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Design Research between Design and Research

Paper for "When Architects and Designers Write, Draw, Build, ? a PhD". The 2011 symposium of the Nordic Association of Architectural Research, Aarhus School of Architecture, May 4-6, 2011

by

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0. **Abstract**

The discourse on architecture and design research in Denmark in the past thirty years has been stuck in an unproductive dichotomy between research through design on the one hand and a phantom image of academic and theoretical, word-based research on the other.

Advocates of the research through design strand have argued, that architecture and design research must follow an architecture and design methodology – designing – and be communicated by means of architecture and design media – images and artefacts. Essentially, this view sees no difference between architecture and design research and practice, as expressed in the notion of research as 'artistic innovation work'.

On the other hand, the pressure to expand research in architecture and design has seen a movement towards adopting traditional research paradigms from the technical and social sciences and humanities. For many architects and designers, this has been seen as an untimely invasion of paradigms which are not only alien to the architecture and design culture, but also fundamentally unable to capture the essence of architecture and design and hence to convey any meaningful new knowledge in the field.

The argument of this paper is that both positions are equally wrong. Design is the act of

creating something new; something which wasn't there before. Research is the act of creating new knowledge and is therefore in itself a design process. And just as design is a dialectic process of action and reflection, so is research. Hence, the main difference between design and research is in the object; design creates artefacts (physical or abstract) and research creates knowledge.

1. **Introduction**

In 2003, the late Erik Nygaard and Natalie Mossin published a small but very instructive article, "Ars sine scientia nihil est", in Arkitekten (Mossin & Nygaard, 2003) on the nature of architectural research.[1] Their argument is, that architectural research cannot meaningfully depart from the general criteria of stringency, novelty and communicability which define new knowledge in all other fields of research. They therefore argue against considering insights which are generated as a result of doing architectural design projects – in Denmark referred to as 'artistic innovation work'[2] – as research. Nygaard & Mossin do not dismiss the relevance of artistic innovation work, but argue that claiming it to be research would be irreconcilable with the general research paradigm.

Nygaard & Mossin's 2003 article was written as an attempt to clarify concepts in a time where the discourse on architectural research had for many years been stuck in endless claims that architectural research is essentially incomparable to other types of research due to the very nature of architecture and therefore cannot abide by the same criteria. This is unfortunate as the nature of research (as Mossin & Nygaard also hint) in fact bears many similarities to the nature of design/architecture. But as little seems to have moved in the discourse on design research since Mossin & Nygaard's article as up until then.

A couple of years earlier, Kristian Berg Nielsen (2000) contended that in fact very little had happened since a 1981 Ministry of Culture report[3] on architectural research described the research at the Danish schools of architecture as weak in its foundations (referenced in a quote by Thomsen, 2000). Nielsen not only agrees with Mossin & Nygaard that both artistic innovation work (or architectural innovation work, as he prefers to call it) and research are relevant to the advancement of the field of architecture and design, but also in that the two should not be confused:

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[1]In this article we use the terms design research and architectural research indiscriminately. Design is a very ambiguous term which has different connotations in different contexts. By extention, the same is true for the term design research. We would like to advocate a broad definition of design which encompasses all the traditional making disciplines of architectural design, urban design, industrial design, graphic design, etc. Equally, we define design research as research which – in one way or another – pertains to these disciplines. Later, we shall develop the different ways in which design research can relate to these disciplines.
[2]In Danish: 'Kunstnerisk udviklingsarbejde'
[3]The Danish schools of architecture and design are under the auspices of the Ministry of Culture.

It must […] be spelled out that the requirements for the execution of these activities are fundamentally different, just as their functions in relation to the profession are not coinciding.

The ambiguous position of architecture between art and science does not imply, however, that there can exist a particular scientific paradigm for that research which is related to the profession. Research results must comply with the norms that must be followed in any other research.

– Nielsen, 2000 (authors' translation)

Today, some thirty years after the publication of the Ministry of Culture report, Danish architecture and design research has taken a decisive step away from a general research paradigm as advocated by Mossin & Nygaard and Nielsen. In 2008, Peter Bjerrum was promoted the first ever doctor of architecture in Denmark, based on his work, "3 fortællinger om arkitekturens grundlæggelse" (Three Narratives about the Foundations of Architecture). Bjerrum's doctoral work as it is presented in his book[4] consists of an essay, followed by the presentation of three architectural sculptures, or 'architectons' (as coined by Malevich). Each architecton is represented in photos and drawings and accompanied by commentaries written by an architectural critic, a philosopher and an architect respectively and brief texts by the author himself.

