Rethinking Design: From the Methodology of Innovation to the Object of Design

Abstract

The design literature theorizes design as the methodology of innovation, supposedly required for mediating the world's separate entities, such as theory and practice, the human and the material, and subjective and objective knowing, coming 'naturally' with the designer's ways of knowing. But instead of taking such naturalizations for granted, we argue that through such positioning of design the specifics of design activity are obscured, along with the locations designers take within them. We propose that 'design as a methodology' is an object produced by design. Investigating this object of design, and how it is made, will make visible what design activity is, and what locations the designers take within them.

Making the Case for Design as a Human-centered Methodology of Innovation

According to user-centered design, the quest for innovating through technology has gone horribly wrong. There is a concern about the illusion of progress, hiding the reality of monstrously unusable technology. This concern is expressed by Alan Cooper [1] when he says that:

> *"The high-tech industry is in denial of a simple fact that every person with a cell phone or a word processor can clearly see: Our computerized tools are too hard to use."*

The above quote directs attention to challenges of software production whereby technology often fails people and their needs. More recently, during the British Human-Computer Interaction 2018 conference, a keynote presentation on artificial intelligence (AI), featured spacecraft computer HAL9000 from the film 2001 – a Kubrick film made in 1968. In the film, HAL interacts through voice with the space crew and future technology is imagined to have human-like intelligence. The video clip shown at the conference was a satire which reimagined HAL as Amazon.com's Alexa [2]. Alexa is a virtual assistant and smart speaker which came to market in 2017, and reflects the current state of AI technology. In a comical twist, the computer (as Alexa) does not respond meaningfully to the crew's commands, but instead reacts in clearly misconceived ways to what was requested. For example, it plays the music band "The Doors" instead of opening the doors of the spacecraft as requested, or instead of answering what the problem was, it finds information about a film called "Problem Child". What we see is a computer unable to understand human speech and

meaning, and the result is comical because we are all familiar with technology behaving in bewildering ways. While the comments from the audience suggested that we need "better representations" of the context and the world surrounding these human-computer interactions, Cooper [1] argues the solutions to such problems do not begin with better technology:

> "As engineers, their belief is in technology, and they have faith that only some new technology, such as voice recognition or artificial intelligence will improve the user's experience. Ironically, the thing that will likely make the least improvement in the ease of use of software-based products is new technology. There is little difference technically between a complicated, confusing program and a simple, fun, and powerful product. The problem is one of culture, training, and attitude of the people who make them, more than it is one of the chips and programming languages. We are deficient in our development process, not in our development tools."

Cooper implies that the solution to such fundamental problems is to find better production processes, dispelling the faith of technologists in technology, and changing the culture, training, and attitude of the people involved in the production processes. And this can be understood as part of a larger movement of user-centered design, which has established itself as a human-centred framework for production processes [1,3], and more recently even as shaping human experience, rather than only physical interfaces [4-6]. The IxDA (Interaction Design Association) has the worry that the "human condition is increasingly challenged by poor experiences" [7]. Design is stepping up to take on a central role in the mediating of

innovation methods whereby the "power of design" is to perceive it as "the hub of a wheel" [8]. As such design has attracted the attention of business management [8-10]. For example, a group of management academics were fascinated by the collaboration with Architect Frank Gehry and team, who illustrated to them how management might learn from design as a "mode of cognition and as an organizational practice" [11].

Design has been represented as an 'epistemology' of tacit knowledge [12], and in a wider sense as a new and independent knowledge practice, materializing in practical methods such as 'design thinking' [13]. Design has also been represented as caring for the human experience. This then makes the case for design as a human-centered methodology, where designerly ways of knowing are offered as the way to navigate innovation in a way that works for society. However, at the bottom of this is the assumption about a certain 'nature' of design. We are going to explore these naturalizations within design theorizing in the following text. In the first part of the paper we investigate the separations between 'theory' and 'practice' which become visible in the representations of the design process. In the second section we trace the differentiation of the human and the supposedly passive material in design activity. In the third section we highlight the separation between 'subjective' and 'objective' knowing in design, as well as the absence of a concept of how subjective experience meshes with the so-called objective world. Finally, we question the proposition that designerly knowing is somehow an internal process, hidden from view. We'll conclude with the proposal to view design as an object which is made up in practice, rather than taking for granted this 'nature' about design.

