Introduction: Design Epistemology

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> "But the world of design has been badly served by its intellectual leaders, who have failed to develop their subject in its own terms." (Cross, 1982)

This quote from Nigel Cross is an important starting point for this theme: great progress has been made since Archer's call to provide an intellectual foundation for design as a discipline in itself (Archer, 1979), but there are fundamental theoretical and epistemic issues that have remained largely unchallenged since they were first proposed (Cross, 1999, 2007). Many of these issues surround consideration of knowledge and its application in design processes, but are also confounded by cultural trends that orientate views towards that knowledge.

Almost 20 years after the call for a foundation of design knowledge, Cross repeated one of the original aims, thus highlighting the lack of progress in certain key areas:

> "We have to be able to demonstrate that standards of rigour in our intellectual culture at least match those of the others." (Cross, 2001)

Today, 15 years on from this quote, there remains no independent, epistemic basis to establish design as a recognisably independent discipline, or even identification of epistemological tendencies that have stronger relevancies to design processes than others. First and second generation design studies, as well as studies of creativity in other disciplines, clearly identified the types of thinking applied in design as divergent or convergent (Jones, 1973; Rowe 1987). The same thinking structure has been called ideate and evaluate (Basadur & Head 2001), imaginative and logical (Lawson 2006), generation and exploration (Finke et al 1992) and the generation of variety and the reduction of variety (Rittel 1984). While these are associated with methods, they do not address a position or attitude *towards* knowledge. This is an epistemology position; a theory of knowledge includes how it is used in design through its scope, its particular methods and its validation.

Each of these three areas – scope, method and validation – are associated but can also be considered separately. There are a series of questions that arise in doing so such as: What happens when we start to consider design knowledge as layered, operational, effective or framed? Are design epistemological tendencies necessarily rational and how might they relate to issues of fiction or other human constructions of meaning? How does the source of knowledge (episteme) relate to validity of knowledge (relevance) and the application of knowledge (method)? What does repeatability of knowledge mean and what is an acceptable threshold of acceptance to make that knowledge justifiable?

These questions relate to a 'state of the art' which is a major motivation for this DRS special theme.

A 'constructed' epistemology

In the quotation above, Cross (1982) was lamenting that many designers were being seduced by scientific methods and approaches – that the reductionist program in design, developed in the preceding decades, was having such an influence 35 years later. The reductionist program in design and design science advocated by Simon (1996) is still apparent, albeit slightly changed (e.g. Papalambros, 2015) but the underlying schisms originally constructed have yet to be dealt with fully and constructively.

The seemingly endless debate on whether science is design or design can be science is perhaps a symptom of this continuing lack of foundation (For an example, see Farrell & Hooker, 2012; Galle & Kroes, 2014; Farrell & Hooker, 2015). But such debates have significantly influenced the conceptual structures of design knowledge. For example, early formulations of design as a form of knowledge relied on contrasts and comparisons of design with the arts and science (see Cross (1982) for the clearest articulation of this). A duality such as this is powerful rhetoric and easily understood in theory and practice – but the justifiable basis for it has not really progressed since its original stating. It raises the question of whether art and science are useful organizational ideas with respect to design and, at the very least, that the wider debate around them as knowledge categories must be engaged.

There have been attempts to move away from such dualities, for example 'intuition' versus 'rationality' (Coyne & Snodgrass, 1996; Poldma, 2015), but the structural legacy of design knowledge constructed 'in contrast to…' remains and is perhaps now a barrier to framing any other paradigm of design epistemology.

One of the motivations for this theme is in response to such debates and structures – that their continuation might be in part due to the lack of clarity of a foundation to design as a discipline with known relationships to epistemological tendencies. Perhaps, just as argued by Glynn (1985), it is time to consider whether design can genuinely stand on its own epistemologically. If not this, then at least to communicate clearly its own structure(s) to those pursuing its resolutions. Certainly, design cannot continue to simply rely on comparison and contrast to other subjects.

'Good enough' knowledge

Besides the foundational or theoretical issues, there are practical matters that are affected by such dualities and schisms. Returning to the Cross quote (1982), those "badly served" include students, practitioners, researchers, teachers, as well as clients, users, the general public etc. – i.e. pretty much everyone involved in design. This begs the question who benefits from keeping design processes and esoteric knowledge, which tends to enforce the science versus art duality, which has become a staple of claiming ideological territories within design cliques. The former stance reinforces a normative, logical or scientific approach but has produced reductive models that are insufficient to explain design, leading to some of the most widely adopted but unsuccessful examples of design processes. Conversely, a relativist, idiosyncratic and subjective approach is also insufficient as it has led to some of the most obfuscate theories and ideas in design – many of which are personal expressions and non-transferable in that state. Considering these poles as the only possibilities also opens up a larger question – how is it that we have come to consider art and science to represent *all* knowledge in *all* applications across Western culture?

In between such dualities are most design practitioners, teachers and researchers; in that "messy space between people and things' (Koskinen et al., 2011). And in that space, design is hard enough without making it harder by applying esoteric theories inappropriately or by simplifying to such an extent that it is no longer functional or recognisable as design. Those practising in this messy space are (currently) without a sound, simply articulated epistemic basis to allow them to articulate such a pragmatic position – this is arguably the epistemic space that should be considered by design research.