The objective of the work is to make an ontological investigation of architecture as defined through the notions of space, form and material. However, no attempts are made to situate the work in the context of other research, it is not clear what the chosen methodology can contribute, just as the findings of the work are not explicated. And intentionally so: According to Bjerrum, it is important to emphasise that architecture is tied to physical matter and thus that architects work with the concrete, and he therefore sees his work as

"… a political statement about claiming independence for architectural research with a distinct research paradigm based on architectural works and media."

– quoted in Folkmann, 2008 (authors' translation)

Seemingly, the creation of non-verbal expressions through the spatial media of architecture is an end in itself, which, however, renders the work inherently non-discoursive.[5] As Bjerrum puts it

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[4]As it does not comply with universal criteria for research, it must be kept open whether the publication is the primary means of experiencing the work; it might well be the accounted artefacts which have been publicly exhibited.
[5]While architecture does arguably "speak", it represents a semiotic system which is so open to interpretation that it can hardly mediate a conversation about the foundations of architecture (or anything else for that matter) without the use of words.

"The three works [architectons] constitute the foundations of the thesis and the fact that they define their own inner consistency as synthetic works of art means that they cannot be contradicted outside their own realm."

– quoted in ibid. (authors' translation)

Bjerrum acknowledges that taking the architectural works as his point of departure for theoretical reflection represents a methodological weakness "… as it leads to references which are dialogic with the works". This does not worry him however, as he finds – arguing along artistic lines – that this is compensated as it "… leaves room for others to include their own references and hence to unfold further reflection" (ibid., authors' translation).

While Bjerrum's work might provide valuable insight and inspiration as artistic innovation work – and there is no reason to dismiss it as such – it is clearly very far from being a work of research as defined in any discipline other than architecture. However, by inscribing the work into the realm of research, it departs from other research fields, as well as from design research internationally (apart maybe from the other Scandinavian countries as mentioned by Sevaldson, 2010). This is unfortunate for a number of reasons.

First, it seems to add very little to the relevance and legitimacy of artistic innovation work to claim it to be a form of research. As both Mossin & Nygaard and Nielsen state, artistic innovation work has its place in the advancement of the design discipline, even if it is not claimed to be research. In this light, the claim seems to be nothing but an attempt to circumnavigate requirements to develop a proper design research culture, as Mossin & Nygaard suggest (2003).

Second, there is a long-standing international tradition of architecture and design research which complies with general research paradigms and which is likely to be dismissive of Danish design research if defined as artistic innovation work. The international design research community has its own body of peer reviewed journals, conferences and a research culture which could potentially enrich and inspire Danish design research, if only Danish design researchers would care to take an interest in it.[6]

Third, as it is the main argument of this paper, the design process and the research process have a lot in common. Also, (and not surprisingly) there is an overlap in the knowledge, skills and competencies required to be a good designer and a good design researcher. In short, while design is the act of creating new artefacts, research is the act of creating new knowledge. Research is therefore in itself a design process. And just as design is a dialectic process of action and reflection, so is research. Hence, the main difference between design and research

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[6]The relative self-sufficiency in Danish design research is evident in works such as Mette Volf's otherwise interesting 2009 book "Design – process og metode" (Design: Process and Method). Despite the fact that there is an extensive international body of literature on this subject, it only lists a few references (Lawson, Schön) which are considered central to design methodology and only a handful of non-Danish titles altogether.

is in the object; design creates artefacts (physical or abstract) and research creates knowledge.

Yet, in design research, one of most central challenges consists precisely in understanding how methodological and theoretical knowledge can be produced through the creation of artefacts. Artefacts in design research refer not to products and prototypes, which are the objects of design. Rather these artefacts are used as a tool for the sole purpose of making experiments in order to explore a research question and/or a research program (cf. Brandt & Binder, 2007). In this sense, they could be described as experimental research-artefacts, and the key question for design research is how to gain insight into the nature of this knowledge that research artefacts deliver (whether in the form of theory construction, conceptual frameworks, taxonomies, new techniques, and so on).

