
NERD – New Experimental Research in Design 2



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Positions and Perspectives

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PREFACE

Design deals with 'normality', acting in the 'swampy lowlands' of banal everyday problems (Donald Schön, Alain Findeli). It devises courses of action (Herbert Simon) for making or keeping the world habitable. In the first NERD anthology I addressed the 'tightrope walk' of design research, between 'artistic research' and 'proper scientific research'. Staying with the playfulness of circus imagery, I now try a new metaphor: juggling three balls, or spheres, namely the 'scientific', the 'moral' and the 'explorative':

- The scientific sphere has to reduce everyday complexity into manageable tasks and apply rigid methodology, and thus runs the risk of the streetlight effect, i.e. looking for answers on the high ground, where the light is, instead in the dark and swampy lowlands, where the problems are. Uncritically following this path often leads to boring and trivial outcomes.
- The moral sphere works on the basis of fixed normative assumptions about how the world should be. Unfortunately, this noble attitude often goes hand in hand with ignoring the unjust and unfriendly power constellations in the real world. Moral designers often seem to have the naïve, almost religious, self-esteem of missionaries (or rocket scientists).
- The explorative sphere questions inappropriate scientific standards, prefers to 'start from scratch', allows amoral working hypotheses and tries out anarchist methods, in order to widen narrow perspectives, irritate ossified mindsets and create options. And, of course, it runs the risk of not being taken seriously, neither by scientists nor ideologues.

So, instead of sticking to one of these single perspectives, I suggest mixing them into a hybrid, projective way of handling the world. To conceive of design and research as the 'un-discipline' of playing with incompatible approaches that nonetheless complement each other. Furthermore, to play with supposedly given realities, and fixed epistemic standards that we sometimes adopt too uncritically, and to reflect on our own roles in design research. For example, cultivate the role as jester (John Chris Jones). Or overcome the strained fixation on desired utopias, or dystopias to be avoided, in favor of the playful design of mind-opening heterotopias (Michel Foucault), that can be discussed publicly. This serene attitude may relieve design (at least a bit) of the compulsion of having to be(come) a scientific discipline and of the moral demand of world salvation.

And, finally, it allows us to do some good for ourselves. Otl Aicher stated: 'im entwerfen kommt der mensch zu sich selbst. anders bleibt er beamter.' In my translation: 'In design, man realizes him/herself. Otherwise s/he remains a civil servant.'

NERD tries to promote this open attitude. Even if it may not be reflected in every single text, then at least in the overall view of the texts selected from the contributions to *NERD2go* (HAWK Hildesheim 2018) and *3rdNERD* (FHNW Basel 2019).

Wolfgang Jonas
Board of International Research in Design (BIRD)

DESIGN AS CRITICAL INQUIRY: POLITICS, PERFORMATIVITY AND PRACTICE

Florian Conradi

Ontological Crisis

On the way from mythology to logistics thought has lost the element of self-reflection and today machinery disables men even as it nurtures them.
(Theodor Adorno and Max Horkheimer, 1944)

We live in times of ubiquitous forces, where powerplays between people, systems and things unfold and intertwine to dissipate the categories by which we have attempted to discern the world hitherto – and now, nothing really seems to be what it seems to be anymore. As we increasingly share the power of formulation and opinion with the manufactured, we question how much of the conversation going on around us is uttered by human-like-bots, and humans find themselves designing tools to chase automated villains through the uncanny valley. Meanwhile, meticulously captured information about us from search engines and social forums to behavior-tracking apps and wearables sanction million-dollar profits off intimate data, as we come to realize that objects, devices and platforms are not the final product, we are. We are becoming the product of the systems that we have produced – and now we have transpired to become the commodity. We are data. The while, all of the masses of miniscule moments of mass-participation and the cataloguing of conducts are fuelled by server parks running geop-bytes of data with jarring environmental repercussions, just so that we can post, rate, search, swipe and like – expose and express, preserve and retrieve. And so, the technosphere of rigorously captured gestures and movements are rematerialized back into the biosphere. And as vibrant matter erupts into palpitating political substances igniting transposing flows of power – onto-theological binaries such as human/machine, life/matter, organic/inorganic and will/determination dissolve (Bennett 2010), as we find ourselves being entwined, meshed and muddled into new unwitting entanglements with things.

We can no longer fathom these new techno-ecologies through the concepts that we have until now, Donna Haraway notably argued already in 1985 in her *Cyborg Manifesto*, as we move from an organic industrial society to a polymorphous information system (Haraway 1985) – and perhaps moreover, thirty-five years later, from an era of the enlightenment to an era of the entanglement (Christensen and Conradi 2019). We are hiking through this uncanny valley, tiptoeing through the technosphere where algorithmic amoebas are constantly cultivating code. The atmospheric (social) pressure seems to be alright, though buzzing bees are humming concerns, consents

and requests in constant relays. And as it begins to rain remote repercussions in the techno-trope, a simulated storm is rising, as we steadily progress to shatter strato-, tropo-, hemi-, and private-spheres. An oddly comfortable chaos, where ‘Einstellungen’ (settings and attitudes) and ‘Vorstellungen’ (imagination and performances) are producing one another within an all-encompassing reification of every-thing.

Human experience is unilaterally claimed as free raw material in a state of surveillance capitalism, as Shoshana Zuboff has called it, as it is translated into behavioral data, becomes fed into machine intelligence, and fabricated into anticipative prediction products. And as automated machine processes not only know our behavior but also shape it at scale, the reorientation from knowledge to power no longer just automates information flows about us but begins to automate us (Zuboff 2019). This capitalization of ‘living matter’ produces an entirely new neoliberal political economy, introducing discursive and material techniques of bio-political governmentality as databanks of biogenetic, neural and mediatic information about individuals include profiling practices that amount to ‘life mining’ (Braidotti 2013, 62). Permeated by geopolitical properties, the technologies that are increasingly occupying posthuman bodies as they go about their daily business moreover display the increasing exercise of data colonialism, as Nick Couldry and Ulises Mejias have termed it – the combining of predatory extractive practices of historical colonialism with the abstract quantification methods of computing (Couldry and Mejias 2018). Big data is capitalism’s dependence on this new type of appropriation as it works at every point in space where people or things are attached to an infrastructure of connection. And just as historical colonialism provided essential preconditions for the emergence of industrial capitalism, data colonialism will provide the preconditions for a new stage of capitalism that we can barely imagine, but for which the appropriation of human life through data will be central (ibid).

We are at the center of an all-consuming engine driving a process of ever-expanding commodification fed by scientific research and the new technologies, Theodor Adorno and Max Horkheimer wrote in *Dialectic of Enlightenment* in 1944, as they described the poor souls of the culture industry as beings so submerged that capitalist production hemmed them in tightly, body and soul, and they unresistingly surrendered to whatever was proposed to them (Horkheimer and Adorno 1944, 11). These people need not think, as the product prescribes each reaction – they continue, through subliminal signals, and any connection presupposing mental capacity is scrupulously avoided (ibid, 109). But the advance of stupidity must not lag behind the simultaneous advance of intelligence, they argued, as in the age of statistics, ideology hides itself in probability calculations. In the culture industry, everyone is provided for, formal freedom is always guaranteed, nobody must answer for what they think – but anyone who wants to avoid ruin must actively participate in the apparatus in order not to fall behind in life and finally go under (ibid, 120). Within a state of commodity fetishism, where products fulfill our tasks, and we fulfill theirs (Marx 1859, 983), masses of preordained products and conniving

communication devices tamper with our abilities to position ourselves, as society increasingly turns to passivity. And this, not just in the mass media of the culture industry, but in the subtleties embodied in everyday objects and interactions that seamlessly dissuade us continuously more and more through excessive alleviation (perhaps better expressed in German – ‘Überentlastung’). Power becomes dispersed in invisible structures, all-encompassing, ubiquitous and constant, as we are inconspicuously led – nudged, guided and chaperoned by possibility, by probability, by default. And in these times of contented comfort and effortless efficiency, the crux is simply that everything has become fairly bearable at best, if not adequately tolerable at least – and as we struggle between the comfort of being led and taking position as critical dwellers, we find ourselves slowly becoming too placid and weary for resistance. And the field of design, like it or not, has been a large part of fabricating and accelerating the process of consumer-ability of notions at such an immensely rapid pace that we often seem to have become its accomplices – bystanders, inciters and jackals rather than interrupters, questioners and repellent resisters acting against the capitalization of selves. We have created the artifacts that have acted out the colonization in this ontological state of object-mediated crisis, a large part of which is made up by things, designed things – over-designed, under-designed, pre-designed, not-yet-designed, you name it.

And so, as individual and collective bodies are discernibly and allusively connected, trailed, classified and governed, not least through design, the human emerges in increasingly automated and perhaps even steadily more autopoietic flows of power. Slowly losing our sway to the masses of micro-powers operating in the everyday, we scuffle to access the critique that we can barely grasp, as the moment we seize it, it seems to have already dispersed. How then can one come toward taking any position at all? Perhaps by positioning oneself in the middle of the problem, becoming part of one’s own design (research) problem, one might say. Dealing with macro-problems at a micro-scale, a personal scale, in order to elicit self-criticality as an avenue to societal critique.

Composing Critique

Besides its intrinsic expertise of fabricating and preserving the norms of the everyday, design can also be employed to access and dispute mundanity – to interrupt that which becomes ‘normality’, as a practice of negotiation. Taking issue with one’s own assumptions and practices in order to surface and make intelligible the quandary that one is emerged in. The following ad-hoc experiments illustrate the unraveling of such a negotiation, the opening up of artifacts to elicit social-material ‘situations’ in which one’s own position and disposition, unwittingness and dependencies, routines and habits could unravel.

In the framework of the studio class *Critical Making – Politics of Things*, Kallum Robinson explored what one might call the capitalization of the unintelligible. Namely, how users of current technologies are often left increasingly un-aware of the concealed actions that are ceaselessly being undertaken by the digital devices that they have come to rely upon in their everyday lives, leading them to give up on personal privacy in the name of convenience. Be it for the sake of personalized advertising, or due to the continuous social media data-dumps and big data pattern mapping, our everyday devices are constantly communicating with other things, that are communicating with other things – responding to queries, performing ‘digital handshakes’, trading personal information about us. Even when we do not even touch them – they are active, working, swapping, transacting, disclosing. Using a hackable receipt printer, a Raspberry Pi (a small low-cost single-board computer), an ordinary network router and a series of open source software, Kallum built a device that was able to materialize these invisible exchanges. The data from his devices is logged, run through a script that trims the log entries into a respective time stamp and the network address of the company serving the query, printing it in real time. Continuously printing, incessantly materializing, he was able to reveal the constant digital trades and ‘handshakes’ taking place in the technosphere of his own devices, making graspable the secret life of his own personal things. Almost as an impromptu rendition real-time, the device reveals the endless dialog taking place as an unfolding playwright of commodification – the unfaltering chit-chat between things.

As a part of her master thesis *Assembling Fragments: Exploring Feminist Modes of Hacking through Design*, Marie Dietze calls into question the capitalization of the female body through intimate data from sexual health and cycle tracking technology. These applications are made less for empowering their users, she argues, as they rather take advantage of a lack of body literacy caused by taboos and a lack of tech literacy. In close collaboration with fellow researcher Marie Kochsiek, she explored alternative modes of hormone tracking – including the project *Let's Spit Hormones*. It has been found that a person's saliva changes according to the amount of the hormone estrogen in their body, and when seen through a microscope, patterns known as ‘ferning’ become visibly identifiable – having the appearance of fern leaves or frost on a windshield. The levels of the hormone estrogen change throughout menstrual cycles (and throughout lives) and saliva changes accordingly. In a very ad hoc manner, using her smartphone camera, Marie experimented with building DIY microscopes with self-made lenses to observe changes in saliva. Trying out different ways of magnification – taking apart a variety of objects such as a reading lamp, a phone, a laser pointer and a DVD drive, she attached their lenses to her own device using, among other things, a downloadable open source 3D printable clip, as an easy way to turn a phone into a microscope. This purposely inaccurate and thus unquantifiable exploratory practice was expanded to a workshop setting, in which women* came together to explore making their own improvised microscopes as a site of discursive and material contestation and debate. From

a personal to a collective performance of design for discourse, questions of both body- and tech-literacy were opened up, as individual self-observation and qualitative self-knowledge emerged as alternative discourses to self-quantification and the notions of universality and technical determinism that come with it. With a strong emphasis on autonomous self-knowledge and self-care, for instance, the importance of hormones for anybody – people that do not have a menstrual cycle, people after menopause or people undergoing hormonal treatment – were addressed. By engaging physically into an ad hoc and materially improvised design process, participating personally with material, technology, discourse and body fluid, the work makes intelligible the dis/connected body and the potential of un- and re-learning. As a temporary performativity, the body becomes part of the experiment setup, eliciting, one might say, a physical engagement in critique.

In their collective master's thesis, *Experienceability Meets Transformation: Circular Approaches for the Anthropocene*, Katharina Schmidt and Ines Weigand inquired into the issues of the phosphate cycle, which in order to comply with our production and consumption needs has been brought severely out of balance by human intervention – an intervention that will slowly but surely drive the earth towards the abstract problem of a 'global collapse'. Exploring how the macrocosmic topic of how material cycles of nature and humans are connected, they took the microcosmic starting point of their own bodies, as precisely the physical excrements of human beings, human urine, contains high levels of phosphate that can be recovered and reused. They experimented using objects and chemical compounds that they had at home or could obtain at a pharmacy and drew on knowledge from anyone really – from the neighboring university lab and the open science community to the unanticipated expertise of family members. Building their own centrifuge out of a 3D printed open source file connected to an ordinary drilling machine, and accumulating their own urine, they designed themselves through a filtering process that ended up nurturing a tomato plant. As a gradually unfolding and rather improvised practice, they designed devices and processes as they went along, always merely for the necessity of the next step. In various cycles and processes their bodies filtered, recycled and transformed the material, and over time they got to know the metabolic processes of their bodies, understanding themselves as organisms (and perhaps, as organic machines). Physically performing the circularity that they were investigating meant being able to grasp the object of research that they were tackling, making an abstract problem discernible and phosphate circularity experienceable as the body transpires to act as a filter (as part of the design work, as an object in the experiment framework). And investigating circularity with the lens of open science in this immersed mode of inquiry ultimately led them to *becoming* open scientists themselves.

Within the context of my current research group, in a series of ongoing experiments with achieving a relation to the intertwinements of nature and culture inaudibly taking place in the obscurity of our mundane everyday lives, the

data-compost emerged as a personal confrontation with digital overproduction, overconsumption and overpreservation. In times of data-hoarding, where we litter our devices and the internet with such masses of information that we can no longer conceive of or navigate our ceaselessly progressing personal big data, the clutter sometimes seems to weigh us down physically, as we cannot keep up with our own repositories. The more storage space with which our equipment is equipped, the more files we can store. The bigger the clouds, the more backups we can keep. The more deceased project websites we keep paying for, the more perished profiles we can maintain. The more barren ground we can colonize on a spatially seemingly infinite internet, the more clutter we can contrive in our rambling repositories of electronically powered digital memory-devices. Personal practices in a global culture of data-hoarding are resulting in ominous energy demands, fueled mostly by fossil fuels. In the experiment creating a data-compost, emptying your digital trash triggers an organic composting process. Through this digital trigger, the method of 'bokashi composting' meant that the organic food trash from the members of the research group could be quickly fermented in an airless environment, producing a liquid that could then be used to fertilize plants. As a first step in an ongoing attempt to recycle the internet, the social performance of composting one's digitally hoarded data did make physically tangible one's production of digital trash and make graspable in the everyday life setting of a research lab that in an ecology of data over-production and over-preservation, practices rematerialize back into organic consequence. As a complex machine for a simple action, a techno-organic mediator of sorts, data was digested and once again made back into physical matter.

Practicing Performativity

Improvisation as Design

In Guy Debord's 'society of the spectacle', the commodities rule, and the consumers are passive subjects that contemplate the reified spectacle – the spectacle, in this sense, reflects a critique of advanced capitalism and a primary concern that it increases towards the expression and mediation of social relations entirely through objects (Debord 1967). Today, perhaps, we live in a society of *spectacles*, one dis/simulation replicating another as we perform and practice parallel renditions of reification. Debord, a founding member of the situationist movement, describes the 'situationist' in the situationists as relating to the theory and practice of constructing situations – the concrete construction of momentary ambiances of life and their transformation into a superior passional quality. 'So far philosophers and artists have only interpreted situations', he declared, 'the point now is to transform them' (Debord 1957). This, inspired by Sartre, who wrote that 'there is freedom only in a

situation, and there is a situation only through freedom' (Sartre in Plant 1992, 20). The situationists incited a value of gameplay that radically negated the separation of 'the game' from everyday life, taking a stand in favour of what will bring about the future reign of freedom and play. We have to multiply the unfortunately so rare poetic subjects and objects, they claimed, and to organize games for these poetic subjects to play with these poetic objects. For Debord, this was the entire program, which he saw as being essentially transitory – creating situations that would be fleeting and temporary, without a future, simply passageways (Debord 1957). And this, as a mode of accessing the politics hidden in the everyday. As Maurice Blanchot has put it – the everyday is always already dispersing, it cannot easily be introduced into a whole in order to examine it, because we can never see it for the first time, thus making it an inaccessible space to which we have always already had access (Blanchot 1993, 239–245).

As a mode of critical inquiry – it is a distinct ability of design to make an alternative viewpoint temporarily and intimately experienceable by materializing a situation that tosses mundanity out of the realm of the ordinary, for a moment. A manufacturing of a speculation into a lived actuality that provides a particular chance to reimagine and recast the possibilities of the unfolding current, making it possible to wrestle with the politics of the ordinary that is so difficult to reach. The experiments above merely demonstrate a way in which the concealed mundanity can surface as thought-terrain able to be tread upon by making the everyday a laboratory of critical thought, of negotiation. By living in a prototype of an alternative politics with things, the personal becomes a lens from which common concerns can surface and become visible and formulated. Temporarily staging the unordinary in the ordinary, engaging the unusual in the usual, turns everyday life into an improvised act in order to gain novel perspectives on the most difficult concerns to capture – the ones that are concealed in rehearsed performances and practices. Making mundanity a laboratory thereby opens it up to be a site of experiment, of exploration, provisionally unfamiliar and temporarily unaccounted for. As a form of research performativity, one might say, this mode of designing situations can create a space to negotiate a personal political play. Employed as a practice of socio-material dramaturgy, design can form a context in which an improvised and side-tracked exploration can unfold, in order to gain a skewed perspective on a blind spot in everyday life. Improvisation as design, in this context, means creating the framework and setting in which the play resides, in which it can unfold.

Acting Objects of Research

Furthermore, in terms of the position of the researcher, all of the experiments above illustrate a mode of immersive practice, entailing in a sense personally becoming a part of the object of research itself – engaging in the live prototyping of it. The

experiments demonstrate how things can draw the researcher into their own inquiry, as they become a part of the investigation physically through their gestures or even their bodies – a literal submersion into the work. Being based on auto-ethnographic engagements, and thereby being in the inherently dual position of being both researcher and researched, this tactile tactic of design research makes possible the experience of becoming one's own research problem, allowing not just an immensely immersive point of view, but the emergence of what one might call 'a critical sociology of the self'. While an autoethnographic approach in itself encourages critical reflection on one's own position, these experiments entailed taking one step further, as the research frameworks were incited (designed) for a critical engagement with the self and its position in everyday life. And so, abstract and political questions raised came to life – literally, as they were prototyped and performed, making them intelligible, occurring as they were acted out.

Rehearsing Rogue Research

The approach of designing situations in which one can immerse personally into the ad hoc provisional prototyping of an issue provides a certain urgency, as we live in times where the problems alter and transform so swiftly that we need approaches to capture and formulate critiques before they have once again been reshuffled and adapted. If we do not manage to create a space for practicing counter-logics and critically disordering presumed reason in an omni-reasoned world, then (to borrow Vilém Flusser's philosophical syntax) we will be 'reasoned by the reason that has been reasoned'. In times of ontological crisis, where things turn into other things before we have perceived what they are – and we become something that happened to happen through the production of and interaction with them – we must engage into a cultural-material negotiation, questioning the current *modus vivendi* by engaging in in-between spaces, uncertain practices and insecure things. This, as an action of never yielding to the finished and secure – to the things that become material ideology, to the things that manufacture the norm. Re-engage, re-question, re-situate and *re-form*.

We must continue claiming space for inciting a critical counterculture in design-research and design-education, devising a postdisciplinary space that operates between critical theory and critical fabrication, between scientific logics, assumptions and methods – that thrives between speculation and materialization, cultural critique and prototyping possibilities. Composing the critical class as a space where the politics of design and technology can be explored by personally immersing into systems, materializing emerging queries to make them intelligible, and thus *formulatable*. And so, the academy remains a safe space for confronting and experimenting with the hypercomplexity that exists as the tissue of this crisis. This may be seen as an approach to inducing a form of rogue research – for a critical

culture that can interrupt the hierarchies in the politics of design, prototyping specimens of the un/identified, the un/specific and the un/finished.

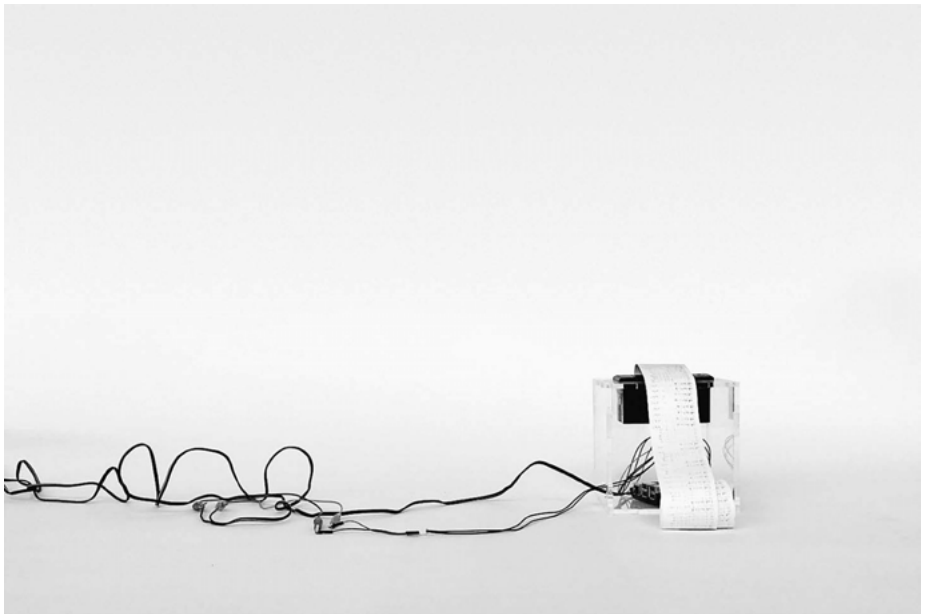
In the peculiar play of people and things, currently a tragicomedy of sorts, it is crucial to see one's part in the problematic and to call oneself into question. In unfolding practices, in an improvised act with things, maintaining that one is a query worth inquiring, and turning from inciting the spectacles to going back to rehearsing – *practicing* self-positioning as a mode of critical inquiry. So that if the curtain falls, we still have the strength left to clap.

References

- Bennett, Jane (2010). *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.
- Blanchot, Maurice (1993). *The Infinite Conversation*. Minneapolis: University of Minnesota Press.
- Braidotti, Rosie (2013). *The Posthuman*. Cambridge: Polity Press.
- Christensen, Michelle and Florian Conradi (2019). *Politics of Things – A Critical Approach through Design*. Basel: Birkhäuser.
- Couldry, Nick and Ulises Mejias (2018). 'Data Colonialism: Rethinking Big Data's Relation to the Contemporary Subject'. *Television and New Media Journal*.
- Debord, Guy (1957). 'Report on the Construction of Situations and on the International Situationist Tendency's Conditions of Organization and Action'. Paris, June 1957. Translated by Ken Knabb. *Situationist International Online*, Collaboratory for Digital Discourse and Culture, Virginia Tech.
- Debord, Guy (1967). *The Society of the Spectacle*. Edition from 1995. New York: Zone Books.
- Flusser, Vilém (1999). *Shape of Things: A Philosophy of Design*. London: Reaktion Books.
- Haraway, Donna (1985). 'A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s'. *Socialist Review* 5.2: 65–107.
- Horkheimer, Max and Theodor Adorno (1944). *Dialectic of Enlightenment. Philosophical Fragments*. Edition from 2002. Stanford, CA: Stanford University Press.
- Marx, Karl (1859). 'Results of the Immediate Process of Production', appendix in *Capital Volume 1* (1976). London: Penguin Classics.
- Plant, Sadie (1992). *The Most Radical Gesture: The Situationist International in a Postmodern Age*. London/ New York: Routledge.
- Zuboff, Shoshana (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York: Public Affairs.



1 Composting data, disposing of digital trash triggers organic fermenting process into soil amendment.



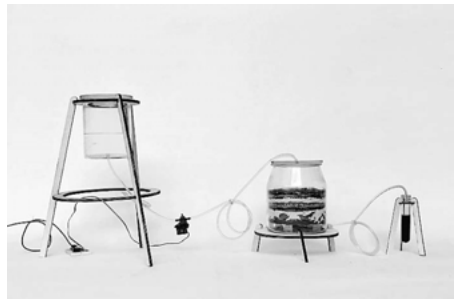
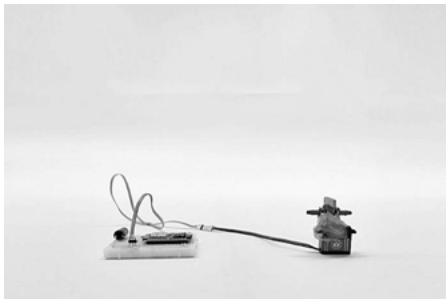
2 Printing invisible tracking and digital handshakes in real time using open source software and a hackable receipt-printer.



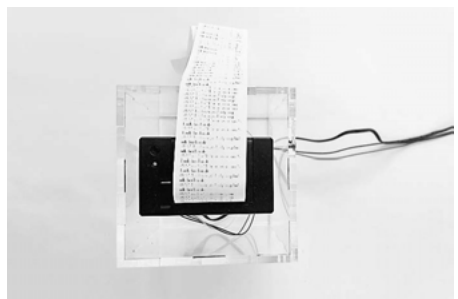
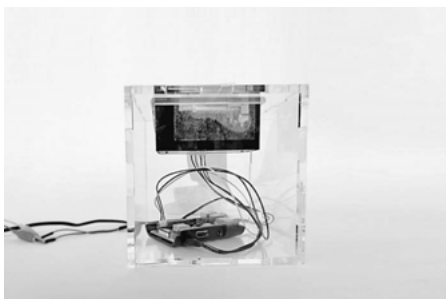
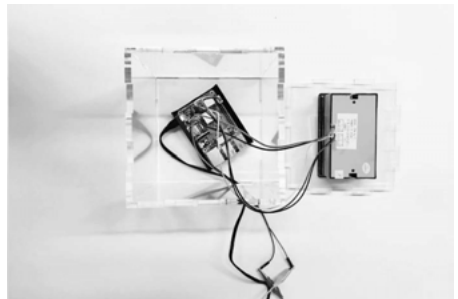
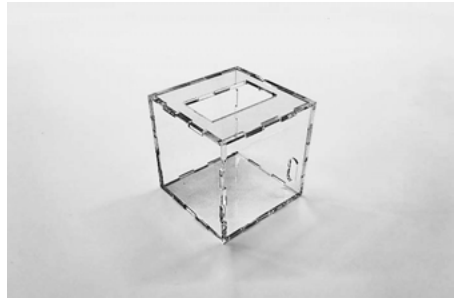
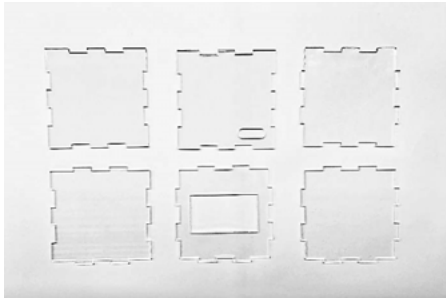
3 Designing personal DIY phosphate circularity from urine using found items and open source tools.



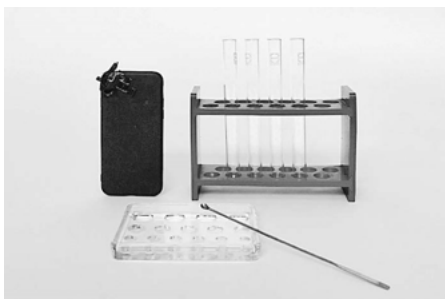
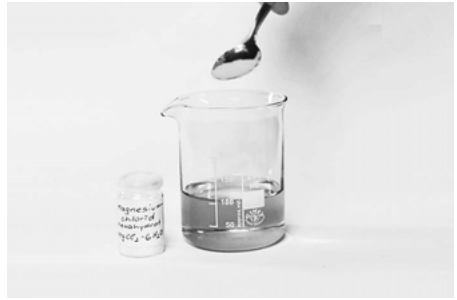
4 Re/designing DIY/DIT microscopes for hormone tracking using an approach of feminist hacking.



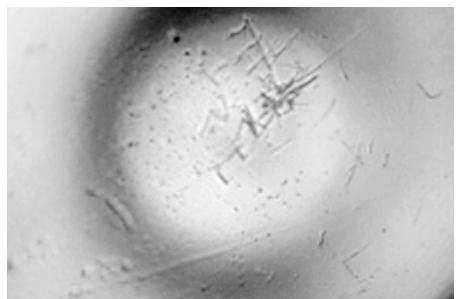
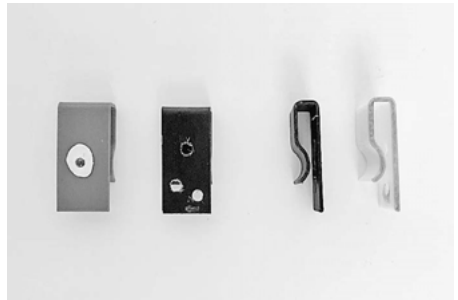
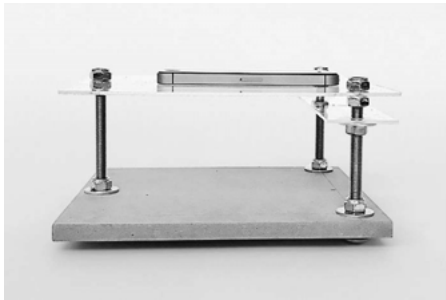
5 A series of ad hoc experiments exploring postanthropocentric engagements and 'intrafaces' between human, nature and technology. Using low cost electronics, open source software, rapid prototyping and organic others – from composting digital trash to turning a plant into an independent chatbot in order to nurture intermediate interferences with one's own knowledge culture.



6 Inquiring into personal data surveillance. Using a hackable receipt printer, a Raspberry Pi low-cost computer, an ordinary network router and a series of open source software to print the invisible tracking and digital handshakes taking place in the background of one's personal devices in real time, revealing the constant digital dialogs taking place between things.



7 Submerging into personal phosphate circularity – extracting phosphate from urine and in turn using it to nourish edible plants at home, allowing the body to filter, recycle and transform the material. Reusing and reappropriating objects to set up a home micro-lab, making use of open knowledge and open source files to build devices such as a DIY centrifuge.



8 Experimenting with hormone tracking individually and as a collective performance – speculating on feminist radical self-learning and self-sovereign bodies. Building DIY/DIT microscopes using open source designs, disassembled everyday objects, 3D printed parts and accessible technology such as a phone camera to incite understanding through resituated making.

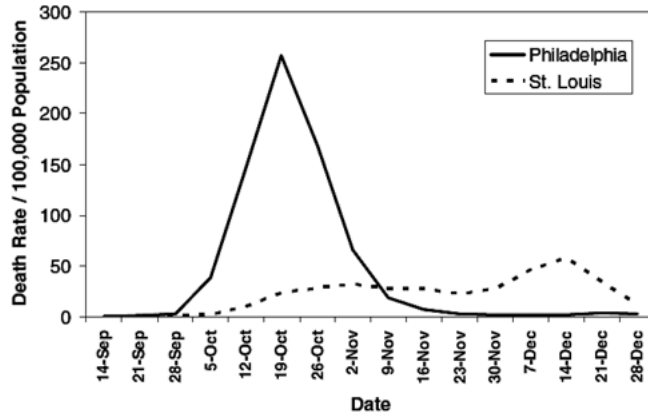
‘FLATTEN THE CURVE’. THE PERFORMATIVE EMBODIMENT OF IMAGE, SPEECH, AND GESTURES IN SCIENTIFIC COMMUNICATION FROM A DESIGN RESEARCH PERSPECTIVE

Judith Dobler

In spring 2020, the coronavirus pandemic dominated media and public reporting. Political decision-makers around the world communicated the necessary restrictions on public life with the help of scientific curve diagrams in order to keep the number of infections under control. Under the slogan ‘Flatten the Curve’, massive social rules of conduct, such as distance regulations, contact restrictions, and hygienic measures, were demanded of the world population. By utilizing a line diagram as an example, the author analyzes the crisis communication in the public media during springtime 2020. Subsequently, the macro-political communication strategies using curve charts are compared with similar scientific knowledge processes. Essential characteristics of scientific ‘curve discussions’ are rooted in the combination of linguistic, visual and gestural communication, or ‘multimodality’. Therefore, the concept of ‘performative drawing’ is introduced. The assumption is that strategies for knowledge communication in crises can be derived from the observation of micro-social practices in the laboratory. Research into multimodal communication requires a multidisciplinary and experimental research approach that takes into account scientific, historical-cultural, social and image-scientific findings. Due to their unorthodox methodological approach, experimental design research can make a significant contribution to the understanding of media, visual and embodied communication processes in crisis.

Introduction

Already at the beginning of the coronavirus pandemic in February 2020, the term ‘Flatten the Curve’ was used in the media expert panels – consisting mainly of politicians, virologists and physicians. This term, which originates from the research of medical health systems, became a fixed term in health care in the 1980s in the course of national austerity programs (Schroder et al. 2011, Fuchs 2004). The ‘curve’ represents an assumed overburdening of the health care system by annual epidemics, such as the wave of influenza in winter. In addition to medical measurements such as the provision of vaccines or drugs, non-medical measures

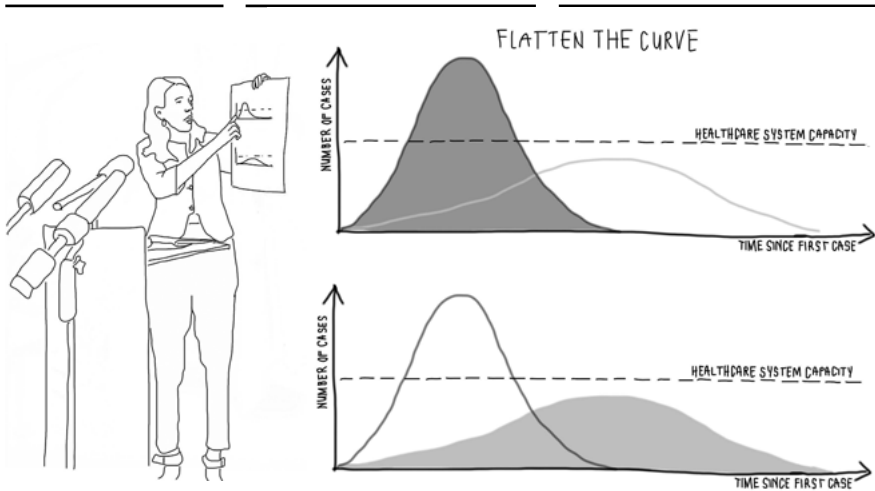


1 'Excess [...] mortality [...] in Philadelphia and St. Louis, 8th September–28th December, 1918.' In: Hatchett, Mecher, Lipsitch (2007:7583).

or *nonpharmaceutical interventions (NPIs)*, contribute to a considerable extent to 'flatten' the curve. *NPIs* consist, for example, of comprehensive hygienic behavior such as washing hands or rules for coughing and vomiting to minimize the risk of infection. Besides, far-reaching social restrictions such as school closures, bans on meetings and a 'shutting down' of public life can lead to a 'flattening of the curve' and thus relieve the medical infrastructure (staff, doctors' practices, hospitals). The relevance of social measures for health care is based, among other things, on historical data collection and analysis. Among the authors, Marc Lipsitch, a renowned epidemiologist and consultant to US health authorities, dealt with the historical analysis of measures during the 'Spanish' flu pandemic one hundred years ago in 1919 (Hatchett, Mecher, Lipsitch 2007). The authors compared data sets from the cities of Philadelphia and St. Louis and created a graph with two lines (see Figure 1).

The Philadelphia line shows the exponential increase in infection rates without *NPIs* and the resulting overload of the medical infrastructure, which resulted in a high mortality rate. In the St. Louis curve, the previously prescribed social measures result in a flattened line and lower mortality rates.

During the Corona Pandemic 2020, this graph with two curves experienced a global renaissance in press conferences and media coverage. In combination with the term 'Flatten the Curve,' it can be considered a historical icon of science communication (Amsen 2020, Raff 2020). For the media coverage of the *NPIs* in spring 2020, however, not only the visual graph and the terminology were decisive. A vital feature of successful pandemic communication was due to the gestural



2 left: 'Our goal is to ultimately flatten the curve', Jacinda Ardern, March 13th, 2020; right: Detail of drawing by Siouxsie Wiles, 2020. Drawings from Screenshots, JMD 2020.

illustration that accompanies the communication of image and spoken content. For example, at a press conference on March 13th, 2020, New Zealand's head of government Jacinda Ardern used two curve diagrams to illustrate the flattening of the curve using her index finger while explaining the necessary measures simultaneously (see Figure 2).

In one of the first Coronavirus press conferences, on March 9th, 2020, the German Health Minister Jens Spahn drew two lines on a piece of paper and explained the NPIs' concept to the media representatives, both with gestures and in words, to contain the virus (see Figure 3 left). The German Chancellor Angela Merkel also used hand gestures in her government statements on the coronavirus situation, which was taken up by the media, underlining the hand gesture with corresponding curve illustrations (see Figure 3 right). The scientist Merkel, who holds a doctorate in physics, explained complex model calculations and the curve reliability of infection figures and illustrated the connection between epidemiologists' expertise and capacity limits in the health care system to a broad lay public using scientific terms, curve representations and gestural movement. Both countries, Germany and New Zealand, are considered successful in their strategies to contain the coronavirus (as of June 2020). The communication with a broad public practiced by politicians and scientist during the corona pandemic with the help of visual data presentations bears out the assumption of how media presentation, linguistic and physical expression must work together for successful science communication.



3 left: Jens Spahn, press conference March 9th, 2020, screenshot from online live transmission by television news broadcast ZDF heute; right: 'So, the curve is flatter', Angela Merkel press conference, April 15th, 2020; Imagery by Süddeutsche Zeitung April 24th, 2020, based on a video still from press conference transmission by television news broadcast ZDF heute. Drawings from screenshots, JMD 2020.

The hypothesis called for here is that a macro-communication of scientific representations could only be successful through the interplay of image, language and gesture. The following case study will be examined based on the experimental design research conducted within the context of the dissertation 'Drawing Together – Manual Drawing as Collaborative Knowledge Practice' (Dobler 2016; 2020).

Experimental Design Research in Science Laboratory

During a nine-month field study in 2015 in the experimental physics laboratory BLiX at the Technical University of Berlin, ethnographically observed how experimental data are generated, illustrated, discussed and finally presented to a broader scientific community. The research interest focused on the interaction of highly technical apparatus and manual representation techniques, especially hand drawing. The videographed encounters between scientists document how data, language, image and physical expression function as multimodal elements for scientific communication. The use of media such as blackboards, whiteboards, paper (notes or flipchart), or digital projections (laptop, Beamer) played a decisive role in the production of scientific knowledge.

Based on those observations, I have developed the concept of performative drawing. Here, drawing is seen as an extended space for communication and ac-

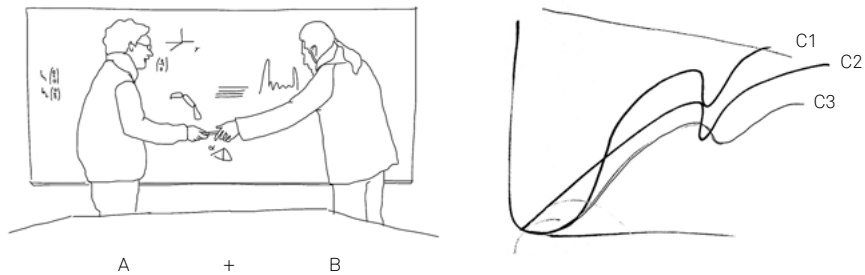


4 Drawing from Ethnographic Fieldwork at BLIX-Laboratory, TU Berlin. Meeting with data discussion of four participants in front of a whiteboard, a. Notebooks, b. Laptop, c. Mobile Phone. Drawing from Visual Research Journal, February 11th, 2015, JMD 2015.

tion. With gestural-performative actions, a transitional level is introduced, located between visual thinking and pictorial action. Performative drawing also criticizes the one-sided consideration of images, such as the idea of *Disegno*, which has been conceiving drawing as the product of a creative (primarily male) mind since the Italian Renaissance, still prevailing until modernity (Kemp 1974). In contrast, the performative approach understands the hand not only as a tool between thinking and seeing but, above all, as a medium of communicating embodied knowledge. Based on a case study from a science laboratory, I will introduce the concept of performative drawing in more detail in the following section.

In a working group meeting in a work room of the laboratory, the members meet and discuss data from the experimental measurements (see Figure 4).

The scientists compare existing measurements with calculated simulations. In particular, the researchers understand the difference between experiment and simulation as a ‘problem’, which they represent graphically with curve diagrams (see Figure 5). The experimental curve from the laboratory (see Figure 5, C1) looks different from the calculated curve from the simulation (see Figure 5, C2).



5 left: Whiteboard Drawings of two scientists A and B; right: Detail of collaborative curve diagram drawn during the meeting. Drawing from Videostill and Photo, JMD 2015/2020.

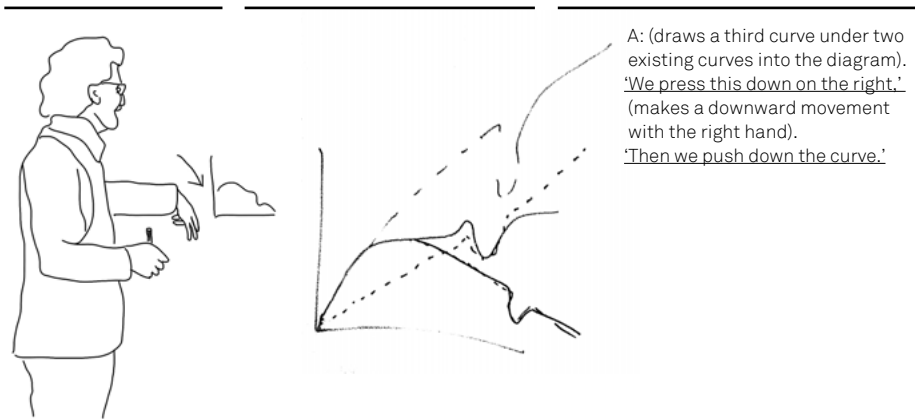
The discussion between scientists A and B revolves around the difference between the two curves. The main question is how data interpretation can change the curve shape. In a third curve, B shows how the curve can be further flattened by a modified mathematical calculation, here multiplication (see Figure 5, C3; Figure 6).



B: ‘Then it would mean that if we multiply the [simulation], [the curve] will flatten’ (draws curve C3 in the line graph).

A: ‘Exactly. However, we see that the [curve] runs even flatter’ (he points to the curve and moves the hand several times to the bottom). ‘We only see that the simulation is flatter than the measurement.’

6 A+B discuss how to ‘flatten’ the curve. Drawing from Videostill, JMD 2020.



7 B. embodies the drawn curve and 'pushes' it down with his hand. Drawing from Videostill, JMD 2020.

In a second curve diagram, A and B draw further curves on the whiteboard, which look different depending on the interpretation of the data (see Figure 7). Gestural actions accompany verbal and graphic representations.

The case study from the laboratory shows, similar to the crisis communication of politicians described at the beginning, that gestural-performative drawing, in addition to verbal-linguistic articulation, is primarily linked to physical movement and are expressed by movements drawn in the air. In 'performative drawing', the connection between gesture, language and materialized image treatments is of particular interest. This connection will be discussed in more detail below, examining it theoretically and methodically.

Theoretical Background of Performative Drawing Actions

'Performativity' is a transdisciplinary concept that can be found in the humanities and the social and natural sciences. Of particular importance for performative perspectives are feminist and praxeological perspectives in which the production of knowledge/science is always concerned with social actions and techno-material possibilities (Barad 2003; Schatzki 2010; Pickering 1995). Following on from Science and Technology Studies (STS), performative drawing is understood here as a communicative process in which the transitions between embodied imagination and materialized representation take place fluently. Thus embodiments of knowledge come into view, created as ephemeral gestures in space and finally materialized as a graphic depiction on the drawing surface.

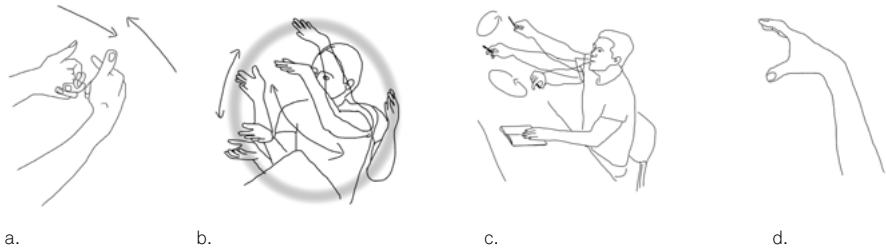
The extensions and shifts of graphic actions between hand, image and eye during the performative drawing process are accompanied by the exploration of gestures and facial expressions, which, in addition to speaking and listening as further modes of human communication, are increasingly attracting scientific attention (Streeck 2013). It is assumed that the analytical procedures of this what is called multi-modal communication research can bring us closer to the relationship between gestures and drawings, in which the spatial and physical expansion of the graphic representation becomes visible. At the same time, artistic drawing perspectives expand beyond the edge of the drawing surface into a performance of the drawing body with spatio-temporal structures (Gansterer et al. 2017). The extended triad of language, body and space for drawing as a practice of knowledge will be developed below, based on a performative understanding of gestural communication processes.

Gestural Depictions

The linguist and gesture scientist Cornelia Müller emphasizes that specific ‘artistic’ types of images can be formed with gestures, since they contain knowledge of drawing or modeling actions (Müller 1998). The gesture becomes either the carrier of this motor activity or the embodiment of a familiar object. According to linguistic interpretation, these ‘ideographic’ images always follow the verbal-linguistic articulation and the spoken discourse (Müller 1998: 112, 118). The terms ‘speech-accompanying gesture’ and ‘discursive’ gesture testify to this linguistic order as pictorial articulation subordinate to verbal-linguistic articulation. Müller assigns four pictorial modes of representation to the ‘speech-accompanying gestures’: (a) The hand acts; (b) it models; (c) it draws; (d) it represents. Müller’s designation of ‘representation’ is somewhat misleading here. It is more that the hand ‘embodies’ the object and becomes part of it (Müller 1998:115, 121–126). These four types of gestures are exemplified here (see Figure 8): In embodied gestures, hands can (a) act and pantomime an action, in which individual objects are imagined or metaphorically represented; (b) model an object in three dimensions, as if it were a sculpture; (c) draw outlines in the air and flatten objects in two dimensions; (d) embody an object. The last category (d) differs from the previous three in the entirety of the embodied representation.

Although the laboratory study is a microanalysis of scientific knowledge processes, it is nevertheless possible to transfer the results of the analysis to macro-political science communication.

In the performative drawing, gestures accompany speech and are essentially image-based (iconic). In the next stage, gestures occur in the simultaneity of language and image action as speech-accompanying drawing (graphic). Drawing action accompanied by speech differs from iconic pictorial gestures, in that the drawing gestures materialize in the form of a manual paper drawing. Finally, pointing



8 Drawings of the four gestural representations according to Müller based on observations made during ethnographic field research in the laboratory. a. The hand acts, b. models, c. draws, d. represents. Re-drawings from video stills of the laboratory study at BLIX, JMD 2018.

gestures connect the actions fixed in the drawing with the pictorial gestures embodied at the beginning (deictic). All three types of gestures are to be regarded as language and image actions, which become visible in the form of imagination (iconic), image generation (graphic) and image reference (deictic). Due to the manifold gestures occurring during discussions, a graphic-visually guided communication consists mainly of embodied images.

Multimodal Communication

In their pictorial representation, gestures serve primarily for human communication. In addition to spoken language, which has long been regarded as the primary form of communication, there is now a multimodal understanding of social communication, and body-language expressions of gestures and facial expressions are an integral part of that understanding (Kress 2011, Mondada 2016). In addition, multimodal communication research opens up new perspectives on the central position of media technologies and material artifacts in communication processes, which go beyond social articulation and interaction, and also take into account representation practices in image, space and time. Thus the communication scientists Gunther Kress and Theo van Leeuwen define the concept of contemporary communication as a ‘multimodal discourse of modes and media of contemporary communication’ (Kress, van Leeuwen 2001: 45–65). In this discourse, the visual design of content, its production and distribution are closely linked. According to Kress, multimodality ‘includes all modes as socially shaped resources for making meaning: action; movement; three-dimensional objects, such as instruments, tools, sculptures; space, socially shaped.’ (Kress 2011: 255).