#1 Theoretical and practical knowing

In regards to professional knowledge, the predominant logic has been a distinction and a hierarchy between theory and practice [14]. And using this distinction design has tended to loose out in a comparison with the natural sciences and is seen as "intellectually soft, intuitive, informal, and cookbooky" [15]. Applied work is seen to rely on the theorizing of the sciences. Practical work, like design, was expected to use for its problems "professional knowledge as the application of scientific theory and technique" [14]. According to Schön [14], the issue is that professional knowledge is understood to be the result of scientific theorizing, while the practice does not produce any knowledge, but only applies knowledge acquired earlier. Universities and our education system work on this understanding. Theory and practice are seen as two different activities in which knowledge is produced in one, and then brought to use in the other. The supposedly more difficult work, and the higher regarded work, is the theoretical work.

In the discussion on design activity, there has been a historically textured systematizing of design activity, of which a famous example is the design methods movement and its postulated stages of design as "1. Analysis; 2. Synthesis; 3. Evaluation" [16]. Design activities are so separated into distinct stages. In table 1, below, we identify seven design process models and provide a brief description of the process. Some models, such as Design Methodology [16] are older, and go back to the 60s, and some, like Design Sprint [17], are more recent. We propose that there are similarities across all these approaches whereby theoretical and practical knowing are understood as distinct and separable elements in the

process of designing and that this ongoing splitting of the world into theory and practice

produces material effects.

Design process model	Description
Design Methodology	Design methodology comprises of analysis, synthesis, and evaluation and is proposed to bridge the gap "between logical analysis and creative thought" [16]
User-Centered Design (UCD)	defined in an international standard, describes the design process as a cycling through understanding and production activities – "understanding and specifying the context of use", "specifying the user requirements", "producing design solutions", "evaluating the design" [18]
User Experience (UX) Design	a more specific application of the user-centered design methodology, activities are described as "Analysis, Design, Implementation and Deployment" [19]
Design Thinking	a reconciliation of the "two modes of thought": "analytical thinking", and "intuitive thinking, the art of knowing without reasoning" [10]
Lean Startup and Lean UX	emerged from the lean manufacturing movement, making and learning are wrapped up in cycles of testing hypotheses [20] in "Build-Measure-Learn feedback loops" [21]
Value Proposition Design	adopts the Lean Startup 'build-measure-learn', as well as the design innovation triad technology-customer-business value [22]
Design Sprint	a short 5-day process, an initiative from Google Ventures. Monday: "map out the problem", Tuesday: "sketch competing solutions", Wednesday: "make difficult decisions and turn […] ideas into a testable hypothesis", Thursday: "hammer out a realistic prototype", Friday: "test it with real live humans" [17]

Table 1: Selected of Design Process Models

A reoccurring theme in the above table is the separating out of 'theoretical' activities (analysis, understanding, learning, logical) and 'practical' activities (synthesis, producing, implementing, building, intuitive). As design processes, these activities should cover on the one hand the *understanding* of problems, and on the other hand the *making* of solutions. However, practice studies of architectural designing have shown there to be no distinct steps of analysis and synthesis, but that activities are made up of both ways of knowing at the same time [23]. The current representations of knowledge production in design represent nothing more than the conventional separations between thinking and doing, ignoring opportunities to perceive "embodiment and being in the world [as the] condition of knowing and action" [24]. Furthermore, the separation between the "intellect" and the "corporeal" creates a hierarchy between the objectified body directed by the mind [25]. In summary, while each of these design process models attempt to provide new approaches to designing, they rest on very conventional understandings of a theory-practice binary and work to reinforce that binary.

