

The wickedness of design research practice

Methodological issues in bringing knowledge to expression through design.

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Abstract: In this paper we review existing literature in design research to see to what extent it provides a basis for meeting the methodological challenges that we encounter in our own practice-based design research. Seemingly, much attention is given to describing the results and types of knowledge that design research may provide, the purposes those may serve and by what yardsticks those results may be evaluated. Another focal area seems to be the form(-ats) in which the results of design research are presented and disseminated. What is often missing, however, are detailed accounts of the roles that design practice plays that can be picked up and used by others doing design research. This is unfortunate, as it is often such methodological structures that we struggle with. The emergence of ‘design research practices’ entails something more than mere combinations of design practice and academic research. Research typically has the objective of knowledge production; practice has the objective of creating the right thing by solving a set of problems. Considered a ‘new’ kind of design practice, design research practice seems to be more about problem finding through the design and creation of things that bring knowledge to expression. Thus, the process by which it achieves this must be uncovered and articulated.

Key words: *design research practice, design theory, design practice, conceptual circles, wicked problems*

1. Introduction

A designer in practice works to create something for a given situation in the aim to change that situation into a preferred one. In order to do this a design practitioner engages in a kind of research that informs him to some extent of the current situation, of potential ways to achieve the preferred situation as well as ways to cast what is preferred.

Design research as an academic discipline arose in response to the complexity of the design situations of practice. It has a rich history as can be seen in the extensive discourse on the types of design research and approaches to it that can be distinguished, see e.g. [3,5,7,8].

Academic design research has the objective of generating knowledge, at least in part for a design practice, that has the objective to make an artefact.

Recent discourse in academic design research looks into, on the one hand, the relevance of academic design research for practice, and, on the other hand, the roles that design practice plays in academic research.

In this paper we review current discourse concerning the latter area of interest, i.e., practice-based design research or Research through Design. Even if the these two concepts are not necessarily identical -the first seems

to be more current in other fields of creative research, e.g. the arts, and the second seems to be used more in the context of interaction design and HCI-, in the context of this paper we use these terms to indicate a kind of research where approaches from design practice are used in the realization of an artifact as a way to construct knowledge. Not only is the design of the artifact the means by which the knowledge is generated, the knowledge is embodied in the artefact as well.

We evaluate the kind of support structures that are developed for such research in published work and to what extent those are useful in our own practice. Our search is motivated from methodological issues we encounter in our own practice-based design research. We begin by outlining these issues in the following section, so that they can be used as a lens through which a few salient papers can be viewed in the consecutive section. That review is followed by a brief evaluation and our concluding remarks.

2. A practice-based research project

As designers working in academia we are conducting research that concerns designing technologically mediated group interactions. In particular, we attempt to bring the dynamics of groups of people to expression in and through individual interactions with such a medium. As a concrete example of our practice based design research we present a specific design we have been working on to get to grips with the subject matter of our research.

As we discuss in more detail later, for this specific design we build on concepts and theory from perceptual and social psychology concerning how we come to be aware of others, to investigate the aesthetics of such interactions through designed artefacts.

In working on this design we encountered difficulties in how to approach this subject matter and how to structure the design research process. After presenting the specific design, we elaborate such issues that concern the relation of practice and theory, i.e. the complex relation of ‘how to design ...’ and that which is designed.

2.1 Embodying theory: making the social tangible

In order to begin to approach the subject matter of our research, we began by creating a technological mediated interaction system that enables someone to experience the dynamics of interacting with others.

For this design, we looked to theory and concepts from phenomenology of perception and perceptual and social psychology. It does not serve the purpose of this paper to discuss this theoretical inspiration and grounding at length, but we think it is important for the reader to have a passing understanding of the concepts on which our first design was based and from what academic fields they stem. In both phenomenology of perception [15] and ecological perception [10], perception is developed as an activity, not a passive registration of events; I can become aware of the world because I act in it with my body. The world gains meaning in our sensorial experience of it. For example we do not need to have a higher abstract understanding of gravity, mass and inertia, for us to be able to jump or throw a ball. The active, reciprocal relation between our body and the world (i.e. perceiving) has been further developed in the context of our relation to others. Perceptual crossing is the interplay between perceiving and being perceived [13].

Based on these ideas, we set out to make a system that enables people to directly perceive the perceptive actions of multiple others interacting with the system. Such a system would inherently enable the direct perception of the dynamics of perceptive inter-actions combined.

