin Gao et al., "Analysis of EEG Activity in Response to Binaural Beats with Different Frequencies," *International Journal of Psychophysiology,* Volume 94, Issue 3 (December 2014): 399–406.

fication as a "digital drug" in some countries.[214] Consisting of two different frequencies, one played to each ear, they cause the brain to create an auditory illusion: a third frequency that connects the two frequencies originating from the sensors (Figure 4.33). Through this third frequency, the plants, lichen, and fungi can directly influence the human brain of the listener. The sound installation thus aims to create an alienating effect through switching power relations and crossing imagined boundaries between human and non-human.

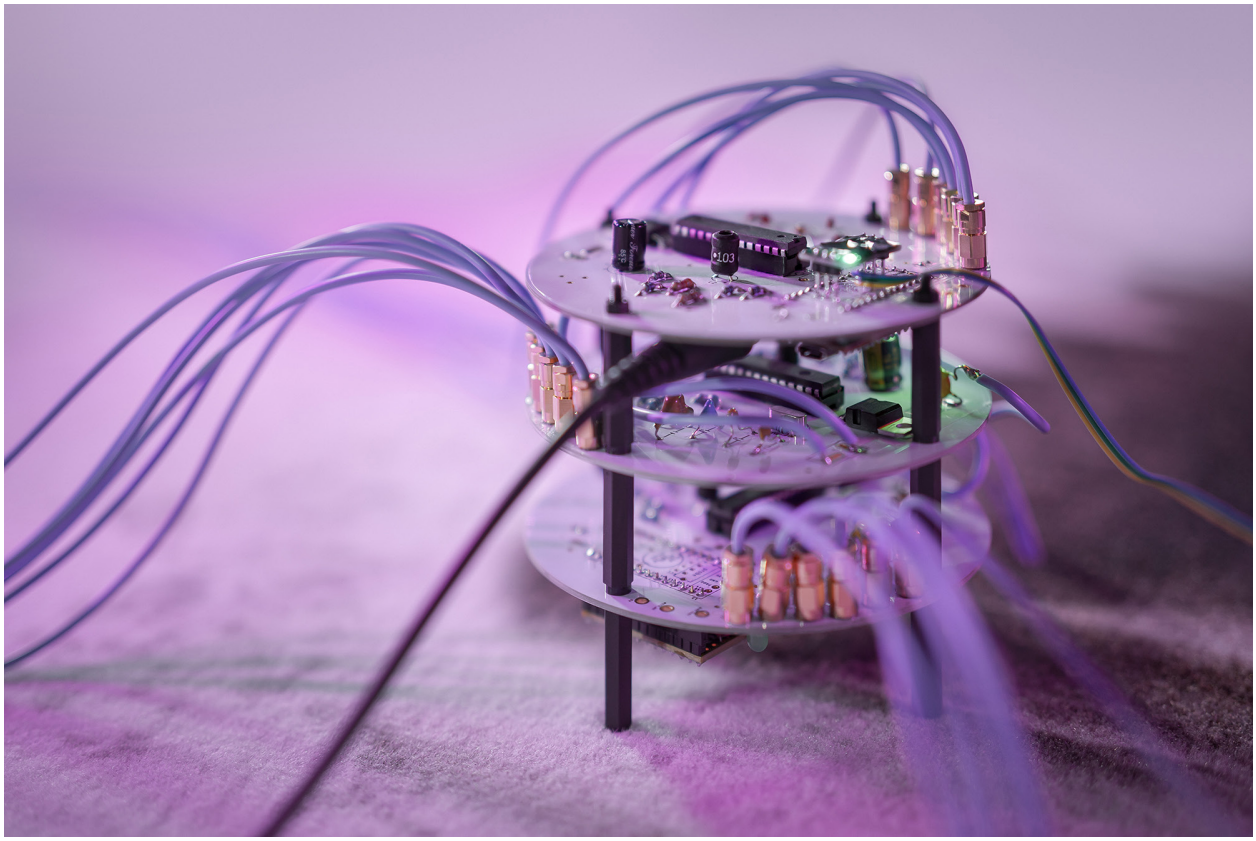

Fig. 4.32 *The Outside Inside – Forming Earth, Forming Brain*, custom electronics, 2019.

214 Martin Croucher, "UAE Call to Ban Hypnotic Music as Illegal Digital Drug," *The National*, September 19, 2012, https://www.thenational.ae/uae/uae-call-to-ban-hypnotic-music-as-illegal-digital-drug-1.381616.

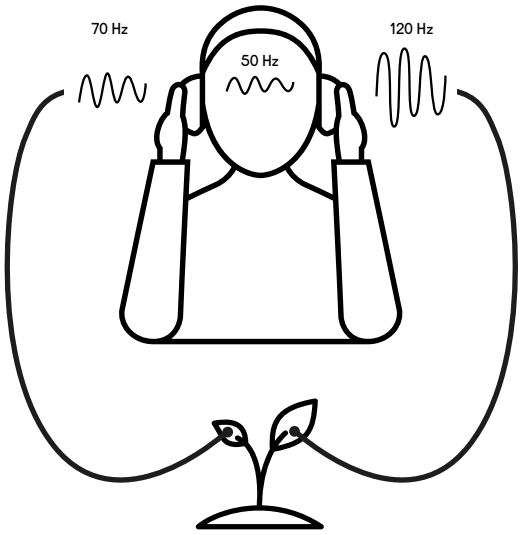

Fig. 4.33 *The Outside Inside – Forming Earth, Forming Brain*, binaural beats diagram, 2019.

Apart from the power-shifting function, the sound makes the activities of these species more perceptible to humans, engaging with what is usually beyond human experience, which could be used to alienate an audience from their usual way of perceiving these species. When the photosynthesis rate of the plants in the terraria decreases, for example, due to environmental stress or during the night, CO_2 levels increase. The CO_2 sensors register this information, and the software uses this data to increase the pitch, creating a tone more stressful to the human ear. Similarly, in the terraria with lichen and fungi, changes in methane levels due to bacterial activity and changes in volatile organic compounds impact the pitch of the sound. The frequencies of the binaural beats originate from two capacitance sensors that measure the capacitance between two parts of the plant. Through this technique, the sound frequencies represent water flows and activities within the plant.

THE OUTSIDE INSIDE – FUTURES WITHIN

Forming Earth, Forming Brain uses sound to artificially create a situation in which human / non-human boundaries are crossed, thus questioning the human in its relation to non-

human entities, but not deconstructing the human as a separate category. The second part of The Outside Inside, a piece called "Futures Within," focuses on this deconstruction of the human, emphasizing that the inhuman is always already within the human. If the xeno is a specific form of the inhuman in the human, as Anke Hennig suggests,[215] then alienation can be both an approach to and an effect of the engagement with it, created by shifts in perspective and techniques to amplify the inhuman within the human. Futures Within consists of a display unit filled with edible amaranth flowers harvested from the installation (Figure 4.34). These flowers are also grown in possible future environmental conditions of the year 2100 and are stored in a transparent display unit for visitors to see and taste (Figure 4.35). The nutrient composition of these flowers is altered by being exposed to elevated carbon dioxide levels and saline soil. Tasting the flowers allows visitors to ingest part of a possible future, which directly affects their body on a molecular level, allowing them to understand and speculate about how objects (in this case the environment, plants, microecologies, climate, weather, and humans) relate.

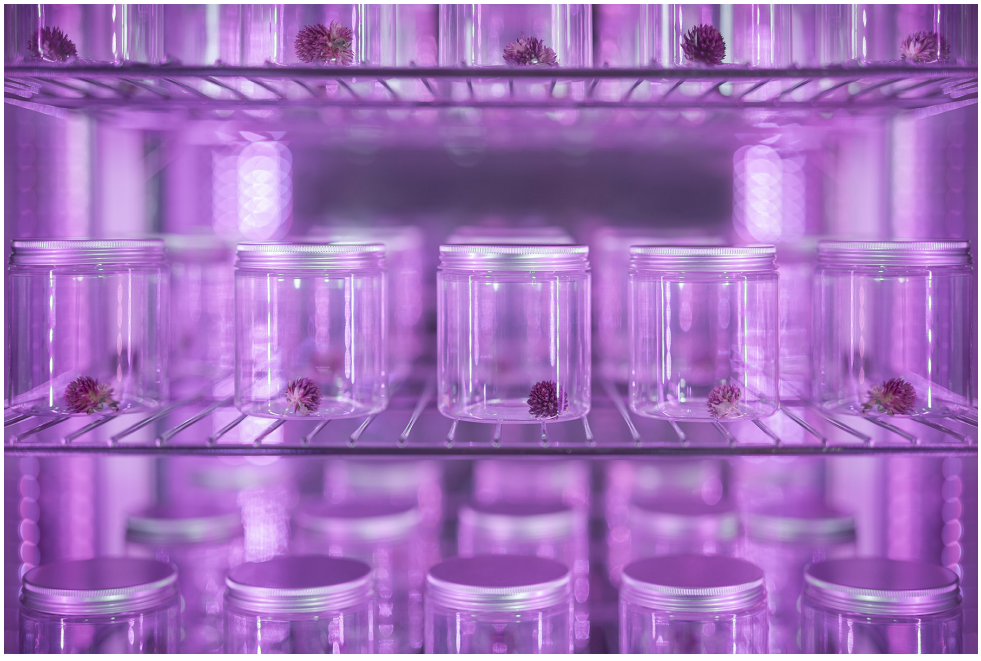

Fig. 4.34 *The Outside Inside – Futures Within*, edible flowers in display unit, 2019.

215 Anke Henning in Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match,* 58.

Fig. 4.35 *The Outside Inside – Futures Within*, edible flower petals in sweets, 2019.

A flower is a structure of four concentric rings, consisting of sepals, petals, stamens, and an ovary.

A flower is a cultural tool, used to signify appreciation, condolences, or congratulations.

A flower is part of a living organism that can photosynthesise.

A flower is a material from which dyes, spices, and fragrances are made.

A flower is an edible piece of a plant, sometimes used in cooking and other food preparations.

A flower is the reproductive structure of a plant, often designed to attract insects to increase chances of pollination.

A flower is the result of soil, the nutrients, water, and sunlight.

A flower is often both male and female.

. . .

Fig. 4.36 Flower perspective descriptions, 2019.

Here, the project links back to the findings from Chapter 4.2. – the edible flowers become an ontographic machine. The idea of Futures Within emerged while experimenting with growing plants, lichen, and fungi in my studio and reading scientific papers on how their environments affect these species.[216] As part of this, I also used the previously discussed OOO-related techniques of perspective descriptions (Figure 4.36) and ontography, developing an ontographic mapping of a flower through all associations of a flower that entered my mind during that process (Figure 4.37). Both the mapping and the perspective descriptions consider a flower's relationships with light, soil, microecologies, water and mineral flows, air, wind, gravity, and sound. The ontographic mapping of the flower is a good example of the closeness between an OOO approach to objects and non-Western thought and knowledge practices, as discussed in Chapter 2.1. It resonates with a statement by Buddhist scholar and monk Thich Nhat Hanh: "*A flower is not a flower. It is made only of non-flower elements — sunshine, clouds, time, space, earth, minerals, gardeners, and so on*."[217]

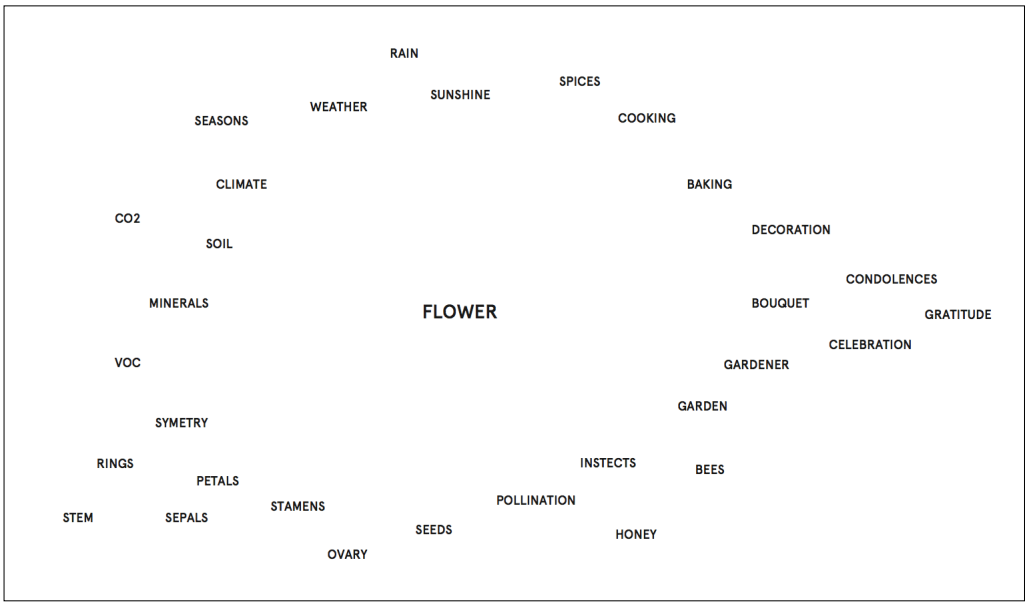

Fig. 4.37 Ontography of a flower, 2019.

216 See Monica Gagliano, *Thus Spoke the Plant: A Remarkable Journey of Groundbreaking Scientific Discoveries and Personal Encounters with Plants* (Berkeley, CA: North Atlantic Books, 2018) and Daniel Chamovitz, *What a Plant Knows: A Field Guide to the Senses* (Oxford: Oneworld Publications, 2012).

217 Thich Nhat Hanh, *The Heart Of Buddha's Teaching* (London: Rider, 1998), 129.

In the installation, the edible flowers with a changed nutrient content become artifacts from a potential future. The act of eating, an activity that is often given little second thought, becomes part of a technique of alienation. Eating is a way of literally bringing the inhuman into the human. Through eating, molecules in the human body shift. The human becomes part of what they have eaten, and what they have eaten becomes part of the human. The installation emphasizes this transversality and reproduces it through an experience of ingestion and sound that places something that is usually beyond human perception and is not entirely knowable to us in focus, even if it is not directly visible.

THE OUTSIDE INSIDE – CONVERGENCE

The third part of The Outside Inside is an atmospheric film titled "Convergence," developed in collaboration with designer Anna-Luise Lorenz, which plays on a 4-meter-tall screen behind the other two parts of the installation. In the film, a non-human perspective is taken by showing the view of a drone that flies above three different landscapes, analyzing their potential as new habitats and sites of terraforming. The aesthetics of this non-human view are different from those commonly seen in computational object detection and analysis systems, providing a further potentially alienating element in the installation. Moving within and beyond a central search window, they appear in strange organic shapes, covering parts of landscapes (Figure 4.38). The film hints at a convergence of the biosphere and digital technology – technological systems that operate beyond human understanding and control, which interface directly with other species. Drawing on Darwin's theories of plant movement and intelligence,[218] and recent research into fungal communication networks[219] (Figure 4.39), the film speculates about possible worlds that might emerge from active decision-making processes through non-human agency. This theme emerged and was consid-

218 Charles Darwin, *The Power of Movement in Plants*, ed. Frances Darwin (Cambridge: Cambridge University Press, 2009.) Originally published 1880.

219 New discoveries in the field of environmental science suggest that organisms can shape and maintain their environment. An example is the "wood wide web," which reacts to threats pre-emptively through a fungal network: http://www.bbc.co.uk/earth/story/20141111-plants-have-a-hidden-internet.

ered unsettling and strange by the participants in the Autonomous Agriculture walk and dinner event. It underlines the alienating approach of The Outside Inside.

Fig. 4.38 *The Outside Inside – Convergence*, film still of viewfinder, 2019.

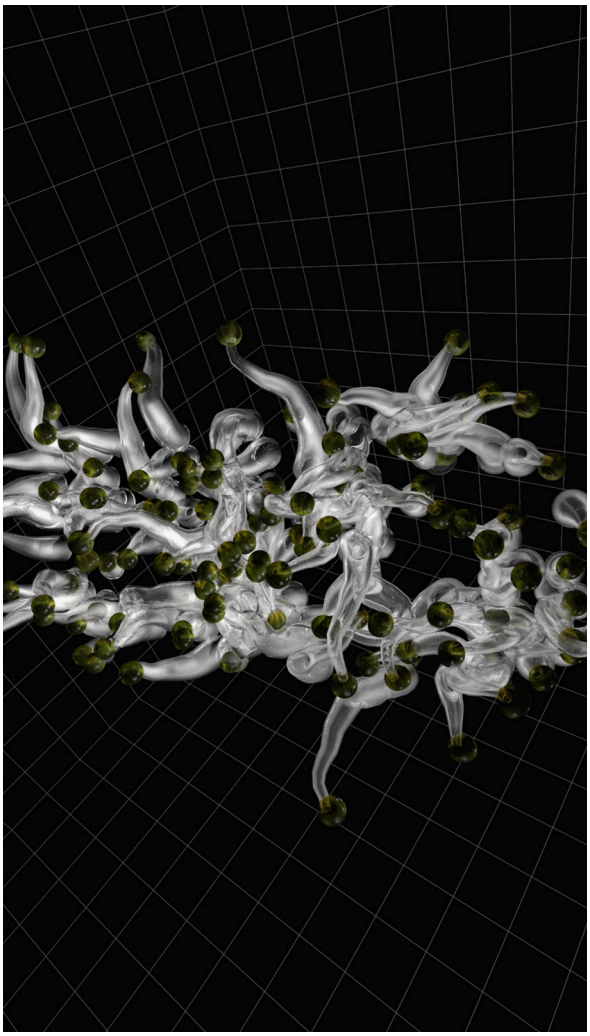

Fig. 4.39 *The Outside Inside – Convergence*, film still of mycelium movement animation, 2019.

4.3.2.4. ENGAGEMENT

The aesthetics and scenography of the installation were designed to support the alienating experience, to draw people in and generate curiosity through abstract and appealing aesthetics. The positioning of the installation close to the ground, with cushions for people to sit on and engage with it while the related film is playing in the background, aimed to set it apart from the rest of the exhibition, creating a break to elicit longer engagement times and focus needed for the alienating effect to emerge. While those that sat on the cushions spent more time engaging with the installation and listening to the sound than those who did not sit down, the alienating effect only worked with those who were pre-informed about how Forming Earth, Forming Brain works.

To investigate the reactions and alienating effects on the museum audience, I spent a day at the museum during the opening week, observing those interacting with the installation, engaging them in conversations, and recording discussions and reactions through notetaking (see Appendix Figure D21, D22). The thematic foundation developed with the idea of transversality in mind enabled discussions about non-dualistic posthuman thinking on a more thematic basis, while the techniques of alienation that emerged in the project, such as switching power relations and emphasizing the inhuman in the human, further underlined this through the direct experience of transversality. The visitors reacted differently before and after being told about how the installation works, which was previously unknown to many, as the curators had not initially positioned the project description in a prominent place. After being told about the binaural frequencies controlled by these species' activities, which directly affect the human brain, people became more insecure in interacting with the installation, putting the headphones on more carefully, finding the idea unsettling and strange. Eventually, they relaxed more during the experience, often lying on the seating cushions provided next to the headphones for some time, listening and waiting to hear subtle changes in the activities of the plants and other species, and describing feeling slightly dizzy and disoriented but relaxed afterward (Figure 4.40).

Fig. 4.40 *The Outside Inside*, museum visitors interacting with the installation, 2019.

When not told about how the frequencies are generated and operate, people usually listened to the sound for a shorter time, intuitively understanding it as a means of listening to "*what the plants are saying*" (see Appendix Figure D22). Some were preoccupied with trying to determine how the sound is being generated and what it signifies. Since all sensors, cables, and electronics are visible in the exhibition, intentionally left on top of the plinth, it became an investigative experience for some exhibition visitors. They tried to decipher the computationally generated "language" of the plants, lichen, and fungi and tried to influence it through moving the lights or blowing air into the terraria.

Forming Earth, Forming Brain was thus successful in enabling an alienating effect and alternative connection between human and non-human through technology that enables switching power relations, but only when the functionality of this switch in power relations was understood by the humans engaged in it. This is a limitation of the project, as the switch in power relations is not self-explanatory. Knowledge about this functionality led the audience to engage with the piece in an affective way. In contrast, when this knowledge was withheld, it instead became an investigative experience of trying to understand the sounds and how these work. Alienation by going beyond what is usually perceptible to humans worked even when the audience had no further information, as the visible electronics, cables, and sensors already seemed to visually hint at a new kind of access to the activities of plants, lichen, and fungi in the installation. Because the visual aesthetics of the devices appear technoscientific and familiar, a more alien aesthetic could have potentially assisted in making the alienating effect even more immediate without requiring much explanation.

The curators were initially concerned about widely communicating the power-shifting functionality of the binaural frequencies used in the installation. They thought it might be too uncanny for the broad audience the museum seeks to address. Discussions and long correction processes of press materials and catalogs developed by the museum staff provided an insightful experience in audience engagement and communication, as did the engagement with the visitors when the museum finally opened. While initial drafts of the materials communicating the exhibition created by the museum staff rested on positioning the human as separate from nature, this significantly changed throughout our ongoing conversations, impacting what was later published, not only about my project but about the general concept of the exhibition.

Concerning Futures Within, with its edible flowers grown in altered environmental conditions, the audience at the Futurium Museum in Berlin, as well as at a previous exhibition in which I tested early prototypes at the Grantham Institute for Climate Change and Environment at Imperial College London (Figure 4.41), were relatively reluctant to taste

the flowers. Whether the flower petals were pure, encapsulated in sweets, or brewed into tea, did not change this. Ingesting a possible future, and the idea that it would impact the human body on a molecular level (even though to a minimal extent) perhaps appeared slightly too uncanny and unsettling to engage in for most. However, even if the audience largely did not engage with the work in the way it was intended, the alienating effect of emphasizing the inhuman in the human still had an impact through people imagining eating these flowers, and their rejection of it, by feeling too alienated.

Fig. 4.41 *The Outside Inside*, work in progress, Imperial College exhibition as part of the Grantham Institute Art Prize, April 2019.

The questioning and deconstruction of the category of the human, as well as those of other entities such as the flower or its environment, were enabled through the alienating technique of highlighting the inhuman in the human. The binaural frequencies create an alienating shift in power relations between human and non-human and emphasize transversality.

Both these elements of the installation made the exhibition visitors slightly uncomfortable but also generated interest and fascination (see Appendix Figure D22). Generally, the audience's interest in the sound installation appeared to be higher than in the edible flowers. This is potentially due to the medium of sound being more immediate in generating an experience. However, it is also possible that alienation can lead to a faster dismissal of a design if the alienating effect is too strong, which might have been the case with the edible flowers grown in potential future conditions of the climate crisis. This aspect warrants further research and might be similar to how speculative designs can become less engaging and are quickly dismissed by an audience if their narrative is too utopian or dystopian.[220]

The technique of alienation through making perceivable or experienceable what is normally at the border of or beyond human perception and experience is less related to the aim of deconstructing the human than to that of decentering the human. This technique was perhaps the weakest in its alienating effects amongst those tested, potentially because a deconstruction of the human per se causes alienation in an audience used to a world constructed around Enlightenment ideas of the human as separate from and above nature. Moreover, making perceivable what is normally beyond human perception is something that people have most likely experienced through tools and devices before, if only by looking through a microscope and seeing what is invisible to the naked eye. In a later project, one participant compared it to experimenting with a Geiger counter (see Chapter 4.3.3.).

Further limitations of the use of alienation in The Outside Inside were that it relies on a certain depth of engagement, and effective communication and explanation, which is difficult to achieve if the visitors to the installation do not take sufficient time to engage with it. The aesthetics and design of a piece can counteract this by drawing attention and increasing engagement time, which worked well in the installation, assisted by the seating cushions on

220 Anthony Dunne and Fiona Raby, *Speculative Everything: Design, Fiction, and Social Dreaming* (Cambridge: MIT Press, 2013), 63.

the ground. However, the alienating effect will probably only reach a part of the museum audience due to the large amount of work exhibited in the museum and the resulting selective and sometimes short attention span of the visitors.

Furthermore, a few conversations with visitors in the exhibition hinted that alienation, connected to perceiving something as uncanny and strange, might be an expected effect of visiting a museum about futures, which shows recent art and design (see Appendix Figure D21). This could imply that alienation works differently within a museum context than it might outside of it. This is an aspect which warrants further exploration.

The posthuman imaginary that the project moves towards establishes alternative links between humans, non-humans, and technology. Here, the agency of non-humans is recognized and co-exists with human agency in a world in which the human is decentered and cultural practices of cross-species communication occur. While the project worked well to discuss these ideas with the exhibition audience, it perhaps worked less well in allowing them to develop their own posthuman imaginaries. This is explored in the subsequent project, "Cosmotechnical Tools," which I developed from The Outside Inside. It also explores alienation in design and engagement that operates outside of museum contexts, to counteract potential expectations of strangeness, and is discussed in chapter 4.3.3.

4.3.3. COSMOTECHNICAL TOOLS

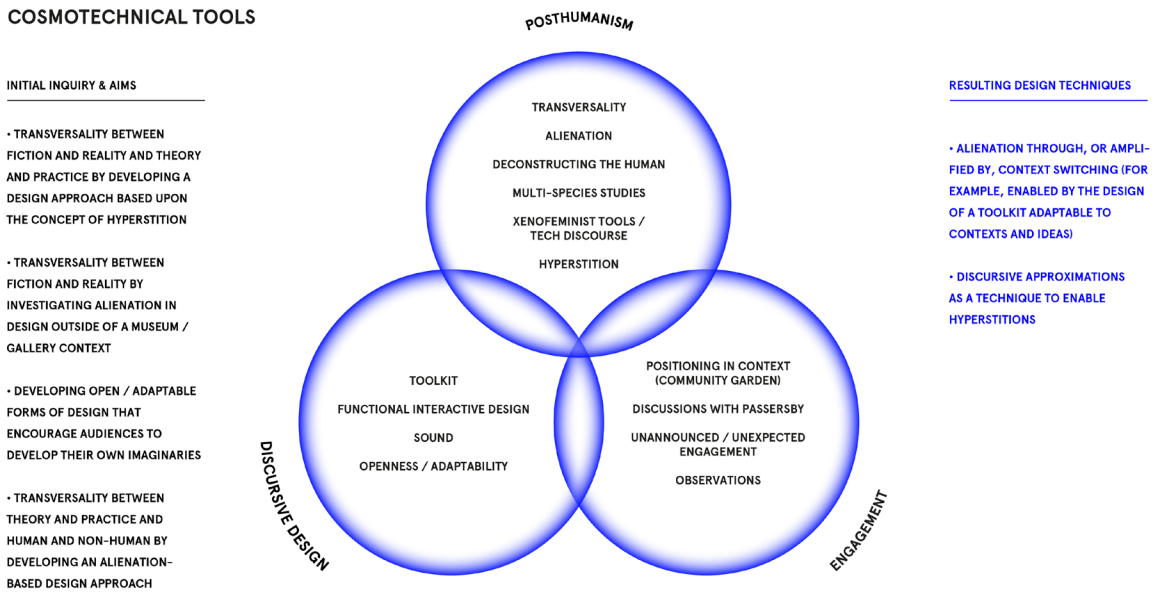

Fig. 4.42 *Cosmotechnical Tools,* process diagram, 2020.

The "Cosmotechnical Tools" project[221] emerged as an inquiry into engaging with alienation and developing posthuman imaginaries outside the museum and gallery space, in the context of the everyday (Figure 4.42). The technique it evolves is alienation through – or amplified by – context-switching. In analyzing the different parts of The Outside Inside with regard to their transferability to settings outside the museum, I used parts of the hard- and software designed for the installation Forming Earth, Forming Brain, and developed these into a portable toolkit consisting of a microcontroller, environmental sensors, and sound-generating software (Figure 4.43). Through this transformation into a portable toolkit, a broader range of contexts can be explored.

221 The title references Yuk Hui's concept of cosmotechnics, Yuk Hui, "Cosmotechnics as Cosmopolitics," *e-flux Journal*, #86 (November 2017), https://www.e-flux.com/journal/86/161887/cosmotechnics-as-cosmopolitics/.

Fig. 4.43 *Cosmotechnical Tools*, community garden test, 2019.

The project title references computer engineer and philosopher Yuk Hui's concept of cosmotechnics, which acknowledges that technology is not culturally universal or purely utilitarian but "*enabled and constrained by particular cosmologies.*"[222] Cosmotechnics *"connects*

222 Yuk Hui, "Cosmotechnics as Cosmopolitics."

cosmologies with cultural beliefs about what constitutes a good life."[223] It references the many cultural contexts within which technology emerges, each with its own specificities. The concept can thus be a useful lens through which to analyze or design technological tools in the context of an awareness of cultural practices and belief systems. In my research, this involves questioning established worldviews and moving towards posthuman imaginaries, and the Cosmotechnical Tools project explores this through practice.

Working within the realm of technology and tools is strongly linked to xenofeminism: If the DIY Del-Em menstrual extraction device is positioned as a xenofeminist technology that enables an alienating shift in perspective on the functionality of the female body, while simultaneously becoming a productive tool to liberate it (see Chapter 2.2.), then the creation of open-source tools that allow a similar alienating shift in perspective and generate new experiences and behaviors can form an approach to xenodesign.

The toolkit was taken to a community garden (Figure 4.44) to examine the same technological setup used in the museum (conductivity and environmental sensors that measure species activity and generate brainwave-altering sounds) in a different context. This was done relatively informally, not as a preannounced event or workshop but as a form of spontaneous experimentation with the toolkit, where curious passersby and community garden members joined in, and conversations developed naturally. Being in the center of Berlin in an area undergoing a process of gentrification in the last years, the audience in the community garden consisted of a similar demographic compared to that in the museum: predominantly people between the ages of 20 and 40, many of whom worked in the creative sector or technology industry.

223 Carl Mitcham, "Varieties of Technological Experience," *Issues in Science and Technology* XXXIV, no. No. 4 (Summer 2018).

Fig. 4.44 *Cosmotechnical Tools*, participant in community garden test, 2019.

Despite the audience being of a similar demographic, compared to the museum exhibition, the alienating, perspective-shifting effect differed in several ways. Generally, people appeared more willing to use the device, despite mentioning feelings of uncanniness, and spent longer listening to the sound than those in the museum. This is possibly because, in the museum, the piece is one exhibit of many, and people come to see the whole exhibition. In contrast, in the community garden, many people came to relax and found the project to be an unexpected and interesting activity to engage in while doing so. Museum audiences are often intentionally or unintentionally primed before visiting an exhibition, having read or heard about the museum, the exhibition, and possibly even the exhibits in the show and

having seen images in advance.[224] Especially in the context of the opening of the Futurium Museum, which had 100,000 visitors during its opening month and was heavily advertised on television, in newspapers and magazines, and on social media, unexpectedness was not generally attainable. In the museum, people appeared to engage with the piece while already expecting something unfamiliar, imaginative, or futuristic. When audiences are primed with such expectations, minimal consideration may be given to feelings of alienation that might occur, as it is an anticipated feeling. However, the unexpectedness of the encounter with the project in the community garden appeared to make it more alienating, with the majority of participants initially worried about the effect of the sound on them. This feeling later developed into cautious curiosity, as people tested several plants and speculated about what changes in the sound might signify (see Appendix Figure E6). Switching the project that was designed to have an alienating effect in a museum context to a context outside of the museum amplified its alienating effect.

The portability of the device also changed the audience's interactions with it. There was an interest in not only testing it on several plants but also in taking CO_2 and air quality measurements outside the garden on the street and developing ideas for other applications. It became an uncanny investigative tool for understanding the environment around oneself rather than a static, prescribed part of an installation. As one of the listeners said, "*It reminds me of experimenting with a Geiger counter as a teenager. Even when you are told that certain objects emit more radiation, it is still a fascinating experience. It is a bit like looking at the world through a different lens, and you see things differently after that*." (see Appendix Figure E6).

Perhaps due to the context of the garden, the discussions that emerged around the project were also more specific to the themes the project intended to discuss (terraforming, climate crisis, decentering the human, the role of technology in these, plants considered as a terraforming technology). Conversely, in the museum, the conversations often remained on

224 Tharp & Tharp, *Discursive Design,* 114.

a more abstract level, sometimes relating to the design and production process or revolving around personal questions about me as a designer and the originator of the work, which was not the case in the garden.

Rather than being a prescribed alienating experience in a museum, Cosmotechnical Tools with its adaptive features fosters the ability of an audience to find the “alien” or the “other” in the world on their own terms, to engage with the inhuman in the human and with what lies beyond human perception in a multitude of ways, and to ultimately imagine and define their own posthuman imaginaries. The toolkit uses open-source electronics and software and can thus be adapted to other uses, which potentially incorporate other cosmologies and posthuman imaginaries.

Compared to The Outside Inside, the Cosmotechnical Tools project consisted of a relatively small, short experiment and thus did not generate as many findings. It did, however, result in the insight that context-switching can increase or decrease a project’s alienating effects. This, together with an openness that allows people to explore their own posthuman imaginaries, can be enabled by making projects portable, modular, and transferable, for example, by designing or redesigning them as toolkits.

