

2 Tactics

This book is about research through design, research by design, about practice-based, practice-led, and constructive design research and similar terms that refer to research where designing and making are a foundational aspect of the research process (cf. Joost et al. 2016; Koskinen et al. 2011). There are differences between these notions, but for the present purpose, what is more important is how they share an orientation toward designing and making as central to how the research process unfolds, and thus to what constitutes the core ways of finding out new things. For instance, the term “research through design” was initially proposed by Sir Christopher Frayling (1993) as one of three used to describe different relations between research and design, but has since been interpreted in various ways, as well as become the name of a specific research community and conference series. Consequently the precise meaning of the term has been equally mobile.¹

While these research formats driven by design in many ways are just another member of the family of different ways of doing design, they are also different in that they to a significant degree are defined by an orientation toward creating new knowledge. Asking researchers who have done a practice-based PhD in design about the differences between practice and research, Katharina Bredies notes that “the deep reflection, the profound engagement with methodology, and the need for a highly structured approach is often radically new to PhD students in design in the early stages of their research. Likewise, the role that artefacts play in a research process is often entirely different: they do not need to function, but rather to provide explanatory power and serve as theoretical considerations in their own right” (Bredies 2016, 15).

There are several reasons behind the increasing importance of research in (and through) design. One key reason is that, as design problems become

increasingly complex, the need for new knowledge in practice has become a more pressing issue. In the context of changing architectural practice, Michael Hensel and Fredrik Nilsson comment that “practice-orientation in research entails, among other insights, the realization that reskilling and thinking outside the established bounds is increasingly necessary to solve contemporary complex design problems at the pace of practice. ... There are two important factors that more than others seem to drive the need for research in architecture and contribute to the changes of architectural practice we currently experience, and which seem to influence practices of all kinds: *the increasing complexity* of architectural projects and *the digital technologies* and their rapid development” (Hensel and Nilsson 2016, xvi).

Reasons for changes in design with respect to research, however, can also be found within its institutional contexts and higher education. Whether one likes it or not, design education is increasingly treated, interpreted, planned, and evaluated as one of many different subjects in the university apparatus—and the history of design research in many ways reflects this (cf. Cooper 2016). Aspects ranging from curricula and pedagogics to the ways each discipline articulates itself and its “knowledge production”² are being compared across subjects, with funding being allocated based on performance. Thus, as much as we want the workings of research through design to be meaningful to design and designing, it would be naive to think that our institutional contexts and phenomena such as “academization” do not influence what questions are being asked, and how, in our field as they are in others.

Given how prevailing academic orientations tend to value theory over practice, what the notion of “theory” actually refers to in a domain inherently driven by practice, therefore, becomes quite important. If design in this context and condition does not even make a claim to theory development, then the old notion of design as a strictly *applied* art will take on a whole new meaning. Of course, many other matters of concern are also involved, such as what qualifies as a solid disciplinary foundation in the academic context in question, what qualifies as research, what forms of knowledge are privileged, and so on, but reducing theory in design to only a matter of applying more fundamental ideas developed elsewhere would be completely against the field’s development since the 1950s.

Thus we have at least two reasons to take a better look at theory development in the context of research through design. First, we need to articulate and advance the way we understand theory in the context of design practices, a matter of increasing importance in light of the increasing external pressures and influences on design education. Second, while it is evident that research through design has real merit, both academically and professionally, and that it continuously gains traction as a research orientation, there are few, if any, detailed accounts of how this research actually develops its theory. While certainly exciting, it is also somewhat problematic that we are developing a consensus *that* something works while still not being able to articulate quite *how*. This book cannot hope to resolve such issues, but it is an attempt to engage with them head-on to learn something about what is at stake.

Anecdotal Evidence

Looking into what issues pertaining to theory emerge in this kind of design research, let's start with an example in which relations between theory and practice appear, at least from the outside, to be somewhat obscured and even weak. This anecdote stems from experiences and observations made in situations such as project and paper reviews, PhD thesis defenses, and similar situations of taking a step back and evaluating design research. Here I will use the PhD thesis as an example, since it illustrates well what examining a more complete piece of design research can be like. The story may go something like this:

In the account of a design research process of a PhD thesis, there is a rich body of theory in the early parts of the narrative. In the stages leading up to initial problem formulations and design conceptualization, one finds ample references to particular and developed theories, in many cases not from just one area but from many. In fact, one might wonder, when looking at the picture presented, how all these different theoretical orientations will be joined without serious conflict. Overall consistency seems hard to obtain, to say the least. Then, at some point, acts of design seem to take over, and the narrative puts aside the more theoretical concerns to deal with processes of making, leading up to a final description of the actual design output (be that this output is a still an open-ended process, a collection of things, or something else). A thesis of this sort will rarely return

to the initial theories in the later stages. One might see a few references back to certain concepts presented earlier, but in general the overall process seems to have left that behind, leaving the reader with a rather vague idea of what actually happened to the complex theoretical foundation that was first proposed.