In this paper we will argue for a moving beyond the unfortunate dichotomy that isolates design research from other research practices. Rather than seeing design research as something distinct from other types of research and with design outcomes, it must be seen as something similar to other types of research and with research outcomes. Design research, in other words, is not similar to design in both its object and methodology – then it would be design, not research. On the contrary, it differs from design in its object (knowledge, not prototypes) and is similar in its methodology. And in this way, it is like any other research. Hence, there is no reason for design researchers to be scared of traditional research. It is already an act of design.

2. **Definition of design research**

Parallel to the discussion about the nature of the research paradigm for design research it is also discussed what may actually qualify as design research altogether. The pressure to expand research in architecture and design in Denmark has seen a movement towards adopting traditional research paradigms from the technical and social sciences and humanities, partly as a result of the recruitment of researchers with a background in other fields at the schools of architecture and design. For many architects and designers, this has been seen as an untimely invasion of paradigms which are not only alien to the architecture and design culture, but also fundamentally unable to capture the essence of architecture and design and hence to convey any meaningful new knowledge in the field.

As in other fields of research, different attempts have been made to define and categorise design research and its possible subcategories. Dickson (2002) lists three categories of design research, research *into, in* and *through* design. While the former denotes inquiries into design by researchers from disciplines other than design (i.e. art historians or sociologists), the next denotes research about design methodology, processes and communication made by researchers with a background in design, and the latter denotes the use of design methods to enquire into fields other than design.

Sevaldson (2010) uses some of the same prepositions, but add some categories. While he agrees with Dickson on the definition of research *into* design, research *through* design is not limited to fields other than design but can be applied to the design field itself. Dickson's research

in design, it seems, to Sevaldson is research *by* design. In addition, he defines research *for* design as "research that serves design and is subservient to design" (ibid.), as well as the dual pair of design-oriented research, which is the application of design behaviour in research, and research-oriented design, by which research is a potential spin-off by the creation of new products.

Rather than engaging in a battle over prepositions, we argue that both of these sets of definitions are poor instruments to define the field of design research. The definition of research *into* design anticipates that the researcher's professional background is defining the outcome of the research. While this is meaningful in the sense that different professions have different dominant interests and methods, it doesn't mean that these interests and methods cannot be overlapping or shared among other professions. As such it is an imprecise delimitation which might add more to the mutual preconceptions about different disciplines than to the clarification of the nature of the particular form of research. As an example, there are plenty of architects doing research in architectural history or style which, by this definition would be the domains of historians and art historians and hence qualify as research *into* design.

Similarly, research *through* design does not indicate anything about the object of study as – by definition – it can be applied to different fields of study. As such, research *through* design is a research method – just like case studies, laboratory testing, or action research – rather than a subfield denoting a particular interest for design research. The same can be said for research *in/ by* design, which for both Dickson and Sevaldson implies that the researcher has a background in design. Again, this *ad honem* approach to defining design research takes more interest in the researcher than in the research.

As an essentially interdisciplinary field encompassing technical, aesthetic as well as social components, all the research paradigms of the arts and sciences and any combination thereof are potentially relevant and valid in design research. To claim a universal architecture and design research paradigm, always and only applicable to architecture and design research does therefore not seem very meaningful. This does not exclude however, that there might be – or evolve over time – a dominant paradigm for architecture and design research. To claim exclusiveness for such an imagined paradigm as reserved only for architecture and design research, however, seems as little meaningful.

Nonetheless, a distinction between different types of design research is still relevant. We would like to suggest a distinction defined by the different objects of study, which may be taken up in design research:

1. There is design research which deals with *ontological questions* of what design is and what is it good for.
2. There is design research which deals with *epistemological questions* of how we can know about design and how we perform design.
3. There is design research which deals with *contextual questions* of how design interacts with the world when it meets people, cultures, social systems, the environment, etc.

4. Finally, there is design research which deals with *procedural questions* of which tools, techniques and procedures that are relevant to the execution of design.

To the extent that design methods are used to investigate into fields other than design – such as *research through design* – they should be considered shared methods and thus not be included into the definition of design research.

While some research methodologies may be more appropriate or dominant for some research questions than other, there is no reason to believe that a particular type of research questions can be investigated only by the use of one particular research methodology, nor that one particular research methodology is useful only to investigate one a particular type of research questions. On the contrary, different research methodologies – as well as different professional backgrounds of researchers – are likely to lead to different ways of knowing about the object of study, none of which are a priori dismissible as irrelevant to design.

3. **Misconceptions about the nature of research**

In the Danish discourse on architecture and design research, writing and theorising is largely dismissed as non-architectural and non-designerly. However, this is based on a number of misconceptions about the nature of research.

