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Epistemic artifacts

The potential of artifacts in design research

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Abstract. An epistemic artifact is characterised by having the sole purpose to be a tool to develop theory in interplay with a verbal reflection and discussion in the context of practice-based design research. It offers the design researcher the advantage to deviate from the design context and turn the design practice in which the he or she is trained, into an integral part of the design research. Hence, the design research can focus solely on the experimental and exploratory aspect of the design practice through the use of materials and techniques. These advantages are discussed and exemplified by the author's own experiments with experimental use of digital media within the field of ceramics. The paper is based on an ongoing PhD project.

Keywords. Epistemic artifact; practice-based design research; digital media; Rapid prototyping; ceramics.

Introduction

This paper reflects on an ongoing Ph.D. project titled “Experimental use of digital media within the field of ceramics”. In this research it is relevant to use terms like “research through design”(Frayling 1993) or “practice-based design research”, which for this purpose can be defined as an experimental design practice that is part of the design research and contributes empirical data.

The paper is about research method. As a PhD. student with a background in design practice I have been occupied with how design research, which includes own experimental design practice, can utilize the researcher's background as a practitioner and make the practice central for the research.

This issue is also about how design research and design practice can be seen not as two separate and parallel tracks in practice based design research, but as a single track and as an integrated whole.

My overall research question is about how the digital media can be integrated in the field of ceramics in a way that takes advantage of the approach a ceramic artist has to designing and in a way which can produce synergy in the interaction between the digital media and traditional techniques with natural materials. And by that, what the use of digital media can add in an artistic qualitative sense to a product of ceramics. The aim of the research is to support the ceramic artist to work experimentally and exploratively in themes such as movement, transience and metamorphosis by the use of digital media within the field of ceramic.

The project focuses on 3d design and by that 3d digital graphics and Rapid Prototyping (RP). RP is a common term for a range of techniques to transform 3d digital form into 3d physical form.

The overall research question does not reflect the design process as a whole from identifying user problem to finding the right way of production, but focus solely on the experimental and exploratory stage of the shaping process through the use of materials and technique (design practice). See Figure 1.

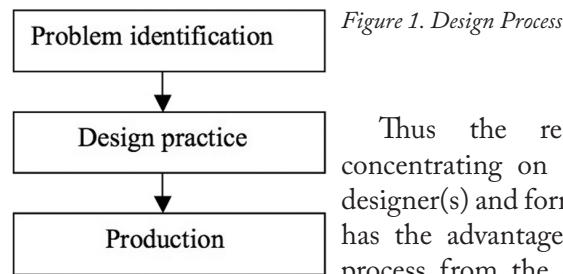


Figure 1. Design Process

Thus the research question is solely concentrating on the relationship between the designer(s) and form, material and technique. This has the advantage of disengaging the research process from the design context and turns the design practice in which the design researcher is trained, into an integral part of the design research. Below I will show how that the creation of an artefact and the artefact itself in the context of design research can have the sole purpose to be a tool to develop theory in the context of practice-based design research. I shall call such an artefact an epistemic artifact, and I shall argue that such artefacts offer certain advantages for the design researcher to do with practice, method and communication of the outcome in practice-based design research.

In the next section I will clarify my method of research. Subsequently I will clarify the difference between the role of practice and artefact in the context of design and design research, respectively, and how this contributes to and influences my research method, which I will exemplify by my own experiments. Finally, I will draw a parallel to a similar use of artefacts in Participatory Design Approaches from the concept of Make Tools (Sanders, 1999) and Critical Design, which use artefacts with a purpose to stimulate discussion and debate (Dunne, 2001)

The method in this design research

The method begins with a definition of a frame for carrying out experiments, which is inspired by Exemplary Design Research: With the notion of “exemplary design research driven by programs, experiments and interventions”, we refer to research based on the explicit formulation of design programs that act as a frame and foundation for carrying out series of design experiments and interventions. It is ‘exemplary’ in the sense that it enables critical dissemination primarily by creating examples of what could be done and how, i.e. examples that both express the possibilities of the design program as well as more

general suggestions about a (change to) design practice (Binder and Redström, 2006).

My intention with this section is to give an insight into the operational aspect of this frame and the potential it may exhibit. The frame is defined by the overall research question.