With this, multimodal communication theory finally detaches itself from the mono-modal conception of a long-prevailing dominant verbal communication in ‘transmitter-receiver mode’ (Saussure 1916). The methodological challenges of multimodality affect all scientific fields that deal centrally with human communication. In the most recent proposal for ‘media-scientific multimodality research’, multimodal knowledge practices are reflected in participatory (media) multimodality (Sachs-Hombach 2018, Giessmann 2018). Non-verbal body actions and the pictorial and spatio-temporal dimension of multimodal communication research are particularly suitable for use in design research and knowledge practice.

Conclusion

Although the laboratory study is a microanalysis of scientific knowledge processes, it is still possible to transfer its observations and conclusions to macro-political science communication.

1. Curve representations play a central role as explanatory models of scientific data, both in the laboratory and in the science communication with media (Morgan, Morrison 1999). The curves are not used as static images, but as changeable progressions that can be influenced by technical measures (e.g. increasing the number of intensive care beds or ventilators) or social measures (in the case of NPIS). The knowledge that scientific data are not static but relative and changeable is self-evident to researchers. For politicians and the lay public, however, this is still difficult to understand. Therefore, for effective crisis communication, it is all the more urgent to consider how scientific data is presented, how it is discussed, and with what gestures the communication is associated. In the best case, ‘Flatten the Curve’, as used during the Coronavirus pandemic, becomes a wording that reconciles social action and scientific facts for the general population.
2. For anticipated future crises and transformations, such as global climate change or demographic change, it will also be necessary to find catchy explanatory models that make micro-social behavior and macro-political relationships comprehensible. Science communication will be made more difficult by the fact that micro and macro correlations are not necessarily perceptible to the individual and are therefore

challenging to embody. The long-term effects of climatic or social change cannot be measured in two-week quarantine periods or with a fever thermometer.

3. For the challenges of the future, it is urgent to learn from past crises and to design science communication in such a way that the interdependence of representation, language and embodied action is taken into account. The challenges call for interdisciplinary perspectives and historical analysis that will incorporate (natural) scientific, social, media and historical-cultural analyses.
4. The concept of performative drawing proposed here critiques the currently dominant one-sided consideration of selective media formats or image results (Raff 2020). It ignores the fact that communication and the media technologies used, such as video conferences, are crucial for the communication of knowledge images. The concept of performative drawings, therefore, assumes an interdependence of graphic, time-based, linguistic and embodied media practices, in which manual drawing and depiction play a central role. For future technologies, this embodiment and manual work as graphic, iconic, and deictic actions must be taken into account.

References

- Amsen, Eva (2020). 'How 'Flatten The Curve' Is On Its Way To Become A Historic Disease Image', *Forbes Magazine online*, Accessed May 20, 2020. <https://www.forbes.com/sites/evaamsen/2020/04/29/how-flatten-the-curve-is-on-its-way-to-become-a-historic-disease-image/#6f98d95070d7>.
- Barad, Karen (2003). 'Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter'. *Journal of Women in Culture and Society* 28, Vol. 3: 801–831.
- Dobler, Judith Marlen (2016). 'Collaborative Imaging. The communicative practice of hand sketching in experimental physics'. In: Peter Lloyd, Erik Bohemia (Hg.): *DRS2016: Future-Focused Thinking*. Vol. 3.: 997–1011. London: Design Research Society 2016.
- (2020). 'Drawing Together – Manual Drawing as Collaborative Knowledge Practice', unpublished Phd-Thesis, University of Potsdam, Institute of Arts of Media.
- Fuchs, Victor R. (2004). 'More variation in use of care, more flat-of-the-curve medicine'. *Health Affairs* 23.
- Gansterer, Nikolaus, Cocker, Emma, Greil, Mariella (2017). *Choreo-Graphic Figures. Deviations from the Line*. Berlin and Boston: Walter de Gruyter.
- Giessmann, Sebastian (2018). 'Elemente einer Praxistheorie der Medien'. *Zeitschrift für Medienwissenschaften* 19, Vol. 2: 95–109.

-
- Hatchett, Richard J., Mecher, Carter E., Lipsitch, Marc (2007). 'Public health interventions and epidemic intensity during the 1918 influenza pandemic'. *Proceedings of the National Academy of Sciences of the United States of America* 104, Vol. 18: 7582–7587.
- Kemp, Wolfgang (1974): 'Disegno. Beiträge zur Geschichte des Begriffs zwischen 1547 und 1607'. *Marburger Jahrbuch für Kunstwissenschaft*, Vol. 19: 19–240.
- Kress, Gunther (2011). 'Partnerships in research: multimodality and ethnography'. *Qualitative Research* 11, Vol. 3: 239–260.
- Kress, Gunther, Theo van Leeuwen (2001). *Multimodal Discourse. The modes and media of contemporary communication*. London: Hodder Education.
- Mondada, Lorenza (2016). 'Challenges of multimodality: Language and the body in social interaction'. *Journal of Sociolinguistics* 20, Vol. 3: 336–366.
- Morgan, Mary S., Morrison, Margaret (Eds.) (1999). *Models as Mediators. Perspectives on Natural and Social Sciences*. Cambridge: Cambridge University Press.
- Müller, Cornelia (1998). *Redebegleitende Gesten. Kulturgeschichte – Theorie – Sprachvergleich*. Berlin: Berlin Verlag A. Spitz.
- Pickering, Andrew (1995). *The Mangle of Practice. Time, Agency, and Science*. London: The University of Chicago Press.
- Raff, Jan-Henning (2020). 'Visual Corona Communication. A Visual Essay', *medium.com*. Accessed April 30, 2020. <https://medium.com/@janhenning.raff/visual-corona-communication-aa90d925da88>.
- Sachs-Hombach, Klaus, John Bateman, Robin Curtis, Beate Ochsner, Sebastian Thies (2018). 'Medienwissenschaftliche Multimodalitätsforschung'. *MedienWissenschaft*, Vol. 1: 8–26.
- Saussure de, Ferdinand (1967[1916]). *Grundfragen der allgemeinen Sprachwissenschaft*. Edited by Charles Bally, Albert Sechehaye. Berlin: Walter de Gruyter.
- Schatzki, Theodore R. (2010). *The Timespace of Human Activity. On Performance, Society, and History as Indeterminate Teleological Events*. Plymouth: Lexington Books.
- Schoder, Johannes; Peter Zweifel (2011). 'Flat-of-the-curve medicine: A new perspective on the production of health'. *Health Economics Review* 1, Vol. 1: 1–10.
- Streeck, Jürgen (2013). 'Praxeology of Gesture'. In: Cornelia Müller et al. (Ed.): *Body – Language – Communication. An International Handbook on Multimodality in Human Interaction*, 674–688.

Image Sources

- Fig. 1: Hatchett, Richard J., Carter E. Mecher, Marc Lipsitch (2007). 'Public health interventions and epidemic intensity during the 1918 influenza pandemic'. p. 7583.
- Fig. 2 left: Drawing from screenshot, JMD 2020. Original source: Jacinda Ardern, press conference March 13th, 2020. Accessed June 1, 2020. <https://www.facebook.com/jacindaardern/videos/255443338799538/?v=255443338799538>.
- Fig. 2 right: Drawing from screenshot, JMD 2020. Original Source: Siouxsie Wiles 2020. Accessed June 1, 2020. <https://thespinoff.co.nz/society/09-03-2020/the-three-phases-of-covid-19-and-how-we-can-make-it-manageable/>.
- Fig. 3 left: Drawing from screenshot, JMD 2020. Original Source: Jens Spahn, press conference March 9th 2020, online live transmission by ZDF. Accessed June 1, 2020. <https://www.facebook.com/ZDFheute/videos/pressekonferenz-spahn-zu-coronavirus/496594654369877/>.
- Fig. 3 right: Drawing from screenshot, JMD 2020. Original Source: Angela Merkel press conference April 15th, 2020; Imagery Design by Verena Gehrig, 'Die Macht der unsicheren Zahlen', *Süddeutsche Zeitung* 24.4.2020. Accessed June 1, 2020. <https://projekte.sueddeutsche.de/artikel/wissen/coronavirus-die-macht-der-zahlen-e170940/?reduced=true>; Image based on a video still from press conference online transmitted by ZDF, <https://www.facebook.com/ZDFheute/videos/kanzlerin-merkel-s-C3%B6der-und-tschtschenscher-zu-corona-ma-C3%9Fnahmen/229994785017752/>.
- Fig. 4: Visual Research Journal, February 11th, 2015, JMD 2015.
- Fig. 5: Drawings from Videostill and Photo, JMD 2015.
- Fig. 6: Drawing from Videostill, JMD 2020.
- Fig. 7: Drawing from Videostill, JMD 2020.
- Fig. 8: Drawings from Videostill, JMD 2018.

DESIGNING IN TROUBLING TIMES: EXPERIMENTAL ENGAGEMENTS WITH SOCIO-ECOLOGICAL CHALLENGES AT THE UROBOROS FESTIVAL

Markéta Dolejšová, Lenka Hámošová

Introduction

Early in May of 2020, the era of the burgeoning COVID-19 pandemic, we organized a four-day online design research festival called Uroboros,¹ exploring what and how we could design in the current times of global social crises to support positive change. The festival was grounded in experimental design co-creation, inviting design researchers and practitioners of diverse social, cultural and professional backgrounds to contribute their projects responding to the festival theme *Designing in Troubling Times*. While the ongoing pandemic radically impacted the festival's format and program, the theme was proposed to cover a wide range of social and ecological challenges: from climate emergency and ecological injustice to rising wealth disparities and structural inequalities. Informed by the UN Sustainable Development Goals², the theme outlined these challenges as being deeply intertwined, and brought to the foreground the urgent need for new approaches and initiatives that could stabilize socio-ecological systems and support sustainable transformations. Emerging research in the area (e.g., CreaTures 2020; Dolejšová and Wilde et al. 2020, Light et al. 2019, Wilde 2020) highlights that creative art and design practices have important transformative potential. The Uroboros 2020 festival provided a shared space to explore such potential through a four-day program of experimental design events that co-creatively engaged the festival audience.

Our aim with Uroboros was to offer a stimulating experimental design space accessible to all as an alternative to (often closed) professional design festivals and academic conferences.³ The festival was cost-free and open to the general public: people could either sign up to actively participate at individual events, or watch a live stream on the Uroboros Youtube channel⁴. The theme and the concept of the inaugural Uroboros 2020 festival were proposed by the Czechoslovak design research collective ALTTAB⁵ in autumn 2019, with the vision of organizing a local event in the physical premises of the DOX Center for Contemporary Art in Prague⁶. At the time, we had no idea that the COVID-19 pandemic was waiting around the corner and that by mid-2020 the proposed theme would be more urgent than expected. The uncertain development of the virus and the social distancing measures that started emerging just a few months ahead of the festival also meant that we had to quickly devise a festival 'plan B'. Instead of cancelling or postponing, we decided to take the risk and adapt the festival program into a new online format. Despite the many practical

challenges that this change brought with it, the online environment enabled access to much larger audiences than originally expected. At the end, the festival was attended by more than 600 designers, artists, researchers and practitioners from around the world, with over 3500 views of festival events live-streamed on YouTube.

In this article, we focus on three selected online festival events and discuss the diverse experimental approaches that they employed to address the theme *Designing in Troubling Times*. Writing from the perspective of festival curators and full participants, we share our first-hand observations from each event and discuss what knowledge they helped to reveal. Drawing on these insights, we propose that these three events provide viable examples of how experimental design co-creation can support diverse critical engagements with sustainability issues and nurture imaginative proposals for desirable futures. Co-creative experimentation in design research and practice is not new and it is not our intention to claim such novelty here. Instead, we hope to demonstrate the – often undervalued – potential of these creative experimental approaches for supporting critical reflections on urgent social and environmental challenges. In the following sections, we introduce the festival theme, unpack the three events and discuss how the collective processes of hands-on (yet also remote) design experimentation shaped the participants' thinking and debates about the socio-ecological issues at hand.

Designing in Troubling Times

Global crises such as anthropogenic climate change, poverty, food scarcity and the Covid-19 pandemic have led to gradual social and ecological degradation. As the prospects for the near future darken, it becomes painfully felt that we have failed to maintain healthy and just conditions for life on the planet to thrive. Design is often seen as intrinsically a part or even a cause of societal challenges, intensifying inequalities and accumulating power in the hands of the privileged few. Entangled in the socio-economic processes of production and consumption, mainstream design in the form of unsustainable techno-fixes created for immediate profit rather than long-term impact emerged as a source of problems rather than solutions for better futures (Buchanan 1992; Cross 2011; Papanek 1985). Acknowledging that we have *designed ourselves into* many of the world's current problems, the festival theme *Designing in Troubling Times* highlights the need for design to urgently reorient towards the values of social justice and environmental sustainability.

Creating conditions for design to become a tool of positive social change requires that we shift our understanding of what design is and does. Design researchers and educators such as Arturo Escobar (2018), Tony Fry (2009), Ann Light (2019), Ezio Manzini (2009), and Danielle Wilde (2020) have been stressing the need for design to reshape its position in society in order to become responsible, responsive

and transformative in its effects. Called the ‘social turn’, this sees design as a post-disciplinary practice capable of empowering individuals as well as communities and enabling broad access. The democratization of design processes and outcomes is considered to include the interests of diverse stakeholders, human and non-human alike (Puig De La Bellacasa, 2017), and reach beyond the threshold of professional design sectors. This radical inclusivity and openness towards diverse more-than-human concerns is critical, as all of us living on this planet share responsibilities and are implicated in futures to come. The social turn in design proposes a shift away from designing quick-fix solutions to *engineer our troubles away*, and towards efforts to use design to assist in the development of long-term conditions for social change. Design is embraced as a world-making process supporting critical engagement with social challenges that is capable of mobilizing diverse stakeholders to propose visions for sustainable and just futures. Such inclusive and socio-aware design approaches have been theorized about and implemented in various forms and contexts for decades. Still, in 2020, we are in need of finding ways to bring design’s creative transformational potential into full bloom and ensure long-term, equally distributed impact. This need is felt strongly in (some parts of) the design research community, as is evident from the growing number of initiatives aiming to nurture design’s transformative capacities.⁷

Inspired by these initiatives and existing work in the field, the Uroboros festival aims to assist such efforts by providing an open and widely accessible space for sustainability-oriented experimental design co-creation. To frame the festival theme, we borrowed the symbol of the Uroboros – the ancient serpent devouring its own tail that changes its form in an eternal cycle of re-creation, using its own body as a fuel. The self-consuming Uroboros, whose wellness depends on how the snake is nourished from within, serves as a metaphor capturing the need to reshape design’s social position: to make design flourish and to make it socially impactful, we, design researchers and self-reflective practitioners, need to feed it better. At the same time, while following this metaphor, our aim is to gently disturb the somewhat monolithic looping of the design-erly serpent and allow more actors from beyond the design circle to enter, and bring in their perspectives and expertise. Starting from this provocation, the Uroboros festival called for experimental projects that critically and experimentally engage with the question: *what can we design in these troubling times to support a positive change?* The four-day online festival program involved thirty-two events, including workshops, performances, LARPs (Live Action Role Playing), panel discussions, lightning talks, live coding parties, and other co-creative experiments initiated by forty-five authors from across the world. The size of the festival events ranged from a four-person LARP to a panel discussion on the future of design education attended by more than ninety people. Events were typically two hours long. The main festival platform was the video conferencing system Zoom⁸, although authors were given the option to use alternative tools of their choice.

We now discuss three selected festival events: Danielle Wilde’s distributed salon *Honey, Shit, Soil, ‘dært ~ Eating Our Way To (Better) Futures*, Juli Sikorska’s workshop *Urban Heat Island Living – Designing Sustainable Urban Futures*, and the Every-

thing Dies (Though It's Never Been Alive) workshop by Stefan Schäfer. We chose these particular events because they illustrate diverse experimental design approaches and techniques, as well as diverse thematic and conceptual angles to address contemporary socio-ecological issues.

Three Examples of Designing in Troubling Times

Danielle Wilde: Honey, Shit, Soil, 'dært ~ Eating Our Way To (Better) Futures

The distributed salon *Honey, Shit, Soil, 'dært ~ Eating Our Way To (Better) Futures*⁹ was led by Danielle Wilde, an Associate Professor of Embodied Design at the University of Southern Denmark and used experimental food design as a starting point for critical thinking about sustainable ecosystems. The salon was carried out as a guided exploration of the full cycle of food processes happening on the scale of our bodies – from eating to defecating – and their impacts on the ecosystems we inhabit. Co-creative activities revolved around four primal elements: honey, shit¹⁰, soil, and 'dært (a phonetic spelling of dirt) that we used as material and conceptual resources. Prior to the event, we were instructed to prepare foodstuffs and items related – literally, metaphorically, or materially – to one or more of the primal elements. Working in small groups, we shared stories about the origin of our items, engaged in remote tasting, and crafted models of our personal poops, the end products of the human-food cycle. Throughout, we explored the intricate entanglements of human and non-human food processes in food systems, discussed issues with socio-ecological sustainability, and imagined desirable futures.

Theme and Focus

In the salon, food served as a design material as well as a context for research. Danielle outlined food as a critical concern, highlighting that human-food practices are a key driver of climate change. Indeed, the way we eat, provision and dispose of food at present is pressuring Earth's systems toward tipping points, making both people and the planetary system on which we rely for our survival sick (Willet et al. 2019). Aside from being a critical concern, food was also foregrounded as a socio-culturally potent and sensory-rich material for design research experiments. Food and food practices are relatable everyday life events that occur at the scale of the body – the scale at which people operate, think and can easily imagine (cf. Wilde 2020). Through all these qualities, food provides an accessible design material and a locus for critical thinking. The salon embraced these food qualities and leveraged experimental food design methods (e.g., Dolejšová and Wilde et al., 2020; Wilde 2020) to provoke co-creative reflection on current socio-ecological issues that was open to anyone, with no requirements in terms of skills or expertise.

Activities

The salon was centered around Danielle's performative lecture intertwined with two co-creative sessions in small groups and a closing discussion. The three-part lecture was broadcast from Danielle's home kitchen and provided essential information for the co-creative activities, illustrated by various practical – tangible and hands-on – examples.

1. Honey

The first part of the lecture focused on honey, a food product resulting from unique more-than-human food processes that require a careful, long-term collaboration between bees and beekeepers. Honey has complex organoleptic qualities and benefits for human health, including positive effects on the human gut microbiome. Highlighting that our personal health is closely intertwined with the health of our ecosystems, Danielle outlined her first provocation: *What can we learn from the more-than-human stewardship that is central to beekeeping to become better stewards to our microbiomes?* Informed, we proceeded with the first group session; sharing the honey samples we brought, engaging in remote tasting, and discussing their flavors as well as long-term effects on our digestion (see Figure 1). We also shared the stories of our honeys' origin and the personal meanings they carried. All those shared stories and samples helped us to connect various personal as well as wider ecological qualities of honey, and also to get to know each other, which was crucial for the next group activity.



1 Sharing honey and stories: getting together and diving into the topic.

2. Shit

The second part moved us a leap forward in the human-food cycle, from honey to shit – an end product of digestive processes. We took a closer look at the human microbiome and the hidden world in our guts. Danielle proposed that our microbial gut flora is a kind of black box: the colonies of tiny non-human microbes living in our guts are not accessible to a layperson's eye but also not entirely mapped by expert scientists. Gut processes and their end product are also caught up in rich cultural arrangements saturated with social norms and taboos. Our excretions provide a good indicator of what is happening in our guts, but talking about them is not a common part of social conversations. This is curious, as the health of our gut impacts both our physical and emotional wellbeing (Wang et al. 2017), which has a profound effect on how we live our everyday lives and – potentially – impacts the world around us. In our second breakout session, we developed on our previous discussion and engaged with the question: *how can we take care of our microbiomes to support the balance of our – both internal and external – ecosystems?*

We started by focusing on our personal gut processes. To make the conversation more accessible, we were asked to craft models of our personal poops using any suitable materials we could find in our pantries (see Figure 2). While hand-making our poopmodels using ingredients like tea bags, chocolate, coffee and our honeys, we talked about our daily diets and digestive experiences: what do we eat and why, how does it affect our digestion and wellbeing, and how is it represented by our poop models? These conversations were personal and intimate, as well as



2 Experimental crafting of personal poops stimulated a lively discussion about human and planetary health.

informative and reflective of our diverse lifestyles and larger cultural contexts. We discussed various types of toilets across countries and how diverse cultural and social norms influence people's feces inspection practices. Who can (not) talk about their poops and personal gut health and why? The co-creative process of crafting our poop models aided our ability to discuss these delicate health practices and draw connections to broader social contexts.

3. Soil

The final soil lecture closed the cycle of personal and systemic food processes explored in the salon, showing their close interdependence. Soil is the core base of all grown food that we eat and serves as a bed for carbon dioxide absorption and sequestration. However, the ongoing degradation of soil quality through human-driven processes such as industrial farming has led to an increased release of carbon into the atmosphere, directly contributing to global warming and climate change. Human food production and consumption are key economic drivers of these harmful processes that negatively impact soil and climate, as well as people's health (Willet et al. 2019). Human-food practices are thus central to both people's and the planet's wellbeing. In a closing discussion, we highlighted that to keep the soil quality on a sustainable level, these practices need to change. The complex entanglements of personal and systemic food processes are often hidden from the end-consumers' eye: they are not part of primary education, and are deliberately neglected in the food industry's marketing communications. To make the processes more visible, we discussed that schools should provide space for hands-on food learning and practices such as composting, gardening, cooking and fermenting. Same as for us in the salon, these hands-on engagements with food materials can help people realize the food system interdependencies and acknowledge that food practices need to be performed with more-than-human care (cf., Beacham 2018; Dolejšová and Wilde et al. 2020).

Juli Sikorska: Urban Heat Island Living – Designing Sustainable Urban Futures

The workshop *Urban Heat Island Living – Designing Sustainable Urban Futures*¹¹ by futures-oriented designer Juli Sikorska addressed the burning issue of urban heat waves, one of the climate change consequences already felt by humans and non-humans across the world. The workshop invited participants to explore the phenomenon of urban heat islands (UHI) – areas that are significantly warmer than their surroundings due to human activities – and design posters from the future proposing various ideas for sustainable and cooler cities. UHI was introduced as a wicked problem that exists as a complicated cluster of socio-ecological and economic causes and effects. To make the problem accessible to non-experts, the workshop focused on participants' personal experiences with heatwaves in their home cities. This focus supported a diversity of perspectives, as we came from all over Europe, including

Split, Seville, Berlin, Rotterdam and Prague. The workshop itself took place in the online collaborative environment Miro,¹² which had been pre-populated with UHI materials and instructions for the poster design task. Our future thinking and imagination were provoked by Juli's kick-off speculation: *'First signs of urban heat islands were observed as early as 1810, but it was not until the great heatwave of 2024 that people started creating their own ways of dealing with them'*.

Theme and Focus

In her introductory lecture, Juli outlined key UHI challenges and framed urban heat waves as a climate change problem caused by various human-led factors, such as mass deforestation and waste heat generated by energy usage. UHI has multiple side effects that are harmful to individuals as well as local, and potentially also global, ecosystems. While scientific warnings of climate change effects are often set in the far future, many humans and non-humans are already affected now. Acknowledging that rising temperatures will likely have consequences for all of us living on this planet, we approached UHI as an urgent issue that requires radical changes in socio-economic processes as well as individual lifestyles.

Activities

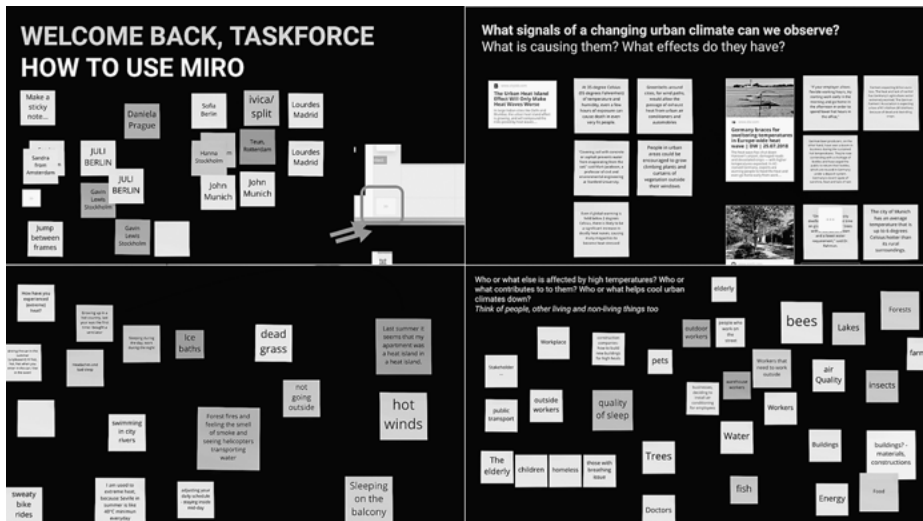
The workshop activities consisted of several scripted steps, including a collective mapping of UHI stakeholders, research into the signals of changing urban climates, and a speculation on desirable future changes in the form of call-to-action posters.

1. Stakeholder Mapping

To grasp the wide scope of UHI effects, we first shared examples of our first-hand experiences with urban heatwaves and filled our Miro board with personal post-its saying things like: 'not going outside', 'dead grass', 'headaches and bad sleep' (see Figure 3). Informed, we continued with mapping of stakeholders most affected by rising temperatures, including human groups such as homeless, construction workers and elderly, but also various non-human species and entities from house pets and bees to trees and lakes. The shared Miro helped us to collect our individual examples in one place and quickly create a basic UHI stakeholder map, which provided a starting point for a more in-depth exploration of UHI signals.

2. Researching UHI Signals and Social Contexts

Looking into existing signals of changing urban climates and their social linkages, we came across a variety of examples, including the link between people's exposure to heatwaves and their wealth (see Figure 3). Green city areas, which tend to be cooler, are often located in rich neighbourhoods with higher housing costs. This 'green gentrification' (Anguelovski et al. 2019) makes low-income groups more exposed to heatwaves and their side effects. Ironically, these most exposed populations often contribute the least to climate change but they have the fewest resources to adapt or



3 How do we experience heatwaves? Who is most affected and why?

protect themselves. This research task helped us to shift our critical thinking about UHI from personal to more complex social dimensions, which we elaborated in the next step, which focused specifically on positive UHI signals. Looking at examples of ‘good’ UHI mitigation measurements, such as building green rooftops, we brainstormed strategies for supporting cooler future cities. To make our strategies visually engaging, we designed DIY call-to-action posters.

3. Designing Future Posters

Working individually, each of us chose one positive UHI signal and unpacked the social changes that it would possibly reveal should it get implemented. To speculate on possible implications of the envisioned changes and define plausible target groups, we analyzed our signals using the futures wheel (Glenn 1972). Outcomes of this scripted step-by-step futuring process were materialized in our posters, which eventually introduced a wide variety of creative and often also practical UHI mitigation proposals. One poster introduced the idea of ‘Universal Basic Green’, a universal basic income in the form of unrestricted access to city green space. With the slogan ‘Everybody Deserves to be Cool’, the poster called for climate justice and the need to fight green gentrification. Another poster with the slogan ‘Paint the city!’ took a more playful direction, encouraging citizens to paint city streets and buildings with heat resistant colors (see Figure 4). These examples show that the futures workshop helped diverse participants, including non-experts and novices to the UHI theme, to develop critical perspectives on UHI issues and share them in a creative and accessible manner, in a short period of time.



4 Call-to-action UHI posters: imaginative ideas for sustainable future cities.

Stefan Schäfer: *Everything Dies (Though It's Never Been Alive)*

The workshop *Everything Dies (Though It's Never Been Alive)*¹³ by Amsterdam-based design researcher Stefan Schäfer explored various representations of death in a more-than-human world, inviting participants to co-design prototypes of memorials for the 'deaths of the non-living'. Memorials, as vehicles of commemoration and mourning, are made almost exclusively for humans and their closest non-human companions, such as pets (at least in Western cultures). Highlighting that there are many other non-human but also inanimate entities on this planet that are dying and deserve to be acknowledged – from melting icebergs and burning rainforests to vanishing cultural traditions – Stefan proposed to disrupt the human-centric tradition of memorials. Participants were invited to suggest which nonliving entities deserved to be commemorated and to collectively design memorials. Considering that the deaths of the non-living and the non-human are often caused by a human hand, such human-made memorials are a much-needed tool for self-reflection in the twenty-first century.

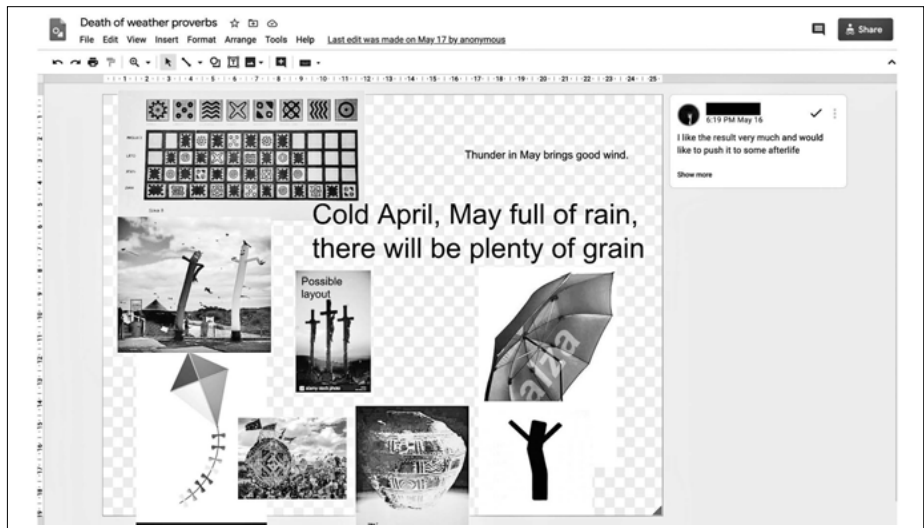
Theme and Focus

The workshop drew on Stefan's long-term research project *Let Death Dance Again*¹⁴ focusing on the medieval allegorical concept of the Dance of Death (DoD)

that embraced esthetic and poetic values to defend society against human egoism (Rosenfeld 1974). DoD aimed to make people conscious of their interconnectedness with the environment and other living or non-living entities (or their ‘Kreatürlichkeit’). The workshop proposed that a shift of modern Western conceptions of death towards the DoD-inspired ‘human un-centeredness’ could provide a lens for research into more-than-human interdependencies in ecosystems. This idea is certainly not far-fetched: the ongoing climate crisis has caused many people to mourn the dying of nature and the degradation of biodiversity. This ‘ecological grief’ (Ashlee and Neville 2018) has been already expressed in concrete actions – an example is a memorial ceremony that was held for the dead Icelandic glacier Okjökull in 2019. These eco-grieving actions often reach beyond mere commemoration and serve as appeals to society to prevent further environmental degradation by radically altering social norms and behaviors. Starting from a question: *How should we approach the mortality and gradual decay of nonliving entities in the context of environmental ruination and social crisis?* we plunged into the workshop activities.

Activities

Inspired by Stefan’s storytelling lecture about his Let Death Dance Again project and some of its outcomes, such as a memorial T-shirt created for the Okjökull glacier (see Figure 5), we shared our personal interests in the area and proposed non-living entities for which we would like to design a memorial.



5 The Okjökul t-shirt is a wearable memorial that enables the wearer to visibly show grief and share it with others.

1. Collecting Ideas

We shared diverse concerns related to the death of non-living entities, including a dying volcano in Mexico, gentrified city areas and dead buildings, drying rivers in Central Europe, the death of the ‘old normal’, referring to the pre-pandemic society, as well as the vanishing sense of the taste of natural-grown foods. After a long and rather detailed discussion, we clustered our collected concerns into three main categories – dying natural ecosystems, urban landscapes and ‘old normal’ social values – and split into three working groups.

2. Prototyping Memorial Designs

The ecosystems group focused on changing weather patterns, using the lens of weather proverbs – short sayings representing ancestral knowledge that exists globally but carry different meanings across countries and cultures. An example is a Mexican proverb ‘Cold April, wet May, there’ll be plenty of corn’, which uses weather patterns to predict a future harvest. To us in the group, the proverb served as a representation of a traditional knowledge that is dying along with the changing climates and unstable weather patterns.

After deciding on the main focus of our prototyping, we negotiated what tools we should use to design our memorial. Considering the varying levels of design expertise in the group, we chose the simple Google Draw tool that enables easy remote sharing of images. We started with a Draw collage of a weather totem that included diverse symbols typically representing weather patterns, such as an umbrella, a kite, or a hundred-year-old Croatian weather calendar (see Figure 6). For our final



6 The sky dancer is a non-living memorial made for a dying non-living entity (weather) that is powered by air artificially pumped into its body. The dancer comes to life, performing a modern version of the Dance of Death.

prototype, we decided to embody the digital totem in a material form, as a huge inflatable sky dancer – the ‘dancing’ figure commonly used at fairs that resembles traditional totems. The sky dancer carries pictograms representing weather proverbs and serves as a memorial for old weather patterns vanishing due to the climate change.

3. Workshop Afterlife

At the end of the workshop, we proposed several ideas for the workshop ‘afterlife’ to maintain the connections we built and continue in our productive exchange. Stefan proposed making a collaborative ‘memorial chimera’ in the form of a ‘mass memorial T-shirt’ with all the prototype ideas co-designed at the workshop. We also discussed the possibility of implementing the memorial prototypes in everyday life contexts. Our group decided to execute the inflatable sky dancer totem as part of the upcoming festival Nasuti in Bratislava (SK). The totem is now in progress. The Everything Dies workshop is thus still ‘alive’, nurturing long-term, and hopefully fruitful, collaborations.

Discussion

All three events that we have unpacked followed the goal of creating an experimental and provocative but also accessible and collaborative space where participants could learn about, and critically reflect on, current socio-ecological challenges. Each event approached the festival theme *Designing in Troubling Times* from a distinct perspective and leveraged participants’ personal experiences as a springboard to explore symptoms and consequences of more complex social and environmental issues. From unsustainable food processes to urban heat islands and anthropogenic obsession with human-centeredness, the events addressed complicated global problems, and by using various down-to-earth experimental methods and techniques, created conditions for collaborative, imaginative and critical engagement of diverse public audiences.

Danielle’s salon used co-creative crafting with simple food materials found in participants’ home pantries to support impromptu ideas and unfolding creativity. The hands-on engagements with familiar food items such as honey or soil provided a convenient context to discuss intimate food practices, connect them to larger food system issues, and imagine better ways to lead healthy, sustainable and ecologically entangled lives. Through all these activities, the salon helped us to recognise how our ecosystems are affected by our day-to-day human existence and the ‘shit’ we leave behind. Juli followed methods from futures and speculative design and used a shared Miro board to orchestrate a DIY collaging of call-to-action posters, with no requirements on participants’ design skills. Her workshop was more task-oriented, following a scripted, almost textbook-like futuring process of

critical reflection and speculation. The workshop provided a fertile ground for swift guided research into climate change issues that culminated with imaginative proposals for sustainable urban futures. Stefan's workshop did not follow a specific design method, technique or tool and, instead, let participants choose their preferred working approach. The resulting memorial prototypes had multiple forms, including Google Draw sketches and proposals for live performative actions. The option to collectively decide what and how we want to design supported a relaxed, friendly atmosphere and the workshop cultivated a long-term continuity of initiated collaborations.

These diverse experimental design approaches had advantages as well as drawbacks. Juli's guided and scripted approach was effective: having the step-by-step workshop activities outlined in the shared Miro promoted a quick workshop flow. However, since we were working mostly individually and there was less space for discussion, it was felt that a follow-up event was needed to unpack the researched issues in better detail. In contrast, participants at the other two events had a better chance to discuss issues and exchange ideas: Danielle gave an information-packed lecture and provided enough time for us to digest and reflect in small groups. Stefan's event was the least scripted and provoked us to work together closely throughout the workshop to come up with ideas that were relevant to our group interests. The collaborative designing at both events was useful for exploring the outlined issues from our diverse personal perspectives, while introducing a plurality of opinions. At the same time, Juli's individual 'rapid-learning' approach was an efficient way to consume a lot of practical UHI information in a short time. In all cases, the experimental design and research processes stood over the end products (posters, prototypes, collages) and the emphasis was put on learning and mutual knowledge transfer. The co-created artifacts emerged as outcomes of our practice-based critical engagements with the socio-ecological challenges that we addressed at the events and that we face in the world today.

These engagements provided an opportunity to learn about various causes and existing as well as anticipated consequences of these troubles and understand them better. Drawing on the evolving knowledge co-produced at the events, we were able to articulate a variety of reflective and imaginative ideas for what a sustainable future could look like. From down-to-earth proposals to support hands-on food learning in schools to more extravagant (yet still plausible) plans to design a memorial for dying weather patterns, or introduce a Universal Basic Green income to support environmental justice. The three events also showed that such experimental hands-on design engagements are feasible even in these extreme, socially distant times. Even though we were physically apart in Zoom windows, we engaged in exciting materially rich design activities, had inspiring conversations, and learned new things. Despite our initial frustration as curators with moving the festival into a virtual space, the events (and many other parts of the festival program) have helped us to see the online environment as an opportunity for new experiments, rather than

necessarily a limitation. Each of the analyzed events was a compelling and inspiring response to the question: *what and how can we design in these troubling times to support a positive change?*

Conclusion

We presented our discussion of three experimental design events that took place at the online Uroboros festival and engaged participants with a wide range of contemporary socio-ecological challenges. While drawing on our first-hand experience of curators-as-participants, we elaborated on the events' themes and the diverse experimental design approaches they employed to provoke reflective activities and debates. These observations are subjective and we are not suggesting that some of the approaches are better or worse. Instead, we aim to present three viable – and hopefully inspiring – ways how designers can engage with social and environmental issues to stimulate critical thinking and imaginations of sustainable futures.

It can be argued that merely meeting at a workshop and imagining better futures is not enough: at a time when a radical change to transform beliefs, values, practices, lifestyles and means of production is urgently required, we need implementable solutions. Proposing solutions that are effective, equitable and responsive to people's situated needs is a complex, contested process that is interwoven with socio-economic infrastructures of power, and certainly requires more than a design workshop. Still, if we cannot imagine how desirable futures could look and what a positive change should entail, we have nothing to start with.

As pointed out by researchers across fields, collaborative and imaginative arts practices hold an important transformational potential: they can impact people's feelings about issues and provoke immediate reflections, which is more powerful than addressing thought alone and more likely to result in longer-term change, since it is closely related to self-identity (Coelho et al. 2010; Light et al. 2019). Imaginaries of future situations can provide further orientation in decision making to help people grasp existing issues and realize how they may affect their lives (Nikoleris et al. 2017; Raven 2017). Thus, inspiring people through imaginative, creative means to act positively on their socio-ecological environments can support their critical engagement with the issues at hand, change their degree of commitment, and inspire collective reflection and action.

We believe that leveraging design's creative world-making capacities to help people come together, experiment, think, reflect and engage with imaginative future proposals can serve as a small yet important step towards larger socio-ecological changes. This of course requires having a careful process of continuous self-reflection in place, and that we keep asking ourselves: what differences is our design research actually making? Who decides what should be changed? Who

should evaluate if this change is ‘good’ and what should the evaluation criteria look like? Long-term continuity of co-creative efforts to help assist sustainable social transformation is certainly desirable. As our choice of the Uroboros festival symbol suggests, this continuity is central to our agenda. In 2019, we proposed Uroboros as an ongoing initiative to be built around an evolving and diverse network of design researchers, practitioners, and others who wish to be involved. Several network activities, including the Uroboros Bites series of online experimental interventions combined with a physical exhibition in the DOX center, have been put in place.¹⁵ The Uroboros 2021 festival is ahead and the looping Uroboros circle is always open to new ideas and inputs.

Acknowledgment

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- 1 <https://www.uroboros.design/>
 - 2 Acknowledging that ecological sustainability will only be attained by addressing social sustainability, the SDGs point to 16 aspects in need of balance, including decent work, social equity, responsible consumption, and economic development (<https://sustainabledevelopment.un.org/>).
 - 3 While acknowledging that there are other design initiatives and festivals that share the same goal and aim for radical openness – examples include Pixelache festival and network (<https://www.pixelache.ac/>), Pif Camp (<https://pif.camp/>), and Dinacon (<https://www.dinacon.org/>).
 - 4 https://www.youtube.com/channel/UCQwv_jy_s9mgm2_HSTFkQUg
 - 5 <https://www.alttab.design/>
 - 6 <https://www.dox.cz/en>
 - 7 Examples include: CreaTures (<https://creatures-eu.org/>), AMASS (<https://cordis.europa.eu/project/id/870621>), Transition Design program at CMU (<https://transitiondesignseminarcmu.net/>); UAL Social Design Institute (<https://www.arts.ac.uk/ual-social-design-institute>); Design Research for Change symposium (<https://www.designresearchforchange.co.uk/symposium2019/>).
 - 8 <https://zoom.us/>
 - 9 Recording is available at <https://www.youtube.com/watch?v=Vn875XLl7yE&t=1049s>.
 - 10 Here referring to the end product of digestion; bodily waste; feces; excrements.
 - 11 Recording is available at <https://www.youtube.com/watch?v=QGOb8BPh7Ig&t=1066s>.
 - 12 <https://miro.com/>
 - 13 Recording is available: <https://www.youtube.com/watch?v=xg1FYyAfWKk>.
 - 14 <http://letdeathdanceagain.net/>
 - 15 Uroboros Bites is underway by autumn 2020, more details at <https://www.uroboros.design/uroboros-bites>.

References

- Anguelovski, Isabelle et al. (2019). 'Opinion: Why green 'climate gentrification' threatens poor and vulnerable populations.' *Proceedings of the National Academy of Sciences* 116, 52: 26139–26143.
- Beacham, Jonathan (2018). 'Organising food differently: Towards a more-than-human ethics of care for the Anthropocene.' *Organization* 25, 4: 533–549.
- Buchanan, Richard (1992). 'Wicked problems in design thinking.' *Design Issues* 8, 2: 5–21.
- Coelho, Filipe; Maria C Pereira, Luís Cruz, Paula Simões, and Eduardo Barata (2017). 'Affect and the adoption of pro-environmental behaviour: A structural model.' *Journal of Environmental Psychology* 54: 127–138.
- Cross, Nigel (2011). *Design thinking: Understanding how designers think and work*. Oxford: Berg Publishers.
- CreaTures: Creative Practices for Transformational Futures. Accessed August 15, 2020. <https://creatures-eu.org/>.
- Cunsolo, Ashlee and Neville Ellis R (2018). 'Ecological grief as a mental health response to climate change-related loss.' *Nature Climate Change* 8, 4: 275.
- Dolejšová, Markéta; Danielle Wilde, Ferran Altarriba Bertran and Hilary Davis (2020). 'Disrupting (More-than-) Human-Food Interaction: Experimental Design, Tangibles and Food-Tech Futures.' Proceedings of the 2020 ACM on Designing Interactive Systems Conference. 993–1004. Eindhoven Netherlands.
- Escobar, Arturo (2018). *Designs for the pluriverse: radical interdependence, autonomy, and the making of worlds*. Durham: Duke University Press.
- Fry, Tony (2009). *Design Futuring: Sustainability, Ethics and New Practice*. Sydney: University of New South Wales Press.
- Glenn, Jerry (1972). 'Futurizing Teaching vs. Futures Courses.' *Social Science Record*.
- Light, Ann (2019). 'Redesigning Design for Culture Change: Theory in the Anthropocene.' Design Research for Change. Design Museum, London.
- Light, Ann; Ruth Wolstenholme and Ben Twist. (2019). 'Creative practice and transformations to sustainability-insights from research.' *SSRP Working Paper No. 2019-1*, University of Sussex.
- Manzini, Ezio (2009). 'New design knowledge.' *Design Studies* 30, 1: 4–12.
- Nikoleris, Alexandra; Johannes Stripple and Paul Tenngart. (2017). 'Narrating climate futures: shared socioeconomic pathways and literary fiction.' *Climatic Change* 143, 3–4: 307–319.
- Papanek, Victor J. (1985). *Design for the real world: human ecology and social change* (2nd edition). Chicago: Academy Chicago Pub. Ltd.
- Puig De La Bellacasa, Maria (2017). *Matters of care: Speculative ethics in more than human worlds*. U of Minnesota Press.
- Raven, Paul G. (2017). 'Telling tomorrows: science fiction as an energy futures research tool.' *Energy Research & Social Science*, 31: 164–169.
- Rosenfeld, Hellmut (1974). *Der mittelalterliche Totentanz*. 3rd Edition. Köln: Böhlau Verlag Köln Wien.
- Wang, Baohong; Mingfei Yao, Longxian Lv, Zongxin Ling, and Li Lanjuan (2017). 'The human microbiota in health and disease.' *Engineering* 3, 1: 71–82.
- Wilde, Danielle (2020). 'Design research education and global concerns.' *She Ji: The Journal of Design, Economics, and Innovation* 6, 2: 170–212.
- Willett, Walter et al. (2019). 'Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems.' *The Lancet* 393, 10170: 447–492.

IMAGINING OFFJECTS IN THE FRACTIVERSE

Enrique Encinas

Hard times are coming, when we'll be wanting the voices of writers who can see alternatives to how we live now, can see through our fear-stricken society and its obsessive technologies to other ways of being, and even imagine real grounds for hope. We'll need writers who can remember freedom – poets, visionaries – realists of a larger reality.

(Ursula K. Le Guin)

In her acceptance speech at the 2014 National Book Awards, Ursula K. Le Guin (Le Guin 2014) reminded her audience of the importance of the work of those who imagine alternatives. But at a time in which ‘it is easier to imagine the end of the world than to imagine the end of capitalism’ as the postmodern cultural critic Frederick Jameson famously pointed out (Beaumont 2014), being a ‘realist of a larger reality’ is not an easy feat. The imagining and envisioning of alternatives is a complicated task when subjected to the horizon-erasing forces of capitalism as a system of thought that functions precisely by negating the possibility of any alternative (Fisher 2009, 2). The globalizing impetus of the capitalistic model and its devastating effects on the planet and the peoples that inhabit it adds an ontological dimension to this crisis of the imagination. How can one begin to understand and respect other modes of being, other ways to relate to social, natural or cultural contexts, if one cannot even imagine them? And, as an extension of particular interest to design, how can we ‘face modern problems for which there are no modern solutions?’ (de Sousa Santos 2012) A lack of potential to conceptualize and materialize the possible is perhaps the worst ill for design because design is, fundamentally, about bringing about the new.

Perhaps a first step towards addressing this crisis of the imagination demands the recognition of what John Law designates as the One World World (OWW from now on) (Law 2015): the dominant set of notions that define a single real from a modern Western perspective. This is a ‘universalising ontology’ (Escobar 2018, 66) that deems other modes of being, and in turn other ways of understanding and enacting a world, as lacking credibility, value and even existence. The OWW univocally defines a universe (through capitalist modes of value exchange, scientific rationality, technological possibility, etc.) that reduces difference and relegates other practices of world-making to mere beliefs, that ‘evacuate reality from non-dominant reals’ (Law 2015). The project of envisioning alternatives, for Law, is not an epistemological effort of accommodating different ways of knowing a single universe, but one of ontological plurality where one is able to participate in multiple realities, or what he terms the fractiverse.

If taken seriously, the fractiverse and its privileging of worlds over worldviews highlights the ways in which design is ontological. As Anne-Marie Willis succinctly put it, 'Design designs', not only experiences or memories but also worlds: 'we design our world, while our world acts back on us and designs us' (Willis 2006, 80). At the same time, every object of design enables ways of being through its very use and thus 'contributes to shaping what it is to be human.' (Escobar 2018, 110). While this ontological impulse is implicit in design, there are certain approaches to designing that make the creation of worlds the focus of their activity. This is the case with Critical Design (Dunne 1999), Speculative Design (Auger 2012) and related disciplines, such as design fiction (Bleecker 2009; Blythe and Encinas 2016; Blythe and Encinas 2018), adversarial design (DiSalvo 2012), discursive design (Tharp and Tharp 2019) or material speculations (Wakkary et al. 2015), to name just a few. Most of these disciplines use design as language and structure challenge the status quo and provide spaces for collective reflection and debate. In many cases, design objects within these approaches articulate 'what if' scenarios through design, where the imaginary, the fantastic, the fictional and the future play fundamental roles. This is a role perhaps similar to how science fiction narratives articulate alternatives by mobilizing the possible and the fantastic within a literary form.

It is within this tradition of design, in the intersection between the expressly fictional (e.g. a design object of the future) and the ontological, that I would like to situate this work. My aim is to provide designers with additional means to activate social, cultural or technological imaginaries beyond those afforded by an OWW. However, my proposal is not just another design approach, but an alternative design concept, one that acknowledges the fractiverse and sees by extension that 'reals are contingent and relational enactments ... done in performances and rituals in specific locations' (Law 2011). In what follows, I will argue for the opportunities of expanding the design lexicon with a term that brings to the fore the relational and ontological character of the imaginaries we create through design. This is a more appropriate design denomination than 'Design Speculations' to underscore, not only the worlds a design object creates, but also the worlds it departs from. I refer to this concept as the 'offject'.

