

The central role of the designer's appreciative system in socially situated design activity

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Abstract 350 words maximum:

According to Dorst and Dijkhuis (1995) the two principal paradigms governing design activity discourse, are Simon's rational problem solving, and Schön's theory of design as a 'reflective conversation with the situation'. The rational problem solving view, that a fixed problem space structures design activity, has reduced the designer to a 'missing person' within design activity research (Dorst & Reymen 2004). This thesis aims to highlight the agency of the designer in structuring and motivating socially situated design activity. Dorst's (2006) framework of 'design paradoxes' suggests that design problems are evolving and unknowable. Design situations are determined through the designer's re-interpretation of the social discourses underpinning design situations, in a similar way to 'problem setting' within 'reflection-in-action' (Schön 1983). While Dorst suggests interpretation relies on intuition, problem setting relies on 'professional artistry' which is 'bounded' by the 'appreciative system' (personal knowledge, values and beliefs) and is essentially 'learnable' (Schön 1983).

This thesis explores the correspondence between Schön's theory and contemporary frameworks including 'design paradoxes' (Dorst 2006), 'designerly ways of knowing' (Cross 1982), 'organising principles' (Rowe 1987), and 'creative problem construction' (Mumford et al 2004). It investigates the agency of the designer as evidenced in the use of the 'appreciative system'. This is elucidated using case study analysis of a novice designer, within a tertiary design degree. The case reveals the structured and motivated use of the designer's appreciative system. It indicates the deployment of 'appreciative goals' are fundamental to the 'linking behaviour of designers' (Dorst 2006), enabling design to begin in the absence of 'repertoire' or domain knowledge (Schön 1983), and the acquisition of new repertoire knowledge.

These emergent findings offer new pedagogical perspectives both in terms of design expertise, which is normally associated with domain knowledge, and educating domain independent, multidisciplinary designers. Frames or similar 'organising principles' operate in most design fields, and create a 'principle of relevance' for knowledge from multiple domains and disciplines (Buchanan 1992). An awareness and acknowledgement of the objective function of subjective personal and social knowledge is essential in order to locate the 'missing' designer and understand innovative design activity, both in terms of design expertise, which is normally associated with domain knowledge, and educating domain independent, multidisciplinary designers. Frames or similar 'organising principles' operate in most design fields, and create a 'principle of relevance' for knowledge from multiple domains and disciplines (Buchanan 1992). An awareness and acknowledgement of the objective function of subjective personal and social knowledge, and educating domain independent, multidisciplinary designers. Frames or similar 'organising principles' operate in most design fields, and create a 'principle of relevance' for knowledge from multiple domains and disciplines (Buchanan 1992). An awareness and acknowledgement of the objective function of subjective personal and social knowledge is essential in order to locate the 'missing' designer and understand innovative design activity.

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The central role of the designer's appreciative system in socially situated design activity.

Monique Bacic

A thesis submitted in fulfillment of the requirements for the degree of Master of Design (Honours)

2007

College of Fine Arts, University of New South Wales, Sydney, Australia



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ABSTRACT

According to Dorst and Dijkhuis (1995) the two principal paradigms governing design activity discourse, are Simon's rational problem solving, and Schön's theory of design as a 'reflective conversation with the situation'. The rational problem solving view, that a fixed problem space structures design activity, has reduced the designer to a 'missing person' within design activity research (Dorst & Reymen 2004). This thesis aims to highlight the agency of the designer in structuring and motivating socially situated design activity. Dorst's (2006) framework of 'design paradoxes' suggests that design problems are evolving and unknowable. Design situations are determined through the designer's reinterpretation of the social discourses underpinning design situations, in a similar way to 'problem setting' within 'reflection-in-action' (Schön 1983). While Dorst suggests interpretation relies on intuition, problem setting relies on 'professional artistry' which is 'bounded' by the 'appreciative system' (personal knowledge, values and beliefs) and is essentially 'learnable' (Schön 1983).

This thesis explores the correspondence between Schön's theory and contemporary frameworks including 'design paradoxes' (Dorst 2006), 'designerly ways of knowing' (Cross 1982), 'organising principles' (Rowe 1987), and 'creative problem construction' (Mumford et al 2004). It investigates the agency of the designer as evidenced in the use of the 'appreciative system'. This is elucidated using case study analysis of a novice designer, within a tertiary design degree. The case reveals the structured and motivated use of the designer's appreciative system. It indicates the deployment of 'appreciative goals' are fundamental to the 'linking behaviour of designers' (Dorst 2006), enabling design to begin in the absence of 'repertoire' or domain knowledge (Schön 1983), and the acquisition of new repertoire knowledge.

These emergent findings offer new pedagogical perspectives both in terms of design expertise, which is normally associated with domain knowledge, and educating domain independent, multidisciplinary designers. Frames or similar 'organising principles' operate in most design fields, and create a 'principle of relevance' for knowledge from multiple domains and disciplines (Buchanan 1992). An awareness and acknowledgement of the objective function of subjective personal and social knowledge is essential in order to locate the 'missing' designer and understand innovative design activity.

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I would like to formally acknowledge and thank Carol Longbottom, School of Design Studies, College of Fine Arts, University of New South Wales, as the author of the design briefs included in the appendix of this thesis. The two briefs are called 'walking the walk/passage' and 'shelter' from the course Environments/Spatial Studio. I have included the briefs based on the course I have taught, authored by Carol Longbottom, then Bachelor of Design program and Environments Studio co-ordinator. With her kind permission I have reproduced them and referred to them in my thesis. I would also like to thank Carol, as one of my supervisors, for her faith in my ability and sustained interest in design knowledge and design thinking in general.

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DEDICATION

This work is dedicated to my son whose conception corresponded with the inception of this Masters. It is my hope that he will maintain his good humour and curiosity for life and develop the same passion for knowledge, understanding and learning which inspired this thesis.

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CHAPTER 1

INTRODUCTION

The role of the designer within design activity can be understood very differently depending upon the paradigm through which design activity is viewed. Dorst and Dijkhuis (1995) identified the two principal paradigms governing design activity discourse as Simon's (1969) 'rational problem solving' and Schön's (1983) theory of design as a 'reflective conversation with the situation'. These paradigms represent very different ways of understanding design activity. Due to the perception that Schön's theory lacked the 'clarity and rigour that was achieved by the rational problem solving paradigm' (Roozenburg & Dorst 1998:36) the language and underlying concepts of rational problem solving have become the 'normal language of thinking and talking about design' (Dorst 2006:4), profoundly affecting the understanding of the agency of the designer within design activity discourse. Within the rational problem solving paradigm the designer seeks to resolve the 'design problem' using an information search process within a fixed 'problem space' (Simon 1969:58). The problem space prescribes the design task and the designer's activity, thereby reducing the designer to a conduit for knowledge determined by the design problem. The subsequent lack of focus on 'subjective' design activity and informal design knowledge has reduced the designer to a 'missing person' within design research (Dorst & Reymen 2004).

Schön's theory of design activity as a 'reflective conversation' is dependent, as is any conversation, on the 'phenomena' the designer decides to 'attend to' when 'problem setting' (Schön 1992), and is therefore largely directed by the agency of the designer. Schön believed 'problem setting' as 'the process by which we define the design to be made, the ends to be achieved, the means which may be chosen', had been largely ignored within design activity discourse due to the emphasis on rational problem solving (Schön 1983:40). Schön's epistemology of reflection-in-action represents a direct challenge to normative definitions of professional knowledge. Rather than focusing on 'systematised logical domain information' (Cross 2000:94), it is a descriptive model of 'professional artistry' within practice (Schön 1983:VII). Schön's model validates the designer's use of knowledge, which cannot normally be justified within the rational problem solving paradigm as 'legitimate' domain knowledge (Schön 1985:28)

'Professional artistry' is most evident in the problem setting phases of design activity and depends on a combination of the designer's repertoire (domain knowledge), their appreciative system (personal experience, values and beliefs) and their stance (attitude). In marked contrast to a rationalist view of valid design knowledge, reflective practice is based on viable knowledge. Sanyal (1997) suggested that Schön's true legacy was that he legitimised informal knowledge in foregrounding the agency of the designer within the design conversation. Within reflective practice validity is based on establishing internal consistency within the design episode based on 'fidelity' (Schön 1983:91) to a 'web-ofmoves' bounded by the appreciative system (Schön 1983:94). Schön held that while the process of 'seeing-as' (Schön 1983:182), involving the 'qualitative judgments' essential for innovative design activity, is based on subjective or appreciative knowledge (Schön 1983:151), that fidelity ensured a 'kind of objectivity' (Schön & Wiggins 1992:138) within reflective practice. While Schön's concepts of seeing-as and fidelity are rarely discussed within design activity discourse, the agency of the designer as evidenced by the use of their appreciative system represents one of the most vital aspects of Schön's theory. The increasing focus on multi-disciplinary design activity suggests that Schön's framework of reflection-in-action as a domain-independent model of design activity has contemporary significance.