4.3.4. DESIGNING DEATH

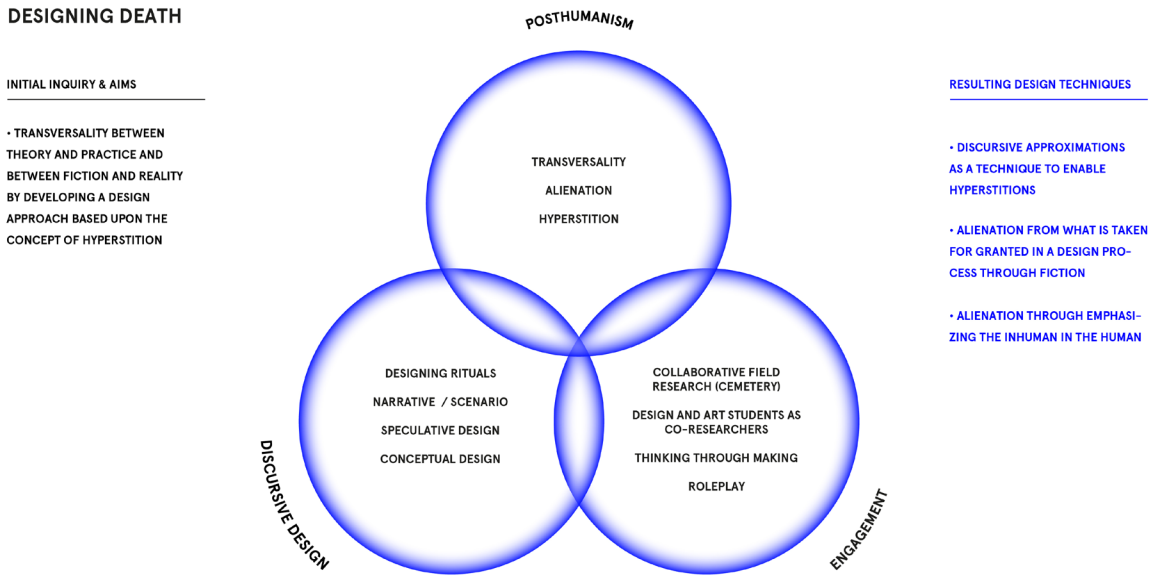

Fig. 4.45 *Designing Death*, process diagram, 2020.

In the "Designing Death" workshop, which I taught at the Royal College of Art in October 2018 in collaboration with designer Anna-Luise Lorenz, a fifth technique of alienation emerged from practice: alienation from what is taken for granted in a design process through fiction. Alienation through emphasizing the inhuman within the human also emerged from a student project within this workshop, similarly to how it operates in The Outside Inside. While the workshop was initially not designed as an inquiry into alienation but as an investigation into creating transversality between fiction and reality (testing the technique of discursive approximations with the participants, see Chapter 4.4.), alienation emerged as an aspect of connecting fiction and reality (Figure 4.45).

The workshop was part of Across RCA, a cross-college week of workshops and activities that students from different departments can sign up for, to collaborate and explore practices

outside of their regular course subjects. The 18 participants in the Designing Death workshop were from a variety of courses, including photography, performance art, sculpture, product design, global innovation design, and information experience design.

Thematically, the workshop engaged with death as a taboo subject in contemporary Western culture, with customs and rituals that traditionally stem from the realm of religion and the church but which are decreasing in importance and relevance in an increasingly secular society. Touching on posthuman topics, such as AI chatbots impersonating the deceased, or Silicon Valley's techno-utopian visions of eliminating death, but also the emergence of coffin clubs and death doulas, the Designing Death workshop investigated contrasting views and approaches to death. It explored what it might mean to "design" death – to engage with it, make it visible, celebrate life through it – by designing new rituals, objects, interactions, and processes for death in the 21st century.

The workshop was split into three phases. The first phase was a day of input, including a guided tour at the City of London Cemetery and Crematorium (Figure 4.46), a guest talk, a conversation guided by a death doula, and a presentation by me about death-related design projects. The next morning, the workshop continued with a short 60-minute speculative design exercise in group work. During this exercise, the students were asked to select one topic related to death from a selection of preprepared cards (e.g., funeral, inheritance, last days of life) and to speculate about how this aspect could manifest itself in a ritual in the year 2100. They were asked to consider how the world might be radically different and how this might impact attitudes and behaviors in the context of death and dying. After 60 minutes, they presented their ideas developed in a thinking-through-making approach through sketches, rough prototypes, or role-play, and the ideas were discussed amongst all the participants. The initial fictions included a machine that could reincarnate people based on preferences they would input during their lifetimes, an AI that simulates and evolves a character based on deceased family members, a virtual version of deceased family members, and euthanasia services that go beyond the existing ones for those with terminal diseases.

Fig. 4.46 *Designing Death Workshop*, City of London Cemetery tour, 2018.

Following their presentations, the students were asked to find aspects at the core of their fictional ideas, which could enable unusual, new rituals, and transfer these aspects closer to reality. They were tasked to achieve this by designing a concept for a cemetery (in the broadest sense), which could be implemented technologically, despite having a discursive, provocative approach and being culturally or socially radical. The next step was to develop a mock-up or otherwise suitable presentation format for these concepts over the next 2.5 days.

The iterative process of designing new fictional rituals around the topic of death and then creating closer-to-reality concepts was used to create transversality between fiction and reality in the workshop (as I discuss in Chapter 4.4.). However, insights into alienation also emerged. One project that stood out was a cemetery design developed by the group that

had initially developed a fiction about reincarnation. Their design was a cemetery that functions similarly to a community garden, in which members and their families can choose edible plants that are grown above their buried bodies when they die so that their body fertilizes these plants as it decomposes. Once a year, the garden would invite friends and family of the deceased to a ritual, in which the food grown in the garden is eaten, effectively ingesting part of the deceased. This emphasizes the inhuman in the human and, through this, questions what it means to be human by highlighting the materiality of the decomposing body, which enables the fertilization and growth of plants. Of the four projects developed within the workshop, this was the one most controversially discussed after the final presentation, in which the food ritual was simulated in a performative presentation in Hyde Park (Figures 4.47 and 4.48). While some found the idea beautiful, seeing it as a celebration of life that can be created through death, some found the idea too uncanny or disrespectful towards the dead. Its strong alienating effect originated both from intense feelings of uncanniness related to ingestion (as also noted in The Outside Inside) and its proximity to the "real," as a radical concept that does not take current practices surrounding death as given but remains within the realm of the possible. Moreover, imagining humans as molecules, distributed from soil into plants and other species, enables questioning and deconstructing the human by picturing human bodies literally becoming "other." The alienating effect emerged almost naturally as part of a confrontation with an unfamiliar, radically different ritual, rather than being an initial aim or part of the brief.

Fig. 4.47 *Designing Death Workshop,* community garden cemetery ritual role-played in Hyde Park, dish of harvested vegetables, 2018.

Fig. 4.48 *Designing Death Workshop,* community garden cemetery ritual role-played in Hyde Park, holding hands in a circle, 2018.

Reflecting on the workshop after the final presentation, all the participant groups commented that the process of initially designing fictions with minimal constraints helped them to shift their perspectives away from established ideas of rituals around death (see Appendix Figure F10). By alienating themselves from what is normally assumed or perceived as the norm through this process of designing fiction, they were able to later produce design outcomes that were radically different from current ideas of what a cemetery is but close to reality through their technological feasibility. The alienating effect of the fictions in this process could be considered a xenodesignerly version of what is described in xenofeminism or xenoarchitecture as the productive potential of alienation.

4.3.5. CONCLUSION

In this chapter, my research moved from adapting techniques from philosophy to design (as in the previous chapter with OOO) to developing new techniques through practice.
In summary, the research has revealed five techniques of alienation useful for transversal engagement and developing and communicating posthuman imaginaries through xenodesign: switching power relationships between human and non-human, making perceivable or experienceable what is normally at the border of or beyond human perception and experience, emphasizing the inhuman within the human, alienation from what is taken for granted in a design process through fiction, and alienation through – or amplified by – context-switching. These transcend previously described uses of alienation in discursive design, which relate to Shklovsky's defamiliarization and Brecht's estrangement / V-effect, by engaging in transversality with the "other" and the "outside." Two of the techniques, switching power relationships between human and non-human and emphasizing the inhuman within the human, work particularly well in addressing the limitations of an OOO-related approach to design and engagement by enabling a deconstructing and questioning of the human.

In the installation Forming Earth, Forming Brain as part of The Outside Inside, power relationships between human and non-human are switched by giving plants, lichen, and fungi agency to alter human brainwaves through sound. Engaging with what is normally beyond human perception and experience, the sound also makes the biochemical and electrical communications of these species more perceptible to humans, enabled by sensors and a custom-made technological system. The alienating effect of both these techniques only worked effectively when the functionality of the installation was explained to the audience. The experience of switched power relations was more alienating to the audience than the expansion of perception, probably because using technology to transcend what humans can normally perceive is not an unusual experience. While the aesthetics of the project were relatively technoscientific, an unfamiliar aesthetic could have potentially enhanced the alienating effect by making it more immediate without the need for prior information.

Emphasizing the inhuman within the human, Futures Within enables a perspective of how matter flows through bodies through the example of how changes in atmospheric CO_2 concentrations alter the biochemistry of plants, which can affect the human body when ingested. The project showed that even audiences that did not ingest the edible flowers, as initially intended, experienced alienating effects, showing that imagination and mental consumption can also be effective engagement strategies. However, the fact that many visitors felt too alienated to try the edible flowers and instead engaged more with the sound installation might indicate that making a project too alienating or insufficiently immediate in its experience might decrease people's engagement with it.

Overall, The Outside Inside worked well in creating transversal engagement between humans and non-humans through techniques of alienation. The themes the project engages with further underlined and supported this through the topic of terraforming and technological augmentation, which highlights transversal aspects of the relationships between human and non-human. It was also successful in discussing a particular posthuman imaginary related to terraforming and amplified non-human agency with the audience, which was

communicated through the installation. It was less effective in enabling audiences to evolve their own posthuman imaginaries. This worked better in The Cosmotechnical Tools project, which, by developing the technology of The Outside Inside into a toolkit with portable and adaptive features, enabled an audience outside the museum context to engage with the "other" on their own terms and develop their own imaginaries.

Bringing the project into a community garden caused the discussions to become more engaged with the themes the project aims to discuss, such as terraforming, the climate crisis, and plants considered as a terraforming technology. This is possibly due to the garden being more directly related to these topics than the museum. The alienating effect of the project appeared to be stronger, probably due to the unexpectedness of the engagement, when something designed for a museum is brought into a different context. Museum audiences visit exhibitions expecting surprising or strange experiences, often having read or heard about the exhibition in advance. In contrast to this, the audience in the community garden was less primed or biased about the project before testing it than the museum audience may have been. The garden enabled a form of alienation through context-switching.

In the Designing Death workshop, the technique of using alienation from what is taken for granted in a design process through fiction emerged through the process of using fiction to shift the participants' thinking away from established ideas and practices around death. This was achieved during the design process to create transversality between fiction and reality, to enable the design of radically different but realizable concepts of a cemetery as a final outcome. The participants remarked that the alienating shift in perspective worked well as a tool for them in the design process, and the success of the resulting projects also evidenced this, with one of them additionally evolving alienation through engagement with the inhuman in the human, although this was not a primary aim of the workshop.

As this chapter has shown, in contrast to historical examples of alienation, alienation can be used as a positive, productive force in design, similarly to how it is described in xenofeminism. Even though alienation can, to a certain extent, reduce complexity to the scale of the human, it does not necessarily do this in a human-centered manner. Instead, the discussed projects work with alienation from our usual way of seeing the world – with human discomfort or strangeness of experience – to offer a change in perspective.

As the Cosmotechnical Tools and Designing Death projects have shown, alienation can be stronger when it is more closely connected to the everyday, when it is easier to amplify it through unexpectedness or its connection to the real, and when concepts are uncanny but realizable. This connection to the everyday can be created by working outside of a museum context. The situatedness of a project in a relevant context (e.g., the community garden when talking about plants, environmental interactions, and climate breakdown) can move the discussions resulting from a project into a more focused space compared to when it is exhibited in a museum.

Nevertheless, museums, gallery spaces, and similar institutions provide an ideal space to develop these types of projects initially, because they often support work that people may consider strange or unsettling, which would be difficult to fund outside of a cultural context. Therefore, it is helpful to develop projects with a life both within and beyond the museum in mind, to enable engagement with multiple audiences. In a museum, a xenodesign project can resemble a Trojan horse – designed to blend seamlessly into this context and only over time revealing elements intended for other uses, stretching its tentacles out into other contexts, questioning the production of discursive design for these contexts as an end-in-itself, and instead using it as a means.

4.4. HYPERSTITION

4.4.1. INTRODUCTION

My research aims to connect the "fictional" in discursive design closer to the "real" and to explore a project's effects once it is out in the world, to enable and reflect on its political aims of developing new posthuman imaginaries. This is investigated in my work through the concept of hyperstition, which invokes a "leakiness" – or transversality – between fiction and reality. While the concept of hyperstition does not originate in xeno theory, it is referenced in the context of xenoarchitecture, as discussed in Chapter 2.2. It is connected to xenofeminism through being a major theme discussed at the conference from which the work that led to the Xenofeminist Manifesto emerged, documented in a film titled "Hyperstition."[225] The term "reality" can be problematic, given that reality is not singular and depends on perspective, and fiction can be intertwined with reality in many ways. In my research, a design's fictionality or reality is defined by possibility – whether it would be technologically possible, or possible in relation to current social, economic, or cultural practices. Not only is the designed object examined through this lens but also its implications. Design is considered to transcend the designed object or medium, speaking of its context and the world from which it originates.

While OOO and alienation can increase awareness of the existence of perspectives and agency of the other-than-human, this chapter is more concerned with engaging with various human perspectives, which are used to create transversality between fiction and reality. It explores the potential of hyperstition in understanding and creating feedback loops in xenodesign, to transcend the use of discursive design as an end in itself and also use it as a means to an end.

225 Armen Avanessian and Christopher Roth, *Hyperstition*, Documentary film, 2015.

Hyperstitions are fictions that enable the conditions to make themselves real, such as terraforming, as discussed in Chapter 4.3.2.2. The term is a portmanteau of the terms "hyper" and "superstition" and emerged in the 1990s in the work of the Cybernetic Culture Research Unit (CCRU) at Warwick University, where it was used to describe how the cultural dissemination of ideas through writing, memes, music, or art can lead to real-world change.

The CCRU describes four ways in which hyperstition operates:

"1. Element of effective culture that makes itself real.
2. Fictional quantity functional as a time-traveling device.
3. Coincidence intensifier.
4. Call to the Old Ones."[226]

In other words, it functions as a future vision introduced into culture, which creates feedback loops that operate in the present, to enable it to bring about its own reality, intensifying coincidence in the process.[227] The "Call to the Old Ones" references its connection to myths,[228] which are frequently referred to in the CCRU's hyperstitional writings, which take the form of fictional fable-like stories.

Hyperstition is connected to cybernetics through the explicit reference it makes to positive feedback loops to explain how fictional ideas can impact reality: "*Hyperstition is a positive feedback circuit including culture as a component. It can be defined as the experimental (techno)science of self-fulfilling prophecies*."[229] While negative feedback loops stabilize systems and maintain their equilibrium, positive feedback loops can affect the status quo of a system through small

226 Cybernetic Culture Research Unit (CCRU) [website], www.ccru.net.
227 Simon O'Sullivan, "Accelerationism, Hyperstition and Myth-Science," *Cyclops Journal*, no. 2 (2017).
228 O'Sullivan, "Accelerationism, Hyperstition and Myth-Science."
229 Delphi Carstens, "Hyperstition" [research note] (2010).

disturbances, which are intensified through each loop, eventually leading to change.[230] First order cybernetics, especially Norbert Wiener, is critiqued by the CCRU for creating a "*cybernetics of stability fortified against the future*" [231] by focusing on control and stabilizing negative feedback mechanisms. This, they argue, ignores the possibility of mutations or runaway circuitry that cannot be described by metrics and dismisses the importance and productive force of positive feedback loops, which can be used to move away from an (undesirable) status quo.[232] How positive feedback loops operate in a hyperstition is not analyzed in-depth, as, for the CCRU, investigating its mechanisms was less of interest than experimenting with the concept by actively producing hyperstitions in the form of art, music, and fictional or semi-fictional writings, as evidenced through their body of work. Rather than investigating hyperstition in relation to cybernetic theory, they frame it in relation to cultural phenomena or other writers of (hyperstitional) fiction such as William Burroughs, who becomes part of a semi-fictional CCRU essay that emphasizes Burroughs interest in the relations between fictional writing, signs, and reality.[233]

While the CCRU does not explicitly position its work within second order cybernetics, in which the observer is not considered impartial but both acts and observes within a system,[234] its members' direct involvement in the act of creating hyperstitions suggests that they consider themselves part of the systems they investigate, within which they both act and observe. This is similar to how I develop xenodesign through practice in my research – being immersed within the system and acting, recording, reflecting, and theorizing. In the following chapters, I explore how hyperstitional feedback loops could operate in xenodesign, where the initial output is often a fiction, intended to impact reality (be it through discussions, changing mindsets, or potentially evolving fictional into possible designs).

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230 Francis Heylighen and Joslyn Cliff, "Cybernetics and Second-Order Cybernetics," *Encyclopedia of Physical Science & Technology* 4 (2001): 155–70.

231 Sadie Plant and Nick Land, "Cyberpositive," in *#Accelerate: The Accelerationist Reader*, ed. Robin Mackay and Nick Land (Falmouth / Berlin: Urbanomic / Merve, 2014), 305.

232 Plant and Land, "Cyberpositive," in *#Accelerate*, 305.

233 Cybernetic Culture Research Unit, *CCRU 1997-2003* (Falmouth: Time Spiral Press, 2015).

234 Bernard Scott, "Second-Order Cybernetics: A Historical Introduction," *Kybernetes* 33 (2004): 1365–1378.

In contrast to future-facing design methods such as world-building[235] or experiential futures,[236] hyperstition provides an overarching approach. They are not mutually exclusive – world-building, experiential futures, or a range of other methods, could be used as methods within a hyperstitional design project. A hyperstitional approach is less about the details of how to design a fiction or an experience, and more about understanding how this fiction might seep into "reality," considering what might happen with the imaginaries that emerge in its discussion.

4.4.2. HYPERSTITIONAL DIAGRAMS

In this chapter, I argue that diagrams in their abstraction and reality construction can act as hyperstitions and introduce the discursive approximations diagram I developed to explicitly foster transversality between fiction and reality in my design processes. In my research, diagrams are used to guide, illustrate, and reflect design processes. They are representational, and thus differ from non-representational approaches to diagram making, such as those of Gilles Deleuze[237] or Simon O'Sullivan.[238]

In design, diagrams are frequently used to represent and enable specific design approaches. Diagrams such as the Double Diamond design process model published by the British Design Council in 2005,[239] or Liz Sanders' diagram, which maps design practice and design

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235 Contextualizing a fictional design in a fictional future world through media or design details that represent this world. See: Paul Coulton et al., "Design Fiction as World Building," in *Research Through Design Conference Proceedings*, 2017.

236 Involving people in immersive future scenarios, through a range of media or techniques such as role play, in which they can rehearse or experience a certain future. See: Stuart Candy and Jake Dunagan, "Designing an Experiential Scenario: The People Who Vanished," *Futures* 86 (2017): 136–53.

237 Kamini Vellodi, "Diagram: Deleuze's Augmentation of a Topical Notion," *Word & Image*, no. 34:4 (2018): 299–309.

238 Simon O'Sullivan, "On the Diagram (and a Practice of Diagrammatics)," in *Situational Diagram*, ed. Karin Schneider and Begum Yasar (New York: Dominique Lévy, 2016).

239 The British Design Council, "The Double Diamond Design Process Model," 2005.

research,[240] have become guiding tools for design practitioners and researchers alike. They are frequently cited in both practical and theoretical explorations. In the context of speculative design, one diagram is most frequently used to guide, explain, and contextualize projects: the futures cone[241] (Figure 4.49).

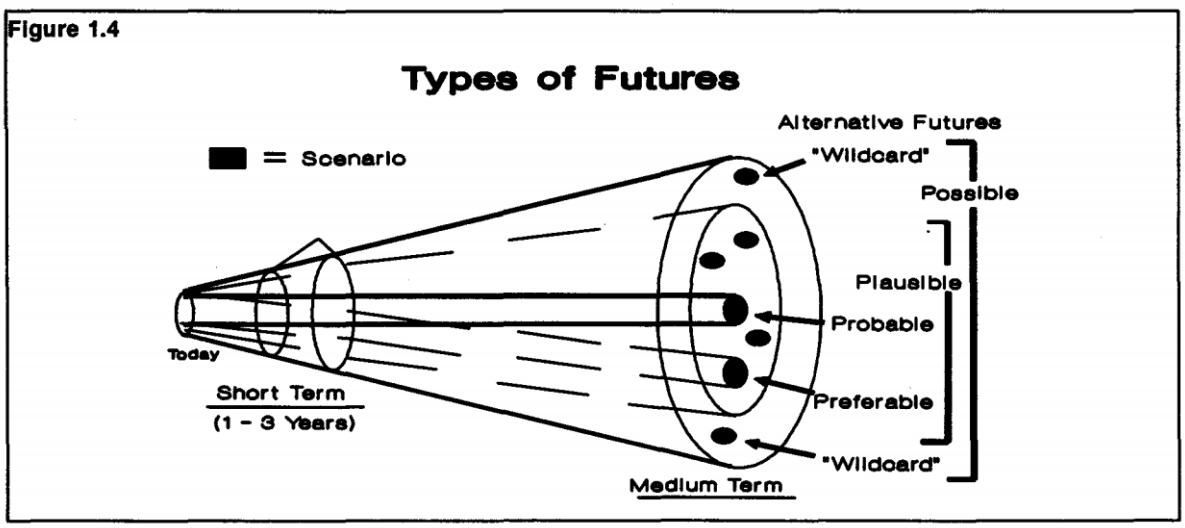

Fig. 4.49 Types of Futures, in Clement Bezold and Trevor Hancock, "An Overview of the Health Futures Field," Report of an international consultation convened by the World Health Organization Geneva, Health Futures: In Support of Health for All, July 1993.

However, in many cases, the futures cone, in its most common version first published by Hancock and Bezold in 1993,[242] which distinguishes between possible, plausible, probable, and preferable futures, is of limited use. It does not apply to designs engaging with counterfactual histories or alternative presents, as Daisy Ginsberg's variations on the futures cone, which depict the use of speculation to enable reflection on the present, illustrate (Figure

240 Liz Sanders, "An Evolving Map of Design Practice and Design Research," *Interactions* 15, no. 6 (2008): 13–17.

241 For example, in Candy (2010), Dunne (2010), and Dunne & Raby (2013).

242 Clement Bezold and Trevor Hancock, "An Overview of the Health Futures Field," Report of an international consultation convened by the World Health Organization Geneva, Health Futures: In Support of Health for All, July 1993.

4.50).[243] It also obscures the fact that the characteristics of "now" and the "future" depend on the perspective taken and are not the same for different people, objects, and contexts, which Julia Lohman addresses in her version of the futures cone for co-creative and co-speculative processes (Figure 4.51).[244] Apart from these issues, the futures cone includes no parameters that describe how "open" or ambiguous a discursive design or scenario is – how much of its idea is defined by the designer, and how much is left to the audience's interpretation – even though this interpretation would be a key factor when determining whether an idea is possible, plausible, probable, or preferable. Its dualism between the future and the present, which resembles dualisms between fiction and reality, needs to be addressed by a posthuman approach to design, which seeks to create transversality between dualisms.

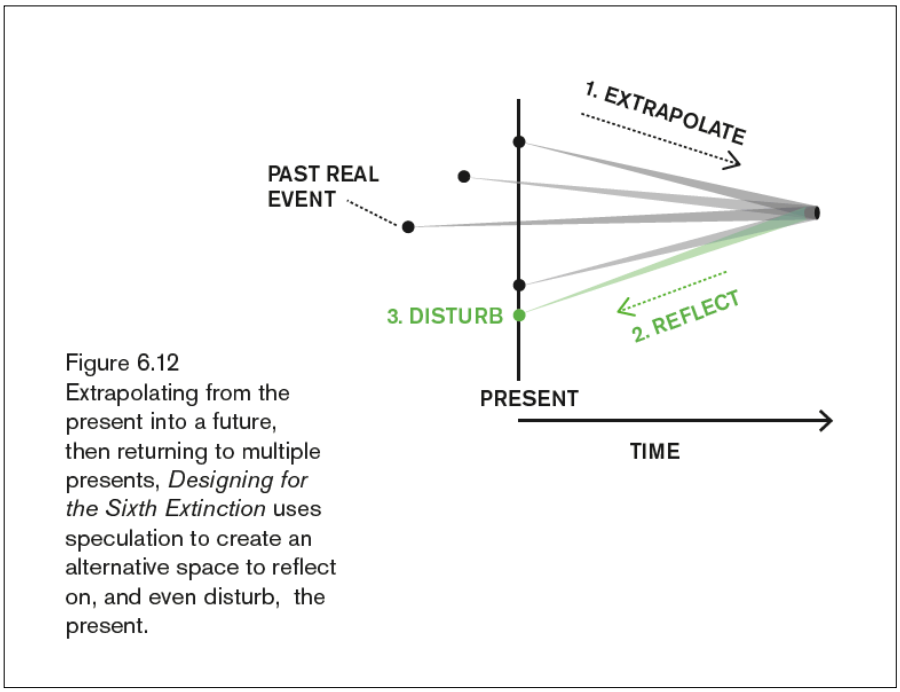

Figure 6.12
Extrapolating from the present into a future, then returning to multiple presents, *Designing for the Sixth Extinction* uses speculation to create an alternative space to reflect on, and even disturb, the present.

Fig. 4.50 Adapted futures cone by Daisy Ginsberg, in Alexandra Daisy Ginsberg, "'Better.' Navigating Imaginaries in Design and Synthetic Biology to Question 'Better'," Ph.D. diss., London, Royal College of Art, 2017, 164.

243 Alexandra Daisy Ginsberg, "'Better.' Navigating Imaginaries in Design and Synthetic Biology to Question 'Better'" (Ph.D. diss., London, Royal College of Art, 2017), 164.

244 Julia Lohmann, "The Department of Seaweed: Co-Speculative Design in a Museum Residency" (Ph.D. diss., London, Royal College of Art, 2017).

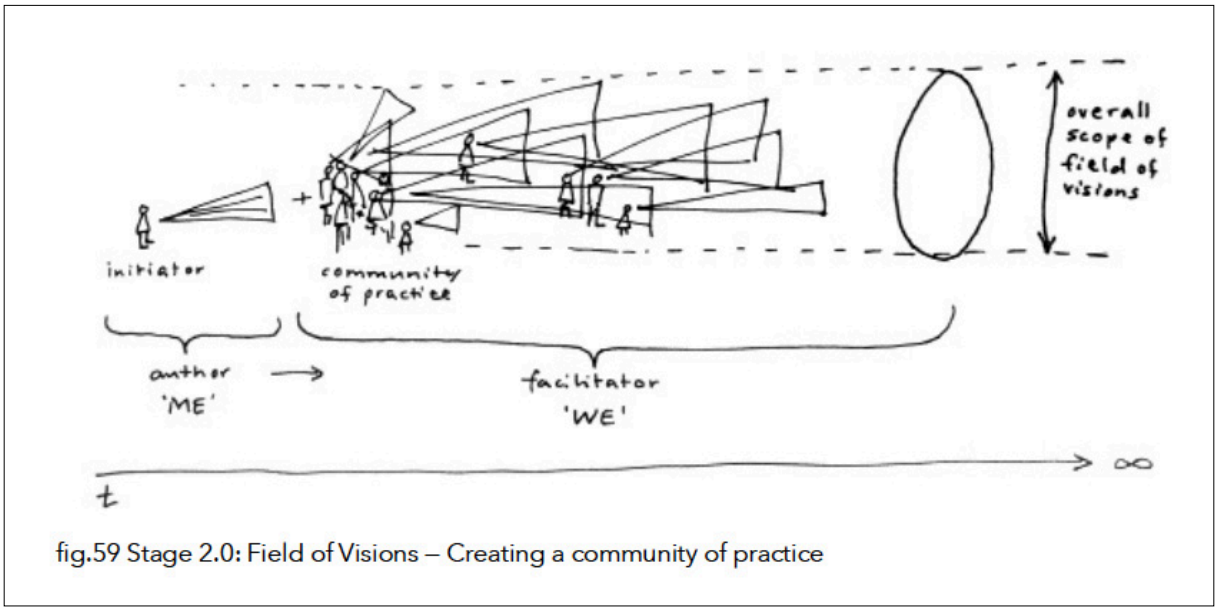

fig.59 Stage 2.0: Field of Visions – Creating a community of practice

Fig. 4.51 Adapted futures cone by Julia Lohmann, in Julia Lohmann, "The Department of Seaweed: Co-Speculative Design in a Museum Residency." Ph.D. diss., Royal College of Art, 2017.

Rather than a diagram depicting how far in the future, and how possible, plausible, probable, or preferable the design projects I am conducting are, a different tool is needed to guide and discuss my research concerning transversality between fiction and reality. Before starting the design projects, I developed the discursive approximations diagram (Figure 4.52) as an overarching tool to understand and analyze the design work and guide further work. The diagram is itself hyperstitional in enabling these processes, while also tracking the hyperstitionality of the projects. The discursive approximations diagram assists in situating designs according to their level of fictionality and concreteness, and it guides the development of project iterations that move from fictional and abstract towards closer-to-reality and more concrete. The level of a design's concreteness or abstraction is determined by considering its legibility, usability, and openness, including its narrative and project description. Its fictionality is determined by whether it would be technologically possible, or possible in relation to current social, economic, or cultural practices. This diagram does not depict a z-axis of criticality (from reinforcing to questioning the status quo). All my projects seek to retain criticality, even when moving through project iterations towards reality.

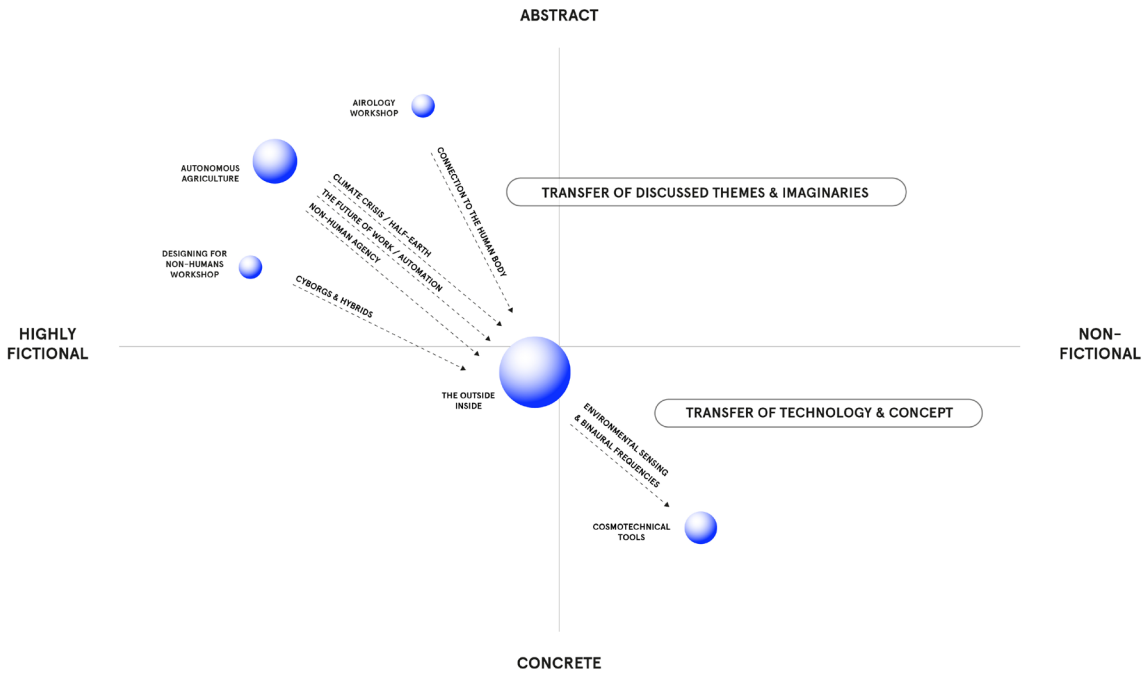

Fig. 4.52 Discursive approximations diagram, 2016–2019.

At first sight, it may seem contradictory to position discursive design projects as hyperstitions, especially when the designs are intended to provoke and enable discussions and debates rather than to be realized. This raises the question of which reality a project that is intended to provoke rather than become real, could bring about. Here, it is important to clarify that it is not the actual designs that are meant to move from fiction into reality (although they could of course, but in some cases, this would be problematic) but rather the posthuman imaginaries they invoke in their dissemination and discussion. This is a crucial point in which "discursive approximation" differs slightly from the concept of hyperstition from which it evolved. The developing posthuman imaginaries, rather than the actual designs, bring about their own reality. These imaginaries flow from one project into the next and are the thread that runs through iterations of increasingly concrete and closer-to-reality designs.

Despite the referencing of positive feedback loops in the concept of hyperstition, feedback in my research is not to be misunderstood as cybernetic feedback loops that assess, evaluate, and control, and that can be defined in mathematical terms.[245] Instead, they take the shape of informal forms of discussion and debate that lead to internal reflection and findings. Consistent with a discursive design approach of raising more questions than finding answers, the aim is not to gather generalizable feedback on the designs. Instead, the design projects are framed as a series of ongoing conversations, in which fictionality seeps into reality through the evolving posthuman imaginaries that impact closer-to-reality designs. The feedback loops in my work materialize discourse and result in discourse-generating designs. Each feedback loop enables a broadening of perspectives by involving different audiences and contexts.