The offject is the result of my ongoing research interest in the possibilities of designing in order to study, understand and activate metaphysical notions for design research purposes (Encinas 2020; Encinas et al. 2018). In order to characterize the offject, I choose to foreground relationality and difference by proposing an understanding of speculative design things, not in terms of metaphor, but in terms of metonymy. This is a shift from 'understanding one thing in terms of another' to 'understanding the whole through a part'. In order to accomplish this shift, I rely on Garcias' Thingly Ontology (Garcia 2014), which will allow me to attain a radically relational conceptualization of designed speculations. The critical reader, however, can compare my sketchy use of Garcias' philosophy in what follows to how a designer makes sketchy use of a paper. Both their strengths lie in fluidity. The main purpose they serve demands of them a degree of incompleteness, so they can be

effortlessly discarded in favour of better versions of themselves. Hence, I invite the reader to consider my interpretation of Garcias' Thingly Ontology as a philosophical sketch that shows a distorted view of the objects it depicts without being totally alienated from them.

This text is structured in three main parts: Formation, Form and Example. Formation covers the theoretical background that informs the concept of the offject. This section is similar to those in design research papers that cover the design process that led to a particular design outcome. Form focuses on the ontology of the offject by oscillating between what the offject is and what is in the offject. Finally, in Example, I present a gravity record player as an instance of an offject of my own design.

Formation

... in its original meaning, the Greek word *theoria* meant to see something, to be a spectator ... 'theory' approached as something meant to take you places so as to witness a spectacle.

(Johann Redström – *Making Design Theory*)

The offject is a theoretical proposal in the sense that Redstrom hints at – something meant to take designers and design researchers to a place so as to witness a spectacle. The offject is simply a concept, a word, an idea that might be of help when trying to build imaginaries under the pressures of an OWW. It is a way to refer to speculative design objects from a perspective of relationality in order to bring to the foreground the worlds they depart from and the worlds they try to depict. A focus on relationality is paramount, in my view, to craft plural imaginaries that bring forth design alternatives that imply how reality could be otherwise than techno-utopian world-erasing dreams of late-capitalist modernity (Raskin et al. 2010). It is in this sense that this article is an attempt to shift an understanding of design speculations 'from considering things in interaction to considering things as *mutually constituted*, that is, viewing things as existing at all only due to their dependence on other things' (Sharma 2015, 2 in Escobar 2018).

The offject is the product of a design process. A series of questions leading to an effort in making that provides certain answers which inform the creation of various concepts that result in new prototypes that partially respond to previous questions and generate new ones informing new concepts in return and so on, and so on. In this section I reflect on the formation of the offject as a concept with a motivation to disclose how the offject came to be, before addressing, in the next section, what the offject is. I proceed in this way to clarify the theoretico-philosophical ground on which the offject is built so that designers engaging with it have an

easier time putting the offject to use or just setting it aside. Also, I hope to show how the offject commits to the idea of relationality as interdependence by considering theory as something fluid and dynamic, as ‘something unfolding, something acted as much as articulated, performed as much as described.’ (Redström 2017, 2). This understanding of design theory demands that theory is specific only to the extent of the design project it substantiates, so as to be able to cope with the changes that result from design practice. This form of design theory approaches concepts on the basis of difference rather than through static criteria, and trades conceptual precision for the ability to cope with continuous change around them. In turn, the concepts developed following such an understanding of theory need not be seen as something ‘final’ but rather ‘transitional’, capable of providing an important conceptual support at a certain stage of a design process but easy to discard once the designer is ready to move ahead with her work:

These ideas, concepts, principles – theories – are transitional in a sense similar to the notion of transitional forms in evolutionary biology: traces of how [one] form has evolved into another, as in transitional forms showing how life evolved from living in water to living on land ...They are transitional in a sense similar to Wittgenstein’s ladder. Propositions that are used to obtain a different view but in retrospect are no longer necessary. (Redström 2017, 135)

The offject resulted from a research through design process (a non-linear threading of making, reflection and conceptual synthesis) so as to form a transitional concept. Early in the process, the offject would fail to be a transitional concept because it became so static that any new design object developed afterwards would promptly refute it – no design object could be an offject. In other cases, the offject would become such a diffused and all-encompassing concept that any design object could be assimilated within it, erasing all its ability to attain any sort of conceptual precision. It was not until I was able to think from a particular philosophical position that the offject became a transitional concept. My engagement with philosophical ideas was designerly in nature, an iterative process to understand the wickedness of a wicked problem (how to think design speculations from the perspective of relationality as interdependence) and began with the rather obvious notion that to think through a particular philosopher is to color thoughts in a specific hue and differentiate contrasts that wouldn’t otherwise be there. This engagement resembled an invitation and the acceptance of a necessary arbitrariness. After I chose to let different philosophical perspectives inhabit me, one of them decided to remain more present than the others. As when one builds a birdhouse and is nonetheless surprised to discover that a particular bird, and not another, has made a home there. It was the Thingly Ontology of Tristan Garcia that allowed me to think about speculative design objects through the lenses of relationality and construct the offject as a transitional concept.

Tristan Garcia is a contemporary French philosopher and author of *Form and Object* (Garcia 2014), a systematic philosophical treatise that has become one of the main contributions to the young Speculative Realist (Harman 2018) philosophical movement. Speculative Realism comprises various relational ontologies that have in common a focus on relations as objects in their own right (Winograd and Flores 1986; Jonas 2019). This is a ‘realism of relations’ (Avanessian 2017) that resembles some of the work done in systems theory where the character of an object is determined by the quality and strength of its relations (Winograd and Flores 1986; Jonas 2019). In *Form and Object*, Garcia proposes his ‘thingly ontology’ in contradistinction to substantial and vectorial ontologies.

According to Garcia, substantial ontologies have in common that they define what something is through an essential thing that supports other entities. If something is, according to an ontology of substance, it is because there are things ‘in themselves’ (that at the same time are made of other more fundamental substances). This way of understanding and dividing things is characteristic of classical and ancient ways of thinking. Plato, Aristotle, Kant, Hegel, Descartes and Heidegger, for example, proposed, with important differences among them, ontologies of substance. In ontologies of substance one can always find a hierarchy from primary to secondary or from fundamental to derived or auxiliary. Things have more fundamental things that serve as their ontological support. The crucial point here is the hierarchization and categorization of being. This is not to be taken in a valuating sense, such that there is one way of being that is more important than another (which varies wildly according to different ontologies of substance), but rather that what something is, is dependent on a thing being substantial, *being in itself*, in conjunction with something being predicated on it. The thing in itself is responsible for sustaining the being of another thing. In contrast, Garcia considers being not as something in itself but as a current that flows, leaving things in its wake.

In vectorial ontologies, substance is non-existent, there is nothing ‘in-itself’. Here there are vectors that carry being, but there is not an arrow that closes upon itself, making permanent what something is. Vectorial ontologies are, for example, those of Nietzsche, Bergson or Deleuze, where things are identified at the crossing of events, forces, relations or becomings. What makes a thing re-identifiable is the quasi-stable form that arises when these vectors of being encounter each other, like when the transient trails of vapor left by airplanes in the sky give the impression of forming a triangle. In opposition to ontologies of substance, ontologies of transience result in things that can never be compact or stable. To be is to be in flux, in a permanent state of change, and there is not a point where cohesion is achieved, where the flow of being closes upon itself, raising a consistent structure.

Garcia’s thingly ontology provides a way of thinking about things that have being (that are) without being in themselves by acknowledging being as a current

(a flow) that leaves things in its wake. From the perspective of a thingly ontology, substantial ontologies close the channel (and hence the flow) of being by conceiving of things as things in themselves. Being does not flow because a thing is 'in itself' closed and isolated from other things. On the other hand, ontologies of transience dissolve the channel of being, resulting in things that aren't able to retain any consistency. Being as a current never encounters any disturbance that gives things some sort of density. If in substantial ontologies being enters into a thing to constantly circulate around the thing itself, and if in vectorial ontologies being circulates without any objective end point, in Garcia's 'thingly ontology' *'Being enters into a loop wherein being is not projected in itself but cast outside itself.'* (Garcia 2014, 11). Being, in Garcia's sense of flow, enters a thing and leaves a thing and it is precisely this difference between 'entering' and 'leaving' that makes a thing, any thing, what it is.

Seeing Double

According to the Thingly Ontology, being has two senses: the sense in which it enters into the thing and the sense in which being abandons it. The entering sense is 'what *is in* the thing' (Garcia calls this sense *being*) and the abandoning sense is 'what the thing *is in*' (which Garcia refers to as *comprehension*). Let's try to understand the sense of being and comprehending by looking at the example of a painting in a gallery:

Before me is a picture, a painting, framed and at the centre of a museum. I try looking at this landscape, this scene, this composition. But as soon as I look carefully at the painting – if I no longer consider the room of the museum that the work belongs to – I am no longer very certain of truly seeing it. I am seized by doubt. I plunge into the painting. I examine a mass of significant or seemingly insignificant details – distant characters, scattered objects, movements, layers, shades, and so on. By examining the varnish, I perceive coloured matter and its tiny waves on the surface of the canvas. I follow the brushstrokes. I approach an area where there is a subtle overlapping of an almost transparent sienna and Bismarck red, and so on. I see the object closer and closer, but in so doing I have lost sight of the object as such.

I wanted the thing, but only ever had that which enters into the thing.
(Garcia 2014, 129)

If we look at the things that are in the painting, we access the painting through one sense: the sense of being. Things are in the painting but, crucially, the painting is not these things. If one tries to obtain the meaning of the painting from the other direction:

By thinking of the painting in some context and history, I can survey its effects, its consequences, and its posterity. But I also have the opportunity to situate the painting within my singular history, to obtain control over its accidental relationship with what I have experienced up to now. It is possible for me to place the painting in many contexts, with many conditions, and always seek the meaning of the painting. What the painting is, is what it dwells in, where it is situated. If the painting remains in its historical context or in art history or in the perception that I have of it or on the market, and so on, the painting always has one distinct meaning. Its matter (what is the painting) will be the same. But what the painting is will depend on what the painting is temporarily located in. (Garcia 2014, 129)

It is important to note that, for Garcia, being is not symmetrical. There is a crucial difference between ‘what is the painting’ (sense of being) and ‘what the painting is’ (sense of comprehending). This is the first step towards understanding Garcia’s maxim ‘to be is to be comprehended’. The gallery comprehends the painting and the painting is in the gallery. This is perversely simple and can heavily tax common sense, so a helpful approach to thinking through the thingly ontology is to never consider ‘to be’ without adding ‘in’: ‘to be’ is to ‘*to be in*’. If ‘the wall is white’, it does not mean that whiteness is a quality that is in this wall. The wall does not comprehend whiteness but rather, whiteness comprehends this wall. The wall is, among other things, white. This rhetorical inversion puts being on the side of the predicate. Subjects are parts and predicates are wholes and being is antisymmetrical: if a is (in) b, then b cannot be a. If I am a child I cannot comprehend childhood, but childhood comprehends me. If I comprehend this, this is in me. If that comprehends me, I am in that:

Comprehending is having something inside itself. Comprehending is also comprehending an element by being a set; comprehending one quality by being a substrata of qualities; comprehending someone by appreciating or paying attention to this someone; assimilating a way of thinking or an idea; having a part when one is a composite; or comprehending a temporal, historical, or evolutionary moment in a longer timespan.

Being is belonging to something. Being is also having a quality; being an organism; being in a situation, that is, being situated in some thing, and, more precisely, in a series of objects in each other, like Russian dolls but impossible to completely hierarchize; being a body; being a history; being a social function; being a community; being a language; being a consciousness; or being a sexual organism.

(Garcia 2014, 152)

In order to think through a thingly ontology, we need to first and foremost consider that things are a difference (or a differential (Cogburn 2017, 75)). In order to see a thing, one needs to assume a difference. A thing ‘*marks the difference between two senses or directions of being: that which enters into and that which goes out.*’ (Garcia 2014, 107). When one looks carefully at things through a thingly ontology,

they appear as split. Either one grasps what is in the painting or what the painting is in, but one cannot grasp the painting as a whole. It is only when one allows oneself to see double that one finally manages to see a thing, any thing. There is a closer analogy in stereograms. A stereoscopic image is composed of two images, one for each eye. One can intuit what the image is about by looking at one or the other, but if one looks at them together, if one sees double, a different meaning is disclosed. If, on the other hand, one approaches a thing only from only one sense of being, the thing is reduced:

Physicalist or materialist reductionism reduces things to the matter that composes them. Evolutionary or naturalist reductionism reduces a living organism to the evolutionary processes of which the living organism is a result. Other types of reductionism capture the chain of being from the other direction, and reduce a thing to what it is, that is, to what it is in. Social reductionism reduces a social element to its function in the social whole. Historical reductionism reduces a historical event to the history within which it obtains its place.

(Garcia 2014, 118)

Garcia's philosophical position is one of extreme ontological equality in order to avoid reductionism. Affirming that in Garcia's universe every thing exists is not an exaggeration. Material, natural, psychological or fictional things all are granted the chance of existing, of being something. Although an atom, a body, a revolution, a cherry or the idea of a cherry are different, for Garcia, they are all equal in the sense that they exist, that they are something. Qualities are things, theories are things, organs are things, contradictions are things and for that matter anything can be a thing. Ontologies that grant being to everything are known as flat ontologies, because there are no distinctions when it comes to which things are and which things are not, all things simply are. This is drastically different from other ontologies that grant being based on categories, effects, properties, etc. Garcia's thingly ontology, due to its impetus to provide an ontological home to every thing, is uncompromisingly and radically flat. Garcia is not alone in his apology for ontological equality, and his ideas resonate powerfully with ideas that belong to what is known as the ontological turn, a body of multi-disciplinary tendencies of the past decade that 'break away from the normative divides, central to the modern regime of truth, between subject and object, mind and body, reason and emotion, living and inanimate, human and nonhuman, organic and inorganic, and so forth.' (Escobar 2018) by bringing attention to nonhumans, networks, spirituality, feelings, bodies, and so on.

Garcia's thingly ontology is an invitation to see entities, things or objects, not only differently but as differentials. It is an ontology that loudly affirms the reality of relations and conceptualizes things as existing beyond themselves. In doing so it attempts to avoid reductionisms by providing an alternative and relational



vantage point from which to look at and understand objects via a constant oscillation between that which is in an object and that which an object is in by focusing (or de- focusing) on the two senses that make a thing: being and comprehending. In what follows, I will describe the object as a transitional concept of design theory from the perspective of Garcia's thingly ontology.

Form

We encounter the deep question of design when we recognize that in designing tools we are designing ways of being.

(Terry Winograd and Fernando Flores, *Understanding Computers and Cognition*)

Winograd and Flores coined the term ‘ontological design’ (Willis 2006) in order to lay a foundation for thinking about design as an activity that is profoundly ontological. They defined ontology as related to ‘our understanding of what it means for something or someone to exist’ (1986, 30) and argued that design enables the existence of worlds that in turn design the ways that people exist within them. Their understanding of reality as a multiplicity of worlds is akin to Law’s fractiverse and has influenced the work of many designer-theorists, most noticeably those within ‘transition design’ (Tonkinwise 2014) and ‘autonomous design’ (Escobar 2018) that have focused on design as a form of world-making with radical socio-political implications. However, design as world-making with a focus on the creation of speculative imaginaries is also present in a plethora of design approaches that developed through an engagement with the arts – Critical Design, Speculative Design, Design Fiction, Scenarios and others (Bythe and Encinas 2018). These approaches have in common that they hold the real at a distance and hint at possibility rather than actuality. Objects produced within these frameworks seem satisfied with their ambiguous status and, rather shamelessly, seem to use it to flirt with both the potential and the actual in terms of the ‘what if’. They seem to attempt to escape a particular reality, which they illustrate by departing from it and revealing a vantage point to look at and reflect on the way things are from a different perspective. It is precisely from this quality of ‘being off from a particular understanding of reality’ that the object takes its name in order to propose a different way to conceptualize the work of those who are designing alternatives through an intimate relation with fiction. An example that is rather straightforward to conceptualize as an object is Dunne and Raby’s United Micro Kingdoms (UmK) (Dunne & Raby 2015). UmK is a design project that presents four fictional futures for the United Kingdom as four counties with different lifestyles, forms of governance, economical models and technologies. Different aspects of the world of each of the four counties – the Digitarians, the Communo-nuclearists, the Anarcho-Evolutionists and the Bio-liberals – were designed in order to illustrate the ‘what if’ and attain the vantage point from which to interrogate the technologies, politics and lifestyles that defined the United Kingdom in 2012.

In a general sense, an object has a transitional character in order to inhabit the intermediate space between discovery and argument or between insight and idea. In this sense, the theoretical pretensions of an object are somewhat akin to Hook and Lowgren’s idea of Intermediate Knowledge, which is illustrated here with the example of ‘Strong Concepts’:

Design-oriented research practices create opportunities for constructing knowledge that is more abstracted than particular instances, without aspiring to be at the scope of generalised theories ... We propose an intermediate design knowledge form that we name strong concepts that has the following properties: is generative and carries a core design idea, cutting across particular use situations and even application domains; concerned with interactive behavior, not static appearance; is a design element and a part of an artifact and, at the same time, speaks of a use practice and behavior over time; and finally, resides on an abstraction level above particular instances. (Höök and Löwgren 2012)

These theoretical concepts act as higher-level definitions than the artifacts that originated them, without becoming self-contained theoretical arguments in the process. They bridge the gap between theory and practice and aim at achieving a form of intermediate-level knowledge by modulating insights and structuring claims. It is precisely in this liminal space of intermediate knowledge where a design artifact characterized as an offject dwells and where it is better positioned to express its generative, dynamic and abstracted character. In fact, it is by being a transitional form of intermediate knowledge that an offject is able to integrate the fluidity and constant change of a design process and remain relevant. An offject is intentionally flexible and ambiguous in order to coexist with other definitions rather than discard them. This is, in my opinion, a necessary characteristic of fundamentally relational design theory that functions by proposing valid alternatives rather than disqualifying existing ideas. When a new chair is made, for example, it provides a new definition of sitting without disqualifying what other chairs considered sitting to be. To consider the UmK as an offject should not be in conflict with alternative understandings of it, such as a case in which the UmK is seen as a design fiction, or an object of speculative design, or a design provocation, for example. The offject is, then, a concept that refuses to remain static while everything around it changes. As a consequence, its form needs to remain malleable but resilient, not so much a compliant answer but more like ‘something calling for a response’ (Redström 2017). It is a concept that carries with it the necessary elements to guide its own adaptation to a particular design process and its evolution through a shift between its status from an object of design to a design object.

Object of a Design Discipline vs. Transitional Design Object

Design is a process (as in ‘to design’) and it is also an outcome (as in a ‘design object’). In the thematic context of this article, design objects are frequently classified according to the kind of design discipline or tradition they belong to: is this a speculative design object? An adversarial design object? A critical design object? This operation facilitates differentiation through the specification of a conceptual

companion to some sort of seemingly ‘conventional’ or ‘regular’ design. Certainly, specificity is useful, as it simplifies categorization and supports clarity in discussion. However, how different is design as a practice in all these X designs or design Xs? (Tonkinwise 2015) Certainly, differences exist in terms of design as a practice between these design traditions (in the methods employed, aims pursued, etc.), but is it necessary to differentiate design as a discipline in order to distinguish the object it produces? Wouldn’t it be possible (and perhaps preferable) to differentiate the objects themselves without having to redefine design itself?

Design is rich in disciplines and traditions, but it is even richer in specific design objects associated with them. There is graphic design, for example, and there is also a plethora of design objects that accompany it as a practice: there are logos and fonts and icons and layouts, etc. Importantly, these design objects are not only comprehended by graphic design but by other practices too, such as marketing or filmmaking. They are in a sense, transitional design objects. The conceptual chance of a design object lies in its ability to transverse practices without losing specificity. This is the case with the concept of the prototype or the sketch, for example¹. What is striking about these concepts is their transitional nature: they are a step to something else, but also specific to the design process they are embedded in. A sketch is an object that is not particular to fashion, industrial or graphic design. Similarly, an offject is an object that is not particular to speculative, adversarial, industrial or textile design. The offject is a concept that serves to specify or differentiate particular design objects without redefining design as a practice. It is an object-oriented transitional concept because it specifies the object rather than the process of which it is a result. In turn, the relational qualities of an offject are strengthened as it does not belong to a discipline or process but is able to be mobilized whenever necessary to generate any sort of imaginary.

From Metaphor to Metonymy

The ‘off’ in offject needs to be understood in two ways for an offject to function as a form of intermediate knowledge. Earlier we mentioned the first: an offject as a mechanism of escape from a particular reality in order to form an alternative and provide a vantage point. The second way of understanding ‘off’ is a consequence of the offject arising from the Thingly Ontology of Tristan Garcia. As any object, an offject is a difference or a differential between the senses of being and comprehension – between what is in the offject and what the offject is in. The ‘off’ in offject highlights a movement between the parts, the components of a design object and the relations, the context, that this design object enters into. In this sense, an offject is an invitation to conceive of a design object not so much in terms of metaphor (how the offject expresses itself in terms of another object) but in terms of metonymy (how the offject is expressing a whole by identifying as a part). In fact, such a metonymical

understanding of a design object is seemingly present in Dunne and Raby's treatment of Speculative Design:

Whereas a child uses props to imagine a box is a house or a rock is an alien, speculative design props are intended not to mimic reality or allow us to play act but to entertain new ideas, thoughts, and possibilities for an alternative world from the one we and the prop coexist in, what Kendall calls 'fictional propositions' in contrast to the 'fictional truths' of children's props. The prop belongs to its own fictional world.
(Dunne and Raby 2013, 92)

The Speculative Design prop is a part that represents a whole (the alternative and fictional world). However, an understanding of an offject through Garcia's thingly ontology goes, not beyond, but before, an alternative fictional world. In taking a metonymical stance when engaging with an offject, the spotlight is not on the disclosure of an alternative world but on the relation between the offject and the actual world where it is placed. It is about establishing a new relation with, or rather, about achieving a new understanding of the context where an offject is (or what comprehends a particular offject). Going back to the previous example of the UmK, a consideration of UmK as an offject imposes a metonymical understanding of the design work, which means a consideration of how UmK is a part within a whole, and precisely, how the whole is manifested in UmK. The UmK is a design project that depicts a fictional world through design objects (vehicles, humanoid models, etc.) that are offjects themselves, metonymically relating to the whole that they are part of (UmK). But most importantly, that fictional world is a part of the fractiverse that is the UK in 2012. The UK comprehends the UmK and it is through an understanding of the UmK as an offject that we gain insights into the whole that it belongs to, which is the actual UK of 2012. This is precisely where the strength of the offject as a form of intermediate knowledge lies: not as an access to another world but as an enhanced understanding, a fractal revealing or an awareness, of one's own understanding of the (social, cultural, etc.) context that comprehends an offject. It is in its status as transitional concept and in its unapologetically ambiguous character that an offject is suited to provide an 'objective' account of the context where it is situated but, crucially, not objective because it is universal but objective because it is 'in objects'. In this way, an offject acknowledges Tony Fry's argument that 'The way the world is thought or viewed is always predetermined by a culturally authored perception and naming.' (Fry 1999, 4) and Zizek's rejection of trans-cultural universal objects:

So while Bordwell and other Post-Theorists like to distinguish trans- cultural universal features (part of our evolutionary heritage and the psychic structure of human beings) from features that are specific to particular cultures and periods – i.e. to operate with a simple pyramid from natural or other trans-cultural universal features to more



and more specific characteristics that depend on localised contexts – the elementary counter-argument to it is that the very relationship between trans-cultural universals and culture-specific features is not an ahistorical constant, but historically overdetermined: the very notion of a trans-cultural universal means different things in different cultures. The procedure of comparing different cultures and isolating or identifying their common features is never a neutral procedure, but presupposes some specific viewpoint – say, while one can claim that all cultures recognise some kind of difference between subjective imagination and reality – things as they exist out there – this assertion still begs the question of what ‘objective reality’ means in different cultures: when a European says that ‘ghosts don’t exist in reality’ and when a Native American says that he communicates with them and that they therefore do exist in reality, does ‘reality’ mean the same thing for them? Is not our notion of ‘really existing’ (which relies on the opposition between is and ought, between being and values) specific to modernity? (Žižek 2001, 17)

An object understood in terms of metonymy brings to the foreground the question ‘what does reality mean for the designer?’ An object enables a person to consider the answer to this question and, as a consequence, the experience of conceptual fore-shortenings or contrasts. An object reinforces the notion that there is an eye-level from which reality is looked at and that its position is contingent and idiosyncratic, and in doing so, provides the possibility of contesting and designing how it could

be otherwise. It shines a light on the wholes (and the worlds) that objects produce, assume and contest, and of which objects are a part:

Just as metaphor is usually thought of on the basis of a given equivalence, so metonymy is usually understood in terms of a given whole.

(Avanessian 2017, 77)

Example

Those of us who inhabit the liberal worlds of ‘real realities’ and ‘autonomous individuals’ can certainly come to understand the profound insights of relationality theoretically; yet conceptual analysis can carry us only partway in the journey toward more relational living. To the theoretical work we need to add some form of practice that takes us into other habits and modes of living and interexisting, of being in a world that is made up of things that are real yet not inherently independent.

(Arturo Escobar – *Designs for the Pluriverse*)

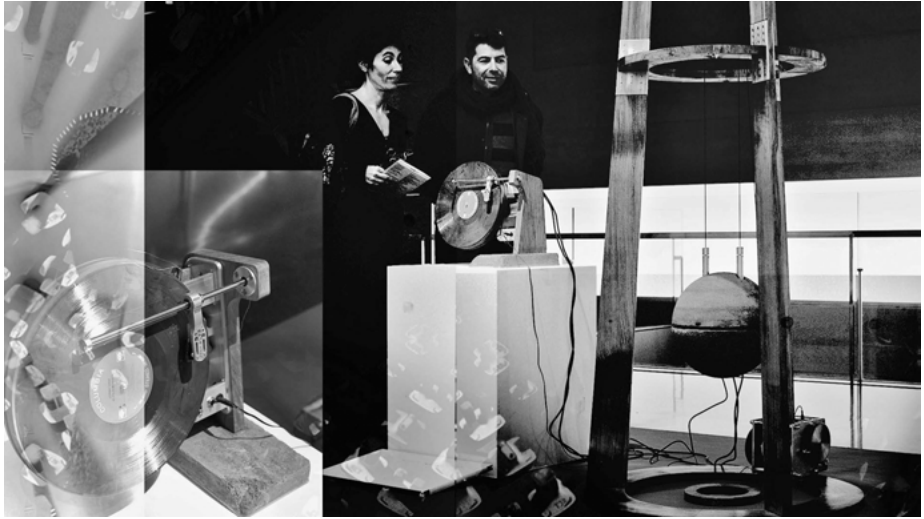
This example was developed in collaboration with other members of the Reconstructed Design group (Hanna et al. 2017) after a design brief that hinged on thinking about energy in alternative terms from those who dictate how it is generated, transferred and consumed in modern and industrialized regions. The starting assumption that grounded our design process was that energy had become a commodity with a set of practices of use that obscured how it is generated and transferred. An electric plug in a wall socket brings energy almost magically into any built environment without accounting for where it came from or how it got there. In order to reverse this trend and as an attempt to make energy visible, we designed a domestic gravity battery as method of energy storage and generation. In very simple terms, a gravity battery is an energy generator that produces electricity while a heavy mass falls. (Auger et al. 2017) It is mainly composed of three elements: a heavy mass, a gearbox and an electrical generator. The heavy mass is attached to a pulley with a rope connected to a gearbox. The slow vertical falling speed of the mass results in the fast rotation of a gear at the end of the gearbox. This gear is coupled with an electrical generator that produces electricity. Once the heavy mass reaches the ground, the generation of electricity stops. The functioning of our electrical generator could be reversed – if instead of receiving rotational movement through the gearbox, it received an electrical current, the generator would function as a motor, rotating the gearbox and lifting the weight as a result. This meant that if a solar panel was attached to the gravity battery, its energy could be used to lift the heavy weight back to its initial position. We envisioned an initial scenario of a house that had a gravity battery installed on its roof next to some solar panels. During the day, the heavy

mass would be lifted by means of the solar energy produced by solar panels. Once its inhabitants needed the energy stored in the gravity battery, they would simply have to release the heavy mass.

In the process of developing the third iteration of the gravity battery, we were invited to the Scottish island of Eday for a week in order to build a gravity battery with local residents. This experience helped us question how our design project incorporated the local context in the production and use of energy. The gravity battery was a system that comprised technological artifacts, but those were only secondary to the local knowledge and materials of a community that gets together to make it happen. The overarching aim of our design project became the production of design objects that highlighted contexts and not objects celebrating technological efficiency or progress. This was a metonymical move because it meant designing to represent the whole through a part. It was also a move that brought our design efforts closer to what Alfred Borgmann referred to as ‘things’ in *Technology and the Character of Contemporary Life* (Borgmann 1987). In his book, Borgmann differentiates between ‘things’ and ‘devices’ on the basis of how they engage with the context where they exist. ‘Things’ are inseparable from their context: the means of the activity they facilitate exist in an unbroken continuum with the ends they try to achieve. ‘Devices’, on the other hand, conceal their context. In his study, Borgman contrasted the stove as a thing, and the central heating plant and the radiator as a device to satisfy the human need for warmth. From a thing as ‘*a focus, a hearth, a place that gathered the work and leisure of a family and gave the house a centre*’ to a device that ‘*procures mere warmth and disburdens us of all the other elements*’ (Borgmann 1987).

It was at this point that the resolutely fictional entered the scene in our design process. We started to consider the implications of applying the design principles of structuring our design process in a domestic environment and established a speculative scenario in which electric plug sockets did not exist, neither in the walls of rooms nor in appliances. This design constraint forced us to forfeit the plug as the ending point of our designs which, in turn, meant that the means of energy generation became a design element that had to be considered from the start rather than taken for granted. Any domestic product designed following the ethos of the gravity battery – to expose a context by employing local knowledge and materials – had to generate its own energy and do so visibly. It would have to welcome its context and situate means and ends in a continuum, thus promoting its thing-ness. But these domestic products would function under the premise of a fictional world in which the electric socket is nonexistent and, hence, we would be designing offjects. Transitional design objects purposely designed for ‘being in’ a fictional world that is comprehended by the fractiverse in order to illustrate metonymical relations.

The result was the Gravity Record Player, an appliance that generated its own energy to play the sound stored in vinyl records. It had one module for energy generation and another for sound reproduction. The energy generation module had four



main elements: a speaker encased within two heavy concrete lead-infused hemispheres, a pulley system, a gearbox and an electrical generator. The energy was produced by releasing the concrete from a height of two meters. Once the concrete reached the floor, it had to be lifted again by spinning a handle or by connecting it to a source of energy, like a solar panel or a wind turbine. The sound reproduction module incorporated a small amplifier and an electrical component for signal treatment (i.e. filtering and equalization). A cable powered the record player and the speaker with the electricity coming from the generator while the concrete ball fell. We estimated around twelve minutes of playback time per drop. The materials employed were acacia wood, acrylic, aluminum, nylon cord, iron gears, black sand from the local coast, cement and lead. From our perspective the Gravity Record Player was a thing, rather than a device:

The gravity turntable is a 'thing' rather than a 'device' because of the shift it causes in the practice and attitude of listening to music. The gravity turntable is wall-less: the gravity-based mechanism for energy generation is an integral design feature. Hence, its energy infrastructure and its functionality are components of equal aesthetic relevance. The experience of listening to music on the gravity turntable is highly influenced by its design. Its maximum playback time – 10 minutes – and the slight effort it imposes on its user encourages active rather than passive listening, and quality over quantity. After all, a record is not an mp3 file, so why should their modes of enjoyment be the same? (Encinas, Hanna and Auger 2017)

With the Gravity Record Player we wanted to highlight the separation between domestic appliances and alien infrastructures of energy production and transfer. Instead of relying on a magic wall and its wall plug to make function come alive, we wanted to go beyond the wall and do away with the plug altogether by designing the means of energy generation into the objects. A consideration of the Gravity Record player as an object compelled us to make visible the dependency between this design artifact and its context, to highlight a whole through the design of a part, and this included bringing local knowledge and materials to the forefront. However, we did not want to restrict ourselves to the design of do-it-yourself objects that were satisfied with performing a function. In our view, this would not differentiate our project from other techno-solutionist attempts that would be considered finished simply because they worked, regardless of how they might be experienced (esthetically or otherwise). Our aim was to design objects that could be built and re-designed by others and that could be seen as an alternative in terms of material quality and attention to detail to a purchase in, for example, a shopping mall. The Gravity Record Player had instruction manuals and blueprints that some might find too difficult to build by themselves, but that should present no problem for a professional in their community. A small aluminum pulley, for example, would take just minutes for a local metal worker to make. Local craftsmen have amounts of expertise that we hoped would be mobilized by people trying to build these products. It was very likely too that these craftsmen would be able to improve our designs or come up with new ones better fitted for the contexts of the people needing them. We saw this increase in complexity and quality of materials used for a DIY project as a reasonable price to pay in order to design things instead of devices, that is, objects where means and ends exist in a continuum and that, in doing so, reject concealing their context.

Epilog

Will designers be able to contribute to dissuading unreflective publics from succumbing to the virtual realities offered by the patriarchal and capitalistic technological imaginations of the day?

(Arturo Escobar – *Designs for the Pluriverse*)

Early in this article, Ursula Le Guin reminded us of the importance of ‘realists of a larger reality’ for it is they who can envision alternatives. At the same time, it is paramount to remember, as Escobar points out, that efforts at creating imaginaries need to be critical in acknowledging their situatedness. It is crucial for designers working in the design of speculations, such as futures, to be conscious of the perspective they are designing from in order to challenge the dominant narratives of possibility imposed by dominant One World World capitalist ideologies.

In order to envision true alternatives that respect and engender a plurality of worlds, that truly acknowledge the fractiverse, ‘design needs to contribute to creating conditions that dampen our impulse to think and act like modern individuals’ (Escobar 2018)

The Offject is an attempt to conceptualize design speculations from a perspective of radical relationality. The goal of the offject is expand the design lexicon with a concept that functions as a tool for ontological reflection that highlights the wholes (contexts, worlds) where design speculations exist, in order to make such wholes visible and subject to scrutiny. At the same time, it is crucial to acknowledge that any consideration of a design artifact as an offject is also an effort in defining limits (between part and whole, being and comprehending, etc.) and a limit is, if we think of it through Garcia’s thingly ontology, of the same nature as the objects it tries to separate. Like a thin layer, a membrane, that pretends to disappear within or mimic the objects it is attached to. The limit between a branch and the rest of the tree is of the same nature as the branch and the tree. The limit between love and hate is an emotional threshold. Limits are contingent and non-necessary, which makes them open to question and redefinition. Once one speaks of offjects there is no way to avoid the limits that accompany them and with this move, one inevitably surrenders how certain things matter:

This book is limited by the room in which it is, provided that it is in a room, just as it is limited by its time – it is enclosed in a place, in a time, in the consciousness that you have of it, in its economic value, and so on. If I put this book in a bag and close it, this bag captures it. This is yet another limit. But limits change and depend on a point of view, on interests attributed to a thing, on a scale of perspective.

(Garcia 2014, 143)

Limits render some matters of meaning obscure or even obsolete, while bringing others in to the spotlight. It is with an awareness of how limits matter that the offject as a theoretical contribution does not aim at formal completeness or temporal survival. It is not walled behind an argumentative structure that intends to give an illusion of plenitude. It would also become feeble and stagnant if I were to provide a logical carapace to inhibit critical assault. An offject is made through design, and like design, it needs to be able to cope with change by attaining precision through relation and difference. An offject is then, not a concept that better describes design artifacts that are ‘out there’ but an alternative handle to grasp what is in a design speculation and what a design speculation is in.

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- 1 Perhaps the idea of the offject is closer to the provotype than to the prototype or the sketch – ‘Provotypes are ethnographically rooted, technically working, robust artefacts that deliberately challenge stakeholder conceptions by reifying and exposing tensions that surround a field of organisational interest.’ (Boer, Donovan, and Buur 2013). Offjects and provotypes share a motivation to highlight tensions between the actual and the potential, but mainly differ in the purpose and context of their deployment.

References

- Auger, James (2012). ‘Why robot?: speculative design, the domestication of technology and the considered future.’ PhD diss., Royal College of Art.
- Auger, James, Julian Hanna, and Enrique Encinas (2017). ‘Reconstrained design: Confronting oblique design constraints.’ *Nordes* 7, no. 1.
- Avanessian, Armen, and Anke Hennig (2017). *Metanoia: A speculative ontology of language, thinking, and the brain*. London: Bloomsbury Publishing.
- Beaumont, Matthew (2014). ‘Imagining the End Times: Ideology, the Contemporary Disaster Movie, Contagion.’ In *Žižek and Media Studies*, 79–89. New York: Palgrave Macmillan.
- Bleecker, Julian (2009). ‘Design fiction. A short essay on design, science, fact and fiction’ Near Future Laboratory.
- Blythe, Mark, and Enrique Encinas (2016). ‘The Co-ordinates of design fiction: Extrapolation, irony, ambiguity and magic.’ Proceedings of the 19th international conference on supporting group work.
- Blythe, Mark, and Enrique Encinas (2018). ‘Research fiction and thought experiments in design.’ *Foundations and Trends® in Human–Computer Interaction* 12, no. 1: 1–105.
- Boer, Laurens, Jared Donovan, and Jacob Buur (2013). ‘Challenging industry conceptions with provotypes.’ *CoDesign* 9, no. 2: 73–89.
- Borgmann, Albert (1987). *Technology and the character of contemporary life: A philosophical inquiry*. Chicago: University of Chicago Press.
- de Sousa Santos, Boaventura (2012). ‘The European university at a crossroads.’ *IdeAs. Idées d’Amérique* 2.
- Chamberlain, Gethin (2011). ‘Apple’s Chinese Workers Treated ‘inhumanely, like machines’’ *The Guardian*, Apr 30, 2011. <https://www.theguardian.com/technology/2011/apr/30/apple-chinese-workers-treated-inhumanely>.
- Cogburn, Jon (2017). *Garcian Meditations: The dialectics of persistence in Form and Object*. Edinburgh: Edinburgh University Press.
- DiSalvo Carl (2012). *Adversarial design*. Cambridge, Massachusetts: MIT Press.
- Dunne, Anthony (1999). *Hertzian tales: Electronic products, aesthetic experience and critical design*. Art Books International Limited.
- Dunne, Anthony, and Fiona Raby (2013). *Speculative everything: design, fiction, and social dreaming*. Cambridge, Massachusetts: MIT Press.
- Dunne, Anthony, and Fiona Raby (2015). ‘United Micro Kingdoms: A Design Fiction (2013), Critical Design FAQ (2007).’ In *Arts, Research, Innovation and Society*, 177–196. Cham: Springer Nature.
- Encinas, Enrique, Hanna Julian, James Auger (2017). *Wait for the Drop: Designing a Gravity Powered Turntable of the Future*. Proceedings of the Fifth Conference on Computation, Communication, Aesthetics & X (xCoAx).
- Encinas, Enrique (2018). ‘The Offject. A Design Theory of Fiction.’ PhD diss., Northumbria University.
- Encinas, Enrique, Abigail C. Durrant, Robb Mitchell, and Mark Blythe (2020). ‘Metaprobes, Metaphysical Workshops and Sketchy Philosophy.’ In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13.
- Escobar, Arturo (2018). *Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds*. Durham, North Carolina: Duke University Press.
- Fisher, Mark (2009). *Capitalist realism: Is there no alternative?*. John Hunt Publishing.
- Franklin, H. Bruce (1979). ‘What Are We to Make of J.G. Ballard’s Apocalypse?’ In *Voices For the Future: Essays on Major Science Fiction Writers*, edited by Thomas D. Claresson, 2: 82–105. Bowling Green University Popular Press.
- Fry, Tony (1999). *A new design philosophy: an introduction to defuturing*. Randwick: UNSW Press.

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- Garcia, Tristan (2014). *Form and object*. Edinburgh: Edinburgh University Press.
- Hanna, Julian, James Auger, and Enrique Encinas. 2017. 'Reconstrained Design: A Manifesto.' In *Proceedings of the 2016 ACM Conference Companion Publication on Designing Interactive Systems – DIS '17 Companion*, 177–81. Edinburgh, UK. <https://doi.org/10.1145/3064857.3079141>.
- Harman, Graham (2018). *Speculative realism: an introduction*. John Wiley & Sons.
- Höök, Kristina, and Jonas Löwgren (2012). 'Strong concepts: Intermediate-level knowledge in interaction design research.' *ACM Transactions on Computer-Human Interaction (TOCHI)* 19, no. 3: 1–18.
- Hutchinson, Jeremy (2012). 'Erratum' Accessed August 15, 2020. <https://jeremyhutchison.com/Work/2012-Erratum/>
- Jonas, Wolfgang (2019). 'Design Cybernetics: Concluding Remarks From a Semi-external Perspective.' In *Design Cybernetics*, 281–298. Cham: Springer Nature.
- Law, John (2011). 'Collateral realities.' *The politics of knowledge* 157.
- (2015). 'What's wrong with a one-world world?.' *Distinktion: Scandinavian Journal of Social Theory* 16, no.1: 126–139.
- Le Guin, Ursula K. (2014). Ursula K Le Guin's speech at National Book Awards: 'Books aren't just commodities.' *The Guardian*, Nov 20, 2014. <https://www.theguardian.com/books/2014/nov/20/ursula-k-le-guin-national-book-awards-speech>.
- Raskin, Paul D., Christi Electris, and Richard A. Rosen (2010). 'The century ahead: searching for sustainability.' *Sustainability* 2, no. 8: 2626–2651.
- Redstrom, Johan (2017). *Making design theory*. Cambridge, Massachusetts: MIT Press.
- Sharma, Kriti. (2015). *Interdependence: Biology and Beyond*. New York: Fordham University Press.
- Tharp, Bruce M., and Stephanie M. Tharp (2019). *Discursive design: critical, speculative, and alternative things*. Cambridge, Massachusetts: MIT Press.
- Tonkinwise, Cameron (2014). 'Design's (Dis)Orders and Transition Design.' https://www.academia.edu/11791137/Design_Dis_Orders_Transition_Design_as_Postindustrial_Design.
- (2015). 'Just design: being dogmatic about defining speculative critical design future fiction.' *Cameron Tonkinwise (Blog)*, August 21.
- Wakkary, Ron, William Odom, Sabrina Hauser, Garnet Hertz, and Henry Lin (2015). 'Material speculation: actual artifacts for critical inquiry.' In *Proceedings of The Fifth Decennial Aarhus Conference on Critical Alternatives*, 97–108.
- Willis, Anne-Marie (2006). 'Ontological designing.' *Design philosophy papers* 4, no. 2: 69–92.
- Winograd, Terry, and Fernando Flores (1986). *Understanding computers and cognition: A new foundation for design*. Bristol: Intellect Books.
- Žižek, Slavoj. (2001). *The Frigate of Real Tears: Krzysztof Kieślowski between Theory and Post-Theory*. Berkhamsted: BFI Pub.

MAKING A CUP: AN AUTOETHNOGRAPHIC STUDY ON THE DOMAIN OF MAKING AND ITS DISTINCTION FROM DESIGNING

Merle Ibach

Introduction – Why I Am Not a Maker

I guess I'm what you would typically call a designer. I completed a design degree at an art school and worked in agencies as a graphic and interface designer. During my training I learned to think in terms of results. A plannable process with a defined goal corresponds to my understanding of design. Therefore, I separate professional design practice on the one hand from the tinkering amateur activities of DIY on the other hand.

With the rising popularity of the maker movement in the form of makerspaces, fablabs and repair cafés, this boundary is becoming increasingly blurred. Gershenfeld, also called the intellectual father of the maker movement, propagated in 2003 with the invention of the fablab: Almost everyone can make almost everything, everyone can be a designer (Bandoni 2016, 212; Gershenfeld 1998).

And I have to ask myself, can the line between design and making be drawn so sharply? Is design the 'right design' and making an 'ordinary craft', for its own sake? Or can't making be distinguished more as a specific type of design? Although Gershenfeld still considered both closely related, making, as distinct from designing, is more of an exploratory attitude towards a problem. How can I grasp the chaotic, moody, fleeting preoccupation of making, which seems to have no continuity and speaks its own esthetic language? A method of designing without a recognizable methodology that brings something into the world while following its own rules and dynamics. What are the frictions between designing and making? And what distinguishes me as a trained designer from a maker?

I want to explore the domain of making in a material experiment. I want to dive into the material processes, the social dynamics and the technical circumstances of making. In a self-reflexive, hands-on experiment, I want to encounter its idiosyncrasies and frictions. Based on Schön's concept of a reflection-in-action, I would like to analyze the 'dialog between practitioner and situation'.

After introducing my research framework, I will give an overview of the theoretical foundation and draw a connection to my object of investigation: making. Then, using selected memos from my own material investigation, I will discuss individual aspects of making, looking at the interaction between practitioner and situation from different angles. (a) The frictions between designing and making,

(b) the mentality in making, (c) the practice of making, (d) the process or means of making. The aim is to work out the specific character of making, the intuitive and open-structured negotiation between maker, technology and matter, and to locate it as a specific mode of design culture.

Research Framework – Getting My Hands Dirty

During my own practical involvement with the 3D printer, I observe and question the domain of making. It is a ‘holistic experience’ in which I am both observer and subject of observation.

My field of observation is a makerspace, where I want to 3D-print a cup. I choose a simple, everyday object to keep the process and the related considerations and decisions replicable.

The decisive factor is that I unconsciously define a framework here that already discloses my bias. On the one hand, I access making through my approach as a designer by defining a design framework, tools and problem. On the other hand, I take my assumption that the infrastructure of the makerspace, the technology of the 3D printer and the practice of making are inseparable. But later I have to realize that the 3D printer does not automatically produce a maker practice, that making does not only take place in Western makerspaces and that making is not a process but rather an attitude.

During the entire course of my exploratory investigation of about five months, I document my activities in photos and memos. As an ethnographer, I myself am part of the depicted process. Through my background as a designer I have a ‘member researcher status’, which determines my perspective on the object of research. I make this perspective visible in the representation through the ‘first person narrative’. In this way it becomes clear in which moments I take a subjective perspective and in which sections I step back from my own experience in order to reflect on it and place it in a context. The criteria for my autoethnographic fieldwork refer to the ‘key features’ of analytic autoethnography as formulated by Leon Anderson (2006).

Theoretical Framework – A Conversation between Practitioner and Situation

The basis for the reflection is the seminal book *The Reflective Practitioner* (Schön 1982), where Schön describes the reflection of one’s own action and the resulting sequence of moves as a method of reflection-in-action. For him, the essence lies in the fuzziness and confusion of the practical process, which is incapable of

generating systematic knowledge (ibid. 23). Instead, Schön argues, the practitioner produces his/her own form of empirical, embodied knowledge (ibid. 49). By working out and accounting for the complexity of practical processes, this approach is often used to capture the elusive character of designing.

Schön describes the practical process as a reflective conversation between practitioner and situation – between the speculative-visionary question ‘what-if’ and the recognition of the impact, between looking at the individual and recognizing the whole, between exploration and commitment (ibid. 103).

Schön draws the process as a back and forth that oscillates between many factors, which he calls variables. For this he uses the image of a ‘web of moves’ in which a multitude of complex relationships are created and decisions are made (ibid. 102).

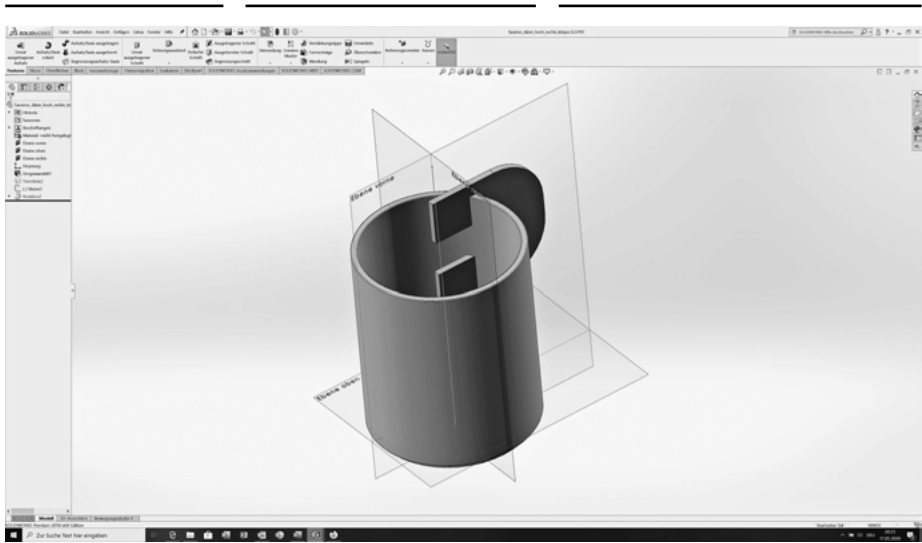
Rather than mystifying the concepts of creativity and intuition, he proposes to analyze practices as reflective processes. In design, according to Schön, a drawing can be used to create abstract ideas that would otherwise be ‘difficult and time-consuming’ to build (ibid. 297). In this way, ‘variables’ that interlock in the real, built world can be viewed separately and also decisions can be reversed. Thus, possible scenarios can be speculated on and planned.