#2 The human and the material

Gibson's affordances [26] are an important concept in theorizing the relationship between the human and the technology, which were also taken up by writers such as Klaus Krippendorff [27] and Donald Norman [28], in the sense of 'what one can do' with technology.

> *"If a terrestrial surface is nearly horizontal (instead of slanted), nearly flat*
>
> *(instead of convex or concave), and sufficiently extended (relative to the*

size of the animal) and if its substance is rigid (relative to the weight of the

animal), then the surface affords support. It is a surface of support, and we

call it a substratum, ground, or floor. It is stand-on-able, permitting an

upright posture for quadrupeds and bipeds. It is therefore walk-on-able

and run-over-able. It is not sink-into-able like a surface of water or a

swamp, that is, not for heavy terrestrial animals." [26]

Gibson describes the relationship as between humans and the material surroundings as immediate (see Gibson quoted in [29]), while Norman sees the material as subject to human cognitive interpretation: "[…] the brain had to process the information arriving at the sense organs to put together a coherent interpretation" [3]. Gui Bonsiepe [30] describes the interface to be a connection between "a body", "a purposeful action", and "an artefact" [30], also implying a dependence on a purpose or intention. The separation between cognition and body, and human and technology, represent the cognition as active, and the body and the material as a passive matter. A hierarchy emerges so between the human and the material. However, action, or the capacity to act, can alternatively be seen as distributed across humans and the material in more collaborative ways than here represented [31]. There has been numerous work revealing the active participation of the material in action, illustrating how the material redistributes skills between humans and materials, conventionally ascribed to humans only. The material could so be seen as actively shaping everyday human practices and experience. A study by Elizabeth Shove, Matthew Watson [32] on DIY projects demonstrates the reconfiguration of "the distribution of skill" between the human and novel materials such as "smart paint" [32], which are "fast-drying, non-drip, water-based paints that 'know' how to go on to a door" [32]. Shove and Pantzar's study traces the co-evolving of the material and meaning of "walking sticks" in the practice of Nordic walking [33].

Fisher studied plastic products and their affective significance to the practices of their owners [29]. The way 'things' seamlessly fit into and carry the social practices of its owners is demonstrated by Miller's work [34]. Rosner [35] illustrated on the basis of a bookbinding workshop how different kinds of material collaborations form activity. Material-material, material-human, and material-workspace collaborations produce the "emergent patterns" of the work practice in which we "recognize the formative techniques and practices that hold lasting personal and cultural value" [35]. Following these accounts, the human-machine interface may be understood to be an ongoing formation of skills, practices and collaborations between humans and materials [36].

Material collaboration in every day life can be extended to information and the digital. Although the digital is treated as immaterial, it lives through "large-scale material infrastructures of electrical power, air conditioning, servers, cables, and buildings", as well as it actively participates in society through "constraints that bleed through to the human experience and to the social arrangements within which digital and virtual entities are embedded" [37]. Tacchi's research [38] illustrates how "domestic soundscapes" help materialize memories of the father shaving, or create emotional balance for a person knowing "that there are other listeners to a late-night call-in show". Orlikoswski [39] demonstrates how Google search technology comes to matter in different ways when researching historical events from different locations such as from the UK or from China. Volonte [40] analyses how the "thin ideal" in fashion is constituted not only by models' bodies but also by the constraints of the formulas employed to standardize measurements which do not work beyond size 12, thus materially enforcing size 12 as a barrier between 'normal' and plus-size.

Contrary to the the usual treatment of the material as passive, and as directed by intention, the human-material relationship may be reconceptualized as relations which produce particular effects [36,39]. User-centered design does - as the name says - center the human as the dominant actor. But rather than viewing the human and the material as naturalized opposites, we may direct our gaze at how and to what effects the "boundaries between persons and machines [are] discursively and materially enacted" [36].

