

Reading the Tea Leaves: patterns of theorisation about design research

1. Introduction

Heterogeneity is regarded as an inherent and significant feature of the emergent and complex field of Design. This pluralism is recognised as an important factor underpinning design's increasingly significant role and position as an 'inter' discipline which is both integrative and an interface and has the potential to bridge traditional divisions such as the 'natural' orientation of sciences and the 'social' orientation of the humanities through a 'third culture' concerned with the 'artificial' (Jonas, 2000). It is also recognised as contributing to the increasing articulation and vibrancy of design discourse. However there is a critical need for greater relational understanding between different theoretical positions and research practices. This paper discusses ongoing research into the development of relational models based on an analysis and interpretation of different design research theories and reflections on how such hermeneutical models might inform the design of information resources about design research methodology.

There is a recognition in the approach taken to this analysis and modelling, that the pre-understandings of an author, of an analyst, reader or researcher, will affect the construction and the understanding of theories. A person using an information resource will approach it through his or her existing knowledge frameworks and historical understandings. This perspective, informed by information hermeneutics, recognises limitations in traditional computational approaches towards the construction of formal information structures as well as the need for greater relational understanding across the diverse concerns of the field.

2. Project context

The problem of design's theoretical complexity and lack of organisation has given rise to a number of different strategies, research groups and conferences that sought to solve, engage with or overlook the issue of heterogeneity. For example the Artificial Intelligence (AI) in Design group sought to develop formal design ontologies as ways of systematising and generalising design knowledge (Brown & Birmingham, 1997); Wolfgang Jonas's online event "Paradox endeavour to design a foundation for a groundless field" (Jonas, 2000) was based on the premise that design "is a groundless field, there cannot be eternal basics but rather arbitrary entry points." (unpaged) and sought to develop understanding through discourse; The 2008 "Undisciplined" Conference by the International Design Research Society, recognised dynamic shifts in the field but deferred the possibility of articulating them, claiming that "Designing seems to be moving into a new era, the disciplines that have framed our work are reshaping themselves, new kinds of designing are emerging and we are not yet able to define these new and hybrid professions." (<http://digitalcommons.shu.ac.uk>)

A number of limitations caused by, or associated with, the dynamic pluralism and theoretical heterogeneity of design research have been recognised. They include: the difficulty of representing this complex field to people outside the discipline (Buchanan, 2007), the resulting tendency to represent and practice design research through the ill-fitting frameworks of other disciplines (Jonas, 2007), a limitation of understanding and

utilisation of the potential and range of available methodological approaches among design researchers (Cross, 2006), inhibition of the development of the discourse of design across different design research communities and approaches (Margolin, 2002), problems concerning the organisation of design knowledge in information systems (Poggenpohl, 2000) and a restriction of the development of new approaches that are needed to address complex contemporary problems that require multiple perspectives (Navarez & Feher, 2000). These problems have led to an acknowledged need for more dialogue and relationality between different theories and approaches. For example, Dorst (2007) has suggested this will require the identification of core assumptions that underpin existing ways of working, and from this, anomalies could be identified and “footholds for a further development” recognised (p.1). Complexity has been recognised as a distinctive attribute of design, arising from the dynamic interactivity of relationships. The need for greater relational understanding across the complex field of design research prompted this inquiry, with contextual and methodological issues that have underpinned this research being the focus of this paper.

3. Methodological Issues

Hermeneutics, as an interpretative activity, has been recognised as a way of approaching design’s diverse frameworks and multiple identities and challenge the fundamental dualisms that have been part of design’s formative identity (Coyne and Snodgrass (1991, 1997). Within the methodological framework of this project, two different levels of hermeneutical processes can be recognised: one is concerned with the hermeneutical interpretation of texts, the other with information hermeneutics. These relate to phases of the project that are outlined in this paper; the first concerned with an analysis and comparison of design theory texts; the second with the identification of patterns across theories that might be used to form semantically based information structures. This approach, which builds from theories and perspectives from within the domain, must be distinguished from attempts to develop unified theories of design based on notions of a stable disciplinary core, fixed vocabularies and formal taxonomies. Such approaches have sought to create totalising theories into which all aspects of design knowledge can be categorised. Buchanan has written:

Many investigators are tempted with the prospect of a single monistic vision of design, but the diversity of potential monisms suggests that pluralism is an unavoidable reality. The pluralism of design research suggests that design is a field comprised of many fields, each shaped by its own problems and lines of investigation (2007, p.56).