Schön's foregrounding of the designer within design activity has been supported within Dorst's (2006) new conceptual framework of socially situated design activity. Dorst holds that design problems are constantly evolving and 'unknowable'. Rather than addressing an absolute problem, the designer approaches a 'local network of links' which comprise the design situation. Design problems are 'design paradoxes' based on commonly held discourses or understandings, from which the designer determines both the problem and solution through subjective interpretation or 'linking behaviour'. Design paradoxes challenge the normative understanding of the design problem as the most determining feature of design activity, suggesting a contemporary re-reading of Schön's theory. Schön and Dorst's theories highlight the role of enculturated personal knowledge within the qualitative interpretations or judgments within innovative design activity.

This thesis explores the correspondence between Schön's work and contemporary theory to locate the kind of objective use of subjective knowledge within design activity that Schön described as 'problem setting'. The complementary theories examined include 'design paradoxes' (Dorst 2006), 'designerly ways of knowing' (Cross 1982), 'organising principles' (Rowe 1987), and 'creative problem construction' (Mumford et al 2004), all

of which support the central role of personal and social knowledge within domainindependent design activity. While the use of personal knowledge within design activity is often associated with intuition (Buchanan 1992, Cross 1994, Teixeira 2000, Dorst 2006) Schön held that the use of appreciative knowledge within 'professional artistry' is a 'learnable' activity. Although not directly focused on design education this contemporary re-reading of Schön's theory of reflection-in-action offers new perspectives for design pedagogy in enabling the development of a tolerance for ambiguity, identifying linking behaviours to support particularised design demonstration, and the assessment of qualitative judgments within design activity.

The literature review provides a contemporary re-reading of Schön's theory of reflectionin-action with the intention of illustrating the agency of the designer, as evidenced in the use of their appreciative system within problem setting phases of design activity. This rereading of Schön's theory demonstrates the structured and motivated use of the designer's appreciative system and offers the foundations of a descriptive model of domainindependent design activity that focuses on the agency of the designer rather than the parameters established by a fixed problem space.

The re-reading of Schön's work is illustrated using emergent findings from qualitative research based on a single instrumental case study of a novice designer within tertiary design education known as 'Halle'. The case study revealed emergent content domains including 'random ideas', 'branching', 'linking' and 'seeding'. These preliminary findings indicate that novice designers employ their appreciative systems in a structured and motivated way in order to commence designing in the absence of 'repertoire' knowledge, to develop a tolerance for ambiguity and to direct and structure the acquisition of new repertoire knowledge.

This thesis examines design activity through the eyes of the designer, in this case the novice designer Halle. The focus of this inquiry is an attempt to experience design activity 'vicariously' (Stake 2000:439) in response to calls by Schön, Dorst, and Lawson, amongst others, to examine design activity guided by the experience of the designer rather than the design problem. While Halle's context is a tertiary design degree it is not the purpose of this inquiry to critique her design education or the nature of tertiary design education in general which constitute fields of inquiry in themselves.

Elements of the literature review elucidated within the case study offer insight into novice design activity. While not immediately generalisable this insight suggests pathways for future research involving the education of multi-disciplinary designers, and domain-independent design activity and design knowledge.

CONTEXT

This research began in response to my own teaching experience within a tertiary design degree and my design practice which involves working with novice designers and developing structures within commercial design enterprises to enhance innovation in multi-disciplinary design teams. My experience as a design student and educator suggested that there was a view that a large number of tertiary design students that did not understand how to do what they were being asked to do and did not know how to learn how to do it. Similarly Toynbee Wilson (2002) observed a disparity between learning styles and teaching objectives with novice designers when studying within a tertiary design degree. This situation was further complicated by the sense that design is learnt by osmosis or experience and that the tacit decisions within design activity could not be articulated. My initial inquiry was therefore focused on the procedural knowledge or know-know embedded within design activity. My early research revealed that procedural knowledge is very poorly understood in a design context both in terms of acquisition and transition. My teaching practice indicated that this was possibly a situation that could become even more complex with reduced contract hours within design degrees if it could not be described and illuminated within design education. My personal focus of inquiry was therefore to gain a greater understanding of the 'know-how' decisions made within design action. Because Schön's theory of reflection-in-action focuses on the 'professional artistry' of design practice as a learnable activity it represented the ideal framework for this investigation.

Schön's epistemology of reflection-in-action is a descriptive domain-independent model of design activity intended to address the conflict between 'relevance and rigour' which is evidenced in design practitioners inability to justify their 'know-how' as 'a legitimate form of professional knowledge' (Schön 1985:28). While the theory of reflective practice has been influential within design education since the 1980s there remains a tendency to focus of formal domain knowledge with design activity theory, as seen in research based on strategic domain knowledge (Popovic 2002, 2004), precedence (Christiaans 1993, Downton 2000, Oxman 1994, Restrepo et al 2004), and case-based reasoning (Chui

2002). While there is an increasing understanding of the role of 'experiential knowledge' and 'episodic memory' (Lawson 2001, 2004) within design activity discourse, this is can be interpreted as a personalised subset of domain knowledge rather than unorthodox or informal knowledge. Schön distinguishes the former as repertoire knowledge and the later as appreciative knowledge.

This imbalance within design research is, in part, due to the dominance of protocol analysis within design activity research, especially since the Delft Protocol Workshop (1994). Protocol experiments attempt to understand real time design by scrutinising the dialogue and actions of designers. The variables within protocol experiments are highly controlled in order to address specific hypotheses. As such, protocol analysis is extremely well suited to analysing design activity from a problem solving point of view and less well suited to analysing reflective practice (Craig 2000). While protocol analysis has offered design activity discourse invaluable insights it has not, to date, been able to capture the situated nature of design activity as experienced by the designer. As a result, the most subjective and ambiguous characteristics of design activity are poorly understood within design theory.

The lack of research regarding the central role of the designer's appreciative system may be positively influenced by the increasing focus on the analysis of design expertise pioneered by Lawson (2000, 2004) and Cross (1994, 1998, 2004) as seen by recent conferences such as the 'Design Thinking Research Symposium 6' (2003) which focused on design expertise. Traditionally studies of design expertise have taken a broad spectrum approach to classifying novice and expert design behaviour and focused on the accumulation and application of domain knowledge. More recent studies (Dorst 2005, Dorst & Reymen 2004) have focused on the transitional phases between novice and expert design activity with an additional focus on the shifts in attitude within design activity by the designer, implying that the role of personal knowledge may also offer insight into these transitional phases. While not specifically located within this field of research this thesis supplements the current broad stroke definitions of the transition from novice to expert.

MAIN OBJECTIVE OF THE STUDY

Chenail (1994) suggested in his paper 'Presenting qualitative data', that 'qualitative research is the practice of asking simple questions and getting complex answers' (Chenail 1994:8). As a designer, a design educator and a researcher it became obvious to this author that there was a significant lack of research regarding design activity as experienced by novice designers especially over multiple projects within design activity discourse. While novice designers are frequently involved in protocol studies their design activity is rarely analysed in situ for any length of time and they are rarely asked to discuss, at any length, their perception of their design practice.

The possible gap between actual design practice and the assumptions embedded in models of practice may be especially significant in our understanding of novice designs activity. Studies have that despite assumptions about the limitations of novice design activity, that novices can make similar design moves to expert designers (Cross et al 1994) This poses numerous questions regarding how we support the transition from novice to expert designer both pedagogically and in practice. The objective of this research was to establish a clearer picture of a novice designer's *experience* of design activity in a socially situated context. Rather than issuing the designer with specific and limited resources as in a protocol analysis, the intention was to illuminate the resources the novice designer perceived as relevant within their design activity. The focus of this inquiry was based on an interest in how novice designers make design decisions and what sort of information or knowledge they employ to make them. The aim was not to assess the quality of outcomes but to describe the experience of design activity.

RESEARCH QUESTIONS

The design of this study has been based on phenomenological concepts and methods common to qualitative research and involves an emergent, modified case study approach. The study has been shaped in response to the following initial research questions as the focus of the inquiry:

What (if any) design strategies do novice designers employ in framing/setting poorly defined design situations and how do these strategies affect their information seeking behaviours (both accessing and processing) during the design process?

Do novice designers employ organising principles in order to frame or contain poorly defined design situations to help facilitate design solutions? What types of organising principles do they employ?

What do the design strategies employed by novice designers reveal regarding procedural knowledge within pedagogical theory and practice?

The focus of inquiry of this thesis generated significant correspondence within the critical literature, and between the literature and the case study. It became clear that determining specific design strategies represents a very simplistic approach in the context of this study because these strategies are situational. During the course of the research the focus on 'organising principles' shifted from labeling them to determining their general qualities. In particular, the use of the designer's appreciative system in the genesis and evaluation of organising principles and their role, in determining the relevance of information within design activity.

RELEVANCE OF THE STUDY

Schön (1983) believed his model of reflective practice described the behaviour of *all* professional practitioners and should be the basis of all professional education. Similarly Cross (1982) held that designing could be used as a model for general education. The underlying reasoning behind these propositions is the multi-disciplinary nature of design activity.

