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Editorial: Design as a discipline

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Editorial: Design as a Discipline

When *Design Studies* began publishing in 1979 (forty years ago) we opened a series of invited articles on the topic of 'Design as a Discipline'. The purpose of this was outlined in the first issue as follows:

One of the principal assumptions behind the launching of this new journal is that Design can be identified as a subject in its own right, independent of the various areas in which it is applied to practical effect. The Editorial Board is therefore proposing to publish a series of papers by leading members of the international 'invisible college' of Design Studies, which will aim to establish the theoretical bases for treating Design as a coherent discipline of study in its own right.

In the event, only three papers were published explicitly as part of the series, by Archer (1979), Nadler (1980) and Cross (1982), although of course many others over the forty years of publishing *Design Studies* have contributed significantly to the same theme. Over those forty years, the concept of design as a discipline has progressed and developed, and sometimes has been challenged. The concept of design itself has also progressed and developed, and expanded to cover a much broader range of activities and applications, sometimes to the extent that it may seem to have lost coherence.

In 2018, at the invitation of the editor of the *Journal of Engineering Design*, I published a paper on 'Developing Design as a Discipline' (Cross, 2018), which was a personal review of my own history in design research over some fifty years, and therefore a *very* partial view of the development of design as a discipline. In response, my editor colleagues at *Design Studies*, Peter Lloyd and Rachael Luck, invited me to curate an issue around the same theme of Design as a Discipline, in recognition of the 40th anniversary of introducing the theme in the journal and with a broader remit of providing some indication, inevitably still partial, of how the concept of design as a discipline has progressed.

So I invited a cohort of leading members of the design research community to contribute papers to this special issue of *Design Studies*. I asked them for papers that

address questions, issues, achievements and conclusions related to Design as a Discipline from a current perspective and reviewing the development of the discipline as they see it. Contributions could be based on theoretical work or on research threads in empirical work. The intention was to compile a contemporary overview of the state of the art; papers could usefully look back over some of the forty (or more) years of progress, establish and summarise the present, and perhaps look forward to new research and developments. They could be either individual contributions or collaborations, and if the authors were not entirely convinced about the concept of design as a discipline, and wanted to challenge it, or aspects of it, that would be alright too.

The result is this themed issue containing nine original papers on Design as a Discipline. This diverse set of papers covers some key topics within the discipline, including:

The establishment of design as an academic discipline, its internal consistency and its interactions with other disciplines; its research methodology for examining and understanding significant aspects of design cognition; the application of design thinking through its process of co-evolutionary framing and re-framing of problems and their solutions; the discipline's values as expressed for example within user-centred design and social design; the articulation of designerly ways of knowing, thinking and acting, and their encouragement and development in education; the nature of design research and arguments for designerly ways of pursuing and conveying knowledge; the shifts and patterns within, and the coherence of the discipline's progress and development.

The introductory paper by Rachel Cooper, President of the Design Research Society, offers an overview of a very full fifty years of developments in design research, viewed partly from her own personal involvement, which has been considerable - from a research assistant in the 1970s through to becoming founding director of a major research institute and playing influential roles within the UK governmental support for design research. Cooper's summary of 'the 50-year transformation of design research' provides an historical background and touches on several topics that resonate through the other papers in this issue. She outlines how design research developed in a series of 'waves' from its start in discourse around design methods and design science in the 1960s, through early environmental, social and political concerns in the 1970s, the recognition of the importance of design within industrial management in the 1980s, the

academic growth in design education and research in the 1990s, and the widening scope and interpretations of design in the 2000s, leading to the current very broad role and application of design thinking within innovation throughout society as well as industry.

Bo Christensen and Linden Ball take another approach to assessing the history of design research, and the building of the discipline, through analysis of the publication records over the forty-year history of *Design Studies*. They start by acknowledging the recent enormous expansion of interest in design thinking and its applications, but note that it appears to have led to concerns over domain fragmentation and a possible loss of focus for the discipline. To examine these concerns, they use the journal's publication records to explore and establish indicators of expansion, integration and consolidation in design research. They find that there has been an overall stability of the journal's domain, and that *Design Studies* has been instrumental in creating both the expansion and integration of design research across and into a range of other disciplines. They also use citation patterns as indicators of discipline consolidation over time, and find evidence of a coherent pattern of publications that frame the discipline. Christensen and Ball draw parallels with the initiation and establishment of cognitive science as a new discipline, which began in the 1950s, and imply that design may be following a similar trajectory in progressively becoming an autonomous academic discipline. Overall, these analyses (although based primarily on just this journal) are very positive for those engaged in building the discipline of design.