The hermeneutical approach taken in this research recognises that the pre-understandings of an author, and those of a reader, will affect the production and the understanding of a text. In particular the history of design research, its various institutionalisations and the ideas that have informed its different methodological and conceptual developments, underpin our different understandings and interpretations. The significance of historical context is critical here, not only to the interpretation of older theories, but to an understanding of the present: “Any present is never just its present situation, but always also a particular version of the past that makes sense of the version of the future that the present is working on” (Tonkinwise, 2006, p.55). This recycling and dynamic of theories and

methodologies of design research has been recognised by Jonas as a generational cycle: “We have ‘theory generations’ which are not ‘true’ or ‘false’ but ‘fashionable’ and ‘appropriate’ or ‘outdated’ and ‘inappropriate’”(1999, unpagged). In this context the basis of the discipline of design is considered as a history of theories or discourses about design, rather than a history of objects, famous designers or styles. This perspective recognises the field of design research and its discourse as inherently unstable, but productive, because of this dynamic. Buchanan, (2007) has also identified this cyclical and historically inscribed process of design research theory building: “They have risen and declined in popularity but they have all persisted and been available when one or another embodiment of a strategy has temporarily run dry or has suggested further problems for which a different strategy was needed. Their interplay accounts for much of the vitality of the field” (2007, pp. 56, 57). However the history of design research is unevenly recorded and access to historical material to help better contextualise and understand design research theories, and enrich the broader discourse of design research theory is still limited.

This project has involved the identification, analysis and modelling of some twenty design research theories. These were selected from a review of over eighty texts produced between 1983 and 2008, which were drawn from across the spectrum of writing about design; from books, journals, conference papers, websites and theses. The selection of texts was made to represent a range of authorial perspectives and to include a variety of different theoretical understandings and approaches to design research, representing a broad historical and epistemological spectrum. A number of factors were taken into account when making the selection of texts for detailed analysis. For example, texts had to address the field or parts of the field of design research. They could not be based on specific design research projects, case studies, problems or applications, as such approaches tend towards description and generally provide a limited basis for research theory building. Texts focusing primarily on other areas of design as a discipline such as design practice, design history, design management, design education or design policy were also disregarded. While recognising that much can be drawn from these domains and productively related to the discourse of design research, such dimensions were beyond the scope of this initial inquiry. Other factors, which also influenced the selection of texts for more detailed analysis, included: the level of ontological or epistemological focus in a text – that is the author’s consideration of the nature or organisation of design and its knowledge, whether an author sought to give an overview of the field rather than detailing a personal observation or favoured methodological approach, the clarity and level of consistency across a theory was taken into account, the impact and significance of a theory - identified through citation, the standing of the publication and the profile of the author - was also taken into consideration. Research theories from other disciplines were excluded, unless such approaches had been significant in the development of design research, or had been adapted, reframed and used effectively in the field of design research.

Once an initial ten texts had been identified and analysed, some further criteria for selection were developed in relation to the overall range and focus across the group of selected texts. For example, further consideration was given to the relative depth and richness of some theories in comparison to the breadth and relative thinness of others. The selection of texts was not made systematically in that there was not an attempt to represent every major theoretical text or possible approach to design research, nor to create a definitive mapping of all the literature across the field. Rather, a representative selection was made of texts

that, as a group, presented a diverse range of theories through which different approaches, understandings and relationships between different conceptualisations could be traced and explored. This involved the selection of a number of different texts that represented a range of theories and approaches so that the potential development of a relational overview, built from patterns identified across the dynamic and heterogeneous field of design research, could be explored .