A typical response to this situation might be to think that it demonstrates an inconsistent, and in many cases therefore also superficial, relation to theory—especially if compared to how such matters are handled in other areas of academic work. With respect to issues of theory development in artistic and experimental design research, this also seems to indicate a weak connection between theory and practice, not only because of neglect but sometimes also because of explicit intent. Consider, for instance, the following remark by Bill Gaver: “More fundamentally, I am suggesting that, however valuable generalized theories may be, their role is limited to inspiration and annotation. It is the artifacts we create that are the definite facts of research through design” (Gaver 2012, 945).

Seen from the perspective of theory development being one of the primary objectives of research, concerns have been raised more generally in design, as here by Ken Friedman:

One of the deep problems in design research is the failure to develop grounded theory out of practice. Instead, designers often confuse practice with research. Instead of developing theory from practice through articulation and inductive inquiry, some designers simply argue that practice is research and practice-based research is, in itself, a form of theory construction. Design theory is not identical with the tacit knowledge of design practice. (Friedman 2003, 519)

Whether Friedman’s analysis of the situation of theory-practice relations in design holds or not, an unsettling aspect of the whole thing is that some of the people who make these kinds of (seemingly problematic) accounts, and thus exemplify this relation to theory, are successful design researchers, who may have a significant influence on others’ research. True, it will not suffice to say it is simply “implicit” or “tacit,” but to assume that they do not quite know what they are doing with theory does not necessarily appear as the only alternative interpretation, perhaps not even the most likely. Further, since research through design often aims toward the conceptual, it often directly addresses issues related to interpretation, categories, values, and so on, making the assumption that the relation between theory and practice is simply weak even more problematic. And so what if this

initial reaction of ours, even if in just a few of these cases, is completely misleading? What if we do not see what theoretical contributions are actually there because we are looking for the wrong kind of closure?

A starting point for this investigation is the idea that maybe it is not primarily the relation to theory per se that is the key problem in examples such as the foregoing anecdote, but instead some kind of structural mismatch between the character of the theories used and what design researchers use them for—and as a consequence, issues related to what we expect the theoretical impact and feedback to be like. In many ways, it is about exploring a notion of theory development close to Gilles Deleuze and Félix Guattari's idea about philosophy: "Concepts are not waiting for us ready-made, like heavenly bodies. There is no heaven for concepts. They must be invented, fabricated, or rather created and would be nothing without their creator's signature" (Deleuze and Guattari 1994, 5). To begin this inquiry, let us look at how theory is currently handled, and what tactics are in place to address it.

Three Tactics

In numbers, design research might be a relatively small area, but in terms of scope it is certainly not, as it ranges from art and design history to engineering and technology development—but importantly also from the analytic to the artistic. Throughout design's, and thus design research's, history, this scope has caused a range of tensions between the technical-rational, on the one hand, and the artistic, on the other. In many places that came to define what industrial design is, such tensions have been very present. Consider HfG Ulm, for instance, and the following remarks by Tomás Maldonado (headmaster) and Horst Rittel (professor in design methods):

Although my own cultural orientation was strongly marked at that time by Neopositivism ... the presence of Adorno in Frankfurt represented for me, as it were, a contradictory intellectual stimulus. ... "The useless is eroded, aesthetically inadequate. But the merely useful lays waste the world," he once said to me in an attempt to cool my enthusiasm for the industrial culture of usefulness. ... These and other reflections in the spirit of Adorno, and later also Habermas, led me to examine the relationship between industrial culture and the culture industry, and to undertake a critical investigation of the role played by "design" in between these two realities. (Maldonado 1991, 223)

In retrospect, it becomes apparent that the HfG's [Ulm] most durable legacy was the endemic internal strife that kept the institution going. It is widely believed that the HfG was destroyed by the "policy conflict" between "designers" and "theorists." The truth is the exact opposite. The HfG stayed alive just so long as it remained a hotbed of discord. (Rittel 1991, 118)

Or, as in the remarks by Andrea Branzi:

In Ulm's case there has been the comic misunderstanding of treating designers as scientists, simply because they were talking about science. In reality, that hill was home to a group of extraordinary artists who, in the guise of inflexible scientists, were looking for beauty, that beauty so necessary to human life and so fragile and difficult to define and defend. (Branzi 1988, 42)

In design research, related historical tensions can, for instance, be seen between advocates of a "design science" versus ones who favored a "design discipline" (Cross 2001), not to mention in the significant difficulties encountered in resolving basic discrepancies between what is valued in professional, artistic, and scientific academic contexts (cf. Biggs and Karlsson 2010).