Buchanan holds that the need to define a coherent discipline of design in the early 1970s resulted in the identification of ill-defined or wicked problems as common to all design domains (Buchanan 1992). Ill-defined design problems remain the most commonly identified characteristic of domain-independent design knowledge (Reymen 2001). Cross (1982) noted that the paper 'Design in general education' produced by The Royal College of Art in 1979 set a greater challenge by identifying that 'design has its own distinct things to know, ways of knowing them, and ways of finding them out' which he described as a 'designerly way of knowing'. While the term is used frequently within design education discourse and resonates with design practitioners it is not generally addressed in domain-independent studies. While 'ill-defined problems' or design phases address the design problem and design process (as derived from the design problem) a 'designerly way of knowing' pertains to the designer. As such, the subjective nature of this knowing has meant it has largely been ignored within empirical domain-independent

studies. Similarly 'organising principles' (Rowe 1987), as expressions of a designerly way of knowing, while identified by Schön and Cross as domain-independent knowledge, have not been included in recent domain-independent studies (Reymen et al 2006).

The need to understand the common aspects of design activity is becoming ever more obvious with the increase of multi-disciplinary and cross-domain design teams, as evidenced in the focus of conferences such as 'ConnectED 2007' which specifically addressed the education of multi-disciplinary and domain-independent designers. For such teams to function successfully there needs to be a greater understanding and articulation of implicit design activity. Recent analysis of the nature of design problems suggests that a new approach is necessary which focuses on the agency of the designer within design activity or 'the designer's experience of design of design situations' (Dorst and Dijkhuis 1995:264).

This thesis addresses the need for an analysis of design activity which articulates the agency of the designer and their use of their personal and social knowledge to augment the current understanding of domain-independent knowledge. In doing so it offers new perspectives for design pedagogy in terms of design expertise, which is normally associated with formal domain knowledge and educating domain-independent , multi-disciplinary designers. Organising principles such as Schön's 'frames' operate in most design fields and create a 'principle of relevance' for knowledge from multiple domains and disciplines (Buchanan 1992).

Educating designers requires the acknowledgement and understanding of the objective function of subjective and social knowledge within design thinking. As it stands the generation of design knowledge by novice designers within design activity, is still poorly understood. Lawson (2001) noted that the way students browse books for visual stimulation using their personal memory or appreciative systems to stimulate ideas did not conform to normative literacy standards, which made it impossible for librarians and university administrators, in particular, to measure and support:

Perhaps then more research and understanding of the need to develop design knowledge in the form of episodic memory might in turn help design schools to defend their practices from university authorities that find them hard to understand. (Lawson 2001:13) Design expertise is traditionally perceived as the accumulation and application of domain knowledge (Goldschmidt 2004:3). While the attributes of expert and novice designers have been examined, the transition between the two has remained poorly understood. Within their emergent model, Dorst and Reymen (2004) have identified seven transitional phases in developing design mastery. The model details the type of actions the designer takes within each phase but does not clarify how or why they function this way. The model does however acknowlege the designer's experience of the design activity by suggesting changes to their 'comfort level' and 'involvement' with design situations within in each transitional phase. While still in its formative stages this transitional model of design expertise suggests that a greater understanding of the agency of the designer could significantly contribute to new persepectives of design expertise.

This thesis does not address design expertise directly but a broad understanding of the agency of the designer within domain-independent design activity. Over two decades ago Cross noted design as a coherent discipline had 'only begun to make rough maps in the territory' which unified design research, practice and education based on a 'designerly way of knowing'. (Cross 1982:221). This thesis is intended to build on these rough maps.

CONSTRAINTS ON THE SCOPE OF THE STUDY

The aim of this thesis is not to produce a domain-independent model of design activity but to add depth to the already existing 'maps' of design activity generated by Schön and Cross. While Schön and Cross held that studio based design education could function as the basis for general and professional education, this thesis employs their understanding of design activity as a framework for analysing design activity. Halle, as the principal case study referred to within this thesis, like many novice designers, is a design student within a tertiary design degree. While Halle's design activity takes place in an educational context, this thesis is not intended to offer any in-depth insight into general professional education or studio based learning specifically. The aim of this inquiry is to gain greater insight into the novice designer's *experience* of design activity.

While the use of visual representation including sketching is discussed within the case study it use to elaborate on Halle's understanding of her own design activity. This thesis does not examine representation within design theory in general, or it's specific role within design pedagogy. This thesis does address learning styles and teaching strategies briefly to augment the discussion of design activity and pathways to future research. Beginning with the premise that the design problem has been preferenced over the designer within a significant amount of design activity discourse, this thesis is organised to enable a contemporary analysis of design activity focused on the agency of the designer. As a starting point, the thesis highlights contemporary design activity theory, which explores the use of personal and social knowledge within socially situated design activity, as evidence of the agency of the designer. This theory is then used as a lens through which to contemporise Schön's theory of reflection-in-action, concentrating on many of the lesser know aspects of his descriptive model, especially those which focus on central role of the designer and use of their appreciative or personal knowledge within design activity is then used to facilitate the analysis the design experience of a novice designer. This analysis is based on a single instrumental case study (Stake 2000) in order to offer as a rich description as possible of the designer's perceived experience. It is not intended to be generalisable but to offer indicative, and possibly instructive, pathways for further research through a clear understanding of the agency of the designer within socially situated design activity.

DEFINITION OF TERMS

Design activity

This research adopts the belief expounded by Manzini (1994) that meaningful design should '... give form to a changing world, and offer opportunities for new types of behavior' and that design outcomes should 'render visible the weak signs expressed by society' (Manzini 1994:40). This thesis is based on a belief that designing is a social process. As such, the research is based on Dorst's (2003) understanding of design activity as the relationship between the design task, the design activity and the designer.

Design activity refers to the action of designing. It equates to Schön's theory of reflectionin-action and refers to the actions and decisions the designer makes *within* the 'action present' (Schön 1985).

Design situations

The concept of the design situation is vital to any analysis of design activity because it reflects the social nature of design and the type of knowledge employed. Design activity is contextualised through its interaction with the design situation:

A design situation is a premise of design that a process is exposed to some degree of the context [of the situation], and which as a consequence causes a change in the process. (Chui 2003:3)

In his book *Design Thinking*, Rowe (1987) cites Mallin's interpretation of the philosopher Merlau-Ponty's term 'situation' to mean the 'involvement in circumstances' or 'active concern with sets of natural, cultural or human problems' (Mallin 1979:7 quote in Rowe 1987). This 'active concern' draws on both objective and subjective knowledge, which are equally vital and 'founded in the situation' (Rowe 1987:76). The designer's *experience* of the situation lies at the core of design activity:

Design is not a process or a profession, it is experienced as a situation that a designer finds him/herself in. Until now design methodology has failed to systematically take into account this situational aspect of design. (Dorst and Dijkhuis 1995:264)

Domain-independent design knowledge

Domain-independent design knowledge has been a significant focus of the Design Research Society since the 1960s because it facilitates inter-disciplinary communication especially within multi-disciplinary design teams (Reymen et al 2006:1). Domainindependent design knowledge is based on the 'similarities between design processes' (Reymen 2001). Reymen et al suggest there are three criteria that define domainindependent knowledge:

... it should be based on the study of several design disciplines; it may not contain domain specific aspects; and it should be useful for supporting several design disciplines and multi-disciplinary teams. Knowledge based on only one discipline can be domain-independent when it fulfils the second and third criterion and when it is recognised as general knowledge by many disciplines in the field. (Reymen et al 2006:2)

Reymen (2001) holds that domain-independent design knowledge applies to 'concepts and terminology' and cites the belief that design problems are 'ill-defined' and that design episodes involve different 'phases' as two examples.

This thesis holds that domain-independent design knowledge is procedural as well as declarative. Organising principles while not predefined rules or concepts, fulfill the criteria of domain-independent design knowledge. 'Organising principles' offer an approach to domain-independent design knowledge based on the agency of the designer, in addition to knowledge determined by the problem (or design situation) and the process.

Personal knowledge

Each designer's appreciative system is unique, based on their personal knowledge, values and beliefs. Personal knowledge refers to the designer's personal history or private knowledge as opposed to personalised domain knowledge as a subset of organisational knowledge. Within this thesis there are references to formal knowledge, informal knowledge and unorthodox knowledge. Formal knowledge is associated with domain or repertoire knowledge whereas informal and unorthodox knowledge may be associated with the designer's appreciative system. Formal knowledge is specialised or normative design knowledge, which requires prior intellectual effort to accumulate. Formal knowledge requires domain based experience and is considered 'factual or propositional' (Downton 2000:50). Informal knowledge is non-specialised knowledge generated 'onthe-spot' within design activity or 'practical knowledge' (Downton 2000:50). Unorthodox knowledge represents non-design knowledge from any domain, and can include the designer's personal and social knowledge or appreciative knowledge.

CHAPTER 2

CRITICAL REVIEW OF THE LITERATURE

This literature review examines design activity within the context of the two most frequently utilised paradigms within design activity discourse, Simon's (1969) 'rational problem solving' and Schön's (1983) theory of design as a 'reflective conversation with the situation'. It examines relevant theories within design discourse that contribute toward an understanding of the role of the designer, as evidenced in the use of their appreciative system or personal knowledge within design activity. The theories examined include 'design paradoxes' (Dorst's 2006), 'organising principles' (Rowe 1987), a 'designerly way of knowing' (Cross 1982) and 'creative problem construction' (Mumford et al 2004). The thesis then offers a re-reading of Schön's theory of reflection-in-action based on concepts and terminology distilled from forty years of his writing, assessed through the lens of contemporary design activity theory.