The approach to design research is explorative and experimental, which in this study means that the research questions and empirical series of experiments are produced and developed in the process of research. This approach can be seen as a “reflection-in-action” (Schön, 1983).

One experiment has formed the starting point in the research, which has given rise to new questions and experiments. Subsequently the research has comprised parallel experiments which influence one another through verbal discussion and reflection. The verbal discussion and reflection is based on parallel studies of relevant literature and similar experimental work in the field. The frame and series of parallel and interdependent experiments are illustrated in figure 2.

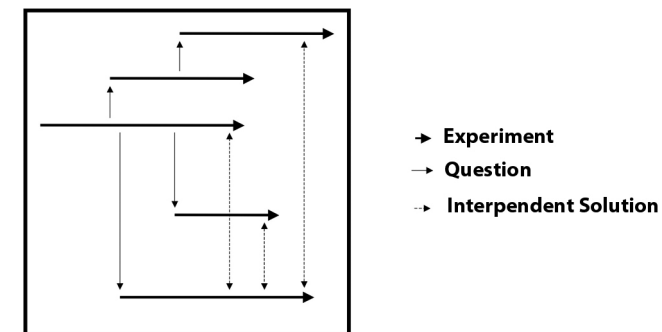


Figure 2
Series of parallel and interdependent experiments

The difference between the role of the artefact in design and design research

In this section I will clarify the difference between the role of practice and artefact in design and design research and how this gives some advantages for the design researcher, which has to do with practice, method and communication of the outcome in practice-based design.

Arguably the purpose of design research is to produce knowledge expressed in terms of theory. The Danish design researcher Per Galle (2009) defines research, knowledge and theory like this:

Research [a process]: Disciplined acquisition of new non-trivial knowledge and documentation of it by means of theory.

Knowledge: Familiarity with concepts, states-of-affaires, or courses of action.

Theory [a product]: A description (often detailed, argumentative, explanatory) of concepts, states-of-affaires, or courses of action.

In the present project, the resolution of the overall research question relies on a series of experiments which contributes empirical data. In that sense the creation of the artefact and the artefact itself can be seen as tools or means to develop theory in interplay with a verbal reflection and discussion.

In comparison the purpose of design is to enable the production of artefacts, accordingly Per Galle, who defines design like this:

Design [a process]: Creatively develop and express an idea so as to enable yourself or someone else to produce an artifact that you will recognize according to the idea.

Following Hilpinen (2004), he takes an artefact to be something deliberately made for a certain purpose; and Per Galle elaborates:

For example, an artefact may accomplish its purpose by being useful in a certain manner, by arousing particular emotions, by signaling its owner's social status, by mediating an artistic expression, and so forth.

In the ordinary context of design the role of the artefact can be said to be a product and a statement by itself, useful and understandable for a consumer, and it will usually stand alone without a verbal description to accompany it.

As table 1 shows, the purpose, role and product depend on whether it is situated in research or in the practice of art or design.

	The purpose is to develop	Role of artefact is to be a	The product is
Design Research	Knowledge	Tool /means	Theory
Design	Artefacts	Product	Artefacts

Table 1

This gives some advantages for the practice-based design researcher, which has to do with the role of practice, method and communication of the outcome in practice-based design research.

Because in the research situation, the artefact is developed specifically and solely for the sake of the experiment and does not have to make sense outside the experimental setting, it can be characterised as an epistemic artefact. This is possible because the epistemic artefact does not stand alone in the context of design research, but will be accompanied with a verbal reflection and discussion.

This is an advantage because the design research can focus solely on the experimental and exploratory aspect of the design practice through the use of materials and technique. It enables the design researcher to ignore the design context, which usually is about the relationship between the artefact and the user. The epistemic artefact is relieved from its usual obligation to fulfil a purpose e.g. of everyday use, such as the purpose of a vase to contain water for flowers. The design research can focus on the overall research question that is to support the ceramic artist to work experimentally and exploratively

and express the possibilities within the frame and general suggestions about design practice. In that sense the epistemic artefact, that is the object of the experiment, can be seen as a tool or a means to develop theory in interplay with a verbal reflection and discussion and by that an integral part of the research practice. This turns the design practice in which the design researcher is trained, into a tool for research. This is an advantage. Thus the research becomes relevant and accessible for the target group of design researchers and designers, who are meant to make use of the developed theory in practice. Furthermore, the epistemic artefact does not have to make sense outside the experimental setting. It can be interpreted in the context of several applications, without having served to serve the purposes of an ordinary artefact such as a plate or a cup.