Diagrams necessarily greatly simplify the complexity of the design projects and processes they seek to depict or generate and are, consequently, often imprecise. Despite these limitations, diagrams can still be valuable as tools for generating and discussing design practice. In Chapter 4.2., OOO-related diagrams that map relations between entities helped to develop designs based on alternative configurations of human and non-human agency and interconnection, as a form of diagrammatic world-building that preceded the design. They also enabled an awareness of different audiences and their entanglements in dissemination processes.

The discursive approximations diagram has flaws, such as a lack of depiction of different contexts, similar to the futures cone. A design may be more fictional to some than to others; social, economic, and cultural practices vary heavily depending on the context. It also holds potential inherent contradictions in terms of questioning the status quo while moving closer towards current social, economic, and cultural possibilities. It is thus to be understood as

245 See Ashby for his definition of feedback in cybernetics: W. Ross Ashby, *An Introduction to Cybernetics*, 4th Edition (London: Chapman & Hall, 1961), 53–55 & 81.

a guiding tool for creating and understanding transversality in iterative design processes between fiction and "reality" and not as a diagram that can fully represent and help analyze their scope. It leaves room for experimentation, exploration, and adaptation.

4.4.3. MATERIALIZED DISCOURSE

In my practice-based work, transversality between fiction and reality is an overarching endeavor, in connecting discursive design closer to the "real" and remaining involved in the discussions a project generates, to enable and reflect the development of new posthuman imaginaries. My projects exploring xenodesign form an interconnected lineage of works, which builds on discussions generated by previous design projects, as an ongoing materialized discourse (Figure 4.53), moving each project closer to the realm of the possible and the concrete. This is enabled and tracked by the discursive approximations diagram, evolved from the concept of hyperstition.

The discussions that developed around the Autonomous Agriculture project, during the cultural walking tour and community dinner in Lendava, impacted the concept of the Designing for Non-Humans and Airology Workshops as well as the project The Outside Inside. Rather than focusing on an audience's needs and wishes, the discussions were informal and spontaneous and were conducted to investigate what the audience considered uncomfortable or unusual territories touched on by the Autonomous Agriculture project. As mentioned in Chapter 4.2., the main themes occurring from these discussions were non-human agency and systems that can operate beyond human interference or control, the climate crisis and the Half-Earth concept by E. O. Wilson,[246] and automation in the context of labor.

246 Edward O. Wilson, *Half-Earth: Our Planet's Fight for Life* (New York: Liveright Publishing Corporation, 2016).

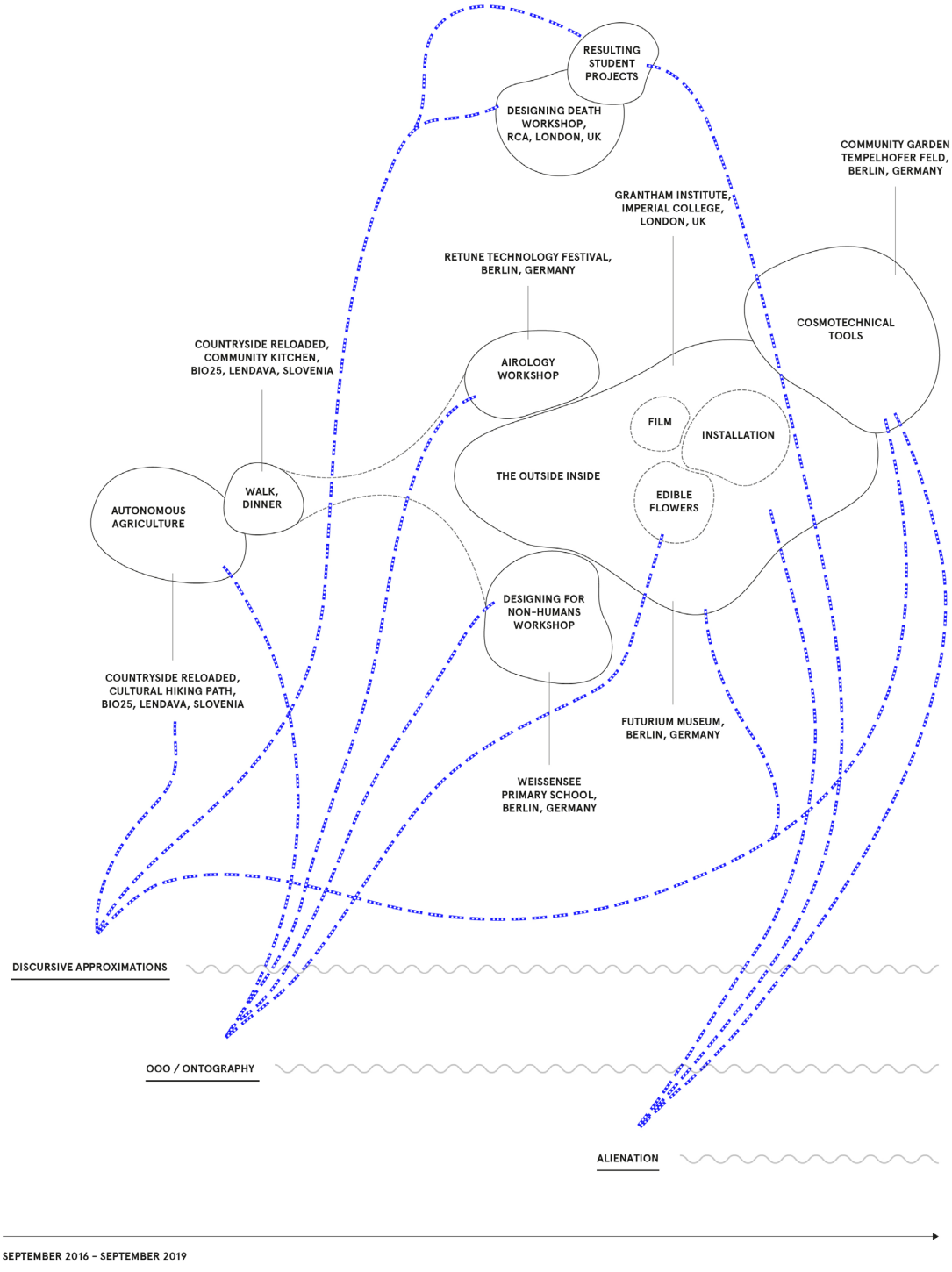

Fig. 4.53 Evolving approaches, projects, and contexts diagram, 2019.

The discussion of these posthuman imaginaries could emerge because of the multi-meaningness, malleability, and underlying complexity of Autonomous Agriculture. This provided a multifaceted basis on which the audience could project their own related ideas, opinions, and concerns. Abstraction can be used to move humans outside their comfort zone, opposing a widespread preference for concreteness and the human scale.[247] Highly fictional, abstract designs, such as that of Autonomous Agriculture, create a type of alienation and othering by using conceptual and visual strangeness. They can be starting points for interesting open-ended conversations, open to multiple perspectives and interpretations rather than prescriptively steering in one direction. In these cases, it is crucial is that designers maintain an open mind in the discussion and iteration of a design, as it may initially be unclear which direction a project will take – a consequence of sharing agency with others in the design process. Ambiguity invites the agency of others. The themes of the discussions about the Autonomous Agriculture project determined the initial research themes for further work, from which the Designing for Non-Humans and Airology workshops evolved, as well as the design for The Outside Inside.

The Designing for Non-Humans workshop took place while The Outside Inside was still being developed. It influenced The Outside Inside through the recurring imaginary of a cyborgization of the non-human, which emerged in many of the participants' prototypes as a result of their group discussions. This fascination with other species as cyborgs impacted the development of the installation, particularly the augmentation of the plants, lichen, and fungi with a sensor-based computational system. The Airology workshop provided another crucial insight that was key to the later development of the installation of The Outside Inside. All participant groups, even when tasked to understand air in relation to other species or objects, continued to relate their ideas to the human body. This connection to the body seemed to be helpful in understanding and exploring abstract concepts of what is otherwise difficult to perceive. It led to discussions about how our bodies are impacted by invisible

247 Patricia Reed, "Xenophily and Computational Denaturalization," *e-flux Architecture*, Artificial Labor (2017), https://www.e-flux.com/architecture/artificial-labor/140674/xenophily-and-computational-denaturalization/.

things around us (in this case, air), which are otherwise given little thought. In The Outside Inside, these discussions are represented in the project's visceral connections to the human body: sound that influences the human brain and edible flowers as ingestible possible futures.

The Cosmotechnical Tools project was developed to take this an iteration further, using a feedback loop that focused on the transfer of technology and ideas from research. In contrast to the previous iterative processes, the development of The Outside Inside into the Cosmotechnical Tools project was only partially based on discussions and audience engagement, because it was developed during a time when only a small audience had engaged with The Outside Inside at the Futurium Museum, while the museum was not yet officially open. Of the people that had seen the project, several mentioned that they would be curious to test the sensors and the sound-generating system on other plants or use it as a meditation tool in other spaces (see Appendix Figure E5, E6). This led to another approach of iterating projects closer to reality: technology transfer. Rather than finding ideas at the core of projects or imaginaries to use as a basis for the next closer-to-reality project, as in the case of The Outside Inside, the technology and research used in the project were the main transferable elements. They were turned into a toolkit that can exist and operate outside a museum or gallery space, which creates possibilities to engage with audiences beyond the museum.

As mentioned in Chapter 4.3.3., the discussions that emerged when testing the Cosmotechnical Tools toolkit in a community garden context were much more specific to the topics the project seeks to address. They led to several follow-up conversations and plans for developing the project further, including discussions about using sound as a fertilizer with an environmental engineer from an urban farming startup. Potentially turning the project into an open-source toolkit was also discussed, as several other designers and design students approached me asking to share the environmental sensing technology, since they were interested in using it in their own work, for example, in sustainable landscape design.

The project not only invoked discussions about posthuman imaginaries but inspired those directly working with them – farming food in indoor farms that consist of plant-technology entanglements and designing sustainable environmental interactions. In the Cosmotechnical Tools project, the toolkit becomes both "design for debate" and "design for use," finding applications in both discursive and applied contexts and mixed realms in between.

To test the process of discursive approximations and transversality between fiction and reality outside of my own design work, I also centered the Designing Death workshop at the Royal College of Art around this approach, exploring how it could operate in ideation workshops or educational settings. In the workshop, the process of discursive approximations was followed within only one day, starting with developing fictions and then transforming these into closer-to-reality concepts. Although the fictions developed during the workshop were not of a high quality (often using clichés, or being too controversial and thus easily dismissed, probably due to the short time frame), their use as a means to an end nevertheless worked exceptionally well. As discussed in Chapter 4.3.4., the participants described how developing fictions helped them to move into a space of radical thinking, which they assumed they would otherwise have struggled with had they immediately started creating designs that were technologically possible. The resulting discussions about poetic but perhaps unsettling fictional ideas significantly impacted the later closer-to-reality work. For example, the group that developed the community garden burial concept initially worked on the fiction of a complex technological reincarnation of the deceased. The concept of becoming reincarnated through plants in a community garden, which can be tasted in a collaborative ritual, was developed based on the original fictional idea. It is closer to reality due to being technologically possible, albeit socially and culturally radical, and caused engaging and lengthy discussions amongst the participants, tutors, and guest tutors. Even after the workshop, the group maintained contact with Nathan Burr, a guest tutor with experience in gardening and permaculture. Currently, they are investigating the legal frameworks of potentially turning the concept into reality.

4.4.4. CONCLUSION

In summary, the diagrammatic approach of discursive approximations, which evolved from the concept of hyperstition, successfully assists in enabling, understanding, and reflecting processes of iterative forms of discursive design that move from fictional and abstract towards closer-to-reality, more concrete work. It enables an engagement with multiple audiences.

Striving to build a process of engagement with "*what actually happens*," rather than merely "*what is*" and "*what could be*,"[248] discursive approximations are concerned with remaining involved in the discussions that occur as a result of a project and understanding them as hyperstitional. While the diagram evolved from the concept of hyperstition, here, it takes a slightly different approach to fictions making themselves real: not the fictional designs, but rather the imaginaries they generate through discussion make themselves real.

In the process of discursive approximations, feedback loops use initial, highly fictional and abstract designs as a basis for workshops, open-ended conversations, and technology or research transfers, which result in discussions of posthuman imaginaries and ideas that can evolve through a series of conversations and be developed into further work. These feedback loops proved particularly suitable if they incorporated implicity, inclusivity, tangibility, and open-endedness. The resulting work becomes a form of materialized discourse.

The characteristics of initial, fictional designs that have proven successful for iterative forms of discursive design between fiction and reality are multi-meaningfulness, malleability, and underlying complexity. Ambiguity can be used as a tool to open a project to the agency of others, allowing them to interpret or react to it, shaping how it is taken further in the next design iteration. Either the core ideas and posthuman imaginaries emerging in the

248 Like in xenoarchitecture: Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match,* 14.

discussions or the technologies and research can be transferable to a subsequent iteration – the latter are especially transferable in projects that are already closer to reality and have previously passed through an iterative loop.

Discursive approximations can foster an engagement with a variety of audiences. Those in gallery contexts, where highly fictional, abstract projects are usually disseminated, are different from those that encounter closer-to-reality work, which can eventually be disseminated as functional products and prototypes – not necessarily commercially, but through open-source tools or community contexts. Discursive approximations work towards creating xenodesign projects that are, in part, materializations of previous discussions. These projects become both “design for debate” and “design for use” and can operate in a variety of contexts.

5. TOWARDS XENODESIGN AS A PRACTICE OF TRANSVERSAL ENGAGEMENT

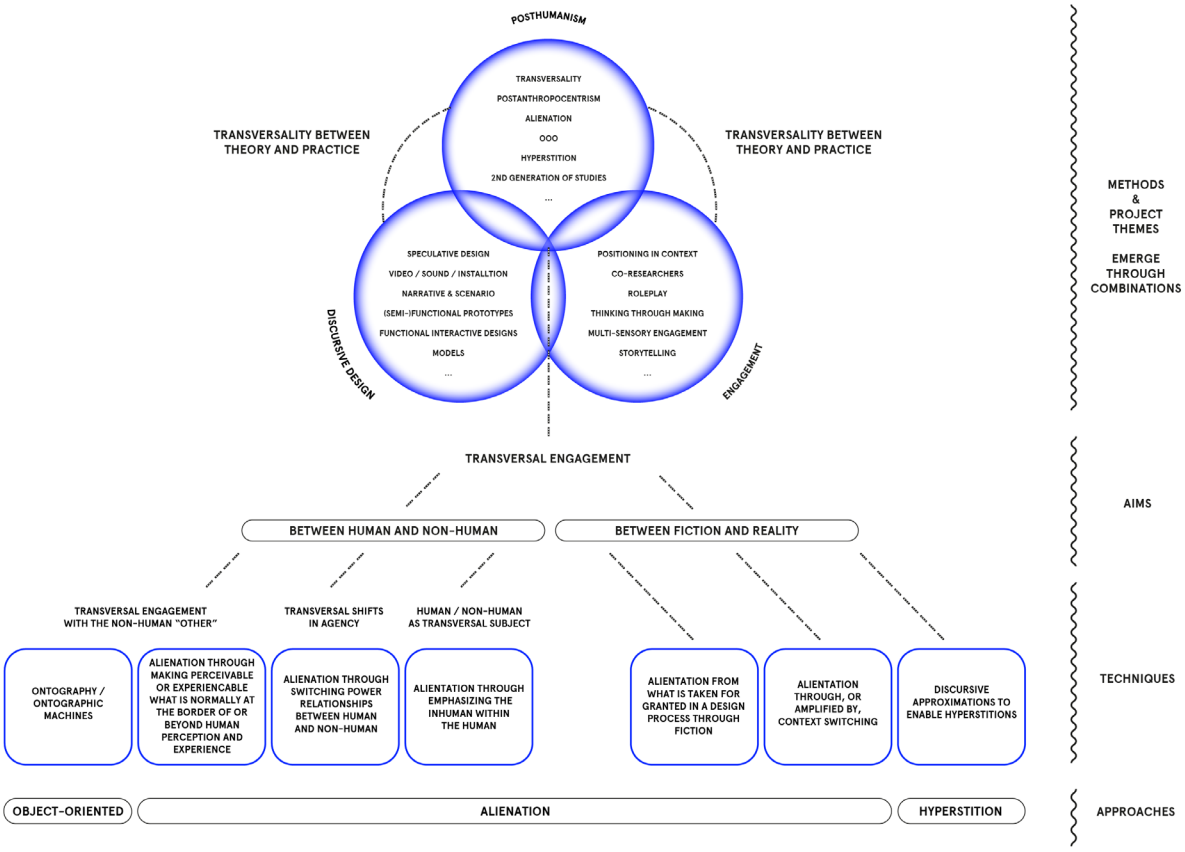

Fig. 5.1 Posthuman Methodology Diagram, 2020.

5.1. INTRODUCTION

In this chapter, I discuss the posthuman methodology (see Figure 5.1) my research develops through the design projects introduced in Chapter 4. This methodology addresses the gap between theory and practice, which can exist in work in the overlap between discursive design, posthumanism, and engagement, by developing design and engagement techniques directly from posthuman concepts and theories. This provides the basis for a practice of

xenodesign – answering the research question, "**What could entail a posthuman / xeno approach to design?"** Chapters 5.2. and 5.3. discuss transversal engagement between human and non-human,[249] and between fiction and reality, which the methodology strives towards, to help develop posthuman imaginaries. This is enabled by the seven xenodesign techniques developed as a part of my research. Chapter 5.4. elaborates on how transversal engagement can lead to collaboratively developed posthuman imaginaries. These chapters answer the subquestions to my research question – "**How might design employ concepts from the realm of posthumanism and xeno theory to enable new imaginaries to emerge? How might it develop strategies to connect with humans and non-humans in order to achieve this?"**

5.2. TRANSVERSAL ENGAGEMENT BETWEEN HUMAN AND NON-HUMAN

Xenodesign's posthuman methodology is centered around transversal engagement. Central to posthumanism is a breakdown of perceived boundaries – "transversality" as Braidotti terms it, or "crucial boundary breakdowns" in the work of Donna Haraway. According to Rosi Braidotti and Matthew Fuller, transversality is a way of describing interrelations between entities, without emphasizing their difference,[250] and "*a pragmatic method to render problems multi-dimensional: expressing active forces and capacities under the radar of established forms of articulation.*"[251] Similarly, Haraway's boundary breakdowns, as described in her Cyborg Manifesto, entail hybridity and "leakiness" between categories previously described as separate: human and non-human animals, organisms and machines, and the physical and virtual.[252]

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249 While transversality between non-human and non-human also plays a role in my research, for example in the case of "Futures Within" with its flowers impacted by environmental changes, it is not a central element. This is because non-human / non-human relations are more difficult to access epistemologically, but also because they are less relevant for the goal of developing new posthuman imaginaries, for which engagement with humans is imperative.

250 Braidotti and Fuller, "The Posthumanities in an Era of Unexpected Consequences," 16–17.

251 Braidotti and Fuller, "The Posthumanities in an Era of Unexpected Consequences," 1.

252 Haraway, "A Cyborg Manifesto," 151–153.

In my practice-based work, OOO and alienation enable transversal engagement between human and non-human. As discussed in Chapter 4.2., OOO-related techniques adapted to design in my research are ontography and ontographic machines. As discussed in Chapter 4.3., my research develops five techniques of alienation in design: switching power relationships between human and non-human, making perceivable or experienceable what is normally at the border of or beyond human perception and experience, emphasizing the inhuman within the human, alienation from what is taken for granted in a design process through fiction, and alienation through – or amplified by – context-switching. While the latter two are related to transversality between fiction and reality and engaging with the human "other," and are discussed in the next chapter, the remaining techniques enable transversal engagement between human and non-human that revolves around three key overlapping themes: transversal engagement with the non-human "other," transversal shifts in agency, and humans / non-humans as transversal subjects.

5.2.1. TRANSVERSAL ENGAGEMENT WITH THE NON-HUMAN "OTHER"

Alienation by making perceivable or experienceable what is normally at the border of or beyond human perception and experience, as well as ontography and ontographic machines, foster an engagement with the non-human "other." This is achieved by analyzing and highlighting relations and creating awareness of the existence of non-human perspectives and agency, even if these are not fully accessible to humans. By expanding the perspective of a design project towards the "other," the human can be decentered, and a broader view can be created that includes the potential consequences and possibilities of a project.

If the connection of a work of art or design to an audience is an inherently social practice,[253] then it is important to pay close attention to the power relationships this entails. This raises

253 Kevin Coffee, "Audience Research and the Museum Experience as Social Practice," *Museum Management and Curatorship*, 2007, 337–89.

the question of whether being entangled in design processes and engagement practices can give agency not only to humans but also to non-humans. Here, it may be useful to draw on Karen Barad's definition of agency. For Barad, agency is not a property but emerges from "intra-action," how entangled agencies relate to each other.[254] In a design that emphasizes this entanglement and investigates intra-actions, agency is shared. It can mean to "*recognize agency in different forms as relations, movements, repetitions, silences, distances, architecture, structures, feelings, things, us/them/it, words…,*"[255] opening up new ways of thinking and acting, within this entanglement.

In The Outside Inside, sensing and sound-generation make the activities of plants, lichen, and fungi, which are normally not perceivable to humans, accessible. It highlights the entanglement and intra-actions between plants, their environment, technology, and humans. It also changes how the human audience views these species and their activities, leading to potentially different behaviors, although this might be difficult to measure.

How techniques of ontography can help understand entanglement is reflected in the mappings of a flower, which were developed as part of the project's process (see Chapter 4.3.2.3.). The flowers harvested from the installation, affected by their environment, then form an interconnected but separate part of the project, becoming ingestible futures. Similarly, ontographic mappings helped understand both human and non-human interrelations in several analyzed and imagined agricultural technologies in the Autonomous Agriculture project (see Chapter 4.2.2.). Ontography and ontographic machines can strengthen the inclusion of the "other," beyond the human, both in the process and outcomes of projects.

Looking back at the existing work within the realm of design and OOO discussed in Chapter 3, one key difference in my approach has been to investigate not only relations between

254 Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Duke University Press, 2007), 33.

255 Sofie Sauzet, "Phenomena – Agential Realism," *New Materialism* (blog), March 13, 2018, https://newmaterialism.eu/almanac/p/phenomena-agential-realism.html.

humans and technology, or technology and technology, but to include a broader range of non-human entities, investigating wider environmental and ecological or economic aspects.

The transversal engagement that ontography creates in the design processes through mappings is analytical and mental. This can result in new forms of transversality when maps of potential future interrelations are materialized as design projects. The analytical approach of ontography operates in a different way to the use of alienation, which makes otherwise invisible non-human relations experienceable. Alienation operates in an affective rather than analytical manner. For example, in The Outside Inside or the Cosmotechnical Tools project, people's experiences of engaging with what is normally beyond human perception and experience, and allowing plants, fungi, and lichen to gain influence over their brains, caused initial affective reactions that only later triggered analytical reflections and discussions (see Chapter 4.3.). These reflections and discussions are necessary for new posthuman imaginaries to emerge, as I discuss in Chapter 5.4.

As The Outside Inside and the Cosmotechnical Tools project show, opening up perspectives towards an engagement with the non-human "other" often requires crossing disciplinary borders. For example, exploring research from the natural sciences to find aspects potentially unknown to the audience the design engages with. This transdisciplinarity is a key characteristic of the posthumanities,[256] which involves transversally crossing traditional disciplinary boundaries and transcending the confines between formerly separate realms of knowledge.[257]

In contrast to design work positioned in the realm of "more-than-human design," such as Anne Galloway's and Superflux's previously discussed projects, "Counting Sheep" and

256 Braidotti and Fuller, "The Posthumanities in an Era of Unexpected Consequences," 2–3.

257 This is in contrast to multidisciplinarity, which engages with knowledge from other disciplines but remains within its boundaries, and interdisciplinarity, which combines disciplines into a new integrated whole but does not break their boundaries down. See Roderick J. Lawrence, "Deciphering Interdisciplinary and Transdisciplinary Contributions," *Transdisciplinary Journal of Engineering & Science* 1 (2010).

"Mitigation of Shock," the transversal engagement with the non-human "other" in my projects does not lead to work that directly addresses human needs. It also does not result in designs that aim to address non-human needs, as in Amy Haigh's "A Series of Intermediate Artefacts," but in designs that speculate and assist human audiences in imagining non-human needs – as part of a process of developing new posthuman imaginaries. This imagining of non-human needs, by myself in the design process but also by the audience the projects engage with, is a principal way in which xenodesign operates to decenter the human. Techniques such as alienation, ontography, and ontographic machines foster this imagining of non-human needs. To a certain extent, knowledge about the non-human "other" is produced in my design processes, for example, in learning about plant behavior through working with plants, and closely connecting posthuman theory, theory from the second generation of "studies" (including critical plant studies), and design practice. However, the transversal engagement with the non-human "other" in my work produces more questions than answers.

5.2.2. TRANSVERSAL SHIFTS IN AGENCY

Moving beyond decentering the human and creating awareness of non-human agency, as discussed in the previous chapter, transversal agency takes a step further in intentionally shifting agency towards the non-human in design and engagement practices. Alienation can enable this through the technique of switching power relationships between human- and non-human. Ontography enables this in design processes by mapping power relations between entities and then purposefully shifting these. Both can be used in combination, first using ontography to understand the context and imagine shifts and then designing a switched power relationship that generates an alienating experience for a human audience. Braidotti and Fuller's statement that the "*posthuman without an ethics, and without an active*

analysis of power risks simply being advertising for the Anthropocene,"[258] hints at the necessary awareness of power relations and potential consequences within posthuman analyses or practices. It also opens up a route to address these directly through design. In the Autonomous Agriculture project, visual ontography was used in mappings to understand power relations between humans, existing agricultural technologies, and ecosystems. It was then used to shift agency towards the non-human, first in new mappings of fictional technologies and then materialized in the designed prototypes (see Chapter 4.2.2.).

In the previously discussed example of Betti Marenko and Philip van Allen's work on technological devices that become collaborators in creative design processes, animism is used as an approach to design objects that disrupt or inspire human activity in a form of shared agency. My approach to agency shifting is slightly different. While shared agency between human and non-human is part of the design processes, in the design outcomes, this is taken a step further to create shifts in agency and power that have alienating effects.

The Outside Inside and its subsequent iteration, the Cosmotechnical Tools project, use these alienating power shifts resulting from transversal agency as a key technique. By using technology to enable non-human species such as plants, mushrooms, and fungi to influence the human brain via sound frequencies, the power humans usually perceive to have over these species in such a controlled environment is distorted. As discussed in Chapter 4.3., alienating power shifts are often perceived as uncomfortable but can be a productive force in creating new mindsets and relationships, "*becoming-with each other,*"[259] as Donna Haraway would say. Visitors of the installation and participants in the community garden tests mentioned their changed view of how plants sense and interact with their environment, triggered by the strangeness of the project, which invoked a sense of curiosity. The possibilities of the Cosmotechnical Tools project, including using the technology as a toolkit for creating other

258 Braidotti and Fuller, "The Posthumanities in an Era of Unexpected Consequences," 26.

259 Donna Haraway, "Staying with the Trouble for Multispecies Environmental Justice," *Dialogues in Human Geography* 8, no. 1 (February 26, 2018), 103.

interspecies or cyborgian interrelations, such as using it as a sonic fertilizer, take this a step further.

5.2.3. THE HUMAN / NON-HUMAN AS TRANSVERSAL SUBJECTS

An understanding of the human and non-human as transversal subjects, not separate from but always entangled with other entities, means emphasizing the inhuman within the human in my design work. This is a technique of alienation, which can also benefit from ontographic mappings in the design process but cannot be developed through OOO-related approaches alone. As discussed in Chapter 4.2., OOO understands the human as a universal subject, which implies that answering the question of what it means to be human, or deconstructing the human, consistent with a posthuman critique of not only anthropocentrism but also humanism, cannot be achieved through OOO alone. Emphasizing the inhuman within the human can help to overcome these limitations of an OOO-related approach to design.

This becomes particularly relevant in Futures Within, the work that is part of The Outside Inside and consists of edible amaranth flowers grown in possible future environmental conditions of the year 2100. Since the biochemical composition of plants is altered when they are exposed to different environmental conditions, highlighting this through design means understanding and emphasizing the plant as a transversal subject. When plants with lower protein contents (which they develop when exposed to elevated CO_2 levels), or higher antioxidant contents (when grown in saline soil) are ingested by humans as part of the installation, the human as a transversal subject is also emphasized. The agency of salt minerals, conveyed through their ability to affect the inner workings of plants, affects not only these plants but also crosses through the plant body into the human body, also affecting humans.

The technique of alienation by emphasizing the inhuman in the human, which my work develops, was not explicitly conceived through a new materialist approach. However,

it operates along similar lines of thought. New materialism is closely related to posthumanism in its decentering of the human and rejection of nature / culture dualisms, and it particularly emphasizes the action and agency of matter:

"*The very nature of materiality is an entanglement. Matter itself is always already open to, or rather entangled with, the 'Other.' The intra-actively emergent 'parts' of phenomena are co-constituted. Not only subjects but also objects are permeated through and through with their entangled kin; the other is not just in one's skin, but in one's bones, in one's belly, in one's heart, in one's nucleus, in one's past and future. This is as true for electrons as it is for brittlestars as it is for the differentially constituted human*." – Karen Barad[260]

5.3. TRANSVERSAL ENGAGEMENT BETWEEN FICTION AND REALITY

In my practice-based work, transversal engagement between fiction and reality is achieved by using engagement approaches and the discussions a project generates to enable and reflect the development of new posthuman imaginaries. This addresses the need to connect discursive design closer to the "real" when it comes to topics of contemporary urgency such as climate crisis mitigation or questioning anthropocentrism. This is done through three techniques in my work, which create a "leakiness" between fiction and reality: alienation from what is taken for granted in design processes through fiction, alienation through context-switching, and – most directly – the use of hyperstition as a design technique, guided by the discursive approximations diagram. This overcomes dualisms between "design for debate" vs. "design for use."

In my work, engagement in the context of the human / non-human differs from the participatory or discourse-oriented type of engagement that is more common in discursive design

260 Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Duke University Press, 2007), 393.

in its leaning towards the non-human. Engagement in fiction / reality transversality in my work, however, operates through more established approaches of engaging with human audiences in discursive design. This is because the concept of hyperstition – fictions that make themselves real by introducing new ideas into culture, becoming new social imaginaries – necessitates human audiences to help bring about its own reality.

As previously discussed in Chapter 4.3.2.2., the imaginary of terraforming my work references is a historical example of a hyperstition. It was introduced into culture through science fiction and then developed in scientific research and current geopolitical environmental projects that directly impact the "real," such as the Great Green Wall project in Africa, an effort to grow an 8,000 km long forest across the entire continent to halt desertification.[261] To create processes in which hyperstitions can be used in a more directed way, I use the discursive approximations diagram in my work as a guiding tool to explicitly create transversality between fiction and reality in design processes.

Within discursive design, the idea of developing fictions that could potentially make themselves real is also discussed in the work of Chris Woebken's and Elliott Montgomery's studio, "Extrapolation Factory." Taking a participatory approach to futures thinking and speculative design, their work involves opening up discursive design processes to both designers and non-designers, holding workshops with designers, scientists, or museum audiences. In many of their workshops, participants develop ideas through forecasts from a futures database mapped out on a version of the futures cone. [262] They then prototype their ideas by disassembling products from 99-cent shops and reassembling them into new, fictional devices.[263] Although the concept of hyperstition is not explicitly referenced in their work, their

261 "The Great Green Wall," https://www.greatgreenwall.org.

262 Elliott P. Montgomery and Chris Woebken, *99 Cent Futures*, 2013, https://extrapolationfactory.com/99-Futures.

263 Elliott P. Montgomery and Chris Woebken, *Extrapolation Factory Operator's Manual* (CreateSpace Independent Publishing Platform, 2016), 64.

aim – that the fictional products will create feedback loops when seen by people that might be able to make these real – overlaps with the concept of hyperstition. To support these processes, the Extrapolation Factory sent fictional prototypes from their workshops to organizations that work with the technologies they reference, in the hope of inspiring them. For example, a fictional "Drone Detection Cookie Dough" (Figure 5.2) prototype and description were sent by the Extrapolation Factory to the Alaska Center for Unmanned Aircraft.[264]

Fig. 5.2 The Extrapolation Factory, *Drone Detection Cookie Dough, Pawn Tomorrow*, 2014.

The difference between the transversality between fiction and reality in my work and in that of the Extrapolation Factory is that their work remains within the realm of fiction and does not directly move into "reality" through design. Instead, there is a hope that others will enable this shift from fiction to reality. Moreover, their work playfully engages with the

264 Elliott P. Montgomery, "Experiments in Social Rule-Bending" (Lecture, School of Visual Arts, New York, 2019), https://www.youtube.com/watch?v=BMmmDJCcBDU.

possibility of creating fictions that could become real, but it is less about critically examining whether these fictions should, in fact, be made real. For example, Montgomery's DIY kit for organ transplants raises many questions about future healthcare affordability, access, and safety, which are not explicitly addressed when he mentions that perhaps a doctor could see the fictional prototype and make it a reality.[265] However, implying that designed fictions could be made real, without explicitly attaching questions or other impulses for critical thinking to a design, forgoes a chance to take a political stance as a designer and potentially impact the "real" more directly.