To make practical delimitations possible, this inquiry is located within the more specific context of what has been referred to as "research through design," "constructive design research," and similar terms (Joost et al. 2016; Koskinen et al. 2011), and domains such as industrial, product, interaction, or service design. The kinds of design theory discussed here therefore primarily concern questions related to basic concepts and structures tied to artistic foundations in design, and to the articulation of what it is that we think and do as we (indeed "we," as design is typically a collaborative activity) design. Examples of such basic concepts might, for instance, be form, material, function, use, user, and so on, but also concepts we use to explain how we structure design activities and their outputs, such as product or project, and the logic they bring to the structure of the creative process. I also want to place the discussion in the context of such design research because it so clearly bears traces of both art and science and therefore has to deal with the difficult conflicts arising from being in-between. From a research point of view, positioning oneself closer to either art or science would be easier, relatively speaking, but here we are looking for trouble, so conflicting views are something we're interested in. In what follows, I briefly introduce three different ways of addressing theory versus practice in design research, here called parallels, sequencing, and intermediaries.

Parallels

The first and perhaps most obvious approach to the gap between theory and practice is to acknowledge its existence but to build bridges across this divide. To put it bluntly, this approach approximates trying to avoid the problem and instead rely on existing research frameworks to create an overall structure, keeping a clear distinction between the designing/making on one side and more theoretical accounts on the other. However, in practice this is still complicated to do, and one should not underestimate the effectiveness of this approach. I will call this tactic *parallels*, as it keeps the two domains parallel and largely independent from each other.

In its most straightforward form, the approach starts with an existing design practice and then adds a reflective layer on top of it, often in retrospect. It can, for instance, be seen in cases where a designer has been involved in a series of artistic or other development projects, building a set of works that is later used as a basis for a research project, such as doing a PhD thesis. The designer then aims to make the transition from artistic practice to research through elaborate reflection and theorization of these works. To simplify, what we get from this structure is in many ways a design practice combined with a research framework borrowed from (most often) the humanities or social sciences.

While this may result in interesting ideas and other relevant results, such parallels do not necessarily imply any significant changes to the way the actual designing happens. More importantly, however, this approach does not relate to theory as something addressed and potentially produced within the design practice as such. Rather, it largely relates to theory as something external. In a sense, what parallels do is to address the division of labor between designer and design theorist by bringing the two roles together in one overall project, but they do not necessarily challenge the division of the subject matter that such disciplinary habits enforce. Or, in other words, the research process tends to take on the character of the designer articulating and theorizing her own design work *as if* she were an (almost) external observer. Let us consider an example, how Maarit Mäkelä articulates her “retroactive approach”:

I have written the main chapters only after the visual work process has ended, giving a retrospective glance at my artistic work process as an artist-researcher and placing my actions into the context of feminist theories. The speaker in my thesis is therefore the artist-researcher, who is reviewing her intuitive work process in retrospect.

... During the research process, the artist-designer reviews her artistic work process and the created artifacts from a retrospective viewpoint and creates a dialogue between her observations and interpretations on the one hand, and research literature on the other. (Mäkelä 2006, 176)

This example comes from artistic research, and while the approach may seem straightforward, it is still far from trivial to articulate its workings and contributions. Indeed, it is in many ways unfair to reduce Mäkelä's approach to a matter of keeping things parallel, as it is an elaborate account of how art and research interact and together create something she compares to a hermeneutical circle. At the same time, it is important to distinguish between the primary topic of this book—that is, design theory in general, and design's conceptual foundations in particular—and other, related, but also very different discussions in artistic research concerning what (kinds of) knowledge this research aims at articulating as it deals with issues related to nonconceptual content and experience. Consider the following statement by Henk Borgdorff:

We can justifiably speak of artistic research (“research in the arts”) when that artistic practice is not only the result of the research, but also its methodological vehicle, when the research unfolds in and through the acts of creating and performing. ... This is not to say that viewpoints in art criticism, social and political theory or technology play no part in artistic research. As a rule they do play a part. The discourses about art, social context and the materiality of the medium are in fact partially constitutive of artistic practices and products. The distinctiveness of artistic research, nevertheless, derives from the paramount place that artistic practice occupies as the subject, method, context and outcome of the research. Methodological pluralism—the view that various approaches deriving from the humanities, social sciences, or science and technology may play a part in artistic research—should be regarded as complementary to the principle that the research takes place in and through the creation of art. (Borgdorff 2010, 46)

This gives us a different perspective on the reasons for keeping different parts of the research effort parallel to each other: while they speak to each other, they also remain separate because they are oriented toward fundamentally different forms of knowledge. With respect to such questions, design research may position itself almost anywhere on a spectrum between the artistic and the analytic, and so the relevance of the chosen position therefore depends highly on what the research in question aims to achieve. Obviously, all research acknowledges that there is a critical relation between methodology and what knowledge one may obtain, and in

design research—with its span from art to science—this becomes particularly important, as it is sometimes hard to see precisely where on such a spectrum one is positioned and how that may differ from where others stand.