Technically speaking, the system consists of a number of linear actuators (sliders) that can be networked. The topology of the network (what slider influences another) and how actions on and positions of one slider are mapped to movements and positions of the other sliders, both are under software control. The sliders are mounted in minimalistic boxes behind a surface of stretching, smooth fabric. This hides the sliders from sight while their movement can still be felt and acted upon.

When one person moves one slider, the other sliders can move according to the network topology and mappings between sliders. When more than one person are moving their sliders, each can feel the actions of the others through the forces that their own slider is exerting.

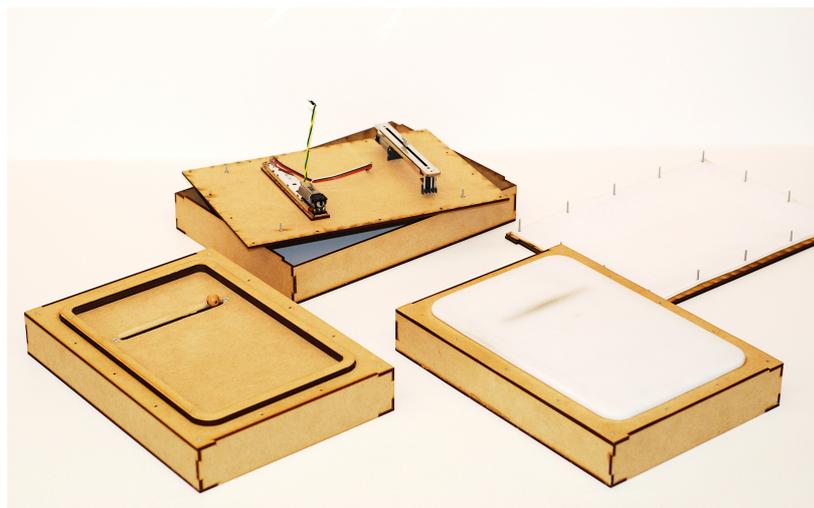


Figure 1 Slider boxes in various states of assembly.

2.2 Evaluating a research artifact

While building various iterations of this design, questions arose in relation to the conceptual grounds as well as to the more practical engineering sides of the system. What is it that we built? What is the merit of what we built? What kinds of insights can be gained from the design? Once a system of 5 networkable sliders was built and operational, it seemed obvious to set-up some kind of experiment with the design. However, we found it rather difficult to determine the form and focus of such an experiment, as these have to do with the kinds of questions one asks and from what framework of reference they come. Even more troubling, the decision to do any kind of experiment itself implies a particular perspective.

From an engineering perspective the design could be evaluated and developed concerning, for example, force-feedback in distributed systems, focusing on technological variables relating to transparency of the interaction medium, e.g. resolution, latency, noise, jitter etc. From a perspective of perceptual and social psychology the system could be evaluated and developed focusing on the experiential effects of such variables and more fundamental questions concerning perceptual-crossing in group context could be addressed. From a perspective of network science and social science, the system could be used to study the influence of network topology and mappings between sliders on emergent behavior. From a design practice perspective the design could be evaluated regarding its visual or interactional aesthetics and its viability in and potential for a commercial context.

The sliders were made in a design research project. All perspectives mentioned above are to some extent, relevant for the designing of the interaction medium. Each perspective, however, places emphasis on a particular way of viewing that which the system gives rise to and implies a particular approach to developing and evaluating

that, e.g. an engineering perspective implies an approach to research from technical sciences; a sociological perspective implies an approach to research from the social sciences, and so on.

Even if each of these perspectives provide valuable parts, none of them seemed to be particularly helpful in driving the project towards or evaluating the whole of “bringing the dynamics of groups of people to expression in and through individual interactions with such a technological medium”. In our project we intend to explore what interaction media of this sort could be, what they would look, sound or feel like, and, more precisely, how the experience of an individual interacting in and with large group dynamics could develop. As such, we attempt to open up a design space on a more conceptual level.

2.2 Methodological issues

The import of theory and concepts from other academic fields into our practice of design research as outlined above, generates unease concerning the import of the systems of evaluation of those fields as well. This unease consists in that, for evaluating the successful opening up of a design space, perspectives that focus on elements that may help to construct an artifact that indicates such a design space are of little help by themselves. It is the design judgments on the combinations of such elements that constitute the ‘ultimate particular’[16]. By extension this unease introduces uncertainty about how to proceed with the research; (how) can the research be undertaken (systematically) in order to generate the types of outcomes that fit a system of evaluation, which, in turn, fits the type of work?