In my work, initial fictional designs are not intended to be made real, especially not those that are at the start of a process of discursive approximations. Provocative, fictional designs such as my Autonomous Agriculture project and their specific scenarios are not meant to be realized. Instead, they are a basis for discussions, which is why they are designed to be neither utopian nor dystopian but to create conflicting reactions, ideas, and consequences that create rich starting points for conversations. The imaginaries that evolve through these discussions, rather than the fictional designs themselves, are what can become "real."

Here, hyperstition – using the discursive approximations diagram as a guiding tool – overlaps with the technique of alienation from what is taken for granted in a design process through fiction. For example, in the Designing Death workshop, the process of designing fictions was used to move the participants out of their comfort zones, to think in a less restricted manner, and later discuss the results. In these discussions, the aim was to discover the interesting elements at the core of the fictions that can become part of new social imaginaries around cultural practices related to death and dying. The new cemeteries the students then designed were, especially in the case of the community garden cemetery concept, not only fictional designs but new social imaginaries, involving not only imagining and thinking through a design but also considering the rituals, belief systems, and social and

265 Montgomery, "Experiments in Social Rule-Bending."

technological practices that would enable and sustain it – relating it closely to the "real" by investigating its current feasibility in legal frameworks.

In another connected technique, alienation through context-switching, transversality between fiction and reality is created by bringing elements of design or technology into other spaces and contexts. In my work, this emerged when the sensing and sound-generating system from The Outside Inside was brought from the museum to a community garden in its redevelopment into the Cosmotechnical Tools project. Here, the transversality between fiction and reality is less in the design, which remained similar by recreating the technology in a portable form, than in the engagement and discourse it generated in the two different contexts. While the discussions in the museum primarily revolved around the idea development, design and production process, the community garden context enabled thematically specific imaginaries to evolve that are more closely connected to the "real," revolving around terraforming, the climate crisis, post-anthropocentrism, and which role plants and technology could play in these contexts.

A key challenge that emerges in transversal engagement processes between fiction and reality is maintaining the criticality and radicality of a fictional idea when connecting it closer to reality. Often, ideas inadvertently become diluted and thus not only become closer to functionality or feasibility but also to the status quo that they intend to critique. This is also a key issue in the recent trend of using speculative design approaches within commercial contexts.[266] For example, the Google X "Selfish Ledger" project, which was positioned as a thought-provoking speculative design, consists of a video depicting a future in which extensive data collection is used to influence both individual users and larger communities and populations.[267] The project depicts a more extreme version of business practices currently already in place at Google. It extrapolates from the status quo rather than using speculative

266 Tobias Revell, "Five Problems with Speculative Design," *Tobias Revell* (blog), April 2019, http://blog.tobiasrevell.com/2019/04/five-problems-with-speculative-design.html.

267 Google X, *Selfish Ledger*, 2016, 2016, https://www.theverge.com/2018/5/17/17344250/google-x-selfish-ledger-video-data-privacy.

design to imagine alternative data collection and use scenarios, which, for example, would give users more control or create transparency in how their data is used.

To avoid these potential pitfalls in transversality between fiction and reality, my work always maintains an awareness of these. It aims to retain the criticality of the original fictional ideas from which later projects emerge. The role of critique in my design projects draws on its positioning within xenoarchitecture. Here, criticality is described as having the greatest value when it is used as a means rather than an end in itself. Rather than critiquing technology in the way the Frankfurt School did – as a tool of power – critique is used as a means of acknowledging technology for its potential for inhuman intervention as well as its ability to "*expose other modes of reasoning*."[268]

In my research, this other mode of reasoning stems from posthumanism. Defining a specific critical stance that a project takes – a posthuman one in this case – can help retain its criticality within a further iteration. Posthumanism is used in my work not only as an epistemology but also as a critical, political mindset embedded in the design, which can be followed through all its iterations. This stance is infused into the specific themes (e.g., autonomous machines, designing for non-humans, non-human environmental interventions) but also in the specific approaches the work develops (alienation, ontography and ontographic machines, hyperstition / discursive approximations), which can operate within both fictional and closer-to-reality design projects.

The research demonstrates this maintenance of a posthuman stance through all iterations. However, it is important to acknowledge that this is only one of a variety of critical positions that could potentially be used within a process of iterating fictional designs closer to reality. However, if a different critical stance is used, object-oriented approaches and alienation might be less suitable, and other approaches might need to be developed, since these

268 Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match*, 80.

approaches are specific to a posthuman epistemology. In terms of my practice, this means that the transferability of the design approaches of ontography, ontographic machines, and alienation outside of posthuman contexts is limited. The concept of hyperstition / discursive approximations, however, could be used more broadly in other design methodologies, such as taking an intersectional feminist or a cybernetic approach.

A consequence of connecting fictional designs closer to reality is overcoming dualisms between "design for debate" and "design for use." The approach of discursive approximations, and the Cosmotechnical Tools project, its furthest iteration so far, share commonalities with discursive design work that also overcomes dualisms between "design for debate" and "design for use," including that of Maywa Denki with their playful conceptual musical instruments, such as the "Otamatone" (Figure 5.3),[269] Droog's products, such as Martí Guixé's "Do Frame Tape" (Figure 5.4), which enables a literal framing of anything as art,[270] and Radical Design from the 1960s, such as the Pratone lounge chair (Figure 5.5),[271] which questions what a chair is or could be through its large grass-like foam structure. Although these projects exist in a commercial realm, they also offer a form of cultural critique and simultaneously exist in museum and gallery spaces[272] as well as shops and online marketplaces.

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269 Masamichi Tosa and Nobumichi Tosa, "Otamatone," project website, n.d., http://www.otamatone.com/about-otamatone/.

270 Martí Guixé, "Do Frame Tape," Droog online shop, n.d., http://www.droog.com/webshop/product/do-frame-tape.

271 Gruppo Strum, Pratone Lounge Chair, in Maria Cristina Didero and Francesca Molteni, *SuperDesign – Italian Radical Design 1965-1975*, Documentary film, 2017.

272 For example, Gruppo Strum's Pratone Lounge Chair in exhibitions such as MoMA's "Italy: The New Domestic Landscape" exhibition in 1972: https://www.moma.org/calendar/exhibitions/1783, or Maywa Denki's Otamatone as part of the permanent collection of Ars Electronica Center in Linz, Austra: https://ars.electronica.art/center/en/otamatone-kids/.

Fig. 5.3 Maywa Denki, *Otamatone*, 1998.
Fig. 5.4 Martí Guixé, *Do Frame Tape*, 2000.
Fig. 5.5 Gruppo Strum, *Pratone* (produced by Gufram), 1971.

In these examples, functional products are used as a means of dissemination and audience engagement within the realm of discursive design. While these examples are discursive mainly through their critique of aesthetics or an introduction of humor into the design of functional products, the Cosmotechnical Tools project goes beyond this by taking a broader critical stance. It embodies posthuman cosmologies in a functional product that fosters an engagement with environments, non-human species, and ecologies. The potential adaptability of the toolkit invites a further range of cosmologies to be creatively implemented through technology.

The possibilities of making functional discursive designs have increased in times in which it is becoming easier to produce and distribute one's own products as a designer. This resonates with the xenofeminist call for designing technological tools: *"The radical opportunities afforded by developing (and alienating) forms of technological mediation should no longer be put to use in the exclusive interests of capital, which, by design, only benefits the few. There are incessantly*

proliferating tools to be annexed, and although no one can claim their comprehensive accessibility, digital tools have never been more widely available or more sensitive to appropriation than they are today."[273]

Cosmotechnical Tools benefits from this wide availability of digital tools, employing open-source platforms, such as Arduino and the Teensy microcontroller, and using the opportunity to have custom-made PCBs manufactured in small quantities. It becomes a tool that can be used in predetermined ways (as an environmental sensing and brainwave-altering device) or modified for other uses that involve environmental sensing.

The Xenofeminist Manifesto also describes an awareness beyond the immediate product or user, which is addressed in xenodesign specifically through the approaches of ontography and ontographic machines – *"[...] xenofeminism knows that technological innovation must equally anticipate its systemic condition responsively."*[274] Using the discursive approximations diagram as a guiding tool, discursive design can transcend asking "what if" to do what to what is referred to in xenoarchitecture as "*staying involved in what actually happens*."[275] It can assist in creating discursive designs, which, like in Radical Design of the 1960s, are functional and usable but are products of a more contemporary, technological, posthuman approach and are potentially more accessible due to being open-source.

5.4. COLLABORATIVELY DEVELOPING POSTHUMAN IMAGINARIES

Transversal engagement is used in my work to collaboratively develop posthuman imaginaries through discussions of and reflections on the design projects. The designs are not social imaginaries in themselves, although they hint at the possibility of these. Instead, they

273 Laboria Cuboniks, "The Xenofeminist Manifesto," 0X08.

274 Laboria Cuboniks, "The Xenofeminist Manifesto," 0X08.

275 Avanessian et al., *Perhaps It Is High Time for a Xeno-Architecture to Match*, 14.

allow social imaginaries to evolve in their discussion and reflection: If the social imaginary is defined as the imaginations and beliefs people have towards their connections and relations with others,[276] and this directly affects reality, then design projects that question, provoke, and help to discuss human / non-human interconnections and relations can enable new imaginaries to emerge. These imaginaries differ from scenarios in not being specific narratives but rather overarching shifts in thinking and in understanding our position as humans in the world. In my work, these imaginaries are considered in the design iterations in an emerging web of ideas and projects using the technique of discursive approximations. The engagement with human audiences is a key site where these new posthuman imaginaries can develop. This engagement differs from other approaches to participation in discursive design through its posthuman, post-anthropocentric methodology. As discussed in Chapter 3, engagement in discursive design has so far been relatively centered around the human, despite discursive design's position of questioning the status quo.

As outlined in the introduction, my research is highly process-oriented. It is less focused on which specific imaginaries develop through the work than on how these can be created. The posthuman design approaches that emerge in my research are relate to both engagement as well as design processes. Alienation creates uncomfortable shifts in perception or power relations that help question what is otherwise taken for granted or given little thought. This enables new human / non-human interrelations to be introduced into social imaginaries. Ontography and ontographic machines decenter the human and broaden perspectives towards other entities and systems affecting or affected by design proposals, creating more inclusive imaginaries. Hyperstition and discursive approximations use fiction to develop strange, critical, or radical ideas before moving these closer to "reality" and "weirding"[277] them in the process, moving imaginaries beyond the status quo or merely extrapolating them from the present.

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276 Charles Taylor, *Modern Social Imaginaries* (Durham: Duke University Press, 2003).

277 i.e., rendering ideas strange by introducing new practices through designed products or experiences that invoke alienating feelings in a productive way.

Through these approaches, discourse with a variety of audiences through various means can become central to the design process. For example, the iterative design process that moved ideas and imaginaries through various discussions, shifts, and reincarnations into what finally resulted in the Cosmotechnical Tools project can be traced back over three years. Autonomous Agriculture was the first project to be developed. The follow-up discussions and resulting further work have, for example, taken place at a cultural walking path and community kitchen event in the countryside, with a group of children at an elementary school, at a technology festival, with a climate change research institute, in a museum about the future, at a community garden, and at an urban farming startup (see Figure 4.52). Each of these audiences, contexts, and projects enabled different imaginaries to evolve.

While critical design has been characterized by Liz Sanders in her widely shared mapping of design research (Figure 5.6) as being predominantly design-led and having an expert mindset,[278] xenodesign takes a more research-led approach that foregrounds engagement. However, I would not describe this engagement as a "participatory mindset" – the term Sanders uses to contrast an expert mindset – since dualistic thinking between experts and participants is too narrow. This would be contradictory when working with a posthuman methodology that seeks to overcome dualisms and definitions of experts or participants as separate from other entities rather than deeply entangled.

278 Liz Sanders, "An Evolving Map of Design Practice and Design Research," *Interactions* 15, no. 6 (2008): 13–17.

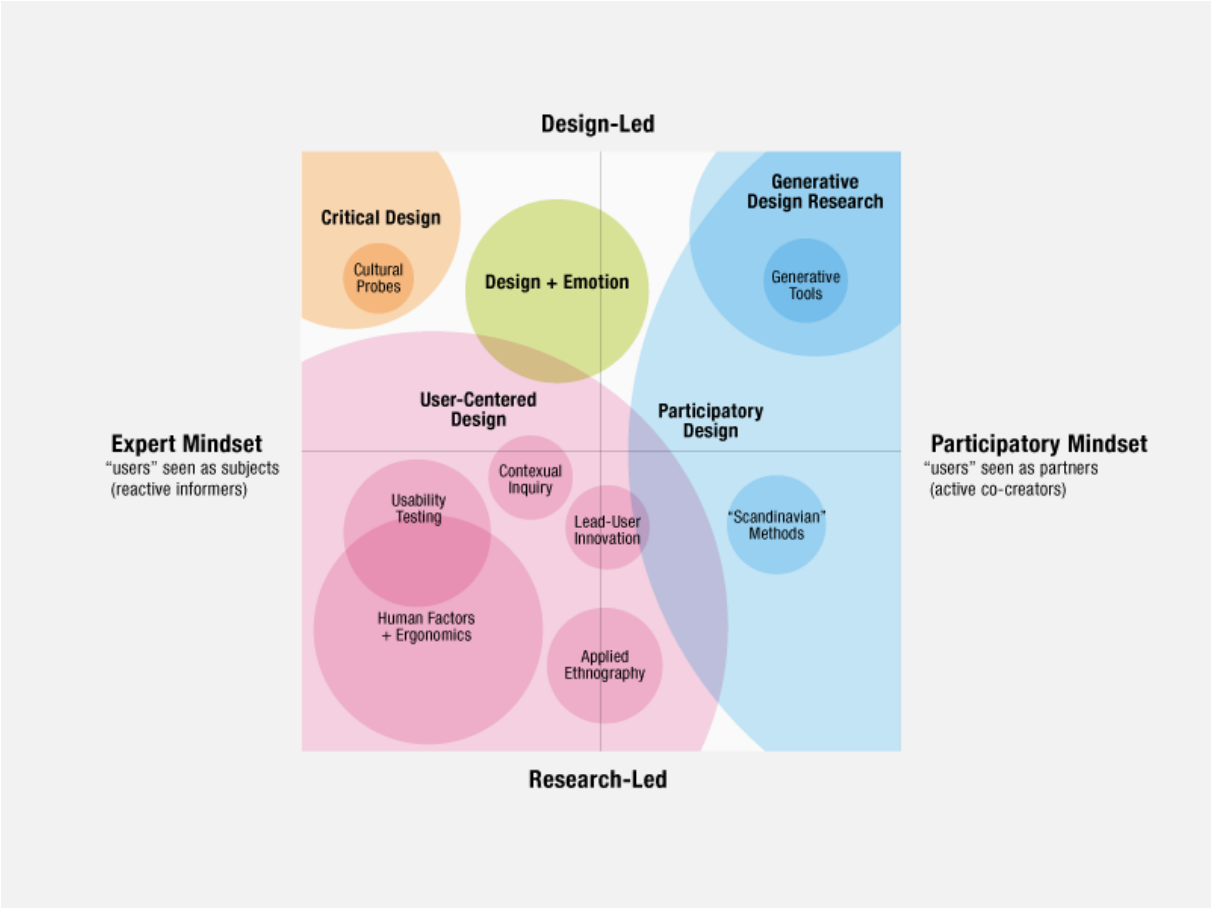

Fig. 5.6 An Evolving Map of Design Practice and Design Research by Liz Sanders, in Liz Sanders, "An Evolving Map of Design Practice and Design Research." *Interactions* 15, no. 6 (2008): 13–17.

Thematically, apart from the key principle of reimagining human / non-human relations, technology plays an important role in the evolving imaginaries in my research. This is influenced by the design projects that intentionally highlight or question the role technology could play in new posthuman imaginaries. This is because technology is a realm in which the posthuman becomes particularly visible in its productions and effects – technology is where "*lives, politics and ontologies are played out*."[279] An interest in technology as a powerful tool that can liberate, alienate, or break boundaries permeates posthumanism from

279 Rosi Braidotti and Matthew Fuller, "The Posthumanities in an Era of Unexpected Consequences," *Theory, Culture & Society* Transversal Posthumanities Special Issue (July 31, 2019): 4.

Haraway's Cyborg Manifesto to more recent related projects such as those of xenoarchitecture and xenofeminism. In both Braidotti's and Haraway's work, technology is central to the posthuman condition as a key cause of it (especially the technologies of the Fourth Industrial Revolution). In Haraway's concept of the cyborg and xenofeminism, it also functions as an emancipatory means.

In my design projects and the resulting discussions, technology is thus crucial in enabling and highlighting the inherent transversality of the human. In the context of moving concepts from the fictional closer to the "real," technology is relevant in the context of transferability: either the technology of a project is fictional or semi-fictional (as in Autonomous Agriculture) and is discussed in relation to a technology that could achieve similar aims but is closer to reality, or a technology developed within a project (The Outside Inside) is used as a basis for a closer-to-reality project (Cosmotechnical Tools).

In relation to discursive design and imaginaries, Daisy Ginsberg argues that the design of social imaginaries can be a technique of critical design, in designing what she calls "critical imaginaries."[280] Her research provides rich insights into the specific sociotechnical imaginary of "better" (better futures, better products, etc.) in the overlap between design and synthetic biology.[281] She contends that synthetic biologists aim to control the imaginaries of "better" in their field but that this should not be left for them alone to decide. Rather than creating designs around potential downstream implications that result from existing sociotechnical imaginaries, her work proposes to design critical imaginaries that operate on a level preceding specific implications and design outcomes. Her work uses this approach to question existing sociotechnical imaginaries and to challenge the economic, ethical, or political aspects that underpin them. Rather than proposing better imaginaries, she designs critical imaginaries that help question existing ones, reminding us that alternatives are possible.

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280 Alexandra Daisy Ginsberg, "'Better.' Navigating Imaginaries in Design and Synthetic Biology to Question 'Better'" (Ph.D. diss., London, Royal College of Art, 2017), 155.

281 Alexandra Daisy Ginsberg, "Better," 151.

My work overlaps with this in that the design projects do not prescribe alternative imaginaries but assist in creating them. However, it intentionally shifts these imaginaries towards the posthuman, which is where the work takes a political stance. To this discussion, it adds the specific techniques with which these posthuman imaginaries can be catalyzed – based on alienation, OOO, and hyperstition.

5.5. CONCLUSION

In summary, transversal engagement in my research operates within two main themes: transversal engagement between human and non-human and transversal engagement between fiction and reality.

Between human and non-human, transversal engagement with the non-human "other" in my design work differs to the discussed related work in that it uses ontography and ontographic machines to investigate entanglement beyond human-technology or technology-technology interactions, including a broader range of entities. It also develops alienation by making perceivable or experienceable what is normally at the border of or beyond human perception and experience, as a specific technique for using design to raise questions concerning non-human perspectives and agency rather than designing for human or non-human needs. Transversal shifts in agency and power relations through alienation are also developed as a new technique within discursive design. So far, even if a certain empathy for and collaboration with the non-human is established, many discursive design projects lean towards designing for human needs or imagining future human needs rather than decentering the human. While much of the related work in discursive design draws on OOO to acknowledge non-human perspectives and entanglement, my research addresses a key shortcoming of an OOO approach within this realm – that it does not deconstruct the human – by using alienation to emphasize the inhuman in the human.

The transversality between fiction and reality needed to connect xenodesign closer to the "real" and to remain involved in discussions and track its political aims can be enabled through participation. Hyperstition necessitates human engagement to bring about its own reality. In my research, this is achieved through the development of three new techniques: alienation from what is taken for granted in a design process through fiction, alienation through – or amplified by – context-switching, and the concept of hyperstition with the related discursive approximations diagram as a guiding tool.

All these techniques assist in collectively developing new posthuman imaginaries. Although some of the designs hint at posthuman imaginaries, the designs themselves are not social imaginaries. These develop only through engagement with human audiences, their discussions, and the designer's and audience's reactions, ideas, and imagination. My research focuses less on the specific posthuman imaginaries that develop and more on how to bring these about, through the design and engagement approaches and techniques it develops. An object-oriented approach, alienation, and hyperstition can allow for new human / non-human interrelations to be brought into social imaginaries, help create more inclusive imaginaries, and help move imaginaries beyond being continuations of the status quo.

6. CONCLUSION

My research initially set out to explore the question of engagement and connecting fiction closer to "reality" in discursive design, led by considerations of my previous work and the challenges facing the world in the light of climate and ecological crises. Despite its aim of questioning the status quo, engagement in discursive design has so far been centered around the human. Posthumanism was identified as a conceptual frame that can address these issues, leading to the research questions – **What could entail a posthuman / xeno approach to design? How might it employ concepts from this realm within design to enable new imaginaries to emerge? How might it develop strategies to connect with humans and non-humans in order to achieve this?**

The contribution to new knowledge made by my research is the development of xenodesign as a practice of transversal engagement that merges discursive design with posthumanism and engagement. It addresses gaps between theory and practice by developing design and engagement techniques directly from posthuman concepts and theories. Through this, the research offers knowledge about what could constitute a posthuman methodology in design.

Through three design projects, three workshops, and one walking tour and dinner event, three approaches to xenodesign were developed, explored, and reflected on theoretically: alienation, an object-oriented approach, and hyperstition. The development of each of these through a close combination of practice and theory revealed knowledge about seven posthuman design and engagement techniques.

Alienation is a confrontation with strangeness – to be subjected to a shift in perspective, which creates feelings of uncanniness. The research develops five techniques of alienation that are useful within the context of conceptual design: switching power relationships between human and non-human, making accessible what is normally beyond human perception and experience, highlighting the inhuman within the human, alienation from what is

taken for granted through fiction, and alienation by context-switching. Generally, alienation was shown to be more effective when it is connected to the everyday contexts a design seeks to address. Situating a project in a relevant location outside a museum or gallery space can create more thematically focused discussions. It can also help avoid the potential effects of museum audiences' expectations of strangeness and novelty and thus enable stronger alienating effects through unexpected encounters.

Object-oriented design techniques are based on theory from object-oriented ontology. They can be used in design processes to gain a broader understanding of the potential implications of a design. In ontography, this is achieved by mapping its complex entanglements with objects, people, and systems within the world, verbally or visually. Through the technique of ontographic machines, this is done by switching perspectives to understand how various entities relate to each other. An object-oriented approach can contribute to a post-human methodology by positioning the human perspective as one amongst many, creating cross-entity awareness and affect.

Hyperstition is an approach enabled through the technique of discursive approximations. It assists in guiding and reflecting processes of iterating a fictional discursive design closer to reality while maintaining a critical approach. It establishes feedback loops in discursive design that operate through workshops, discussions, or the transferability of technology and research. In the workshops, techniques that allowed implicity, inclusivity, tangibility, and open-endedness were particularly useful. Initial fictional designs characterized by ambiguity, malleability, and underlying complexity are particularly suitable for iterations into the realm of the functional. Through iterating projects and establishing feedback loops that operate within divergent contexts, a wider variety of audiences can be reached than when projects remain only within one context, for example, museum and gallery spaces. In my research, bringing functional discursive designs into contexts relevant to the themes they seek to discuss caused more engaged discussions than those that operated exclusively within the realm of the museum.

These approaches and techniques enable xenodesign to become a practice of transversal engagement, which helps overcome dualisms and operates as transversal engagement between human and non-human, and between fiction and reality. It assists in developing posthuman imaginaries that allow for alternative figurations of human / non-human interrelations, fostering inclusivity and moving beyond the status quo.

Transversal engagement addresses some of the questions a posthuman approach to design raises more effectively than others. While the outlined approaches and techniques are especially suitable for attending to problems of limited perspective and imagination, they may be less useful for engaging with potential social imbalances or systemic aspects of a design, as they touch on these issues only implicitly. An exploration of a systemic approach to xenodesign would be a valuable addition to the discourse. Moreover, the research engages with notions of the "other," with different cosmologies and inclusivity in design, but only within a European context. Since posthumanism owes much of its thinking to non-Western thought and knowledge practices, xenodesignerly investigations that engage more actively with non-Western contexts in practice, not only in theory, would be a valuable addition to the research.

I have made the key connections between the research questions and the results explicit in this thesis. However, a range of other implicit and tacit connections exists that is not described in the written thesis but embodied in the design work. The design projects and workshops were impacted by a posthuman mindset that I developed during the research, which is difficult to describe in its entirety and which has significantly affected my way of seeing the world both within and beyond this thesis.

A common feature of all discursive designs is that their main goal is to communicate and discuss ideas. My research contends that whether a discursive design is fictional and represented through a non-functional model, or not, does not affect its value or power, as this merely represents a difference in how it engages with an audience, and which audience it

engages with. It argues that establishing a discursive design practice, which can engage with various levels of fiction and reality, creates new opportunities for engagement and alternative ways to spread and communicate ideas, while simultaneously developing posthuman, post-anthropocentric approaches that could also find application in other design fields.

While the concept of the posthuman, as it has been used in my work, has been popularized in Western theory since Donna Haraway's 1984 Cyborg Manifesto, its urgency has increased in the past years. In times in which human-led extractivism and exploitation are leading to climate, ecological, and social crises on an increasing scale, the Enlightenment view of the human as separate from "nature," which still permeates much of Western thinking and acting, is not only outdated but highly problematic. Beyond its interventions into discursive design, my thesis thus advocates for a posthuman turn in design, which establishes posthuman methodologies as a key framework for design that operates with more awareness of and engagement with our complex entanglement in the world. My research has developed xenodesignerly approaches for achieving this, but these are only a starting point. The field of design needs to become more interdisciplinary, inclusive, and context-aware to address the increasing complexity of the world we live in.

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APPENDIX

This appendix is structured into six parts, each providing photographs, notes, and other materials from the six design projects.

Appendix A: Autonomous Agriculture

Fig. A1 Robot installed in a field in Lendava, Slovenia

Fig. A2 Snail in snail trap robot

Autonomous Agriculture

Project Text

Original text as published in 2017 and used for press purposes

Automation is entering all aspects of services and production, and agriculture, too, is becoming increasingly digitalized and automated. To a certain extent, robots, digital sensing, and algorithmic predictions in agriculture are already commonplace. New technologies and systems such as the blockchain and the Internet of things give machines the capability to operate even more independently, to communicate, and to make transactions by themselves.

Autonomous Agriculture investigates how increased automation could lead to new economic and social systems in the countryside, dominated by a symbiosis between nature and digital technology. Once manufactured and placed in the countryside, Internet-connected planting and harvesting robots form part of an autonomous network of agricultural machines, operated by an algorithm. These machines work as an independent business with no human employees, planting and harvesting what is deemed profitable according to predictive algorithms.

The collected food is sold to people online and paid for with digital money. The robots acquire required maintenance via the Internet, also with digital money, and are serviced by humans or other robots. They then continue their work, eventually accumulating enough capital to buy the land they are working on. One solar-powered robot harvests the healthy and drinkable sap of a birch tree, and a group of autonomous robots collects snails in a field to decrease the need for pesticides and to sell them as a delicacy. The project explores the idea of non-anthropocentric agriculture, in which the power structure is changed. People also become a tool for the machine, rather than the machine merely a tool for people.

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Autonomous Agriculture
CAD: Tom Baffi
Graphic design of poster: Anna-Luise Lorenz

Curation: Angela Rui, Maja Vardjan / 25th Biennial of Design Ljubljana, Slovenia

The project is now part of the permanent collection of the MAK Museum of Applied Arts Vienna.

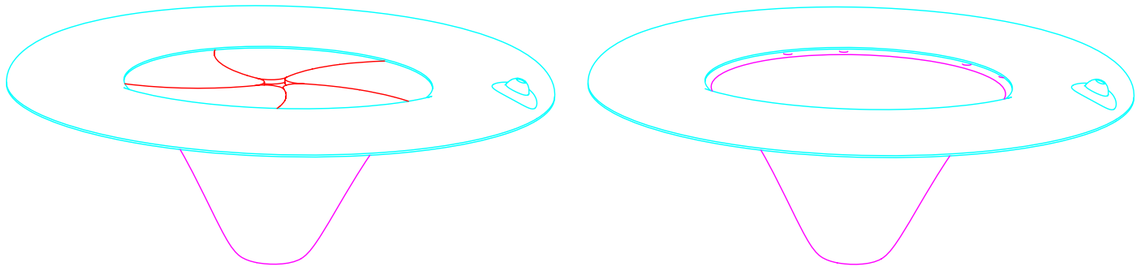


Fig. A3

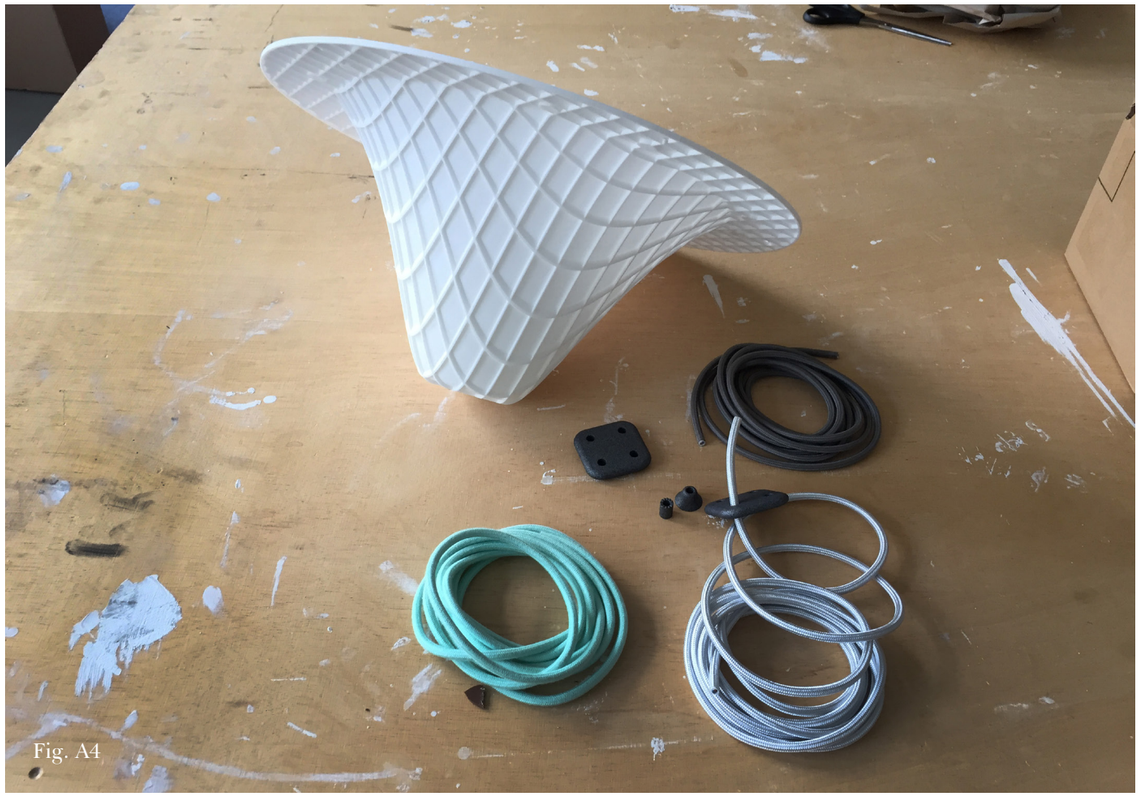


Fig. A4

Fig. A5

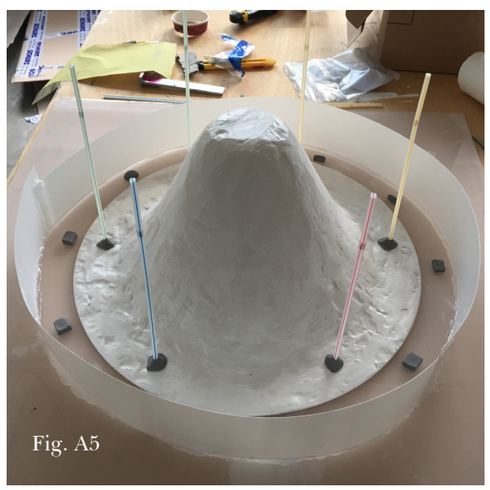


Fig. A5

Fig. A7

Fig. A8

Fig. A9

Fig. A3 Outlines of CAD drawings of snail collecting robot
Fig. A4 3D print and electronics cables
Fig. A5 First resin tests
Fig. A6 Moldmaking for funnel
Fig. A7 First cast of top ring
Fig. A8 Moldmaking for top ring
Fig. A9 First casts of funnels and closing mechanism

Fig. A10

Fig. A11

Fig. A12

Fig. A10 Final assembly and waterproofing
Fig. A11 Walking tour in Lendava
Fig. A12 Installed snail collecting robots
Fig. A13 Close-up of closed mode
Fig. A14 Next page: Walking tour in Lendava

Fig. A13

Fig. A14

Fig. A15

Fig. A16

Fig. A17

DECENTRALISED

Decentralised Autonomous Agriculture Test Site 0382

Decentralised Autonomous Agriculture (DAA) is a fully automated company with no human employees, which operates only through algorithms, robots (1a)(1b), and blockchain transactions (2). It sells agricultural and natural goods and uses any profits generated (3) to buy its own land (4).