A second paper by authors Linden Ball and Bo Christensen reviews the research history and the progress that has been made in advancing the understanding of design cognition. The underlying challenge for research in design cognition is to articulate the processes in design for coping with the uncertainty within design problems, generating new solution ideas, and the associated reasoning, judgements and decisions. The sheer quantity of research in design cognition is now quite daunting, and so Ball and Christensen focus their review on the key phenomena that have been identified. Significantly, they find that there is enough consistency across the evidence to support the claim that design cognition is underpinned by a set of core cognitive processes. These core processes include those such as conjecture-based problem formulation, problem–solution co-evolution, analogical reasoning, mental simulation and targeted solution generation. Design ability requires steering a path through the uncertainty from an ill-defined problem situation to the end-point of a satisfactory and high-quality

resolution. Key to that ability is the designer's careful and often apparently tacit selection of strategies and tactics. Ball and Christensen suggest that this strategic processing in design indicates levels of metacognition that must be in operation. Metacognition refers to processes of monitoring and control so that effective strategies can be maintained whilst ineffective ones can be abandoned and replaced. Ball and Christensen suggest that bringing metacognition into consideration can enable a more integrated understanding of design cognition and offers many fruitful new directions in design research.

As noted by Ball and Christensen, one of the key strategic processes that has been observed in design activity is that of a co-evolution of the problem and solution spaces. Kees Dorst's paper shows how the co-evolutionary interpretation of design thinking has developed from descriptive accounts of 'how designers think' to a creative approach for innovation and for reframing intractable problems and re-imagining their potential solutions. Designers do this all the time, sometimes to seek an adjustment of criteria in the problem as given, sometimes to suggest that a good solution - better than present concepts - might emerge from a different interpretation of the problem. It is the design process of developing a matching problem-solution pair. Co-evolution applied deliberately and pro-actively, says Dorst, is the designerly way to interpret and re-interpret problems. To illustrate his argument he uses examples ranging from difficulties encountered in relatively simple, conventional product design practice, to ameliorating social issues in complex urban design through reframing interpretations of 'what is the problem'. Throughout his paper, Dorst's aim is to articulate more clearly the process of co-evolution, and thus to sharpen and develop understanding and discussion around it.

A specific area of design research related to cognition has been based around investigations of the phenomenon of design fixation (an unconscious, limited focus on potential solution choices), as a part of the broader area of research into creativity. In his paper here, Nathan Crilly addresses the nature of how this research has been conducted, which has been primarily through laboratory-based experiments, and questions this limited focus - as though fixation research has itself become fixated on certain types of research questions and methods. Through a citation analysis of the now extensive design fixation literature he finds a distinct dis-connection between two sets of studies and their corresponding research methods (experimental and field studies), reflecting

two almost separate research communities. (The 'looming danger of echo-chambers of disconnected knowledge' was also noted as a contemporary concern by Christensen and Ball.) Crilly calls for greater coordination across the discipline, to achieve stronger paradigm development, whilst also encouraging more discussion and practice of methodological diversity in research. He points out that discussion of this kind seems to have declined over the forty years of history of the discipline.

Since the 1970s we have seen the emergence of user-centred approaches to design, from participatory design to inclusive design. In their paper, Ann Heylighen and Andy Dong suggest that underlying these approaches is a core distinguishing value of the design discipline: empathy. In recent years, an approach specifically known as 'empathic design' has developed. Through empathy, designers attempt to place themselves in others' shoes and to translate that empathic understanding into the design process. However, Heylighen and Dong suggest that in design theory, research and practice there has been rather limited understanding and expression of the concept of empathic thinking. They clarify two principal interpretations of empathy: as directly perceiving others' experiential life and as indirectly attributing experiences to others. For each of these, they identify implications that are relevant in the context of design practice. Some of this analysis may be surprising, such as the wariness held by some designers with a physical impairment towards attempts in design to employ empathy for others with impairments. Heylighen and Dong present empathy as an embodied concept, with foundations in cognitive psychology and philosophy, but still core to our concerns for ethical imagination in design. They are not discouraging designers from developing empathy for users, but stressing that it is important to recognise limits to knowing others' experiences. Like Dorst on co-evolution and Crilly on fixation, they are sharpening and developing the discussion around a key concept in the discipline of design.