Consider, for instance, the differences between the earlier remark by Friedman and the statement by Borgdorff. Friedman states that “instead of developing theory from practice through articulation and inductive inquiry, some designers simply argue that practice is research and practice-based research is, in itself, a form of theory construction. Design theory is not identical with the tacit knowledge of design practice” (2003, 519). In contrast, Borgdorff states that “the distinctiveness of artistic research, nevertheless, derives from the paramount place that artistic practice occupies as the subject, method, context and outcome of the research” (2010, 46). Perhaps some of the differences can be traced to one of them focusing on theory, the other on research more generally, but it is nevertheless clear that while both of them seem to talk about practice and its relation to research, either they are not talking about the same kinds of practice (Borgdorff addresses artistic ones, while Friedman refers to the importance of inductive principles, hence likely advocating more analytical ones), or there is some confusion as to what kind of methodology is associated with what forms of knowledge.

There are many areas in which such uncertainty about what it is that we actually speak of is highly present in design research. Consider aesthetics, for instance. On a most general level, most of us would probably agree on some notion related to expressions and experience, likely using historically important ideas such as beauty or the sublime as reference points. But at some point, perspectives would start to diverge. Design researchers oriented toward history and the humanities would typically take off in directions related to art discourse, what art and artistic expression are and how they operate—and what it is to experience them. Researchers oriented toward the behavioral sciences would turn to psychology and sociology and what people experience in the encounter with things, aiming toward theories of human experience and how it structures the world as perceived. Looking in still another direction, the design researcher working with experimental design examples to investigate new materials, forms, and expressions might use the term “aesthetics” to describe the way these new things present themselves. As when saying, “What do you think about the aesthetics

of this?" as a way of addressing the structure of, or basic reasons behind, their expressions. In many ways, this is all fine—as long as we understand that all these questions and answers are bound to their particular contexts, their particular methodological worldviews, and for the most part have little bearing on the knowledge generated in other such worldviews. This is not to say they exist in isolation or in a vacuum, but only that you cannot replace the artistic methodology of a given inquiry with an analytical one and expect to be answering the same questions, and vice versa.

Unless we understand that design research operates in a space between art and science, and this space actually affords considerable diversity, it is unlikely that we will be able to see that what we refer to as theory depends highly on what parts of this spectrum we want our theories to speak about. Indeed, it is crucial that we do not bring the evaluation criteria from one part of the spectrum to the results from another, as doing so will not necessarily tell us anything of interest and importance. Still, there are reasons for thinking about certain approaches to relations between design practice and design theory as a matter of parallels, and how certain aspects of research happen after making—though the two, in cases such as Mäkelä's, have been arranged in an unfolding circular pattern. Although such projects may range from the simplistic to the highly complex, we can think of their basic structure as matter of parallels, as they tend to leave the artistic/design practice fairly intact and the layer of theoretical articulation separate from it.

Sequencing

The next tactic shares many similarities with the first one, with one fundamental difference: whereas parallels keep making and theorizing separate, the one I call *sequencing* explicitly aims to bring them together. In particular, it aims to make theoretical notions influence designing in sometimes fundamental ways.

Typically, the theories that we apply to making are not themselves from the domain of design but from somewhere else. Significant examples of introducing theoretical frameworks into design come from areas such as psychology and sociology, from which theories for understanding and describing human perception and action were brought into the development of approaches such as user-centered design. There are also numerous examples of how philosophical positions have been introduced to

conceptually ground experimental design practices. Let us take a brief look at some examples.