At this point, however, the practice of making differs fundamentally from the practice of designing. Making neither tries to separate the complexity and intricacy of the variables, nor it is an intellectual practice. It is therefore interesting, as Schön describes in a second case, that the practical activity of psychoanalysis also follows the method of reflection-in-action. He thereby makes it clear that the ‘conversation between practitioner and situation’ is meant to be a general principle of applied professions. In this sense, could making be regarded as a distinct domain of design culture? Similar to design, things are brought into the world, but its intention and approach are fundamentally different.

Discussion

1) The Frictions between Designing and Making

MEMO 1, Berlin, 2.1.2019: *Searching the internet for a suitable print template that I can 3D-print. Hoping to find something commonplace like a cup, but nothing pleases me. Deciding to draw a sketch myself instead. Transferring my hand sketch into a CAD file, but have to realize that my cup has now also got the cold, smooth appearance of an industrial product. I do not like my own design any more than the online templates on thingiverse. Trying to change that, the proportions shift unintentionally. I take the resulting glitch, which the software presents to me, as a suggestion. Feeling brave.*



I approach the domain of making through my own experience and practice as a designer and start with a goal-oriented, strategic planning of a project. I define a problem: design a printable everyday object; I set a frame: a makerspace nearby, appointment in the coming week; I determine the tools: Solidworks (CAD software), Ultimaker 2 (3D printer); and I plan the steps: draw a sketch by hand, then transfer it to CAD software, then print it with 3D printer in makerspace. I perceive the influence of the software on my design as an flaw, which I allow in view of the experiment.

The relationship between designers and the maker community is not a matter of course, and in fact is rather problematic. The maker community brings together people with different professions and backgrounds, but not every person in a maker community is also a designer. Gershenfeld's vision, that the fablab 'enables everyone to become a designer', means the ability to produce things. Although the basic intention is similar to 'introduce new things into this world' (Bandoni 2016, 220), the professional design is characterized by the concepts of planning, abstraction and strategy. Designers do not necessarily find it easy to deal with the lack of rules and objectives and the flexibility in DIY, as Bandoni notes (2016, 220).

Planning, abstraction and strategy are key concepts of design. Concrete experiences are abstracted in order to be able to design universally valid products that include as many variables as possible. Schön refers to the design of a building in which spatial, material and environmental factors are incorporated in the same way as social, emotional and political factors (Schön 1982, 187). There are far fewer decisions to be made for the design of my cup, only the proportions of the vessel

and handle and its usage (three-fingered grips, stackable). The materiality can be neglected, that is one of the 3D printing's promises.

A planning, strategic thinking is needed to be able to make necessary design decisions through effective, targeted manipulation and with a result in mind. In the classical, humanistic sense, the intellectual act of designing is separated from the actual production in design and architecture. This point in particular, the separation between mental work and manual work, is criticized by making as a 'broken link between design and execution' (Nijenhuis 2019, 130).

Instead of an abstracting, strategic practice, making is an affective activity (Allen et al. 2019, 57). It is in a close examination of a specific situation and concrete materials that the artifact emerges. The shifted proportions in my design, which I perceive as flawed, are from the makers' point of view rather a desired 'situation's back talk' (Schön 1982, 148). The agency of the software opens up unexpected possibilities for the maker, which will influence the further development and appearance of the artifact.

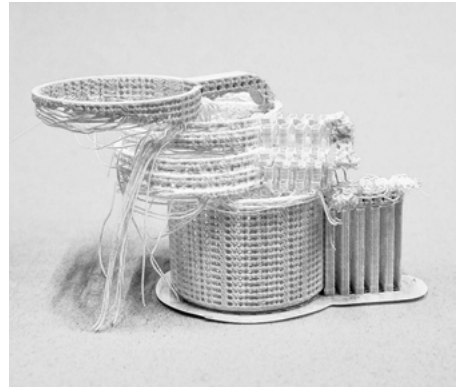
For designers in the maker community, the challenge of an explicitly open project result, as well as the question of authorship arises. In the open structures of maker communities, the free passing on of information and knowledge is a common social basis. In the maker movement, the customary securing of income for designers through exclusive designing and selling is deconstructed and authorship is marked at most with copyleft licenses (Bandoni 2016, 221).

2) The Mentality in Making

MEMO 2, Basel, 9.1.2019: *Standing in a makerspace surrounded by the whirring of several 3D printers, a laser cutter and the penetrating smell of melted plastic. Having a USB stick with me, my file on it and am ready to press 'print'. Before the print head moves and the cup is created before my eyes, there are a few technical intermediate steps to be taken. Finally, inserting an SD card into Ultimaker 2. Getting 3 hours of printing time displayed and a hint from people present telling me to stay nearby.*

Hint was helpful: The first attempts fail because of wrong settings, hardware errors or because the filament gets stuck. No one seems to be surprised. Getting all kinds of tips about what the problem is and how I could solve it. Starting to explore the inside of Ultimaker 2.

I enter the world of the maker community: enter the makerspace, get in contact with the 3D printer, experience the very own temporality and get to know the inherent trial-and-error attitude. My own design problem, designing a printable everyday object, generates new technical and material problems. They in turn open social doors for me.



As design critics Gareth Foote and Eva Verhoeven note, the common picture of the maker is the following: The maker, a mostly male member of the maker movement, who controls his materials through new digital tools (Foote and Verhoeven 2019, 73). It is above all a Western image of non-professional tinkering. Making here means working, trying out, inventing and being part of a larger community. It is a privileged hobby, which for some becomes a purpose in life. The possibility of understanding, taking apart or manipulating things in the highly technical world means social empowerment and can therefore also take on activist characteristics. The expected revolution here is the utopia of decentralized power distribution and the democratization of knowledge and resources through digital technologies.

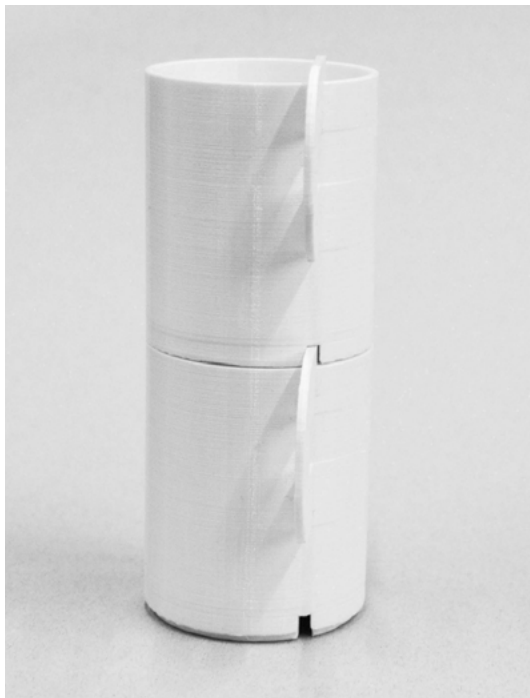
In addition to tinkering with digital technologies, the maker movement is characterized by a certain attitude towards work. Schön describes the creative practice as a muddling through, based on experience and intuition (Schön 1982, 43). For him, the trial-and-error attitude resulting from this is the epitome of a reflection-in-action. He thus describes a general observation of practical work. But whereas designing tries to systematically counteract randomness, making tries to emphasize this very fact.

In making, in addition to a necessary intuition – through which decisions are made in the moment – and the trial-and-error attitude – trying out an approach, failing at it and learning from it – the factors of materiality and improvisation are added. The maker, as a non-professional amateur, rarely has a comprehensive basic knowledge of material properties and behavior. The possibilities of how certain plastics behave at certain temperatures, how far a laser-cut wooden grid can be bent or which matter can be joined together, she learns through ‘material engagement’, through direct contact with the matter. The knowledge acquired in this way influences further decisions in the procedure. Also, due to the uncertain and open frame, not all necessary components or materials are within reach. Thus, improvising with the existing is essential and in turn influences the process in an unexpected way.

However, making is not an exclusive invention of the Western maker community. In the practices of Jugaad, Urawaza or Gambiarra, this attitude can also be found. Often it is even deeply rooted in the everyday life of the respective cultures. Gambiarra refers to a spontaneous method of repairing things or making things in Brazil and, like the Indian Jugaad, is a common term for unconventional, creative and cost-effective solutions. They are comparable to the Western concepts of DIY or life hacking, like the Japanese Urawaza (Bandoni 2016, 225; Braybrooke and Jordan 2017, 30; Foote and Verhoeven 2019, 77).

They all share the same basic attitude, starting from and moving along the existing possibilities to develop solutions. The experimental, intuitive, improvised, situational design, guided by the material, with the willingness to fail, forms the essence of the making mentality.

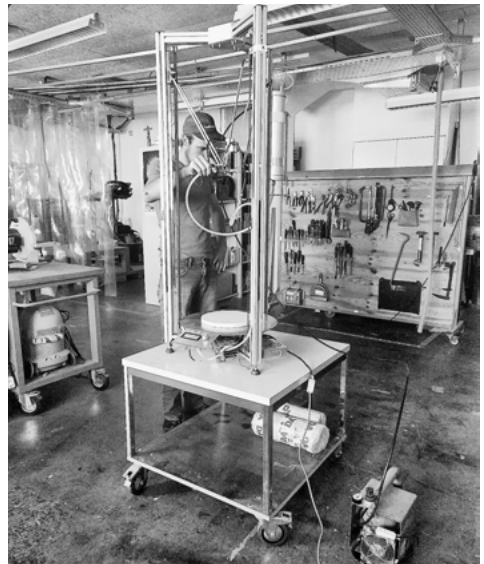
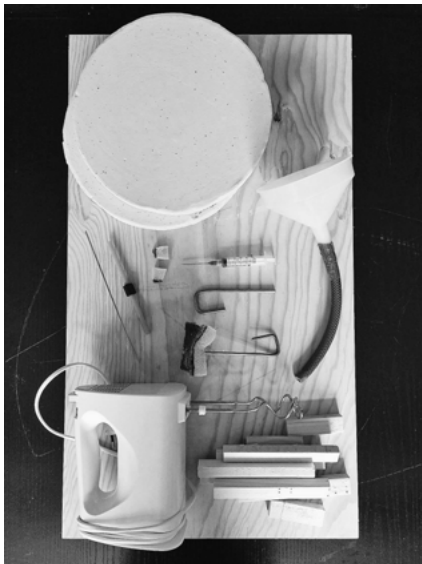
MEMO 3, Basel, 10.1.2019: *Next day. Finally having a complete prototype of my mug on the printing plate. The form was extended by a scaffold, which is firmly fused to the cup, the surface is decorated with a pattern of fine lines. It doesn't look like the CAD rendering and even less like my hand-drawn sketch. Am disappointed with the result. The appearance is sobering and the plastic is poor in its haptics. At least the printing process was fascinating to watch. Deciding to print another version in ceramic.*



The final print result causes irritation and dissatisfaction. Its industrial appearance lacks individual character. Whereupon I question my previous expectations regarding the domain of making. The experienced disappointment about the outcome (even though it is exactly the planned result) leads to a reset of the original design problem and thus an unforeseen turn of the observation project. The original design problem (designing a printable everyday object) is replaced by the new intention to find a way to co-work with a self-built ceramic printer. In the following, the production of a cup is only used as a reference and kind of read thread to keep the process traceable. The basic setting of a plannable process is abandoned. The further course of the experiment is characterized by uncertainty. The process is now actually guided by a 'conversation with the situation', the result is open.

3) The Practice of Making

MEMO 4, Basel, 26.3.2019: *Made contact with an adventurous maker via social media. He has access to a self-built ceramic 3D printer. Standing together in his workshop in front of an aluminium frame around which all kinds of cables are wrapped. Inspecting the things that were delivered in a box: tubes, wires, sponges, hand mixer, funnel. A short overview, then we start. Mixing old ceramic mass with fresh water with a hand mixer while he tries to activate the microcontroller. Then nothing much happens. The microcontroller reacts incorrectly and a hardware test shows that the mass is much too moist, it splashes out of the nozzle unrestrained.*



MEMO 5, April to June 2019: *Spent the past weeks learning how to use the device with the help of tutorials, friends, online research and a lot of trial and error. Learned how to control the flow of material, how to prevent the software from breaking prematurely and how to estimate the mixing ratio of ceramic and water. Having not (yet) produced a usable cup.*

After I entered the physical space of the makerspace, I now enter the mental spaces of making and internalize the ways of dealing and posture. In the center of the further process is the experimentation with an undefined set of things and the question of how these can be (usefully) brought together.

There is no documentation on how to use the individual parts or the mixing ratios, no circuit diagram of the hardware or instructions for debugging the software. The necessary knowledge is (and remains) implicit, we have to work out the inventory ourselves.

The use of the individual parts is not self-explanatory and can only be explained to a certain extent by the mind. It is rather a speculation of possible usage scenarios. Already at the first step it becomes clear that the expected functionality does not work out.

This specific practice comes along with the mentality of making, where design and execution are done together. Rather than first working out a finished design, which is then executed in a planned manner, in making the interplay of maker and situation – material, technology, the external circumstances – is decisive.

Sociologist Andreas Reckwitz describes as practice a routinized behavior that consists of different, intertwined elements. For him, this includes physical and mental activities in the same way as objects, bodies of knowledge and their use (Reckwitz 2003, 290). Schön calls them variables that are negotiated in design. In the practice of making, the interaction of the elements, or variables, becomes the guiding principle.

Making certainly provides a framework in which possible tools, materials and a general vision are formulated. But it serves rather as an inventory. The framework is comparable to a map but does not describe a route. Making is not defined by the ability to master machines or manipulate materials, it does not pursue strategic intentions, but ‘it is a product of socio-material circumstances’ (Foote and Verhoeven 2019, 83). The determination of external conditions and the deliberate leaving open of a result marks making as a tactical practice, a game structure rather than an expected game sequence.

According to Nijenhuis, making thus ‘questions the humanist thesis that intellectual faculties’ such as thinking, speaking and planning ‘determine our humanity and replaces them with a more physical, materialistic vision’ (Nijenhuis 2019, 136). What is meant here is a situational practice in which the maker ‘drop[s] control and go[es] along with matter’ (ibid. 129). What is decisive is the acceptance of a certain lack of clarity in the situation and its course. The mind and explicit knowledge of material properties is countered by implicit knowledge based on experience,



‘a kind of knowing-in-practice, most of which is tacit’, as Schön describes it in the preface of *The Reflective Practitioner* (Schön 1982, 8).

Learning here means trying out, repeating, failing and internalizing, instead of thinking. The emphasis on the implicit knowledge of an object in becoming makes a (exact) reproduction or even a derivation of general principles and design rules almost impossible. This is also often evident in the documentation of open source hardware projects. Although, for example, the structure of the 3D printer or the composition of the ceramics is described step by step, neither the instructions nor the mixing ratio can be transferred directly. Possibly the temperature, the reaction with the aluminum container or the type of nozzle differ. It is characteristic of maker projects that at a certain point each project takes on its own individual character and

also develops its own dynamics. The interaction of the elements/factors/variables requires a practiced weighing up of the situation. The specific knowledge that plays a role in this must be learned but remains implicit.

The results of the making practice have prototype character. They appear random and unfinished. Often, they are unique specimens that cannot be reproduced, and as artifacts they bear witness above all to a materialized process that took place in the interplay between human and non-human entities, between practitioner and situation, between organic and inorganic matter.

4) The Process by Means of Making

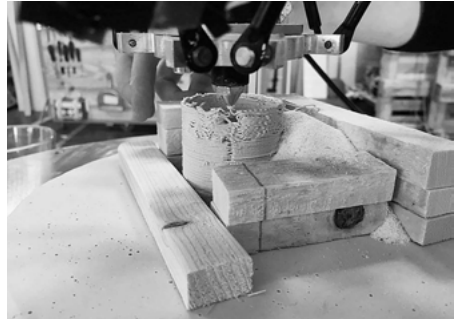
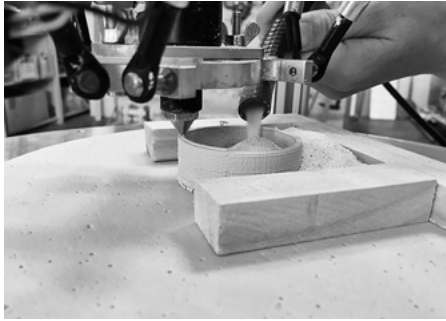
MEMO 6, Basel, 27.6.2019: *My eyes focus concentrated the arrhythmic movement of the print head. Holding a funnel in my hand to which a hose is attached, through which fine quartz sand trickles. In front of me, at the edge of the printing plate, wooden building blocks are piled up. Trying to build a scaffolding that prevents the fragile, constantly growing ceramic sausage from falling into the empty space. The unpredictable movements around which I dance make me a slave to the process.*

The final setup of my investigation was not predictable at the beginning. It is the result of an open-ended, reflexive process of iteration and speculation. The conversation with the material has produced other consequences than initially intended. The tools are improvised according to the situation; therefore, everyday objects become alienated. I no longer see myself as the leader of the process; my actions are now primarily dependent on external factors. It is more a reacting, testing and exploring.

The making of rational decisions, which is one of the basic techniques in design, becomes a 'transitioning' in the domain of making, an interaction between the 'analytical mind and the gut feeling' (Cole and Wilson 2019, 111).

In Schön's observation of the reflective practice, the interplay of thinking and making proceeds in 'continuously iterative loops of perception and proprioception, activation and reactivating, immersion and reflection' (Allen et al. 2019, 56). Especially in making, perception and reaction, penetration and distancing are particularly pronounced dynamics. Here, the result is formed as a sequence of consequences that was not explicitly intended (Schön 1982, 79). Negotiating the dynamics is an affective activity between human and material. The decisions are made close to the material.

Here again it becomes clear that the handling of physical matter, in the form of processing materials and tools, is of particular importance in the making process. Thus, the understanding of collaboration is also expanded here. It is not only the collaboration between several people, but also between organic and inorganic entities and between the human being and the situation. A shift in meaning takes place in which the human being is no longer the sole decision-maker.



Makers do not distinguish between whether the impulse comes from the material, the external circumstances or from the person herself. All entities are equal actors who influence the design and development process.

In order to take a more differentiated look at the mutual structure of maker and situation, it is interesting to look at the making process from a posthuman perspective. There the world is thought of as a material assemblage of technologies and natures, which are part of society in the same way as human beings (Foote and Verhoeven 2019, 76). The ability to affect or to be affected, that is, to be an active part of a process, is not reserved for humans. The material has a very stubborn 'non-human vitality', which in turn influences the process in unforeseen ways (Foote and Verhoeven 2019, 76).

What is decisive for the understanding of designing processes is that here the metaphysical separation of human being, technology and nature is abolished and is instead thought of together as one material world. Rather, Simondon distinguishes between form and matter, which are in a mutual becoming and thus form the artifact (Simondon 2013).

Instead of a planned design process in the humanistic sense, in posthuman thinking an object takes shape 'through an iterative modulation of material forces' (Roberts 2003). The creative design is thus a negotiation between the imagined form and the forces (or vitality) of the matter, which mutually approach each other. In my own experiment, this dynamic is demonstrated by the fact that my imaginary shape of a cup – as an abstract, geometric object consisting of a cylinder and an elliptical handle – gradually forms, together with the material of plastic filament, 3D printer and various software, into what is at the end on the printing plate: a plastic object with a rough surface and supporting structure.

In between, I had made adjustments in order to adapt the emerging artifact as close as possible to my imagined shape. In this first part of my investigation, a designerly way of thinking is still evident. Later, in the second part of the investigation, this principle is reversed.

In making, the becoming of an artifact is an expression of a material thinking. It is not defined from the very beginning, but is only created in the making. Its shape 'captures the kinds of material mutations expressive of a particular technological moment' (Roberts 2017). The appearance of the becoming object is therefore also in constant change. The second half of my investigation produces various variations of objects, all of which are moments in an ongoing process. With the ceramic printer, the objective shifts from 'creating a 3D-printed replica of a virtual model' to 'finding a way to co-work with a self-built ceramic printer'. The results that testify to the process are surreal structures made of ceramic, sand and wooden blocks.

The idea of a reciprocal exchange between the human being, technological processes and the forces of nature is also crucial for Schön. The practitioner finds herself in a 'web of moves' in which the reflective 'conversation with the materials of a situation' (Schön 1982, 78) as kind of a 'situation's back talk' (ibid. 269) opens up new possibilities for the practitioner.

In order to recognize such possibilities and to speculate about different futures, design anthropologist Tim Ingold speaks of an ability to imagine being needed here. For him, however, this does not mean 'to capture up images' or to imagine the geometric projection of a 'mental image', but to understand the perception 'of a world in becoming' as a trace of what is coming into being (Gatt and Ingold 2013, 145).

The world that is about to become is an interwoven fabric of factors, influences and consequences. Makers, professions, bodies of knowledge, institutions, online platforms, databases and digital technologies form an unstable situation of complexity and uncertainty.

The shift from a predictable, linear design process to a messy negotiation of different actors with an open outcome constructs an alternative reality. Open source design groups such as Open Structures, Unfold, and the Additivist Cookbook describe in their manifestos that 'the surreal aesthetics of 3D printing' mark a cultural shift away from the illusion of the twenty-first century, where clarity and uniformity are the guiding principles; the messiness and unpredictability of making leads back to individuality and personal meaning (Bandoni 2016, 219; Allahyari and Rourke 2017).

Conclusion – Knowing the Answer

During my observations I became increasingly absorbed in the making, immersed in my activities and the surroundings. Although I have reflected on my own activities until the end, I have hardly reflected on the situation itself. Here, Schön's observation comes true. The practitioner 'reflects very little on his own reflection-in-action', therefore it is also easy 'to miss the fundamental structure of inquiry which



underlies his virtuoso performance' (Schön 1982, 104). As a practitioner I can hardly reconstruct how one thing led to another. It is only in retrospect, in the reflection of my own role as an observer, that I notice the mental change I myself have undergone: from a planned intention, a design thinking, to a situational reacting, a material thinking. I am immersed in a maker's world in which testing, experiencing, reacting, rejecting is a collective act of planned improvisation.

What became clear in the course of my observation is a shift in meaning in the relation between making and designing. My initial assumption that making could be a distinct practice that complements the practice of designing – similarly as it also brings things into the world, but dissimilarly as it pursues different paths and intentions – was relativized in the course of the discussion.

Making stands, especially in the Western world, for a counter-reaction to industrialization, for individualization and do-it-yourself, for socio-political participation and empowerment. Thus, it occupies a niche in design culture that has its earliest roots in the arts and crafts movement but most of all refers to DIY and the open source movement. Making, as a specific domain of design culture, may be seen therefore as rather a symptom of a design in transition.

The increasing attention for the making indicates a shift in design culture from a professional expertise to a 'more diverse and inclusive field'. By this the British design historian Alice Rawsthorn means the domains of 'gender, geography and ethnicity', which are increasingly attracting attention in current design discourses and opening up the design profession to people, 'who did not train to be designers, yet are eager to engage with design' (Rawsthorn 2018, 9).

Rawsthorn does not regard design as a formative craft, but as an attitude. Design has always been an expression of a certain time and context. The elementary role of design is therefore to be 'an agent of change, that interprets shifts of any type' (ibid. 8).

In a similar way, the Colombian design theorist Arturo Escobar describes how design is undergoing a change towards a participatory, environmentally-aware, human-centered and socially-oriented design. According to Escobar, it thus marks a cultural shift from 'the hegemony of modernity's one world' to a 'pluriverse of sociocultural configurations' (Escobar 2017, 4).

This shift is particularly evident in making. Making as a fuzzy, open-ended practice stands for a 'reimagining and reconstructing of local worlds' (ibid. 4). As a reaction to the global challenges of modernity, making is one of many possible directions that a 'design in change' marks. Escobar collects them under the notion of 'transition design'. Transition design counteracts 'modernity's proclivity to de-contextualized speed, efficiency, mobility, and automation' (ibid. 35) to re-contextualize its potential to a 'more powerful force in society by acting as an efficient and ingenious agent of change, free from commercial constraints', to answer with Rawsthorn's words (Rawsthorn 2018, 9).

The manifold approaches of transition design stand for a liberation from the hegemonic power relations of modernity, for a social empowerment of marginalized groups and a pronounced ecological awareness. Each approach creates its own possible futures.

Making, as one approach of a transition design, pursues a very specific, one could say narrow, idea of how an ideal coexistence works and how to deal with the world at best. Instead of asking how we want to live in a 'pluriversal world of many centers' (Escobar 2017, 70), making pretends to already know the answer: decentralization, democratization, peer-to-peer production by prosumers, share global – produce local, open- and co-everything.

As the maverick of design culture, making lives through its demarcation from professional design. By trying to deconstruct its key concepts, making reacts to a designed modernity and seeks to liberate through the absence of design. The scale shifts from product to process, from strategic to tactical, from human to posthuman and from goal-setting to self-organization, emergence and self-awareness.

The triviality of the crappy objects that result from most of the maker processes illustrates that making is more about a collective experience in which existing values and habits are rejected. It is not intended to produce highly complex, mass-produced consumer goods that create dependencies on markets. The strict attitude based on rejection is reflected in the appearance of the objects. The results may seem unfinished in their emphasized amateurism, but would the community even accept anything else?

Acknowledgments

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References

- Allen, James et al. (2019). 'Unmaking: Against General Applicability.' In *The Critical Makers Reader*, edited by Loes Bogers and Letizia Chiappini, 47–60. Amsterdam: Institute of Network Cultures.
- Allahyari, Moureshin and Daniel Rourke, ed. (2017). *The 3D Additivist Cookbook*. Amsterdam: Institute of Network Cultures.
- Anderson, Leon (2006). 'Analytic Autoethnography.' *Journal of Contemporary Ethnography*, 35–4: 373–395.
- Bandoni, Andreas (2016). 'The Digital Age Reaches the Fringes – A Public Fab Lab in Brazil and Its (Possible) Implications for Design.' In *The Responsible Object – A History of Design Ideology for the Future*, edited by Marjanne van Helvert, 209–226. Amsterdam: Valiz.
- Braybrooke, Kat and Tim Jordan (2017). 'Genealogy, Culture and Technomyth.' *Making and Hacking, Digital Digital Culture & Society: 3-1*. Bielefeld: Transcript.
- Cole, David and Hannah Perner-Wilson (2019). 'Getting Lost and Unlearning Certainty: Material Encounters in an Electronic Craft Practice.' In *The Critical Makers Reader*, edited by Loes Bogers and Letizia Chiappini, 107–126. Amsterdam: Institute of Network Cultures.
- Escobar, Arturo (2017). *Designs for the pluriverse – Radical interdependence, autonomy, and the making of worlds*. Durham, NC: Duke University Press.
- Foote, Gareth and Eva Verhoeven (2019). 'Tactics for a More-Than-Human Maker Culture.' In *The Critical Makers Reader*, edited by Loes Bogers and Letizia Chiappini, 72–85. Amsterdam: Institute of Network Cultures.
- Gatt, Caroline and Timothy Ingold (2013). 'From description to correspondence.' In *Design Anthropology*, edited by Wendy Gunn, Ton Otto, Rachel Charlotte Smith, 139–158. London: Bloomsbury Academic.
- Gershenfeld, Neil (1998). 'How to Make Almost Anything – The Digital Fabrication Revolution.' *Foreign Affairs*, Vol 91–6: 43–57.
- Nijenhuis, Wim (2019). 'Making (Things) as Ethical Practice.' In *The Critical Makers Reader*, edited by Loes Bogers and Letizia Chiappini, 127–139. Amsterdam: Institute of Network Cultures.
- Rawsthorn, Alice (2018). 'Design as an Attitude.' In *Documents Series*, no. 28, edited by Clément Dirié. Zurich: JRP Ringier Kunstverlag.
- Reckwitz, Andreas (2003). 'Basic Elements of a Theory of Social Practices.' *Zeitschrift für Soziologie*, 32–4: 282–301.
- Roberts, Tom (2017). 'Thinking technology for the Anthropocene – encountering 3D printing through the philosophy of Gilbert Simondon.' *Cultural Geographies Sage Journals* 1–16.
- Schön, Donald A. (1982). *The Reflective Practitioner – How professionals think in action*. New York: Basic Books.
- Simondon, Gilbert (2013). 'Technical Mentality.' In *Gilbert Simondon – Being and Technology*, edited by Arne De Boever, Alex Murray, Jon Roffe, Ashley Woodward, 1–19. Edinburgh: Edinburgh University Press.

PARTICIPATORY ANIMATION WITH YOUNG PEOPLE: AN INTERDISCIPLINARY APPROACH TO ENGAGEMENT

Marianne McAra

This approach was employed in a Participatory Action Research project as part of my doctoral fieldwork, where I collaborated with a group of fifteen young people over the course of two years to explore and unpack their ambitions, motivations and expectations for their future post-compulsory education. Through a series of experimental participatory animation workshops, the young people explored and expressed their emotional experiences of education through abstract and conceptual imagery, narrating their films with song lyrics. Through this approach I was able to gain a deep, experiential understanding of the young peoples' complex social context, the external factors that affect their lives and their engagement with education. The methodological insights presented in this chapter surrounding collaboration and creative capacity-building have value for design practitioners and researchers working in the areas of youth engagement and education, and who are seeking to expand practice through developing new and experimental approaches. I theoretically position this approach by drawing on the practice and visual epistemology of the video artist Stan Brakhage, alongside the perspectives of Estelle Barret, John Dewey, and Jean Lave and Etienne Wenger.

Introduction

In this chapter I present and critically reflect upon an innovative and interdisciplinary approach to creatively engaging with young people, which blended the methodological tenets of Participatory Video and the visual techniques of Direct Animation. As a Participatory Design practitioner, the focus of my research centers on youth engagement and creative education, with an interest in prototyping new and experimental approaches that can enhance and empower young peoples' participation in research on issues that affect their lives and matter to them. My research practice is reflexive in nature and is positioned within a participatory paradigm. During my doctoral studies (McAra 2017), I developed and prototyped this approach as a way to creatively engage with young people so as to learn about their lived experiences surrounding their local social and educational practices and sense of agency.

During the fieldwork, I collaborated with a group of fifteen young people, aged fourteen and fifteen, over the course of two years to explore and unpack their ambitions, motivations and expectations for their future post-compulsory education. At the time of the project, the young people were participating in a Prince's Trust class, which provides an alternative means of gaining an educational qualification – with an emphasis on teamwork, leadership, and building confidence and self-esteem. Through a series of experimental participatory animation workshops, the young people explored and expressed their emotional experiences of education through abstract and conceptual imagery, narrating their films with song lyrics.

In the following sections, I will set out how I constructed the approach by introducing Participatory Video and Direct Animation. I position its interdisciplinarity by drawing on the practice and visual epistemology of video artist Stan Brakhage, and the theoretical perspectives of Estelle Barret, John Dewy, and Jean Lave and Etienne Wenger. I will then present the case study of the approach in action, and through discussion unpack its methodological contribution. I conclude by identifying areas for future research and outline the value of this approach for design practitioners and researchers working in the areas of youth engagement and education.

Designing an Interdisciplinary Approach: Participatory Video

The method of Participatory Video, as developed and implemented traditionally by Social Science researchers, was a key methodological interest in my doctoral studies. The method engages participants collaboratively to explore a topic through the co-production of a film that can be used as a device to inform and influence a range of audiences, particularly in the context for advocating for social and political justice, action and change (Singh et al. 2017; Blazek and Hraňová 2012; Milne 2016; Shaw 2012). This method has been championed by numerous studies that highlight its ability to empower participants and imbue a sense of agency by inciting debate and promoting awareness (Lomax 2011; Milne, Mitchell and De Lange 2012; Shaw 2012; Yang 2013). Indeed, Participatory Video facilitators Chris Lunch and Nick Lunch describe the method as a 'tool for positive social change [...] a process that encourages individuals and communities to take control of their destinies' (2006: 4). Whilst many diverse prescriptions of the method exist (High et al. 2012; Milne 2016), a key tenet is the collaborative practice where, to varying degrees, participants govern the video content, story-telling or reporting, and the making process. The tangible output of the video results from a process that can be equally as valuable and transformative for the participants themselves, providing opportunities for creative capability-building by acquiring new technical skills and developing self and group efficacy through working collaboratively as a team (see for example McAra 2017; Lunch and Lunch 2006; Yang 2013).

The Participatory Video method has been adopted in a wide range of research contexts, such as Youth Studies, Educational Studies, Tourism Studies, and participatory and human-centered design projects. Canosa, Wilson and Graham (2017) evidence the impact of Participatory Video in the context of understanding young peoples' sense of identity and experience of growing up and living in tourist destination areas. After the young people were recruited as co-researchers, through the collaborative video-making process they constructed and shared their own narratives surrounding the tensions of transient tourism in their communities. Sharing their concerns about the environmental issues resulting from tourism in their local area through public screenings was an empowering form of consciousness-raising, where the young people felt that their voices were listened to and their perspectives legitimized by their wider community. In this example, the use of the Participatory Video method provided the authors with a youth-centered approach and mode of creative engagement that amplified the voices of young people on a topic in Tourism Research that has been historically regarded as adult-centric in nature (ibid. 895).

The transformative ethos of upskilling and empowering participants to engage and take action and ownership over a research process, which critically challenges dominate voices, echoes the underpinning principles of participatory practice in this project. In the case of my doctoral fieldwork, however, and in response to ethical challenges surrounding anonymity due to the participants' age and degrees of vulnerability, I explored and experimented with alternative visual techniques as a way to innovate the Participatory Video method. As will be described in the following section, Direct Animation provided a novel and experimental filmmaking technique, which I argue fostered a deeper connection to the making process, as it encouraged conceptual thinking and a form of visual, emotive storytelling that relied on the use of metaphor.

Direct Animation and Experiential Knowledge

Direct Animation is a film-making technique whereby illustrations and mark-making are applied directly onto the surface of celluloid film, which is then projected through a reel-to-reel projector (see Figure 1) at approximately 24 frames per second. For this, materials and tools are used directly on the celluloid, such as marker pens, inks, bleach, nail varnish, dental tools for etching, stamps, and stitching by hand or by machine. This technique affords the creation of highly abstract and metaphorical imagery, where the maker can use shapes, colors and textures conceptually to tell a story (for example, see *Sea Song* by Richard Reeves 1999; *Firehouse* by Bärbel Neubauer 1999; *Free Radicals* by Len Lye 1958).

Furthermore, and as commonly utilized by the visual artist Stan Brakhage (1933–2003), everyday objects can also be physically imposed onto the film. An



1 An Eiki Elf 16mm reel-to-reel projector.
Photograph. Source: Author

example of Brakhage's work in this style was the film *Mothlight* (1963). Here the filmmaker sought to convey a moth's visual experience through physically attaching found objects onto clear film. These included collected moth and other insect wings, and pieces of foliage such as flower petals, weeds, leaves and grass. When projected, the fleeting visual depictions transmit a sensory and visceral experience, embodying the physical quality and metaphorical essence of a moth as envisioned by Brakhage (Camper 2003; McAra 2017). Evident in this example is a visual epistemology, described as 'moving visual thinking' (Ganguly 2017), which can be seen to underpin the artist's practice. For Brakhage, a central theme was exploring optical experiences (particularly that of light) and the subjective experience of seeing – described by the artist himself as the 'adventure of perception' (Brakhage 1963; Ganguly 2017, 146; McPherson 2001, 12).

For the approach prototyped in my doctoral fieldwork, and drawing methodologically on Participatory Video and Brakhage's filmmaking techniques and visual epistemology, Direct Animation presented an alternative filmmaking process that would encourage conceptual and metaphorical thinking, bringing form to emotive and tacit knowledge, and embody narratives experientially. Unpacking this further, I draw on Estelle Barrett's theory of experiential knowledge (2007), which is described as 'sense activity' through which one's 'esthetic experience' (citing Shusterman 2012) can be elucidated. Within this, and drawing on the connection between embodied knowledge and artistic practice as outlined by John Dewey (1934), Barratt explains that:

[...] knowledge produced through aesthetic experience is always contextual and situated [...] it is derived from an impulse to handle materials and to think and feel through their handling [...] aesthetic experience plays a vital role in human discovery and the production of new knowledge. (Barratt 2007: 2–3)

The notion of esthetic experience can be viewed as quintessential to the experience of Direct Animation, as evidenced through Brakhage's practice. As a dialogical transaction between the self and the making process, tacit knowledge can be elicited from the maker, which is imbued into, and subsequently embodied by, film. The film becomes a carrier of the maker's knowledge, which can then be experienced and interpreted by a viewer. This echoes Dewey's notion of the *expressive object* (1934), which can draw out, as described by Michael Biggs (2007), an *esthetic response*, where a viewer can also ascribe their own subjective meaning. As such, the film can be described as performing as a *boundary object* (Star and Griesemer 1989; Star 2010).

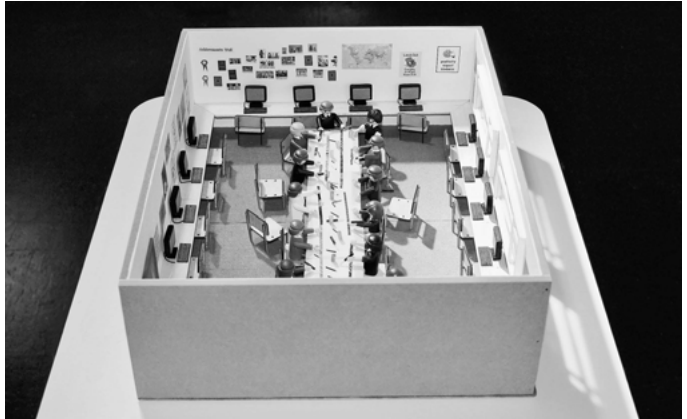
To summarize, and returning to the context of my doctoral study, my aim was to innovative and prototype a form of Participatory Video that could support young people to engage in a reflective dialog about their lives, and through the approach, creatively represent this as 'experiential content' (Biggs 2007, 6) in their films. Direct Animation presented an alternative visual making-process that could inspire conceptual and abstract thinking, where the young peoples' knowledge, experiences and ideas could become embodied in their films – akin to Brakhage's practice. As will be described in the next section, practically, this involved the creation of multi-sensory and expressive moving images, which, theoretically, generated experiential knowledge through a visual epistemology. Positioned in a participatory paradigm, the approach was also facilitated around collaboration and socially constructing a *community of practice* (Lave and Wenger 2001; Wenger 1998) with the participants in the research.

Fieldwork Case Study

The fieldwork took place over a two-year period, where I collaborated with a group of fifteen young people over five phases of engagement. This included a period of classroom observation, participatory workshops, group interviews, an activity-based focus group and evaluation events. For ethical reasons, I was unable to photograph or film in the field. This led me to recording the fieldwork through in-depth field notes and documenting participation through reflecting and recreating critical moments using PlayMobil® figures in a model box of the classroom context I constructed, as shown in Figures 2 and 3 (see McAra 2017 and 2019 for more detail).

The participatory animation workshops took place over six months, and were facilitated as two-hour weekly interventions with the young people in the classroom. During this time, the group were introduced to a range of Direct Animation techniques, and created a series of collaborative experimental films (see Figure 4). During the earlier workshops, the classroom teacher approached the group to suggest entering a film into a city-wide school film-making competition; a serendip-

2 Classroom Model Box.
Photograph. Source:
Author



3 Classroom Model Box 2.
Photograph. Source:
Author



itous opportunity that, in fact, provided an anchor for the remainder of the workshops. The competition brief required us to produce a one-minute film about a government sector of our choosing. The participants chose to focus their film on their emotional experiences at different stages of education. Throughout this time, the group had many, quite sophisticated, conversations surrounding the emotive and symbolic connotations of color, giving meaning to these as well as exploring and collating lyrics from contemporary music. The participants drew up mood boards, music play lists, and a timeline tracking the different developmental and transitioning phases of education – from nursery up to high school. So to translate their journeys into color, the group co-defined a classification system to codify their illustrations, which included associating the color white with innocence, yellow



4 Examples of the Young Peoples' Film Illustrations. Photograph. Source: Author

with happiness, red with anger, pink with love and romance, black with sadness, purple with power and ambition, green with growth, orange with enthusiasm, and blue with wisdom.

Upon viewing, on numerous occasions in an earlier phase of observation, how this group was socially and authoritatively governed in this class, I sought ways of encouraging the participants' sense of autonomy and agency. I would arrive early to each workshop to physically adjust the space before the young people arrived – re-arranging the desks and chairs into clusters or as one large bank for everyone to sit around (see Figures 5 and 6). After informally demonstrating techniques to the pupils at the beginning of each session, I intentionally left all the materials out on one desk for the participants to then self-select what they wanted to experiment with, so as to encourage their independent creative decision-making. At times there was a great deal of energy in the classroom as the pupils moved around the space. As the workshops continued in the process of co-creating their competition film entry, the participants began to self-assign roles for themselves. This included a director, assistant director, producers, music editors, and artists.

Early on in the workshops, insights began to emerge surrounding challenges and social tensions in creative collaboration. Whilst the approach required the young people to work together, individuals also sought out opportunities to participate either autonomously on their own or within friendship-based sub-teams. It was during the evaluation phase of the research that the participants recognized this reflected upon the fragility of sustaining affable collaboration (all names have been changed to pseudonyms):

5 *Participatory Animation Workshop – collaborating as one group.* Photograph.
Source: Author



6 *Participatory Animation – working in small groups.* Photograph.
Source: Author



Hailey: There was a lot of like ... tense moments where a lot of people got into arguments at times ... just to do with making the films or whatever because obviously me and Meghan came up with the idea for the emotional phases and everything ... and we were try'na organize it into colors and all this and then other people weren't listening so there was just a lot of tension happening at that time.

Researcher: So was working in sub groups could actually be quite difficult?

Hailey: Yeah ... because obviously we had organized it all and then try'na get them who were making the films to like listen to what we were saying... and at times it wasn't ...

Researcher: ... do you prefer working as a team or working individually?

-
- Dan: As a team ... with certain individuals.
- Hailey: Yeah ... I think that's just worked a lot better for us, like working with the people we were comfortable working with rather than... cause a lot of people clashed.
- Researcher: Uh huh. So be able to work with your friendships then?
- Hailey: Yeah ...

As the project progressed, the young people did begin to demonstrate skills in managing group cohesion, where tensions and conflicts were channeled through the creative activity as opposed to personally at each other. However, within this sense of capacity-building in collaboration, and as the young people developed their animation skills, I was often confronted with defensive disclaimers about an apparent lack of artistic ability. In such instances, I found myself reflecting upon the possible motivations for this self-devaluation. Often participants would permit their own creativity through self-disparagement. Such downgrading appeared to be instinctually adopted to disguise insecurity and low self-esteem, a disparaging strategy that seemed to be entrenched within the general culture of this classroom. Ironically though, it was this same self-deprecation, for example describing their work as child-like, that seemed to then permit the participants to become more fully involved, expressive, and explorative, whilst safeguarding against critique. However, reflecting on their participation in the workshops during an evaluation phase later on in the research, the participants alluded to a shift in appreciating their own capabilities and achievements, reflexively acknowledging a renewed sense of self-capacity:

- Hailey: It was fun ... like getting to make the film yourself and then seeing it all come together stage by stage.
- Dan: It was good ... it was something most of us haven't done before... So it was ... a new experience ...
- Steven: [...] It's just surreal looking back on it now and looking at what we did. Cause like beforehand I don't think we could have created anything like this ... I mean at the start we started like mucking about with the film but then when we actually got down to it, we did create something good.

Once the competition entry was finished, the participants organized a film screening, where we transformed their classroom into a cinema (see Figures 7 and 8) and invited other teachers and pupils to attend. Shortly after the classroom screening, we discovered we had been short-listed for the inter-school competition, which required the class to attend the local iMax cinema for the awards ceremony, where all the entries were showcased on the big screen. One of seventy-one entries, the participants' film was awarded joint second place.

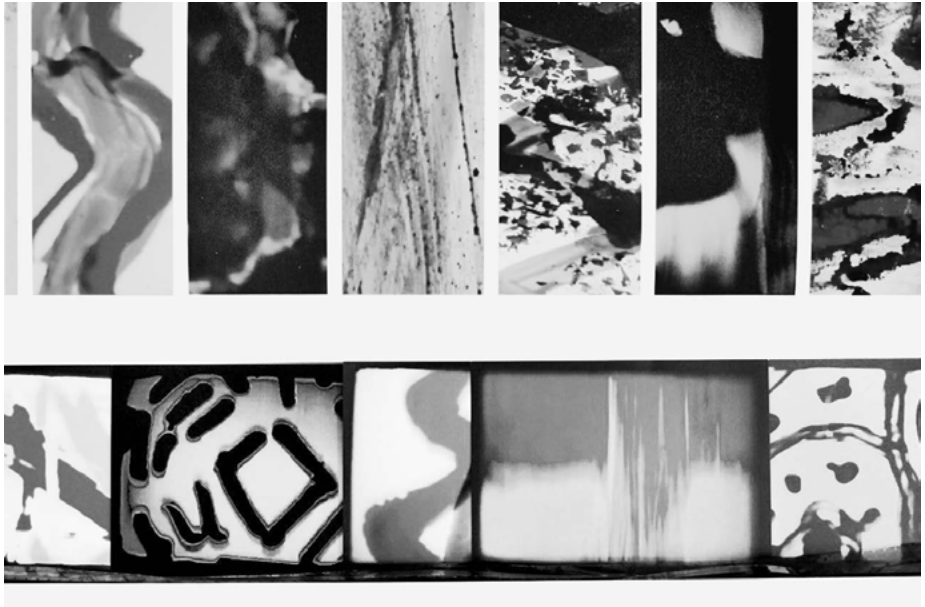
7 Rearranging the classroom into a cinema for the film screening. Photograph. Source: Author



8 Teachers and peers invited to the film screening. Photograph. Source: Author



In their final film, the participants narrated each stage of their educational journeys by selecting specific song lyrics. Viewing their film (see Figure 9) through the lens of the participants' color coding, it appears that they associate their young years with happiness and a degree of innocence. What is then experienced is a sense of trepidation, as they transitioned through the stages of education. Later on, nuances of peer inclusion, rebellion, and dealing with insecurities were depicted, narratives that were also translated through the music. Throughout, the theme of growth, signified by the color green, is repeatedly featured, with the film concluding with the profoundly optimistic written caption on a green background: 'That was the past. Let's look to the future'.



9 Stills from the *Young Peoples' Competition* film entry. Photograph. Source: Author

Reflecting on the outcomes of the workshops and the content of their final film, the participants agreed that the abstract nature of the medium supported multiple, intersubjective interpretations. Whilst the film focused on the participants' collective emotional experiences of education, the participants explained that their film could have the potential to resonate with diverse audiences, suggesting it had an ability to communicate the participants' message as well as becoming a bespoke (custom or personal) experience for the viewer:

Hailey: Aye, like anyone can relate to it ... everyone's gone through school, everyone's either going through it, been through it, about to go through school and ... because of how abstract it is ... everyone can interpret it differently ... you can't like just say aw, it's just for 13- to 15-year olds ... you can be like well anyone can look at it and interpret it differently cause like even people in this class could interpret it differently. Obviously we know the things behind it but if you showed it to like an assembly full of people ... you could have like so many like different views on it and so many different people taking different things from it ...

Joe: ... like different people can trigger like different primary school memories or like even just looking at it, you can interpret it differently.

To summarize the key findings from the fieldwork, insights emerged surrounding the challenges and tensions of collaboration incited by the participatory animation approach; the ways in which the process fostered creative capacity-building; and the intersubjective nature of the final workshop outcomes. In the following section, I unpack these insights further through discussion and situate the value of this participatory animation approach by returning to the method of Participatory Video, Brakhage's visual epistemology, and the theoretical positions of Barrate, Dewy, and Lave and Wenger.

Discussion

With the aim of cultivating a safe space and conduit through which the participants could explore and narrate their experiences, emotions and stories, the participatory animation approach encouraged the participants to be explorative and experimental, collectively deciding upon the music, color, shapes, and textures to include to tell the narrative of their collective emotional experiences of education. As the abstract nature of the medium did not demand strict drawing ability, even those who believed that they lacked artistic skills were less apprehensive than they might otherwise have been. The medium enabled the participants to quickly learn the various direct animation techniques and gradually grow in confidence with these. Choosing to base their collaborative film on their emotional experiences of education, towards the end of the workshops the young people had become fluent in a collaboratively constructed visual language based on the connotations of color used to codify their film. This visual language placed the participants in control of what, and the degree to which, they wished to disclose their experiences and knowledge, and the abstract nature also assured the participants of their anonymity (which had been raised as a central concern, evident in their reluctance to be filmed or photographed).