The notion of epistemic artefact encourages a mode of research that involves a series of parallel and interdependent experiments. The answer to the overall research question expressed by theory can be said to be a primary activity, while the production of the epistemic artefact is secondary. It is more important to clarify the overall research question of what can be done and how by interventions and new questions and experiments, than to design an artifact in its own right. This is an advantage. Firstly because it enables the design researcher continuously to put each single experiment into perspective by which the potential is clarified. Secondly and most importantly, because it create solutions based on unpredictable relationships.

Exemplifications of advantages

In this section I will exemplify the above-mentioned advantages by some experiment of my own.

I will show how one experiment has formed the starting point in the research and how epistemic artefacts can express the possibility of what can be done. Below I will consider how a new solution based on unpredictable relationships was created.

An epistemic artifact

The first experiment, which formed the starting point, is about the use of "Dynamics" in 3d digital software programs, in this case Real Flow. The aim of the experiment was to explore themes such as capturing transient phenomena and synergy in the interaction between the digital media and traditional techniques with natural materials. Dynamics cover a range of tools in 3d digital graphic software to simulate effects related to reality such as wind, gravity, liquids etc. Instead of capturing transient phenomena from the physical world, the use of Dynamics allows you to simulate the transient phenomena, making it possible to work with physical representations of these. Dynamics is typical used for the film industry and thus animation based. Through the use of Real

Flow, I am not bound by the laws of physics and can even freeze a moment in the film sequence at any time, which can be enlarged or made smaller. An attractive point is that it is also possible to have these effects – in this case a collided water surface, which delivers a water splash (figure 3) – produced as a 3D physical model by the use of Rapid Prototyping (figure 4).

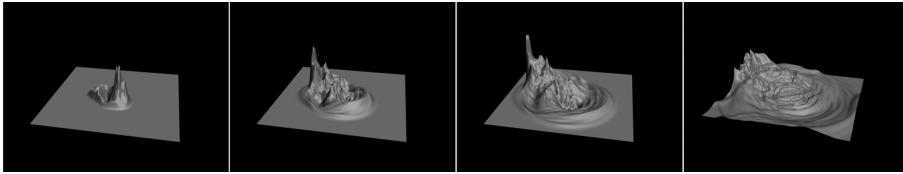


Figure 3

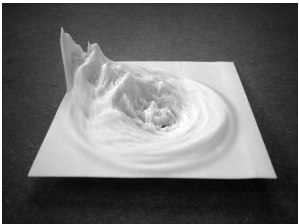


Figure 4

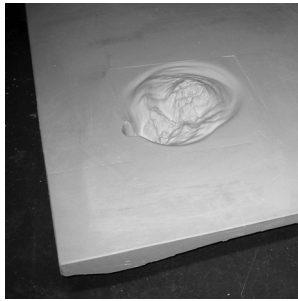


Figure 5

During the experiments, an artifact was produced in porcelain by the use of a hundred-year-old and refined technique, slip casting. The technique transforms the three-dimensional print figure 4 into plaster (figure 5).

The resulting artifact, which can be seen in figure 6, has a conspicuous, organically growing and detailed formation in the middle, produced by the use of digital media. However it is bounded by a soft curved edge, which was determined by the liquid material, in which it is produced by the traditional techniques.

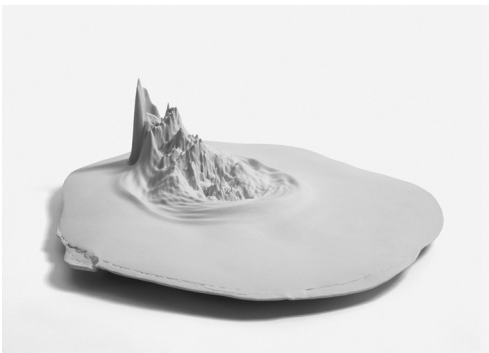


Figure 6

To exemplify how such epistemic artifacts may work in the research context, I will emphasize the possibility for the digital media to paraphrase or to produce a fictitious narrative about the material in which it is embodied and produce what I call a “scale conflict”. At first sight the formation is interpreted as part or result of the creation, but on closer inspection it becomes clear that the formation seen in this context reflects a splash at a scale entirely at odds

with the scale of the curved edge. As if the splash was caused by a meteorite impact in a big ocean.