This approach can be described as an a-posteriori approach, based on literary warrant. That is, information categories are developed from a study and analysis of literature from the field. Frohman (1983) has identified two different approaches to semantic analysis: Firstly, categories can be given a-priori as part of the meaning of a term for a concept. Such categories can be determined before examining the literature of a field and are usually based on established ontological beliefs or associated epistemological schema. The second approach locates categories within the specific discourse of which the associated term is part. Thus semantic relations are formed a-posteriori and can only be determined after an examination of the literature. Within the field of information science, such categorisation is regarded as more adequate, because it is contextually related, but less likely to be universal. The issue of “the degree to which the categories devised by human ontologists should be thought of a universally applicable or objective, as opposed to artifacts of particular contexts” has been recognised by Legg (2007, p. 425) as having “...bedeviled philosophical ontology from the beginning.” This issue continues to underpin debates about formal and applied ontologies in information science, and underpins debates about canonicalization and decentralisation, in relation to the development of new information technologies like the semantic web.

It also resonates with the fundamental ontological schism, based on overarching binary models, that informs much design research theory, described by Coyne and Snodgrass, (1991) as design’s dual knowledge thesis. In particular, the polarity between the rational, systematic approach of design science and that of intuitive, tacit, practice-based, approaches has underpinned much discourse about design research over the last forty years. Victor Margolin (2002) has suggested that such divisions are part of a history of institutionalisations and disciplines: “... between those practices that have traditionally been recognised as intuitive and aesthetic and hence located in schools of art, and those seen as technical and thus founded in colleges of engineering and computer science departments.”(p.29). He suggests that these divisions are cultural rather than epistemological, and that “the different ways of valuing aesthetics and technical knowledge are deeply embedded in the culture at large and have prevented greater communication among designers.” (p.31) The need to interrogate and re-negotiate these fundamental dualistic underpinnings and find new ways of articulating and researching design outside the confines of these historical divisions, has been recognised by a number of design theorists and has led to the development of some more nuanced interpretations. Certain models engaging with the nature of design research, the objects of its study, the ways design research is conducted or the form and nature of the knowledge it produces, have moved beyond this longstanding, dualistic framework. However research and literature which attempt to relate, critique or systematically analyse this body of design research theory are still limited.

The development of design research and its associated discourse has seen a significant growth in the quantity of published research findings. While the focus of much design research has been on processes of designing and the development of methods and tools to enhance the efficacy of design processes (Dorst, 2007), inquiry into other aspects of design is growing. However research and the development of the broader, reflexive discourse about the nature and scope of design research is still fragmented. This has made it difficult to organise, access and articulate the growing body of 'design knowledge' generated through design research, beyond specific professional or paradigmatic frameworks. A singular framework can't represent the diversity of design research approaches and understandings. This diversity places design research in a unique position, to engage and develop interdisciplinary understandings and methods to support cross disciplinary teams that are necessary for the development of new or improved technological and systemic approaches. To fully engage in any interdisciplinary process, design researchers need to be able to understand and draw from different disciplinary approaches as well as from emerging, designerly ways of thinking and researching. Nelson and Stolterman (2003) have noted:

“Every chosen form of inquiry – intuitive, artistic, scientific, logic or a composite thereof – will lead to a specific body of knowledge. The chosen form of inquiry influences both what constitutes knowledge and how knowledge is gained. Each particular approach is based on some fundamental assumptions concerning what it means to create knowledge” (p.38).

However, the choice of approach to design research is often based on individual experience or institutional conventions, rather than through the review or identification of the most appropriate research process, or the questioning of fundamental assumptions behind a given methodological approach. While bodies of theory have developed in relation to specific forms of design inquiry there has been little focus on the development of relational understanding across these different areas and approaches. This project seeks to engage with design research theories and analyse them in order to try and understand, trace and relate the different conceptualisations, strategies and process that they articulate.