It could be argued that it was the inherently experimental nature of the approach that contributed to fostering creative capacity-building. The participants appeared to reflectively interacted with and through the process of direct animation, working within the connotations of their illustrations, as opposed to what had literally been drawn. In the making of these films, the mark-making was a mode of self-expression rather than of representation. The young people visually depicted their emotions, expressed in and through the mark-making, echoing Brakhage's sensory visual epistemology. Returning to Barrett's notion of esthetic experience (2007), for the maker (in this case, the young people) the use of metaphor and symbolism

meant that their films became the output of a process of dialogical interaction between themselves and their illustrations. Furthermore, the use of direct animation techniques often resulted in meaningful moments of dialog between the participants and myself as the researcher, revealing how it lends itself as a creative conduit for conversation. However, creative self-sabotage was apparent on numerous occasions within the group. It seemed that acts of self-sabotage were instigated by the young people as a means to disguise their insecurities and as an attempt to manage my expectations of their abilities, which continuously occurred prior to and on completion of the creative activities. These instances of feeling insecure became less apparent during the film screenings, where the participants were transformed in the sense that they appeared to outwardly embrace and celebrate their achievements, notably in front of their peers and other teachers.

Reflecting on the efficacy of the participatory animation approach to facilitate collaboration – a key tenet of the Participatory Video method – the young people self-managed collaboration through the analogy of a production team, where they appointed distinct roles and responsibilities. As the group became increasingly mobilized to individually contribute to a collective goal, over the duration of the workshops a community of practice (Lave and Wenger 2001; Wenger 1998) was gradually formed. This instilled group camaraderie, as well as a sense of authorship over their own individual contributions. Supporting the development of an automatus learning environment, this appeared to heighten the participants' own enchantment with the project as they progressively transitioned from the role of participants to taking on the role of pro-active co-researchers. Seeking recognition and ownership through being solely responsible for individual tasks outwardly enabled the participants to contribute to an overall collaborative production process, whilst inwardly still maintaining a sense of individual agency in the project. This relational dimension in creative collaboration in the context of film-making with young people, suggests supporting participants to collaborate as a collective in parallel to supporting their independent participation.

Whilst the aim underpinning the Participatory Video method is to co-create a film to be used as a device to advocate for change, in this case the experimental nature of the film-making process, which was highly expressive, narrated by music, provided deeper layers of interpretation. A key dimension of the participants' film entry was its Boundary Object quality (Star and Griesemer 1989; Star 2010), where the young people described how it could be experienced and interpreted by multiple audiences. Whilst inscribing their own meaning and definitions onto the film through the participants' visual color language, the abstract nature of the direct animation medium supported intersubjective meaning-making. This particular aspect of the approach could have value for practitioners seeking the participation of young people in future Participatory Video research, as it supported not only creative capacity-building and collaboration, but also caused the young people to reflect upon and translate their emotional experiences in and through visual meta-

phor. In future research, practitioners may wish to adapt the method by drawing on the techniques of other video artists. I suggest exploring the possibilities of illustrating and manipulating recycled pieces of already filmed celluloid, such as old movies, cartoons, and adverts – akin to the style of Stan VanDerBeek, for example. Through collaging a sociocultural commentary, the notion of satire could be explored with young people, offering an alternate means by which to develop their sense of criticality.

Conclusion

To conclude, it was the creative process underpinning this blended approach, as well as the final outputs themselves, that enabled me to learn about the young people's localized social and educational practices, where I was able to gain a more comprehensive and meaningful appreciation of the complexity that surrounds their lives. Taking part in this study provided the group of young people with opportunities to collaborate creatively together whilst also maintaining and supporting their own sense of autonomous agency. The challenge, I believe, for practitioners and researchers, is to create interventions that can sustain authentic moments of mobilisation such as these, with young people when seeking their participation in research. The doctoral research underpinning this chapter (see McAra 2017) provides a candid case study of the approach action. The methodological insights presented surrounding creative capacity-building, collaboration and visual language can inform the method of Participatory Video and have value for design practitioners and researchers working in the area of creative youth engagement and education, and who are seeking new approaches to eliciting and capturing experiential knowledge as a means of constructing meaningful and authentic understandings of the more tacit and emotional dimension of personal experience.

References

- Barrett, E. (2007). 'Experiential Learning in Practice as Research: Context, Method, Knowledge.' *Journal of Visual Art Practice*, Vol: 6.2: 115–124.
- Biggs, M. (2007). *Modeling Experiential Knowledge for Research, The Art of Research: Research Practices in Art and Design*. Helsinki: University of Art and Design (Uiah).
- Blazek, M. and P. Hraňová (2012). 'Emerging Relationships and Diverse Motivations and Benefits in Participatory Video with Young People.' *Children's Geographies*, Vol: 10.2: 151–168.
- Brakhage, S. (1963). *Metaphors on Vision*. Film Culture.
- Camper, F. (2003). 'Stan Brakhage: A Brief Introduction.' Accessed March 30, 2018. <http://www.fredcamper.com/Film/Brakhage4.html>
- Canosa, A., E. Wilson and A. Graham (2017). 'Empowering Young People through Participatory Film: A Post-methodological Approach.' *Current Issues in Tourism* 20 (8): 894–907.

-
- Dewey, J. (1934). *Art as Experience* (2005 edition). New York: The Berkley Publishing Group, Penguin.
- Ganguly, S. ed. (2017). *Stan Brakhage: Interviews*. University Press of Mississippi.
- High, C., N. Singh, L. Petheram and G. Nemes (2012). 'Defining Participatory Video from Practice.' In *Handbook of Participatory Video*, edited by Milne, E. J., Mitchel, C. and De Lange, N.. Plymouth: AltraMira Press.
- Lave, J. and E. Wenger (2001). 'Legitimate Peripheral Participation in Communities of Practice.' *Supporting lifelong learning*. 121–136. Routledge.
- Lunch, N. and C. Lunch (2006). 'Insights into Participatory Video; A Handbook for the Field.' *InsightShare*. Accessed November 20, 2013. <http://www.insightshare.org/resources/pv-handbook.html>.
- Lomax, H., J. Fink, N. Singh and C. High (2011). 'The Politics of Performance: methodological challenges of researching children's experiences of childhood through the lens of participatory video.' *International Journal of Social Research Methodology*, Vol 14: 3: 231–243.
- McAra, M. (2019). 'Modelling Experiential Knowledge Ethically: an artefact-based approach to visually documenting a participatory design process with young people.' *International Journal of Art and Design Education*, 38 (3): 583–598.
- (2017). 'Participatory design with young people: exploring the experiential, relational and contextual dimensions of participation.' PhD thesis, The Glasgow School of Art.
- McPherson, B.R. (2001). *Essential Brakhage*. New York: McPherson and Company.
- Milne, E.J. (2016). 'Critiquing Participatory Video: experiences from around the world.' *Area*, 48(4): 401–404.
- Milne, E.J., C. Mitchell and N. De Lange (2012). *Handbook of Participatory Video*. AltaMira Press.
- Shaw, J. (2012). 'Contextualising Empowerment Practice: Negotiating the Path to Becoming using Participatory Video Processes.' Diss., The London School of Economics and Political Science (LSE).
- Singh, N., C. High, A. Lane and S. Oreszczy (2017). 'Building agency through participatory video: insights from the experiences of young women participants in India.' *Gender, Technology and Development*, 21(3): 173–188.
- Star, S.L. and J.R. Griesemer (1989). 'Institutional Ecology, Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39.' *Social studies of science*, 19(3): 387–420.
- Wenger, E. (1998). *Communities of practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.
- Yang, K. (2013). 'A Reflection on a Participatory Video Project: Possibilities and Challenges for Promoting Participatory Cultures among Adult Learners.' *The Urban Review*: 1–13.

RESEARCH THROUGH DESIGN AND REFLECTION ON POETIC CURIOSITY

Kensho Miyoshi

The field of design research has now become a platform not only for the topics already established as common concerns for designers but also for new themes that have been little explored in relation to design. In the latter case, we need to devise, and to be open to, new methods and approaches rather than relying on conventional ones. The NERD – New Experimental Research in Design – has been a timely conference providing young design researchers, such as myself, with an opportunity to share their literally experimental projects. The theme of my PhD derived from my background in aerospace engineering and kinetic art. While I was experimenting with mechanical and kinetic objects prior to undertaking a PhD, a perceptual phenomenon, which later turned out to be what is called ‘kinesthetic empathy’, had caught my interest. Motivated to explore the phenomenon’s relation to, and possible benefit for, the design of everyday objects and environments, the area of design (research) has been a useful platform for dealing with the multiple elements together, such as functionality, esthetics, technology and perception. Such an interdisciplinary perspective might be less feasible in a purely technological domain. The second year of the NERD conference held in summer 2018 in Hildesheim, called NERD2GO, provided me with an excellent opportunity not only to meet with other contemporary design researchers with similar mindsets, some of whose contributions appear elsewhere in this book, but also to deepen confidence in my experimental approach to design.

The primary focus of my PhD project was on the design esthetics of the physical movement of everyday objects, such as the opening and closing of the automatic doors, the waving of curtains in a breeze, and the rotation of fan blades, and the way we might associate with them the kinesthetic sensations of our body. When we watch a dance performance, for example, we can empathically enjoy the various feelings of the movements of the dancers even while sitting quietly in our chairs. This type of empathy with movement, namely ‘kinesthetic empathy’, is not necessarily emotional or sentimental, but it happens relatively easily between a group of people. Based on my previous experience of creating, and experimenting with, various kinetic artifacts, such as quadcopters and kinetic sculptures, I attempted applying the concept of kinesthetic empathy to explore the vicarious kinesthetic sensations we experience while observing the movement of everyday objects. My project, engaging with physical objects and mechanisms, may initially appear to be an orthodox design project. However, the focus on kinesthetic empathy, a concept little explored in design, and the lack of methods and vocabulary for exploring and annotating physical movement in design, made my project inevitably highly experimental.

My PhD project is thoroughly documented in the book *Designing Objects in Motion: Exploring Kinaesthetic Empathy* (Miyoshi 2020). In this modest essay, instead of rehearsing the overview of the project, I would like to reflect on the type of curiosity that I call ‘poetic curiosity,’ which underlies my PhD dissertation, if implicitly, and also concerns experimentation in design research. The mode of research where design experimentation primarily drives the enquiry is called ‘research through design’ (Frayling 1993) or RtD, which has now been used as a name for communities and conferences (Redström 2017). In natural sciences, the researchers are expected to conduct the experiments, whether theory or experiment, in an objective manner, without reflecting their personal contexts, emotions or desires. However, in RtD, the researcher’s own reflections, emotions and imaginations could become indispensable factors rather than merely peripheral, accessory elements. Among the elements of first-person nature that concern design research, I would highlight the poetic imagery that the researchers explore through their practice and reflection. Another type of curiosity, intellectual curiosity, would allow a chemist to wonder about possible reactions that might happen between a group of chemical components. Likewise, poetic curiosity allows not only poets but also creative practitioners to explore new scenery and narratives that arise at the intersection of materials, spaces and people.

Curiosity embraces many kinds of our innate desires for knowledge, such as intellectual curiosity and poetic curiosity. Intellectual curiosity can be found in our spontaneous pursuit of factual, scientific and objective knowledge. This kind of curiosity is central to scientific observation, like the above example of the chemist, as well as the famous episode of Newton’s apple and his theory of gravity. In the Japanese language, the word ‘curiosity’ (kōkishin) is often coupled with the adjective ‘intellectual’ (chiteki). Children are encouraged to nurture their ‘intellectual curiosity’ (chiteki kōkishin), which allows them to cultivate new interests, rather than being taught passively, and eventually learn new facts or principles of the world.

While such a logical and academic interest is fundamental to the work of the natural sciences, the impetus that drove the enquiry of my PhD in Design was curiosity of a different nature – a dimension for poetic, emotional and potentially irrational contemplation. The adjective ‘poetic,’ as used here, refers to the mindset, scenery and perspective often involved in writing and reading poems, but it is not necessarily limited to the specific form of texts of poems. It is also close to Goethe’s study of nature, in which he studied botany, zoology and anatomy through his descriptive and morphological approach. The architectural historian Zeynep Çelik Alexander, quoting the physicist and physiologist Hermann von Helmholtz, differentiates between the Newtonian and Goethean approaches to research into nature and refers to them as ‘logical induction’ and ‘artistic (or esthetic) induction’ (Alexander 2018, 28). While Goethe’s artistic induction is perhaps still focused on the behavior and development of natural objects, using such an approach to human-made objects reveals new narratives around such objects and people.

The Finnish architect and phenomenologist Juhani Pallasmaa famously stated, 'The door handle is the handshake of the building. The tactile sense connects us with time and tradition: through impressions of touch we shake the hands of countless generations' (Pallasmaa 2005, 56). His statement on a door handle does not necessarily offer designers practical advice for designing door handles, such as an ergonomic perspective on determining the form of the handle or tips for the selection of the material used for the doorknob. But it allows us to realize the dimension that was always lurking behind our instant, countless yet unconscious contact with door handles. It also warns of the possible disappearing of such an encounter with poetic imagery through the decay of materials caused by the rapid introduction of artificial alternatives capable of appearing new for an unnaturally long time. Pallasmaa's contemplation on the generation of people who lived in, and visited, the building instantiates the realization that we could reach by exploring our poetic curiosity in relation to the human-made objects and environments.

Poetic curiosity seems to be useful for a wide range of professions, such as architects and scientists, to open up a new space to explore the hidden connection and narratives between objects, spaces and people. How is poetic curiosity nurtured? Is it a product of childhood education or is it supported by our literary knowledge? In what follows, I explore the origin of poetic curiosity that also underlies my previous projects by reflecting on their connection to my own childhood experiences.

Two of my previous projects partly derived from my poetic curiosity nurtured in my childhood. As a junior high school student, I used to cycle between my house (in my hometown) and the school every morning and late afternoon. Between the house and the school runs a straight river called Shukugawa river. More than a thousand trees of cherry blossoms are planted along the river, which creates over the road along the river a long tunnel of gorgeous pink in spring, lively green in summer, red and yellow in autumn and naked branches in winter. Cycling through the tunnel of the trees was an exceptional experience for me, distinct from cycling in any other places – I became aware that riding a bicycle made me experience a unique kinesthetic feeling.

When we walk, we feel the gravitational force on the feet, legs and whole body at every step. On the contrary, while cycling, especially when completely relying on the inertia without having to push the pedals, we feel our bodies moving forward without explicitly feeling the gravity-driven ups and downs, allowing us to feel as if we are moving just straight in the space and are free from the gravity. When we stand on the pedals with the hip off the saddle, the eyesight is heightened from its normal level positioned while standing on the ground. While cycling like this, I often thought that moving in the air on a flying broomstick might feel like this. Probably because this kinesthetic experience was an intense stimulus for me, I frequently saw in a dream myself flying on a bicycle, broomstick or whatever could make sense as an aerial vehicle in the fantastic world. Perhaps it was also influenced by fantasy novels and films I then enjoyed reading and watching where people fly in the air on

cars, bicycles and broomsticks. Owing to such dreams, I could envisage what kind of scenery would expand if I gradually took off with the bicycle, penetrated through the branches and floated upwards, although it was entirely in my imagination.

There was another scene in my childhood with which I associated such a three-dimensional spatial sense and the sense of escaping from gravity. In my house there was a small fish tank with golden fish or different kinds of tropical fish inside. Taking a close look at how the fish locate themselves inside an aquarium, you will notice that fish can freely choose at which height they stay or swim. In water, they can distribute flexibly in a three-dimensional way, which is difficult for us without the aid of architecture, as we are pulled down and stuck to the surface of the earth. I would often project myself onto the fish swimming freely up and down in the water, imagining what it would feel like to be flying or floating in 'our' (terrestrial) world, especially around the road along the river. Perhaps swimming around undersea ruins might allow us to move around the architecture in such an unusual way and experience such freedom from our terrestrial conditions of being rooted in the ground (governed by gravity).

The fascination with such senses of freedom from gravity and expansion into three-dimensional space still exists in me, and it has influenced the design of my past research projects. 'Above Your Hand'¹, the research project into the interaction between a human and a small autonomous drone was an obvious example. The project envisaged a world where people and aerial robots co-existed in the same space while the aerial robots made use of the empty space above humans. But the primary focus of the project was the ways humans and robots could interact and communicate harmoniously with each other, rather than pursuing how they could collaborate efficiently for practical tasks (Miyoshi et al. 2014). I developed an application in which people could interact with the drone just like playing catch – in fact, not catching it but keeping it hovering above their hands. If dominated by intellectual curiosity, I would have been interested in exploring the technical aspects of the drone's control mechanisms or its practical benefit for efficient human-robot collaboration. Instead, poetic curiosity led me to explore the gestures that would enable a friendly, not hierarchal nor utilitarian, interaction with an aerial robot just like we greet with butterflies flying around us in a garden or a forest.

My curiosity about the sense of freedom from gravity was explored in another project. Puwants² is a group of kinetic sculptures that make movement by interacting with air bubbles in water. The work was created in collaboration with Kosei Komatsu, a Japanese artist who also pursues the sense of flight and floating with his kinetic sculptures and installations. The sources of inspiration for the sculptures were the unique shapes of plants and flowers; they do not move dynamically in a physical way like animals but their shapes are dynamic enough for us to imagine some kinetic behaviors and energy around them. This imaginative way of looking at the behavior of plants led us to experiment with various mechanisms to create movement and finally reach the way to use the buoyancy of air bubbles as a trigger for

movement. The slowness of movement of the sculptures makes it appear as if they are in a different, lighter, gravitational space, like on the moon. In a room with a fish tank with Puwants sculptures moving inside, we can see two physical movements of two different kinds of gravity and viscosity – one is the movement of people and the objects in the space, such as curtains waving in the wind and doors moving in a way that is ‘natural’ to us, while the other is the movements of the sculptures, as if slightly freed from gravity and moving through a viscous atmosphere. This fusion of the two kinds of worlds of movement invites people to kinesthetically imagine the sense of floating and lightness.

The above examples of projects that allowed me to explore the poetic imagery related to the sense of floating and the awareness of aerial space eventually became a foundation for my PhD, which further investigated the esthetics of physical movement in the context of design. Like Pallasmaa’s door handle, poetic curiosity invites us to a dimension that is not explicit in our instantaneous interactions with the world but emerges through imagination, interpretation and contemplation. Goethe contrasted his approach with Newton’s and advocated artistic induction as opposed to logical induction. Pallasmaa’s acute insight into the narrative and the sensory experience around the door handle suggests a further step, to ‘poetic induction’. As research develops through design, the poetic dimension also expands and transforms through the act of designing and reflection. In such a process, practice forms poetry, which in turn triggers new practice. And an entrance to such poetic reflection may be found anywhere in our mundane objects, such as bicycles and door handles.

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- 1 Above Your Hand: <https://miyoshikensho.com/en/phe.html>
 - 2 Puwants: https://miyoshikensho.com/en/puw_n.html

References

- Alexander, Zeynep Çelik (2017). *Kinaesthetic knowing: aesthetics, epistemology, modern design*. Chicago, IL: The University of Chicago Press.
- Frayling, Christopher (1993). ‘Research in Art and Design.’ *Royal College of Art Research Papers*. 1(1): 1–5.
- Miyoshi, Kensho, Ryo Konomura and Koichi Hori (2014). ‘Above Your Hand: direct and natural interaction with aerial robot.’ *ACM SIGGRAPH 2014 Emerging Technologies*, 10–14 August 2014, Vancouver. *Association for Computing Machinery*: 8.
- Miyoshi, Kensho (2020). *Designing Objects in Motion: Exploring Kinaesthetic Empathy*. Birkhäuser: Basel.
- Pallasmaa, Juhani (2005 [1996]). *The eyes of the skin: architecture and the senses*. Chichester: Wiley.
- Redström, Johan (2017). *Making design theory*. Cambridge, MA: The MIT Press.

DESIGN BY ACT: A NEW LOOK AT DESIGN ACTIVISM AND ITS ACTORS

Maziar Rezai

Designers may be the true intellectuals of the future.
(Paola Antonelli)

The Activist-Designer as ‘Intellectual-Designer’

One of the challenges of design studies in the last decades has been the role of designers in society and the boundaries of this role. And subsequently, in recent years, this question, given the presence of designers and non-designers, which action exactly is design action and which is not.

In fact, the importance of the designer’s role became problematic during the sixties and seventies as the impact of left-wing thoughts grew and raised more questions about the nature of ‘design’ and ‘designer’. Particularly after the publication of Victor Papanek’s famous work in 1971, *Design for the Real World*, ‘Many designers wanted to save the world by their own actions – and considered themselves strongly responsible for the developments around them.’ (Valtonen 2006, 10)

Before Papanek’s book, in 1969, Herbert A. Simon argued in *The Sciences of the Artificial* that design in itself is ‘to devise courses of action aimed at changing existing situations [e.g. systems and products] into preferred ones’ (1996, 111). In Simon’s view, it can be interpreted that ‘Design’ does not exactly mean ‘Change’ and that designers are not activists themselves, but designers conceive ‘courses of action’ that may serve as blueprints for others for changing the world.

Years later, the word ‘act’ beside ‘design’ became more meaningful, including in *Design Activism: Beautiful Strangeness for a Sustainable World* by Alastair Fuad-Luke, and in the works of Ann Thorpe, who has been exploring the Activism phenomenon in recent years. Thorpe believes that Activism starts when groups within society call for change, and society responds: ‘I define activism as taking intentional action to instigate change on behalf of a neglected group’ (Thorpe 2008). Thus, design actions, from changing products and systems up to intervention in political and social happenings, gradually became a part of designers’ role. The role that is completed in design activism; where design itself, on the ontological conditions, can be a form of acting. (Keshavarz 2016)

In design activism, ‘design’ and ‘activism’ are two hands joined; but there is an important point to be noted. This river started from design and falls into

activism; therefore designers cannot be more ‘active’ than the activists. Designers should think deeply and design correctly – this correctness is not only about form and function, but also about consideration of user needs and the moral consequences of designs – and then can use the help of people or activists to implement the ideas, or vice versa, the designer’s ability to implement people’s ideas (Rezai 2021). Nonetheless, the border between ‘designer’ and ‘activist’ needs to be explained more explicitly.

Samer Akkach (2003), referring to an Arabic word, uses the concept of ‘decision maker’ for ‘designer’ and helps us in this regard:

[T]asmim (design)... [In] current usage, however, seems to be based on tasmim as “determining”, “making up one’s mind”, and “resolve” to follow up a matter. Thus in linguistic terms “design” is an act of determination, of sorting out possibilities, and of projecting a choice. It has little to do with problem solving, the prevailing paradigm, as the designer (musammim), seems to encounter choices, not problems, and to engage in judging merits, not solving problems. It is closer to “decision-maker”.

Akkach in the context of the design process defines truly, that the designer can be characterized as a decision-maker. However, there is an important point here: mostly, the designer is a decision-maker within the design process, not so much in the implementation phase. ‘Normal’ designers cannot even decide whether a proposal is accepted/implemented at all. In fact, this is the client’s decision. In better words, Akkach says, ‘designer’ is someone who encounters choices, not problems. As for instance, in ordinary design projects, a designer has an ‘employer’/‘client’ and a ‘consumer’/‘user’ with a defined problem; and what a designer does is ‘devise the courses of action’ to help to solve the problem. On the other hand, the activist is the person who finds the problems, makes the decisions, and implements/acts based on those decisions. Nevertheless, in design-activism, the designer should find the problem and be a questioner. Therefore, Activist-Designer is a role in-between being ‘Designer’ and being ‘Activist’.

Hence, it can be concluded that designer/decision maker is aware of the act of ‘design’/‘decision making’ in design activism, and this awareness is established by making a change – as one of the most important duties that design can do for societies and users – for helping to solve a problem. Moreover, the big difference between the final actions of non-designers and activist designers is the same ‘awareness’ from applying design instructions and instruments to the progress of a goal.

Here, an activist-designer is a designer who observes, analyzes, and then does an act by its design. Activist-designer is more sensitive to the surroundings, especially to social issues that affect society, and thinks outside the box and fundamentally. In design-activism, what is most important is questioning and criticism – the characteristics that are intellectual behavior – deep observing, finding problematics, and ‘making change for people, not just being a cog in the capitalism machine’

(Rezai 2021). Thus, looking at design-activism as an ‘intellectual work’ does not seem far-fetched.

Antonio Gramsci (1891–1937), the Italian activist, journalist, and brilliant political philosopher, in his *Prison Notebooks* writes ‘all men are intellectuals, one could therefore say: but not all men have in society the function of intellectuals’ (Gramsci 1971). From this perspective, he believes intellectualism can be divided into two types. Edward Said, in the Reith Lectures broadcast on BBC Radio 4 in 1993, which were then published as *Representations of the Intellectual*, mentioned how Gramsci further explores the issue: ‘First, traditional intellectuals such as teachers, priests, and administrators, who continue to do the same thing from generation to generation; and second, ‘organic intellectuals’, whom Gramsci saw as directly connected to classes or enterprises that used intellectuals to organize interests, gain more power, get more control’ (Said 1996, 4). Hence, Gramsci explains about the ‘organic intellectual’: ‘The capitalist entrepreneur creates alongside himself the industrial technician, the specialist in political economy, the organizers of a new culture, of a new legal system, etc.’ (Gramsci 1971). Said concludes that Gramsci believes ‘organic intellectuals are actively involved, in society, that is, they constantly struggle to change minds and unlike teachers and priests ... who [do] the same kind of work year in year out, organic intellectuals are always on the move, on the make’ (Said 1996, 4).

From this point of view, it can be said that Michelangelo was an organic intellectual when he changed/transformed a chapel with his art and did an intellectual work¹. Hence, activist-designer in a sense can be an organic intellectual. In other terms, activist-designer is the same as intellectual-designer in my words. I use this term to fission the concept of that intellectual side; activist-designers are those who ‘perform the intellectual function’ in society from design expertise, such as organic intellectuals do.

The Citizen-Designers or the Designing Citizen

To clarify the argument, we have to continue the review of some concepts and some questions. Including, who is the client? Moreover, how we can explain the non-designer’s actions in the design area?

Herbert Simon, in the sixth chapter of his book, poses an important question: ‘Who is the client?’ and then describes ‘society as the client’: ‘The members of an organization or a society for whom plans are made are not passive instruments, but are themselves designers who are seeking to use the system to further their own goals’ (Simon 1996, 153).

In this regard, years later, Brandes et al. (2009) in *Design by Use: The Everyday Metamorphosis of Things* look at the matter from another viewpoint. In this book,

referring to Holger van den Boom, they redefine the relation of form and function and try to change this linear concept to a triple connection with a new side, namely use. 'The form of an object represents the sum of its potential appearances in situations of use. Therefore, we can no longer say *form follows function* but rather: *form follows use*' (Van den Boom 1994, 107). Brandes and Erlhoff, before this book, in *Non Intentional Design* (2006) described this new term in design: 'Non Intentional Design meant to illustrate the everyday redesign of designed objects by users that do not create a new design, but through using an object, create something new or replace the old' (Rezai 2019, 229). In other words, 'Non-Intentional Design' means 'things [that] are used for purposes other than they were intended for' (Brandes et al. 2009, 57), and 'Design by Use' is this action of redesign through reformation and reuse of things to make them multifunctional and/or transforming or combining them to generate new functions. An innovative and economical design action for repurposing the nature of creating things.

Simple design actions such as transforming a chair to a coat stand, using a T-shirt instead of an oven mitt, opening a bottle with a spoon, using a cup as a pencil holder, radiator as a kitchen shelf, etc. all are 'design by use'. However, here again, the border between designer and non-designer looks blurred.

Brown et al. (2010) address and elaborate in their reflections on the power relationships between the researcher and the community. Jonas (2021) analytically explains what they did and makes the matter clearer for us: 'Brown et al. thoroughly reflect the spectrum between complete separation and entire involvement of the observer, or between first and second order cybernetics and thus contribute to make the designers' role explicit'. Jonas explains that Brown et al. (2010) distinguish six relational states that directly affect the quality of the conversational setting in transformative design:

- to work on a community: observer, external planner
- to work for a community: employee
- to work on behalf of a community: delegate
- to work with a community: partnership
- to work within a community: sharing (their values and aims)
- to work as a community: belonging to the community

He continues:

This series opens a continuum between the one extreme of the expert designer or 'Cartesian' inquirer (to work on a community from the position of an external observer) and the other extreme of the 'inquiring community' (to work as a community, being inseparable part of the design situation). In the first case, we have design[er] as consultant, contractor, or advisor of politics, developing options, narratives, moderating, and facilitating decision-making processes for others; however not deciding. In the second case, the

individual design researcher acts as a politically and socially responsible individual. Role conflicts between professional and citizen are likely to occur, which is new and has to be reflected. [Therefore] New role models show up: the citizen-designer or the designing citizen (Jonas 2021),

which means the traditional role of designer vanishes.

To know the citizen-designer phenomenon better, we need to examine some case studies. In this stage, two groups of examples can be proposed.

In the first group, for instance in Idlib, Syria, some people tried to make an improvised gas mask with paper, glass and plastic against chemical attacks in September 2018. Or in Afghanistan, in a small poor village in the Mazār-e Sharif suburbs called Qezelabad, due to the high price of wooden beams, people used remains of BM-21 Grad Soviet Union rockets as their house columns and/or roof beams; something dangerous, tragic and of course still innovative.

In fact, these cases are the same design by use phenomenon by non-designers and the matter of design is non-intentional design, although it happens in an extraordinary situation. Also, what these people do can be analyzed as an ethical phenomenon; because although it happens by non-designers, the people do this to save their lives and fill a necessary gap that occurs during tragedies. Nevertheless, in the second group of examples, the role of the citizen-designer will be easier to find.

For example, in Egypt, the 2011 revolution provides a good example from non-designers on the streets of Cairo to make change by action of design: ‘change as the reformation, redesigning, reassembling, and or remaking’ (Rezai and Khazaei 2017, S3522).

Tahrir Square in Cairo, at that time, was one of the most important places of demonstrations. In fact, Tahrir is the most important or one of the main squares of the city, with public gatherings, national events, or demonstrations happening there. In the middle of the happenings, protesters decided to settle in the square. Therefore, they gradually converted Tahrir into a small-scale neighbourhood and began a series of creative interventions in the square; including ‘took a fast food restaurant and turned it into a hospital. In another corner, a wall was furnished with newspapers so that people who cannot afford them were also kept up to date. In addition, a group of demonstrators showed environmental concern by setting up recycling points. There was also a speakers’ corner where people take the floor to share their thoughts with others. The best example for these was the protesters who spent the nights in tank wheels in order to prevent the army’s advance into the square’ (Cayli 2011).

Another case happened in Belarus in 2020, again by ordinary people/citizen-designers against president Alexander Lukashenko, after the Belarusian presidential election on August 9th. Belarus after this election had been the scene of widespread protests for weeks against what opponents of Lukashenko call electoral fraud.

White, red, white, is the flag of the Belarusian opposition, which has been banned from being installed in buildings and on balconies, and people have pro-

tested in other ways. For example, a number of people hung their white and red clothes on balconies or behind windows in opposition to the president.

The third case in the second group of examples is in Tehran. ‘Girls of Enghelab Street’ [Enghelab means Revolution in Persian] was a series of protests against compulsory hijab wearing in Iran in December 2017. It was started with the act of an Iranian woman who stood in the crowd on a city utility box in the Enghelab Street of Tehran, tied her hijab, a white headscarf, to a stick, and waved it to the crowd as a flag. She was arrested on that day and immediately people started sharing pictures and videos of her act on social networks. After a while photos posted on social media, showed that at least three other women re-enacted the protest.

However, what is important here in our argument is that some wonderful actions/designs have occurred as part of this social phenomenon. First, the form of the protest: Standing on a utility box (like a scene in a theater), using a white scarf (to show a nonviolent protest) and staying silent (instead of shouting, chanting or giving a speech). In addition, this protest is very interesting, not only for the women’s actions, but also because of the government’s reactions. After a while, the government changed the form of the utility boxes and added a metal pyramid on their tops, to prevent protesters from standing on the boxes. This controlling method was a simple and clever reaction (see Figure 1). The design phenomenon could be called ‘top-down design-activism’ by the authorities.

Nevertheless, this was not the end of the story, and design actions continued: protesters made a creative kind of footstool that was designed for standing on the boxes with pyramid heads that helped women to continue their protest (see Figure 2).

After a while, these utility boxes in the city were seen as distinguished elements and the municipality started to invite designers and use the graphic design on this new street furniture, as if they had discovered that this had become important for people now (see Figure 3). It was the same ‘top-down design-activism’ by the government.

The same design actions by ordinary people also can be found at the best level in the 2019–20 Hong Kong protests that caught the world’s attention quickly². One of the reasons for the attention of the world was the creative organizing tactics of protestors, including their creative methods of using such accessible things as defence equipment and/or the way they used social media for publishing their designed posters and demonstration information (Louise 2020). Using traffic cones for choking tear gases, suitcases and umbrellas as shields, and laser pointers for distortion of CCTV cameras, were some other cases of these creative actions.³

In all of these cases, we encounter citizens who design for their needs to continue their resistance, while they are not aware of the design actions that they do. In other words, they are citizen-designers and from my point of view, what they do is a bit different from the design by use phenomenon that everybody can do.

The citizen-designers notion reminds of the citizen-journalism phenomenon (also known as participatory journalism and democratic journalism), which simply

1 Utility boxes in Enghelab Street, unknown photographer. Photo: social networks.



2 Designed footstool against pyramids, unknown photographer. Photo: social networks.



means, ‘When the people formerly known as the audience employ the press tools they have in their possession to inform one another’ (Rosen 2008). This definition helps us to try to give a description of citizen-designers: the people, previously known as the observers, employ the design actions they have in their possession to inform society and politicians.



3 A new design on utility boxes in Tehran by young artists ordered by Tehran Beautification Organization. Photo: Tehran Beautification Organization Telegram channel.

Design by Act

‘Designer’ here, in the ‘citizen-designer’ phenomenon, is the user/client. Also, activist-designers, unlike classic designers who design for the user/customer, design for themselves; not only in the position of intellectuals, activists, or designers but also as humans, people and citizens. Here again, design is made by people (citizen designers) in an extraordinary situation, which naturally implies a design action and transforms every single element of the space into a meaningful tool based on their needs. Although the goal of this transformation is resistance and is dissimilar to ‘design by use’, it is not just to get rid of an everyday problem. In other words, unlike the non-designers of Afghanistan or Syria and many other examples, citizen-designers intentionally do design to meet their needs and make a message at the same time.

Therefore, it seems we need a new term for this division. Because before this, we analyzed these actions by people in the design-activism area and we knew that they were not designers, activists, or activist-designers. Hence, by referring to the ‘design by use’ concept, I would call it ‘design by act’. I think ‘design by act’ is the

exact term to express the situation of those people who design by their actions, based on their social, political or cultural needs for resistance, by small changes and in wishing for a big change. The people change their area, reform the products, and design or redesign things or systems for sending a message to other people, government, or both. Making this message is the most important action these people do.

Accordingly, we have to consider the point that despite the similarities between 'design by use' and 'design by act', the latter happens in political and social events or, in better words, in unplanned extraordinary situations. However, 'design by use' can happen in normal situations, anywhere and anytime.

In this regard, dividing the design-activism area into two different contexts, namely the 'design by act' phenomenon and the 'design-intellectualism' notion, appears necessary. Design by act for describing those design actions by citizen-designers and design-intellectualism for explaining what activist-designers do. In fact, design-intellectualism could be the 'professional branch' of design-activism. Because what an intellectual designer does, is to devise courses of action by using design methods and design instruments that make the social and political actions more effective, more efficient and more successful.

If so, the next question would be how a 'normal' designer could be transformed into an intellectual-designer? Can there be training and education for it? Is it something like transformation design or transition design/social design? The answer should be that intellectual veins in design fields like social design or transformation design, naturally because of social impacts of these attitudes and existence of social, political, and cultural matters, are stronger. But, the main difference between an ordinary designer and an intellectual-designer or professional activist-designer, from my point of view, is 'creative enlightenment'.

I am using the term creative enlightenment, because, from my perspective, an activist-designer/intellectual-designer, unlike a normal designer, usually works in an extreme, extraordinary or out of the ordinary atmosphere. As mentioned, this abnormal situation often is the encounter scene of social, political, and or cultural problems. Therefore, at that moment, first, you, as an intellectual-designer, are one person among ordinary people, second, a creative person at the maximum, and third, an activist-designer who is searching for a time to do something as a performative role. Here, creative enlightenment can find meaning in the square of being an activist and a thinking intellectual, being creative and having raised awareness. Thus, a typical designer, to find 'creative enlightenment', needs 'social consciousness'⁴, as in the consciousness shared by individuals within a society, to become an intellectual-designer.

In short, the big difference between activist-designers and those with other roles is this 'creative enlightenment'. As for being an activist-designer/intellectual-designer, having all four of the above-mentioned conditions appears to be necessary.

- 1 The Sistine Chapel ceiling, painted by Michelangelo between 1508 and 1512, is a cornerstone work of High Renaissance art. (Shearman 1986)
- 2 https://en.wikipedia.org/wiki/2019%E2%80%932020_Hong_Kong_protests retrieved on 11 September 2020.
- 3 More information is available here in *How Hong Kong's Protesters Evade Police and Keep the Demonstrations Alive* | Visual Investigations by The New York Times: <https://www.youtube.com/watch?v=V0iy-trOqM90>.
- 4 The concept of 'social consciousness' in sociology and philosophy is a lengthy topic and examined in many sociologists' and philosophers' works, including German philosopher Karl Marx's (1818–1883) book: *A Contribution to the Critique of Political Economy*. Available at: https://www.marxists.org/archive/marx/works/download/Marx_Contribution_to_the_Critique_of_Political_Economy.pdf.

References

- Akkach, S. (2003). 'Design and the Question of Eurocentricity', *Design Philosophy Papers*, vol. 1, no. 6: 321–326.
- Benson, Louise (2020). 'How Protesters in Hong Kong Use Illustration to Make Their Voices Heard.' Published July 13th, 2020. <https://eyeondesign.aiga.org/how-the-protesters-in-hong-kong-used-illustration-to-make-their-voices-heard/>.
- Brandes, Uta; Sonja Stich; Miriam Wender (2009). *Design By Use: The Everyday Metamorphosis of Things*. Board of International Research in Design. Basel: Birkhäuser.
- Brown, Valerie A. (2010). 'Collective Inquiry and Its Wicked Problems'. In *Tackling Wicked Problems through the transdisciplinary imagination*, edited by V. A. Brown; J. A. Harris; J. Y. Russell, 61–83. London, Washington DC: Earthscan.
- Cayli, Eray (2011). 'The Vernacular of Insurrection.' *Radikal Newspapers* monthly design supplement. 27 February 2011. The article is written in Turkish. English version available here: <https://disiplinsiz.tumblr.com/post/4294506456/the-vernacular-of-insurrection>.
- Gramsci, Antonio (1971). *The Prison Notebooks: Selections*. Trans. Quintin Hoare and Geoffrey Nowell-Smith. 9. New York: International Publishers.
- Jonas, Wolfgang (2021). 'Designing democracy – or muddling through? A cautious plea for reflection and moral disarmament in social/transformativ design.' In *Design and Democracy: Activist Thoughts and Practical Examples for Sociopolitical Empowerment*, edited by Michael Erhoff, Maziar Rezaei. Basel: Birkhäuser.
- Keshavarz, Mahmoud (2016). 'Design-politics: An inquiry into passports, camps and borders.' PhD diss., Faculty of Culture and Society, Malmö University.
- Rezaei, Maziar and Mitra Khazaei (2017): 'The Challenge of being Activist-Designer. An attempt to understand the New Role of Designer in the Social change based on current experiences.' *The Design Journal*, 20, sup1: S3516–S3535.
- Rezaei, Maziar (2019). 'Critique of the Activist-Designer Phenomenon Based on Arab Spring Experiences.' In *Design (&) Activism*, edited by Tom Bieling, Mimesis International.
- (2021). 'Design Activism, Democracy and the Crisis of Social Networks.' In *Design and Democracy: Activist Thoughts and Practical Examples for Sociopolitical Empowerment*, edited by Michael Erhoff; Maziar Rezaei. Basel: Birkhäuser.
- Rosen, Jay (July 14, 2008). 'A Most Useful Definition of Citizen Journalism'. *PressThink*. Accessed May 21, 2012. http://archive.pressthink.org/2008/07/14/a_most_useful_d.html.
- Said, Edward W. (1996). *Representations of the Intellectual. The 1993 Reith Lectures*. Vintage Books.
- Shearman, John (1986). 'The Chapel of Sixtus IV.' In *The Sistine Chapel*, edited by Massimo Giacometti.
- Simon, Herbert A. (1996). *The Sciences of the Artificial*, Third edition, MIT Press. Originally published in 1969.
- Thorpe, Ann (2008). 'Design as Activism: A Conceptual Tool.' Changing the Change: Design Visions, Proposals: An international conference on the role and potential of design research in the transition towards sustainability. Torino, 10th–12th July 2008.
- Valtonen, Anna (2006). 'Back and Forth with Ethics in Product Development: A history of ethical responsibility as a design driver in Europe.' https://www.academia.edu/972634/Back_and_Forth_with_Ethics_in_Product_Development.
- Van den Boom, Holger (1994). *Betrifft: Design. Unterwegs zur Designwissenschaft in fünf Gedankengängen*. Braunschweig: VDg.

DESIGNING A COMPUTATIONAL INTERFACE FOR THE STUDY OF COLLECTIONS: 'GROUPEUR' AS A RESEARCH TOOL

Daniele Savasta and Elif Kocabiyik

Introduction

We conceptualized and prototyped a computational interface¹ – named 'Grouper' – to both theoretically explore and practically address an apparent problem that is experienced by researchers and academic scholars coming from various disciplines² when dealing with collections³ of visual resources⁴.

Problem Statement

Kocabiyik (2012), one of the authors of this paper, studied a collection of 1161 Turkish cigarette packages to understand how their design changed from the 1900s up to the present, utilizing an evolutionary perspective. In order to efficiently examine the collection, the following steps were taken: (a) create a purposefully structured index card in Microsoft Word; (b) fill in the index cards for every cigarette package in the collection in Microsoft Word; (c) transcribe data from the index cards into a datasheet in Microsoft Excel; (d) take photographs and organize them under folders of grouped cigarette packages; (e) link the photographs to each data record in Microsoft Excel; (f) create visual boards of grouped cigarette packages in Adobe Photoshop; (g) make line graphs of grouped cigarette packages in Microsoft Excel.

As portrayed in this example, researchers in the process of initiating their collection, previously digitized or not, often adopt a combination of different software programs relying on the common office suite or more specific database management tools. Both in our observations and according to literature⁵, tools such as Word and Excel or Access and Filemaker are mostly used in database management, while PowerPoint and Photoshop are preferred for the visualization counterpart. Researchers who dive into more advanced tools for visualization, could find Gephi and Pajek or computational tools such as d3js, Processing and Python, which all require more specific skills and understanding.

The lack of proper functional support for studying collections of visual resources in typical data management and visualization software programs and the demand for skills by more complex computational tools reveal a practical difficulty that researchers encounter.

An encouraging environment has emerged for object-centered studies with the extensive release of digital collections by galleries, libraries, archives and museums (GLAMs) around the globe.⁶ However, in many cases the poor, static and limited display of collections on the websites of GLAMs discourage the personal contribution and experiencing of that data. Moreover, the projects and academic studies that have been produced on this matter can usually be characterized as non-inclusive and collection-specific digital platforms.⁷ These monologuing websites and self-enclosed platforms appear to be another practical difficulty that researchers encounter.

The particular insufficiencies and idiosyncrasies of these software programs, computational tools, websites and digital platforms mentioned above do not only affect the making of the research and its outcome, i.e. the produced knowledge. The problem also becomes one of subjectivization when the authoritarian and specialist tone of the digital world in effect weakens the role of the researcher by alienating, deskilling and silencing her.

These two types of effects are to be considered here as two sides of the same coin; together they constitute the basic research and design problem addressed in this project. The research part aims for a better understanding of the important issues and criteria involved in enabling researchers to better deal with collections of visual resources, while the design part simultaneously develops a computational interface to better address those issues/implement those criteria.

Design Research Project: Grouper

Digitized or non-digitized, collections come into formation through the subjective perspective and organization of their owners and curators.⁸ When a researcher conducts an object-centered study on a (digital) collection of items (digital visual resources), she applies her own lens and in a way reshapes the collection to yield new knowledge and/or understanding.⁹ That is to say that the researcher builds her study on an already structured collection by de- and re-structuring it.

Objects can be observed through a variety of lenses that can describe a multitude of different properties of the object. Since none of these lenses are 'more true', it is never possible to reach the inner selves of objects, and all possible lenses are valid ways of seeing the object. In this spirit, Grouper approaches the design of a computational interface from an Object-Oriented Ontology (OOO)¹⁰ lens, as this theory 'puts things at the center of being' (Bogost 2012, 6).

When objects are the primary concern, the authoritarian and specialist tone of the digital world is challenged. Correspondingly, we emphasize the critical and ecological approaches within OOO. Further below, after expanding on these theoretical approaches, we delineate and distinguish a series of esthetic qualities to bridge the theoretical and practical perspectives in the conceptualization and prototyping of Grouper, i.e. the computational interface.

Grouper can be characterized as a design research project following a ‘research through practice’ approach.¹¹ Conceptualization/research/theory stages and prototype/design/practice stages are interwoven as thinking and making processes of this computational interface.¹² Grouper is an ongoing and evolving project that has been developed iteratively through designing, testing and researching in the context of five different collections¹³ and also by the contributions of their researchers.

One interesting aspect of this design research project is the function of its outcome: Grouper, the computational interface, functions as a research making tool. It prioritizes visualizations of the collections and their groups/classifications whereby researchers use continuous visualizations as a key for iteratively creating new insights. It could thus be argued that Grouper itself as a research tool acts in favor of ‘research through practice’; it propagates ‘designerly ways’¹⁴ of knowing and thinking within other disciplines.

Related Works: Positioning Grouper

We present here a selection of works – projects and academic studies from various disciplines – to delineate the comprehensive field of study of *visualizing collections*. We classify these works in order to clarify the positioning of our Grouper project in the context of that wider field.

In the absence of a commonly used definition¹⁵, by *visualizing collections* as a field of study we mean the study of computational interfaces that focus on the visualization of collections of items. It can be considered as an emerging transdisciplinary research field.¹⁶

The expansion of technological possibilities, the release of digital collections of items by GLAMs, the creation of digital collections by individuals and the growing attention towards data visualization constitute an environment that is favorable for the study of *visualizing collections*. This has attracted contributions from various disciplines.

Windhager et al. (2016; 2019) brought together seventy existing works of *visualizing collections*, emphasizing the need to consolidate this emerging field of study, and reviewed them through analyses and comparisons. Here we use some of the same works, add others and classify them into original groups.

We classify the existing works of *visualizing collections* based on the possibilities provided to the audience by the computational interfaces: *Collection graphs* provide a single view of the collection, *collection exhibits* provide multiple views of the collection, *collection interfaces* enable the audience to minorly intervene with the collection, and finally *collection (research) interfaces* enable the audience to create and modify the collection. These classified computational interfaces are further explained, referred to and exemplified below.

Collection Graphs

Collection graphs are original visual representations of collections through a single view. For example, a timeline or a map, as well as any other diagram that represents a collection, can be considered as part of this group. They only provide one individual visual interpretation of a collection; thus the exploration of the audience is limited to a single perspective. These works can be associated with what Bogost, Ferrari and Schweizer (2010) define as *directed infographics*; visualizations that guide the audience through a predefined experience.¹⁷ *Collection graphs* can further be divided into two sub-groups that approach visualization from an esthetic or computational point of view. The first approach gives particular attention to the visual and representative form,¹⁸ and the second one to the optimization and algorithmic structures of the visualization.¹⁹

Collection Exhibits

Collection exhibits focus on the presentation feature of the collection towards the public. They are the results of a combination of different *collection graphs* following a multi-view approach.²⁰ This provides the possibility to explore further and browse the same collection through different perspectives. Whitelaw (2015) suggests the term *generous interfaces* to describe a more explorable interface, not only more explorable than what we call here *collection graphs* but specifically more explorable than those interfaces that merely provide a search function and with almost absent visualization features. By using the term *generous*, Whitelaw also implies the importance of providing rich exploration possibilities to encourage the role of an *information flaneur* (Dörk et al. 2011), i.e. one who wanders a collection in wait of a discovery.²¹ In *collection exhibits* we can further specify a sub-group composed of interactive exhibits that are installed inside the physical space of GLAMs. These off-line interactive exhibits generally excel in exploring the collection through different views; however, the audience might feel limited in exploring the collection since the experience is directed by the curatorial voice of the institution.²²

Collection Interfaces

Collection interfaces are *collection exhibits* that extend the possibilities of studying a collection by enabling further curating capabilities. For example: the audience might establish new categories within the collection and more directly manipulate the content. Morse et al. (2019) synthesizes seven features based on what Ruecker et al. (2016) defined as *rich-prospect interfaces*. They are *representation, organization, depth, availability, multiplicity, coherence* and *selection*.²³ The *selection* feature, in

particular, is what differentiates *collection interfaces* from *collection exhibits*; it is a way for the audience to intervene in the collection by marking one or more items in the collection to keep track of them.