AUTONOMOUS

1a Tree Sap Harvesting Robot

1b Snail Collecting Robot

Land plots acquired by the Decentralised Autonomous Agriculture with profits generated by robots

AGRICULTURE

TEST SITE 0328

Fig. A18

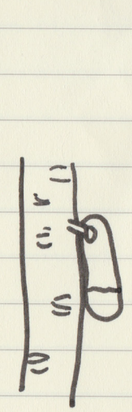
Fig. A19


Fig. A20

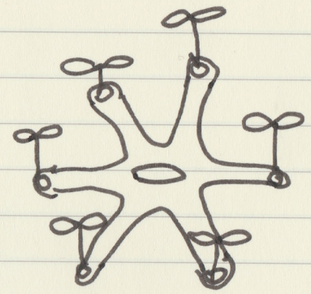

Fig. A21

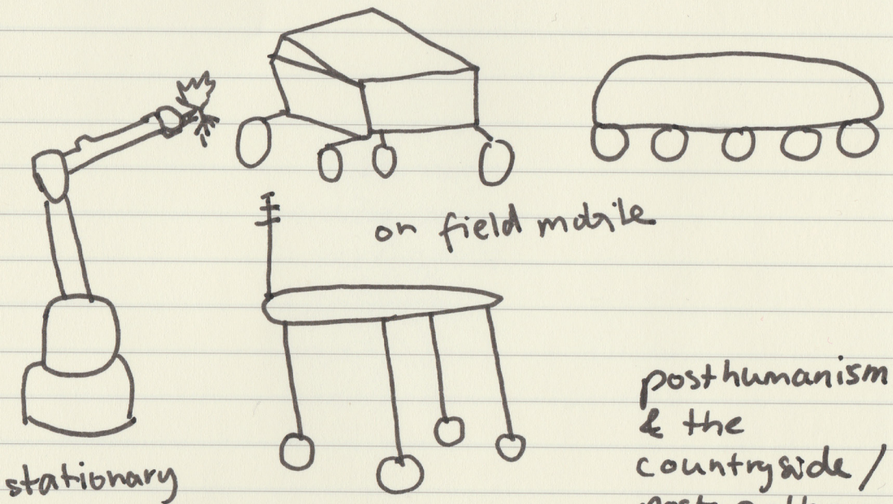
Fig. A22

Fig. A15 Previous page: Snails on snail collecting robot
Fig. A16 Previous page: Informational poster on supermarket wall
Fig. A17 Previous page: Snail collecting robot
Fig. A18 Previous page: Informational poster about Autonomous Agriculture
Fig. A19 Supermarket prepared for dinner
Fig. A20 Abandoned supermarket
Fig. A21 End of walking tour before dinner
Fig. A22 Informational posters & gathering outside supermarket



birch tree sap collection

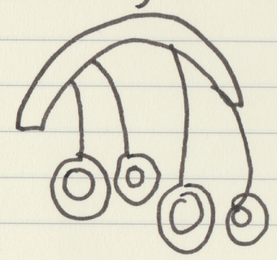




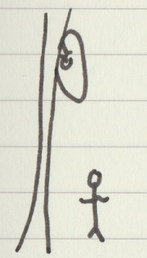
on field mobile

stationary

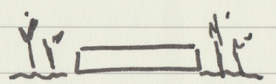
posthumanism & the countryside / post-anthropo-centric agriculture



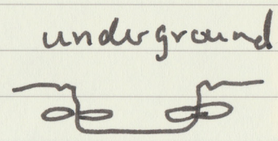
Lendava permanent unsupervised install outdoors



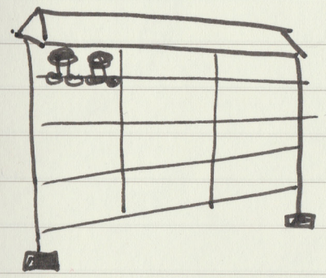
tree height install



larger heavy

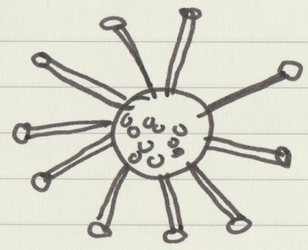


underground



slovenian hayrack

greenhouse testbed



seed tumbleweed

Fig. A23 Excerpt from research journal – design process

supermarket
Start
+ endpoint
of tour

food fields:
amount of water

food fields:
one person per year

autonomous
agriculture:
snail collecting
robot

food fields:
energy field

food fields:
1 dish for 4 people

(autonomous agriculture:
tree sap harvesting robot)

Fig. A24 Excerpt from research journal – design process / map for walking tour

partially noted down from memory, quotes paraphrased: **WALK** conversations

- surprise about snails actually in trap
- "are they edible?"
- lost knowledge about what is edible, asking grandmothers, etc.
- "are slugs edible as well?"
- "it would be interesting if the dinner consisted only of foraged food from Lendava."
- "I wonder what other food is here along this walk that we don't know about". (edible)

-> more interest in food than automation

- "I do find the idea a bit creepy, that robots could operate beyond human control & acquire land by themselves"
- "I agree, especially when you don't really know who is in control."
- "Even if they are autonomous, there must be someone who programmed the algorithm and who is taking a share of the money they make. Who knows what their interests would be."
- "Or if interests evolve, ~~within~~ amongst the robots, kind of like it seems with AI sometimes. They might make decisions we don't understand and we might not be able to stop this."
- heard of drones in farming but not in this region, it still seems far future. Only robots here for milking cows
- likes the idea that it is not directly an agricultural robot but one that helps by removing pests / getting worse here, many say because of climate change. not snails but things like fungal infections on crops.

DINNER conversations

- less people want to work in farming or restoring / conserving landscapes, so maybe automation
- there always needs to be work on the land if we want to keep it as today but climate is changing with hotter & dryer summers
- half-earth concept by wilson, half of earth human-free for conservation & restoration because of climate change

→ discussion: how could this work, would robots be allowed, what would these robots do, in service not of agriculture but something else

- "I wonder if this would make more local food production possible. Because in some regions people don't want to work in agriculture anymore, or it's not economically attractive."
- discussion what a "technology" is in food production / "natural technologies" / can a snail be a technology?

Fig. A25 Excerpt from research journal – walk / dinner discussion notes

27.5.17

I had several conversations related to the availability of overlooked food in our surroundings, and the "lost" knowledge about this and about foraging. Especially those living in cities felt like this is forgotten knowledge which people don't have anymore if they get all their food from a supermarket. The snails & the possibility to eat these – removing pests from the fields & collecting food at the same time – seemed more interesting to most people in these conversations than the idea of automation or new IoT systems. This could be because food as a topic is relatable to anyone, but perhaps also because the snails were there, tangible, and the IoT and blockchain aspects are more abstract / invisible infrastructure. The interests the workshop participants had in Berlin did not translate 1:1 into the Slovenian countryside with the locals and members of the cultural community that were at the event, who were less tech-oriented than the participants of the Berlin workshop. I had to steer the conversations in that direction, while most walk participants / dinner participants started discussions from a more food-oriented perspective.

Fig. A26 Excerpt from research journal – reflection after walk / dinner

Appendix B: Designing for Non-Humans

Fig. B1

Fig. B2

Fig. B3

Fig. B4

Fig. B1 Workshop process
Fig. B2 Workshop final presentation
Fig. B3 Workshop process / prototyping
Fig. B4 Workshop final presentation

Workshop:
Designing for Non-Humans

Introduction (5 minutes)

Introduction to the workshop, explaining the world map (zones: arctic, mountains, desert, lake, grass field).

Perspective Switching (20 minutes)

Instructions: *We would like you to put yourself in the position of 5 characters that live in different ecosystems. Each group draws one card which holds information about one character. Please go and stand on the world map in the location that you think would be an ideal habitat for your character. There can only be one inhabitant per spot. Negotiate with the others to decide on who inhabits which area. Think about what a typical day in the life of your character might look like.*

Building Ontographic Machines (1 h 35 minutes)

Instructions: *Each group will now receive a card with information about environmental changes that influence the lives of the inhabitants of this ecosystem. What could you design to help your character change or live with these environmental changes? We would like you to build a prototype of your invention, using the provided materials.*

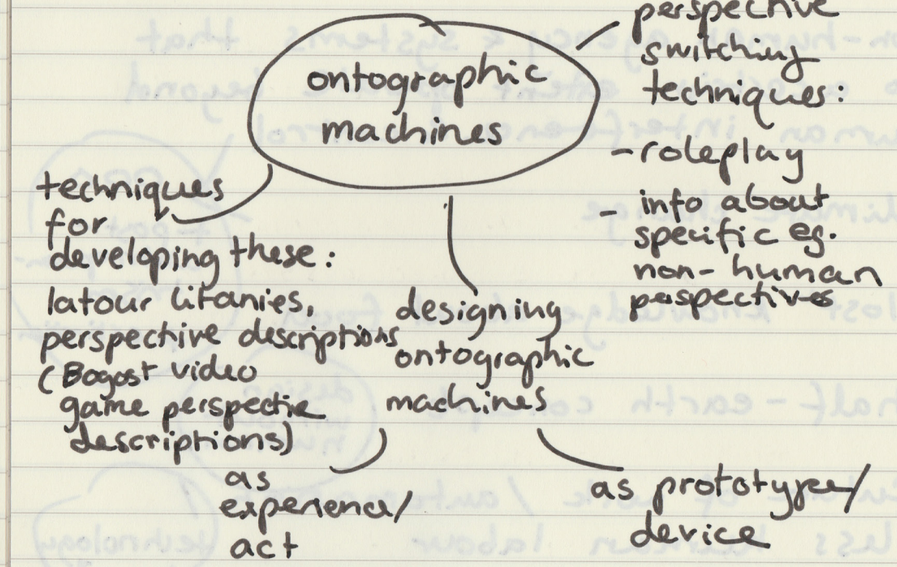
15 minute break

Presentation (45 minutes)

The built inventions are staged on the world map. They are presented and explained through role-play.

Acknowledgments

Workshop in collaboration with Anna-Luise Lorenz
Special thanks to the students and staff of Weissensee Primary School, Berlin



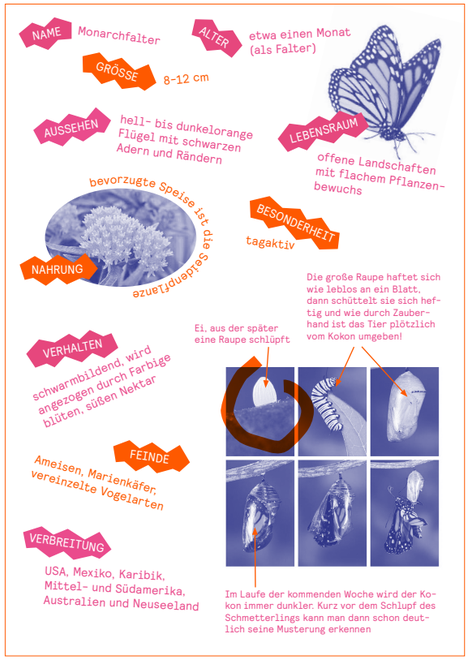
- explain zones (arctic, lake, desert, grasslands, mountain)
- 5 non-human protagonists:
  apple tree, butterfly, eel, cloud, stone
  → give participants information on these / their contexts, familiarization
- ~~5~~ action / intervention cards + design brief (climate breakdown + other threats)
- building prototypes for non-humans based on brief (that act as ontographic machines in that they help understand relations between protagonists + environment, but also protagonists + protagonists, & landscape
- use prototypes to roleplay relations on worldmap

order:
- green cardboard
- pink
- orange
- plotter film
- string

futurium:
- scissors
- cutting knives
- mats
- pens / pencils
- duct tape
- neon tape

Fig. B5 Excerpt from research journal – workshop preparations

Fig. B6 Final presentation



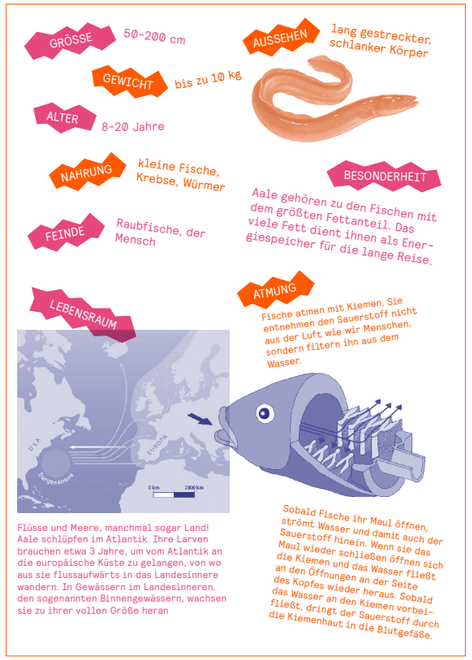


Fig. B7 Input cards. Graphic design: Anna-Luise Lorenz

APFELBAUM

An manchen Orten wird durch die Industrie der Boden giftig. Er enthält zum Beispiel Schwermetalle, die beim Abbau von seltenen Erden für die Produktion von Smartphones entstehen. Der Apfelbaum kann dort nicht mehr wachsen.

MONARCHFALTER

Monarchfalter ernähren sich fast ausschließlich vom Nektar der Seidenpflanze. Gleichzeitig schützt die Pflanze die Raupen der Schmetterlinge, weil Fressfeinde die Pflanze abstoßend finden. Durch die Klimaerwärmung verändert sich die Seidenpflanze und produziert mehr Giftstoffe. Dadurch können die Pflanzen für den Monarchfalter und seine Raupen giftig werden.

AAL

Bei heissem Wetter wachsen im See viele Algen und Bakterien, die den Sauerstoff im Wasser verbrauchen. So haben die Fische zu wenig Sauerstoff und sind vom Sterben bedroht.

WOLKE

Bei starkem Wind können Cumuluswolken auseinandergerissen werden, dann entstehen Wolkenfetzen die Cumulus fractus genannt werden, und die keinen Regen bringen. Durch den Klimawandel gibt es häufiger turbulentes Wetter, so dass diese Wolkenfetzen häufiger entstehen.

STEIN

Plastik ist mittlerweile überall in der Umwelt zu finden, in Böden, im Wald, im Meer. Durch Wind, Wellen und Strömungen wird er verteilt, sodass sich der Müll selbst auf menschenleeren Inseln und in der Arktis und Antarktis findet. Wegen der Vermüllung verenden viele Tiere, winzige Plastikteile gelangen sogar in die Nahrungskette.

APFELBAUM

Eure Aufgabe:
Helft dem Apfelbaum!

Baut ein Fahrzeug für den Apfelbaum, mit dem er giftigen Böden ausweichen kann. Vielleicht wird der Baum nomadisch, und bewegt sich immer dorthin wo es für ihn am Besten ist, und wo ihm das Wetter am Besten gefällt. Vielleicht wird sein Fahrzeug durch Windkraft mit Segeln angetrieben. Oder es rollt.

Vergesst dabei aber nicht, dass euer Baum bestimmte Vorlieben hat, um gut wachsen zu können.

Gebt eurer Erfindung einen Namen. Eurer Phantasie sind keine Grenzen gesetzt!

MONARCHFALTER

Eure Aufgabe:
Helft dem Monarchfalter!

Der Schmetterling muss aufgrund des Klimawandels sowohl andere Pflanzen essen, als auch andere Pflanzen finden, die seine Raupen beschützen. Erfindet eine neue Pflanzen mit Superkräften: sie soll sowohl den Schmetterling ernähren, als auch weiterhin ihn und seine Raupen beschützen.

Vielleicht hat sie eine spezielle Form in der der Schmetterling sich gerne aufhält? Vielleicht hat sie riesige, große Blüten, um den Schmetterling anzulocken und die Raupen zu schützen?

Gebt eurer Pflanze einen Namen. Eurer Phantasie sind keine Grenzen gesetzt!

AAL

Eure Aufgabe:
Helft dem Aal!

Der Fisch braucht mehr Sauerstoff. Er möchte aber nicht an die Wasseroberfläche kommen, denn dort lauern seine Feinde. Baut ein Gerät mit dem der Fisch an Sauerstoff kommen kann. Vielleicht ist es ein Gerät das tief in der Mitte des Sees Luftblasen entstehen lässt weil es Luft von der Wasseroberfläche absaugt? Vielleicht ist es ein Schnorchel oder ein Atemgerät für den Fisch?

Gebt eurer Erfindung einen Namen. Eurer Phantasie sind keine Grenzen gesetzt!

WOLKE

Eure Aufgabe:
Helft der Wolke!

Die Wolke braucht bei turbulentem Wetter Schutz damit sie nicht zerfetzt wird. Baut eine Schützhülle für die Wolke, die es ihr ermöglicht sich zu bewegen, und zu regnen, die aber verhindert dass sie durch starke Winde auseinandergerissen wird. Vielleicht ist die Schutzhülle dehnbar, vielleicht ist besteht sie aus vielen Einzelteilen mit beweglichen Öffnungen?

Gebt eurer Erfindung einen Namen. Eurer Phantasie sind keine Grenzen gesetzt!

STEIN

Eure Aufgabe:
Helft dem Stein die Umwelt zu retten!

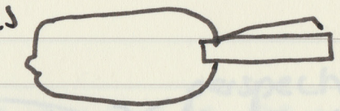
Plastiglomerate sind ganz besondere Steine: an heißen Orten wie Stränden schmilzt das angeschwemmtes Plastik durch die Hitze der Sonnenstrahlen und verbindet sich mit den Steinen. Da es nun mit dem Stein verbunden ist, gelangt das Plastik nicht mehr durch Wind und Wasser zurück ins Meer.

Doch Plastik findet sich nicht ausschließlich im Meer

hier eher auf den Plastiksammelprozess eingehen, nicht die Form! Um Plastik sammeln zu können, müsst ihr euch entweder zum Plastik hinbewegen Stellt euch vor, ihr seid ein Stein und wollt Plastik aus eurer Umwelt sammeln um euch in eine neue nützliche Form Seid ihr ein Stein mit Superkräften der zu Plastik hinrollen und es sich einverleiben kann? Zermalmt ihr das Plastik lieber, als es zu schmelzen? Oder habt ihr einen Roboter, der das Plastik zu euch bringt und einen Schmelzprozess auslöst? Gebt eurer Erfindung einen Namen. Eurer Phantasie sind keine Grenzen gesetzt!

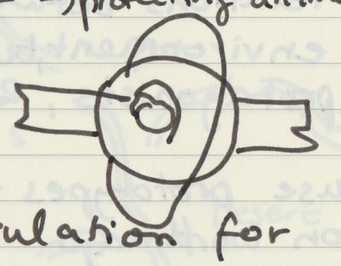
Fig. B8 Input cards. Graphic design: Anna-Luise Lorenz

Group A
Designing for stones
Fish- "The Plas"
Robot



- a device for a beach which is like a robot which has a net that loosens the soil / sand
- through the loosening microplastic can be collected in the net and put into a container that is inside the robot, there it is mixed with stones
- but then group decided there is not so much plastic on beach but more in water, so they made a device which operates in the water and looks like a fish
- the fish device collects plastic from the ocean to make sure fish and turtles don't eat it → protecting animals

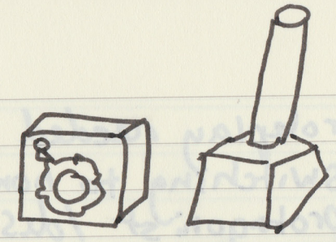
Group B
Designing for a Cloud



- an artificial encapsulation for a cloud
- can enable artificial movement of the cloud in a different direction than where it would usually go
- artificial outlet for rain
"technologically enhanced cloud"

eg. regions with desertification

Group C
Designing for fish (eel)

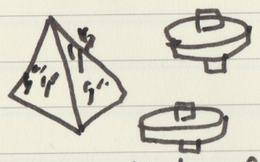


- breating devices for fish so that they can spend longer time underwater
- makes for a good protection
no need to come to the surface where dangerous animals or humans might catch the fish
- device is mobile, moves around with fish

Group D
Plant / Flower for Butterflies

- a flower that protects butterflies at all stages of their life (endangered monarch butterfly)
- plant is toxic to other animals but not to butterfly / their larvae

Group E
Apple Tree



tree + robot symbiosis

- Trees on habitats floating in the air
- Flying drone-type devices for tree care, watering, dispersing seeds

(more non-anthropocentric than airology but perhaps also because it was made more explicit in this workshop, even in the title) - seemed easy for kids to adopt non-human perspectives

cyborgs / technological enhancement

Fig. B9 Excerpt from research journal – workshop notes

Appendix C: Airology

Fig. C1 Prototypes designed by workshop participants

Fig. C2

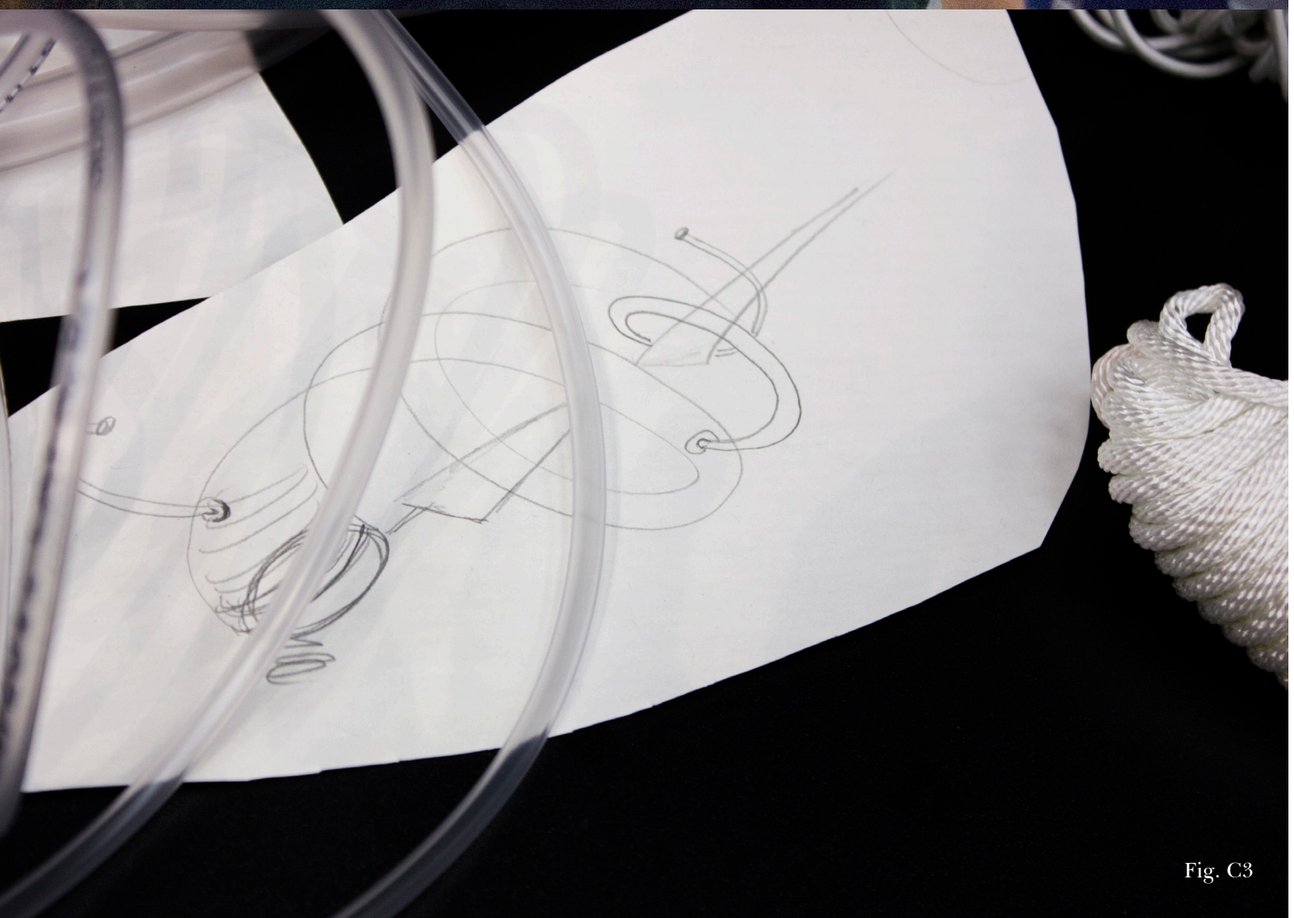


Fig. C3

Workshop:
Airology

Introduction (15 mins)

Short input talk (30 mins)

A talk about speculative design / radical design, air & climate change.

Concepts (40mins)

Participants split into 4 groups, discuss the group topics (ancient bacteria / pollution and the brain / microbiomes / dust highway).
Brainstorming and concept creation.

Design & Prototyping (1 hour 15 mins)

Designing and building inflatable prototypes.

Presentation (30 mins)

Presentation, discussion, tasting of tea grown in climate change conditions.

Acknowledgments

Workshop in collaboration with Anna-Luise Lorenz
Special thanks to the participating attendees of Retune Festival

Fig. C2 Prototype designed by workshop participants
Fig. C3 Prototype sketch by workshop participants

Fig. C4

Fig. C4 Image of smoke bomb created for workshop announcements

Fig. C5

Fig. C6

Fig. C5 Prototyping process
Fig. C6 Participants testing prototypes

There are diseases hidden in ice – and they are waking up

source: http://www.bbc.com/earth/story/20170304-there-are-diseases-hidden-in-ice-and-they-are-waking-up

Long-dormant bacteria and viruses, trapped in ice and permafrost for centuries, are reviving as Earth's climate warms

Throughout history, humans have existed side-by-side with bacteria and viruses. From the bubonic plague to smallpox, we have evolved to resist them, and in response they have developed new ways of infecting us.

We have had antibiotics for almost a century, ever since Alexander Fleming discovered penicillin. In response, bacteria have responded by evolving antibiotic resistance. The battle is endless: because we spend so much time with pathogens, we sometimes develop a kind of natural stalemate.

However, what would happen if we were suddenly exposed to deadly bacteria and viruses that have been absent for thousands of years, or that we have never met before?

We may be about to find out. Climate change is melting permafrost soils that have been frozen for thousands of years, and as the soils melt they are releasing ancient viruses and bacteria that, having lain dormant, are springing back to life.

In August 2016, in a remote corner of Siberian tundra called the Yamal Peninsula in the Arctic Circle, a 12-year-old boy died and at least twenty people were hospitalised after being infected by anthrax.

The theory is that, over 75 years ago, a reindeer infected with anthrax died and its frozen carcass became trapped under a layer of frozen soil, known as permafrost. There it stayed until a heatwave in the summer of 2016, when the permafrost thawed.

This exposed the reindeer corpse and released infectious anthrax into nearby water and soil, and then into the food supply. More than 2,000 reindeer grazing nearby became infected, which then led to the small number of human cases.

The fear is that this will not be an isolated case.

As the Earth warms, more permafrost will melt. Under normal circumstances, superficial permafrost layers about 50 cm deep melt every summer. But now global warming is gradually exposing older permafrost layers.

Frozen permafrost soil is the perfect place for bacteria to remain alive for very long periods of time, perhaps as long as a million years. That means melting ice could potentially open a Pandora's box of diseases.

The temperature in the Arctic Circle is rising quickly, about three times faster than in the rest of the world. As the ice and permafrost melt, other infectious agents may be released.

„Permafrost is a very good preserver of microbes and viruses, because it is cold, there is no oxygen, and it is dark," says evolutionary biologist Jean-Michel Claverie at Aix-Marseille University in France. „Pathogenic viruses that can infect humans or animals might be preserved in old permafrost layers, including some that have caused global epidemics in the past."

In the early 20th Century alone, more than a million reindeer died from anthrax. It is not easy to dig deep graves, so most of these carcasses are buried close to the surface, scatt=ered among 7,000 burial grounds in northern Russia.

However, the big fear is what else is lurking beneath the frozen soil.

People and animals have been buried in permafrost for centuries, so it is conceivable that other infectious agents could be unleashed. For instance, scientists have discovered fragments of RNA from the 1918 Spanish flu

Dust — Blowing in the Winds of Climate Change

https://news.cnrs.fr/articles/dust-blowing-in-the-winds-of-climate-change

Dust from the African deserts spreads across the globe, playing a complex, but important role on ecology and the planet's climate. New findings by a French-US team shed light on the underlying mechanisms that carried this dust in the past, and how these may change in the coming decades.

Dust from the deserts of North Africa is present across the globe. It plays an important role in the Earth's climate by virtue of its ability to reflect and absorb sunlight, and also

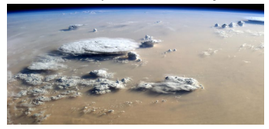


Image taken from the International Space Station over Libya showing a dust storm stretching several hundred kilometers across the Sahara. Isolated cumulonimbus clouds are developing within the dust layer.

affects ecology through its capacity to fertilize forests and provide nutrients for seas. Yet dust levels have undergone significant multi-decade fluctuations, including the present decade of very low emissions. Previously, scientists had suggested that meteorological processes such as El Niño or the recovery of Sahelian rainfall were causing these dust fluctuations, scrutinizing the latter as a possible cause for the recent decrease in the dust load transported over the Atlantic Ocean. However, other work has shown that most of this dust is emitted from the Sahara rather than the Sahel, prompting scientists to search for another answer, which now appears to be at hand.

In a recent study published in Nature,1 CNRS2 and University of California, San Diego3 researchers demonstrate that the key driver of dust emissions over the Sahara is in fact the mountain-induced acceleration of North African winds—in particular the northeasterly Harmattan—downstream of the largest mountain ranges of the Sahara. They also show that the areas prone to strong leeward winds coincide with known dust emission source regions.

Mountains of data

"One of our goals was to determine why the Harmattan had such a prominent role, and we quickly focused on its route, which crosses the Atlas, Hoggar, and Tibesti mountains, as well as the Ennedi plateau," says Cyrille Flamant, one of the article's co-authors. "The impact of these mountains is two-fold. Firstly, winds accelerate as they blow over or between mountains, allowing the Harmattan to emit and transport greater amounts of dust. Secondly, due to weathering processes, in which precipitation erodes rocky mountainsides and washes alluvium down in temporary rivers, mountains are surrounded by alluvial deposits that can be swept up by these accelerated winds. The Harmattan also passes over well-established dust sources, such as the remains of a paleolake called the Bodélé depression, whose sediments can be dispersed by the wind."

Image taken from the International Space Station over West Africa, showing a „river" of dust being transported towards the Americas by the East African jet stream.

Basing their work on data from sources as disparate as space-borne observations, Cape Verde coral samples, and near-surface wind fields generated by international meteorological forecast centers, researchers have reconstructed estimates of dust load fluctuation from 1850 to 2011. "We began by comparing satellite data of dust aerosol content over the Atlantic with coral samples from Cape Verde over a recent 30-year period," continues Flamant. "These samples provide an accurate record of dust emissions, because as coral grows, it incorporates the dust that has settled on its surface, thus presenting layers of varying depth that help us reconstruct past emission levels. In a way, this is similar to how ice cores help determine past atmospheric conditions."

A clear connection emerged between dust emissions and wind patterns and speeds, especially with regard to the dry and dusty

Is Climate Change Putting World's Microbiomes at Risk?

https://ycjlo.yale.edu/features/is_climate_change_putting_world_microbiomes_at_risk

Researchers are only beginning to understand the complexities of the microbes in the earth's soil and the role they play in fostering healthy ecosystems. Now, climate change is threatening to disrupt these microbes and the key functions they provide.

[...]

As snow and ice melt, it's fairly straightforward to grasp what climate change means for the future of, say, polar bears in the Arctic or penguins in Antarctica. But it's far more difficult to understand what is happening to the planetary microbiome in the earth's crust and water, a quadrillion quadrillion microorganisms, according to Scientific American. Yet it is far more important, for microbes run the world. They are key players that perpetuate life on the planet, provide numerous ecosystem services, and serve as a major bulwark against environmental changes.
Researchers say that as the planet warms, essential diversity and function in the microbial world could be lost.
But they can also cause serious problems — as the world's permafrost melts, microbes are turning once-frozen vegetation into greenhouse gases at a clip that is alarming scientists.

As vital as they are, we are only beginning to understand microbes and the role they play in the world's ecosystems. The problem is that these fungi, archaea, and bacteria are so small that in a gram of soil (about a teaspoon), there are a billion or so, with many thousands of species. Perhaps 10 percent of the species are known. The Lilliputian communities that these microorganisms create are enormously complex, and their functions difficult to tease out. But in the last decade, new tools have been developed that have begun to change the research game.
"Soil was a black box," said Janet Jansson, chief scientist for Biology Earth and Biological Sciences at the Pacific Northwest National Laboratory and president of the International Society for Microbial Ecology. "I have been working in microbial ecology for decades, and it has been difficult, if not impossible, to study them. Now we have these new molecular processes, and suddenly the whole field is exploding."
There is a Manhattan Project-like urgency to sussing out these secrets. A paper in the journal Science last year called for a Unified Microbiome Initiative, and experts have held a series of meetings about it at the White House. The Earth Microbiome Project is a massive global effort to collect samples of microbial communities from thousands of ecosystems around the world. Meanwhile, the Global Soil Biodiversity Initiative got underway in 2011 — one-third of the world's biodiversity lives beneath our feet — and it's focused on preserving the services that healthy soil ecosystems provide, such as a place for plants to grow, the breakdown of waste, and the natural filtration of water. The TerraGenome Project is sequencing the metagenome of soil microbes.