In order to make a re-reading of Schön's theory of reflection-in-action influenced by the emergent perspectives of design activity, which attempt to focus on the experience of the designer rather than the design problem, it is important to clarify the influence of the two principal paradigms governing design activity discourse have on our perception of design activity.

PRINCIPAL PARADIGMS WITHIN DESIGN ACTIVITY DISCOURSE

In order to locate the 'missing' designer (Dorst & Reymen 2004) within design activity it is essential to examine how and why the agency of the designer is marginalised within the rational problem solving paradigm and centralised within 'reflective practice'. This analysis sets up a broad base for interpreting relevant theory within design activity discourse and a detailed re-reading of reflection-in-action as a descriptive model for domain-independent design activity.

The epistemological ideas underlying rational problem solving and reflective practice are based on objectivism and constructivism respectively, which to some extent, work in opposition to each other and profoundly influence how the role of the designer is perceived within design activity. The 'design methods movement' began in the 1960s based on the belief established by 20th Century Modernism that the world is made up of facts that are independent of the observer (Schwandt 1994:125), which can be studied and translated into process and products based on 'objectivity and rationality' (Cross 2000). Simon's theory of the 'science of design' based on his concept of 'bounded rationality' has profoundly influenced design methodology since the 1960s (Simon 1969:58). He conceived design activity as a 'rational problem solving process' in which the designer seeks to resolve the design problem using an information search within a fixed problem space. The problem space is determined by an a priori problem which in turn determines the design strategies available to the designer. In direct opposition to Simon's model of design activity as 'rational problem solving', Schön's seminal text *The Reflective Practitioner* (1983) is based on constructivist theory and represents a direct challenge to the dominance of 'technical rationality' within professional education. This is based on a transactional epistemology in which 'knowledge and truth are created, not discovered' by the individual (Schwandt 1994:125).

Within Schön's theory of the 'reflective conversation', design activity involves an openended, transactional design situation rather than a fixed problem space. 'Problem setting' involves the designer generating an initial 'frame' and undertaking 'move' experiments to fit the 'frame' to the situation, thereby simplifying the 'overwhelmingly complex reality' they face into something that *they* can manage (Schön 1979:265). Problem setting and problem solving work symbiotically within design activity. Schön saw problem setting as a form of 'hypothesis testing' which was 'bounded' by the designer's 'appreciations' (Schön 1983:151) or the qualitative judgments made by the designer based on their appreciative system. Rather than rejecting normative knowledge structures Schön suggested the designer's 'professional artistry' *mediated* the use of research based theory in practice (Schön 1985:92). The designer's structured and motivated use of their appreciative system to mediate formal domain knowledge is one of the least acknowledged aspects of Schön's theory.

Objective use of subjective knowledge

Simon held that the introduction of designer's own sense of reality compromised the problem solving process. He believed that personalised strategies such as heuristics, were 'good guesses' that could not produce an optimal outcome (Feigenbaum 2003:5). For Schön the most positive expression of professional artistry was the designer's ability to generate and utilise frames based on qualitative judgments within problem setting. Objectivity and rigour are not externally imposed by the problem space within reflection-

in-action but are based on the concept of 'fidelity' (Schön 1983:91) within the design episode or reflective conversation. Fidelity is based on the socially situated character of 'reflective conversation' and ensures the internal consistency necessary to structure the 'conversation':

... a good conversation, which must be neither wholly predictable nor wholly unpredictable. If it were wholly predictable, it's boring and not good, and if it's wholly unpredictable it's crazy. (Schön 1987:5)

Fidelity enables the objective use of subjective knowledge and is based on Dewey's idea of contractual fidelity within social inquiry in which the inquirer enters into a 'contract' in which he is 'committed to stand by the results of similar inquiries' (Schön 1983 quoting Dewey 1938:18). Within reflective practice as the designer generates frames and move experiments they construct a web-of-moves. Fidelity is established by honouring previous moves and anticipating future moves within the web as a form of evaluation.

Fidelity to both the designer's appreciative system and to the web-of-moves is essential in order to maintain structured design activity that is internally 'coherent'. Schön suggested the designer's appreciative system is usually constant within the design episode although it may change between design episodes. The 'constancy of the appreciative system' ensures that the values used to generate and evaluate frames and moves are internally consistent. The experimentation possible within a web-of-moves represents a form of hypothesis testing:

...hypothesis testing is bounded by appreciations. It is initiated by the perception of something troubling or promising, and it is terminated by the production of changes one finds on the whole satisfactory, or by the discovery of new features which give the situation new meaning and change the nature of the questions explored. (Schön 1983:151)

Fidelity as a form of evaluation ensures the designer's actions while based on personal knowledge are not arbitrary but involve the objective use of subjective knowledge. A designer's ability to evaluate their moves and identify 'mistakes' through fidelity, establishes a 'kind of objectivity' within the web-of-moves (Schön & Wiggins 1992:138). Objectivity within reflective practice is established internally through the social transaction of the reflective conversation rather than externally imposed notions of validity as in rational problem solving. Reflective objectivity is based on *viability*, whereas rational objectivity is based on *validity*.

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Viability as a form of validity

Understanding the importance of the appreciative system within design activity is governed by different concepts of validity within the two major paradigms. Within 'reflective practice' the agency of the designer within design activity is based on the transactional relationship between the socially situated design situation and the appreciative system in problem setting or framing. Framing is the process used to clarify chaotic or 'complex' design situations (Schön & Rein 1994):

There is no way of perceiving and making sense of social reality except through a frame for the very task of making sense of complex, information rich situations requires an operation of selectivity and organisation which is what 'framing' means... (Schön & Rein 1994:30)

Schön and Rein identified 'framing' as 'radically constructivist' (Schön & Rein 1994:215). Within radical constructivism, knowledge is not independent or absolute but an 'activity or a process' (Schwandt 1994:127) in which we construct our own reality through networks and relationships between events and objects (Murphy 1997:7). The validity of knowledge is not based on 'correspondence to an independent existing world', but is valid if it is *viable*, or establishes a functional 'fit' with a goal (Schwandt 1994:127). Where validity is based on *elimination*, or on 'identifying and removing contradictions' in order to clarify the problem space (Dormer 1998:7), problem setting based on *sensing similarity* between dissimilar situations or concepts in order to establish the *viability* of a new concept. Schön called this activity 'seeing-as' (Schön 1983:182) and held that is was central to reflective practice. Unlike rational problem solving which is premised on the distancing of the designer, sensing similarity or 'seeing-as' requires immersion within the design situation and the use of subjective qualitative judgment:

The practitioner violates the canon of controlled experiment which calls for objectivity and distance. In controlled experiment, the inquirer is supposed to refrain from imposing his biases and interests on the situation under study. (Schön 1983:149)

Viable frames result from 'internal consistency' within design episodes. The designer establishes internal consistency through fidelity. Professional artistry employs 'kinds of inquiry which are, according to the dominant model of technical rationality, not rigourous' (Schön 1985:16). Both the altered perspective necessary for innovative design and the means of evaluating and confirming it are dependent on subjective personal

knowledge not just objective domain knowledge as in rational problem solving. It is this notion that the practitioner constructs the frame experiments and moves *themselves* in relationship to *their* understanding of reality, which is so vital to this study of the role of the designer within design activity.

Although it has been purported that Schön completely rejected technical rationality and problem solving (Waks 2001:48) Schön actually recognised the dual nature of design activity and suggested that 'competent practice ... demands a marriage of problem setting and problem solving' (Schön 1985:28). He suggested there was an essentially symbiotic relationship between problem setting and problem solving in which the reflection-in-action is able to 'mediate' the use of research-based theory in practice (Schön 1985:92):

In order to differentiate they have to be able to set up the problem but setting up the problem is something for which there aren't rules and no theory. On the contrary, you have to be able to set the problem in order to apply the rules and the theory. (Schön 1987:5)

Schön located 'professional artistry' within problem setting which he considered to be the *most* 'indeterminate zone of practice' because he believed 'complexity, instability and uncertainty are not removed by applying specialised knowledge' (Schön 1983:19) and that the specialised knowledge necessary for problem solving was only effective once the problem was 'set or 'framed'. Whereas problem solving depends on the use of 'systematised logical domain information' (Cross 2000:94), reflective practice depends on the use of informal and unorthodox knowledge for problem setting. Reflective practice is based on a combination of the designer's repertoire (domain knowledge), their appreciative system (personal knowledge, values and beliefs), and their stance. The practice of problem setting is heavily dependent on the designer's appreciative system in order to commence activity in the absence of formal knowledge through the generation of frames and the evaluation of moves. In recognising and 'legitimising' (Sanyal 1997) the use of informal and unorthodox knowledge in determining the design situation, Schön's is the only model of design activity currently available which focuses on the agency of the designer and the use of their personal knowledge.