Research is not foreign to design, but shares many of its common characteristics. While design is the act of creating something new, something, which wasn't there before, research is the act of creating new knowledge and is therefore in itself a design process. Hence, the main difference between design and research is in the object; design creates design artefacts (physical or abstract) and research creates knowledge. What is often claimed to be unique for design research - and what seems to make it different from many academic forms of research - is that design researchers often use the creation and making of research artefacts – be they material or immaterial – as a means for producing new knowledge. In this sense, the research artefact becomes a nexus for knowledge production, and the challenge consists in being able to somehow extract this knowledge that is embedded in the research artefact.

Many design researchers are fond of citing Nigel Cross's notion of "designerly ways of knowing" in order to explain the knowledge-artefact nexus. Cross (2006) sees 'Designerly ways of knowing' as a third paradigm alongside the sciences and humanities (as if there were no difference between the natural/technical sciences and social science), and opposes design as result-oriented to science as problem-oriented. However, the idea of designerly knowledge being ontologically different in nature from the other two faculties of knowledge rests upon a too simplistic notion – if not a misconception – of what research is within science and humanities.

First of all, science has moved away from the strict rational paradigm towards more tentative and interdisciplinary approaches. In Limoges et al. (1994), this paradigm shift was described more than 15 years ago as a transition from Mode 1 to Mode 2 forms of knowledge production. While knowledge in Mode 1 was tightly coupled to the work of individuals, subject specific, and

not dependent on any particular context, knowledge in Mode 2 is produced in cross-disciplinary teams being engaged in result and practice-oriented research in order to develop solutions determined by contexts of various kinds.

Over the years, design research has matured so as to become a central factor for Mode 2 research and development. Especially, in research clusters that are set up as drivers for IT-innovation and product development. Hence, instead of stipulating design research being a 'third culture' opposed to science and humanities, we should instead acknowledge how it cross-breeds and interacts with those fields so as to end up in trans- and interdisciplinary Mode 2 forms of knowledge.

Secondly, Käufer & Scharmer (2000) have argued convincingly that there is a need for reforming the didactic model of universities in terms of integrating, not only research and lecturing, but also practice. Their new proposal for a more "modern university" must be held up against and compared to the Humboldtian model for the university that has dominated Western thinking for more than two hundred years. In the beginning of the 18th century Wilhelm von Humboldt forfeited the view that universities should be build on principles entirely different from arts and craft schools and other schools of profession. His idea was that research-based education should focus narrowly on the process of making scientific inquiry itself rather than on technical skills and competences.

In contrast to Humboldt, Käufer & Scharmer (2000) does not recognize such a clear-cut boundary between research process and profession-oriented practice. Instead, they herald practice as being a pivotal means by which research is most likely to make progress in science and humanities – when combined with theorising and research methods. Especially, what they find valuable is the kind of practice that increases student's ability to sense and visualize how future potentials can be brought into reality (Käufer & Scharmer, 2000, p. 237).

This is very interesting, because it actually suggests that the creative practice so central for design should ideally be merged with research-based education at the universities, not of course as *the* universal model, but in those areas of study where it makes sense. Taken seriously, this means that we need to find new practice-based ways of working with writing and theorising in research-based education at the university. Students should no longer sit passively listening to lectures, but ought to engage actively and creatively with theoretical knowledge. Theory and writing should be grafted onto the creative practice and this practice should be exploited as a means for working with theory. In this sense, students become co-creators and co-actors rather than just passive co-listeners.

Now, design and architecture schools are at the forefront when it comes to educating students in sensing, creating and visualizing future potentials. So, design education and knowledge about design methods have in fact a huge, and hitherto unexplored potential to offer to academic research disciplines and institutions. Hence, once again we end up drawing the conclusion: What is interesting is not to insist on the difference between designerly ways of knowing and research within science and Humanities, but to explore how research and design mutually

enrich and support each other. Research is moving towards design both in terms of method and validation (transference rather than proof). In this, we argue, lies the key to finding an answer to the question of how design researchers are able to extract knowledge from the creation and making of artefacts.

4. **Case: Generation of knowledge through the study of form**

In this section we would like, by way of an example, to suggest that there is a way (and probably more) in which the skills and competencies which are particular to the design profession may be used in research. Not as artistic innovation work, but as a means to investigate architectural problems with the aim of developing new explicit knowledge. The case we use is taken from design education, but we believe that it is transferable to design research.