Design has a long history of borrowing conceptual as well as practical frameworks from the medical and behavioral sciences. Ranging from ergonomics to theories about attention and memory, there is a rich set of concepts, criteria, and contexts to build on when designing things for an intended user group and for evaluating to what extent they actually meet the users' needs. In Scandinavia, an early example is the Swedish Hemmens Forskningsinstitut (Home Research Institute), which was founded in 1944 to study and improve living standards in general, and women's working conditions in the home in particular.³

The HFI's approach was inspired by methods that had previously been used to improve workplace efficiency in industrial contexts. Research projects at the HFI ranged from calculating the optimal proportions of kitchens to minimize unnecessary movement, to studying work effort and different practices of preparing food. The institute's findings and recommendations played an important part in transforming Sweden's standard of living from among the poorest in Europe in the 1930s to one of the highest. The HFI's program also illustrates how user-centered design in Scandinavia has its origins not only in the design work more typically included in design history, but also in methodologies coming out of political efforts to change society through design. In that sense, the HFI is a precursor to contemporary socially and politically engaged design (cf. Ericsson and Mazé 2011).

Turning to contemporary research through design, we find approaches related to this early research on design and everyday things in, for instance, design research building on ideas from experimental psychology. Several design research environments have developed approaches based on the use of systematic laboratory experiments to close the gap between theory and design experimentation (e.g., Overbeeke, Wensveen, and Hummels 2006; Stappers 2007; Koskinen et al. 2011). For instance, the connection between theory and experiment in such projects can be developed through controlled studies of specific design variables in tests with human subjects. This structure of the research process allows design researchers to make significant use of certain theories throughout the design process while at same time keeping a space open for design experimentation. Using a highly iterative research process, more developed relations between theory and design

*Tesil	
Utrustning för städning	1
Sopborste	1
Sopskyffel	1
Levang	1
Hink	1
Skurtrasor	

Rensning: borsur
 m. m.
 Beredning: hackning, skärning, pressning, passering,
 stötning, malning m. m.
 Varmmatlagning: rörning, vispning, stekning m. m.
 Uppläggning, upphällning etc.

Diskning
 Vid användning av lösa disklådor
 » » » fasta, nedsänkta disklådor

Bakning
 Tillsättning av deg
 Knådning av deg
 Utbakning av deg

framkommit att husmödrar
 defekter i rygg, armar och
 ned olämpliga arbetsförhål-
 lar t. ex. hårda golv, olämplig
 förändring i arbetsställ-
 elsen ordentligt, t. ex. små
 halvuttagna steg m. m. Un-
 deg, svenska sjukgymnasters
 letta.
 rckas på flera olika sätt, och
 speciella studier vid HFI.

anhänger med arbetsställ-
 att man uppnår goda ar-
 ten ansträngning och med
 iken för arbetsställningens
 ställande.
 rett speciellt stora svårig-
 kommer troligen att upp-
 giska expertis, som sysslar
 synpunkt. Undersökningar
 därmed sammanhängande
 förkning m. m. bedrivs i
 ens hantverksinstitut.
 dessa undersökningar har
 fter i huvudsak tre linjer:
 enligt Douglas säckmetod
 a utslag, men lämpar sig
 oden är tidskrävande och



Fig. 5. Mätning av energiomsättningen vid tillsättning av deg på olika arbetshöjder medelst Douglas' metod. Genom analys av utandningsluften, som uppsamlas i en säck, beräknas energiomsättningen hos den arbetande.

Figures 2.1, 2.2

Photographs of archive materials: reports from Hemmens Forskningsinstitut (HFI), published in 1947. The first (2.1) comes from a study of kitchens and cooking practices, documenting the experimental setup for measuring work effort when preparing dough at different workbench heights (Bergström, Boalt, and Lindgren 1947). The second (2.2) comes from a study of the design and ergonomics of different kinds of knives, showing prototypes made

Utan anmärkning	Skaver något i handen	12,2
För utsvängd på ryggsidan och för kantig	Holkskarven skaver i handen	13,4
För utsvängd på ryggsidan och för klumpig	Utan anmärkning	8,8
Ryggsidan något för rak	Utan anmärkning	12,2
Utan anmärkning	Utan anmärkning	10,2
	Utan anmärkning	10,2
	Utan anmärkning	15,2
	Utan anmärkning	14,0
Utan anmärkning	Utan anmärkning	14,2
Utan anmärkning. Bra stöd för lillfingeret	Utan anmärkning	14,0
Utan anmärkning. Bra stöd för lillfingeret	Utan anmärkning	15,4
Utan anmärkning. Bra stöd för lillfingeret	Utan anmärkning	14,6
Olämplig. Vulsten skaver i handen	Utan anmärkning	13,0
Vulsten skaver något i handen	Utan anmärkning	13,4
Vulsten skaver något i handen	Utan anmärkning	12,8
För kantig	På det unders. ex. skaver slitsen för tången i handen	13,6
För kantig. Stödet dåligt utformat	På det unders. ex. skaver slitsen för tången i handen	12,2
Utan anmärkning. Bra stöd för lillfingeret	På det unders. ex. skaver slitsen för tången i handen	15,2
Utan anmärkning. Bra stöd för lillfingeret	Utan anmärkning	15,2