The Lomen project (Mauri et al. 2013) presents a prototype for the visualization of the archive of Italian architect Luciano Baldessari. The audience can browse through projects, documents and actors, organized in views as *lists*, *galleries*, *timelines*, *maps* and *relational networks*. The views are strictly bound to the type of object observed (e.g. *galleries* are available for projects and documents while *relational networks* are only available for actors). A series of filters contribute to the exploration of the archive and encourage discovery. Furthermore, Mauri et al. (2013) include the creation of thematic paths to curate a selection of items from the collection with the aim of research and/or presentation. This enables shifting the role of the audience towards that of the curator.

Of particular note are the works of Boyd Davis and Krautli (2015) and Vane (2020) focusing on *visualizing collections* in relation with time. While being developed in collaboration with institutions and professional curators, their highly crafted visualizations allow rich explorations of large collections through timelines including several features such as color and theme filters or time-period comparisons.

A divergent example is Rijks Studio from Rijksmuseum website (2020), which presents a variety of views and tools to reappropriate artworks with image alteration. Although the website does not provide graphs, it does include an overview with a *thumbnail-grid* per artist, details about the artworks and access to their metadata.

Collection (Research) Interfaces

Collection (research) interfaces are *collection interfaces* that are explicitly developed with the curator in mind instead of a general audience. Beyond the visualization and the exploration features mentioned in the other *visualizing collections* groups, *collection (research) interfaces* enable the audience to modify the content of the collection, its items and their properties, and even create entirely new collections from scratch.

Among the few projects we encountered that provided such features were ARTISTE and SCULPTEUR (Goodall et al. 2003, Addis et al. 2005), Viewshare (Algee et al. 2012) and Kultuurisampo (Mäkelä et al. 2012), which was discontinued due to technological obsolescence and/or research conclusions. The ARTISTE and SCULPTEUR projects (Goodall et al. 2003, Addis et al. 2005) are prototypes developed for museums and galleries to view, compare and present respectively 2D and 3D artifacts. These prototypes support content queries and present them through views as *lists*, *galleries* and *relational networks*. The focus of these projects is on what they call ‘power users’, experts and museum professionals, who require advanced editing and search techniques. While the visualization aspect of the projects is under-

developed, these already dated works excel in the richness of the content queries. Some of the tools provided within these projects are: *attribute map* (to view a relationship network of metadata), *color picker* (to search for a color), *lightbox* (to save a selection of artifacts), *image cropper* (to search for a detail) and *query history* (to recall previous searches).

Neatline (Nowvskie et al. 2013) is a plugin for Omeka, a collection management framework that provides a narration structure for curators who want to exhibit a collection. This tool does not provide an interface for proper visualizations of the collection but a way of structuring the contents in a website-like form that allows navigation and storytelling with multiple content-types.

Nodogoat is a 'web-based data management, network analysis & visualization environment' (Bree and Kessels 2013). Through the web interface, it is possible to create collections and their items as part of a rich and complex series of forms and subsequently visualize them with geographical and network graphs.

We position our Grouper project in this much less populated group of *visualizing collections*, next to the examples mentioned above.

Theoretical Perspective: Defining Grouper

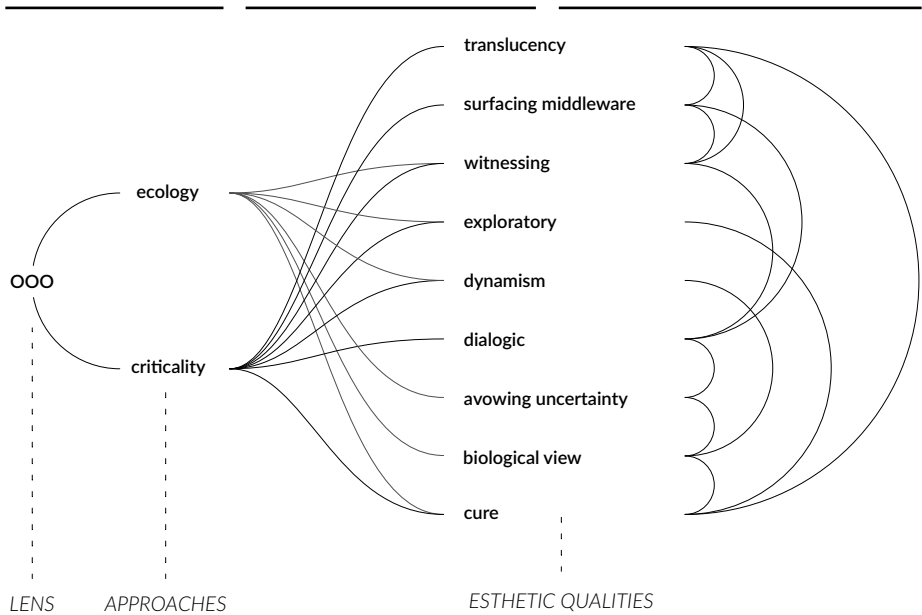
We present here, in more detail, the theoretical perspective that the Grouper project is based upon. The Object-Oriented Ontology (OOO) lens, the ecology and criticality approaches, and the *translucency, surfacing middleware, witnessing, exploratory, dynamism, dialogic, acknowledging uncertainty, biological view, and cure* esthetic qualities are shown in their reciprocal relations in Figure 1. These latter esthetic qualities belong to various theoretical and conceptual levels, but here they are flattened due to their similar, multiply-connected and intertwined influence on shaping *collection (research) interfaces*.

Object-Oriented Ontology (OOO)

We approach the design of Grouper through an Object-Oriented Ontology (OOO) lens. OOO 'puts things at the center of being' (Bogost 2012, 6); it is a flat ontology proposing that 'all things equally exist, yet they do not exist equally' (Bogost 2012, 11).

OOO is a strange mereology in which 'one object is simultaneously a part of another object and an independent object in its own right' (Bryant 2011, 214). Correspondingly, in *collection (research) interfaces* a collection and its items can be considered simultaneously one object and a multiplicity of independent objects.

OOO sustains that 'objects exceed what we know or ever can know about them' (Bogost 2012, 30). Objects can be observed through a variety of viewpoints that



1 Theoretical Perspective. The diagram synthesizes the relations among the theoretical lens, approaches and esthetic qualities.

describe a multitude of different properties of the object while accepting that no viewpoint is 'more true', for it is impossible to reach their inner selves.

OOO 'embraces messiness' (Bogost 2012, 59). It is impossible to establish a priori a metadata scheme related to a collection of items without influencing the possibilities of its exploration. Consequently, an object-item cannot have stable, predefined properties, but only fluctuating, unplanned ones, which dynamically change according to the curator who registers them in the context of her research.

Ecology

One thing this type of ecological thinking seems to want to do is convey or express or explore some sense of immersion in something-or-other (Morton 2018, 140).

Through the lens of OOO, and especially due to Morton's contribution²⁴, it is not possible to speak of OOO without ecology. Conversely, associating ecology with *collection (research) interfaces* should be superfluous, yet it is widely unaccomplished. In a field governed by overview and detail (Shneiderman 1996, Cockburn et al. 2008), and by distant and close views (Jänicke et al. 2015), every work of *visualizing collections*

is intrinsically composed of items and their environment. Items in collections are shaped in relational properties that are equally dynamic and multiply connected, as in any other ecological system.²⁵

Starting from a business perspective, Davenport and Prusak (1997) discuss four attributes of information ecologies²⁶ that here we synthesize as *diversity*, *change*, *observation* and *behavior*. In the area of *collection (research) interfaces*, these attributes can correspond to the following: *diversity* describes the variety of items in a collection; *change* describes the variability of the content and the property of a collection through time; *observation* describes the decision of properties based on inspection instead of predefined models; and *information behavior* describes how individuals can approach the collection. Discussing ecology in regard to *collection (research) interfaces* becomes essential to rediscover such crucial features, which in most of the works are superseded by machinic solutions that favor uniformity and stability for their computational simplicity.

Criticality

When a supermarket puts [wheat] vermicelli in the pasta section but rice vermicelli in the Asian section, the supermarket suggests that rice vermicelli is more *Asian* than *noodle* (Feinberg 2017).

In this study criticality is adopted in a twofold manner: in its process and in its outcome. As a process, the research through practice of Grouper is a form of what Ratto (2011) calls ‘critical making’: a fusion between critical thinking and making practices. Criticality aims to ‘emphasize iterative and collaborative methods’ (Boyd Davis and Krautli 2015) as a part of the development of the thinking/making process. Similarly to the works of Boyd Davis and Krautli (2015) and Vane (2020), where they highlight the collaboration with professional curators within the design process of the interfaces, Grouper has been restructured and expanded in the last four years thanks to collaboration with researchers and workshop participants.

Bardzell and Bardzell (2013, 3302) delineate five ways in which critical design²⁷ operates: *perspective shifting holistic approach*, *theory as speculation*, *dialogic methodology*, *emancipatory social role* and *reflexivity*. The *holistic approach* in critical design resonates with OOO and ecological lenses in their common attempt to consider objects in relation with their contexts. Equally, *theory as speculation* recognizes the absence of verifiable truth-claims as OOO would. A *dialogic methodology* is the seeking of meaning in what the objects make us perceive through an esthetic and social experience, not only what we read embedded in the objects themselves. The *emancipatory social role* constitutes the basis for the implementation of a *perspective-shifting* approach to enrich sensitivity and insight. Criticality, in a designerly way, aims at improving an existing condition of society.

Conclusively, *reflexivity* refers to the role of the critical thinker as a self-conscious actor in the service of social change.

Translucency

Translucency enables the discussion on the visibility of *collection (research) interfaces*. As Lialina (2012) claims, the constant trend in the design of interfaces towards transparency can cause their users to disappear with them. Edward Tufte (2001) has built a case in favor of visual simplicity, accepted as an unquestionable foundation in information design. Olivia Vane (2019), following the same principle, puts forth a critique of complexity as a factor that can increase skepticism. Paradoxically, in this study, we consider skepticism under a positive light, since it can communicate the instability and the untruthful, unauthoritative nature of the presented information. We do not state that we should achieve complexity purposely, but we should focus on the difficult balance between transparency and opacity²⁸ – a conceptual region of translucency.

In a political way, invisibility can be seen as a form of suppression of power, a negation of possibilities, a disabling act. If something is not present in the space of the interface, it becomes impossible to access and so to be thought about. In Berardi's words (2017, 103): 'I call power the temporary condition of implementation of a selection among many possibilities. I call power a regime of visibility and invisibility: the exclusion of different possible concatenations from the space of visibility'. The risk is, in going univocally towards the goal of transparency, that in the process of simplifying access to the black box, we might find ourselves trapped by the inaccessibility of the glass box.²⁹

Surfacing Middleware

Fuller (2005) and Drucker and Svensson (2016) similarly observe an absence of emerging practices that challenge visibility in computational processes. Drucker and Svensson (2016), for this purpose, reinterpret the concept of middleware.³⁰ The (intellectual) middleware is described as that which stays in between the processes and the surface, and further as the infrastructure that allows the interaction. Despite Drucker and Svensson (2016) warning us against confusing middleware with interfaces, the in-betweenness that they characterize refers closely to the concept of interface as stated by Bonsiepe (1999). A middleware is not an interface when it is buried in the fold of the code, but by emerging towards the interface might in turn become an empowering feature. If 'intellectual middleware describes the systemic assumptions and conditions built into digital and physical architectures' (Svensson 2018, 153), in order to critique these assumptions, we

might as well manifest them so as to communicate them to the audience. A middleware can become then a sub-specie of interface, a space of interaction where the role of infrastructure and its political role is exhibited, shared and discussed. A middleware can be an interface with a high level of visibility of its process and mechanics; an explicit interface that makes people conscious of its presence. A middleware can be a translucent interface that contrasts the dominant approach in which '[l]ike Dorothy, the user is not supposed to become conscious of the interface' (Bolter and Gromala 2003, 43).

Due to their obscure – or maybe obscured – nature, software programs act as fill out forms with limited possible answers to be input, and users just have to fill in the blanks and conform within their limits. People are made users, in the restrictive sense of the term, victims of decisions made elsewhere. The design of *collection (re-search) interfaces* aims to empower people to curate their collections by exhibiting the processes and mechanics of the interface instead of imposing conditions and constraints on their studies.

Witnessing

A widely explored case of an interface that conditions and constrains people's cognitive processes is Microsoft PowerPoint. Specifically, Tufte (2003), Robles-Anderson and Svensson (2016), and Drucker and Svensson (2016) have critically analyzed the software for its role in shaping our thoughts and our data. What makes PowerPoint an interesting example here is its adoption of templates to guide the user in their decisions. This filling-out-form-like feature contributes to PowerPoint's visibility and disappearance; PowerPoint is visible through its standardized appeal, but it is invisible due to its being taken for granted as 'the way' to perform a presentation.

The ease of use, given by a template to fill out, often surpasses the critical realization that the template has 'something to say by itself'. By choosing a template, we expressively decide not to indulge in exploration of further possibilities. We maintain a distance from the inner reasoning and mechanics of the interface. We favor a higher level of abstraction over the complexity of the lower reasoning of the algorithm. Although this kind of abstraction is a favorite mode of access for many people, when dealing with the design and adoption of software, this choice comes with sacrificing the direct knowledge of the underlying structure. The distance built with layers of abstraction to reach a certain level of ease of use by the software, ends up reflecting itself on the distance of the author from its text.

Metaphorically, adopting a high level of abstraction of interfaces is making decisions based on hearsay. The users are assimilated to the role of spectators. Although they can act, their actions are limited in the scope of a predefined script, which is defined without their knowledge or competence. How do we make people access the underlying structure and mechanics of the interface? Drucker and

Svensson (2016, 24) define *witnessing* for this purpose as ‘not equivalent to or interchangeable with the testimony being heard, recorded, absorbed, listened to, or transcribed. Witnessing is a mode of attention, a structuring mode.’ In a middleware, witnessing is an act obscured and hidden from the audience; within our intention of surfacing a middleware we question whether the audience can become witnesses themselves. A witness is ‘an observer or source possessing privileged (raw, authentic) proximity to facts’ (Peters 2001, 709). As Lialina (2012) states, by giving privileged access, people are empowered and enabled to become ‘Turing complete users’.

Witnessing as a quality of *collection (research) interfaces* is the attempt to grant people access to algorithmic and formal decisions taken by the developer of the interface and enacted by it. Witnessing is obtained by allowing visibility in relation to the translucent quality. In other terms, witnessing is the provision of access to tools that can hack the interface and profane it (Savasta 2015).

Exploratory

We enable witnesses to become curators via *collection (research) interfaces* in their exploratory practices. Here, the term ‘exploratory’ is borrowed from Bogost, Ferrari and Schweizer (2010). They classify infographics in three patterns: *explanatory*, *exploratory*, and *directed*. *Explanatory* and *directed* seem to share similar aspects, in that they guide the reader towards a pre-defined conclusion – by providing a synthesis or an overall access to the dataset. *Exploratory* infographics, however, offer the possibility of reaching a plethora of conclusions through a process of discovery. The views in this case are generally multiple and include controls to further intervene on them, as in the multi-view approach of Dörk et al. (2017). The exploratory quality underlines the importance of analysis, evaluation, discussion and iteration over a collection. As suggested by Bogost, Ferrari and Schweizer (2010): an interface that provides controls and tools to arrange, zoom and filter the data supports researchers in shaping their own conclusions through exploration and discovery.

Dynamism

Dynamism is a way to support exploration and prioritize collaborative notions over authoritarian approaches. *Collection (research) interfaces* that embrace dynamism enable interpretative, authorial interaction and further exemplify an approach that ‘reorients the residual, making it central’ (Feinberg et al. 2014) instead of applying an established metadata scheme, which inevitably forces stability and centralization. The residual, which does not fit in a category system, should be paradoxically the norm for transient, dynamic *collection (research) interfaces*. The dynamism

quality, consistent with the biological view, suggests the need for a fluctuating meta-data scheme that favors change without compromising the technical needs of the interface. For example, the support for adoption of metadata standards should be considered – to facilitate interoperability among existing accessible collections – while their influence and limits should be consciously acknowledged.

Dialogic

Dynamism also lays the ground for critical dialogic *collection (research) interfaces* (Bardzell and Bardzell 2013). The collection, as a whole, could present itself as dynamic by allowing versioning with a dialogic quality. For example, by supporting and encouraging the merge and link of multiple collections while simultaneously keeping their individuality and independence so as to maintain their uniqueness and their marginality. The merging of collections should eventually evaluate the contrasting data available and ensure a pluralistic view by promoting a plethora of interpretations (Rafferty and Hilderley 2007). From an ecological perspective we can say that: ‘Ecologists focus rather more on dynamic systems in which any one part is always multiply connected, acting by virtue of those connections, and always variable, such that it can be regarded as a pattern rather than simply as an object’ (Fuller 2005, 4).

Avowing Uncertainty

We live in a state of uncertainty, which, paradoxically, has been increased, and not diminished, by technical-scientific progress (Ferraris 2012, 76).

Within *a theory of speculation*, a dialogic approach among collections is a necessity against the affirmation of the ‘true truth’. The ephemerality of the data in time, their variability, is further amplified by the inner uncertainty of data. Not only can data be uncertain due to differences in interpretation, but they can also be internally unknown. The case of dating artifacts is here the most recognizable (Kocabıyık 2016). It is a troublesome field since it is difficult to obtain a univocal answer due to lack of information, contrasting sources, varying perspectives and multiplicity among other issues. Due to its importance, uncertainty has a rich history in the field of *visualizing collections*.³¹ This uncertainty of data is often betrayed in the structuring of the metadata scheme, obscured by the middleware we could say, but is important to highlight here how interfaces themselves should avow uncertainty and their behavioral tone should communicate it to the audience.

Biological View

The biological view refers to evolutionary thinking reflected in the science tradition. Langrish (1999) identifies certain features of the biological view, in contrast with the physics view. These are *non-linearity*, *fuzzy patterns*, *required descriptiveness*, *no predetermined patterns*, and *welcoming variety*. These features are specifically in line with an OOO lens in their ecological approach and in being exploratory, dynamic and avowing uncertainty esthetic qualities.

Langrish (1993, 360) also defines *biological* case studies and their aims as follows: ‘i) to develop labels for use in a classification scheme – taxonomy; ii) to look for principles underlying the taxonomy; and iii) to understand movement through time’. This path indicates a way of how curators/researchers study the collections and how *collection (research) interfaces* and specifically Grouper can function as a research tool to enable such a study.

Cure

The role of curation, and our broad interpretation of the term, is mentioned in a footnote previously in the introduction. Within *collection (research) interfaces*, and in Grouper in particular, we articulate cure as a central aspect of the interface in which taking care, managing, interpreting and maintaining merge. In reference to ecology, Morton (2018, 32) states that we should ‘care less’: paradoxically balancing indifference and over-commitment. While curating a collection, being carefree might mean great chaos; however, over-commitment might compromise the dynamic, uncertain and dialogic qualities of this approach.

Practical Perspective: Designing Grouper

A Transient Definition

Grouper is an open-source interface for researchers to study (prominently visual) digital collections. Grouper aims at enabling researchers to curate their dynamic and uncertain collections by witnessing through a translucent and dialogic emerging middleware to allow exploratory and critical practices. This proposition is a transient result/outcome arrived at after the observation, analysis and iterative development of Grouper as a design research project and not an initially established goal, nor an imperishable manifesto.

In defining *collection (research) interfaces*, we structured Grouper around two main actions: the initiation and update of a collection and the visualization of a

collection for study. These two actions are not sequential, but part of an iterative process in which visualization and update of the collection feed each other. We suggest that, by facilitating this exchange between visualization and update, the act of visualization is shifted from the usual final stage of divulgation to an early stage of research. We propose a shift of *visualizing collections* from a tool of ‘delivery’ to a tool of ‘discovery’.³²

An Overview

An overview of how Grouper functions from a practical perspective and why it functions from a theoretical perspective is shown in Figure 2. Technical features, curatorial features and esthetic qualities are listed in detail in columns and their prominent relations are revealed. Furthermore, technical and curatorial features are grouped in rows related to the views as an overall interface, the views for initiating and updating a collection, and the views for visualizing a collection.

Grouper, at this stage of development, consists of nine views. Each view can be opened as a frame that can be scaled, moved, overlapped and juxtaposed inside the canvas. The same view can also be opened simultaneously in multiple frames, allowing, for example, the comparison of the same view with different parameters. Furthermore, to provide an ‘overview to detail’ feature, most of the views allow the researcher to scale their contents. The nine views, which we briefly describe in the image captions are: *index card*, *data table*, *catalog*, *timeline*, *grouping*, *composition*, *geographical*, *radial tree* and *timeline with groups* – shown together in Figure 2 and further exemplified in Figures 3 to 11.

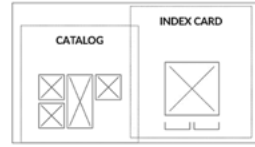
These nine views are loosely connected to the two main actions of the interface. We say ‘loosely connected’ to highlight the fact that while *index card* or *data table* are mainly editing views, they act as visualization by providing observational perspective to the researcher; in a similar way, views such as *grouping* and *composition* operate on the collection and can be considered editing views that modify the collection and not exclusively visualization views.



2 An overview of the Grouper project. The diagram lists the esthetic qualities, technical features and curatorial features; it reveals the prominent relations and view groups.

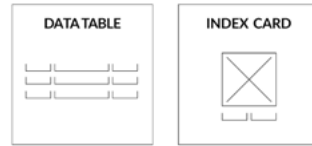
INTERFACE

- display multiple views side by side
- early visualization of items, groups of items and collection
- explore visualization and raw data side by side
- simultaneous visualization and modification of properties
- live search among visual and/or textual properties



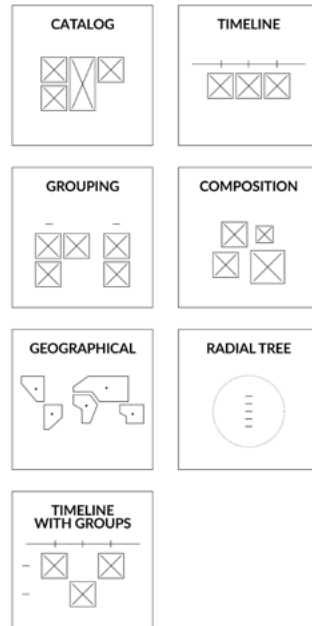
INITIATE AND UPDATE A COLLECTION

- close look at source to decide its labels and values
- creation of uncertain and doubtful values
- associate multiple views for in-depth study of items within their context
- creation of groups
- modification of groups



VISUALIZE A COLLECTION

- study within multi-view
- close and distant view for the study of part-whole relation of the collection
- iterate different research and visualization modalities
- discovery of patterns/relations among items
- discovery of anomalies, outliers and biases
- evaluate collection



CURATORIAL FEATURES

Views Descriptions

3 Index card: This view shows a single item of the collection accompanied by all its properties (labels e.g. 'material' and values e.g. 'tin') in a format resembling traditional index cards. The card can be scrolled down to reach the entirety of the item's properties. It allows the user to set new properties and modify the existing ones as well as import and attach files (as images, audio material, videos). It allows adding new items to the collection.



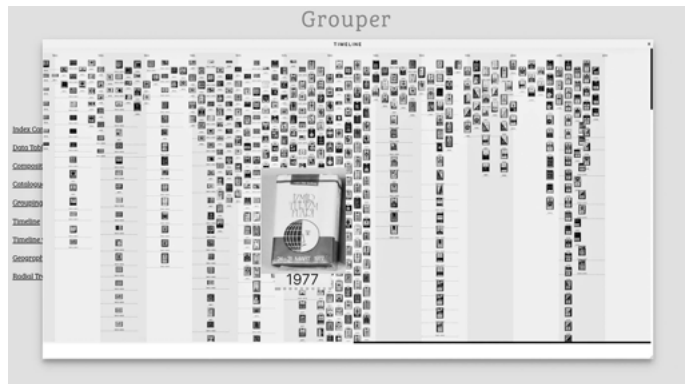
4 **Data table:** This view shows all items in the collection and all their properties in a table resembling familiar spreadsheets. It allows the user to set new properties and modify the existing ones as well as import and attach files (as images, audio material, videos). It allows adding new items to the collection.



5 **Catalog:** This view shows all items in the collection in the form of a zoomable grid-thumbnail. The thumbnails can be scaled, and while hovered on with the mouse they enlarge for a closer look.



6 Timeline: This view shows all items in the collection with thumbnails distributed on the horizontal axis corresponding to time. A mark under the thumbnail highlights an uncertain date. The thumbnails can be scaled, and while hovered on with the mouse they enlarge for a closer look.



7 Grouping: This view shows all items in the collection with thumbnails grouped on the horizontal axis according to the values of their selected properties. Multiple properties can be selected to filter down the thumbnails.



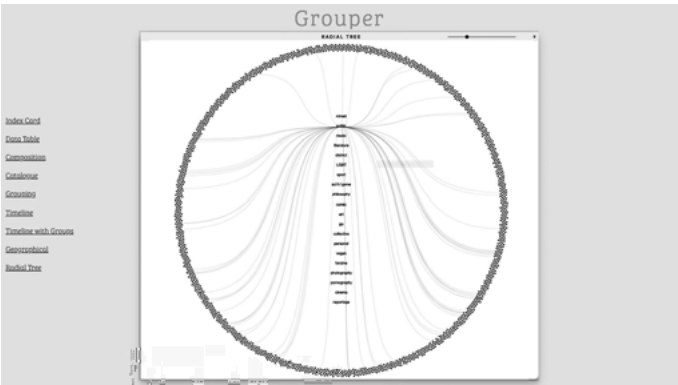
8 Composition: This view allows the user to add items in a canvas and annotate them. Images of the items can be juxtaposed, scaled and masked.



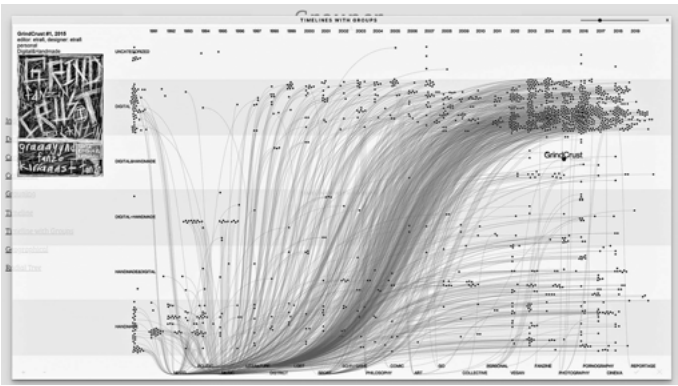
9 Geographical: This view shows all items in the collection on a geographical map. Items can be viewed with abstract dots or with their thumbnails.



10 Radial tree: This view distributes all items in the collection with abstract dots in a circle. In the center, a list of values of a selected property appears. While hovered on with the mouse, the items show their connection to the values and vice versa.



11 Timeline with groups: This view is a variation of timeline, in which items are divided vertically in lanes corresponding to the value of a selected property.



Grouper supports a curator-centered exploration through the possibility of creating multiple frames, each containing one of the aforementioned views, side by side. For example, it is possible to have three frames of index cards open simultaneously in order to compare their properties; or to have two frames showing the data table and one showing visualizations. Thanks to the adoption of different views and constantly updatable data, Grouper supports research that is explorative and iterative. The possibility to cycle through different views provides the researcher with more chances to discover patterns that relate items, outliers, anomalies or biases in the collection. These discoveries can lead not only to the conclusion of the research but also to a new cycle of updating the collection. At any time, the researcher is free to add new items, import other collections as new sources and dynamically observe visualizations updated live to facilitate the recognition of patterns.

Hansen (1999) claims that '[t]he effect of a label is to eliminate and exclude whatever doesn't fit, shut down creativity' while '[p]erceiving an emerging pattern is like gazing at clouds, not knowing exactly what you're looking for and imagining that you see an object'. In her words, adopting a classification and recognizing a pattern are strikingly in contrast since the classification process is a limiting and converging act and the pattern recognition is a creative and divergent one. In our suggestion, by alternating and iterating these two sides of structuring and visualizing collections, we support the emergence of new discoveries.

Grouper can also work as a verification tool for the process advancement, a way to evaluate the collection and critically observe its change-in-time to support the research outcome. The curation of the collection aims to be a vivid subject for discussion, and not just a necessary but unwelcome step to be completed and set aside. A constant versioning system automatically saves updated versions of the same collection every time a change is done. This possibility facilitates the update of the collection without the risk of losing previous versions. Furthermore, it is possible to opportunistically save the state of the system in order to hold onto a process and recall later the state of the enquiry.

An aspect that is being developed as central to the theoretical perspective is the one of collaboration. Collaboration should be implemented with the possibilities of simultaneous access to a common collection or with a comparison of separate collections. Furthermore, commenting should be a possibility provided to the researchers to support research groups, supervisors and external contributors that might be involved in the research, but without having the same access and possibilities as the main researcher.

Grouper – the computational interface or *collection (research) interface* – began as a research tool to overcome practical problems of researchers during their dealings with collections, and evolved into a design research project that seeks to cater for diverse forms of curatorial practices against machinic reductionism.

Highlighting *visualizing collections* as an emerging transdisciplinary field of study, we presented a selection of works consisting of projects and academic studies from various disciplines, and further classified them as *collection graphs*, *collection exhibits*, *collection interfaces* and *collection (research) interfaces* based on the possibilities provided to the audience by those computational interfaces. Consequently, we positioned Grouper under the *collection (research) interfaces* group.

In order to overcome the authoritative and specialist tone of the digital world, we assumed an Object-Oriented Ontology (OOO) lens. In line with OOO, we adopted critical and ecological approaches and further distinguished a series of esthetic qualities: *translucency*, *surfacing middleware*, *witnessing*, *exploratory*, *dynamism*, *dialogic*, *avowing uncertainty*, *biological view* and *cure*. We distinguished these esthetic qualities to bridge the theoretical and practical perspectives in the conceptualization and prototyping of Grouper. Speaking in terms of those esthetic qualities, Grouper aims at enabling researchers to curate their dynamic and uncertain collections by witnessing through a translucent and dialogic emerging middleware to allow exploratory and critical practices.

In brief, Grouper functions as a research making tool. It prioritizes visualizations of the collections and their groups/classifications whereby researchers use continuous visualizations as a key for iteratively creating new insights. Accordingly, Grouper shifts the role of *visualizing collections* from a tool of ‘delivery’ to a tool of ‘discovery’. For the study of a collection, two detailed lists for technical and curatorial features were determined in relation to the esthetic qualities – and thus to the theoretical background – and nine views were conceptualized and designed, which are *index card*, *data table*, *catalog*, *timeline*, *grouping*, *composition*, *geographical*, *radial tree* and *timeline with groups*, in relation to the overall interface and its two main actions – views for initiating and updating a collection and views for visualizing a collection. With these features, Grouper enables simultaneous classification, pattern recognition, verification and collaboration of the collections.

Grouper is an ongoing and evolving project. It has been developed iteratively through designing, testing and researching in the context of five different collections. These are: the Turkish cigarette packages (1900s–2010), the brands of the Italian Central Archives of the State (1948–1970), the Turkish and Middle Asian musical instruments (2019), the Turkish fanzines (1990–2018) and KulturPlant (2019).

Grouper is now under refinement in order to be released publicly online accompanied by its source code. Releasing the interface as an open source project is a way to involve a broader community and improve collaboration and development.

This phase has been postponed so far due to the ongoing development and the need of extensive documentation to be released contextually in order to allow people's contributions and adoption.

Furthermore, a visual classification feature powered by machine learning algorithms is planned as a future work. This implementation will allow automatic classifications, for example by colors and other simple elements, as well as more complex classifications such as semantic recognition of things and people. The adoption of these techniques might influence the discovery and therefore critically question the bias of trained algorithms. Machine learning will likely challenge the theoretical perspective of *collection (-) interfaces*; however, the contribution of a machine-object as a research partner will certainly curiously alter the Grouper ecology.

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- 1 We describe Grouper using the term 'computational interface' or merely 'interface' as opposed to other terms such as 'software', 'computer program', 'platform' or 'application' in order to reveal and emphasize its relation with an audience.
 - 2 This includes disciplines such as art and design history, museum studies and digital humanities. Two studies by academic scholars from the field of design history can be given as examples based on our personal conversations: Elif Kocabıyık's (2012) study on a collection of Turkish cigarette packages and Helena Barbosa's (2011) study on two archives of Portuguese posters.
 - 3 We prefer to use the term 'collection' over other terms that refer to groups of items such as 'archive', 'repertory', 'corpus', 'assemblage', 'series', 'cultural heritage', or 'database'. Whether due to their evaluative tone or their technological bond, each of those related terms carries further theoretical baggage as compared to the relative neutrality of the term 'collection'. The word 'collection' – from *colligere*, 'to bring together into one body or place' (collect) – refers to both the act of collecting and that which is collected. It can further be defined as 'an accumulation of objects gathered for study, comparison, or exhibition or as a hobby' (collection). Pearce (1994, 159) sees collections as being characterized by non-utilitarian gathering, an internal or intrinsic relationship between the things gathered and the subjective view of the owner, as well as being more than the sum of its parts – which corresponds well to the way we would like the term to be understood in the context of this study.
 - 4 By 'visual resources', we primarily refer to 'images' in a broad sense. Other than that, audio material, videos, texts, 3D objects and their combinations can also be the objects of study of various digital collections, and as such, we include them in the wider subject area of our research.
 - 5 Studies such as Algee et al. (2012), van Bree and Kessels (2014) and Haubt and Taçon (2016) present a similar selection of tools.
 - 6 Walker (1989) makes this assumption by linking the growth of design museums, galleries, archives and exhibitions to the increase in object-centered histories. Our own assumption depends on observational facts, including the online websites and academic studies produced around this topic in our digital era.
 - 7 A selection of works – projects and academic studies from various disciplines – is presented and classified in terms of their inclusiveness – relation with an audience – in the following section of this paper.
 - 8 The term 'curation' – from *curare*, 'to take care of' – has changed substantially through time with the various shifts in understanding of what specific roles the function of a curator might encompass: a curator nowadays, amongst other things, can be a producer, commissioner, exhibition planner, educator, manager and organizer (George 2015); furthermore, a researcher, keeper, interpreter and collaborator (Milliard et al. 2016). In this study, we use the term 'curator' mainly to refer to researchers, data managers, interpreters and keepers of digital collections who all, in their different ways of 'dealing with' these collections, can be said to take part in acts of 'curation'. In this study, by the term 'curate' we also mean other research-related actions such as create, plan, explore, observe, discover, analyze, recognize, interpret, synthesize, present, document or exhibit.
 - 9 Meehan (2009) writes about the 'historical standpoint of the archivist and her active role in shaping the records' thoroughly in her study.

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- 10 Graham Harman used Object-oriented philosophy in 1999 in his doctoral dissertation, which was later published in 2002.
 - 11 In other words: 'research through design'. This approach is thoroughly clarified by Wolfgang Jonas (2007) in his study.
 - 12 In the sense that Wolfgang Jonas (2016, 70) builds on the words of Glanville: '...research practice is a specific form of a design process. That means research practice has been modelled as a component of the design process'.
 - 13 The Turkish cigarette packages (1900s–2010), the brands of the Italian Central Archives of the State (1948–1970), the Turkish and Middle Asian musical instruments, the Turkish fanzines (1990–2018) and KulturPlant.
 - 14 Coined by Nigel Cross in 1982.
 - 15 For example: Windhager et al. (2019) use 'visualization of cultural heritage collection data' and 'visualizations of CH collections', Boyd Davis and Krautli (2015) use 'visualization tool specifically tailored to the peculiarities of collections data' and 'visualization tool designed for visual analysis of digital cultural collections', Glinka et al. (2017) use 'visualizing cultural collections', Whitelaw (2012) uses 'collection interfaces' and 'generous interfaces'.
 - 16 Various disciplines such as information technology, software engineering, digital humanities, communication studies and design act together in this field of study.
 - 17 Bogost, Ferrari and Schweizer (2010) classify infographics as explanatory, directed and exploratory. In this classification the degree of freedom for exploring infographics gradually increases. We use a similar approach in our classification of *visualizing collections*.
 - 18 For example: 'facetscape' visualizations of Europeana (Seifert et al. 2014) and 'moviebarcodes' (Burghardt et al. 2017).
 - 19 For example: 'bubble packing of reciprocal image of Italy and China' (Fagiolini et al. 2014), 'stext' of Medical Officer of Health (Vane 2018, Vane 2020), 'slice histogram' and 'growing entourage plot' (Crockett 2016).
 - 20 Dörk, Pietsch and Credico (2017) explore in detail the relevance of a multi-view approach.
 - 21 Whitelaw (2015) gives three project examples that are 'Manly Images' (MI), 'Australian Print and Printmaking' (AP) and 'Discover the Queenslander' (DQ). Within these projects he presents different views of collections that are: 'browsable mosaic-tile' (MI, DQ), 'sortable array of tiles for actors' (AP), 'timeline with a grid thumbnail for the works' (AP) and 'navigable overview' (DQ). Other examples of *collection exhibits* include the studies of Hinrichs et al. (2008), Kramer-Smith et al. (2007), Glinka et al. (2017) and Bludau et al. (2020).
 - 22 For example: 'VIJKS' from the Rijksmuseum (Vijks 2017).
 - 23 These features are helpful in defining what the computational interfaces are and what they can do. 'Representation: The primary page or screen should show a meaningful representation of every item in the collection. Organization: The user should be able to adjust various controls in order to reorganize the images. Depth: Each item or image should link to more data. Availability: The available metadata about the images should determine the tools available. Multiplicity: When possible more than one image should be available, so that the user can choose among alternatives. Coherence: The visual organization of the images should bear meaning that is apparent to the user. Selection: The user should be able to mark the images somehow, so that is possible to keep track of them.' (Morse et al. 2019).
 - 24 Morton explores the relation between OOO and ecology theory in his several books, such as 'Ecology Without Nature' (2009), 'The Ecological Thought' (2010) and 'Being Ecological' (2018).
 - 25 Fuller (2005) extends the use of ecology to media and interfaces.
 - 26 Davenport and Prusak (1997) defines these four attributes as: '1) integration of diverse types of information; 2) recognition of evolutionary change; 3) emphasis on observation and description; 4) focus on people and information behavior'.
 - 27 Bardzell and Bardzell (2013) broaden the common definition of critical design by rooting their reflection on critical theory in order to enrich the literature of the design discipline.
 - 28 Bolter and Gromala (2003) have extensively discussed the relevance of transparency and opacity with regards to the design of interfaces.
 - 29 The reference here is twofold: black box as artist and glass box as scientist in Jonas (2007, 193) as well as black box interfaces in Drucker and Svensson (2016).
 - 30 Drucker and Svensson (2016) broaden the concept of middleware, which in computing terms is a software that acts as a bridge between an operating system or database and applications, stating that a middleware is something related to databases, content management systems or platforms, physical infrastructure and witnessing. To highlight its conceptual aspect, they even propose the formula 'intellectual middleware'.

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- 31 Uncertainty is a richly explored aspect in visualization studies (among others Boyd Davis and Krautli 2015, Windhager et al. 2019, Vane 2020), in digital humanities (Jänicke et al. 2015) as well as in critical design (Gaver et al. 2004).
 - 32 We refer here to the double diamond diagram presented by the Design Council (2005) in which *discover*, *define*, *develop* and *deliver* phases describe the process of general research.

References

- Addis, Matthew, Kirk Martinez, Paul Lewis, James Stevenson and Fabrizio Giorgini (2005). 'New Ways to Search, Navigate and Use Multimedia Museum Collections over the Web.' *Museums and the Web 2005*, edited by J. Trant and D. Bearman, *Museums and the Web 2005*, Toronto: Archives and Museum Informatics.
- Algee, Lauren, Jefferson Bailey and Trevor Owens (2012). 'Viewshare and the Kress Collection: Creating, Sharing, and Rapidly Prototyping Visual Interfaces to Cultural Heritage Collection Data.' *D-Lib Magazine* 18, no. 11/12.
- Barbosa, Helena (2011). '*Uma História do Design do Cartaz Português do Século XVII ao Século XX*.' PhD diss., Universidade de Aveiro.
- Bardzell, Jeffrey and Shaowen Bardzell (2013). 'What Is 'Critical' about Critical Design?' *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems – CHI '13* 3297 the SIGCHI Conference, Paris: ACM Press.
- Berardi, Franco (2017). *Futurability: The Age of Impotence and the Horizon of Possibility*. London: Verso Books.
- Bludau, Mark-Jan, Viktoria Brüggemann, Anna Busch and Marian Dörk (2020). 'Reading Traces: Scalable Exploration in Elastic Visualizations of Cultural Heritage Data.' *Computer Graphics Forum* 39, no.3: 77–87.
- Bogost, Ian (2012). *Alien phenomenology, or, What it's like to be a thing*. Minneapolis: University of Minnesota Press.
- Bogost, Ian, Simon Ferrari and Bobby Schweizer (2010). *Newsgames: Journalism at Play*. Cambridge: The MIT Press.
- Bolter, Jay David and Diane Gromala (2003). *Windows and mirrors: Interaction Design, Digital Art, and the Myth of Transparency*. Cambridge: The MIT Press.
- Bonsiepe, Gui (1999). *Interface: An approach to design*. Maastricht: Jan van Eyck Akademie.
- Boyd Davis, Stephen and Florian Kräutli (2015). 'The Idea and Image of Historical Time: Interactions between Design and Digital Humanities.' *Visible Language* 49, no.3: 100–119.
- Bree, Pim van and Geert Kessels (2013). '*Nodegoat: A Web-based Data Management, Network Analysis and Visualisation Environment*'.
- Bree, Pim van and Geert Kessels (2014). 'Traiblazing, Object-Oriented Navigation in Nodegoat.' *The Search Is Over! Exploring Cultural Collections with Visualization*, London.
- Bryant, Levi (2011). *The Democracy of Objects*. London: Open Humanities Press (New metaphysics).
- Burghardt, Manuel, Katharina Hafner, Laura Edel, Sabrin-Leila Kenaan and Christian Wolff (2017). 'An Information System for the Analysis of Color Distributions in Movie Barcodes.' *Everything Changes, Everything Stays the Same? Understanding Information Spaces. Proceedings of the 15th International Symposium of Information Science (ISI 2017)* 356–358, Berlin, Germany: Humboldt-Universität zu Berlin.
- Cockburn, Andy, Amy Karlson and Benjamin B. Bederson (2008). 'A Review of Overview+detail, Zooming, and Focus+context Interfaces.' *ACM Computing Surveys* 41, no. 1: 1–31.
- collect. (2020). In *Merriam-Webster.com*. Retrieved August 15, 2020 from <https://www.merriam-webster.com/dictionary/collect>.
- collection. (2020). In *Merriam-Webster.com*. Retrieved August 15, 2020 from <https://www.merriam-webster.com/dictionary/collection>.
- Crockett, Damon (2016). 'Direct Visualization Techniques for the Analysis of Image Data: The Slice Histogram and the Growing Entourage Plot.' *International Journal for Digital Art History*, no. 2, Heidelberg: University Library Heidelberg.
- Cross, Nigel (1982). 'Designerly Ways of Knowing.' *Design studies* 3, no. 4: 221–227.
- Davenport, Thomas H. and Laurence Prusak (1997). *Information Ecology: Mastering the Information and Knowledge Environment*. New York: Oxford University Press.

-
- Dörk, Marian, Sheelagh Carpendale and Carey Williamson (2011). 'The Information Flaneur: A Fresh Look at Information Seeking.' *Proceedings of the 2011 Annual Conference on Human Factors in Computing Systems – CHI '11*, Vancouver: ACM Press.
- Dörk, Marian, Christopher Pietsch and Gabriel Credico (2017). 'One View Is Not Enough: High-Level Visualizations of a Large Cultural Collection.' *Information Design Journal* 23, no. 1: 39–47.
- Drucker, Johanna and Patrik Svensson (2016). 'The Why and How of Middleware.' *Digital Humanities Quarterly* 10, no. 2.
- 'Eleven Lessons: Managing Design in Eleven Global Brands.' (2005). Design Council.
- Fagiolini, Giulio, Paolo Ciuccarelli and Yang Lei (2014). 'The Big Picture: A Visual Exploration of the Reciprocal Image of Italy and China through Search Engines.' *The Search Is Over! Exploring Cultural Collections with Visualization*, London.
- Feinberg, Melanie (2017). 'Reading Databases: Slow Information Interactions beyond the Retrieval Paradigm.' *Journal of Documentation* 73, no. 2: 336–356.
- Feinberg, Melanie, Daniel Carter and Julia Bullard (2014). 'A Story without End: Writing the Residual into Descriptive Infrastructure.' *Proceedings of the 2014 Conference on Designing Interactive Systems – DIS '14* 385–394 the 2014 conference, Vancouver: ACM Press.
- Ferraris, Maurizio (2015). *Manifesto of New Realism*. Albany: State University of New York Press.
- Fuller, Matthew (2005). *Media ecologies: Materialist Energies in Art and Technoculture*. Cambridge: The MIT Press.
- Gaver, William, Andy Boucher, Sarah Pennington and Brendan Walker (2004). 'Cultural Probes and the Value of Uncertainty.' *ACM interactions* 11, 53–56.
- George, Adrian (2015). *The Curator's Handbook: Museums, Commercial Galleries, Independent Spaces*. London. New York: Thames & Hudson.
- Glinka, Katrin, Christopher Pietsch and Marian Dörk (2017). 'Past Visions and Reconciling Views: Visualizing Time, Texture and Themes in Cultural Collections.' *Digital Humanities Quarterly* 11, no. 2: 1–18.
- Goodall, Simon, Matthew Addis, Mike Boniface, Paul Grimwood, Sanghee Kim, Paul Lewis, Kirk Martinez and Alison Stevenson (2003). 'SCULPTEUR: Towards a New Paradigm for Multimedia Museum Information Handling.' *International Semantic Web Conference* 582–596.
- Hansen, Marthe Y. (1999). 'Graphic Tools for Thinking, Planning, and Problem Solving.' In *Information Design*, edited by Robert Jacobson, 193–220. Cambridge: The MIT Press.
- Harman, Graham (2002). *Tool-being: Heidegger and the Metaphysics of Objects*. Chicago: Open Court.
- Haubt, Robert A. and Paul S. C. Taçon (2016). 'A Collaborative, Ontological and Information Visualization Model Approach in a Centralized Rock Art Heritage Platform.' *Journal of Archaeological Science: Reports* 10: 837–846.
- Hinrichs, Uta, Holly Schmidt and Sheelagh Carpendale (2008). 'EMDialog: Bringing Information Visualization into the Museum.' *IEEE Transactions on Visualization and Computer Graphics* 14, no. 6: 1181–1188.
- Jänicke, Stefan, Greta Franzini, Muhammad Faisal Cheema and Gerek Scheuermann (2015). 'On Close and Distant Reading in Digital Humanities: A Survey and Future Challenges.' *Eurographics Conference on Visualization (EuroVis) – STARs*. The Eurographics Association.
- Jonas, Wolfgang (2007). 'Design Research and Its Meaning to the Methodological Development of the Discipline.' In *Design Research Now*, edited by Ralf Michel, 187–206 Basel: Birkhäuser.
- (2016). 'Text vs. Artefact in Design Research? A Strange Question!' In *Design as Research*, edited by Gesche Joost et al., 70–76 Basel: Birkhäuser.
- Kocabiyyik, Elif (2012). 'Evolutionary Perspective for Design: Describing the Change in Design of Cigarette Packages from Turkey.' PhD diss., Istanbul Technical University.
- (2016). 'A Discussion on Methodology of Dating Everyday Objects in Design History Studies.' *Design History Society Conference 2016*, London.
- Kramer-Smyth, Jeanne, Morimichi Nishigaki and Tim Anglade (2007). 'ArchivesZ: Visualizing Archival Collections'.
- Langrish, John Z. (1993). 'Case Studies as a Biological Research Process.' *Design Studies* 14.4: 357–364.
- (1999). 'Different Types of Memes: Recipemes, Selectemes and Explanemes.' *Journal of memetics* 3, no. 2: 109–122.
- Lialina, Olia (2012). 'Turing Complete User.' *Contemporary Home Computing* 14.
- Mäkelä, Eetu, Eero Hyvönen and Tuukka Ruotsalo (2012). 'How to Deal with Massively Heterogeneous Cultural Heritage Data – Lessons Learned in CultureSampo.' *Semantic Web* 3, no. 1: 85–109.
- Mauri, Michele, Azzurra Pini, Daniele Ciminieri and Paolo Ciuccarelli (2013). 'Weaving Data, Slicing Views: A Design Approach to Creating Visual Access for Digital Archival Collections.' *Proceedings of the Biannual Conference of the Italian Chapter of SIGCHI on – CHIItaly '13* 1–8 the Biannual Conference of the Italian Chapter of SIGCHI, Trento: ACM Press.