Action based inquiry

Traditional models of design activity begin with analysis followed by synthesis (Asimow 1962, Archer 1964 in Rowe 1987:48). Systematic rational activity or 'analysis' precedes 'creative' activity, or synthesis, so that research and knowledge acquisition always

proceed action. Because the terms (and underlying concepts) 'design problem' and 'design space' have become the 'normal language of thinking and talking about design' (Dorst 2006:4), they profoundly influence our understanding of the role of the designer within design activity. Even studies relating to reflective practice adopt this structure and the language of problem solving. Reymen's (2001) 'model of structured reflection' designed to facilitated the equivalent of Schön's reflection-on-action (as opposed to reflection-in-action) is structured like a traditional process model. The model is based on a checklist in which 'analytic rationality' precedes 'image forming' and 'conclusion generating', or activities within the design episode commensurate with synthesis or the use of 'creativity and intuition'. The traditional separation of analysis and synthesis reinforces the rationalist position of the a priori design problem by implying the determination of the ill-determined design problem is a separate activity to generating a solution. Despite the suggestion by Dorst and Cross (2001), of the 'co-evolution' of the 'problem/solution space' the reliance on the structures and language of the rationalist paradigm continue to limit our ability to understand design from the perspective of the designer.

Within reflection-in-action, problem setting precedes problem solving, and the application of professional artistry precedes the application of formal knowledge. While Schön held that problem setting precedes problem solving, because the designer operates in the 'action present' (Schön 1985) during reflection-in-action, the solution and the problem are co-determined as 'implementation' is automatically built into the designer's inquiry (Schön 1983:68). While there has been significant research into the quality of design outcomes generated by either a problem or solution focus (Lawson 1984), Schön's concept of problem setting is closer to Dorst's and Cross' (2001) theory of the 'co-evolution' of the problem and the solution within design activity. Problems setting is not characterised by a 'problem' or a 'solution' focus but the type of knowledge and reasoning employed within action.

Setting versus 'satisficing'

During the 1970's Simon acknowledges that the rational problem solving model worked with well structured problems and modified the model to address 'ill-structured problems' (Simon 1973). He suggested that ill-structured problems are ones in which the problem space is too large to be fully comprehensible, so that designers work within an 'immediate problem space' or a subset of the larger global problem space. Unlike the 'global problem', immediate problem spaces can appear well-structured as the designer 'evokes his long-term memory' in order to 'derive some global specifications' and 'guiding organisation' for design activity (Simon 1973:189). However Simon suggested that problem solving in this manner could result in the 'interrelations' between various sub-problems being 'neglected or under-emphasised', stating:

As a result, while the final product may satisfy all the requirements that are evoked when the final product is tested, it may violate some of the requirements that were imposed (and temporarily satisfied at an earlier stage of the design) (Simon 1973:191).

The violation of original criteria underscores Simon's belief that designers respond to complexity, through 'satisficing' (Simon 1957:205) or finding a solution that meets an acceptable number of design criteria within the problem space but not all. This form of problem solving never maximises the value of the design problem.

While satisficing represents the designer's diminished capacity in the face of complexity Schön emphasised the 'professional artistry' necessary to make qualitative judgments within innovative problem setting. Unlike satisificing, the use of personal knowledge is legitimised within problem setting to the extent that Schön believed that terminating design activity on the basis of a 'feeling of satisfaction' even when other 'plausible' alternatives existed (Schön 1983:51) represented the deployment of the designer's 'professional artistry'.

Where problem solving is determined by a fixed problem space, within reflection-inaction the designer to a large extent determines the design situation, not just their response to it. Schön argued that the problem must first be *set* before it can be solved. The process of problem setting is the most indeterminate and ambiguous of the phases within the design episode but according to Schön the most vital in establishing the course of action:

But with the emphasis on problem solving we ignore problem setting, the process by which we define the design to be made, the ends to be achieved, the means which may be chosen. In real-world practice problems do not present themselves to practitioners as givens. They must be constructed from the materials of problematic situations which are puzzling, troubling and uncertain (Schön 1983:40).

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The designer does not *discover* the criteria of the problem through an information search process but conducts generative experiments (design moves) to fit the situation to their frame. The designer is not passive, they actively 'adapt the situation to the frame' (Schön 1985:131). In this way problem setting is not about defining an ill-defined problem, but about aligning the situation with the designer's appreciative system in order to make it manageable. Problem setting does not clarify or define an a priori design problem but the generative relationship the designer can establish with the situation, within the 'reflective conversation'.

The central role of the appreciative system in aligning the designer with the design situation is evidenced in the tendency of expert designers to change the 'constraints and goals' of already well-defined design problems (Restrepo & Christiaans 2004:6). This tendency was acknowledged in the recent critique of a model to assist structured reflection. Expert designers critiscised the model because it did not account for the fact that, 'changing desired properties during design activity is common practice' (Reymen et al's 2006). Before it can be determined *how* designers do this, it is necessary to understand *why* designers do this. The answer may lie in the general misunderstanding of design problems as vague, as opposed to ambiguous.

Tolerance for ambiguity

Ill-defined design problems are often referred to as vague (Restrepo & Christiaans 2004:3, Dorst 2006:11, Reymen et al 2006:13). As vague situations require different forms of knowledge to ambiguous ones, design situations are best understood as ambiguous rather than vague. Because qualitative research parallels design activity in dealing with 'ill-structured' personal experiences (Stake 2000: 443) it offers interesting insight into the into the role of ambiguity in understanding poorly defined or structured, but information rich situations. Qualitative researchers Maykut and Morehouse (1994) offer the following distinction between vagueness and ambiguity:

Ambiguity and vagueness as terms are often used interchangeably; however, these words have different meanings which might aid to understanding a tolerance of ambiguity. An ambiguous situation is one which can be understood in more than one way. A vague situation, on the other hand, is one which lacks precision. While a qualitative researcher will need tolerance for both vagueness and ambiguity, these tolerances are of a slightly different sort. (Maykut & Morehouse 1994:31)

While it is commonly understood that 'problem structuring is a process of bringing in more information to bear on the problem situation' (Restrepo & Christiaans 2004:2) designers commence designing within ill-defined situations without 'complete information' (Downton 2000:50) and rarely establish all the information supposedly 'necessary' to achieve appropriate outcomes (Cross 1982:224). Where vague situations can be resolved by 'getting more information' ambiguous ones can not necessarily be solved in the same way (Maykut & Morehouse 1994:31). This is supported by studies which note that the skilled use of information'. It has been suggested that 'knowledge organisation' is more important than 'knowledge acquisition' in problem setting (Mumford et al 2004:24), that information 'gathering' alone is not a successful design strategy (Cross 1994:50), and that the absence of reflection or information 'processing', has been associated with an inability to cope with uncertainty (Restrepo & Christiaans 2004:3). This parallels Schön belief that design situations are already 'information rich' but 'inherently unstable' (Schön 1983:15).

In addition, too much 'knowing-that' or formal declarative domain knowledge can 'inhibit practice' by distracting the designer from the subtlety of the 'performance' or the design conversation (Cross 1981:200). While 'the ability to tolerate uncertainty' and working with 'incomplete information' are considered key characteristics of design expertise (Cross 1994:41) these characteristics are usually discussed in terms of how designers define, ill-defined design problems. Because 'uncertainty or inadequacy of knowledge can be potent in creating something' (Downton 2000:50) designers possibly begin working with an 'imperfect' suite of knowledge (Downton 2000:50) *because* of its generative potential not *despite* it.

Within qualitative research a 'tolerance for ambiguity' is recognised as the ability to negotiate 'multiple perspectives' (Stake 2000:443) or 'multiple interpretations' of a situation while assessing which is merited or most 'viable' (Maykut & Morehouse 1994:31). In much the same way that qualitative researchers maintain multiple perspectives, innovative designers maintain 'parallel lines of thought' (Lawson 1993) or a kind of 'double vision' (Schön 1983:281) in order to stimulate the necessary change in their perspective to generate innovative concepts:

Double vision does not require us to stop and think, but the capacity to keep alive, in the midst of action, a multiplicity of views of the situation. (Schön 1983:281)
Designers *re-define* well-defined design situations because of the generative potential of maintaining double vision when 'restructuring' design situations (Casakin 2004:3) and generating 'novel ideas' (Mumford et al 2004:24). This argument explains *why* designers re-define or frame design situations but not *how*. In order to understand how designers use their appreciative systems to frame design problems it is necessary to look at the role of personal knowledge within design literature as a means to 're-read' Schön's theory of reflection-in-action.

Where the design problem is central within the rational problem solving paradigm, Schön's model of reflection-in-action offers the only descriptive model available which explicitly foregrounds the agency of the designer within design activity. Schön's focus on the structured, motivated and objective use of subjective knowledge, within reflection-inaction offers a framework of socially situated design activity which is supported by Cross' concept of 'designerly ways of knowing' and the way designers generate and utilise organising principles in many design domains.

SOCIALLY SITUATED DESIGN ACTIVITY

Designerly ways of knowing

The preceding discussion about the principal paradigms within design activity discourse highlights how perceptions of *relevant* design knowledge determine how we understand the agency of the designer within design activity. Relevant design knowledge is often discussed in terms of formal declarative and procedural domain knowledge. Since 1982 the unique way designers use non-domain knowledge, has most often been referred to using Cross' concept of a 'designerly way of knowing' (Cross 1982).

Although The Royal College of Art identified in 1979 that 'design has its own distinct things to know, ways of knowing them, and ways of finding them out' (Cross 1982:221) over the last thirty years, 'designerly ways of knowing' (Cross 1982:223) have remained elusive. Cross has recently suggested that the need to understand a 'designerly way of knowing' is even more vital as design discourse focuses on domain-independent design activity:

This discipline seeks to develop domain-independent approaches to theory and research of design. The underlying axiom of this discipline is that there are forms of knowledge and ways of knowing that are special to the awareness and ability of a designer, and independent of the different professional domains of design

practice. Just as the other intellectual cultures in the sciences and the arts concentrate on the underlying forms of knowledge peculiar to the scientist or the artist, so we engaged in the culture of design must concentrate on the 'designerly' ways of knowing, thinking and acting (Cross 2000:97).