To clarify, this is not a call for some theoretical or practice position on design, but for a clear basis for the *construction* of such knowledge. It's not acceptable to simply say things without some basis and it's certainly not acceptable to then pass such opinion off as knowledge. Instead, could we not ask when certain types of knowledge are used in design and in what capacity is it useful, relevant and operational? When is hard, quantitative data used and what are its limits? When does narrative or fiction become relevant (Coulton et al, this session), how does it intersect with other types of knowledge and how are these translated into particular design disciplinary outcomes? When are human ergonomics or human mythology considered? What modality of communication operates within design and how is this manifested (Godin, this session)? How does social meaning or cultural expression become clearly identified and how does it create defensible positions for a designer? How does visual-based content structure knowledge, allowing decisions and judgements to operate and be made (Harland & Craib, this session)?

If we look at tendencies within epistemology, we find that each of these questions introduce an attitude about how knowledge is constructed as relevant, what filters to apply and how it becomes structured for use by methods (Plowright, 2014).

The subject(s) of design

As with the problem of science versus art, a particular paradigm has emerged to frame thinking over the past decades. One of the central claims made by Cross in support of a separate and distinct design epistemology was this:

> "What designers know about especially is the 'artificial world' - the human-made world of artefacts. What they know how to do especially is the proposing of additions to and changes to the artificial world." (Cross, 2001)

This specific area of design research remains under-represented, as shown in the paper *Mapping design knowledge: 36 years of Design Studies* in this theme. Ironically, then, the theoretical and academic are over-represented but have yet to establish any specific claim whilst practice and material research are under-represented but may remain the hope of many original design researchers

We have, quite naturally as academics, taken an academic and logocentric approach to knowledge as a reaction to the lack of rigour in design practice knowledge itself. For example, Parsons (2016) argues, after Galle, that at the heart of design there lies an inherent epistemological contradiction: the process of designing is inherently uncertain and unpredictable. But this argument relies entirely on a tradition of logical (almost positivist) philosophy that is not necessarily relevant to a design epistemology. Our dominant logical tendencies were acquired through Enlightenment philosophy and at a time when truth was considered to be an absolute and achievable conclusion, as well as being bound to a determinist version of progress bound to technical development rather than social justice. However, it could also be that rationalism is often misapplied or misconstrued in design or that design methods look only to a clear line of causation rather than absolute repeatability and factual defensiveness. Design knowledge is not necessarily about knowing what only the final outcome is but (importantly) about the construction of the conditions under which the outcome should be judged. Such judgement relies on factors of human nature and the dynamic between people and the practices that generate these outcomes (Poldma, 2013; Poldma 2015).

But this does not mean that previous traditions can be ignored or that no rigour is required as this falls into common errors of interpretation as those found in siding only on the side of extreme logic or only on the side of romantic imagination. As with the contra-reaction to the science of design, the rejection of formal logics or philosophy should not be a rejection of any rationality at all. It is not acceptable to simply say that design is difficult and then generate philosophies that rely on belief and rhetoric. Similarly, it's not acceptable to invoke metaphysics, epiphenomena or 'wonder tissue' (Dennett, 2013) and treat them as if they were some rational application of knowledge applicable only to design. It might be a question of enquiry into definitions and the specific adaptation rather than the formulation of manifestos that attempts a reductive, unified theory.

As with the messy space of practice, some middle ground needs to be reached. Design research, if it is to exist independently of other research domains, has to be rigorous and

consistent - but the basis upon which such rigour is constructed is not necessarily the same as other disciplines. The issue of 'where' design knowledge might reside, raised by Cross 30 years ago, must be tackled.

Internal conversations

As has been seen with the science versus art debate, there tend to be repeated and recurrent themes in design research. One reason for this has already been presented but another more prosaic possibility exists – we are perhaps have less of a tradition and body of knowledge as other subjects or have yet to 'mature' in terms of establishing this knowledge. For example, Beck and Chiapello (this conference) identify the lack of critical engagement with Schön's work and this may reflect the vacuum of work prior to this period – perhaps a relief that there were emerging ideas and evidence that supported the views held by many practitioners and design researchers.

Part of this lack of criticality perhaps comes from design practice itself – the purpose of design is a particular outcome and the satisfaction of that outcome does not rely solely on extrinsic or objective criteria – it also has typological, historical, socio-cultural and situational content to address. Design has a tradition of using whatever knowledge is useful to the purpose in hand which raises the issue of relevance over absolute truth as a criteria of judgement (Plowright, 2014). Such knowledge is often assessed and applied on the basis of its utility, not veracity but traditional academic practice requires the latter more than the former. It is only relatively recently that research practices and outputs could be thought of in a similar way – that the non-objective could be treated as seriously as the purely objective. This does, of course, lead to problems and discussions of what is valid or acceptable knowledge as other disciplines, such as social sciences and human geography, have struggled with for decades. Many of the same issues that arise in these domains are relevant to design (e.g. representation; the role of the observer; interrelations between people and technology; etc.) and the lack of deeper interaction between these domains is noteworthy. As before, this is perhaps a test for any independent design epistemology – that it not only maintains its own rigour and validity, but that it may also contribute to other domains as a knowledge form in its own right.

What this means, and the framing of the discussion for this session, is that while we can ask complex questions and maintain an attitude that design is too complex and *too human* to understand, no development will likely occur until there is clarity to examining three aspects of epistemology: namely 1) the scope of knowledge (i.e. sources) found in design disciplines and if these are shared or divergent, 2) methods as representations of larger and persistent underlying thinking structures along with either alignment to types of approaches and knowledge (i.e. fiction, memory, sensory, visual, etc) and 3) clarity of validation criteria, understanding its relationship to other types of knowledge.

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