-
- Meehan, Jennifer (2009). 'Making the Leap from Parts to Whole: Evidence and Inference in Archival Arrangement and Description.' *The American Archivist* 72, no. 1: 72–90.
- Milliard, Coline, Rafal Niemojewski, Jonathan Watkins, Ben Borthwick and Natasha Hoare, eds. (2016). *The new curator: (researcher), (commissioner), (keeper), (interpreter), (producer), (collaborator)*. London: Laurence King Publishing.
- Morse, Christopher, Vincent Koenig, Carine Lallemand and Lars Wieneke (2019). 'Art in Rich-Prospect: Evaluating Next-Generation User Interfaces for Cultural Heritage.' *MW19*, Boston.
- Morton, Timothy (2009). *Ecology without Nature: Rethinking Environmental Aesthetics*. Cambridge: Harvard University Press.
- (2010). *The Ecological Thought*. Cambridge: Harvard University Press.
- (2018). *Being Ecological*. Cambridge: The MIT Press.
- Nowvieskie, Bethany, David McClure, Wayne Graham, Adam Soroka, Jeremy Boggs and Eric Rochester (2013). 'Geo-Temporal Interpretation of Archival Collections with Neatline.' *Literary and Linguistic Computing* 28, no. 4: 692–699.
- Pearce, Susan M. (1994). 'The Urge to Collect.' *Interpreting Objects and Collections*, 157–159. London: Routledge.
- Peters, John Durham (2001). 'Witnessing.' *Media, Culture & Society* 23, no. 6: 707–723.
- Rafferty, Pauline and Rob Hilderley (2007). 'Flickr and Democratic Indexing: Dialogic Approaches to Indexing.' *Aslib Proceedings* 59, no. 4/5: 397–410.
- Ratto, Matt (2011). 'Critical Making: Conceptual and Material Studies in Technology and Social Life.' *The Information Society* 27, no. 4: 252–260.
- 'Rijks Studio'. (2020). [Online]. <https://www.rijksmuseum.nl/en/rijksstudio>
- Robles-Anderson, Erica and Patrik Svensson (2016). 'One Damn Slide after Another: PowerPoint at Every Occasion for Speech.' *Computational Culture*, no. 5.
- Ruecker, Stan, Milena Radzikowska and Stéfan Sinclair (2016). *Visual Interface Design for Digital Cultural Heritage: A Guide to Rich-Prospect Browsing*. New York: Routledge.
- Savasta, Daniele (2015). 'Appendici del Futuro: interfacce collettive per l'emancipazione sociale.' PhD diss., Iuav University of Venice.
- Seifert, Christin, Johannes Jurgovsky and Michael Granitzer (2014). 'FacetScape: A Visualization for Exploring the Search Space.' *18th International Conference on Information Visualisation*, 94–101.
- Shneiderman, Ben (1996). 'The Eyes Have It: A Task by Data Type Taxonomy for Information Visualizations.' *Proceedings of the 1996 IEEE Symposium on Visual Languages*, 336–343 USA: IEEE Computer Society.
- Svensson, Patrik (2018). 'Contemporary and Future Spaces for Media Studies and Digital Humanities.' In *The Routledge Companion to Media Studies and Digital Humanities*, edited by Jentery Sayers, 152–161. New York: Routledge.
- Tufte, Edward Rolf (2001). *The Visual Display of Quantitative Information*. Cheshire: Graphics Press.
- (2003). *The Cognitive Style of PowerPoint*. Cheshire: Graphics Press.
- Vane, Olivia (2018). 'Text Visualisation Tool for Exploring Digitised Historical Documents.' *Proceedings of the 19th International ACM SIGACCESS Conference on Computers and Accessibility – DIS '18*, 153–158, Hong Kong: ACM Press.
- (2019). 'Cultural Visualisation and the Value of Simplicity'. *EuropeanaTech* 15.
- (2020). 'Timeline Design for Visualising Cultural Heritage Data.' PhD diss., Royal College of Art.
- 'VIJS. Visualizing the Rijksmuseum.' (2017). [Online]. <http://www.vijks.com>
- Walker, John A. (1989). *Design History and the History of Design*. London: Pluto Press.
- Whitelaw, Mitchell (2012). 'Towards Generous Interfaces for Archival Collections.' *International Council on Archives Congress*, 20–24.
- (2015). 'Generous Interfaces for Digital Cultural Collections.' *Digital Humanities Quarterly* 9, no. 1.
- Windhager, Florian, Paolo Federico, Eva Mayr, Günther Schreder and Michael Smuc (2016). 'A Review of Information Visualization Approaches and Interfaces to Digital Cultural Heritage Collections.' *Proceedings of the 9th Forum Media Technology 2016 and 2nd All Around Audio Symposium 2016* 74–81 *FMT 2016*, Sankt Pölten.
- Windhager, Florian, Paolo Federico, Gunther Schreder, Katrin Glinka, Marian Dörk, Silvia Miksch and Eva Mayr (2019). 'Visualization of Cultural Heritage Collection Data: State of the Art and Future Challenges.' *IEEE Transactions on Visualization and Computer Graphics* 25, no. 6: 2311–2330.

MAKE/BELIEVE OR MAKE-BELIEVE? EXPLORING COLLECTIVE FUTURES THROUGH CRAFTING ENVIRONMENTS IN RESPONSE TO AN IMMERSIVE NARRATIVE

Sjef van Gaalen

A society ruled by the collective intelligence of a rat king. Interspecies sporting events, music festivals and drug trips, or a culture transmitted by the consumption of genetically modified seed-pods of wisdom. These worlds and more came together around cardboard and duct-tape models created by participants in 'Zoö-nomic Futures'¹, a hybrid workshop/performance event performed in September 2019 at the Ruhrtriennale in Bochum², and in February 2020 at Het Nieuwe Instituut in Rotterdam³.

In this workshop we used collaborative crafting as a method through which participant groups could critically and creatively imagine alternative futures, building representations of their living environments as they responded to the events taking place in an overarching narrative.

This combination of an immersive narrative experience with the creation of model living environments draws from and builds upon the approaches of speculative design, experiential futures and critical making. The key distinctions lie in the purpose of the collectively crafted models and the overarching story world. Our approach differs in important ways that can be of interest to other researchers wishing to explore alternative futures through participatory modes of engagement.

Zoö-nomic Futures

The Zoö-nomic Futures workshop takes place within the broader context of the Zoöp Project⁴, a long-term practice-based program of research at Het Nieuwe Instituut in Rotterdam. The project is investigating the design and implementation of a new legal form of multi-species incorporation as an artistic and pragmatic response to the threat of anthropogenic climate change. The Zoöp takes its name from Zoë, for life, in Greek, and coöp for cooperation.

The workshop is a speculative element of the Zoöp project, dealing with the question of how to create a practical ethics for a society that is no longer human-centric. The goal of the workshop is to give participants an experience through which they can imagine cultures in which the needs, desires and



1 February 2020, Het Nieuwe Instituut. Two groups meet to explore the strengths and weaknesses of the cultures they have created, and investigate whether they can be merged to their mutual benefit. Photo: Florine van Rees

qualities of non-human life have stronger representation in human society than they currently do today.

The three-hour experience consists of a speculative narrative performed by two facilitators (Klaas Kuitenbrouwer and myself) with the support of overhead visuals and a live soundscape. Within this performance the workshop assignments take place, designed as challenges responding to the events in the overarching story. Working in groups, the participants take on roles representing human or non-human interests, and collectively build cardboard and duct-tape models of the multi-species communities, or ‘floating habitats’ that they inhabit in the fictional scenario.

The workshop tells the story of a group of humans who take to the ocean in the late twenty-first century in search of a new way of life, and find themselves forced to consider what it means to build a culture in which the rights of non-human life – the plants and animals forming the ecological communities with which they co-exist – are represented on an equal footing with those of humans. A world in which a new mode of cooperation, the Zoöp, is the norm.

The performance moves through three acts, the first of which serves to introduce the world to the participants and the participants to each other, and to get them

started on their building assignment. The second act moves the groups through the challenges of the story. The first crisis comes in the form of a storm, after which each group must deal with a differing disaster scenario. As time passes, the groups ‘develop’ new technologies, and must address the advantages and challenges these bring to their groups, considering the cultures they would like to create. Generations turn over, and the cultures that have developed are brought together to explore strengths and weaknesses, and potentially reconcile their differences. Finally, as the third and closing act, all the groups meet to recount the histories of their development.

Bridges, Gulfs and Gaps

It’s not easy to imagine the conflicts and complications that might arise in a society based on different principles to the world as we currently know it. The function of the overarching narrative we perform, our use of overhead visuals and live soundscape, is to build a story world that provides the conceptual scaffolding within which to do this.

Bringing our participants along into that world is an important part of our method. The effect of closing the gap between reality and fiction has been described both in speculative design, with regard to the creation of artifacts representing a fictional world, and in experiential futures, where a future scenario is simulated. Our method draws from both, but diverges in the way it employs collective crafting to bring our participant groups together around shared images of futures that they build for themselves within the world that is built through the performance.

In speculative design, James Auger describes the requirement for ‘a bridge to exist between the audience’s perception of their world and the fictional element of the concept’⁵. Crossing this ‘Perceptual Bridge’ allows a speculative work to inspire and influence. In Auger’s view, plausibility is key to the suspension of disbelief. If an object or technology is too alien, it will not resonate with its audience, and therefore not be effective. In our case, however, the cardboard and duct-tape constructions created by our participants are not envisioning design concept proposals for future products or services. Their goal is not to present a provocation or speculation in and of themselves, but to serve as a means for collective exploration of an idea.

In futures studies, Stuart Candy’s conception of the ‘Experiential Gulf’⁶ similarly describes a space that exists between an audience’s life as it is directly experienced in the embodied present and an abstract possible vision of the future. Experiential futures encapsulate a wide range of designed artifacts, media and installations, all of which are aimed at establishing depictions of possible futures. The aim in crossing the gulf is to make the scenarios directly relatable, making it easier for diverse audiences to effectively and critically engage with imagining how the changes that they depict would affect one’s own life.



2 Participants at the Ruhrtriennale in Bochum construct and discuss their 'Floating Farm Nutrocia', a culture centered around a nutrient pool through which all living matter is recycled. Photo: Ruben Hamelink

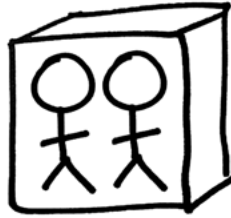
Our narrative experience is also designed to help our participants better inhabit an alternative perspective within their experience of a future scenario, but it diverges here from being an 'experiential future' as defined by Candy. A key point by which experiential futures are distinguished is that the future scenarios are presented in such a way that they can be experienced in 'real life', at a one-to-one scale. The aim of our worldbuilding, however, is not to create a fully immersive fiction, but to set the scene. To sketch outlines providing a setting and a plot of events.

In our case the narration, visuals and soundscape work together to depict a story that our participants experience. We have not, however, created any props, prototypes or models through which the participants can relate to this world. We are not relying on plausibility to 'inspire and influence' or a life-sized depiction of 'lived' experience to achieve suspension of disbelief. Instead, this comes through the experience that the participants co-creatively build for themselves, within the world that is created around through the performance.

Our 'floating habitats' are not architectural models, prototypes, or templates for model societies directly meant to reflect possible physical realities. The models are intended as shared conceptual spaces, physically manifesting the collective discussions and imaginings of our participants as they confront the challenges presented by the overarching narrative.



Design fiction
Speculative design



Experiential futures



Collectively crafted futures

3 Illustrations left and center from original by Stuart Candy⁷, illustration on the right by Sjef van Gaalen.

This physical manifestation of a shared conceptual space is key to our use of collectively crafted models to signify imagined futures, but in their purpose these cardboard creations relate more strongly to the outcomes of critical making workshops than to the artifacts of speculative design, or the multi-media installations employed in experiential futures work.

The difference is well expressed in Matt Ratto's description of how critical making differs from critical design 'The final prototypes are not intended to be displayed and to speak for themselves. Instead, they are considered a means to an end, and achieve value through the act of shared construction, joint conversation, and reflection.'⁸ The shared act of making is emphasized, rather than the evocative object. The value of the co-creation is in the participants together experiencing 'a practice-based engagement with pragmatic and theoretical issues'.

Exploration, Not Speculation

Both the speculative design approach of creating plausible artifacts and experiential futures' life-sized 'lived' experiences rely largely on visions created by designers for the depiction of their futures. The role of the audience is often relegated to that of a consumer or spectator; they do not have any agency in the creation of the speculative world.

In the Zoöconomic Futures workshop we do set out parts of a vision of the future. The workshop narration, visuals and soundscape work together to build a story-world which our participants experience. We have not, however, created any props, prototypes or models through which the participants can relate to this world. They create their own models, building in response to the events that occur. We believe that while our storyworld plays an important part, the true value of the method

used in the Zoönomie Futures workshop is in the experience the participants create together. Creating their own worlds within the scenario we depict gives them, our participants, an opportunity to explore and temporarily inhabit ideas, giving them their own color and texture.

The Zoöp project that this workshop is a part of has a long-term strategic goal of actually instantiating a new legal form in incorporation that represents non-human interests. Most aspects of this, concerning planning, funding, lobbying and legislative work required to make this a reality, fall well outside of the scope of what is addressed in the Zoönomie Futures workshop. Where the workshop does play a part is on a cultural and attitudinal level, the goal being to lead participants to a place where they experience an insight or reflection that changes the way they see or behave in the world.

It's hard to imagine futures in which cultures and societies are structured radically differently from the status quo we are used to today. Research has shown that imagination can support engagement with complex issues such as climate change⁹ by aiding and inspiring collective reflection on the radical effects of the possible changes in natural, as well human, socio-technical and political systems. Being able to think through new forms of society that are drastically different from our current status quo in a structured way can help people to better envision possible change. Even if initial explorations may be somewhat absurd, the act of envisioning these changes can make it easier to believe that change is in fact possible.

The storyworld we built in the Zoönomie Futures workshop outlines the broad events, but it serves primarily not as a way to project our designerly vision of the future, but as a scaffolding for the conversations, reflections, collaboration, and imaginations of our participants. They make the moral and ethical decisions that give their stories form, and the cardboard and duct-tape constructions they build serve as a campfire around which those stories are told. Allowing our participants to invest something of themselves can give them a sense of ownership over the futures they create as they consider the alternative perspectives they are presented with. To us that ownership of the future is more important than any warning or idea embodied in a product, artifact or ideal that we might want to impose.

Our goal in the design of this workshop was for participants to imagine the implications of a complex issue they may not have previously considered, in our case forms of society in which non-human life has rights and representation on equal footing with that of human life. Ultimately the hope is that through creating their own visions of the future, and then going on to share those with others, this ongoing work will achieve steps towards a world in which humanity finds itself in better balance with the ecosystems it inhabits. Not because this is the world we told our participants about, but because they collectively came to this place through the stories that they told together.

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- 1 The Zoöconomic Futures workshop had the working title A Zoöp Aquatic, and was also known under the production titles Extraterritorial Zoöonomy and Extraterritorial Zoöoperations.
 - 2 Klaas Kuitenbrouwer & Sjeff van Gaalen. 2019. Extraterritorial Zoöonomy. Training for the Future. Retrieved January 10, 2020 from <https://trainingforthefuture.org/>
 - 3 Klaas Kuitenbrouwer & Sjeff van Gaalen. 2020. Zoöconomic Futures. <https://research-development.hetnieuweinstituut.nl/en/activities/zoonomic-futures>
 - 4 For more information on the Zoöp Project, visit: <https://zoop.hetnieuweinstituut.nl/>
 - 5 James Auger, 2013. 'Speculative design: crafting the speculation.' *Digital Creativity*, Vol. 24, No. 1.
 - 6 Stuart Candy and Jake Dunagan, 2017. 'Designing an Experiential Scenario: The People Who Vanished.' *Futures* 86:136–153.
 - 7 Stuart Candy and Jake Dunagan, 2017. 'Designing an Experiential Scenario: The People Who Vanished.' *Futures* 86:136–153.
 - 8 Matt Ratto, 2011. Critical Making: 'Conceptual and Material Studies in Technology and Social Life.' *The Information Society*, 27: 252–260.
 - 9 Light, A., R. Wolstenholme & B. Twist 2019. 'Creative practice and transformations to sustainability – insights from research.' SSRP Working Paper No. 2019-1.

POST SOCIAL: TOWARDS DESIGN BEYOND THE HUMAN

Jonas Voigt

In nature we never see anything isolated, but everything in connection with something else which is before it, beside it, under it and over it.

(Wolfgang von Goethe)

Designed Conditions

The question of the human and nature association seems to be more philosophical than designerly. All societies are depending on *nature* to exist, the Western world especially, sees it as a resource that allows for human development: nature is agriculture, nature is the built environment, nature is leisure activities, nature is a commodity for human consumption. We live in, on, and around nature. Natural processes allow us to survive. And yet almost all ‘life is entirely conditioned by designed outcomes of one kind or another’ (Heskett 2005). This means that designers have contributed to the status quo, as they created patterns of consumption influenced by capitalist modes of production, led Human-Centered Design to inform never-ending innovation-cycles of goods and services. This persistent egocentric, competitive and anthropocentric perception of *the human*, defines the root of the environmental crisis. John Heskett describes this type of design as anthropocentric world-making. Others are objecting to this notion of the Anthropocene, saying that environmental degradation is not the result of humanity at large, but of the capitalist modes of production. The colonization of the environment under capitalism is rooted in an ethos that views human beings as separate to and above nature – *earth masters* for whom the planet is an inexhaustible reservoir of natural resources to be exploited (Banerjee 2017). The concept of the ‘Capitalocene’ is precisely looking at socio-political dynamics and the role of the exploitative economies that push an ecosystem collapse. The problem is precisely that almost none of any contemporary design practices are systemically prioritizing the needs of non-human entities and the environment at large, and that is ‘because the way value is generated in contemporary economics depends on the systemic dismissal of ecological priorities’ (Boehnert 2019). One must ask if this thinking of nature, its domination, its subjugation, its manipulation is still feasible for a planet that was and will be unforeseeably altered by human existence (Heyd 2016, xi). What if design is defined as capacity to shape the environment to serve all life on earth?

In an ideal world, all of us – the humans, the lindens, the nightingales, the earth and the water – are partners in symbiotic reciprocity that can only be fruitful if it is based in ‘kinship’ and fair participation, as multi-species feminist theorist Donna J. Haraway proposes. She defines this understanding of togetherness as ‘kin-making’ (2016, 103). The French philosopher, anthropologist and sociologist Bruno Latour goes even further. He expresses in the proceedings of the 2008 annual international conference of the design history society that everything is design – even ‘nature itself – which is in great need of being re-designed’ (2008, 2–10). We must understand and accept that we are nature and that being natural always means to be more than just human. Anne-Marie Willies describes this notion as ontological design: ‘We design our world, while our world acts back on us and designs us’ (2006, 70). I will further argue that a new post-human-centric design paradigm is the only way to face a forthcoming ecocidal dilemma.

Post-Social Design

Post-Social Design addresses the meaning of humanity not in separation but in relation to nature and culture. As we now understand that everything is being designed, it is about time to acknowledge the world’s interdependency. *Post-Social Design* ‘must transcend the limitations of human-centered design’ (Faste 2016). The term ‘Post-Social Design’ provides an alternative framework and expands beyond the human and necessarily to the posthuman. The ambition of this ontological claim might bring clarity and theoretical productivity to new processes and research in *posthuman* design. The concept of the ‘the posthuman’ stands for, as Laura Forlano identified, ‘the non-human, the multispecies, the anthropocene, the more than human, the transhuman and the decentering of the human’ (2017, 17). Forlano points out that humanity will be adaptable with its methods, frameworks, and practices while engaging with ‘non-human knowledge and ways of being in the world.’ She concludes that related practices are not yet developed and grounding *posthuman* theory in practice has yet to be done.

Furthermore, ‘Post-Social’ refers to a society that extends beyond the human, as Eduardo Kohn writes: ‘Beyond [...] exceeds, at the same time that it is continuous with, its subject matter; [design] beyond the human is still about the human, even though and precisely because it looks to that which lies beyond it – a ‘beyond’ that also sustains the human’ (2013, 225). Its modes are manifested not so much in the artifacts of practices, but more in the performative aspects of interventions in the public. A public of disruptions in which multispecies co-existence can provoke and ‘reframe the relation between [entities]’ (Rancière 2009, 72). Post-Social Design is in line with Bruno Latour’s critiques of ‘the sociology of the social’, the usage of society to study society. He proposes a ‘sociology of association’ (actor-network theory)

which tries to study the association of agents, the relational settings of elements (or non-human and human beings). The social becomes a principle of connections, rather than the context of existence (2005, 4–15).

In short, Design must engage with epistemological and ontological concerns. The Post-Social Design paradigm thus emerges in the global search for rapid change and multi-species cohabitation. It states itself as an essential pursuit worthy of further investigation (Koskinen 2006, 29).

Research Process

With a forest, you have to think in terms of 200 or 300 years. I learned to accept that I can't do everything. Nobody can (Mcgrane 2016).

The following research process is non-linear and took a variety of forms. It has been a 'mess' from the beginning until to the very end. Chronologically speaking, trees operate on different time scales, as design projects do. While it takes decades for trees to grow and months, sometimes even years, for them to adapt to the environment, a design thesis adopts a timeframe of several months to complete a full inquiry process. It is an ongoing endeavor. It is the beginning of a deliberate set of experiments, with three examples outlined below. Its experimental research is focused on identifying leverage points and unveiling undefined legal gray-areas to explore practices for social transformation. Its long-term goal is to challenge the concept of the human through transdisciplinary collaborations.

This most recent case study is based on research at The New School regarding urban trees and a series of self-led experiments within the structures of the New York City Parks Department. Through this body of research I have identified three areas of interest: *perception*, *agency* and *rituals*. They need further rigorous attention and treatment, but will be explained through the lens of design-led research in the following sections of this contribution.

Perception is a set of visual and sonic experiments with the perspicacity of natural entities. Photographic mapping exercises and biodata sonification allow for embodied and performative outcomes. *Agency* is a design approach to combine speculation and law. Natural entities receive legal personhood through human-tree marriages. *Rituals* are soil-exchange practices in existing urban infrastructures that allow communication between trees planted in isolation. The following presents the specific interest in trees and the resulting three lines of investigation.

Searching for the forest in the city. Searching for the city in the forest.
(Houjebek 2015)

The term ‘urban forest’ refers to all trees within a city, including street trees, landscaped trees, trees on private property, and forested natural areas. ‘Forested natural areas’ are distinct from street and park trees in their size, biodiversity, composition and management. They connect us to a place with historical native habitats and are the ‘woods’ in cities. The loss of a tree due to a storm in late summer last year and the financialization of green infrastructure fostered my curiosity regarding trees. The New York Parks Department documents the neighbor I lost in April 2019 as ‘Tree Not Found.’ The nearest very same living tree is a Green Ash (*Fraxinus pennsylvanica*) with the ID number 4655133 and a trunk diameter of 17 inches. The ecological benefits it provides to the city are calculated with formulas of the USDA Forest Service’s i-Tree software (Nowak et al. 2018) and measured in dollars per year. 4655133’s stormwater interception of 2,758 gallons is worth 27.30 US dollars, its energy conservation of 1.714 kilowatt-hours, 216.37 US dollars; its capacity to remove air pollutants (including up to 4 pounds of lead), equal 19.40 US dollars; the reduction of carbon dioxide is 2,131 pounds and 7.12 US dollars of value. The total value of annual benefits is 277.31 US dollars per year.¹ Furthermore, this community-based initiative and its volunteers contributed ‘12,000 hours of their own time, worth an estimated 100,000 US dollars, inventorying the city’s trees.’ The massive planting and mapping project the city undertook means that they could then assign an economic value to every single tree, based on the environmental services it performs. Yet another example of quantifying nature in economic values with the aspiration of positioning ‘trees as instruments to offset man-made ecological degradation’ (Pascual and Schwabe 2017). George Monbiot, a Guardian columnist and environmentalist, labels this process as an equivalent for greenwashing carbon dioxide production (Monbiot 2006). This leads back to the former critique of the Western financialization of the environment.

On a global scale, The World Resources reported in June 2018 that tropical forests had lost 39 million acres of tree cover in 2017 alone. ‘That is the equivalent of losing 40 football fields of trees every minute for an entire year,’ writes Mikaela Weisse (Weisse and Goldman 2018). A research analyst at Global Forest finds current global, political, non-governmental and local efforts to reduce deforestation are still insufficient (Ingber 2018). On the other side, scientists are estimating that forest conservation ‘could provide nearly 30 percent of the solution for limiting global temperature rise to 2 degrees C’ (Weisse and Goldman 2018). That means we perceive forests currently as ‘a source and a sink for CO₂’ (Seddon et al. 2019). Following this trend, the UN set a target in 2015 ‘to restore 350 million hectares by 2030 – an area bigger than India’. The *New York Times* reports that forest scientists have



1 Screenshot of The New York City Street Tree Map

started testing how humans might help forests to adapt to climate change. One experiment, known as ‘assisted migration,’ involves physically moving trees northward (Velasquez-Manoff and Khosravani 2019). These practices are only a few examples of human efforts to restore the destructive impact industries once had and still have. Critics of forest regrowth and tree mobilization state that ecosystems and biodiversity will be massively harmed, as a paper by twenty-eight forest ecologists warned in early 2019 (Watson et al. 2019, 1).

After treating trees for two hundred years ‘as expendable and a waste of space’ (Vidal 2018), they become promising holy-grail-like figures. Forests, the new gardens of Eden. Trees, the saviors of the climate crisis. An interesting trend towards utilizing natural entities for the survival of the human species, without acknowledging that these ecosystems and entities might need rights to protect themselves from human impact as well. The biggest problem is that trees operate on different timescales than humans do. Deforestation might only take days, weeks, maybe months, but the growth of native forests takes centuries. If a forest, no matter if it’s an urban forest or not, is gone, then an assemblage of multi-species relationships is lost.

Perception

This line of investigation started with testing ‘expanded’ recording techniques to ‘reveal hidden sounds’ (Poff 2018). One could ask: How might we sonically and/or visually perceive non-human entities and establish ‘post-human’ perception practices?

The creation of contact-microphones, and field testings, enabled an attuning to the sensitivity of sound (sensation produced in the organs of hearing). These experiments produced audio, but more of the surrounding and not of the tree itself, also described as *soundscapes*. They belong to a distinguishable sonic ecology

(Murray Schafer 1977). As an example, at Prospect Park in Brooklyn, one will be able to listen to birdsongs, but also planes passing by in the air. These are two different soundscapes and ecologies. The central insight: the audio recordings reproduced physical surface inputs, body vibrations, or sounds imitating the environment.

Following the results of the contact microphone recordings, exploring other ways of listening was necessary. ‘Acoustemology,’ as it is described in *Sound Worlds* by Steven Feld, means acoustic epistemologies. Feld’s concept expanded this inquiry to: How might sound enable new ways of conceptualizing the being of plants and ultimately give them a ‘voice’ in design processes, in other words, integrating ‘sound as a modality of knowing and being in the world’ (Feld 2009). Since language is the primary system humans use to communicate, scientists were keen on finding out if other, non-human, species have similar systems of sounds (Hedeager 2010, 4). Scientists found that birds not only have a system of sounds, but they have developed a language learning process similar to that of humans (Aitchison 2000, 7–9). But why do we feel the need to compare all communication systems to the way we communicate as humans. Does it matter if languages are not uniquely human (Hedeager 2010, 10)? So, how might we then listen to trees, as they do not use audible noise or sounds for humans to perceive? Additional sonic experiments might foster new understandings of nature-human relations. This is supported by the intrinsic relationship between ‘acoustics and ecologies’ (Ramnarine 2009, 189–190) and by the interdependence between humans and nature.

Not necessarily interested in hearing the forest, but in listening to a tree, one must differentiate between different modes of attention: Hearing and Listening. Hearing describes sounds that are ‘projected into our attention space’ and listening as ‘deliberately [attending] to an audio stream in order to identify salient characteristics or extract information/meaning’ (Hermann and Hunt 2011, 457). Data monitoring activities, or ‘sonifications’ are the auditory equivalent to data visualization (Romans 2007). A Geiger counter clicking when radiation is in close proximity is a simple example of a tool that sonifies data. Here a new set of questions arises: How might we capture and sonify the data of trees? What is data, after all? If we learned how to listen to trees, what would they know? What is stories could they tell (Myers 2017, 74)? To listen to trees is to learn how to inhabit the relationships that give life to source, substance and beauty (Popova 2017).

After reviewing creative data sonification projects and methods, Data-to-sound API’s, were the keyword to look for. Data Garden’s toolkit ‘Midi Sprout’ was the most accessible and is made for creative exploration. The devices are designed to measure micro-voltages and changes in the electrical current, as on the surface of leaves, and then output this data as a stream of MIDI information (Weiner 2016). It operates similarly to lie detectors, or medical EEG’s, which measure the galvanic skin response. An algorithm converts these electrical fluctuations into MIDI data. This biofeedback data is then readable by synthesizers and MIDI software, which then create sonic environments. In the case of plants, the device tells us something about

2 Sound spectrum
created by toolkit Midi
Sprout.



their environment, and how plants will react to changes through touch, light, water and other parameters.

The time spent with the plant, as electric devices interpreted its physiological changes, crystallized the idea that the plants perceive their environmental changes as much as humans and maybe even more so. Natasha Myers, Director of the Plant Studies Collaboratory at York University, examines the utilization of plant-sensing phenomena as inquiry in both the arts and the sciences. She believes that plant sensing phenomena ‘upend our thinking’ and ‘interpret the order of things.’ She proposes decolonizing the human ecological sensorium ‘becoming sensor’ to unlearn the human conception of what *nature* was (Myers 2015, 41).

Using the plants’ biofeedback as a creative prompt led to the creation of a performance: a music improvisation in co-creation with an aloe vera. This performance acted towards disrupting the binaries of nature and culture using Donna Haraway’s term ‘natureculture,’ which insists that the two concepts cannot be separated. The adaption of her non-human animal-centered quote says: ‘[Plants] are not surrogates for theory; they are not here just to think with. They are here to live with’ (2003, 5). This is in reference to Bruno Latour, in what he calls the ‘paradox of modernity.’ It is the division of the world into ‘nature (science) and culture (politics)’ and not acknowledging that we constantly ‘deal with hybrids between these two groups’ (2012, 35). In other words, both push us to see that nature becomes technology becomes human, which equals hybridity.

However, what does it tell us about the secret life of plants? We don’t know. Nobody does. Stacey Harmer’s research at the Department of Plant Biology at UC Davis shows that ‘plants don’t reason, but they certainly have ‘know how’ (Myers 2015, 62). Nonetheless, it is ‘increasingly clear that plants actively monitor a

3 Sound performance around the concept of natureculture with an aloe vera.



continuous flow of sensory information from their environments and respond in ways that profoundly influence their interactions with other organisms' (Mescherand and De Moraes 2014, 433). This refusal to distinguish between nature, culture or technology – through soundscapes – and to accept the claim to any universalism of these categories, is also discussed in contemporary theories and by the hybrid figure of post-human and related concepts, as outlined above. Even if one might not be able to listen to the 'voice of nature', there might be less scientific and technocratic ways of being with and designing, which I will discuss in the section entitled *rituals*.

Whoever has learned how to listen to trees no longer wants to be a tree. He wants to be nothing except what he is. That is home. That is happiness.
(Hermann Hesse (Popova 2012))

Agency

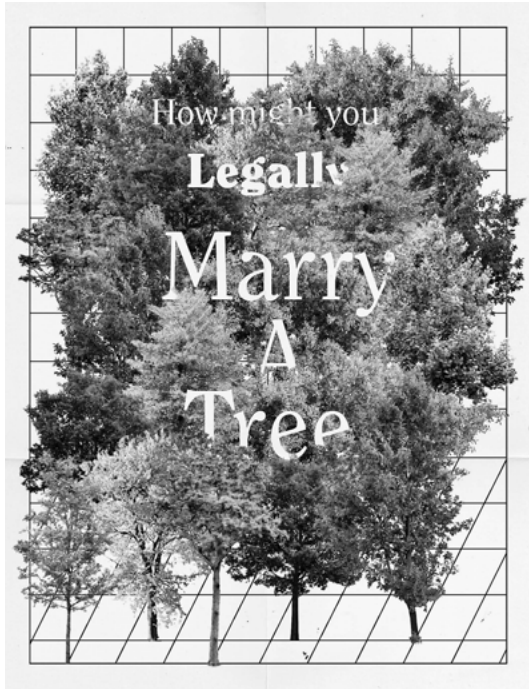
In Toledo, Ohio, citizens have been meeting over the last few years to discuss the water pollution and environmental crisis their communities were facing, especially regarding Lake Erie. In early 2019, with the help of the Community Environmental Legal Defense Fund, they passed legislation giving the lake 'legal personhood', arguing that the lake could protect itself (Tanasescu 2017). In this case, the framework of legal personhood provides a jurisdictional representation of non-human entities in contemporary legal systems. Natural entities become subjects of law. This 'ever-expanding recognition of personhood' (Kimmerer 2017) all started in 1972 with the jurisdictional no-vote in the *Sierra Club v. Morton* case at the US Supreme Court and

the initial discussions around the legal status of nature (or nature's rights, natural rights, state of nature). Subsequently, Christopher Stone published an academic article titled 'Should Trees Have Standing?' which fostered an everlasting discussion in environmental legal theory. It builds upon past precedents of granting rights to ships, corporations and states on behalf of whom human agents speak. Stone expanded on the previous notion of personhood to also include the 'rightless thing' and 'natural-objects' in the case of the environment, forests, oceans, rivers, and others (Stone 1972, 450). In 2010, after many years of academic discourse, Bolivia was the first country to pass the *Law of the Rights of Mother Earth* to recognize Mother Earth as a collective interest of not just humans. A wave of recognition of the rights of personhood followed in New Zealand, Philadelphia, India, Colombia and Ecuador. Ultimately, expanding the human jurisdictional system is the first crucial step towards more-than-human diversity and equity. Upending the hegemony of human systems allows for multiple worldviews to coexist. Nevertheless, could the law and the framework of human rights, even be accountable for such a wicked problem?

Anna Grear (professor of law at Cardiff University, and the founder and editor in chief of the Journal of Human Rights and the Environment) argues that it is wrongheaded to protect nature with human-style rights. International agreements have been required to address the claims of minorities. This marginalization happened already through the abstract and generic idea of 'the human' of the Universal Declaration of Human Rights (Grear 2019). In a very recent interview at Harvard Graduate School of Design, post-humanist Rosi Braidotti voiced similar concerns: "There is also a lot of resentment from women, the LGBTQ+ community, colonized people, and the descendants of slaves who say, "We were never considered fully human, so why should we care about this crisis?" Braidotti encourages 'bridge-building' by sharing this feeling of pain. She outlines that the 'affirmation of counter-identities' must be understood and politically recognized. One must ask, how might we use 'collective positivity' in the face of human extinction (Shafaieh 2019)? How might we postulate a reality that does not prioritize the human perspective, and endeavors to take into reckoning a world before humans? What might one obtain from the transnational trend of granting natural rights?

Nature must overcome being a 'singular object of technical governance.' It is not yet able to account for 'cultural differences and multiple interpretations of the nonhuman world,' outlines Rafi Youatt, professor of politics at The New School (Youatt 2017). Given what is at stake, it might be our only chance to capitalize on the current momentum to truly decenter the human while creatively rethinking the framework of 'rights,' detached from human exceptionalism and universalism. This chance might lead to a realization of interconnectedness, a shared feeling of suffering, joy and symbiotic entanglement, and to a future worth living.

This exploration, along with creative sessions and core challenge mappings, led to the idea of human-tree marriage – a design activist approach of granting marital and legal rights to trees. It might even provide ways to grant citizenship



4 Poster questioning the idea of human-tree marriage.

for legal aliens of the United States of America. The previously described notion of post-social communities gets a more profound meaning and an appropriate context, as this practice would open up the notion of society, by expanding marriages toward the non-human. Speaking of that, it would also include an array of financial and legal benefits: the ability to open joint bank accounts, the right to receive marriage or family rates with healthcare providers and other insurances, the heritage of property, the right to sue in a case of wrongful death or loss of consortium, and many more (Otterstrom 2019). Particularly impressive is the ability to file joint federal and state tax returns to reimburse the environmental services a tree is providing, and the entitlement to shared marital property, which might even allow trees to own themselves, similar to a Jackson Oak in Athens, Georgia, United States (Mueller et al. 2011).

Perhaps it might then dawn on us that we are fully human only when we deeply love and respect not only other humans, but also the vast other-than-human world that enfolds and sustains us.

(Stephan Harding 2012)

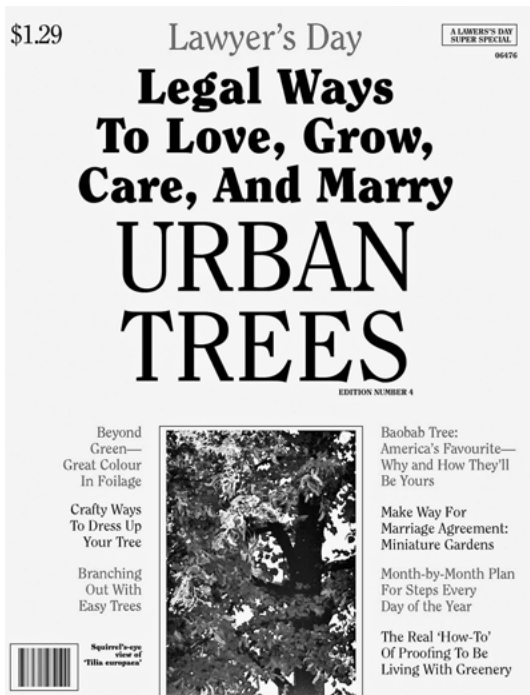
Supplementary research showed that tree marriages do exist in certain cultures of this planet, as symbolic (marital) unions, as environmental protectionism, and as artistic and religious practices. For example, in Mexico, tree-marriage is thought to be an act to 'honor the environment and protect the Oaxaca state.' Women environmental activists are doing the same to protect trees from deforestation (Barbour 2018).

Knowing all of this and after several discussions, I created a magazine to capture these central insights. It uses a speculative narrative of an alternate reality where people would co-exist with trees. The goal was to develop visions for everyday life that provoke critical thinking around other possibilities, rather than communicating a single idea. This type of design works best when it is not showing prevailing perspectives. Might this be a way to turn 'tools of domination' – in this case, law – into 'tools for conviviality' for non-humans (Illich and Lang 1973)?

The magazine is aiming to attract amateurs with a general interest in law, biology, botany, and popular culture. Its title is 'Lawyer's Day,' and this unique issue is asking, what are legal ways to love, grow, care for, and marry urban trees? It introduces readers to a speculative scenario of the 'Trehe Cult,' which describes practices around tree-marriages; building off concerns for environmental degradation and the need for rapid change. It provokes that common human-made social relations, like marriages and families, are constructs of the past. New forms of togetherness are emerging. The Pluriversal Declaration of Rights incorporate human and non-human entities. The cults' people discovered meaningful ways of living and lengthening life to the timespan of trees. On the one side, the human species has many different senses and other abilities to connect to its environment. On the other side, trees have limited capabilities, like pheromone exchange and mycorrhizal cooperation, and are not mobile at all. Various stages of preparation allow for togetherness and mutual exchange over time.

Ecologist Suzanne Simard, a professor of Forest Ecology at the University of British Columbia in Canada, discovered during thirty years of studying forests that tree roots link the plants through mycorrhizal fungal networks, which allow trees to communicate and to share resources. Kevin Beiler, one of her PhD students, used DNA analysis to map the network of mycorrhizal fungi and Douglas fir trees in the forest. He proved that almost all trees were connected. Older trees are 'highly linked' in contrast to smaller and younger trees (Toomey 2016). This evidence of 'tree cognition, microbiome collaborations, and forest intelligence' might help us to understand ecosystems more holistically. It also fosters a 'greater human empathy and caring for the health of our forests' (Simard 2018, 191–213).

The idea of human-tree networks allows for symbiotic relationships between both entities, enabled through carbon-dioxide exchange. The fact that trees share information via carbon dioxide might allow humans to do the same, as the gas they exhale is '4 per cent to 5 per cent by volume of carbon dioxide (about a 100 fold increase over the inhaled amount)' (Dhami et al. 2015). Trehe people created docking stations to dissolve in mycorrhizal networks. They connect trees, fungi,



5 'Lawyer's Day'



6 Prototype of carbon storage and carbon exchange device.

micro-organisms and humans. This human-non-human practice informed a prototype. It connects to the root network of a street tree and has an opening for humans towards the sidewalk. How much carbon dioxide would one have to exhale to see how a tree reacts?

The creation of this design artifact allowed the synthesis of many research aspects into a concrete idea to receive feedback (i.e., from a biology laboratory in Brooklyn). In this case it was very dismissive and discouraging. Carbon storage and carbon exchange are incredibly complex biological processes that involve extremely expensive and scientific types of machinery (like the LI-8100A Automated Soil CO₂ Flux System²) and laboratory conditions, which is not the case on the streets of New York City. The feedback led to suspending the idea, but hints towards microbial consistencies of soil led to the third line of investigation, discussed in the section below, Rituals.

Rituals

New York City's general canopy cover amounts to 7 million trees, of which its urban forest comprises 666,134 street trees. Overall, New York City's urban forest has a value of 5.2 billion US dollars in replacement costs. The life of a NYC street tree is not easy; trees are exposed to a variety of risks, from pedestrian and vehicular traffic to construction work and dog waste. Scientists are concerned about steadily increasing 'human-induced soil compaction,' as the world population and urbanization rates grow. This is a global problem of economic and ecological importance (Kozlowski 1999, 596). Compacted soil is devoid of oxygen (Barnard 2002, 227). Street trees' roots below the soil surface take in oxygen to give off CO₂ and other gases, as opposed to the photosynthesis of the leaves (Barnard 2002, 269). Very compacted soils typically do not recover naturally. That will lead to 'physiological dysfunctions' of the plants (Kozlowski 1999). Aerating the soil with cultivators is an essential step in the street tree care process and helps counter soil compaction (Barnard 2002, 227). Other important problems include litter, waste concrete and plaster in the tree bed. Such 'high calcium carbonate content' results in an 'alkaline soil pH' which will lead to 'nutrient imbalance' and further 'tree-growth constraint.' The importance of good soil quality has not entered the 'tree-planting agenda' yet (Jim 2001, 824–825). Mulching is especially useful for trees in landscapes that receive minimal care, such as street trees. Mulches 'improve [the] soil health' and invite other species' populations to coexist. Further benefits are improvement of soil moisture, reduction of soil erosion and compaction, maintenance of optimal soil temperatures and increase of soil nutrition, ... and esthetic aspects (Chalker-Scott 2007).

As street trees suffer a variety of environmental stress factors, investigations of 'street tree environments in New York City revealed that the immediate microclimate around the tree can be very different' from each other (Bassuk and Whitlow 1985). The Parks Department provided an unpublished study, showing that every

tree bed possessed different pH-values and conclusively different micro-organism communities. Furthermore, street trees enhance biodiversity by providing food, habitat and landscape connectivity for urban fauna (Mullaney et al. 2015, 158).

[The urban forest is] an emergent and expanding multilayered cacophonous web of mutually constitutive, living and growing thoughts.
(Eduardo Kohn 2013, 79)

The idea of soil-exchange to enhance tree communication was the result of extensive field research, brainstorming, ideation, sketching, interviews with experts at NYC Parks and emerged through validation from others like the director of SymbioticA, the Center of Excellence in Biological Arts at the University of Western Australia. Engagement with the New York City Department of Parks and Recreation's Super Steward program enables individual certifications for independent work on NYC Parks property. The outcome of this line of investigation is soil-exchange practices, consisting of transplantations, clover plantings, mappings, and a designed object. These would allow interspecies communication and foster an acknowledgment of ecosystem services that trees provide to us humans. A new relational economy emerges, which has empathy-sustainability at its core, 'mediated through place and identity' (Brown et al. 2019).

This process is intentionally defined as a practice, rather than a Parks program, to avoid supremacist thinking, as philosopher Clare Palmer warns: 'The idea of stewardship originates in a society which is based on slavery and serfdom and represents a despotic and autocratic form of government' (Palmer 2006). This practice is rooted in a 'gift economy' as Robin Wall Kimmerer, professor of *Environmental and Forest Biology* at the State University of New York College of Environmental Science and Forestry, writes in her book *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. She is criticizing the commodification of nature from an indigenous perspective and proposes this perspective as an alternative to the 'private property economy:' 'In Western thinking, private land is understood to be a 'bundle of rights,' whereas in a gift economy property has a 'bundle of responsibilities' attached' (2013, 28). This line of thinking is also embedded in 'ceremonies', as they 'have the power to focus attention to a way of living awake in the world' (2013, 36). It fosters a feeling of empathetic belonging to a place as well as to non-human entities and the built environment where the practices are happening.

Plant roots attract microbes (bacteria and fungi) to form the soil community. They enhance nutrient cycling, reduce soil compaction, and control disease and pests. Soil-ecology exchange allows different street trees to communicate on a microbial level, as one teaspoon of healthy soil contains 20,000–30,000 different species of bacteria. 'There are more microbes in a teaspoon of soil than there are



7 Soil-exchange devices in use.

people on the earth' (Hoorman and Islam 2010). Finally, the amount of soil should not exceed four pints, as soil ecology will also resist overwhelming stresses.

All the necessities for exchanging soil are facilitated and incorporated in a custom-made cart. A sheet of plywood is mounted on large rubber casters that serve as the base. The rolling frame is easily movable, and it holds up to 250 kilograms. Modular containers are assembled on top of it. They can be optimally stacked and are designed for use in all common shelving systems. A low weight in combination with a load of 20 kilograms makes the boxes optimally suitable for mobile use. They contain, from the bottom to the top: mulch, gardening tools, two separate containers for soil samples, and the last box serves as utility storage: booklets, maps, and other personal items.

I am able to keep track of which trees have been treated by marking through cover planting (a common weed and nitrogen fixer) which also helps to improve soil conditions. This is an adaption of current research at NYC Parks, which questions the overall practice of weeding, and considers using clover planting as a low-cost alternative to maintenance practices like cultivating. Next, there are worksheets that

allow you to study if a tree would change over time. Finally, one would send the images of the trees, special features, issues one found and an image of the worksheets to an email, where one collects, evaluates and archives all the data. The data will be presented online and in temporary gatherings, where community discussions and knowledge exchange would happen.

The future of nature, then, is a cosmological question. Before making claims about what the future of nature will be, I suggest that we undertake the cosmological work on the make-up of earth itself, its origins, and how multiple cosmologies interact as ideas, architectures, and materials in space (Bobette 2018).

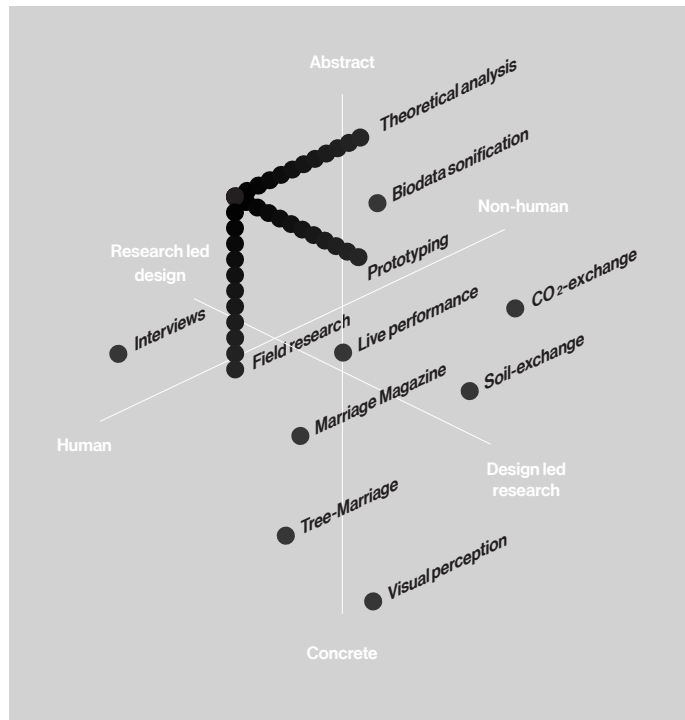
Analysis

While pursuing three different lines of design inquiry, rigorous desk and field research was necessary to obtain and support the original question of this thesis: How might non-human entities find a way to be included in design processes? This thesis uses complex theory to think of design research regarding the nature-culture discrepancy perception. It is embedded in epistemological and ontological concerns, while thinking across multiple binaries. Different views from diverse disciplinary fields propose frameworks for thinking of the nature and culture duality, whereas design might play the role of bridging these views. It has the capacity to 'tangibilize' these concepts. With an understanding of inescapable embeddedness in the forthcoming planetary dilemmas, one must think of alternative realities, countercultures, and embrace uncertainty. This thesis uses critical design speculations to catalyze and redefine how one might relate to existing conditions (Dunne and Raby 2013, 2).

It is the narrative, through which the philosophical issues are explored, rather than through the design objects themselves.
(Bjorn Franke)

To truly think of a design beyond the human, even of 'after design', design research must be open and experiential. Simultaneously assessment criteria of design must be rethought. Design must find ways to challenge and exist outside of social norms, 'patriarchal Western capitalist modernity,' and other constraints that are hindering alternate realities and hidden potentialities (Escobar 2018, ix). As design always reiterates, new multi-modal ways of research might be possible. But how might one base these on a shared understanding of equal participation of humans and non-human beings and in relational and nondualist ontologies? How might we embrace pluralities? Everything is at stake. While Western ways of production of knowledge and indigenous ways of knowing are somewhat contrary, design could mediate (through

8 Research trajectory of this project mapped onto three dimensions.



materialization/visualization/moderation processes) between both. Design does not and will never have precise answers.