The situation is reminiscent of the wickedness of design situations as they are well known in design practice (see for the notion of a wicked problem e.g. [2,17]). The recursive nature of the subject matter of our own research amplifies the idea of the conceptual circles that a design practitioner resolves through practice [11], but it also seems to be different. How is it different?

To begin to address this question, we can say that we seem to experience wickedness in our own project in two regards, that may be intertwined;

- Wickedness of approach: as outlined in the previous paragraph, this regards practice-based design research as a knowledge producing activity. What approach to gaining new insights and generating knowledge best fits that which is studied, if that which is studied is constituted by the research?
- Wickedness of subject matter: that which is the subject of our research (aesthetics of interaction of group dynamics), is brought to expression by the artefacts through which the research is approached.

In the next section of this paper we review current discourse on practice-based design research, looking for support to build on in our own work. In particular we look for ways in which the ‘wickedness’ we encounter in our own project is handled in discourse on practice-based design research.

3. Discourse on (practice-based) design research

Discourse on practice-based design research is wide and deep. It is not the intent of this paper to give an extensive overview of this discourse. Instead we will look at a select few papers that we believe highlight the focal points of current discourse in practice-based design research. Most of the writings reviewed here stem from interaction design research and research in Human Computer Interaction (HCI). We choose writings from these

areas as our own research relates to them and because the discourse in these areas seems to be most lively and relevant in regard to the issues we encountered for our project.

The Nature of Design Practice and Implications for Interaction Design Research. [19]

In a paper that “makes the case that design research that is aimed at improving design practice has to be grounded in a deep understanding of the nature of design practice”, Stolterman explores the notion of complexity in design in contrast to that in science. Based on this exploration, Stolterman argues, like others before him, that the ways science deals with complexity is not applicable to design complexity in practice. Design complexity is strongly related to ‘wicked problems’, which, in design practice, are approached by acting designerly. As an approach of inquiry and action, designing therefore deserves its own intellectual treatment. The paper outlines some characteristics of ‘acting designerly’ in order to develop discipline and rigor in design practice. It goes on to suggest a number of research activities that are needed to further develop a designerly understanding of the design process, which serves design practice.

From the perspective of our own work, the most relevant point of this paper is that it attempts to articulate what it means to ‘act designerly’ in meeting with the wickedness of design practice. It does so by outlining characteristics of ‘acting designerly’. These characteristics strongly resonate with the issues we encountered in dealing with the subject matter of our own project, it provides handles to think about what it means to act designerly.

From design research to theory: Evidence for a maturing field [6]

An analysis and critique of research through design: towards a formalization of research approach [20]

In two papers that review literature and interviews with design researchers, Zimmerman, Forlizzi and Stolterman discuss ways in which design research is done and how it contributes to formalization of the design discipline. In their IASDR 2009 paper [6] they assess that many classifications and models in design research highlight the connection between design research and design practice, but do not address how design research connects to theory. Central to the argument of both papers are (i) what constitutes theory and (ii) what is required from a process that leads to theory. Two types of theory are characterized (after Frayling’s characterization of design research): theory *on* design and theory *for* design. Research through Design (RtD) is proposed as an approach to research that can lead to both these types of theory and does this in a form (of both process and outcomes) that is true to the nature of design. As such, especially their DIS 2010 paper [20] examines and critiques RtD for its legitimacy as a form of academic inquiry, in order to formalize the approach for both the design community and the larger research community. They develop the critique into a call for action.

These papers are useful for understanding why a practice-based design research approach (RtD) is suitable in our own project, as it is particularly well suited for addressing wicked situations and ‘allows researchers to become active and intentional constructors of the world they desire’. Furthermore these papers outline one way of thinking about how and what outcomes of our project could contribute to design and theory, and therefore to establishing practice-based design research as a legitimate form of academic inquiry. It gives a perspective on explicitly addressing questions about how to use and document this approach in an academic context and to meet a need of formalization of design research in the form of rigor and relevance. Both papers discuss several

successful research projects that use an RtD approach and, based on an interpretation of what makes them successful, a call is made to methodological development.