Microbiologists at the Pacific Northwest National Laboratory are studying how soil microbes react to climate change. PNNL And Jansson's project, Microbiomes In Transitions, is studying how "perturbations" — disruptions such as climate change and pollution — affect both the microbiomes around us and inside of us. "It's extraordinarily evident that bacteria, fungi, and viruses play a massive roll in the development of health and disease in humans, and in environmental settings and ecological systems," said Jack Gilbert, a microbial biologist at Argonne National Laboratory and a founding member of the Unified Microbiome Initiative.
The new tools came about because of keen interest in the human microbiome that new research shows is linked to everything from mood disorders to immune system dysfunction. Microbes play similarly essential and wide-ranging roles in the external world. They are a healthy foundation for the food web — plants and the critters that eat them are all dependent on soil microbes.
Interest in microbiomes in the natural world is also exploding because many researchers realize that as the planet warms, essential diversity and function in the microbial world could be lost. Some areas may not be able to grow the same crops they are growing now — in the United States, for instance, no corn in Iowa or wheat in Kansas, because the microbes that currently fix nitrogen for the plants' roots in the soil will no longer be able to do so. And, as we learn more about how

The polluted brain

http://www.sciencemag.org/news/2017/01/brain-pollution-evidence-builds-dirty-air-causes-alzheimer-s-dementia

In a barbed wire–enclosed parking lot 100 meters downwind of the Route 110 freeway, an aluminum hose sticks out of a white trailer, its nozzle aimed at an overpass. Every minute, the hose sucks up hundreds of liters of air mixed with exhaust from the roughly 300,000 cars and diesel-burning freight trucks that rumble by each day.

Crouched inside the trailer, a young chemical engineer named Arian Saffari lifts the lid off a sooty cylinder attached to the hose, part of a sophisticated filtration system that captures and sorts pollutants by size. Inside is a scientific payload: particles of sulfate, nitrate, ammonium, black carbon, and heavy metal at least 200 times smaller than the width of a human hair.

The particles are too fine for many air pollution sensors to accurately measure, says Saffari, who works in a lab led by Constantinos Sioutas at the University of Southern California (USC) here. Typically smaller than 0.2 µm in diameter, these "ultrafine" particles fall within a broader class of air pollutants commonly referred to as PM2.5 because of their size, 2.5 µm or less. When it comes to toxicity, size matters: The smaller the particles that cells are exposed to, Saffari says, the higher their levels of oxidative stress, marked by the production of chemically reactive molecules such as peroxides, which can damage DNA and other cellular structures.

Some of the health risks of inhaling fine and ultrafine particles are well-established, such as asthma, lung cancer, and, most recently, heart disease. But a growing body of evidence suggests that exposure can also harm the brain, accelerating cognitive aging, and may even increase risk of Alzheimer's disease and other forms of dementia.

The link between air pollution and dementia remains controversial—even its proponents warn that more research is needed to confirm a causal connection and work out just how the particles might enter the brain and make mischief there. But a growing number of epidemiological studies from around the world, new findings from animal models and human brain imaging studies, and increasingly sophisticated techniques for modeling PM2.5 exposures have raised alarms. Indeed, in an 11-year epidemiological study to be published next week in Translational Psychiatry, USC researchers will report that living in places with PM2.5 exposures higher than the Environmental Protection Agency's (EPA's) standard of 12 µg/m3 nearly doubled dementia risk in older women. If the finding holds up in the general population, air pollution could account for roughly 21% of dementia cases worldwide, says the study's senior author, epidemiologist Jiu-Chiuan Chen of the Keck School of Medicine at USC.

Deepening the concerns, this month researchers at the University of Toronto in Canada reported in The Lancet that among 6.6 million people in the province of Ontario, those living within 50 meters of a major road—where levels of fine pollutants are often 10 times higher than just 150 meters away—were 12% more likely to develop dementia than people living more than 200 meters away.

The field is "very, very young," cautions Michelle Block, a neuroscientist at Indiana University in Indianapolis. Nonetheless, it's

A cloudy suspension of smog particles, collected near a Los Angeles, California, freeway, will be turned into an aerosol and piped into tanks holding laboratory mice.

a "hugely exciting time" to study the connections between pollution and the brain, she says. And if real, the air pollution connection would give public health experts a tool for sharply lowering Alzheimer's risks—a welcome prospect for a disease that is so devastating and that, for now, remains untreatable.

Demented dogs in Mexico City in the early 2000s offered the first hints that inhaling polluted air can cause neurodegeneration. Neuroscientist Lilian Calderón-Garcidueñas, now at the University of Montana in Missoula, noticed that aging dogs who lived in particularly polluted areas of the city often became addled, growing disoriented and even losing the ability to recognize their owners. When the dogs died, Calderón-Garcidueñas found that their brains had more extensive extracellular deposits of the protein amyloid b—the same "plaques" associated with Alzheimer's disease—than dogs in less pollut-

Fig. C7 Workshop materials – research input

Airology
research input: (print outs)

1. melting permafrost releasing thousands of years old microbes into the air
2. "dust highway" (high winds blowing microbes and dust around the planet
3. the world's microbiome (planetary / environmental) / microbial plume, i.e. humans clouds of bacteria surrounding them
4. Olfaction + environmental factors, brain & air pollution (inflammation & disease risk)

design input: (talk)

- general speculative/conceptual design intro hendriks shrinking man, DEH, superstudio
- air specific:
  - hausrucker co environment transformers & green lung
  - buckminster fuller domes (1960 dome over manhattan sketch
  - archigram/sanyo living capsules 60s/70s
  - reinoso la parole

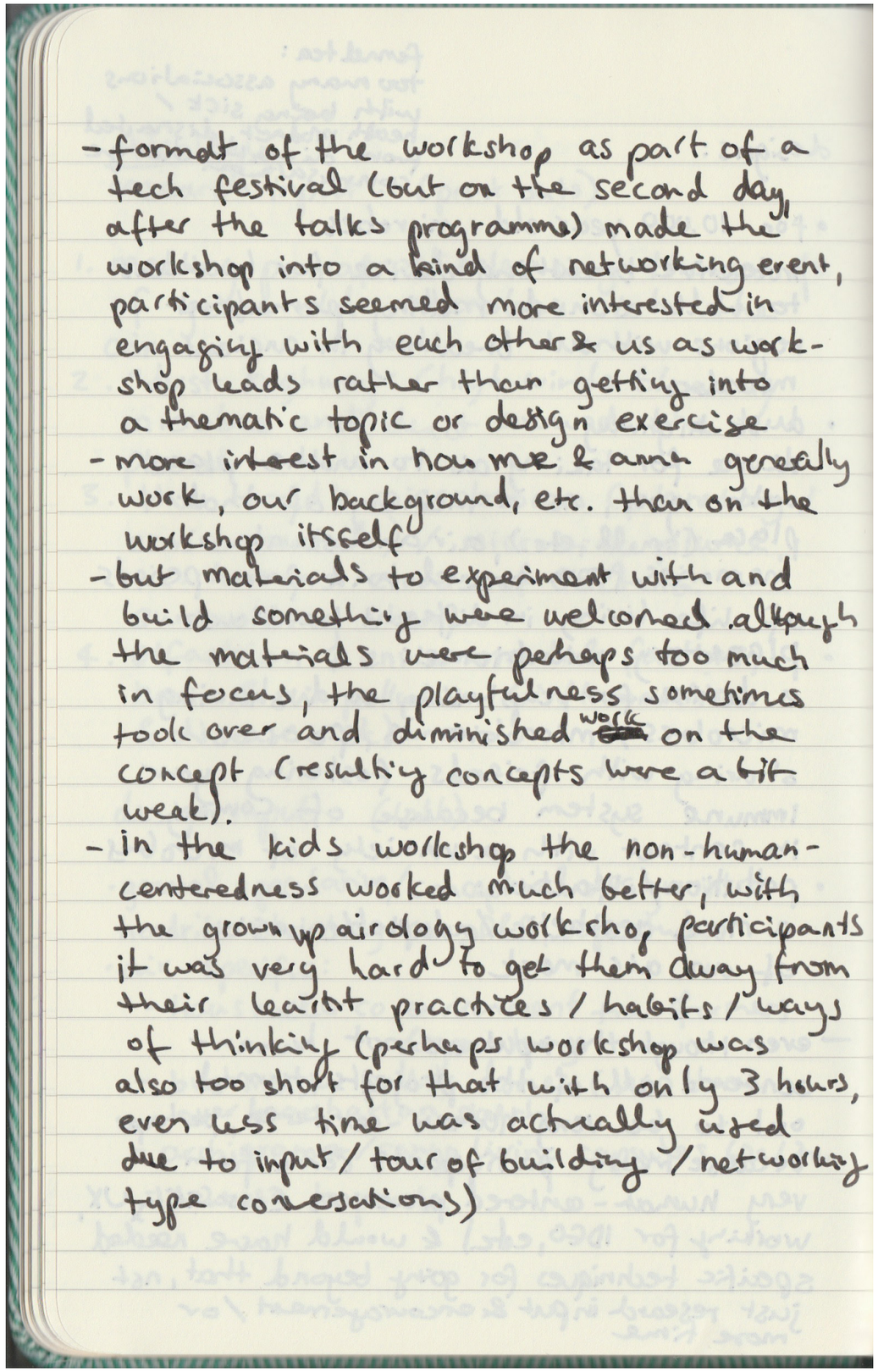
designs:

fennel tea:
too many associations with being sick / heath product, distracted from climate change conversation

- for 10.000 year old microbes:
  protective breathing device for humans to walk around melting permafrost regions without breathing in ancient microbes
- dust highway:
  device for taking air to another place with you, as a memory of that place (smell, etc.), air and scent memories from travel and from periods of life living in different locations
- planetary microbiome:
  a device for capturing and sharing microbes / microbiomes, for sharing with friends, fostering your immune system because of coming in contact with a variety of microbes
- pollution/olfaction:
  a more aesthetic / adaptable version of an air mask

— even though the input was not human-centered all of the projects turned out to be very human-centered, perhaps because many participants come from very human-centered practices (usability, UX, working for IDEO, etc.) & would have needed specific techniques for going beyond that, not just research input & encouragement / or more time

Fig. C8 Excerpt from research journal – workshop notes



- format of the workshop as part of a tech festival (but on the second day after the talks programme) made the workshop into a kind of networking event, participants seemed more interested in engaging with each other & us as workshop leads rather than getting into a thematic topic or design exercise
- more interest in how me & anna generally work, our background, etc. than on the workshop itself
- but materials to experiment with and build something were welcomed although the materials were perhaps too much in focus, the playfulness sometimes took over and diminished ~~work~~ on the concept (resulting concepts were a bit weak).
- in the kids workshop the non-human-centeredness worked much better, with the grown up airology workshop, participants it was very hard to get them away from their learnt practices / habits / ways of thinking (perhaps workshop was also too short for that with only 3 hours, even less time was actually used due to input / tour of building / networking type conversations)

Fig. C9 Excerpt from research journal – workshop notes

Fig. C10 Participants sketching ideas

Fig. C11 Participants prototyping

Appendix D: The Outside Inside

Fig. D1 Exhibition view, Futurium Museum Berlin

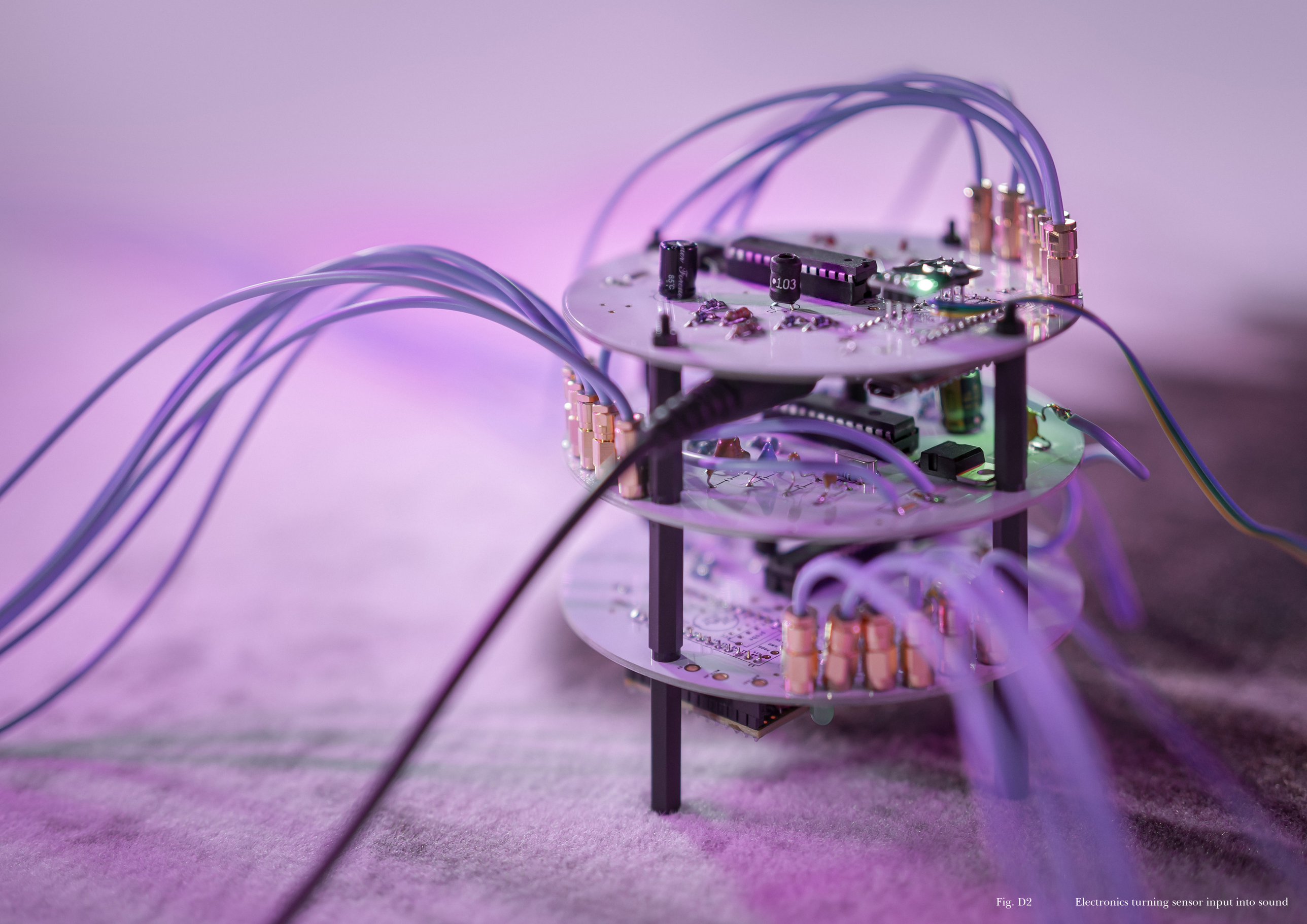


Fig. D2 Electronics turning sensor input into sound

Fig. D3 Sensor-equipped microenvironment with terraforming plant

The Outside Inside

Project Text

Original short caption from the exhibition at Futurium Museum Berlin

Through her installation The Outside Inside Johanna Schmeer explores relationships between environments, the species that inhabit these, and technology. Plants, fungi, and lichen with terraforming abilities grow in terrariums which simulate possible environmental conditions of the year 2100.

These species can cool soil, remove heavy metals, and absorb CO2 even under extreme conditions. In a fictional film, a drone searches for new habitats these species could conserve or transform.

The activities of the plants, fungi, and lichen are measured by sensors and transformed into sounds which affect the human brain. Edible flowers harvested from the installation can be ingested, allowing visitors to “taste” a possible future.

Acknowledgments

Sound & electronics in collaboration with Sam Conran
Plinth construction in collaboration with Tom Baffi
Film in collaboration with Anna-Luise Lorenz
Glass-making and cold-working by Liam Reeves and Lasvit

Funded by Futurium Museum Berlin.
The project is part of the permanent collection of Futurium Musuem Berlin.

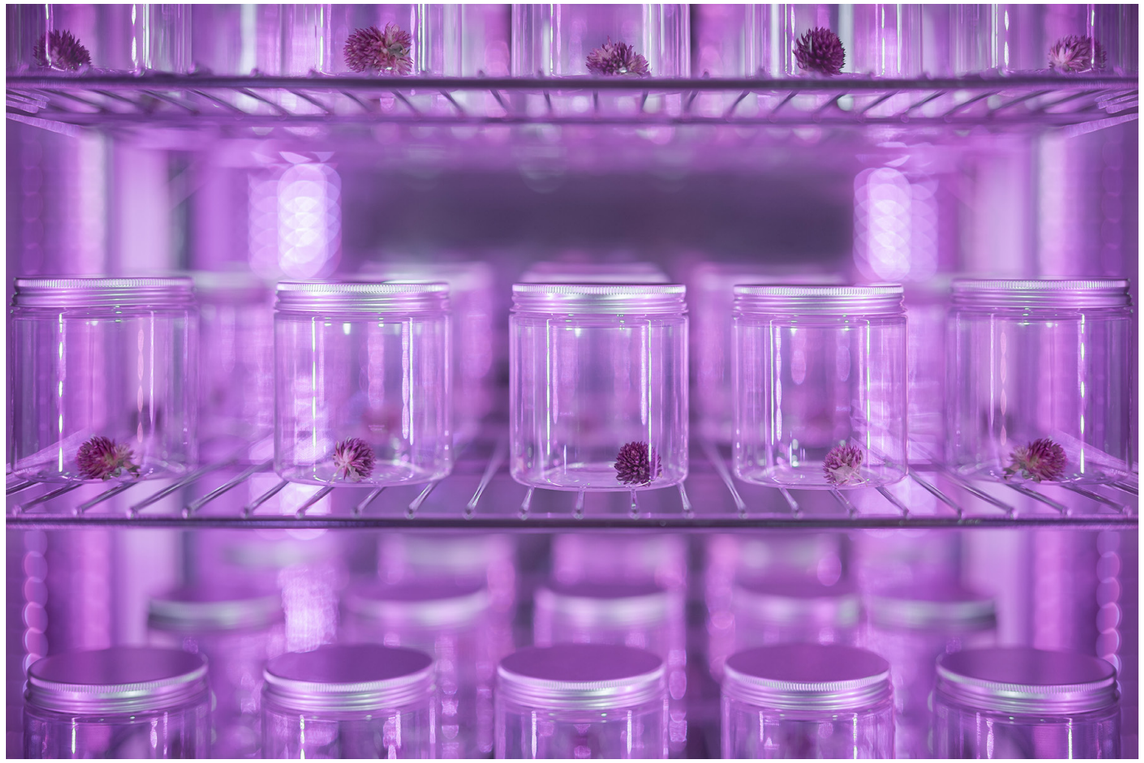


Fig. D4 Edible amaranth flowers grown in predicted climate change conditions of the year 2100

Fig. D5 Edible amaranth flowers in sugar sweets (easier to ingest)

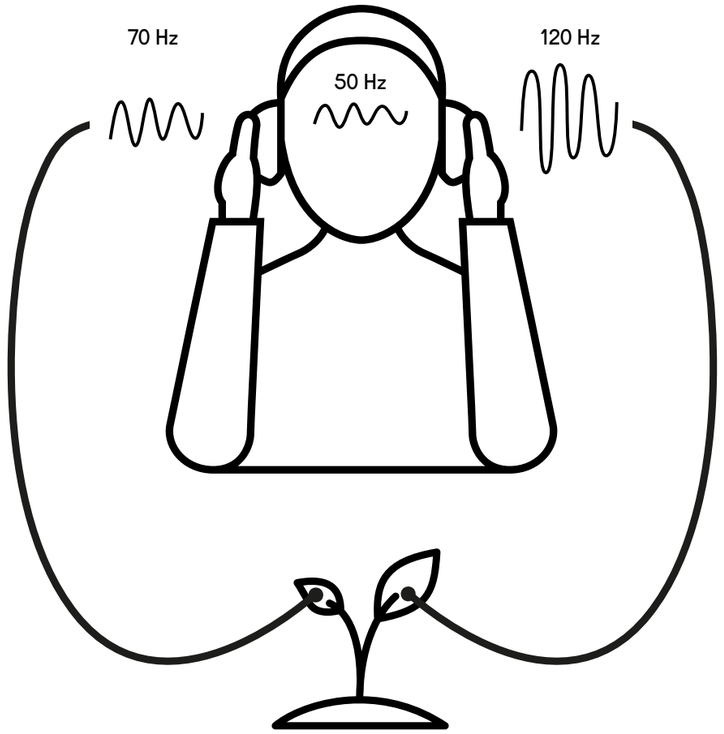


Fig. D6 Binaural beats

Fig. D7 Measuring leaf capacitance

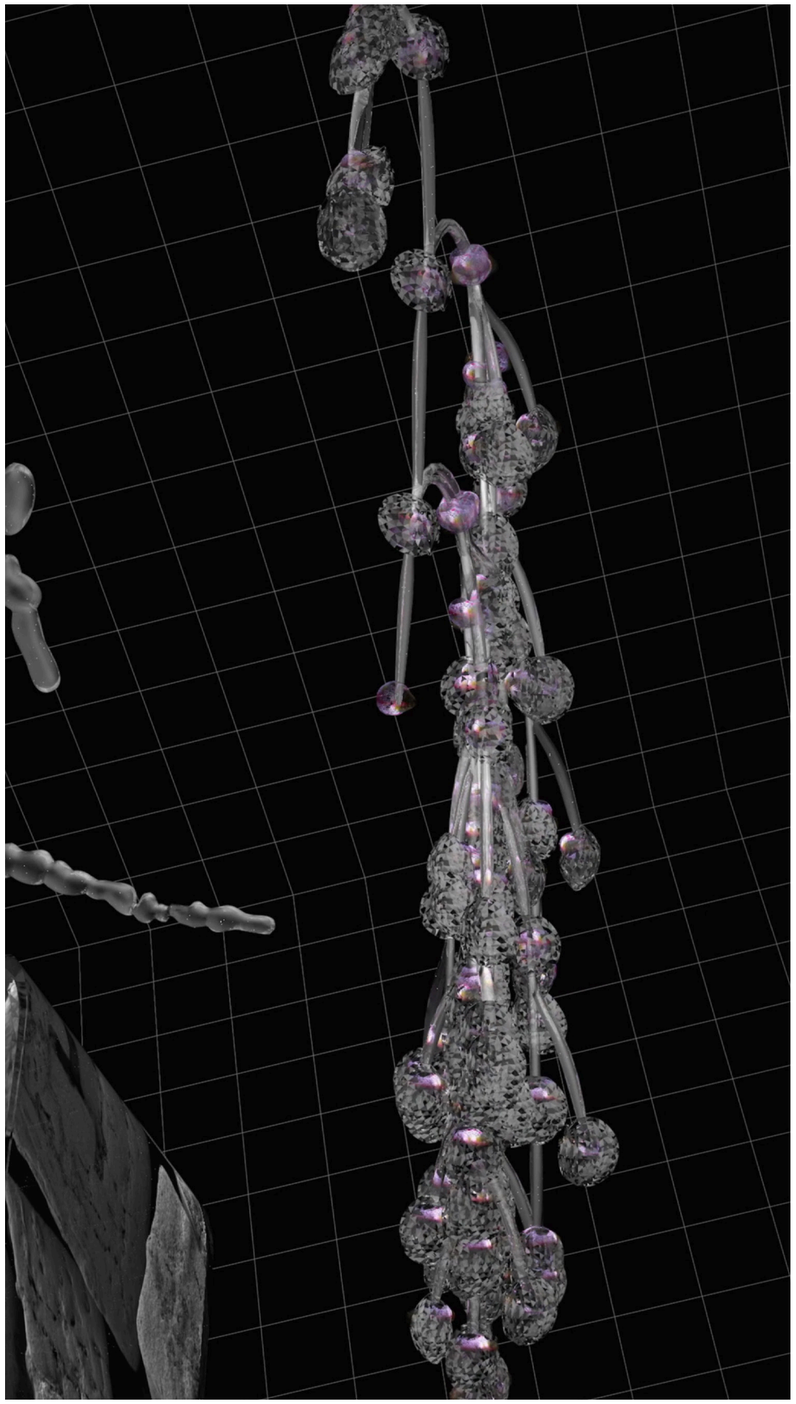


Fig. D8

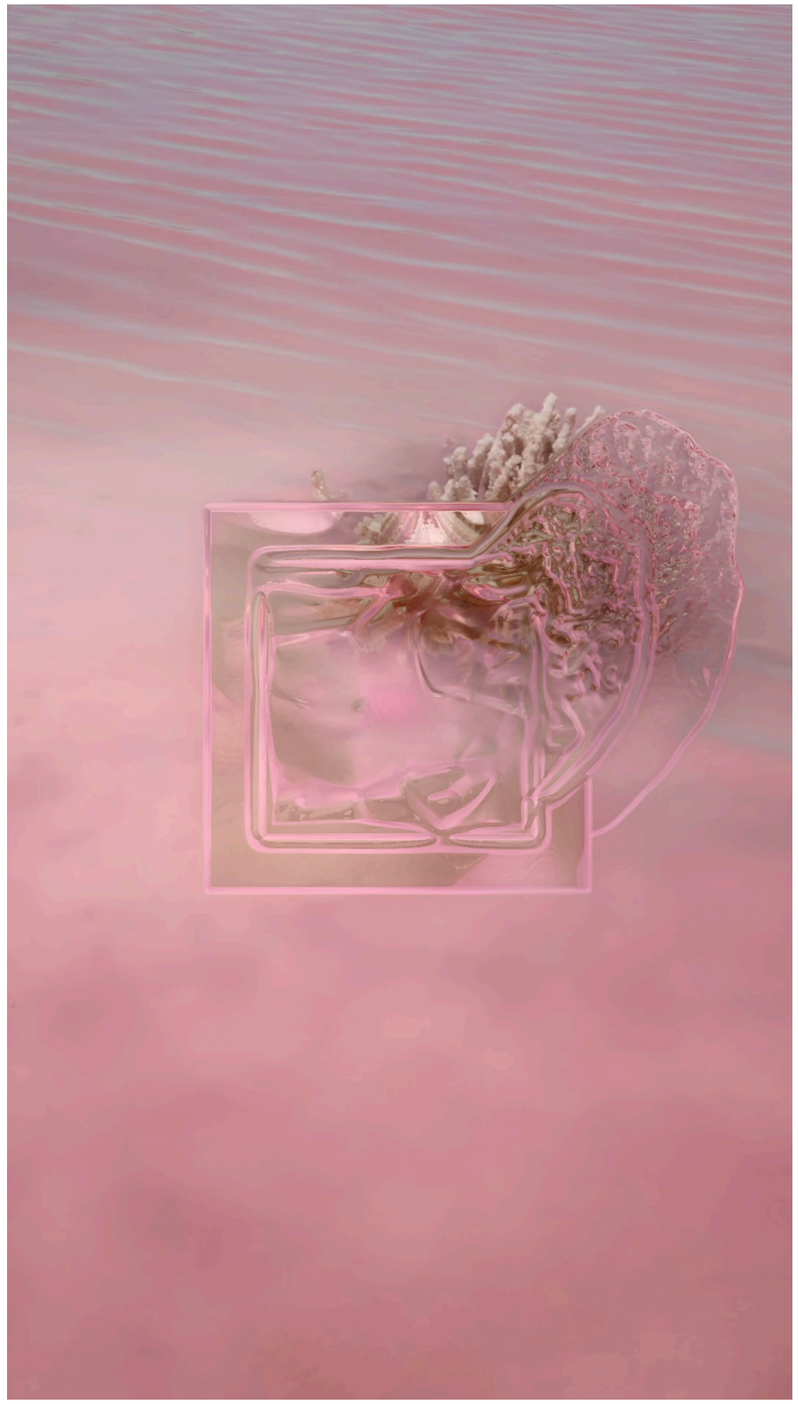


Fig. D9

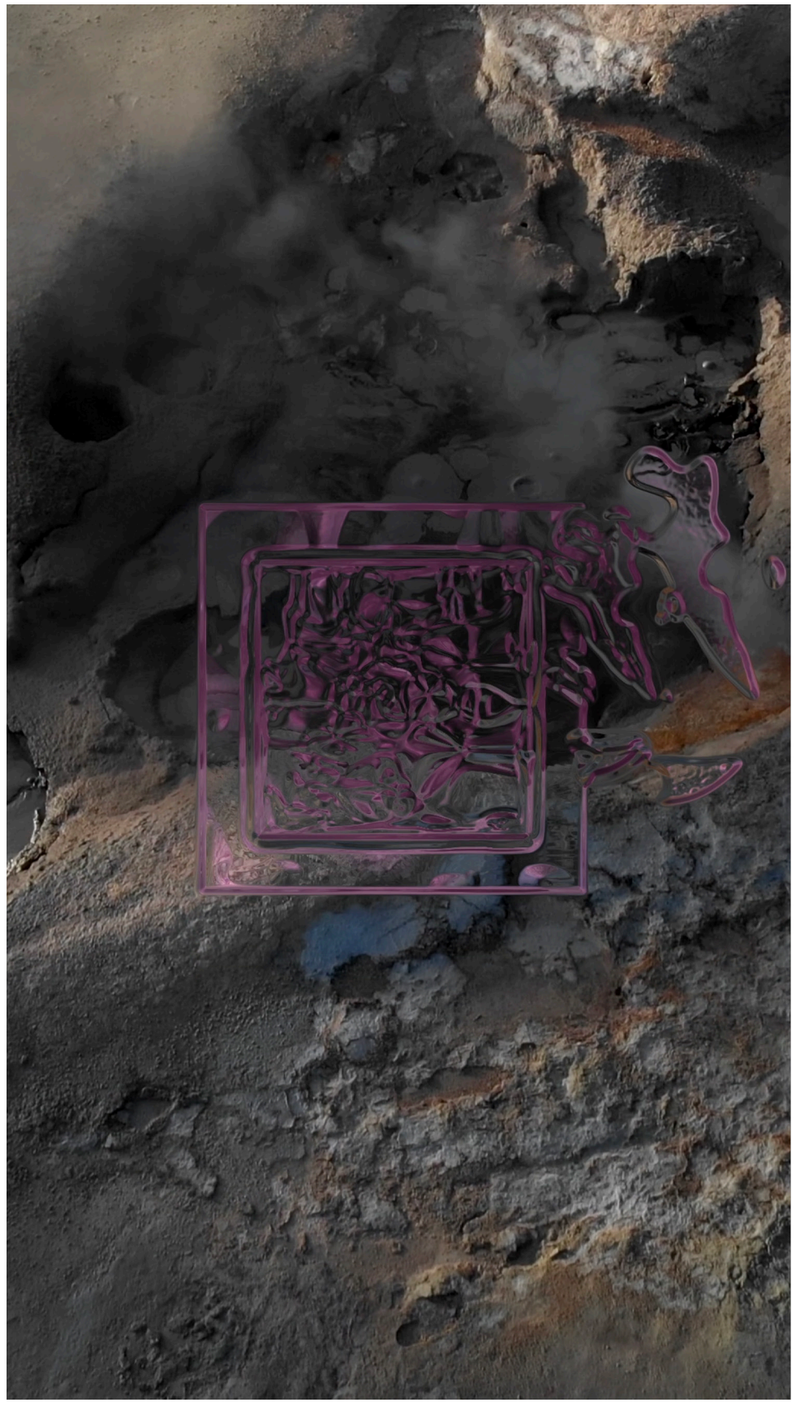


Fig. D10

Fig. D8, D9, D10 Film stills

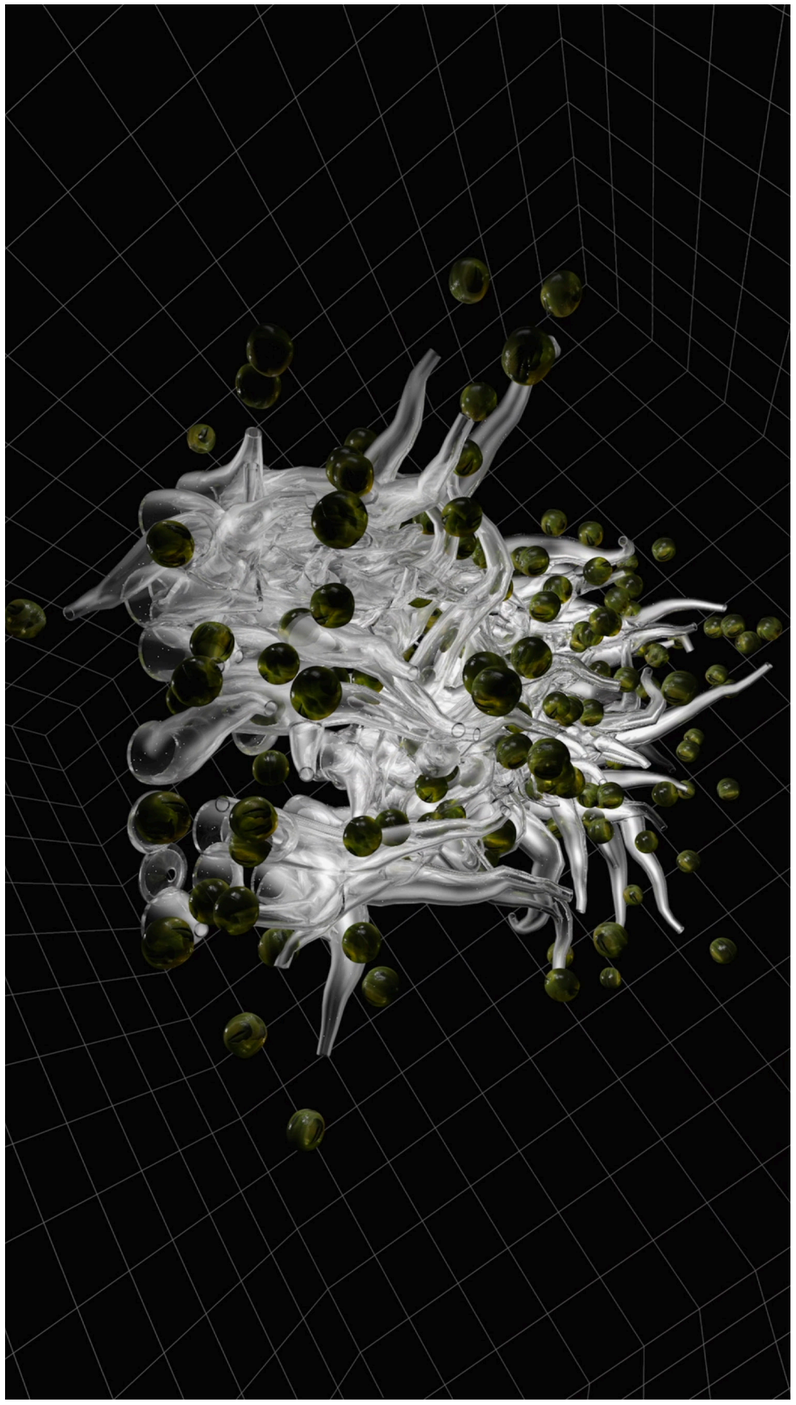


Fig. D11

Fig. D12

Fig. D13

Fig. D11, D12, D13 Film stills

Fig. D14 Sensor-equipped microenvironments with terraforming plants

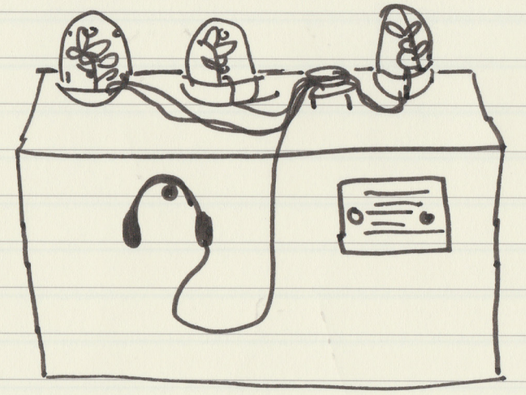
Fig. D15

Fig. D16

Fig. D15, D16, D17 Imperial College Exhibition

Fig. D17

Grantham Institute exhibition
at Imperial College



- questions about functionality / technical aspects / sensors / type of plant (more "scientific" interest)
- first understanding (without reading captions: "listening to plant activity"
- questions about plant abilities
- questions about "how did you come up with the idea?" / "what are you studying / researching at the RCA?" / "what is your background?" → many / large focus on this
- "prof. david nutt: "why do they sound so robotic?" / sound seems too technological / interest in brain-plant connection / meditation
- mechanical engineering students: interest in terraforming aspects, but especially in the context of space & making other planets habitable to humans, one student said "I don't believe in earth anymore" (climate despair & fascination with silicon valley style technosolutionism / moving to other planets instead of keeping earth habitable)
- sound of plants described as interesting by many, listened to the sound for quite long times
- alienating effect not very strong with the sound, more curiosity than feelings of uncanniness
- alienating effect however very strong with tea brewed from plants grown in climate change conditions / not many takers, suspicion, "is it unhealthy?"