4. Mappings

The process of recording the analysis of a text, in terms of its key concepts and arguments, was made using concept mapping software, a process that enabled a level of structural and semantic representation. Jonassen, Beissner and Yacci (1993) suggest that structure is a way of identifying and representing the nature of patterns and relationships of entities. Structural knowledge has been described as a way of describing the knowledge of how concepts within a domain are interrelated. Concept maps are also known as semantic frameworks or networks. John Sowa (2000) defines semantic networks as “graphic notations for representing knowledge in patterns of interconnected nodes and arcs.”

Concept maps, based on the work of Novak and Gowin (1984) into human learning and knowledge construction can be built using software called C Map tools. Concept maps were developed as a method for representing and communicating knowledge in Novak's early work on evaluating knowledge acquisition in science education. The structuring of concept maps is based on concepts, as primary elements of knowledge, and propositions, as relationships between concepts, to form a semantic unit. They can be used to produce an adjustable visual map representing the main concepts, concept relationships and thus ideas conveyed in a text. Two kinds of relations can be recognised using this approach to building a representational structure: between concept (c) – preposition (p) – concept (c), or between preposition (p) – concept (c) - preposition (p). These forms of mapping are not the same and offer quite different diagnostics. In developing robust C Maps both sets of relationships need to be considered. The c-p-c approach focuses on the relationship between subject and object, while the p-c-p approach tends to focus on the flow and location of concepts within the overall argument. In this flow an object in the first semantic unit can become the subject in the next. This mapping process attempted: to trace the ideas and flows of particular theoretical arguments made in texts, to identify certain similarities and distinctions across groups of theories and assist the identification of patterns and the development of composite models across groups of theories.

While attempting to 'map' particular theories as C Maps the actual terms and conceptualisations of authors were maintained as far as possible, so that the models were more proximate to concepts and arguments of a text. However, following the initial mapping of individual texts, some propositional terms were adjusted to facilitate comparison and relationality within and between different texts. These adjustments were made for purposes of clarification, rather than deliberately change meaning, however it is acknowledged that any such adjustments are interpretive and thus involve the researcher's own understanding in the development of the knowledge model.

5. Evaluating interpretations

Snodgrass and Coyne suggest that the main criterion for the hermeneutical assessment of a model is the degree of correspondence it has to what it models (1992, p.69). However, models are representations and so are necessarily incomplete. The models were considered in two respects: Firstly in relation to C Maps made about the particular design research theories of an author. It was recognised that any such modelling can only be an interpretation, and will involve assumptions about authorial intent and limitations of understanding on the part of the researcher. That is, such a modelling process cannot be completely objective. The intention was to approach the text openly, to try and find out more about the context it was produced in and to represent and reflect on key ideas and outline the argument of a text. This intention guided decisions made about the selection of key concepts and the form of the argument through the identification of propositions. This process saw the C Maps adapted over a number of readings with shifts in understanding of a particular theory occurring during this process. Secondly, through composite C Maps, which were developed to identify and represent common approaches and concepts across theories. This required

the types of conceptualisation and reasons for associating particular concepts a cross different theories to be clarified and articulated. The process moved from an analysis of specific theories to a more associative interpretation of ways these theories could be correlated. The relevance of the C Map models was judged through an iterative process of correlation between the model with the original text or groups of texts. Most models required several re-readings, adjustments and stages of remodelling, until the level of correlation was considered to be satisfactory. That is, until it was felt that the main argument of the text could be traced in the C Map.

During a further process of evaluating the results of the analysis and identification of relational areas between different theories, consideration was also given to other writing about approaches and attitudes to research made by tertiary educational theorists who were involved in research about the nature and perceptions of academics towards research. Some strong correlations were identified, supporting the conclusions of the analysis of design theories. Angela Brewer (2001) and Gerlese Akerlind (2008) suggest that researchers, both within and across different disciplinary fields, have specific conceptions of the value and approaches they take to research. In particular Akerlind (p.22) identifies approaches that delineate academic's views of the nature of research which she summarises as: intentions, outcomes, questions and process. These were considered in relation to the shared conceptualisations that were identified through the analysis of design research theories in this project. This comparative approach indicated some fundamental perspectives on the nature of research and values ascribed to the activity of research, that were shared by groups of academics across different disciplines and institutions, and approaches taken to the theorisation of design research. These perspectives would seem to indicate that individual sensibilities or contexts might influence the way researchers understand research, and that this can be quite distinct from a disciplinary perspective. While these are informal categories they suggest some types of pre-understandings that can be correlated not only to the ways some design research theorists have framed or modelled particular theories about design research, but to different ways design researchers may tacitly understand or approach research. In this context it was proposed that these types or categories of models of design research could provide more personalised pathways - related to a researcher's implicit approach to research rather than their explicit understanding of theories about the domain of design research - through which information can be accessed and explored.