ett sådant (nr 12 och 16). Hus-
 öd har hittills varit mindre van-
 inte, att ett behov av en sådan
 som redan denna provserie torde

esultat utformades ett antal plas-
 rskärarskaft (fig. 7), efter vilka
 i (bok) tillverkades av de i den
 esenterade företagen. Dessutom
 l i direkt anslutning till nr 16.
 st. olika modeller (nr 25—31;
 rst fig. sid. 116), samtliga av
 dilt beträffande tjockleken, än
 skaft. Alla hade vidare väl av-
 försedda med bakre fingerstöd.
 fingerstöd — 2 st. (nr 25 och
 kaftavskärning i anslutning till
 28) med sned dylik i anslut-
 gjordes utan främre stöd. Av
 t. (nr 29) den ovannämnda, enk-
 ökade upplagan av det tradi-
 v typ nr 16, 2 st. (nr 30 och 31)
 craftig snedavskärning i främre



Fig. 7. Modeller, utförda i plastelina, till försörskärarskaften nr 25, 27, 28, 30 och 31.

ändan. Dessa snedavskurna skaft, som alltså har ryggsidan framdragen över bladryggen, avser att hindra tummen eller pekfingeret att komma i kontakt med bladet vid sådana arbeten, där man vill hålla så långt fram som möjligt för att få ett bra grepp. Vid flera skaft både med och utan främre fingerstöd gjordes nämligen enligt de utför-
 ligen försöksprotokollen anmärkningar på denna punkt.

Figures 2.1, 2.2 (continued)

in modeling clay that were used for testing (the next iteration of prototypes was then made in wood) (Carlgren, Nyberg, and Holme 1947). Thus two key aspects of user-centered design methodology can already be seen here: tests with users to obtain both qualitative and quantitative data, and iterative prototyping, where the fidelity and material quality of the prototype increase over time.

can evolve as the understanding of how the different design variables will have an impact on the test situation grows deeper.

Such basic methodology is sometimes combined with, for example, a philosophical framing that sets the basic conceptual orientations for the design process. An interesting example of such an approach is work on “embodied interaction” by scholars such as Kees Overbeeke and colleagues in Eindhoven, in which notions from the phenomenology of Maurice Merleau-Ponty and the ecological psychology of J. J. Gibson were used to form a design research agenda explored through a methodology combining design making and experimental psychology (see also Dourish 2001).⁴

An example that works with a different kind of theoretical basis, and philosophy rather than psychology, is Pelle Ehn’s (1989) use of Wittgenstein’s notion of “language-games” to articulate what prototyping a new (design) practice could be like, and how it works from a conceptual point of view. In these projects from the early days of Scandinavian participatory design, a key issue was how professionals could bring their expertise into the design situation when their knowledge is hard or even impossible to articulate in forms that could have an impact on the design decisions made during development. Instead of getting stuck in issues of representation, Ehn shifts the issue into participation and the problem of language into a question of how shared language is first established through language-games:

If designers and users share the same form of life it should be possible to overcome the gap between the different language-games. It should at least in principle be possible to develop the practice of design so that there is enough family resemblance between a specific language-game of design and the language-games the design of the computer artefact is intervening in. A mediation should be possible. (Ehn 1989, 116)

The result was a new kind of collaborative design, where prototypes are not only prototypes of technical objects but the very building blocks used to create new and shared language, in a sense moving toward prototyping a shared “form of life.” Thus the process combined the use of philosophical notions to open up issues in new directions, and the concrete interpretation of these new directions through collaborative making.

Needless to say, this tactic I am calling “sequencing” has produced significant results in design research, and as it will continue to do so, it will

remain a most important part of our repertoire. Still, trying to look critically at what this tactic brings, we need to ask if there are questions in design that such an approach might have difficulties getting at. One such domain seems to be issues pertaining to design's own foundations. For instance, there are few, if any, examples of how this tactic allows us to address and critically examine issues pertaining to the artistic foundations that still somehow also govern the designs developed. In a sense, while the psychological theories allow us to examine certain specific design variables, the project as a whole still depends on a design ability to craft something that makes sense as a whole and can be experienced as such. While the theories can be used to account for such wholes in more sweeping terms, it is difficult to get to the specific issues that the actual designing needs to resolve (cf. Djajadiningrat, Overbeeke, and Wensveen 2002). Similarly, while notions such as language-games provide a different foundation for how we relate to each other in and through making, they say little about the making as such; and even after decades of participatory design, we still struggle to make more precise accounts of, for example, the particularity of the expressions of these prototypes beyond ideas about how "unfinished" things encourage elaboration and discussion in ways that "finished" designs do not. Indeed, such "aesthetics of the social" remain a largely unresolved matter in design research.