A designerly way of knowing is domain-independent design knowledge which involves the ability to adapt, adopt and invent procedures for employing *information* during design activity. This information can be derived from any domain or discipline.

In her paper 'Think-maps: teaching design thinking in design education' Oxman describes a designerly way of knowing as a form of 'meta-knowledge' (Oxman 2004:65) which allows the designer to organise what they know, unfortunately without elaborating on how. The lack of understanding of 'designerly ways of knowing' is clear in Reymen's thesis 'Improving Design Processes through Structured Reflection: A domain-independent Approach' (2001) in which she identifies the phases of design activity and the ill-defined nature of design problems as commonly held domain-independent design knowledge but does not mention 'designerly ways of knowing'. The rational problem solving paradigm which foregrounds the design problem over the designer in structuring design activity may have resulted in a 'designerly way of knowing' being overlooked as a form of domain-independent knowledge.

Originally Cross (1982) held that designerly ways of knowing involved 'the manipulation of the non-verbal codes in the material culture' and that while unique codes operated in all designer fields there existed a 'deep structure' to design codes which went beyond individual design domains (Cross 1982:224). A designerly way of knowing is therefore based on 'forms of knowledge' that underline the domain-independent 'awareness and ability of a designer' (Cross 2000:97). Cross originally identified five aspects of a designerly way of knowing (Cross 1982:224):

- 1. designers tackle ill-defined problems
- 2. their mode of problem solving is 'solution focused'
- 3. their mode of thinking is constructive
- 4. their use of 'codes' that translate abstract requirements into concrete objects
- 5. their use of these codes to both read and write in object language.

There is an obvious correlation between these aspects and his later model of the four characteristics of expert design behaviour (Cross 1994:41):

- 1. the production of novel, unexpected solution concepts
- 2. the ability to tolerate uncertainty, working with incomplete information
- 3. the use of imagination and constructive thought
- 4. the use of drawings and other modeling media as a means of problem solving.

By matching the criteria it appears that the ability to work with underlying codes, to 'translate abstract requirements into concrete objects' (Cross 1982:224) corresponds with the expert designer's 'ability to tolerate uncertainty, working with incomplete information' (Cross 1994:41). In effect, a tolerance for ambiguity enables the designer to harness underlying codes or enculturated knowledge. If a tolerance for ambiguity is a means by which designers generate and maintain multiple perspectives of design situations then the relationship between enculturated or social knowledge and the shift in perspective made possible by multiple perspectives is central to reflection-in-action.

Schön believed designers generated successful frames from a shift in perception when they moved beyond the 'usual range of descriptive categories' (Schön 1985:27). This is possible because all understanding is concept based and 'while a given situation can be conceived in a variety of ways it is always a concept-structured situation' (Schön 1967:8). Descriptive categories, situational concepts and underlying codes all represent socially generated understandings which bare a strong correspondence to the 'discourses' which underpin design situations within Dorst's (2006) recent framework of 'design paradoxes'. The emerging theory of 'design paradoxes' offers a deeper understanding of the socially situated nature of design activity. Analysis of Schön's theory of the 'reflective conversation' most often focuses on the nature of *reflection*. In order to locate the 'missing' designer (Dorst & Reymen 2004) within design activity it is necessary to focus on the nature of the *conversation* or the dialogue between the designer and the situation in which the design activity is co-constituted.

Design paradoxes

While the study of design as a situated activity focuses on the designer and their environment as an 'integrated system' (Craig 2000:30), the situational nature of design activity is often discussed resulting in *additional* conditions to those impose a priori (Gero 2000). In this way situational studies can still marginalise the role of personal

knowledge within design, to the extent that they can justify using protocol experiments for situational studies (Chui 2003). The idea that situational aspects influence designers is commonly accepted. It is the *extent* to which designers design or reinterpret the situation which Dorst (2006) has highlighted and which is so critical to a re-reading of Schön's theory of reflection-in-action.

Dorst initially suggested design theory needed to examine this relationship due to the fundamental use of the designer's perspective of the design situation in design decisionmaking (Dorst and Dijkhuis 1995:264). In his recent paper 'Design problems and design paradoxes' Dorst (2006) holds that design problems are both evolving and unknowable as a fixed representation within the designer's mind at any given time and are repeatedly subject to the designer's 'subjective interpretation'. Designers therefore approach an amalgamation of smaller sub-problems or local problems within a *global* or abstract problem that Dorst (2006) identifies as a 'local network of links'. This idea of a local network of links corresponds with Simon's concept of a well-structured 'effective problem space' within a global 'ill-structured problem' (Simon 1973) and to Schön's web-of-moves which also includes both local and global experiments. Both Schön's 'web' and Dorst's 'network' are based on subjective interpretation by the designer which Dorst describes as the 'the linking behaviour of designers'.

Dorst's framework of 'design paradoxes', as a way of understanding the 'linking behaviour of designers', results from the dominance of the expression *design problem* within the lexicon of design theory. As design problems are 'unknowable' understanding design activity necessitates referring to the *nature* of a term, not the term itself. Dorst holds that design problems are paradoxical situations:

A paradox, a real opposition of views, standpoints, or requirements, thus requires a redefinition of the problematic situation in order to create a solution...The creation of solutions to a paradoxical design situation often requires the development and creative redefinition of that situation (Dorst 2006:14).

Design paradoxes are based on 'elementary statements' or commonly understood 'discourses' which represent the aspects of the design situation including everything from ergonomics to stakeholders.

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Innovative design activity involves designers establishing an alternative perspective to the normative thinking 'embodied' in these 'discourses' by employing their past experience in similar paradoxical situations and a 'strong intuitive element', so that 'the paradoxical problem situation works as both a trigger to creative imagination and as a context for the evaluation of the design' (Dorst 2006).

Dorst's theory of 'design paradoxes' suggests a new reading of Schön's theory of reflection-in-action is necessary because of the embedded similarities. Dorst's design paradoxes and Schön's reflective conversation are both dependent on the designer's subjective interpretations or judgments using enculturated knowledge in order to resolve ambiguous social situations. Dorst reinforces the nexus between a 'break down' in design activity and the designer 'stepping-out' of normative understandings. This mirrors Schön's emphasis on moments of surprise triggering reflection and shifting the designer's perspective.

Both Dorst and Schön emphasis the role of personal knowledge in generating altered perspective. Although Dorst discusses the vital role of intuition where Schön discusses professional artistry it could be argued they are both acknowledging the role of personal knowledge in creating the tolerance for ambiguity necessary to facilitate altered perception. The emphasis Dorst and Schön place on the role of subjective interpretation within socially situated design activity means that the personal knowledge the designer brings to the design conversation requires a greater level of acknowledgment and understanding.

ORGANISING PRINCIPLES

While problem solving models understand the role of the designer through the design strategies they employ, they also embody a prior intellectual determination of goals and actions. The use of subjective interpretation within socially situated design activity suggests a more constructive way of understanding a designerly way of knowing can be found in 'organising principles' (Rowe 1987). The expression 'organising principles' is one of many located in design literature across multiple domains used to describe the structuring activity of designers. Rowe's term 'organising principles' is used throughout this thesis because Rowe explicitly linked them with the conversational nature of design activity:

We might say the organising principles involved in each episode take on a life of their own, as the designer becomes absorbed, in exploring the possibilities that they promise. Here a 'dialogue' between the designer and the situation is evident (Rowe 1987:35 quoting Schön 1983).

Within design literature the following expressions all approximate the concept of 'organising principles':

- primary generators (Darke 1979)
- general principles (Mallin interpreting Merlau-Ponty 1979)
- frames (Schön 1983)
- an 'interpretation' (Goldschmidt 1988)
- a 'guiding reference mark' (Architect Mario Botta quoted in Goldschmidt 1988)
- solution conjectures (Cross, Christiaans & Dorst 1994).
- concept (Lawson 1994)
- placements (Buchanan 1995)
- key concepts (Cross 1998)
- design propositions (Downton 2000)
- repertoire of tricks (Lawson 2001)
- design gambits (Lawson 2004:448)
- early representations (Restrepo & Christiaans 2004)
- problem representations (Mumford 2004)
- leading ideas (Goldschmidt 2004)
- leading concepts (Goldschmidt 2004).

Not only do these terms all express similar ideas pertaining to the purpose of 'organising principles', they all relate them to the use of personal knowledge and therefore represent one of the few areas within design discourse which explicitly discusses the objective use of subjective knowledge within design activity. Unfortunately, there is very little detailed analysis of how 'organising principles' are actually generated.

Organising principles unlike strategies are developed in the midst of action, enabling the designer to commence design activity in a guided way. In the absence of sufficient domain information, they provide 'a means to analyse and structure the design situation'

(Darke 1979:37). They are generated early in the design episode (but can be employed at any time) and help determine later activity including information accessing and processing (Rowe 1987:37). Although usually discussed in terms of problem structuring they may be either solution or problem focused (Restrepo & Christiaans 2004:4). They do not prescribe solutions but profoundly influence them by establishing the focus of the design activity (Rowe 1987:35). As an opening gambit organising principles focus the inquiry while allowing for experimentation and the positioning and repositioning of the design situation.