Fig. D18 Excerpt from research journal – Imperial College exhibition notes

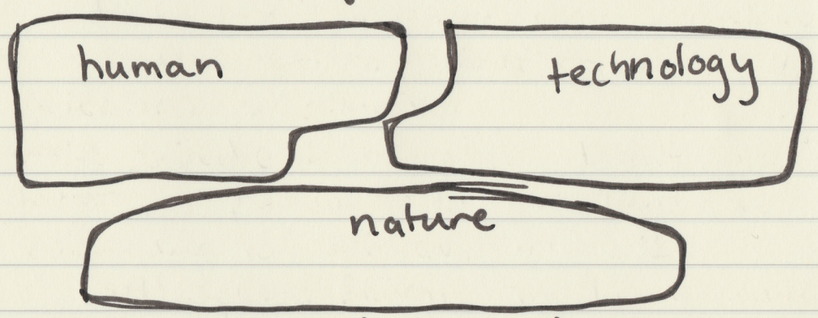
Fig. D19 Futurium Museum exhibition opening

Fig. D20 Futurium Museum exhibition opening

project text futurium website
projet text caption
project text playbadc
project text exhibition catalogue
project video
} project info materials

↳ staff initially removed information about binaural beats effect on brain from most of these ("it is interesting to tell people about this in the exhibition / if you tell people about this, because we are not advertising the project with this information"), felt this aspect of the project might be too uncanny for a broad audience ("general public", kids, etc.)

main exhibition space:



spatially separated & texts by museum staff initially also reinforced a human/nature separation, sounded extractivist ("what can we learn from nature / get inspired by it") (→constant discussions w/ staff)

exhibition opening:

main insights

- focus on process / background ("how did you get involved with the museum? what is your background? who did you develop the project with? do you have your own studio? do you always do projects like this?")
- "can you explain it? how does it work"
  → many people didn't see the caption because the museum positioned it on the wall behind the fridge (quite hidden) / said they would have appreciated more written information
- due to lack of information but perhaps also due to the context of a museum the brainwave altering effect seemed uncanny only to some (who I had explained the project to beforehand / before listening), mostly there was curiosity
- tasting the flowers grown in potential climate change conditions also seemed to provoke less feelings of uncanniness & alienation than it did at Imperial College. The exhibition visitors were more curious & willing to taste the flowers, when asked about whether it would feel strange someone said "no, I trust the museum to make sure everything we do here is safe. I come to see some strange / new things about the future"

Fig. D21 Excerpt from research journal – Futurium process & exhibition notes

discussion details / other notes

- one person referenced the gaia theory & theories of balance within nature that certain species can disrupt (invasive species)
- idea of terraforming species being syntetically / artificially engineered, whether that would make a difference ethically
- half earth theory & discussions about which land would be used for this (terraforming, massive reforestation), how this raises issues of inequality / colonialism (also in language: "colonizing" plants / species
- questions about which parts of the installation are edible (fungi too?)
- question about high pitched mushroom sound (because mushroom heads produce CO2 & they were in small space here) (under glass dome)
- nobody asked explicitly about the film which was playing in the background, perhaps due to its abstraction & more athmospheric function in the installation (lack of emphasis was intentional to not overload the space, focus on installation with various species & sounds more important
- people listened to the sound for quite long, despite the super busy opening, the comfortable beanbags probably helped (people laying back on those)
- most people did try at least 2 of the headphones to see if there is a difference
- audience dynamics: even though there was a do not touch sign some people did not see this & misunderstood how the installation works, or wanted to test what is possible, and started trying strange things – bending the led lamps / letting them face away from the plants to see if this makes a difference in sound for example. when someone started something like this other people starting trying it as well & invigilators had to intervene & explain that this does not have any effect
- "it's strange but interesting"
- "not too strange, the museum wouldn't allow things that hurt people or are dangerous"
- "it's what the plants are saying"
- "it's their activities"

Fig. D22 Excerpt from research journal – Futurium exhibition notes

Fig. D23

Fig. D23, D24, D25
Filming aerial landcape shots in Iceland

Fig. D26, D27
Filming aerial landcape shots in Australia

Fig. D24

Fig. D25

Fig. D26

Fig. D27


Fig. D28


Fig. D29

Fig. D30


Fig. D31


Fig. D32

Fig. D33

Fig. D28 3D-printed model for shape of glass domes
Fig. D29 CNC-milled prototype of bowl
Fig. D30 Wooden mold for glassblowing domes
Fig. D31 Glassblower in Glassfactory Baruth, Brandenburg, Germany
Fig. D32 Glass color tests
Fig. D33 First full size glass dome with white gradient

Fig. D34

Fig. D35

Fig. D34 Glass dome test with red gradient
Fig. D35 Glass blowing at Berlin Glass e.V., Berlin

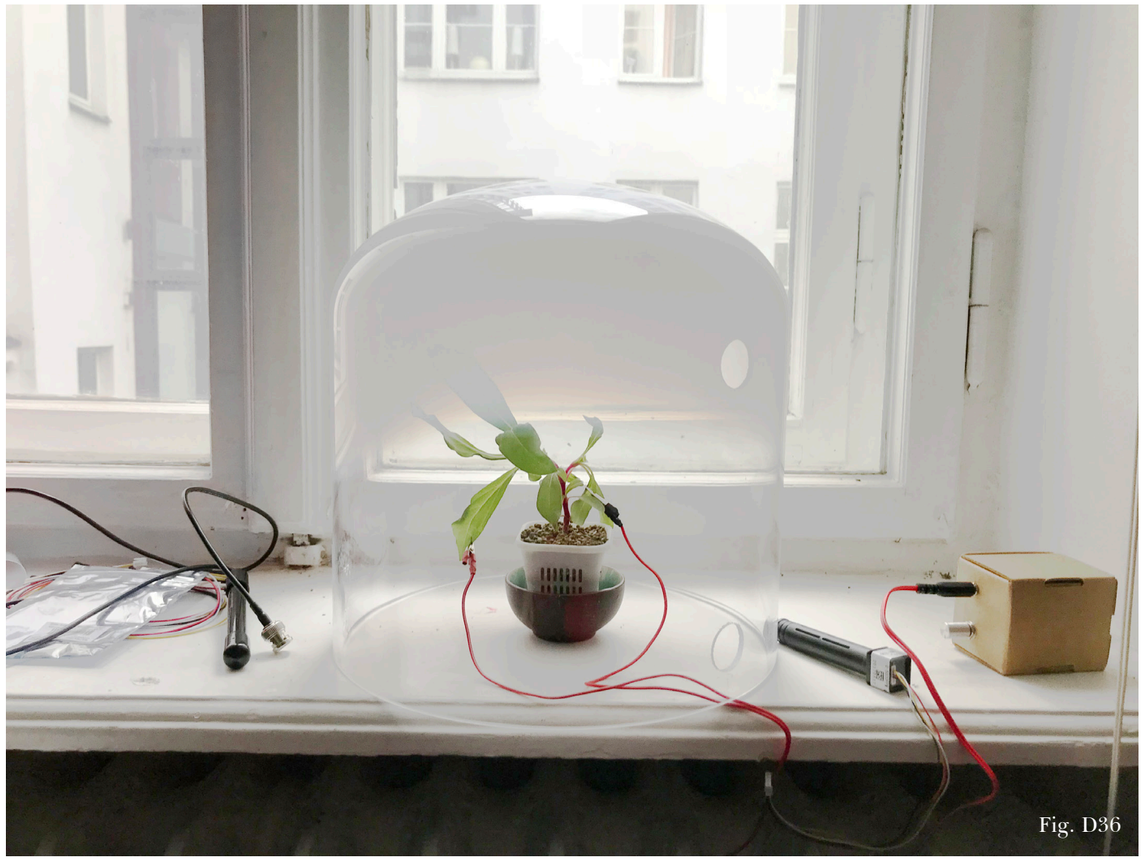


Fig. D36


Fig. D37


Fig. D38


Fig. D39

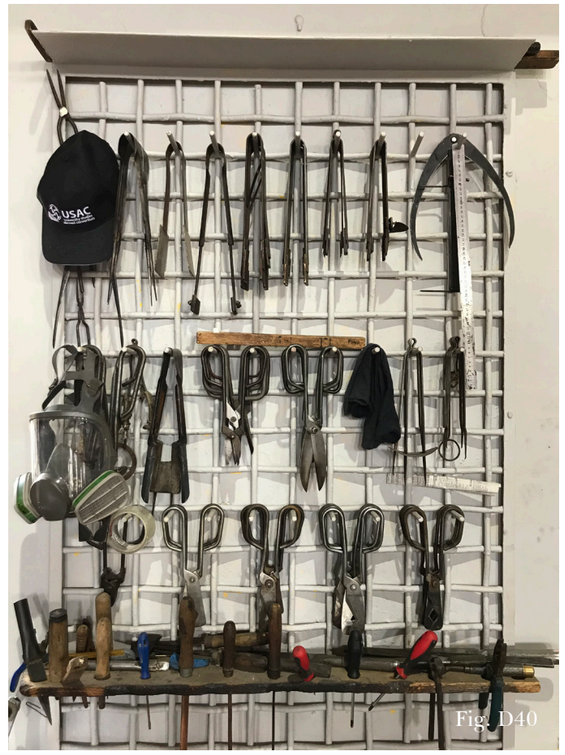


Fig. D40

Fig. D36 Initial test with plant and sensors under glass dome
Fig. D37 First clear glass dome prototype
Fig. D38 Test of glass dome on base
Fig. D39 Glass blowing tests at the Lasvit Glass Factory in the Czech Republic
Fig. D40 Glass blowing tools at the Lasvit Glass Factory in the Czech Republic

Fig. D41 Lichen collected for the installation

Fig. D42 Fungi tests for the installation (oyster mushrooms)

Fig. D43

Fig. D44

Fig. D45

Fig. D46

Fig. D43 Fungi prototyping tests
Fig. D44 Lichen growing
Fig. D45 First harvested amaranth flowers grown in elevated CO2 levels
Fig. D46 Golden Promise Barley (salt resistant, created in the 50s through irradiation)

Fig. D47 Hydroponics tests in controlled environment

Fig. D48 Hydroponics tests in controlled environment

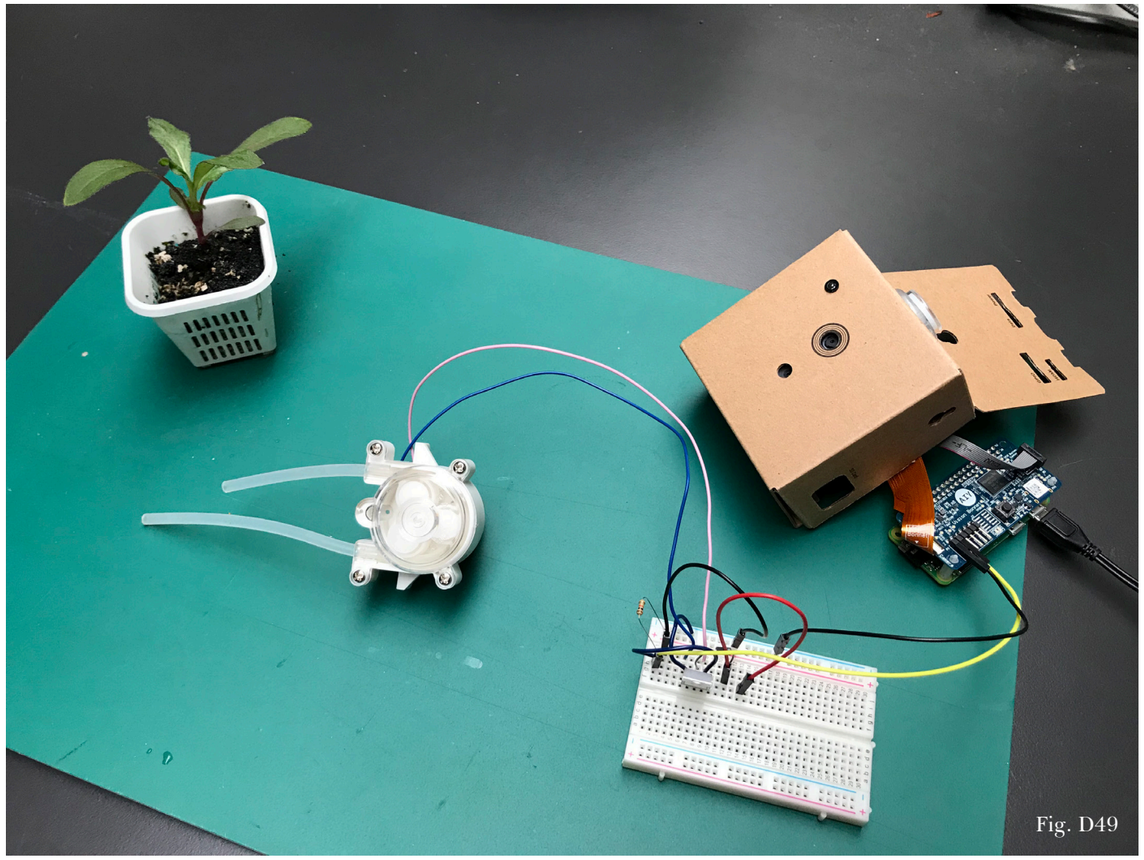


Fig. D49

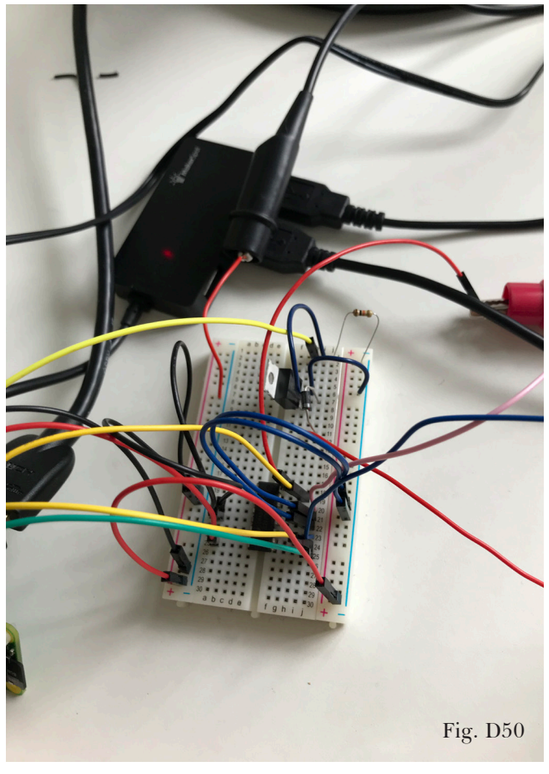


Fig. D50

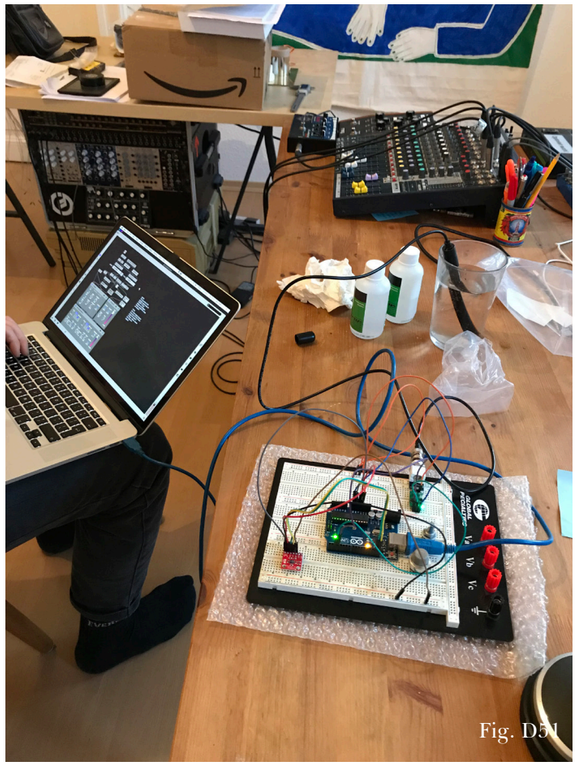


Fig. D51

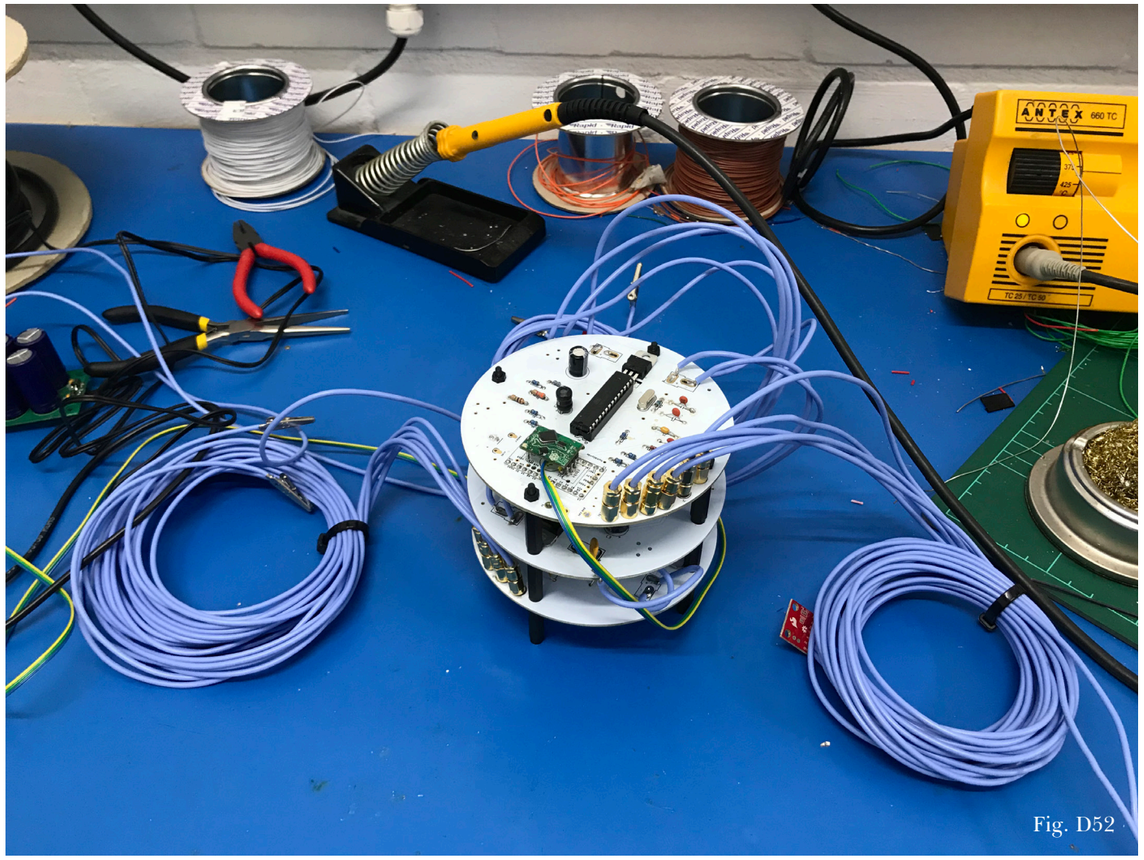


Fig. D52

Fig. D49 Starting to prototype an AI controlled watering system using AIY kits
Fig. D50 Electronics connecting water pump to AIY
Fig. D51 Initial sound tests and first electronics prototype
Fig. D52 Final electronics for the installation using custom PCBs

Fig. D53

Fig. D54

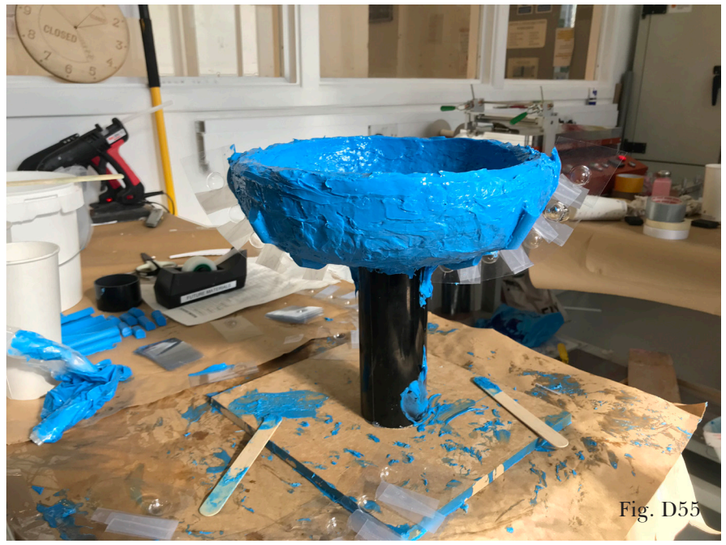


Fig. D55

Fig. D56

Fig. D57

Fig. D58

Fig. D53 Previous pages: First mold test for casting base of microenvironments
Fig. D54 Previous pages: Second mold – making process
Fig. D55 Previous pages: Second mold – making process
Fig. D56 Previous pages: Second mold – making process
Fig. D57 Second mold – making process
Fig. D58 Second mold – making process

Fig. D59

Fig. D60

Fig. D63

Fig. D61

Fig. D62

Fig. D59 Ceramic foam material test
Fig. D60 Third mold – making process
Fig. D61 Third mold – making process
Fig. D62 Third mold – making process
Fig. D63 Third mold – finished mold, ready for casting process

Fig. D64

Fig. D65

Fig. D66

Fig. D67

Fig. D64 Cast bowls for microenvironment base
Fig. D65 Bowl after demolding
Fig. D66 Sanding away excess material
Fig. D67 Finished sanded bowl

Fig. D68

Fig. D69

Fig. D70

Fig. D71

Fig. D72

Fig. D73

Fig. D68 Cutting 3D map for moldmaking
Fig. D69 Plaster cast after demolding
Fig. D70 Creating sides of the mold with clay
Fig. D71 Plaster cast before demolding
Fig. D72 Plaster cast sanding
Fig. D73 Vacuum formed plastic using plaster cast shape

Fig. D74

Fig. D74
Initial setup plan using plinths provided by Futurium Museum

Fig. D75
Microenvironment dome & base, test with carpet print pattern and red-blue LED plant lights

Fig. D76
Carpet printing tests, initial design

Fig. D77
Plot of carpet print pattern, improved design

Fig. D78
Plant, plant light & microenvironment test on plot of carpet print pattern

Fig. D75

Fig. D76

Fig. D77

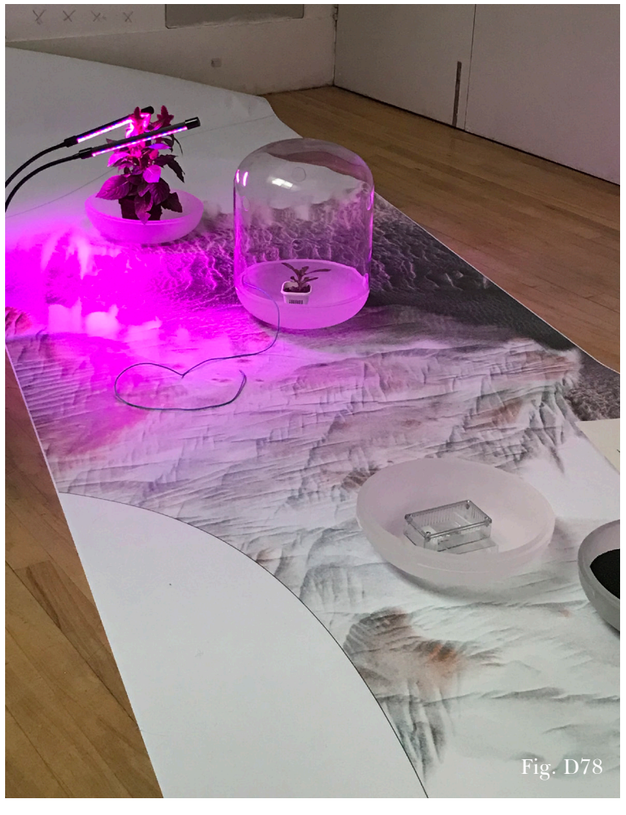


Fig. D78

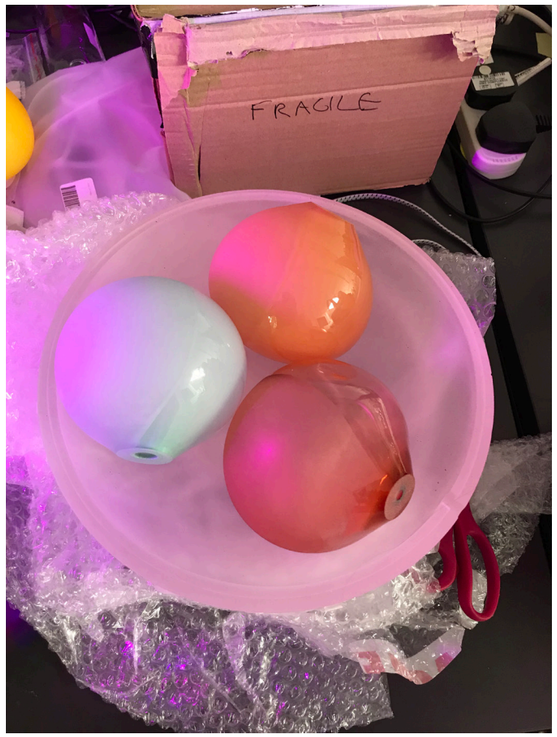


Fig. D79

Fig. D80

Fig. D81

Fig. D82

Fig. D79 Glass color tests for water containers
Fig. D80 Glass color tests on printed carpet
Fig. D81 Glass cold-working process, before cutting
Fig. D82 Glass cold-working process, after sandblasting

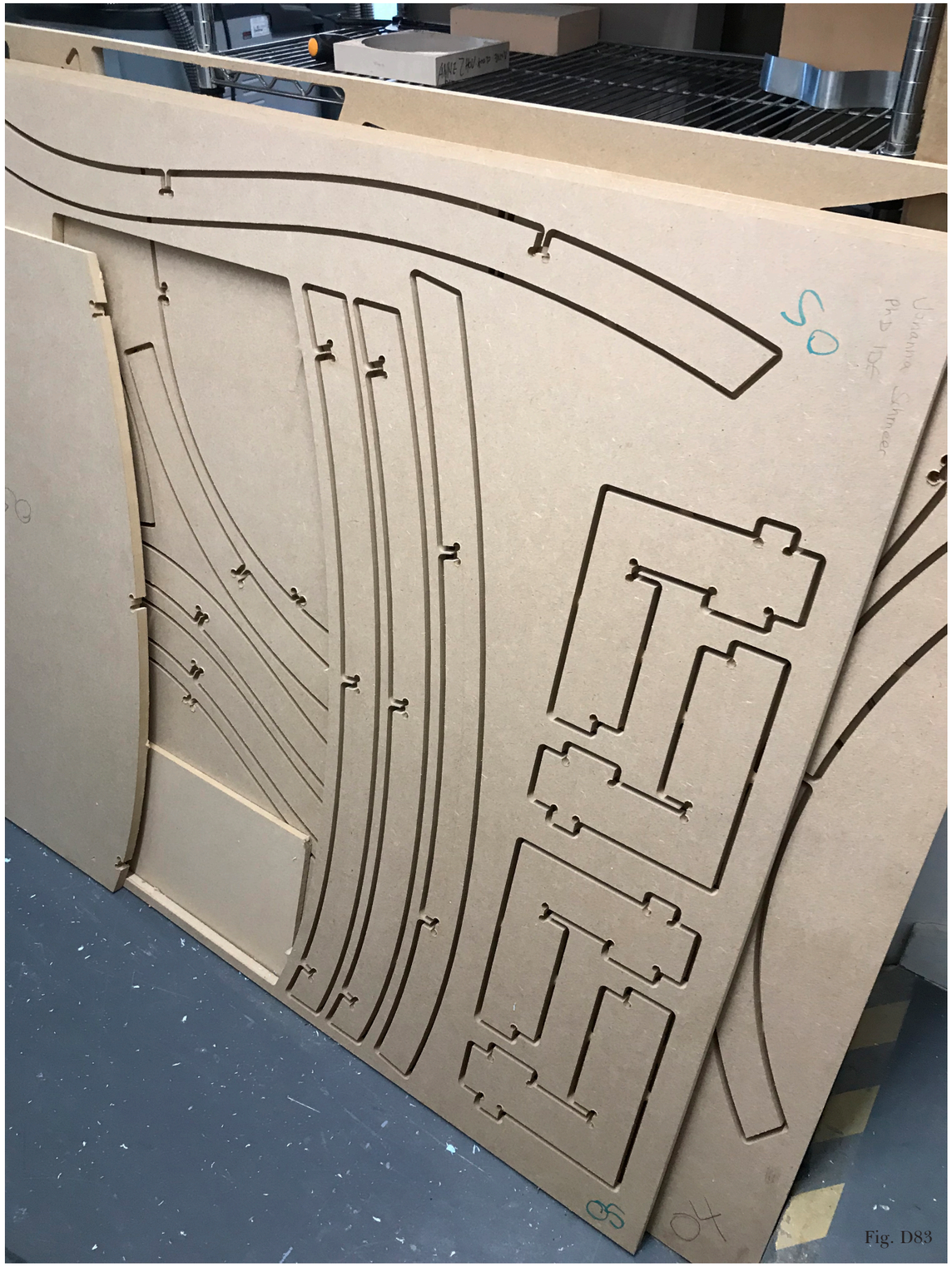


Fig. D83

Fig. D84

Fig. D85

Fig. D86

Fig. G83 CNC cut MDF parts for custom plinth designed for installation
Fig. G84 Testing CNC parts slotting into each other
Fig. G85 CNC cut parts
Fig. G86 Sanding off CNC cut bridges