Thus there seem to be limits to what aspects of design that sequencing speaks about, and these limits stem from what areas the theories originally engaged with. While this is not surprising, what is perhaps more important is that this also suggests a deeper issue, namely, that what we see here are basically various forms of applying theory with little chance of making the transition to actually developing radically new theory. Another indication that this might be the case is that design research only rarely develops new contributions to the basic theories it engages with—which in turn suggests that this does not automatically mean we are moving forward when it comes to questions about how to initiate a kind of "basic" research in design (as distinct from an "applied" one) that addresses design's own foundational issues. However, this is just speculation on my part. Given the efforts currently going into design research conducted along these lines, results may well suggest that this indeed offers a way forward for design theory also in a more foundational sense.

Intermediaries

The third tactic of interest to us here, which I will call *intermediaries*, aims directly at the tension between the general and the particular. Addressing questions about what kind of knowledge is needed, and produced, in design, scholars have attempted to articulate theories at different levels of abstraction so as to move them closer to practice. A historically important illustration is Christopher Alexander's (1979) pattern languages, which were intended to structure and support collaborative planning and development of housing and cities, and how this idea was later adapted in areas such as computer programming and interaction design (e.g., Löwgren 2007). This is related to what has been argued to represent a kind of intermediate-level knowledge in design research, that is, something that is "more abstracted than particular instances, without aspiring to be at the scope of generalized theories," as Kia Höök and Jonas Löwgren put it (2012, 23).

One of the most successful examples of how to orient oneself toward more intermediate levels of theoretical abstraction—although never really framed in this way—is the idea of specific form-languages, as in the instantiations of a particular design semantics or semiotics. There have been various versions of the idea that design decisions regarding form and functionality can be understood as a kind of language based on parts and rules for how they combine. In Swedish industrial design, the work of Rune Monö gives us an informative illustration: "The product's message is formulated in a 'language' that we see, hear or feel. This language consists of signs. Signs are the subject of semiotics. Within product semiotics, these signs consist of forms, colors, sounds and so on—in other words, elements that we usually associate with aesthetics" (Monö 1997, 21). Monö's book *Design for Product Understanding* (1997) is in many ways an instantiation—in the form of an explicitly laid-out form-language—of the idea of product form as something structured like language. As expressed by Klaus Krippendorff and Reinhart Butter: "Just as a journalist creates informative messages from a vocabulary of terms, so could a designer be thought of as having a repertoire of forms at his disposal with which he creates arrangements that can be understood as a whole in their essential parts and that are usable by a receiver because of this communicated understanding" (Krippendorff and Butter 1984, 5).

What is interesting in Monö's remark is how he suggests that issues traditionally understood as a matter of aesthetics can be addressed in terms

of semiotics. Besides being a highly functional hands-on approach in a context aiming for the design of useful products, this is also an explicit answer to the complex question we briefly touched on earlier, namely, what designers talk about when they talk about “aesthetics.” At that point, I suggested that a designer/researcher who is primarily engaged in making, and in the exploration of form, might use the term to quite simply refer to the way a certain thing presents itself, its expressions. And in many ways, this is precisely what Monö does here: explaining what we talk about when we discuss what and how a thing presents itself to a user. What is also important to note is that this form-language is tied to a particular kind of design (although it might become widely spread), to a certain aesthetics, if you wish. Thus it sits somewhere between the particular and the more general; it is more widely applicable than a given design (or family of designs), yet more constrained and context dependent than we would expect from a more general theory of aesthetics.

As such, it addresses a basic tension that design theory cannot escape: the issue of the particular versus the universal. Erik Stolterman described this as follows (see also Nelson and Stolterman 2012):

Within the scientific project, the focus is on regularities, mechanisms, patterns, relationships, and correlations with the attempt to formulate them as knowledge, preferably in the form of theories. The intention is to form theories that constitute knowledge that is valid and true at all times and everywhere. ...

... In contrast to the scientific focus on the universal and the existing, design deals with the specific, intentional and non-existing. Interestingly enough, dealing with design complexity involves almost fundamentally opposite goals and preconditions as does the scientific approach. This is especially true when it comes to the notion of universality. In design practice, the goal is all about creating something non-universal. It is about creating something in the world with a specific purpose, for a specific situation, for a specific client and user, with specific functions and characteristics, and done within a limited time and with limited resources. Design is about the unique, the particular, or even the ultimate particular. (Stolterman 2008, 58–59)

Taking a step back, this points to a basic difference in what we need theories in experimental design for compared to many other areas of research: whereas others look toward the universal for support and stability, design needs theories that support conceptualizing, articulating, making, communicating, collaboratively creating, and so on, something new and particular. Elsewhere I tried to describe this as a difference between aiming for abstract images of the actual versus creating concrete images of the potential.