Despite being evident in the design activity of both expert and novice designers (Cross et al 1994:56), organising principles have been largely ignored because as Lawson notes 'they do not necessarily appear logically out of some objective analysis of the design problem' (Lawson 2001:12). In the absence of 'relevant information' in the initial phases of design activity, they draw on the personal experience, which may or may not be domain experience, and are therefore perceived as highly personal (Buchanan 1992:13).

Because of the use of personal knowledge in the genesis of organising principles the role of the designer in their genesis is viewed as mysterious (and often mystified) (Dorst & Cross 2001:1). Their genesis is discussed in unhelpful terms, such as, expert insight (Teixeira 2000), sudden insight (Restrepo 2004), intuition and imagination (Cross 1994, Dorst 2006), and design intuition (Teixeira 2000). Intuition is seen as the basis of a creative accident (Buchanan 1992:13), a creative leap or creative event (Dorst & Cross 2001:1), a creative spark (Goldschmidt 2004), or a creative act of invention (Roozenburg 2006:35). In order to understand the agency of the designer it is essential to move beyond descriptors of organising principles that imply an arbitrary, unsystematic approach to their genesis based on abstract notions of creativity or personality traits. Despite this common view organising principles have been described as the 'necessary rationality for designing' (Cross 1994:40), and as an 'ordered systematic approach to the invention of possibilities' (Buchanan 1995:13), suggesting the generation and application of organising principles involves the structured and motivated use of personal knowledge.

While it is acknowledged that organising principles connect new and extant knowledge (Restrepo 2004) how they do this and their role in innovative thinking is less well understood. The use of personal knowledge within organising principles may be vital to their primary function which is not only to frame the design situation but to enable a shift in perception by the designer. Lawson noted organising principles can *change* between

design episodes and *within* a design episode. This 'adaptability' is essential in enabling the 'conceptual repositioning' or shift in perception, which is fundamental for innovative design thinking (Buchanan 1992:13). The adaptability of organising principles is the basis on which designers reformulate design situations using their *personal* experience and biases. Organising principles are adaptable because they are based on personal and social knowledge. Designers can only re-interpret design situations because their personal experience *and* the situation are both enculturated and are therefore 'malleable' or 'negotiable' (Restrepo and Christiaans 2004). As such, 'organising principles' are attributes of socially situated design activity.

While we know why designers employ organising principles and the type of knowledge they employ, there is very little understanding of how they are generated. In order to understand the agency of the designer it is essential to understand how designers generate organising principles in a ordered and systematic way. The re-reading of Schön's framework of reflection-in-action within this thesis is focused on problem setting as the structured and motivated use of subjective or personal knowledge in the generation and application of organising principles.

Informal and unorthodox knowledge in organising principles

Organising principles are largely based on 'experiential' knowledge and 'memory' (Lawson 2001). The activity of generating organising principles accesses experiential knowledge spontaneously, 'on-the-spot' (Schön 1983) or 'dynamically' (Restrepo 2004), without prior intellectual activity. The process of triggering memory rather than validating prior intellectual analysis during idea generation is seen as 'opportunistic, rather than structured and motivated' (Restrepo 2004:16). In his paper 'Schemata, gambits and precedent: some factors in design expertise', Lawson (2004) identified the use of informal or unorthodox knowledge (episodic memory) in innovative design situations as expert behaviour but acknowledged this was not well understood within design research:

The argument here is that recognising design situations is one of those key skills. Seeing some kind of underlying pattern or theme that enables a designer to recognise this and make a connection with some precedent in the episodic memory. Remarkably that episodic memory may relate to something from an entirely different context. Quite how we make such connections is surely a question that suggests much more research is needed (Lawson 2004:454).

While the use of personal knowledge, 'episodic memory' and biases is referred to in association with organising principles, it is poorly articulated and often appears to represent a personalised subset of domain knowledge rather than *private* personal knowledge. The closest design discourse appears to come to recognising non-domain knowledge is the acknowledgement that designers use information regarding unrelated products and design domains as inspiration for their designs (Restrepo 2004). It needs to be clarified that the personal knowledge employed in the generation of organising principles is often informal and unorthodox knowledge, based on personal experience, values and beliefs, as opposed to formal knowledge from different design domains or other disciplines. In her paper 'Interpretation: its role in Architectural designing' (1988), Goldschmidt tacitly acknowledges the use of informal or unorthodox knowledge in organising principles stating that when a designer uses 'input completely extraneous to the definition' of the problem they create an interpretation based on a 'a design modifier'. Goldschmidt does not explain what a 'design modifier' is or how it influences the generation of an interpretation.

The only descriptive model of the design which foregrounds the role of informal and unorthodox knowledge is Schön's theory of 'reflective practice as conversation with the situation' in which 'frames' assume the role of organising principles. Although rarely acknowledged, his radical departure from the rational problem solving paradigm may best be understood by the legitimisation of informal and unorthodox knowledge, articulated shortly after his death by Sanyal at a memorial session of the *Conference of the Association of Collegiate Schools of Planning* (1997):

In drawing our attention to the power of theories-in-use and, conversely, the powerlessness of espoused theories, Don legitimised 'informal knowledge' which is usually dismissed in formal professional discourse as anecdotal evidence, impressionistic views, intuitive understanding, or simply gossip. Don demonstrated that more than often effective practice is based on informal and unorthodox knowledge; and that knowledge is conveyed through stories, metaphors, and other 'non-scientific' methods, which lack professional legitimacy. The power and usefulness of informal knowledge, Don argued, is its holistic form; unlike formal knowledge generated by reviews of statistically significant samples of desegregated indicators, informal knowledge attempts to capture the essence of 'the whole' which is crucial for effective action.

This approach to epistemology led Don to argue that individuals, however uneducated in formal methodology, are capable of taking action and, in fact do take effective action when they acknowledge the validity of their own knowledge and learn from their own action through reflection-in-action (Sanyal 1997).

Informal and unorthodox knowledge (including appreciative knowledge) can be employed successfully in the construction and use of organising principles because of the difference between know-how and know-that. In particular, organising principles can produce appropriate rather than personalised or arbitrary solutions because of the structuring role of know-how. Goldschmidt believes that the designer's frame or 'interpretation' is the 'single most important force in the shaping of design solutions' (Goldschmidt 1988:235) not because an interpretation directly determines the solution but because it guides all subsequent design activity by structuring disparate information. Goldschmidt saw the designers 'interpretation' of the design situation as a 'personalised programme' that transforms a critical reading of the situation from 'pieces into a stable structure by achieving a unique relationship with them' (Goldschmidt 1988:235). The introduction of 'the designer's own input' (Goldschmidt 1988:235) is essential to the formation of these structuring relationships, which are akin to organising principles. The use of organising principles as a designerly way of knowing represents a form of procedural knowledge or know-how equivalent to Dorst's concept of the linking behaviour of designers.

The difference between know-how and know-that

Design knowledge encompasses more than formal domain knowledge. The range of knowledge for required for design can be understood by clarifying the difference between declarative and procedural knowledge. 'Declarative knowledge represents cognisance or awareness of some object or event' (Jonassen et al 1993:4). and is referred to as *know*-*that*, or *knowing-that*. It is possible (as is often evident with novice designers) to *know that* without being able to use the knowledge. Significantly, declarative knowledge does not imply understanding (Jonassen et al 1993). Alternatively, procedural knowledge, which is often called *know-how or knowing-how* represents how learners use or apply their declarative knowledge. Learners must 'access and interrelate' relevant schema from declarative knowledge and 'extract the relevant attributes' to apply to the situation they are in. Therefore procedural knowledge is based on *patterns* derived from declarative knowledge (Jonassen et al 1993).

As know-how is based on the 'complex interconnections between ideas' (Jonassen et al 1993:4), organising principles can be seen as frames which established *relationships* within the whole. The type of know-that employed within the genesis of organising principles is less relevant than the know-how they embody. Reflective activity is based on the application of know-how in action (Downton 2000). For this reason know-how rather than know-that is associated with quality within design activity:

....knowing-that is to do with explicit descriptions, to do with rules and procedures. Knowing-that determines competence ... knowing-how is to do with standards of performance that go beyond competence. Knowing-how determines quality (Cross 1981:199).

Organising principles or frames become a filter through which *know that* is processed or a web in which *know-that* is embedded.

Know that and tacit knowledge

This study introduces the notion that organising principles are generated using *know-how*, based on enculturated knowledge. The idea that design knowledge involves more than domain knowledge is supported within Mumford et al's model of 'creative problem structuring':

If we only had domain-specific knowledge, however, people would be incapable of solving novel problems. Extant knowledge must be applied, reshaped, reformed to generate the novel problem solutions that are essential for creative thought (Mumford et al 2004:5).

Cross suggests that *knowing-that*, as conventional wisdom, pertains to rational problem solving, whilst *knowing-how* represents 'designerly ways of knowing' because creating spontaneous responses to design situations involves 'subverting' conventional wisdom (Cross 1981:199). The ability of know-how to subvert conventional or normative wisdom may result from it's tacit nature.