Fig. D87

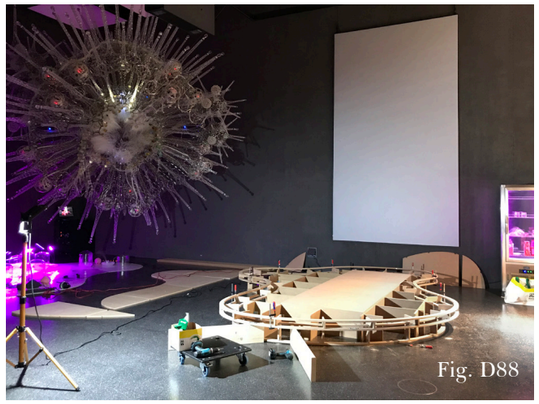


Fig. D88


Fig. D89


fig. G90


Fig. D91

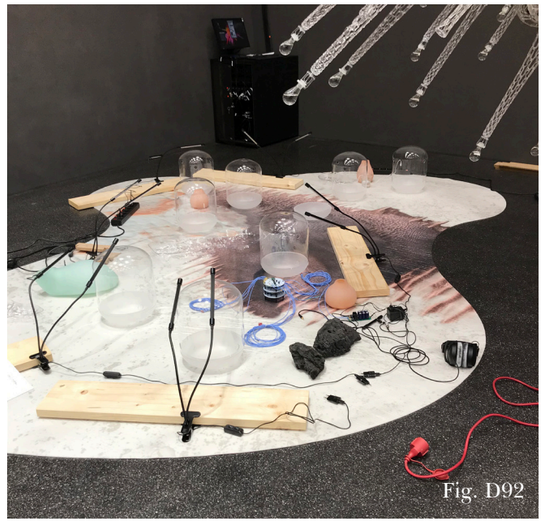


Fig. D92

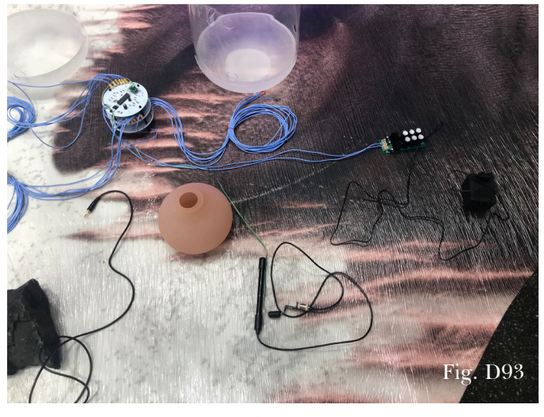


Fig. D93


Fig. D94

Fig. D87 CNC cut parts before setup at Futurium Museum Berlin
Fig. D88 Plinth setup process
Fig. D89 Plinth setup process
Fig. D90 Plinth setup process
Fig. D91 Plinth setup process
Fig. D92 Testing positions of objects on plinth
Fig. D93 Testing power supplies
Fig. D94 Finished plinth before removing protective film from the carpet


Fig. D95


Fig. D96

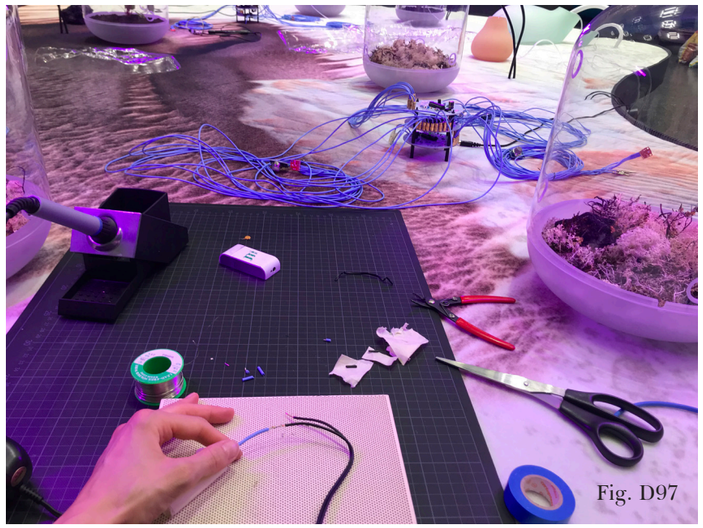


Fig. D97

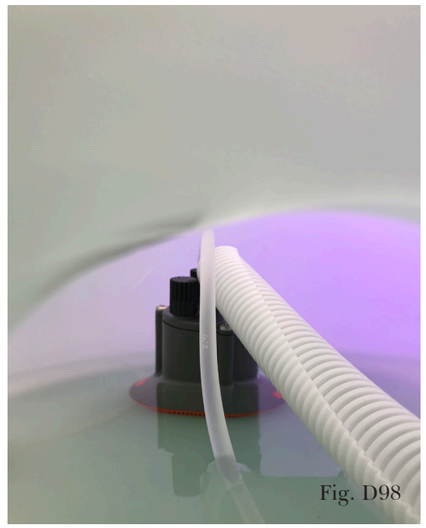


Fig. D98


Fig. D99

Fig. D95 Final electronics tests before setup
Fig. D96 Install of the microenvironments
Fig. G97 Soldering the power supplies
Fig. G98 Water pump in green glass water container
Fig. G99 Fungi growing in microenvironment, air humidifier
Fig. G100 Following pages: Microenvironments with fungi and sensors
Fig. G101 Following pages: Headphones playing fungi-controlled binaural beats
Fig. G102 Following pages: Secondary water container
Fig. G103 Following pages: Main water container
Fig. G104 Following pages: Amaranth plant in microenvironment

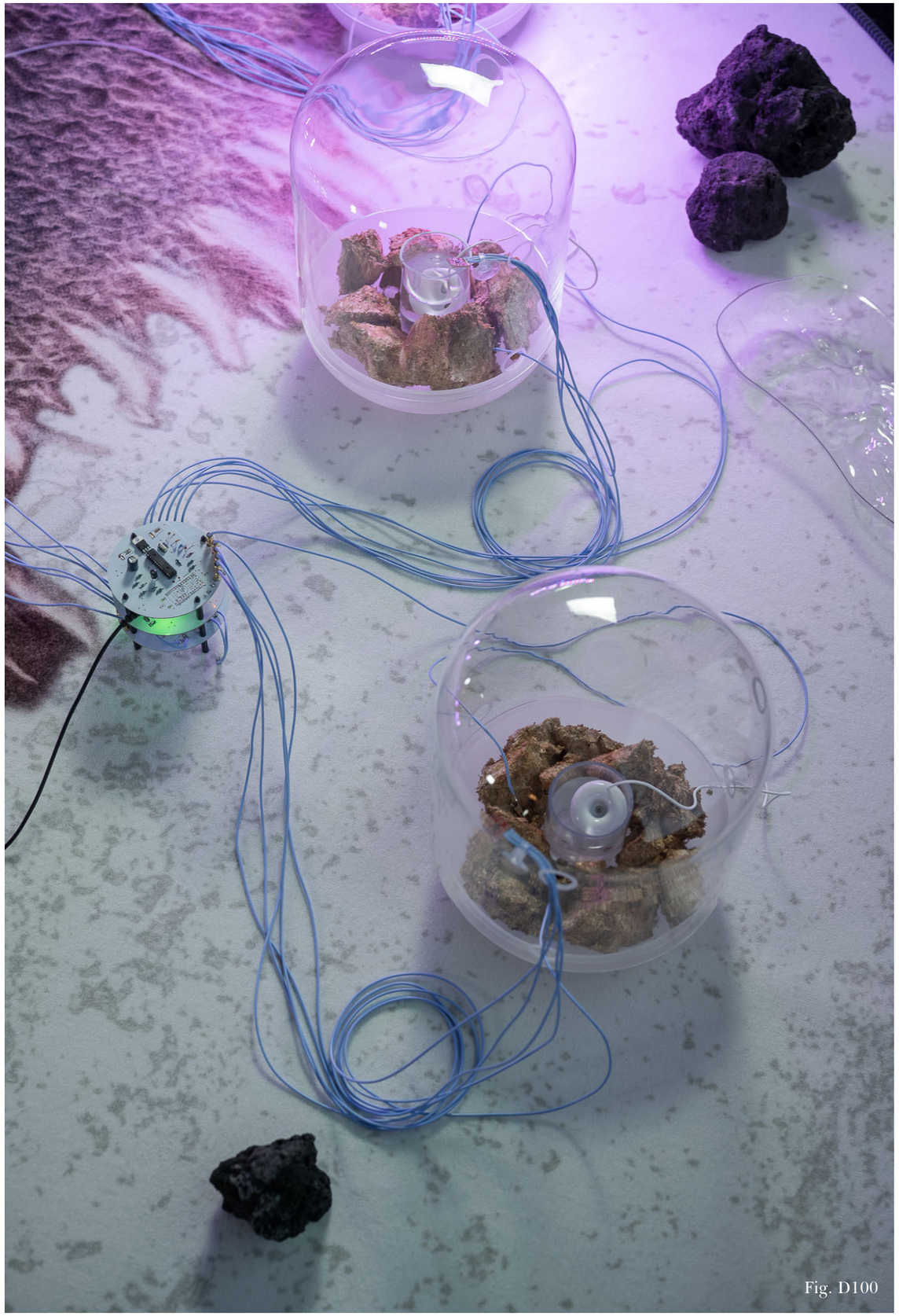


Fig. D100

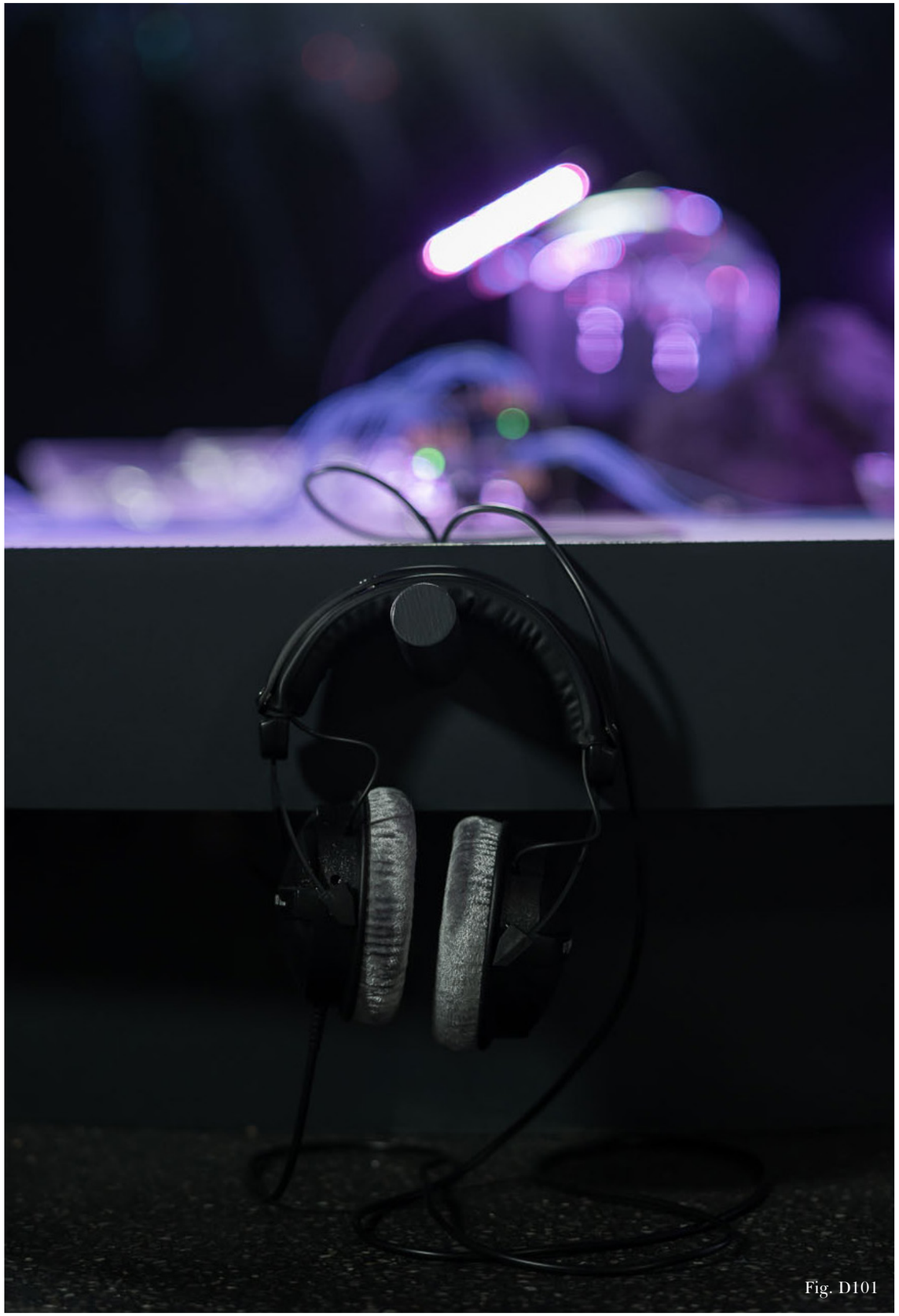


Fig. D101

Fig. D102

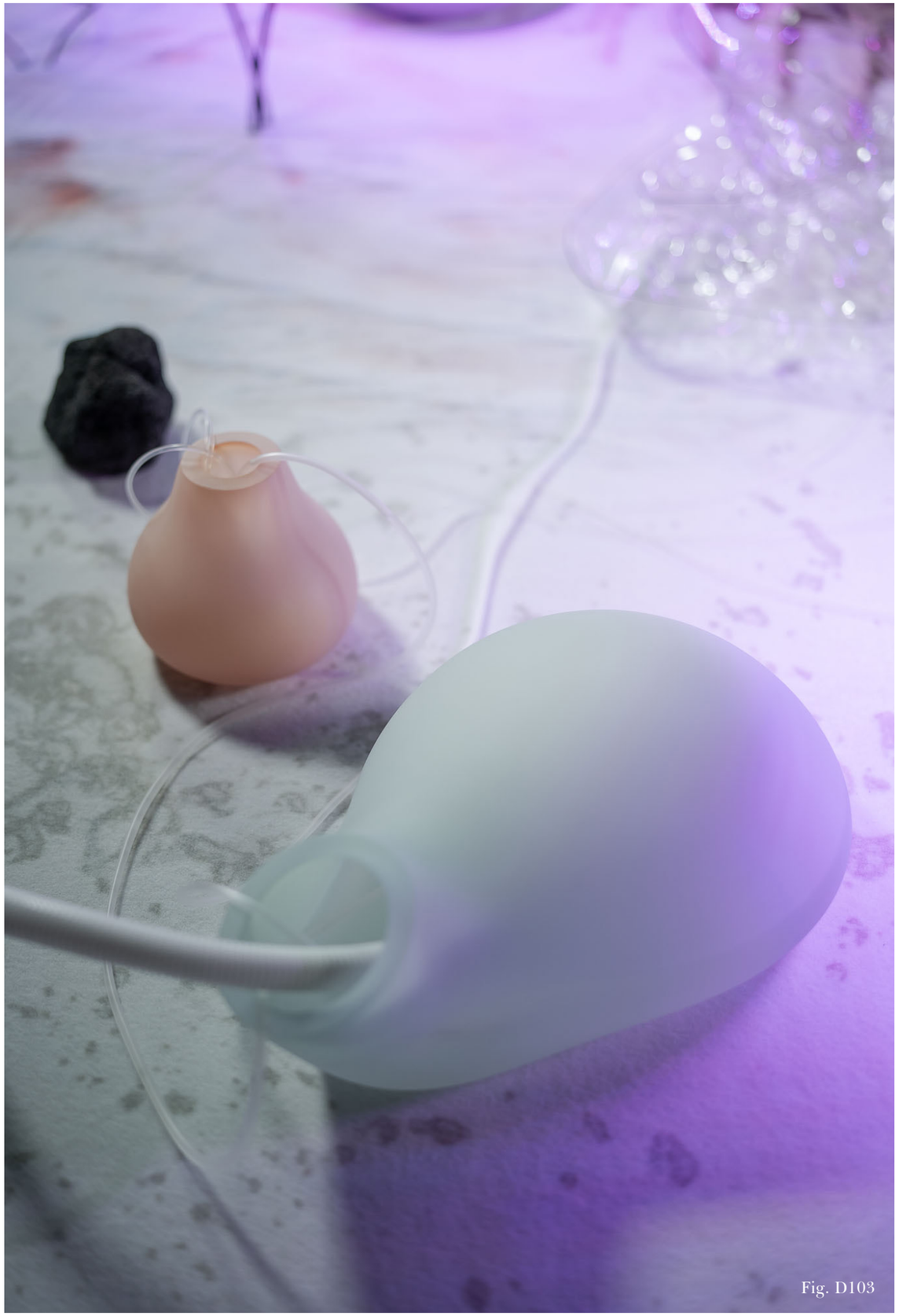


Fig. D103

Fig. D104

Appendix E: Cosmotechnical Tools

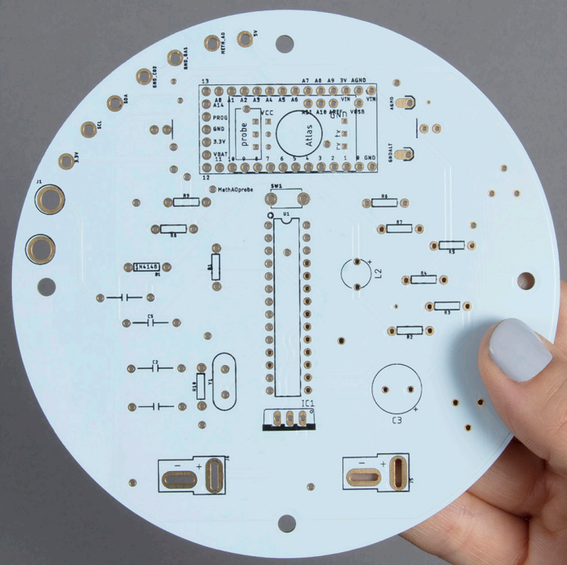


Fig. E1

Cosmotechnical Tools

Testing the electronics, sensing and sound technology from The Outside Inside as a toolkit in a local community garden in Berlin Tempelhof.

Acknowledgments

Sound & electronics in collaboration with Sam Conran

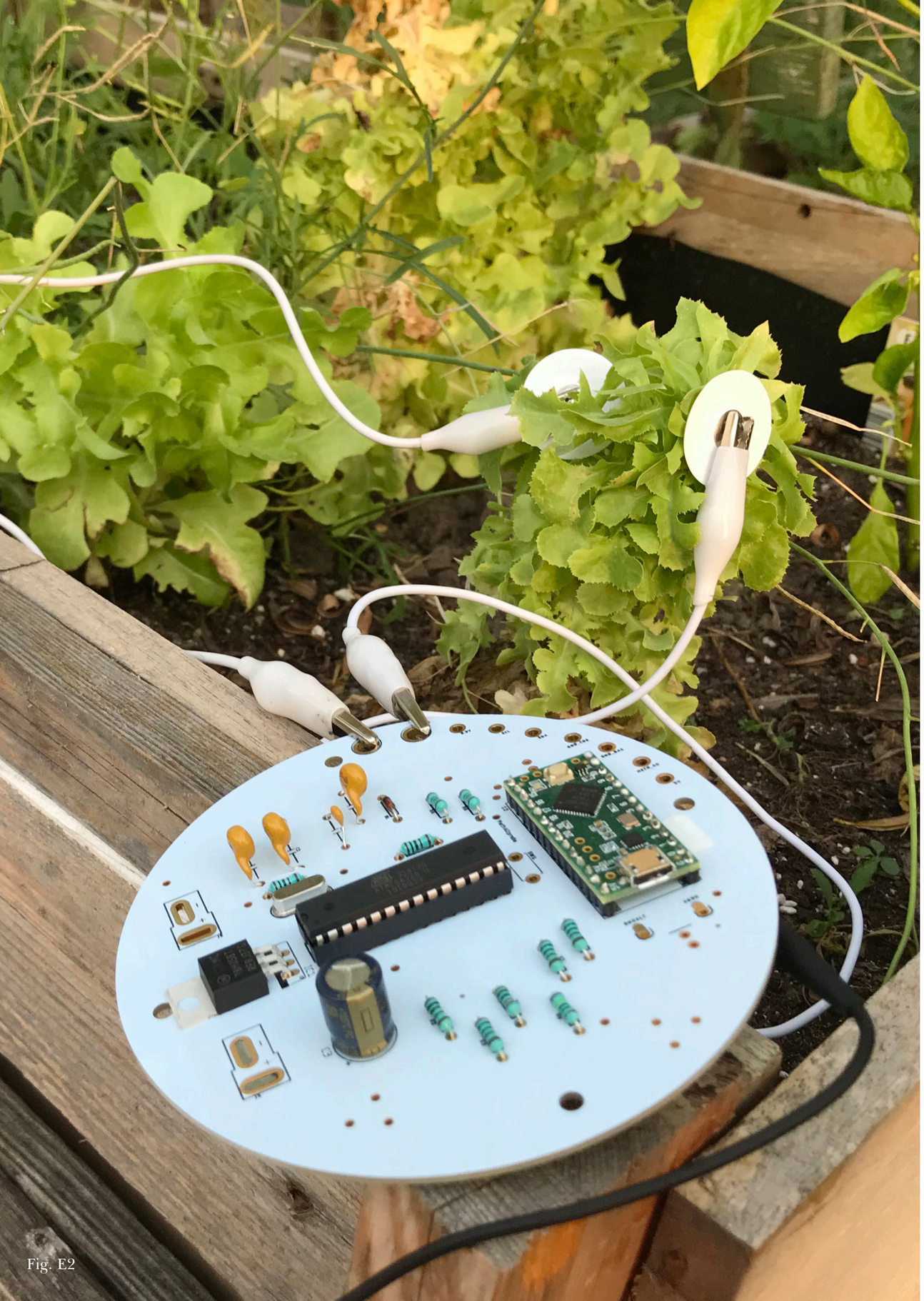


Fig. E2

Fig. E1 Custom PCB
Fig. E2 Binaural beats generating, environment sensing microcontroller


Fig. E3


Fig. E4

Fig. E3 Participant in test at Tempelhof community garden, Berlin
Fig. E4 Listening to different plants

tempelhof gardens:

- curiosity on what the device is & how it works
- "where did you buy it?"
- "what else can you do with it?"
- "the sound is quite relaxing, I would be interested in how it sounds on other plants"
- people reacted quite differently to how they reacted in the museum when told about the functionality that alters brainwaves ("is it dangerous? what will it make me feel like?) → more suspicion, feeling that it is uncanny/ strange "is it safe for kids?"
- "why do you use it like this" (i.e. what is the purpose of the device) → much more focus on functionality and use than in the museum
- meditation/relaxing aspect "it would be nice to use before sleeping"
- "it makes you wonder what is happening within the plant"
- "probably the hydration of the plant has an effect on the sound?"
- discussions about sound & plants in Fx, sonic fertilizer, how the electronics could also be used to send sound to plants to promote growth, perhaps based on previously measured data about plant wellbeing
- "device seems hackable/adaptable, I like that it does not have a closed box. It seems non-commercial, not producty."
- "internet of plants/species" open source?
- when I mentioned the discussions about it being potentially classified as a digital drug due to its impact on brainwaves, the comparison was drawn to plant-based drugs & ceremonies, how the function is similar and there are also stories about connecting to plant agency/spirit/intelligence
- the importance of these plant* connections /species connections / new relationships of humans to these in times of climate change were discussed
- "can this also measure the CO2 levels in the air? would it sound different next to the main street?"
- "I also think about this in the garden, is this garden primarily for humans? or for all species? (when) not centered around human needs some decisions in gardening need to be made differently. same holds true for design probably."
- "it reminds me of the electronics kits my kids use in school. maybe it could be a kit like this but with more environmental-specific functions"

Fig. E5 Excerpt from research journal – Discussions in community garden

- "I think trees are the only technology we need ~~in~~ to lower CO2 levels. Digital devices and even Internet use produce so much carbon, etc."
  -> plant as tech, but only local-plant terraforming:
- "I don't think it would be good to use non-local plants (in terraforming), there are so many examples where this went wrong, when invasive species that were initially considered beneficial became pests, like Chinese ladybirds." (that were used in greenhouses initally to get rid of greenflys, but then escaped and are now threatening local lady-bird populations)
- idea to use device on soil as well, to measure all environmental effects & terraforming effects of plants
- terraforming vs permaculture discussion, overlap vs differences
- "tech usually brings us further away from nature, in this case it connects us closer -> interesting"
- "reminds me of experimenting w/ geiger counter as a teenager. even when you are told certain objects emit more radiation, it is still a fascinating experience: a bit like looking at the world through a different lens and you see things differently after that."

cabbage

"it makes me wonder why these leaves sound different when you place the electrodes on different ones. Maybe some need to be watered and others have retained humidity. Or have some sort of mysterious plant activity."

- "using plants in different / more ways is becoming more and more relevant, tech-plant hybrids are part of that but it should always be carefully considered."

Fig. E6 Excerpt from research journal – Discussions in community garden

Fig. F1

Fig. F2

Workshop:
Designing Death

Introduction (Day 1)

Guided tour of the City of London Cemetery & Crematorium.
Talk about Design & Death.
Guest talk by Ninon van der Kroft, End of Life Doula.

Speculation (Day 2)

Participants split into groups, pick a topic related to death (e.g. funeral, inheritance, end of life care) and design a speculation for the year 2100.
Presentation of the ideas through models, prototypes, or role-play.
Finding the interesting ideas at the core of the fiction, and developing these into a concept for an alternative type of cemetery.

Design (Day 3+4)

Designing and developing the cemetery concept.

Design (Day 5)

Final presentation in Hyde Park.

Acknowledgments

Workshop in collaboration with Anna-Luise Lorenz
Guest talk by Ninon van der Kroft, End of Life Doula
Guided tour of City of London Cemetery by Gary Burks, Superintendent & Registrar
Special thanks to the Across RCA participants

Fig. F1 Final presentation of student project – garden ritual
Fig. F2 Guided tour of City of London Cemetery

Fig. F3 Guided tour of City of London Cemetery

Fig. F4 Guided tour of City of London Cemetery

Fig. F5 Guided tour of City of London Cemetery

DESIGNING DEATH WORKSHOP

16 participants
Across several RCA programmes (IED, GID, Sculpture, Photography, Fine Art, DP, Architecture, Interior Design)

Day 1:
Morning – tour of city of London Cemetery (meet there in morning)
→ back to RCA, introductory talk to project (speculative design intro + research on design & death: silicon valley transhumanism, design research projects in palliative care, etc.) /ishiguro robots etc.
afternoon – guest lecture by end of life doula Nihon vander Kroft

Day 2:
pick one topic related to death (eg. funeral, inheritance, end of life care) from a set of cards and design a speculation for the year 2100 (present as sketch, rough prototype, roleplay, or a combination of these)

Find interesting ideas at the core of these fictions & develop into a concept of a cemetery that is radically different but would be feasible today / possible (group work)
Day 3+4:
group work developing cemetery concept
Day 5:
Final presentation in Hyde Park

Fig. F6 Excerpt from research journal – workshop time plan

As a group, pick one aspect of death from the cards on the table, and imagine what role this aspect might play in the year 2100. Speculate about how it could manifest itself in a ritual in the future, and design this ritual. Which artefacts, sites or participants are involved in it? Think about how the world might be radically different, and how this might impact attitudes and behaviours in the context of death and dying.

You have 60 minutes. Create sketches, a rough prototype, or make a short performance — use whatever format is best suited to communicate your idea.

Fig.F7 First brief: Creating highly speculative concepts

reincarnation

questionaire every 9 years, gets fed into life force tube, information is harvested from you
if you want to be reincarnated you answer questions, animate, non-animate. is gender important to you
there is a machine that with machine learning decides what you will be reincarnated as

digital dynasty

object server AI copy of family member, in the home
rather than focussing on bural, focussing on ritual of accessibility
private shrines in the houses
fragrances of persons odor
testament grandma deciced on giving access to herself, who gets how much access
character of grandma would evolve depending on what you input
conversations like chatbot
what are the characteristics that granma would keep and what could change?
data havested and questionnaire to generate character
do you unplug virtual grandma? after a while? do you have a funeral for her?

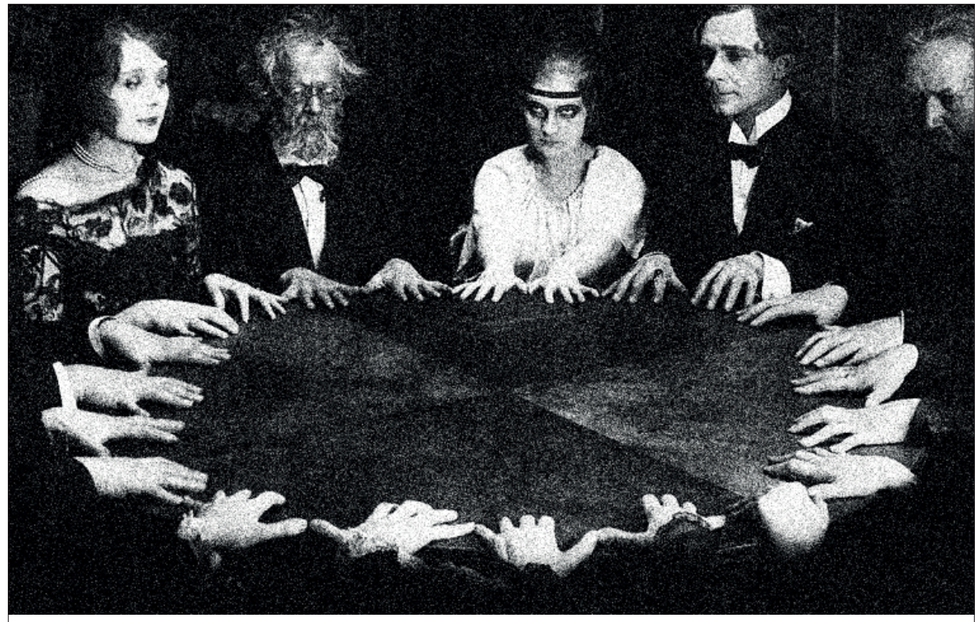
celebration

lemon memory object that brings back the person virtually for a while to have last conversations

suicide

making it acceptable, making things easier and creating empathy within the loved ones that are left behind
video of last words watching
feeling of empathy for suicidal person
ceremony lead by spiritual leader & created empathy

Fig.F8 First brief: Notes from presentations of results



"There are lots of risks with design jumping into the fray when it comes to end of life. Crassly commercialising or commodifying death will only alienate, put people off and make them resent having the fingerprints of a designer on the experience. Designing for the end of life is not something venal or style-driven. It is a deeply human need to wrestle with a profound moment in our social relationships." — Jamer Hunt

What is the role of death as a marking point in the relation between past, present and future? What might we, as designers, bring to the language and inevitability of dying?

In this brief we ask you to rethink the concept of the cemetery as a place for grief, celebration, remembrance, transformation or transition. What could a cemetery mean in developing new relationships to death? Could it be atemporal? Which new rituals could emerge? Does it need to have a location? How is it accessed? Which role does the physical body play in this cemetery? What is its scale — micro-scale, human-scale, planetary-scale, universal?

In connection to this brief, also think about the following: What does or what could dying mean today? What are the various dimensions of death: grief, legacy, suicide, participation, refusal, denial, celebration, immortality, disappearance, omnipresence? Are life and death binary, or is there a spectrum inbetween? How do we learn to die? Who are the participants, what are the set of values, rituals, objects, sites, artefacts, products, technologies, institutions involved?

Explore humour, shock, surprise, subtlety, performance... as tools for your designs while retaining a sense of sensibility.

Fig.F9 Second brief: Closer-to-reality concepts

Reincarnation group:

beautiful vs uncanny

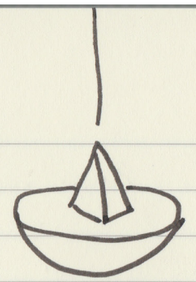
COMMUNITY GARDEN CEMETERY

- presentation as a ritual: all workshop participants holding hands in a circle, group reading out a speech as part of the meal ritual
- in the concept the deceased are buried in a community garden ~~with~~ in non-toxic cloth (& no toxic embalming)
- crops & vegetables are grown above the deceased (body as fertilizer)
- once a year family & friends gather for a community garden meal which is prepared with vegetables grown on the remains of the deceased → part of them is present in the food / becomes the food
- part of presentation: cutting vegetables on a mirror plate & handing them out to workshop participants to eat
- the garden is designed to have a certain geometric layout full of symbolism, and relation to the ritual
- positioned as an option for atheists / a secular ritual

→ caused very engaged discussions, without me having to ask questions or provide prompts, group wants to continue working on it

"the speculative exercise really helped to get into a different way of thinking, I don't think we would have developed an idea like ours otherwise"

digital dynasty / AI copy group:



LASER LIGHT RITUAL

- cemetery as rays of light travelling endlessly through space
- information about a person is coded into a morse-code style light beam
- laser beam comes out of a ritual device that is activated only when held in a certain position by several people at a certain GPS location
- laser beam is then sent out into dark sky to let that person become endless travelling light
- same GPS location can be used to look at sky at same time annually

celebration / memory object group:

GHOST APP AR

- an app where people appear as ghosts in geolocations they or their relatives specify after death
- (virtual AR cemetery)

(suicide group:

because topic was too controversial / problematic and because some workshop participants couldn't take part in the last two us days this group dispersed into the other groups. their speculative concept had been dismissed / criticised heavily on day 2.)

Fig. F10 Excerpt from research journal – student project notes

Fig. F11

Fig. F12

Fig. F11 Student project presentation: Laser Light Ritual
Fig. F12 Student project presentation: Ghost AR App

Fig. F13

Fig. F14

Fig. F13 Student project presentation: Garden Ritual
Fig. F14 Student project presentation: Garden Ritual