#3 Objective and subjective knowing

Having discussed the separation of the human and the material, we would like to consider another separation – that of 'subjective experience' and 'objective knowledge'. In the unfolding of the relationship between the human and the material, we have referred to the cognitivist understanding of human action, whereby experience and emotion is presented as the work of the brain interpreting the bodily senses [25]. With the rising focus on human experience [5,6] and of "context" [41] as significant in human-material interaction, user-centered design has made efforts of theorizing how to design for subjective experience within the wider environment of interaction [42]. The experience of the user is conceptualized to be carried by the human body in interaction with the product ("mountain bike") amid its material environment ("the mud, rocks, sticks, and yes, the water") [43].

> "[The] true outcome of the design […] is not the physical entity or what is in the box (the material product) […]. Rather, it is the behavioural, experiential, and emotional responses that come about as a result of its existence and its use in the real world" [43].

Personal experience is seen as the subjective responses, which result from the interaction with the 'real' and 'objective' material. The world is seen as an objective set of conditions, while humans are conceptualized as subjective. Marc Hassenzahl [4] outlines "objective conditions" to be element such as time, or the buttons on a device, whilst the "subjective experience" relates to concepts such as beauty, or satisfaction [4]. Amongst scholars there is a theoretical interest in solving the dynamic of the unfolding of interaction which involves these supposedly 'objective' materials and 'subjective' experiences. For example, there is an attempt to sketch experience as the grade of fulfilment of "psychological needs", such as "autonomy, competence, and relatedness" [44]. However, despite these detailed accounts of describing the role of experience in human-material interaction, user-centered design theorists admit that there is much to unearth about the "transformation rules" that turn objective conditions into a subjective experience [4].

Turning the gaze towards the designers own body, experience, knowledge, and context, we can observe the same conceptual separations. Kolko describes designerly sensemaking as the synthesizing of the designer's objective knowledge ("I saw this") with the designer's subjective knowledge ("I know this"), which unfolds hidden "in the head" [45]. This is consistent with "romantic" explanations of design understood to be reliant on the designer's subjectivity making designerly knowing "mysterious" and hidden from view [46]. In addition to the separation between theory and practice highlighted previously, we can see here a separation between objective conditions and subjective experience as two distinctly different kinds of knowing, which is taken as natural. Furthermore, to 'naturally' distinguish objective conditions as 'out there' in the world, and subjective experience as 'hidden inside' the human body, serves to obscure parts of the processes of knowing as hidden from view.

#4 The designer and the non-designer

Designers want to be the "force for good" [47] fighting for "technology [integrating] in our lives in a human way" [47]. "We are driven by [the] belief that our practice of interaction design can make the world a better place […] Interaction Designers strive to create meaningful relationships between people and the products and services that they use, from computers to mobile devices to appliances and beyond […]", says the professionals' association of interaction designers. But what makes designers' able to do that? Design knowledge has accordingly been described as a 'cognitive style' [48] which takes place "in the head" of the designer [45]. Designers are seen as connecting everything in a "hub" [8] – theory and practice, the human and the material, and the object and the subjective. "[Their] creative process […] relies on synthesis, the collective act of putting the pieces together to create whole ideas" [8]. Design is presented as a skilled way of knowing which designers are cannot "externalize" [49]. Design knowledge has also sometimes been described as a mental cache which is expressable in drawing [43,48]. In accounts of design thinking, design is represented as "tacit knowledge", as "designerly ways of knowing" [49,50] as "forms of knowledge special to the awareness and ability of a designer" [51], as a reconciliation of the intuitive and the rational [10], and as embracing the creative and the logical [8].

Two ideas are produced in these descriptions of designerly knowing. Firstly, recalling the separation between theoretical and practical knowing, the designer is here understood to mediate and reconcile different types of knowledge, amid a wish to make technology more human. Secondly, designerly knowing is understood as internal and special to the designer, which also surfaced earlier in the description of the 'subjective' knowing of the designer.