Capurro and Hjørland, (2004) have recognised the difference between the representation of information "in domains that have a high degree of consensus and explicit relevance criteria," - like science- and domains - like design - that "have different conflicting paradigms, each containing its own more or less implicit view of the informedness of different kinds of information sources" (p.395). They describe this domain analytic approach as hermeneutic because any understanding is determined by "the pre-understanding of the observer" (ibid). If these ways researchers, in general, tend to describe their approach to research can be correlated with an analysis of design research theories, these frameworks may provide a useful and usable way for design researchers to access information about design research: "With the statedness of a part of a community background in a system, the inquirer can match his/her questions and backgrounds of pre-understanding against it" (Capurro, 2000, p.4). Information hermeneutics has provided insight into ways that the

problem of the limited forms of representation and accessibility to design research knowledge might be approached.

This inquiry was concerned with understanding design research theories and the ways relationships between theories might be modelled or represented as systems of theory, or theories about theory. The process of identifying relationships and common approaches between different theories and groups of theories was not aimed toward the development of a unified or meta-theory, but was guided by a recognised need to represent the pluralism of design research methodology, to inform the creation of a resource that could be accessed through multiple perspectives. These perspectives would be relevant to the prior understandings and knowledge of the researcher about research and the design discipline. A meta-theoretical approach implies a cohesive, overarching model that has not been, and may not be possible in a diverse and heterogeneous human science like design. The C Map models – as models of theories by particular authors and as composite models of groups of types of theories - were developed to represent the ideas and forms of particular design research theories and the commonalities and divergences between different theories. This approach was developed to better represent the pluralistic understandings and approaches to design research. This hermeneutical approach to knowledge representation can be contrasted to logic based models which have tended to dominate approaches to design's ontological and epistemological framing. Coyne, Snodgrass and Martin have suggested that models are metaphors which cannot be assessed by logic but by the criteria which apply to matters of interpretation: "... the semantic and disclosive functions of models are not founded on their logical structures but on their metaphorical structures. Models are metaphors and metaphors convey their meanings by way of a hermeneutic understanding" (1992, p.56). They suggest that such hermeneutical metaphors should "replace the logic based models that have driven design research over the last fifty years" (1992, p.69.) Logic based models are built on assumptions of realism and fixed definition, while metaphors are interpretive - they do not claim to be the same as the actual thing they represent. As interpretations they are never closed or sealed. This metaphorical approach would seem to be more closely aligned with a conception of design which must always remain open to possibilities.

6. Conclusion

Through a process of relating, comparing, mapping, analysing and remapping theories, different strategic approaches and conceptualisations of design research were identified. While the emergence of these groupings across a number of different theories confirmed certain patterns of approach, there were some hesitations about the relevance and robustness of the identified categories. There was little work done in this field with which to compare these results. The value of this categorisation is being considered in terms of the way it might be used to inform the basis of a practical application in the form of an information structure and system to organise and relate information about design research theory. According to Gadamer, (1976) the validity of an interpretation can be gauged through the degree to which it gives rise to new insights and new disclosures of meaning, and the way it stands up to the test of its practical application. Snodgrass and Coyne, (1992, p 68) also recognise the importance of application: "The assessment of the validity of a

metaphor or ... model proceeds by an appeal to its potential deployability, arrived at by projective anticipations and not by objective logic or subjective intuition” (p 69). The strategy being taken to further test this analysis is through the development of a design for an information structure. Through this approach, different types of ‘informed-ness’ can be explored to support the organisation and access to information and to introduce more relational understandings.

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