The need to articulate design as a discipline originated in issues around the development of a generalised form of design within education and the pursuit of domain-independent design theory. Education and research in design have shared goals in understanding designerly ways of knowing, thinking and acting. The integration of research with education has been a driving motive in the programme of work in engineering design education by Cynthia Atman and her colleagues. In her paper she outlines how they focused on understanding the strategic cognitive processes of design, and the

development of those processes within students, through a programme of studies of design projects repeated over different years of student progress, and comparisons with expert design performance. This resulted in a large corpus of data around how both student and expert designers perform in design work, which have been portrayed through timeline plots of individual design processes. These timeline plots help to visualise (and also to hear!) and convey the process of design thinking, and how it develops through education and experience, and they also proved to be helpful in feedback to students about the nature of design thinking. Atman's series of studies over many years, summarised and integrated here in her paper, comprise a consistent programme of enquiry, pursuing an understanding of the nature and development of design ability and demonstrating a co-evolution of research and education in design.

There was a time when the largest group of design researchers seemed to be architects, or people working within an architectural context, and 'architectural design' was the most frequent keyword to be found in papers published in *Design Studies*, but that seems to have changed. In her paper, Rachael Luck wonders what has happened to influence that change, as she investigates changing views on architectural research and its relationship with a broader design research. There have been various influences upon and motivations for some areas of research in architecture (and art) to seek to construct domain-specific interpretations of design research. These include, especially in the UK but also elsewhere, governmental action and involvement in funding different types of research, but also the desire to construct specifically designerly ways of constructing knowledge through design. Through an historical review of literature and events that have shaped the debate on a more discipline-specific form of research in architectural design, Luck examines whether there might indeed be substantive differences between 'design research' and 'architectural design research', and finds significant areas of overlap around practice-based research.

Starting with the international Design Policy conference in London in 1982, Peter Lloyd suggests in his paper that that was a key point in the history of the discipline, where 'seeds of design discipline futures' were sown, and themes were set up for design research that flourish today. Primarily by referencing *Design Studies*, he traces how design methodology (the study of the principles, practices and procedures of design) has changed over the 40 years of the journal's publication. He identifies a 'social turn' in the discipline during the 1980s, away from scientific objectivity and towards more relativist

approaches, opening up more nuanced and critical studies of designing. Lloyd refers particularly to two special issues published in *Design Studies* in 1984 and 1988, originating from the design theory and methods group at MIT. The special issues were guest-edited by Donald Schön, who had recently published his influential book on reflective practice. Lloyd suggests that the kind of design research presented in those issues, drawing on pragmatism and social constructivism, was based on already familiar topics but with a new relativist approach. He develops a view on how research in methodology and social aspects of design practice has brought a constructive discourse into the discipline, encouraging new and more diverse perspectives on design thinking, and a healthy plurality in current approaches in design research.

Looking over all this set of nine diverse and erudite papers on the state of design as a discipline, what do we see? I suggest that what emerges is a strong sense of academic achievement and the establishment of a genuine discipline of design. There are some caveats and concerns, but the overarching message is very positive. We see the identification, articulation and clarification of the discipline's knowledge bases, underlying skill-sets and values. We see both diverse and quite focused research programmes that have been pursued with rigour and imagination. Overall, there has been a movement away from early, technically-orientated approaches to reforming the methods and processes of design, towards a comprehension of design as a cognitive and social, creative reflective practice. There are still the same objectives related to improving design activity and design outcomes, but more by understanding and developing human design skills, rather than replacing them with artificial rationality. There has been a quite gentle but profound and clear epistemic shift - towards the 'epistemology of practice' suggested by Donald Schön.

In my early paper on 'Designerly Ways of Knowing' (Cross, 1982) I suggested that to build a discipline of design we would need a research programme with a core touchstone theory based on the view that there are designerly ways of knowing, around which we could build a network of related theories, ideas and knowledge. I think the design research community, represented in the papers published here but of course much, much larger, has achieved that. In that early paper, I based my discussion of what we knew about designerly ways of knowing on the design research that was available then. Because that research was still quite limited at that time, I pointed out that there was still a long way to go before we could begin to have much sense of having achieved a

real understanding of design as a discipline, that we had only begun to make rough maps of the territory. The papers in this themed issue demonstrate that the territory is now more fully surveyed and those rough maps have been developed and refined into much more reliable charts. The international 'invisible college' I referred to in the introduction to the series on Design as a Discipline at the launch of *Design Studies* in 1979 has become a much more visible and substantial body.

Nigel Cross

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