Conceptualized as an internal process, designerly knowing relies on the designer to be the medium of this knowledge, and the processing itself is hidden from view. Design ability so plays in its narrative on the old notion of the designer "genius" [52]. Current design theorizing maintains the idea that design is something natural only to designers. Such characterization ignores that the designers are embedded in social and material environments in which collaborations of various kinds – human and material – take place. Design activity can hardly be demarcated as exclusive to the designer. The user, for example, has been recognized as a source for "novel product concepts" [53] in the acquisition, scripting, appropriation, assembly, and normalization of products in everyday practice [54]. When the production process is over, the design is not finished because the user "continues to be involved in constituting what a design is" [55]. We have also highlighted the material collaborations within which design work takes place [29,32,33,35,56].

But the conceptualizations of design activity do not tend to take into account these material and non-designer contributions to design. Instead they position the designers as the exclusive mediators of reconciling separate entities, such as theory and practice, subjective and objective knowing, as well as the human and the technology. In this understanding, the designers 'locate' these parts as 'natural' to synthesize them. Designers are thus conceptualized to synthesizing 'natural' locations. In this work, the designers themselves remain locationless – they are rendered "unlocatable":

> *"Within prevailing discourses anonymous and unlocatable designers, with*
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> *a license afforded by their professional training, problematise the world in*
>
> *such a way as to make themselves indispensable to it and then discuss*

their obligation to intervene, in order to deliver technological solutions to equally decontextualized and consequently unlocatable users." [57]

While designers remain 'naturally' without location, and thus unaccountable, they do locate and make accountable other 'natural' forms of knowledge. However, this locating work amid imagining possible future realities is "profoundly political" [58]. Design work which is currently undeclared and unchartered, and as a 'methodology' it is exclusively accessible to designers.

And so there is much left to know about design as a way of innovating. The separation between theory and practice, as well as objective and subjective knowing, maintains the problematic tradition of knowledge binaries. The separation of the human and the material overestimates the agency that humans do have in what is happening, and it makes invisible the material agency. And finally, the conceptualization of designerly knowing as natural and exclusive to the designer calls on the old myth of designer genius, and produces the problematic effect of the unknown location of the designer within their own practices. Design as the methodology of innovation is an exclusive work. It is unlocatable, unaccountable, unchartered, and inaccessible to anyone outside of design practice. We call for a new conceptualization of design. In order to seriously investigate design as a way of knowing, we propose to move away from the narrative of design as a methodology of innovation, but instead begin to look at what the object of design is and how it is made up.

Conclusion: The Object of Design

Taking categories as natural (such as human versus technology, and designerly knowing versus conventional knowing), obscures the politics which are involved in making these categories [59]. Design theorizing so joins in with the creation of "ontological zones" [60], naturalizing these different categories in order to continue with the work of synthesizing them again. Design makes the case for making technology human; it emphasizes the importance of reconciling theoretical, practical, objective and subjective knowing; and it presents design knowledge as the natural ability of designers. Design so describes the ontological makeup of the world. However, rather than taking these ontologies for granted, we need to look at the effects of the work of assembling these categories. When design makes the case for design as a methodology, what does that do? Claudia Mareis [12] has uttered the suspicion that 'tacit knowledge' is less a natural state of design knowledge, but a particular idea practiced and maintained by designers for reasons of independence [12]. When design postulates that technology needs to be made more human through the "culture, training, and attitude of the people who make them", or when designers are reminded that it is "in your power" to change the culture of the team and the organization [47], then these descriptions postulate particular ideas about design, and produce particular effects. We have begun to open up these ideas about design in the topics of theory/practice, human/material, objective/subjective, and designer/non-designer. We argue that taking these categories as natural obscures the view on design activity and its effects, as well as the locations of designers. Design as a methodology of innovation is a particular idea about design work. As such it is an object which is made up in practice, and as such we propose to investigate it.

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