Establishing criteria of rigour and relevance in interaction design [4]

In yet another paper that examines what constitutes ‘good research’. Fällman and Stolterman examine three forms of interaction design research, i.e., design exploration, design practice and design studies. Drawing on a similar discussion of developing rigor and relevance in Information Systems, they assess that the drive towards such formalization comes from “the perceived need to establish the field academically, while at the same time be practitioner oriented”. In the light of what they call the design research triangle, they conclude that each form has a different purpose, which then leads to each its own approach, outcomes, methods and internal logic. They argue that notions of rigor and relevance for each form therefore need to be based on a firm understanding of the respective purpose. They seem to place the responsibility for establishing suitable and appropriate criteria for each form of research in the hands of the researcher, in that it is the researchers task to make their purpose, claims and evidence visible and understandable for the reader.

For thinking about the kinds of issues we encounter in our own project, this paper is helpful in proposing what may be the source for what is called ‘disciplinary anxiety’. Furthermore the paper discusses, like the previously discussed papers, that notions of rigor and relevance must be rooted in a firm understanding of the nature and purpose of the form of research to which they are applied, and seems to imply that therefore they need not to be taken as absolutes.

What should we expect from Research through Design [9]

In his essay on how the approach of research through design should develop, Gaver questions the drive for convergence and standardization in the design research community. Based on a reflection on the nature of design theory using perspectives from philosophy of science, he concludes that “research through design is likely to produce theories that are provisional, contingent, and aspirational.” Gaver argues that the diversity of approaches to research through design “need not be seen as a lack of inadequate standards or a lack of cumulative progress in the field, but may be natural for a generative endeavor.” As an alternative to developing theory that is articulated and developed separated from artefacts, Gaver proposes the annotation of artefacts realized in research through design as a form of theory, and annotated portfolios as a way of reflecting and valuing the particular nature of design theory and practice; as such an annotated portfolio constitutes the collection of work as a research program.

This essay is useful in that it provides an alternative perspective to the previously discussed papers on how design research, in particular practice-based design research, may be developed as a respectable research discipline. This perspective focuses the discourse solidly on the artefact, which is at the heart of design practice. Furthermore it allows for insight (knowledge) to emerge from and be articulated through a collection of artefacts, while still rooted in it.

For our own situation - where it is not yet easy to grasp or define what the focus is of our project, nor does it seem fitting to formulate questions that have their roots in other research disciplines - this perspective seems to provide an appropriate way of thinking about how a practice-based design research approach can help in bringing the subject in focus and what outcomes should come from it. Thus it implies ways to move forward.

The logic of Annotated Portfolios: Communicating the Value of 'Research through Design' [1]

Also this paper proposes an alternative to the drive to bring research through design in line with supposed measures for good research from sources outside of design. Bowers draws a parallel between Gavers essay and Feyerabend's philosophical skepticism over methods and contributions to the Sociology of Science. Bowers argues for design researchers to be aware of the limits of rationalisms and to do this by developing research through design's own 'limited rationality'. Central to this paper again is the proposition of 'annotated portfolios' as a concept that can do some of the work that theory does in other research disciplines.

In addition to the useful, mostly conceptual points that we mention in relation to Gaver's essay, this paper provides an elaborate example of an annotated portfolio. It is this example that provides, on the one hand, inspiration for our own work on a practical, subject matter level, on the other hand it shows how through annotation of portfolio, the approach to designing the artefacts, i.e. the methodology or program they result from, starts to be made visible.

Annotated Portfolios and other forms of Intermediate-level knowledge. [14]

In an article that looks for "paths to fruitful academic discourse and collaborative knowledge production that accommodates design practice", Löwgren interprets the concept of annotated portfolios as a form of intermediate-level academic knowledge. The paper refers to a kind of conceptual space in a dimension of abstraction levels that exists between particular artefacts and general theory. Annotated portfolios and other kinds of intermediate level knowledge, e.g. design guidelines, patterns, concepts and experiential qualities, are mapped in this space and their relations are briefly explored. Attempting to do this is seen as "collectively adding a few more bricks to the bridge between design practice and academic research".

What we find interesting in this paper is that it proposes a way to bring the fundamentally different perspectives in the discourse reviewed above back together.

4. Navigating the design research landscape

The writings we have so far reviewed center on developing an understanding of design research as a knowledge producing activity. Much attention is given to describing the outcomes of design research and types of knowledge it may provide, the purposes those may serve and by what yardsticks those results may be evaluated. Such discussions often lead to a focus on the form(-ats) in which the results of design research are presented and disseminated. Few of the writers go deeper into what design researchers *do* in order to generate those outcomes. Most of them call for developing a deeper understanding of the nature of design or acting designerly. Some of the discourse provides handles to begin to unpack these concepts by outlining their characteristics; some provide a glimpse into the practice of the design research, i.e. how the framing of questions developed and how actions and decisions were taken.