In a workshop at the BSc programme in architecture and design, Aalborg University, students were asked to do a series of exercises to investigate the formal relationships between blocks of styrofoam of different shapes and sizes.[7] The exercises increased in duration and complexity. In the first exercise, the students investigated the formal relations between two block-shaped volumes (boxes). In the second exercise they composed a series of compositions, still consisting of two boxes, which expressed some kind of formal development and kinship across the different compositions (Steinø, forthcoming).

Next, the students made a new formal composition focusing on one or more compositional principles from the previous exercise, using an unlimited number of blocks to form a single composition. In the final exercise, students were asked to use one or more composition principles from the previous assignment for a site design (fig. 1-4). As a crucial element in the workshop, plenary discussions were held after each exercise in order for the students to verbalise their experiences and to develop a vocabulary and a conceptual understanding of form (ibid.).

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[7]For a full description and discussion of this workshop, see Steinø, forthcoming
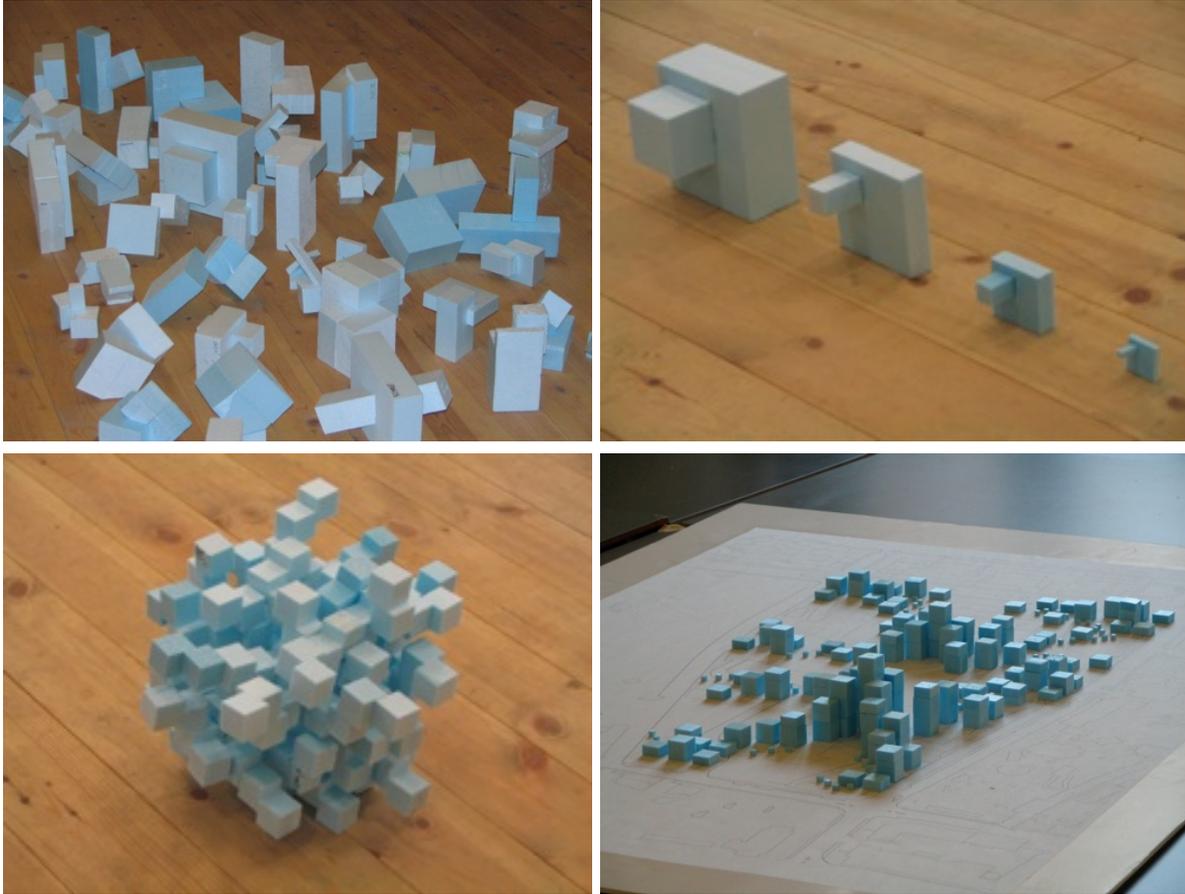
Fig. 1-4. Student exercises exploring formal relations (Photos by Nicolai Steinø).