Is [design] more like the progressive illumination of a well-defined box, or does darkness grow as fast as the light (Proctor and Schiebinger 2008, 14)?

Ultimately, this thesis attempts to combine design theory and practice as a mode to contribute to ecological transitions. One must embed projects in multi-species assemblages, to not simplify, but embrace complexity. This needs transdisciplinary ways of being, doing and knowing, as Escobar states:

[T]he implication is none other than everything has to change. For those for whom the current conjuncture 'changes everything,' what needs to change is an entire way of life and a whole style of world making (Escobar 2018, x).

- 1 'NYC Parks Street Tree Map.' NYC Street Tree Map: NYC Parks. Accessed April 25, 2019. <https://tree-map.nycgovparks.org/#treeinfo-4655133>.
- 2 '8100A Automated Soil CO₂ Flux System.' Licor. Accessed May 01, 2019. https://www.licor.com/env/products/soil_flux/system.html.

References

- Aitchison, Jean (2000). *The seeds of speech: Language origin and evolution*. Cambridge, Massachusetts: Cambridge University Press.
- Banerjee, Subhankar (2017). 'Decolonizing Nature: Resistance, Resilience, Revitalization.' *Green Fire Times*. April 05, 2017. Accessed March 28, 2019. <https://greenfiretimes.com/2017/04/decolonizing-nature-resistance-resilience-revitalization/>.
- Barbour, Shannon (2018). 'Women Are Marrying Trees and the Reason Will Surprise You.' *Cosmopolitan*. Accessed October 20, 2020. <https://www.cosmopolitan.com/lifestyle/a18753102/women-mexico-marry-trees/>.
- Barnard, Edward Sibley (2002). *New York City trees: a field guide for the metropolitan area*. New York City: Columbia University Press.
- Bassuk, Nina, and Thomas Whitlow (1985). 'Environmental stress in street trees.' *The Scientific Management of Vegetation in the Urban Environment* 195: 49–58.
- Bobette, Adam (2018). 'Forecasting Earth Futures.' *Anthropocene Curriculum*. Accessed October 20, 2020. <https://www.anthropocene-curriculum.org/contribution/forecasting-earth-futures>.
- Boehnert, Joanna (2019). 'Surviving Climate Change Means Transforming Both Economics and Design.' *The Conversation*. Accessed October 20, 2020. <https://theconversation.com/surviving-climate-change-means-transforming-both-economics-and-design-109164>.
- Brown, Katrina, W. Neil Adger, Patrick Devine-Wright, John M. Anderies, Stewart Barr, Francois Bousquet, Catherine Butler, Louisa Evans, Nadine Marshall, and Tara Quinn (2019). 'Empathy, place and identity interactions for sustainability.' *Global Environmental Change* 56: 11–17.
- Chalker-Scott, Linda (2007). 'Impact of mulches on landscape plants and the environment – A review.' *Journal of Environmental Horticulture* 25, no. 4: 239–249.
- Chopra, G., P.S. Dhami, H.N. Shrivastava (2015). *A Textbook of Biology*. Jalandhar, Punjab: Pradeep Publications: V-101.
- Dunne, Anthony, and Fiona Raby (2013). *Speculative everything: design, fiction, and social dreaming*. Cambridge, Massachusetts: MIT Press.
- Escobar, Arturo (2018). *Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds*. Durham, North Carolina: Duke University Press.
- Faste, Haakon (2016). 'A Post-Human World Is Coming. Design Has Never Mattered More.' *Fast Company*. Accessed October 20, 2020. <https://www.fastcompany.com/3060742/a-post-human-world-is-coming-design-has-never-mattered-more>.
- Feld, Steven (2000). 'Sound worlds.' *Sound*: 173–200. Berkeley, California: University of California Press.
- Forlano, Laura (2017). 'Posthumanism and design.' *She Ji: The Journal of Design, Economics, and Innovation* 3, no.1: 16–29.
- Grear, Anna (2019). 'It's Wrongheaded to Protect Nature with Human-style Rights'. *Aeon*. Accessed October 20, 2020. <https://aeon.co/ideas/its-wrongheaded-to-protect-nature-with-human-style-rights>.
- Haraway, Donna Jeanne (2003). *The companion species manifesto: Dogs, people, and significant otherness*. Vol. 1. Chicago: Prickly Paradigm Press.
- (2016). *Staying with the trouble: Making kin in the Chthulucene*. Durham, North Carolina: Duke University Press.
- Harding, Stephan (2012). 'What Does It Mean to Be Human?' *Center for Humans & Nature*. Accessed October 20, 2020. <https://www.humansandnature.org/to-be-human-stephan-harding>.
- Hedeager, Ulla (2010). 'Is language unique to the human species.' Columbia University.
- Hermann, Thomas, and Andy Hunt (2011). *The sonification handbook*. Edited by John G. Neuhoff. Berlin, Germany: Logos Verlag.
- Heskett, John (2005). *Design: A very short introduction*. Vol. 136. Oxford: Oxford University Press.

-
- Heyd, Thomas (2016). *Encountering nature: Toward an environmental culture*. Abingdon: Routledge.
- Hoorman, J. J., and R. Islam (2010). 'Understanding soil microbes and nutrient recycling. Agriculture and Natural Resources.' Ohio State University.
- Houjebek, Wilfried (2015). 'About This Blog.' *Cryptoforestry*. Accessed October 20, 2020. <https://cryptoforest.blogspot.com/p/about-this-blog.html>.
- Illich, Ivan, and Anne Lang (1973). 'Tools for conviviality.' *World Perspectives* 47. New York City: Harper & Row Publishers.
- Ingber, Sasha (2018). 'Tropical Forests Suffered 2nd-Worst Loss Of Trees On Record Last Year.' *NPR*. Accessed October 20, 2020. <https://www.npr.org/2018/06/27/623895283/tropical-forests-suffered-second-worst-loss-of-trees-on-record-last-year?t=1554837024107>.
- Jim, Chi Yung (2001). 'Managing urban trees and their soil envelopes in a contiguously developed city environment.' *Environmental Management* 28, no. 6: 819–832.
- Kimmerer, Robin Wall (2013). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Minneapolis: Milkweed Editions.
- (2017). 'Speaking of Nature.' *Orion Magazine*. Accessed October 20, 2020. <https://orionmagazine.org/article/speaking-of-nature/>.
- Kohn, Eduardo (2013). *How forests think: Toward an anthropology beyond the human*. Berkeley, California: University of California Press.
- Koskinen, Ilpo (2016). 'Agonistic, convivial, and conceptual aesthetics in new social design.' *Design Issues* 32, no. 3: 18–29.
- Kozlowski, T. T. (1999). 'Soil compaction and growth of woody plants.' *Scandinavian Journal of Forest Research* 14, no. 6: 596–619.
- Latour, Bruno (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press USA – OSO.
- (2008). A cautious Prometheus? A few steps toward a philosophy of design (with special attention to Peter Sloterdijk). In *Proceedings of the 2008 annual international conference of the design history society*: 2–10.
- (2012). *We have never been modern*. Cambridge, Massachusetts: Harvard University Press.
- Mcgrane, Sally (2016). 'German Forest Ranger Finds That Trees Have Social Networks, Too.' *The New York Times*. Accessed October 20, 2020. https://www.nytimes.com/2016/01/30/world/europe/german-forest-ranger-finds-that-trees-have-social-networks-too.html?_r=0.
- Mescher, Mark C., and Consuelo M. De Moraes (2014). 'Role of plant sensory perception in plant-animal interactions.' *Journal of Experimental Botany* 66, no. 2: 425–433.
- Monbiot, George (2006). 'Paying for Our Sins.' *The Guardian*. Accessed October 20, 2020. <https://www.theguardian.com/environment/2006/oct/18/green.guardiansocietysupplement>.
- Mueller, Michael P., Kemily K. Pattillo, Debra B. Mitchell, and Rachel A. Luther (2011). 'Lessons from the Tree that Owns Itself: Implications for Education.' *International Journal of Environmental and Science Education* 6, no. 3: 293–314.
- Mullaney, Jennifer, Terry Lucke, and Stephen J. Trueman (2015). 'A review of benefits and challenges in growing street trees in paved urban environments.' *Landscape and Urban Planning* 134: 157–166.
- Murray Schafer, Raymond (1977). *The soundscape: Our sonic environment and the tuning of the world*. Rochester: Inner Traditions International.
- Myers, Natasha (2015). «Conversations on plant sensing.» *Nature Culture* 3: 35–66.
- (2017). 'Becoming sensor in sentient worlds: A more-than-natural history of a black oak savannah.' *Between Matter and Method: Encounters in Anthropology and Art*: 73–96.
- Nowak, David J., Scott Maco, and Mike Binkley (2018). 'i-Tree: Global tools to assess tree benefits and risks to improve forest management.' *Arboricultural Consultant* 5, no. 4: 10–13.
- Otterstrom, Kristina. 'Rights and Responsibilities of a Married Person.' *Lawyers.com*. Accessed October 20, 2019. <https://www.lawyers.com/legal-info/family-law/matrimonial-law/rights-and-responsibilities-of-a-married-person.html>.
- Palmer, Clare. (2006). „Stewardship: a case study in environmental ethics.' *Environmental Stewardship*: 63–75.
- Pascual, Daniel Fernández, and Alon Schwabe (2017). 'The Offsetted.' *E-flux Positions*. Accessed October 20, 2020. <https://www.e-flux.com/architecture/positions/153904/the-offsetted/>.
- Poff, Zach (2018). 'CUNY GCDI Sound Workshop.' *Zach Poff*. Accessed October 20, 2020. <https://www.zach-poff.com/artwork/cuny-gcdi-sound-workshop/>.
- Popova, Maria (2012). 'Hermann Hesse on What Trees Teach Us About Belonging and Life.' *Brain Pickings*. Accessed October 20, 2020. <https://www.brainpickings.org/2012/09/21/hermann-hesse-trees>.

-
- (2017). 'The Songs of Trees: A Biologist's Lyrical Ode to How Relationships Weave the Fabric of Life.' *Brain Pickings*. Accessed October 20, 2020. <https://www.brainpickings.org/2017/12/08/the-songs-of-trees-david-haskell/>.
- Proctor, Robert N., and Londa Schiebinger (2008). *Agnotology: The making and unmaking of ignorance*. Stanford University Press, Stanford, CA.
- Ramnarine, Tina K. (2009). 'Acoustemology, Indigeneity, and Joik in Valkeapää's Symphonic Activism: Views from Europe's Arctic Fringes for Environmental Ethnomusicology.' *Ethnomusicology* 53, no. 2: 187–217.
- Rancière, Jacques (2009). *Aesthetics and its Discontents*. Cambridge, UK: Polity.
- Romans, Brian (2007). 'Data Sonification.' *Wired*. Accessed October 20, 2020. <https://www.wired.com/2007/04/data-sonification/>.
- Seddon, Nathalie, Beth Turner, Pam Berry, Alexandre Chausson, and Cécile AJ Girardin (2019). 'Grounding nature-based climate solutions in sound biodiversity science.' *Nature Climate Change* 9: 84–87.
- Shafaieh, Charles (2019). 'We Were Never Considered Fully Human, so Why Should We Care about This Crisis?' Rosi Braidotti Advocates for Collective Positivity in the Face of Human Extinction. *GSD Harvard News*. Accessed October 20, 2020. <https://www.gsd.harvard.edu/2019/03/we-were-never-considered-fully-human-so-why-should-we-care-about-this-crisis-rosi-braidotti-on-collective-positivity-in-the-face-of-human-extinction/>.
- Stone, Christopher D. (1972). 'Should Trees Have Standing – Toward Legal Rights for Natural Objects.' *S. CAL. L. rev.* 45: 450.
- Simard, Suzanne W. (2018). 'Mycorrhizal Networks Facilitate Tree Communication, Learning, and Memory.' *Memory and Learning in Plants*. 91–213. Cham: Springer.
- Tanasescu, Mihnea (2017). 'Rivers Get Human Rights: They Can Sue to Protect Themselves.' *Scientific American*. Accessed October 20, 2020. <https://www.scientificamerican.com/article/rivers-get-human-rights-they-can-sue-to-protect-themselves/>.
- Toomey, Diane (2016). 'Exploring How and Why Trees 'Talk' to Each Other.' *Yale E360*. Accessed October 20, 2020. https://e360.yale.edu/features/exploring_how_and_why_trees_talk_to_each_other.
- Velasquez-Manoff, Moises, and Andrew Khosravani (2019). 'Can Humans Help Trees Outrun Climate Change?' *The New York Times*. Accessed October 20, 2020. <https://www.nytimes.com/2019/04/25/climate/trees-climate-change.html>.
- Vidal, John (2018). 'A Eureka Moment for the Planet: We're Finally Planting Trees Again'. *The Guardian*. Accessed October 20, 2020. <https://www.theguardian.com/commentisfree/2018/feb/13/worlds-lost-forests-returning-trees>.
- Watson, James EM, Tom Evans, Oscar Venter, Brooke Williams, Ayesha Tulloch, Claire Stewart, Ian Thompson et al. (2018). 'The exceptional value of intact forest ecosystems.' *Nature ecology & evolution*: 1.
- Weisse, Mikaela, and Liz Goldman (2018). '2017 Was the Second-Worst Year on Record for Tropical Tree Cover Loss.' *Global Forest Watch Blog*. Accessed October 20, 2020. <https://blog.globalforestwatch.org/data-and-research/2017-was-the-second-worst-year-on-record-for-tropical-tree-cover-loss>.
- Weiner, Sophie (2016). 'Inside the Spiritual World of Plant-Based Instruments.' *Vice*. Accessed October 20, 2020. https://www.vice.com/en_us/article/ez75nn/midi-sprout-plant-instrument-data-garden-interview.
- Willis, Anne-Marie (2006). 'Ontological designing.' *Design philosophy papers* 4, no 2: 69–92.
- Youatt, Rafi (2017). 'Personhood and the Rights of Nature: The New Subjects of Contemporary Earth Politics.' *International Political Sociology* 11, no. 1: 39–54.

ANTHROPONIX: UPCYCLING URINE AS COLLECTIVE DESIGN PRACTICE

Markus Wernli

Integrative flourishing stems from patterns of eating, living and engaging with the world that promote well-being and a healthy environment. For proliferating integrative flourishing, we need to explore novel, design-led collaborations for remaking artifacts and human organization. In this study, participants-cum-makers fermented their urine for a substrate in which to grow lettuce (*Lactuca sativa*) and thereby create a simple material relationship between their bodies and the plants. Process documentation and interviews with the twenty-two participants evaluated the key aspects that promoted their social engagement and thriving during the two-month experiment. The analysis revealed how jointly encountered technical ambiguity stimulated curiosity and how a unifying purpose promoted adaptive co-creation and mutual support. In synergetic dynamics, these factors contributed to the integrative flourishing in the waste upcycling collective. The findings indicate the importance of recursive self-regulation following interaction with an 'other.' The study outlines a systemic model for practitioners' use to orient collectivist design that positively affects environmental relationships.

Human Waste as Social Design Material

The vision of using resources sparingly through upcycling endlessly and starting with one's bodily metabolism has propelled this design research. Unlike biological systems that function in cycles – plants growing in the soil; animals eating plants; excrements replenishing soils – our industrial systems, including sanitation infrastructures, are mostly linear. In 2015, humans harvested 22.2 billion tons of biomass to feed themselves, but recovered only 3 billion tons, or 12 percent, of the total through recycling, composting, or land application (Kunzig 2020). It means that after human needs like feeding and excreting are met, hard-won resources are squandered. A third of all food is spoiling before reaching eaters, while most nitrates and phosphates drift into oceans, landfills, or the atmosphere.¹ Experts see this 'circularity gap' (de Wit et al. 2018) in our shared metabolism with planet Earth as the root cause behind all environmental problems (Perolini and Fry 2012).

William Everdell (1997, 351) describes the essence of our linear, wasteful culture 'as the postulation of ontological discontinuity.' It means that humans tend to understand reality by cutting it into discrete fragments and studying its parts

in isolation. This selective perception helps to reduce the complexity of the world by distinguishing between an intentional ‘figure’ and its un-noticed, contextual ‘ground’ (Logan 2011). Yet our ecological crisis shows how the broader context is never really separable, and ‘the whole is other than the sum of its parts,’ as Gestalt psychologists would describe it (Koffka 1936, 176). By reconsidering the human role in life-regenerating biological circulations, the conundrum thus goes beyond the respective socio-material processes through which we organize our lives, nourish our bodies, and manage our metabolic wastes, including urine.² While conventional design ‘solutions’ like flush toilets may be efficient waste removers, they make it prohibitively costly to recover essential agricultural nutrients. Moreover, they disconnect peoples’ mindsets from the biophysical foundation they depend on (Waltner-Toews 2013).

Questions of (Un)Desirability

Why would a social designer implicate urban citizens in sanitation matters when long-established hygiene regimes so conveniently are ridding us of our ‘dirt’-expelling, mortal body? The justification is twofold. *Firstly*, reconnecting with our bodily selves as holistically functioning Earthlings is not about trading a purity ideal for messy existence but about better integrating and embracing both aspects at the same time. In this health-promoting contradiction of living with the ambiguities of our impure bodies inside purification regimes, we can establish a middle ground for learning to relate to each other through the very impurities that make our lived existence possible (DuPuis 2015; Caslav Covino 2004). In this sensibility, defecating – like other forms of disposal – makes us ambiguously human since we start addressing the qualities and impacts of wasting that range from mutually beneficial to detrimental. Turning to the needs of the body in identity formation and decision-making exposes our ruling bodily self that is simultaneously ruled by others. It is about thriving *together* rooted in codependency. *Secondly*, since the arrival of sewage infrastructures, applied research in biomass recovery like composting or fermentation has mainly been neglected over the last century (Waltner-Toews 2013). Making room for alternative and diverse ways of waste handling seems prudent when in the face of climatic-environmental shifts, we need to feed and clean our growing populations much more resourcefully than ever before.

Since given (infra)structures enact essential functions, designing alternatives prompts the question of what could motivate the community to take on these material responsibilities (Hawkins et al. 2019). In response, this research sought a participative inquiry that coupled material-technical practice with a conversational search forward. Here affirmation meant to confront acceptance issues and reframe local circulations of human waste from indifferent abjection of the body into a gateway

to 'deeper commitment' (Carolan 2016) with living systems on relational and durational terms. Such research on designing yet-to-be social systems is asking questions in the category of desire and desirability. These are undecidable questions that cannot be answered by the collection of evidence but by what the collective deems as possible, significant, or desirable (von Foerster 2003, 293). The co-designing researcher here worked both as instigator and facilitator within the community, which inevitably entails power relations and conflicts. Thus I was challenged to account for my participative involvement in ways that produce useful source material – ideas, theory, knowledge – for others interested in co-designing society (Richards 2019, 274–5).

Methods of Performative Exploration

Following up on these questions, I employed action research (Heron and Reason 2001) in playful and profound ways for collaboratively exploring the agri-cultural re-integration of human waste, in particular urine. This led to a 'prototypes approach' (Mogensen 1992), whereas a fluid cohort of citizen designers initiated a series of small-scale social experiments for testing and feeling out meaningful avenues for overcoming the prejudice surrounding the reuse of human 'waste.' Through short, action-based change experiments, different cultural framings of the topic were explored and deliberated in-the-doing, as illustrated in Figure 1. These 'up-crafting ventures' (Wernli 2018) included educational 'soil cooking' workshops in the park, or speculative 'urine donation rallies' for future Mars colonialization in the gallery, which proposed resourceful ways of dealing with human 'waste' through their revelatory defamiliarization, and provided cycles of action and reflection.

This approach grounded the research with local insight by hosting social events, guiding theories from dialog with the research community, and technical feasibility from biomass cultivation experiments in my rooftop garden. My research evolved from a continuous *Material/Theory/Event Cycle* [Figure 1] that started with the specified topic of exposing our biophysical inter-existence, through evaluating collective actions that reach beyond pre-established formulations. Continually engaging with local and personal concerns helped test the adequacy of the methods, shape field experiments, and scrutinize the relevance of theoretical tools towards alternative human arrangements that resonated with the situation and conditions at hand (Fletcher and Tham 2019).

Initially, I sought direct engagement with established organizations in education, industry or government, only to realize that in the institutional outlook, drivers for pro-environmental conduct are likely tied to incentives or pre-defined value propositions. This bias can impede systemic change, since personal action is made dependent on external standards or given precedents – thereby are neither imaginatively engaging nor radically expanding the possibilities (Bollier 2016). My research,

Rehabilitating human waste as worthy co-creation material became viable over time through applied collaboration with sanitation microbiologist Nadejda Andreev, horticultural engineer Henrique Aiveca Sanchez and industrial designer Sarah Daher. This disciplinary crossover made it possible to prototype a miniaturized, urine-powered plant growing system for household use that combines convivial techniques of biomass nurture with science-assisted monitoring for the processes involved (Andreev et al. 2017). This epistemological complementarity helped to ‘contemporize’ age-old resource recovery skills. It meant to uphold the values of the handmade. Bodily sensing capabilities or cultural heritage (Ihde 1978), in deliberate combination with the ubiquitous and dematerializing efficiency of digital technologies (Pallasmaa 2009), can suspend the limiting schisms of tradition versus progress, and creativity versus conservation for loosening their operational confines (Ravetz et al. 2013).

Admittedly, time restrictions in this three-year short doctoral research did not allow us to thoroughly test all technical procedures involved, because we were dealing with bacterial successions, plant growth cycles, and seasonal conditions. Since the ensuing study became technically unstable, it was emblematically named ANTHROPONIX as in ‘human-powered, hard labor.’ Since the outcomes could not be guaranteed, the interested public was invited to an ‘urban metabolism adventure,’ and the participants’ role as *alpha testers* and co-researchers was communicated up front. This candidness allowed us to carve out a protected space for shared exploration and penetrating deeper into the issues underlying our socio-natural disconnect. Framed as a bio-pedagogical laboratory in everyday life, knowledge and transformation potential could be produced here through insightful mediation of the body’s biophysical processes (Halse 2009; Foucault 1979, 47–8) for perceiving one’s consequential relation with the environment.

A Constraint-oriented Co-creation Experiment

By recovering human urine as fertilizer for crops as part of a collective conversation, the ANTHROPONIX study proposed an approach to design that starts with the question of what we want to avoid as consequences of our designing. Participants in the eight-week-long study became conditioned to ward off undesirable results from their cumulative actions (Fischer and Richards 2017) – like jeopardizing plants through unhealthy eating habits or compromising the overall research trajectory through lack of personal attention. Inspired by Joseph Beuys’ ‘7000 Oaks’ venture (Eichel 2010), ANTHROPONIX evolved around the collectively redistributed material responsibility for precluding conventional responses and instilling urgency where new ways of thinking and acting can emerge. Inside this constraint-oriented design



2 Participants Documenting ANTHROPONIX-in-progress: The ANTHROPONIX study enrolled 22 participants and entailed a simple material relationship between humans and plants that grew on fermented urine specimens accompanied by food journaling and scientific monitoring of substances involved.

stance, my research evaluated the social dynamics behind navigating desirability and undesirability amid the unpredictability of this urine-cycling experiment, as indicated in Figure 2.

ANTHROPONIX shaped up to a university-endorsed work alliance (Sonne and Tønnesvang 2015) with twenty-two Hong Kong households in spring 2017. Participants answered a public call to become *test growers* in urine-powered, water-based

horticulture, as indicated in the *Bio-Pedagogic Work Flow* (Figure 1, bottom). They agreed to collect, examine, and ferment daily 20ml samples of their morning urine into fertilizer for growing lettuce. In urine fermentation source-separated, fresh urine is infused with propagated lactic acid bacteria – generated from sauerkraut – thereby stabilized and odor-neutralized by acidification over three weeks in airtight containers. Unlike industrialized biomass capture, the living processes in fermentation necessitate bargaining relationships with unsafe partners for invigorating the culture's overall resilience (DuPuis 2015). Each fermenting urine specimen in ANTHROPONIX became part of an annotated self-examination passage (Meiselman and MacFie 1996) that involved medical dipstick testers ('urinalysis'), diet monitoring, and plant development tracking. Participants consolidated this into a detailed food diary, *The Journal of Mutual Flourishing*. For access to mutual assistance, a text messaging group was established that ensured continued connectivity across the participating households over the eight-week-long period.

ANTHROPONIX was structured around five biweekly co-creation sessions, each with a thematic focus, such as nutrients fermentation, water-based horticulture, and comparative human/plant anatomy. The sessions consisted of guided peer-to-peer exchanges, lectures to introduce technical concepts, and skill acquisition with the horticultural contraptions – made up of modular components, they were handed out in parts, one per session. This modularity required participants to attend every session in order to secure access to tools, materials, and knowledge needed for advancement. Participants were asked to bring their material experiments back to the sessions regularly for joint consultation. Since most of the ANTHROPONIX activities took place at the homes of the participants, they had to maintain a good rapport with suspicious household members, obscure peers, exuberant bacteria, and volatile plants. This material vibrancy (Bennett 2010) required close attention to processes – rather than ideals – while bearing with the consequences of previously made decisions, which inherently entailed dexterity-influenced judgment and risk-taking (Pye 1968) for every urine fermenter.

When an adverse combination of out-of-season seeds, hastily down-scaled planter size and insufficiently aerated urine concoctions made it challenging to grow anything at all, which tested the resilience of participants and facilitators. Yet despite the technical shortcomings, all involved remained, for the most part, fully dedicated and enjoyed the shared struggle over the two months or longer. While growth in plants was stunted, people prospered in the expansion of harm-awareness, cascading of purpose, and accelerated learning. Precisely, the humbling limitations gave way to 'play with the imperfect' (Gaver et al. 2003), which could engender a 'feeling of shared ownership' (Muller 2002) through direct appropriation or intervention, as depicted in *Participants' Progress Documentation* (Figure 2). Shared ownership in joint unpredictability derives from the flattening of power relationships between the researchers and the collective. As researcher-cum-facilitator, I had to become explicit about my complete involvement with the collective, where

the status of the design expert is replaced with ‘designing citizen’ or ‘citizen designer’ (Brown et al. 2010) inside a peer group. By being honest about our inability to live up to expectations, and clearly articulating early on what we did *not know*, my co-facilitating team made room for being led and corrected by participants. The collective experience of obstacles, frailty, and ‘impotentiality’ (Agamben 2011) was essential, since avoiding them would have also prevented the full gamut of positive emotions. This disarming genuineness helped to let go of external impositions, thus instilled courage for inventive adaptation from *within* the participating person, household, and group.

Eventually, participants’ trouble-shooting efforts were not in vain. Instead, they provided technical pointers for improving the urine growing system and conducting productive follow-up trials that provided a sense of accomplishment and a late win for all involved. ANTHROPONIX became a niche platform for expanding the limitations of institutional frameworks and testing out practices of societal change. A higher-order collaboration that reaches beyond knowledge transfer and explores action potential into a previously unknowable territory requires close attention to the quality of relationships and team consciousness (Wood 2010). The co-creation of research and outcomes depends on the quality of emergence from inputs and synergies that is unpredictable when setting out. Such complexity makes co-creation and interdisciplinarity challenging to grasp and implement due to the stern and longstanding work this entails. Possibility-opening co-creation is a practice situated squarely in the middle of complexity, where decisions are made on the go; thus, relevance stems from grounding in a specific context, engaging multiple stakeholders, and drawing on other contexts. Therefore research with emphasis on co-creation processes is difficult to empirically classify, measure, or annotate and thus notorious for lacking rigor and proper knowledge manifestation (Agnew 1993; Fletcher and Tham 2019:34).

In response, I developed an analytical model for approaching the emerging aspects of participants’ observable existential journeys by reconciling them with concepts drawn from neurophysiology, humanist education, developmental sociology, design cybernetics, and motivation research. This ‘pluriversal’ (Escobar 2018), multi-centered modality, was gradually developed and articulated into *Co-creation Diagramming* (Figure 3). By tracing the existential expressions and journeys of a person in correspondence with the group and evolving situation, this psychodynamic annotation format offers a conversational tool for directing attention to contingencies in joint creative processes. In this approach to analysis, social engagement, adaptation quality, and kinesthetic-affective learning in person and cohort become ‘challenges by choice’ (Schoel et al. 1988), with the self-obligation anchored in the thriving of the whole. By embedding assessable efforts, observable conduct, and experiential interpretation into iterative co-creation diagramming, the quality of co-regulation dynamics in response to the situation can be mutually reflected between all involved.

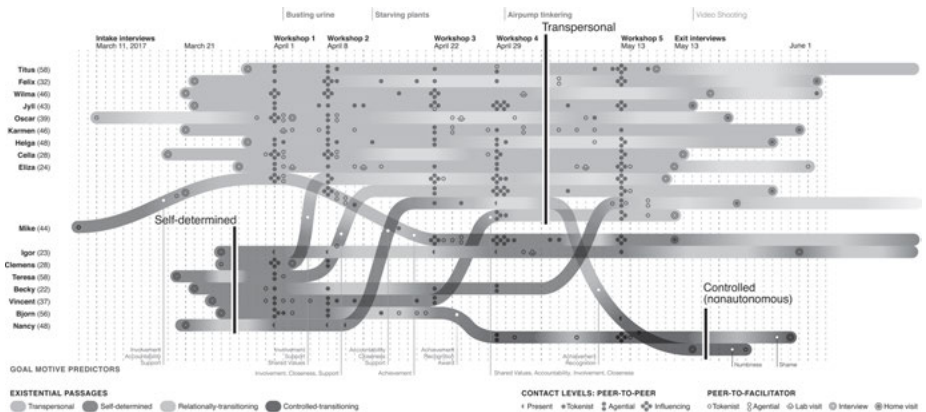
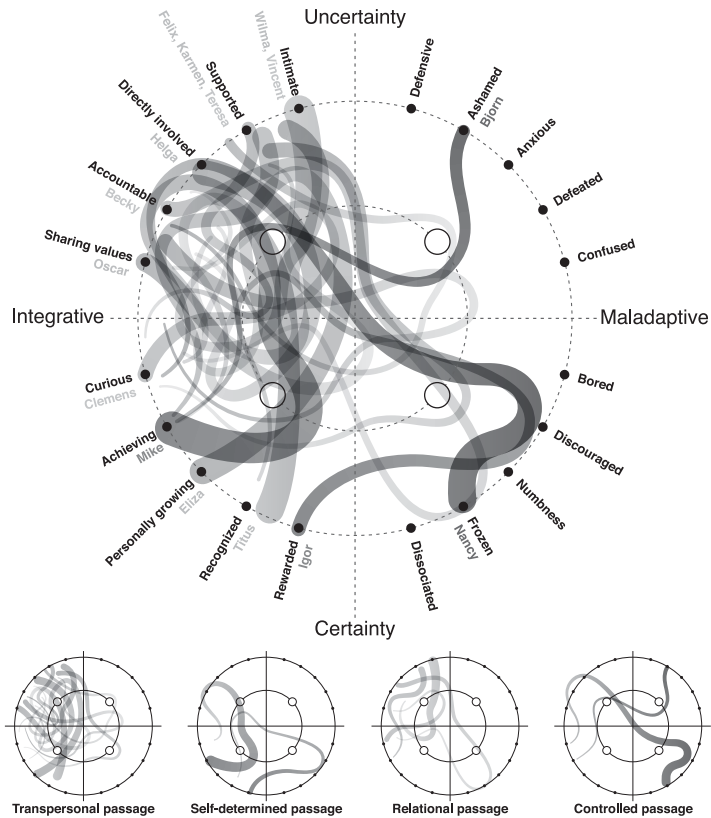
The findings from the ANTHROPONIX research indicate how the collectively encountered uncertainty, together with the self-contracted, urine-integrating goal pursuit, created a supportive, failure-permitting arena conducive to sociality, inventiveness, and rich emergence of meaning. Here close attention to mutual ephemerality and frailty became the catalyst for deeper insight (exposition of self) – thus the basis for more bodily informed, kinesthetic-affective exchanges with the environment (composition with otherness). The research outcome confirms Emmanuel Levinas' conception of 'inhabiting' the world, where person and group are constituted within the simultaneous connectedness to both self and otherness. Paul Harrison (2007, 643) refers to this inter-existent dynamic as 'heteronomy', which was analyzed by rendering co-creation dynamics, as shown in Figure 3.

Constraint-oriented co-creation, therefore, is not fixated on learning from the external world. Instead, leaps of insight derive when people can reconcile the present conditions with the significance of their possible responses. Albert Borgmann (1995, 39–40) refers to this confidence-building in the emergent here-and-now as 'commanding presence.' Awareness routines like stipulated journaling, good social rapport, and multimodal tech-engagement brought the focus of attention and trust in what *emerges* during the ANTHROPONIX study. This affective vigilance generated an arena of mutual care and fulfillment (Praetorius 2015) despite a technically doomed mission.

Tom Atlee (2009) indicates how self-interest in the welfare of the overall condition is at the heart of durable flourishing. Commitment in ANTHROPONIX stemmed from the fragile coordination between the unifying call for duty (contributing to ecological health), and the pleasurable desire of making sense (finding personal closure), where neither element was driving each other out (Ryff and Singer 2008). It meant that the efforts could be justified as long as the venture was desirable, which also defined its 'boundary judgment' (Findeli 2010) – the scope of intensity and duration deemed appropriate for participating or not.

Advancement in complex issues depends on confronting challenges deliberately for circumventing the invisible operational logic behind them, since such norms or paradigms influence everything we think and do, both as individuals and as communities. ANTHROPONIX was energized by the urgency and scale of change that is necessary for tangibly enacting the paradigm of flourishing together over time. In its intransitive meaning, the word *flourishing* postulates the ostensible signaling for changing course. Such a 'call to arms' toward co-thriving is then about gaining critical awareness of the various perspectives in complexity that incur the least amount of harm. The value-explicit desirability framework that directed this research included diverse knowing, co-creation, action research and recursive awareness practice for supporting simultaneously the self and the world.

Engaging with fundamental change causes resistance that typically entails ridicule, redirecting attention ('whataboutism'), discrediting the messenger or



3 Co-creation Diagramming: The analysis visualized participants' experiential passages in chord diagrams, which depicts an overall prosocial and cohesive group (strokes concentrated in the upper-left segment of the chord). The Sankey diagram (bottom) contextualizes these experiential passages on the shared timeline of events and encounters.

reverting to the dominant paradigm to find explanations (Fletcher and Tham 2019). Behind this resistance is the avoidance of relinquishment – the loss of extinct species, acquired lifestyles, fundamental belief systems, and what it means to be human today (Bendell 2018). Overcoming this impediment requires more courage than ever before, expressed by resourcing ourselves with socially, mentally and physically affirmative practices. Such resourcefulness practice is located within ‘new social design’ (Koskinen 2016, 28), recent design approaches where social matters and harm-aware responses are of primary concern above material outcomes. In this conception, desirability-oriented work seeks its esthetic propensities in the creative tension of the agonistic and convivial. By implicating disparate parties in durational collaboration, the multiform value finds affirmation in the sociable for pursuing adversarial strategies (DiSalvo 2012) and pulling marginalized issues back into the everyday domain.

In Conclusion

ANTHROPONIX was about making human waste *re-source-able* into a convivial proposition for holding conversations on its desirability, experimenting with neglected biomass upcycling practices, and inviting self-organizing forms into our living arrangements. As the consequences of human activity become more acute and complex, the understanding of co-creation processes and collective thriving is a matter well worth understanding, since problems and opportunities presented to designers require the expertise of manifold disciplines and affect a myriad of intended beneficiaries. Collectivized waste intervention, co-creation diagramming, and the dynamic tension of curiosity underlying them, can help foster flourishing-oriented designing as we are entering increasingly volatile futures and territories of the unknowable.

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- 1 The human organism excretes up to 80 percent of the nutrients ingested. With appropriate measures in place, the excess nutrients in urine per year and per capita would be sufficient to grow up to 230 kg of cereals (Heinonen-Tanski et al. 2010; Wolgast 1993).
 - 2 The term ‘waste’ for naturally degradable, regenerative biomass is here considered as inadequate human framing, since it is the result of systematic social constructs and disconnects, as Mary Douglas (1966) reminds us.

References

- Agamben, Giorgio (2011). *Nudities*. Stanford: Stanford University Press.
- Agnew, Kenneth (1993). 'The Spitfire: Legend or History? An Argument for a New Research Culture in Design.' *Journal of Design History*, 6(2): 121–130.
- Andreev, Nadejda, Mariska Ronteltap, Boris Boincean, Markus Wernli, Elena Zubcov, Nina Bagrin, Natalia Borodin, Piet Lens (2017). 'Lactic acid fermentation of human urine to improve its fertilizing value and reduce odor emissions.' *Journal of Environmental Management*, (198): 63–69. <https://doi.org/10.1016/j.jenvman.2017.04.059>.
- Atlee, Tom (2009). *Reflections on Evolutionary Activism*. CreateSpace, Seattle, WA. Seattle: CreateSpace.
- Bendell, Jem (2018). 'Deep Adaptation: A Map for Navigating ClimateTragedy.' *IFLAS Occasional Paper*, 2, 36. www.iflas.info.
- Bennett, Jane (2010). *Vibrant matter: a political ecology of things*. Durham, NC: Duke University Press.
- Bollier, David (2016). 'Commoning as a Transformative Social Paradigm.' *The Next System Project*, 23. <https://thenextsystem.org/commoning-as-a-transformative-social-paradigm>
- Borgmann, Albert (1995). 'The Nature of Reality and the Reality of Nature.' In *Reinventing Nature? Responses to Postmodern Deconstruction*, edited by M. E. Soule & G. Lease. 31–46. Covelo: Island Press.
- Brown, Valerie, John Harris, and Jacqueline Russel (2010). *Tackling Wicked Problems: Through the Trans-disciplinary Imagination*. London: Earthscan.
- Carolan, Michael (2016). 'Adventurous food futures: knowing about alternatives is not enough; we need to feel them.' *Agriculture and Human Values*, 33(1): 141–152. <https://doi.org/10.1007/s10460-015-9629-4>.
- Caslav Covino, Deborah (2004). *Amending the Abject Body: Aesthetic Makeovers in Medicine and Culture*. Edited by M. A. Massé. Albany: State University of New York Press.
- De Wit, Marc, Jelmer Hoogzaad, Shyaam Ramkumar, Friedl Harald, Annerieke Douma (2018). *The Circularity Gap Report: An analysis of the circular state of the global economy*. Circle Economy. Amsterdam.
- DiSalvo, Carl (2012). 'Adversarial Design as Inquiry and Practice.' *Adversarial Design*. Boston: MIT Press.
- Douglas, Mary (1966). *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo*. London: Routledge.
- DuPuis, Melanie (2015). *Dangerous Digestion: The Politics of American Dietary Advice*. Oakland, California: University of California Press.
- Eichel, Hans (2010). 'Eine geniale Provokation.' Kassel: 7000 Eichen. <https://www.7000eichen.de/?id=23>.
- Escobar, Arturo (2018). *Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds*. Durham & London: Duke University Press.
- Everdell, William (1997). *The First Moderns: Profiles in the Origins of Twentieth-Century Thought*. Chicago: University of Chicago Press.
- Findeli, Alain (2010). 'Searching for Design Research Questions: Some Conceptual Clarification.' In *Questions, Hypotheses & Conjectures: Discussions on Projects by Early Stage and Senior Design Researchers*, edited by R. Chow, W. Jonas, and G. Joost. 286–333. Bloomington: iUniverse.
- Fischer, Thomas, and Laurence Richards (2017). 'From Goal-oriented to Constraint-oriented Design: The Cybernetic Intersection of Design Theory and Systems Theory.' *Leonardo*, 50(1): 36–41. https://doi.org/10.1162/LEON_a_00862.
- Fletcher, Kate, and Mathilda Tham (2019). *Earth Logic: Fashion, Action, Research, Plan*. London: The JJ Charitable Trust.
- Frayling, Christopher (1993). 'Research in Art and Design.' *Royal College of Art Research Papers*, 1(4): 1–5.
- Gaver, William, Jacob Beaver, and Steve Benford (2003). 'Ambiguity as a Resource for Design.' *Proceedings of the Conference on Human Factors in Computing Systems – CHI '03*, (5): 233. <https://doi.org/10.1145/642651.642653>
- Halse, Christine (2009). 'Bio-Citizenship: Virtue Discourses and the Birth of the Bio-Citizen.' In *Biopolitics and the Obesity Epidemic: Governing Bodies*, edited by J. Wright & V. Harwood. 45–59. London: Routledge. <https://doi.org/10.4324/9780203882061>
- Harrison, Paul (2007). 'The space between us: Opening remarks on the concept of dwelling.' *Environment and Planning D: Society and Space*, 25(4): 625–647. <https://doi.org/10.1068/d365t>
- Hawkins, Guy, David Boarder Giles, Catherine Phillips, and Alex Zahara (2019). 'Myths of the Circular Economy.' *Discard Studies*, November 18.
- Heinonen-Tanski, Helvi, Surendra Pradhan, and Päivi Karinen (2010). 'Sustainable sanitation: A cost-effective tool to improve plant yields and the environment.' *Sustainability*, 2(1): 341–353. <https://doi.org/10.3390/su2010341>

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- Heron, John, and Peter Reason (2001). 'The Practice of Co-operative Inquiry: Research 'with' rather than 'on' People.' In *Handbook of Action Research: Participative Inquiry and Practice*. 179–188. London: Sage. <https://doi.org/10.2307/2392246>
- Ihde, Don (1978). *Technics and praxis: A philosophy of technology*. Dordrecht and Boston: Reidel.
- Koffka, Kurt (1936). *Principles of Gestalt Psychology*. London: Kegan Paul, Trench, Trubner.
- Koskinen, Ilpo (2016). 'Agonistic, Convivial, and Conceptual Aesthetics in New Social Design.' *Design Issues*, 32(3). <https://doi.org/10.1162/DESI>.
- Kunzig, Robert (2020, March). 'Is A World Without Trash Possible?' *National Geographic*. <https://www.nationalgeographic.com/magazine/2020/03/how-a-circular-economy-could-save-the-world-feature/>.
- Logan, Robert (2011). 'Figure/Ground: Cracking the McLuhan Code.' *Compós: Revista Da Associação Nacional Dos Programas de Pós-Graduação Em Comunicação*, 1(3).
- Lupton, Deborah (2018a). 'I Just Want It to Be Done, Done, Done!' Food Tracking Apps, Affects, and Agential Capacities.' *Multimodal Technologies and Interaction*, 2(2): 29. <https://doi.org/10.3390/mti2020029>.
- (2018b). 'Vital Materialism and the Thing-Power of Lively Digital Data.' *Social Theory, Health, and Education* (May). <https://doi.org/10.13140/RG.2.2.13191.09129>.
- Meiselman, Herbert, and Haliday MacFie, ed. (1996). *Food Choice, Acceptance, and Consumption*. London: Chapman & Hall. <https://doi.org/10.1007/978-1-4613-1221-5>.
- Mogensen, Preben (1992). 'Towards a Prototyping Approach in Systems Development.' *Scandinavian Journal of Information Systems*, 4: 31–53. <https://doi.org/10.7146/dpb.v21i412.6725>.
- Muller, Michael (2002). 'Participatory Design: The Third Space in HCI.' In *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications*, edited by J. A. Jacko and A. Sears. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Pallasmaa, Juhani (2009). *The Thinking Hand: Existential and Embodied Wisdom in Architecture*. London: Wiley.
- Perolini, Petra, and Tony Fry (2012). 'Home Eco-Nomy: Dwelling, Destruction, and Design.' *Design Philosophy Papers*.
- Praetorius, Ina (2015). 'The Care-Centered Economy: Rediscovering What Has Been Taken for Granted.' *Heinrich Böll Stiftung Publication Series Economy + Social Issues*, 16.
- Pye, David (1968). *The Nature and Art of Workmanship*. London: Cambridge University Press. <https://doi.org/http://dx.doi.org/10.1016/B978-0-444-40746-7.50009-2>.
- Ravetz, Amanda, Alice Kettle, and Helen Felcey, ed. (2013). *Collaboration through Craft*. London: Bloomsbury.
- Richards, Laurence (2019). 'Cybernetics and Society Redux: The Necessity of Design.' In *Design Cybernetics: Navigating the New* (Design Res), edited by T. Fischer and C. M. Herr. Cham: Springer.
- Ryff, Carol, and Burton Singer (2008). 'Know thyself and become what you are: A eudaimonic approach to psychological well-being.' *Journal of Happiness Studies*, 9(1): 13–39. <https://doi.org/10.1007/s10902-006-9019-0>.
- Schoel, Jim, Dick Proudly, and Paul Radcliffe, ed. (1988). *Islands of Healing: A Guide to Adventure Based Counseling*. Hamilton, MA: Project Adventure.
- Sonne, Mikael, and Jan Tønnesvang (2015). *Integrative Gestalt Practice: Transforming Our Ways of Working with People*. London: Karnac Books.
- Von Foerster, Heinz (2003). *Understanding Understanding: Essays on Cybernetics and Cognition*. New York: Springer.
- Waltner-Toews, David (2013). *The Origin of Feces: What Excrement Tells Us About Evolution, Ecology, and a Sustainable Society*. Toronto: ECW Press.
- Wernli, Markus (2018). 'Adventurous Upcrafting Ventures.' *Cubic Journal: Design Social*, 1, 210–213. <https://doi.org/10.31182/cubic.2018.1.013>.
- Wolgast, Mats (1993). 'Rena vatten: Om tankar i kretslopp' [Clean water: About tanks in circulations]. *Creanom HB, Uppsala (in Swedish)*: 186–189.
- Wood, J. (2010). 'Co-designing Team Synergies within Metadesign.' *Young Creators for a Better City and a Better Life CUMULUS Conference*: 1–12.

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MAZIAR REZAI is a design-activist, design researcher and strategist, and film critic. Holding a master's degree in industrial design from the Islamic Azad University in Tehran and having studied as a PhD joint student at Köln International School of Design (KISD), he currently is a PhD candidate at the Braunschweig University of Art (HBK) and previously a guest lecturer in the Art University of Tehran in Iran. He has given lectures and published numerous papers and articles in both English and Persian on a range of topics, including issues of sustainable design and design activism. Besides his more academic work, he also works as creative director and design counselor and has led several consulting projects in Iran. He is a member of the International Research Network on Design (and) Activism, which was founded in 2017 by Tom Bieling (HAW Hamburg) and Andréa Poshar (Politecnico di Milano), at the Design Research Lab in Berlin University of the Arts.

DANIELE SAVASTA is an interaction designer, lecturer and researcher in Visual Communication Design Department at Yaşar University in Izmir. He received his bachelor's degree in the field of industrial design at University of Palermo in 2007, and his master's and PhD degrees in the fields of product and interaction design at Iuav University of Venice in 2010 and 2015 respectively. He worked as a research assistant at the University of Palermo, Iuav University of Venice and Politecnico di Milano between 2005 and 2014, before becoming a lecturer at Yaşar University. His research interests include interaction design and interaction ecologies, information design and data visualization, game design and exhibit design. He is the founder and has been the coordinator of the Interaction Design Lab (xLab) within Yaşar University since 2016.

SJEF VAN GAALEN is a design researcher working in the emergent field between futures studies and design research. In his practice, *Structure and Narrative*, he uses speculative and participatory methods to explore alternative futures, with a focus on multi-species perspectives and regenerative ecologies. He is also an advisor to the Creative Industries NL Digital Culture program, and occasional collage artist.

JONAS VOIGT believes that the ways design inquiry tackles wicked problems helps to shape relationships between humans, non-humans, technologies and ecologies. His commitment has been shaped by transdisciplinary experiences and collaborations made across institutions in Germany and North America. He is an alumnus of the Mellon Sawyer Seminar on Imaginative Mobilities and of the Design Realities Studio at the New School in New York. He holds an MFA in Transdisciplinary Design from Parsons School of Design (USA), a BA in Communication Design from Hochschule für Gestaltung in Schwäbisch Gmünd (Germany), and studied Sustainable Design Strategies at Emily Carr University of Art and Design in Vancouver (Canada). Jonas's work has been featured, exhibited and awarded internationally. Exhibitions at the Vitra Design Museum, Walker Art Center, Vienna Biennale, and XXII Triennale di Milano. Permanent collections include the New School Libraries and Archives, Design Museum Holon and Philadelphia Museum of Art.

MARKUS WERNLI'S practice, research and teaching focus on human-nature relatedness by exploring the development of more regenerative, ecologically entangled ways of living and designing. His ongoing research draws connections between our food systems and practices, and social, cultural, and local ecosystems. It considers how to forge better relationships between what we breathe, eat, expel, wear and grow. Much of Markus's research might be considered participatory citizen science, or social citizen-design experiments that can be gathered under the umbrella of Participatory Research through Design. He specializes in contextually applied and critical research-through-design, bringing focus to the social and ecological impact of body-technology pairings and human-biosphere interactions. Markus currently works as Research Assistant Professor with the School of Design at the Hong Kong Polytechnic University. Before that, he held appointments at the College of Asia and the Pacific at Australian National University in Canberra, and Zokei University of Art and Design in Kyoto, and the Multimedia Studies Program at San Francisco State University.

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