Moving On

The previous sections have presented an overview of three established and in many ways highly successful ways of addressing different aspects of theory in design research engaged in making and experimenting. I have also, however, argued that there are matters that these approaches struggle with. As we move on and look for other alternatives and options, I would like to point to two further aspects of the research associated with these tactics. And (un)fortunately, they both relate to characteristics we typically do not want theories to have: temporality and contextuality.

If we start with the implications of context, it comes from the tension between the general and the particular. The tension between design's general orientation toward the particular and how theory aims to speak about the general is a foundational problem. We have seen different ways of addressing this tension, for instance, by developing situated accounts that do the job of theory in a certain situation but do not have the reach beyond the particular that we traditionally look for in theory development. Thus, one of the aspects of design theory that we might have to consider more carefully is to what extent we are dealing with situated knowledge, and what that means for how we understand the reach and scope of our doings.

The issue of situated knowledge is a complex topic in itself (cf. Haraway 1988); still, many of the questions asked here are quite basic. For instance, how do we balance the general reach of a term against its effectiveness and relevance in a specific context? Consider the problem of how we may easily end up with definitions of foundational terms such as "form" that do not transfer outside a particular context, thus making critical inquiry across such contexts more or less impossible, as there is little chance of talking about the same thing. Or, equally unproductive, that we end up with general notions that fail to address practice. Consider, for instance, how most academic discussions of what design *in general is* seem to have little or no impact on how actual designing happens and is communicated.

Obviously, that theories have properties related to reach and explanatory scope is an issue in all areas of research, but in our case, this is a foundational problem because of the tension between the particular and the universal. Perhaps this is not a matter we should seek to resolve in the sense of seeking to dissolve it, but rather something that calls for a more explicit

articulation of the tensions between the particular and the general. I turn to this issue in the next chapter.

Another aspect that calls for more attention in the three tactics I have discussed is how our responses to difficult matters all seem to result in temporal solutions. While some of this can be understood as a consequence of how designing is an unfolding process, there is something important about how temporality matters here—ranging from the anecdotal example in the beginning of the chapter to the various forms of turn taking between making and theorizing discussed above.

It is difficult to define what design is,⁵ but there are shared features among the family of definitions offered. In particular, definitions frequently refer to design's orientation toward the future, toward the currently nonexistent; what John Chris Jones expressed in his definition of design as "the initiation of change in man-made things" (Jones 1992, 6) or what Herbert Simon stated as "courses of action aimed at changing existing situations into preferred ones" (Simon 1996, 112). Thus, to make things even more complex for the prospect of theorizing within experimental practice, the basic tension increases further as we add another seemingly contradictory relationship: the one between inductive processes aiming to uncover what remains constant and stable, and design's general orientation toward change (cf. Nelson and Stolterman 2012).

The concern for change seems to drive designers toward methods: whatever the field may lack in terms of theory development, it certainly compensates for when it comes to methods. In terms of basic character, methods more obviously support processes of change, as they explicitly relate to the temporal and the unfolding, whereas theory traditionally builds on the stable and the constant. Another way, perhaps, of interpreting this situation is that methods offer a different relation between question and answer, between problem and solution, compared to the typical orientation of theories. Whereas we tend to want theories to rest firmly on the answering side of the equation, we are more comfortable having methods primarily engaged in the questioning part. And since designing, at least ideally, orients itself around problems and questions opening up something, *making* something, either we need to bring theory there, or else it may easily be reduced to tools for reflecting on the results.

Moving on, an idea to explore further might therefore be to what extent design theory is set up to be present when answering versus in what ways

it is meant to support questioning. Again, this is not by any means unique to design research—but again, things become more hands-on in our case, the primary reason being how we aim to initiate change through design. Not leaving the world as is means that the questioning-answering relation is a matter of agency. We cannot articulate methods without certain central concepts: our design methods may be as unorthodox as anything, but if our work at the same time still relies on conservative definitions of foundational terms, these definitions will most certainly retain a fossilizing influence. Or in other words, we can be as inventive as ever when working with the design of a thing belonging to a certain category, but if the definition of the category itself is left untouched, then we will remain firmly within its frames. Indeed, I argue that this is one of the reasons why certain aspects of design remain so remarkably uncontested despite practice otherwise undergoing such significant change. Therefore I will return to the issue of definitions we use to articulate what kind of designing we are doing, and how such definitions can also be more sensitive to unfolding and temporality, in chapter 4.