The point of giving this example in the context of this paper is twofold. First, in order to perform the exercises, the students had to use competencies which are central (although not particular) to design. In order to perform the exercises, the students engaged in a haptic (touching), kinaesthetic (moving) and visual (looking) process of handling, modifying and combining the styrofoam. In order to do so, they made use of bodily-kinaesthetic intelligence and spatial intelligence (Gardner, 1984), as well as visual perception, all of which are central to architecture and design (and shared with arts and crafts).

Second, through verbalising and exchanging their experiences from doing the exercises through plenary discussions, the students externalised their tacit and personal understandings, and developed a shared language which enabled them to explicate and exchange the knowledge and insights which they had gained from the exercises. In other words, through discursive exchange, the kind of knowledge which the students had acquired through their visual and bodily interaction with matter, and which in the process only resided tacitly within each one of them, detached from each individual and became communicable.

In the context of the workshop, the physical artefacts, or architectons, were used as a medium for developing new knowledge. As such, they were unimportant as an outcome and not something to be admired as works or representations of architecture. On the contrary, they

were mediators, enabling architectural insight, reflection and exchange. The real outcome of the workshop was the new architectural knowledge which the students had developed during the process of working the styrofoam and sharing their experiences. Therefore, there would have been no point in exhibiting the foam models, which were scrapped without sentiment.

In this example, students were performing designerly activities in order to learn about design. Similarly, researchers might perform designerly activities in order to develop new knowledge about design. By this methodology, the outcomes of the research would be *epistemological knowledge*, either because the focus of the research would be on formal questions or because the focus of the research would be on possible ways of exploring formal questions.

But just as the outcome of the student workshop – explicit knowledge about form-making – could not have been generated without the exchange and discussions of the plenary sessions, research based on a methodology of designerly activities will not lead to new explicit knowledge unless the research findings – visual and bodily as they would be – are reflected, explicated and communicated in verbalised form.

Returning to Bjerrum's work mentioned in the beginning of this paper, it was undoubtedly developed through the performance of designerly activities which might have been similar to those performed in the student workshop. However, as the work as published does not elucidate its methodology, nor the nature of its findings, it remains tacit and uncommunicative. While this leaves the reader without any clues of a scientific nature, it must be assumed that it left the author with plenty of clues. As it is, the reader of the work might gain inspiration from reading it. But in addition to that, it might have provided new knowledge, had its findings been explicated.

5. **Conclusion**

In the Danish discourse on architecture and design research of the past thirty years, the notion of artistic innovation work as a distinct and legitimate 'other' research paradigm which does not have to comply with generally accepted criteria of stringency, novelty and communicability has become increasingly manifest. At the same time, attempts to define design research have revolved around criteria which take their point of departure in the professional pedigree of researchers and in research methods rather than in the object of study.

The former is unfortunate, in part because it does not seem to add qualitatively to the notion of artistic innovation work and in part because it derails the Danish discourse from the international discourse in the field of architecture and design research. The latter is unfortunate because it promotes a problematic view of who may legitimately perform design research, and by which methodology, rather than to meaningfully describe the different ways in which research may contribute new knowledge which is relevant to design and how.

We suggest a fourfold distinction of the different ways in which research can be relevant

to design and hence be defined as design research, defined by the object of study. By this distinction, design research may deal with ontological, epistemological, contextual or procedural questions. None of these areas can meaningfully be claimed to be more 'designerly' than others, nor can any research methodology meaningfully be a priori claimed to be more relevant or correct within any of the areas than other.

Needless to say, the explanatory power of the distinction we have proposed would benefit from being demonstrated in more detail by applying the categories in further case analysis. Our aim here was generally to introduce the distinction as a way of clarifying the affinities between design and research.

While we do not dismiss the value of artistic innovation work, we argue that research is an act of design and suggest that there are other ways to conduct research by way of designerly activities, which do not require a departure from the general research paradigm. On the contrary, it seems that in the larger research community the potentials of a designerly approach are increasingly acknowledged. For instance, such a view could be found in Käufer & Scharmer (2000) who has had an increasing impact on the reshaping of research cultures inside the universities. Design research needs to be developed in line with the ongoing paradigm shifts in research within science and humanities, not in opposition to them. By so doing, designers and architects will be able to grasp how design research situates itself between design and research.

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