Throughout these writings, there is mention and analysis of canonical, or good, examples of practice based design research. In a book that gives a detailed overview of several of these and other examples of design research that hinges on creation of artefacts as part of the research process, Koskinen et al. outline three successful strategies to - what they call - constructive design research [12], i.e. Lab, Field and Showroom. This book gives a concrete insight into actual processes followed in these strategies, how knowledge was systematically generated in

parallel with - and embodied in - artefacts. Similarly, in a much older paper discussing the role of the object in art and design research, methodologies used in three examples of ‘innovative design research’ are discussed in detail [18].

Such detailed accounts of the process can be seen as descriptions of exploratory journeys through a landscape of practice based research. What we so far have not been able to find, is explicit treatment of the means by which such journeys may be navigated.

Let us bring all this back to the context of our own design research practice and the methodological issues we experience. In our project we set out to bring group dynamics to expression in the aesthetics of the interaction of individuals with a technological medium. We designed and built a system that mediates the perception of (inter-) actions of and with others.

As we discussed earlier, we experience issues regarding how to stake out trajectories for our research practice from this point. We reiterated that following approaches from other fields of research fails to address the holistic nature of our research questions. We assessed this situation to be similar to the wicked problems in design practice, in that what we want to study is constituted through the study, i.e., what the aesthetics of interaction with group dynamics are, can only be brought into view by making a system that establishes just that. Thus, at least some of this wickedness seems to stem from the conceptual circles that design research questions like the one we are asking brings about. This invokes a tension between design practices and more traditional research practices: whereas the circularity of the question-answer relation is something that research typically aims to break apart so that question and answer can be separated and the relation between them critically reviewed, design practice is typically engaged with situations and objectives where a holistic view of how problem-formulation and design-solution evolve together is central.

In our project, we made a first sketch of what ‘our’ system could be with the example we built. How can we now evaluate this design and reflect on the designing of it, in order to inform the design of a next one, which will further elaborate, refine and articulate our understanding of what such a system could be?

The writings we have reviewed in this paper do identify and characterize the wickedness that we are facing, but they do not resolve it, nor do they address what it means to resolve it. If design research practice is a new kind of practice, in the discourse we reviewed we see little work on how this practice unfolds. The reason for this seems to be a focus on constituting elements of the research discipline, on breaking things apart to get a view on them, to talk about the difference between theory and practice and how one may build the other, whereas it has been shown that the distinction is problematic in itself. What is missing in the discourse are articulations of how ways of bringing and keeping things together unfold through the research process.

The ‘new’ design research practice that we are looking for is different from design practice in the sense that it aims not towards research needs of the individual, i.e. what I need to know to resolve my current design problems, but towards questions and issues articulated in relation to research context and community. As a result this form of practice works with a different set of questions, issues and problems than we would typically find in design – and as a response its output also differs, not only in terms of research publications etc. but importantly also in the kinds of design examples and artifacts and the qualities searched for in them. This ‘new’ design research practice

is, however, clearly a kind of design practice in that it has the character of working with the resolution of conceptual circles through design. In this way our research process is in some ways quite similar to resolving the conceptual circle of investigating what it is like to sit by means of designing chairs. And perhaps our understanding of such more traditional design circles could be helpful also here: how we - through design iterations - move towards increased precision of the design expression.

5. Conclusion

It clearly is not the case that design research practice happens to generate interesting results more or less by chance. As we have seen, a successful body of work is steadily forming under the umbrella of practice-based design research that follows a diversity of strategies.

The main contribution of this paper is to point out that the discourse on practice based design research seems to focus on the academic standing of this form of research. Whereas this focus may be valuable to develop the theoretical side of the field, it seems to be of less value in supporting the practice of doing the research.

Our ideas are still much undeveloped, but we believe that trying to articulate more precisely in what ways design research practice is a *kind of* research practice and in what ways it can be considered a *kind of* design practice might be productive. And with respect to such issues, we think that the resolution of conceptual circles through design might be one thing to look further into. Indeed, the type of support we need in our own work partly lies in how to work with such conceptual circles, how to iteratively and systematically increase the clarity of both questions and answers and how they relate, to refine the resolution of a conceptual circle that we proposed.

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