Furthermore the fluid boundary between the liquid material expressed through the material itself and the representation of the liquid material should be emphasized. On one hand we have a narrative about the creation of the artefact expressed through the behaviour of the liquid material in which it is created. This is emphasized by the contour of the artefact, which is a sign of my pouring of liquid material, something which *actually happened in reality*. On the other hand, we have the naturalistic, yet fictitious and very dynamic narrative, expressed in the central formation, which suggest a dramatic event that *never happened in reality*. This narrative relates to a liquid material as such, rather than the actual material in which it was created.

Unpredictable relationships

The experiment has raised some new questions and issues to explore.

Examples of questions are:

1. Since the technique of Rapid Prototyping (RP) is not developed to a satisfactory degree to transform the digital produced form to the ceramic material, this project focuses on the RP-produced models used in combination with traditional techniques. However the use of traditional techniques involves some limitations to the degree of complexity allowed in the 3d model. Can this be improved?
2. The formation developed in Real Flow was not created as a caricature, but with an intention to be a naturalistic representation of a transient phenomenon captured at a dramatic stage. Is it possible to execute such an experiment and achieve similar effects in reality e.g. with physical materials?

The latter question was explored using plaster. Plaster has the quality of a crystallizing process which enables us to capture a movement of the material in a process from fluid to stable. This was explored in several ways including the use of gravity, as shown in figure 7.

Figure 7



Since the overall research question in this project is focusing on ceramic, the issue of transformation into the ceramic material is paramount. Apparently by accident I was introduced by Karen Harsbo, associated professor at the School of Architecture in Copenhagen, Fine Art department and head of the Ceramic Lab, to her collaboration with Neil Brownsword, PhD from United Kingdom and

their experiments with a mixture of plaster and liquid porcelain. This particular mixture constitutes a material with the quality of plaster as well the quality of a textural ceramic material meant for firing. This material was utilized in the experiments.

Subsequently, I explored the mixed material in relation to the first mentioned question about the limitations of traditional techniques. The material was found very suitable for improving the degree of complexity, when transforming the digitally produced form to the ceramic material, used in traditional techniques with moulds of silicone. This solution is now explored in relation to more complex geometry developed in Real Flow in interplay with the textural quality of the ceramic material gained by firing.

Thus the mixed material which came into existence during another experiment turned out to be a solution to this latter issue based on an unpredictable relationship.

Conclusion and the role of the artefact as a tool in related fields

In the paper I have shown that the creation of an artefact and the artefact itself in the context of design research can have the sole purpose to be a tool to develop theory in the context of practice-based design research and by that be characterised as an epistemic artefact. Furthermore I have discussed the advantages afforded the design researcher by such “epistemic artifacts” advantages to do with practice, method and communication of the outcome of design research.

The notion of artefacts that serve as a medium to achieve overall objectives is not unique. Parallels can be found in fields such as Participatory Design Approaches whose use of the concept of “Make Tools” (Sanders, 1999) is comparable to the use of “epistemic artifacts” suggested above. Make Tools cover a range of artefacts which serve as a common ground for connecting the thoughts and ideas of people from different disciplines and perspectives, e.g. between designer and consumer. The purpose of Make Tools is to discover as-yet unknown, undefined, and/or unanticipated user or consumer needs. Make Tools can be prefabricated or developed by the participators.

Quote: Because they are projective, the Make Tools are particularly good in the generative phase of the design development process. Generative research occurs very early in the design development process. Its purpose is to discover as-yet unknown, undefined, and/or unanticipated user or consumer needs. It is in the generative phase that we are looking for ideas and opportunities to fill unmet user needs. Ideas and opportunities generated by users are usually quite relevant and powerful when acted upon and brought to market. (Sanders, 1999)

Another example is Critical Design named by Dunne and Raby. Critical Design emerges from the field of interaction design, which investigates the way mobile phones, computers and other electronic devices influence people's

experience of their environment. Critical Design uses design as a medium to stimulate discussion and debate amongst designers, industry and the public about the social, cultural and ethical implications of emerging technologies.

Quote: Critical Design is provocative and challenging and asks about what we really need by pushing the cultural and aesthetic potential and role of electronic products to its limit. Its purpose is to stimulate discussion and debate. (Dunne 2001).

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