Schön noted that his concept of 'spontaneous knowing-in-action' (Schön 1985:23) which is central to reflection-in-action because it is 'the characteristic mode of ordinary practical knowledge', was linked to Polanyi's concept of 'tacit knowing' (Schön 1983: 54). While In order for reflecting-on-action to be educative it must make implicit moves explicit, Conversely reflection-in-action depends on the tacit nature of know-how to stimulate the shift in perspective necessary for innovative design activity. In his paper *Do we really understand tacit knowledge* Tsoukas (2002) argues that tacit knowledge is not the polar opposite of explicit knowledge but is 'simply it's other side' (Tsoukas 2002:3). It because tacit knowledge is socially generated and transmitted, that it enables the formation of new knowledge:

Tacit knowledge cannot be 'captured', "translated', or 'converted' but only displayed and manifested, in what we do new knowledge comes about not when the tacit becomes explicit, but when our skilled performance is punctuated in new ways through social interaction. (Tsoukas 2002:1)

Tsoukas holds that 'personal judgment is involved whenever abstract representations encounter the world of experience' (Tsoukas 2002:4). Tsoukas suggest that personal judgment manifests itself in Polanyi's (1968:148) concept that the things of the situation are 'interiorized' by 'indwelling' in the situation. Indwelling amplifies our understanding because it 'reminds' the indweller of what has been previously unseen due to familiarity and enables the indweller to see all the elements of the situation as interrelated rather than separate or dislocated phenomena. In the process some detail of the specific is lost in order to have a new perspective of the whole:

"... for Polanyi, the shrinking consciousness of certain things is, in the context of action, necessarily connected with the expansion of consciousness of other things. (Tsoukas 2002:9)

Know-how as tacit knowledge is vital in the generation of organising principles or frames because as 'cultural knowledge' it enables the 'expansion of consciousness' (Tsoukas 2002:9) or a shift in perspective which is not possible in the same way, once knowledge is explicit. The role of tactic knowledge in generating innovative organising principles or frames is evidenced in Schön's belief that surprise only results from the designer's immersion within the situation and emphasis Buchanan places on the role of enculturated knowledge in the generation of organising principles.

This analysis of organising principles reveals a determination within design literature to establish the role of the designer beyond vague terms associated with creativity or intuition. In the process of constructing frames or organising principles, designers take data from informal or unorthodox sources, employ them as 'legitimate' information and often warehouse the informational relationship formed for future use, thereby converting it to design knowledge, a process Schön called an 'exemplar' (Schön & Wiggens 1992). As this process initially depends upon informal and unorthodox knowledge it represents a form of domain-independent design knowledge.

Organising principles as domain-independent design knowledge

Our understanding of the organising principles as *knowing-how* helps explain their existence in a wide range of design domains including engineering, architecture and industrial design. Unlike other domain-independent phenomena in design theory, such as design phases and the ill-defined nature of design problems, organising principles offer us an understanding of domain-independent design activity or knowledge. Buchanan has identified that organising principles may be a vital tool for positioning a multi-disciplinary understanding of design activity:

By creating a 'principle of relevance' for knowledge, organising principles enable the designer to 'filter' knowledge and disciplines without the process being subsumed by a single discipline (Buchanan 1992:18).

Buchanan makes a significant point which is often misunderstood. Organising principles are not predetermined but act as filters for knowledge and are therefore unique within each situation. Design as an 'information rich' field requires designers to have the ability to filter information from diverse sources. Relevance is established through testing or a move experiment (usually in the form of a design simulation) and qualitative judgments:

In designing, judgment about the degree of success of a proposal must be made. Significant answers in design are infrequently right or wrong; typically they are judged good or bad, better or worse. Judgment is made in light of knowledge; making a judgment employs knowledge. A judgment in this sense contains knowledge or points to the knowledge adduced in making it (Downton 2000:51).

It is clear from the discussion of organising principles that information is considered relevant it if stimulates the development of an organising principle and supports the relationships generated by the organising principle. Any model of socially situated design activity therefore needs to address the role of qualitative judgments in evaluation and establishing relevance, and the use of personal knowledge as *design knowledge*. Schön's theory of design as a reflective conversation is the only model currently available which addresses qualitative judgments in evaluation. In the next section this thesis explores recent shifts in understanding design activity which help focus on the role of the designer.

Philosophy and practice

Schön's theory of reflective practice represents a challenge to the framework of design activity as principally a rational problem solving process. His theory of design activity as a 'reflective conversation with the materials of the situation' concentrated on the 'artistry' of the practitioner, redefining what has traditionally been perceived as intuition. In suggesting the designer determines design activity by fitting the situation to a frame (not the frame to the situation), Schön fore grounded the role of the designer over the design problem. As such Schön's theory is a deliberate attempt to address perceived areas of subjectivity within design and sometimes appears ambiguous or 'weak and fuzzy' (Roozenburg & Dorst 1998) as a result. Certainly the detail of Schön's theory needs to be extracted from his writing as opposed to being immediately recognisable in its entirety. This section locates this *dispersed* detail and offers a comprehensive re-reading of Schön's theory focused on the agency of the designer.

Schön's ability to see professional artistry as the generation of knowledge in action, stems from his philosophical background. To understand his epistemology of reflective practice it is essential to understand how it developed. During the last 50 years Schön has been an influential and prolific contributor to a number of intersecting but divergent fields. During this period he wrote on philosophy, pedagogy, the impact of technological change, social policy, technical innovation, professional practice and organisational learning. To this writing he brought his professional experience as an industrial and organisational consultant to industry and government, and his extensive experience as an academic.

Schön's broad focus, stems from his ability to apply philosophical reasoning to practice. His doctoral dissertation in philosophy (1955), which investigated John Dewey's 'Notion of Inquiry', began his exploration into 'discovery' and innovation in professional practice. His first work the 'Displacement of Concepts' (1963) later published as 'Invention and Evolution of Ideas' (1967) was an attempt to reconcile his philosophical investigations into 'theories of discovery, theories of mind, theories of deciding and theories of social process' and his professional shift from studying and teaching philosophy to working in technological innovation and design (Schön 1967:ix). This work represents a significant exploration of the role of concept development in discovery and innovation and is the foundation of his theory of reflective practice.

In an aligned field of study to 'discovery' and 'innovation', Schön examined the inherent social instability resulting from rapid technological change and its effect on social processes and policy construction (Schön 1967, 1973). These interests merged in 'Generative metaphor: a perspective on problem solving in social policy' (Schön 1979) in which he extended his work on displaced concepts and developed his theory of the 'generative metaphor' or 'frame' as a model for innovative action within professional practice.

In response to what Schön perceived as a crisis of relevance within all professions in the 1980s, he investigated professional practice and the education of professionals by examining the work of a small group of practitioners and students. His interest was in establishing exactly what was involved in 'the artistry of professional practice', how innovative ideas were generated and resolved, and how this knowledge was passed from expert to novice. His resulting theories were published in the now 'canonical' text (Smith 2004:11), *The reflective practitioner: how design professionals think in action* (1983).

Schön's investigation into the crisis of professional practice and tertiary education focused, to a large extent, on the normative dichotomy between research and practice. Schön believed this dichotomy to be the cause of the 'dilemma of rigour versus relevance' in which professionals struggle with the perceived lack of rigour within practice and with the perceived lack of relevance of theory to practice. Schön's theory was an attempt to show how theory and practice could work together and how reflection-in-action or artistry *mediates* the use of theoretical knowledge (Schön 1985:92). Rather than dismissing formal knowledge or rational problem solving skills Schön's theory is an attempt to legitimise the use of informal knowledge when rational problem solving cannot be implemented, to perceive the practitioner's 'artistry as an exercise of intelligence, a kind of knowing, though different in crucial respects from our standard model of professional knowledge' (Schön 1986:13).

Simon and Dewey both used the design profession as a model for all professional practice. Schön however argued that design studio practicum represented the ideal forum for educating *all* professional practitioners, not just architects and designers, and more significantly that there is both 'internal and academic rigour' within this process that could offer an alternative to technically rationalist notion of academic rigour (Schön 1984, 1987). He argued that while reflection-in-action employs subjective knowledge and

practices, it is an essentially objective process when it maintains internal consistency through 'fidelity' to previous and future moves and the designer's appreciative system.

Schön's belief in design education as a model for all professional education may be debatable but his descriptive model reflective practice based on 'professional artistry' (Schön 1983:VII) represents an effective alternative to rationalist understandings of normative design knowledge. This thesis focuses on the actual terminology (and underlying concepts) Schön used to explain professional artistry as an essential and 'learnable' (Schön 1983:VII) phenomenon of design activity. It does not look at reflective practice as a model for other professional education, its application to social policy, or within education generally.

Constructivist philosophy - foregrounding the designer

Schön readily acknowledges that his theory rests heavily on the shoulders of his philosophical forebears, most notably John Dewey, Ludwig Wittgenstein, Lev Vygotsky, and Michael Polanyi. A recurrent theme within Schön's inquiry is an underlying interest and understanding of the role of uncertainty and ambiguity within design activity. Bamberger, a long-time colleague calls this his 'abiding and persistent belief in the permanence of change' and his 'quest for understanding the generativeness in change' (Bamberger 2000). Schön acknowledged his engagement with the nature of uncertainty in design activity emanated from the 'revolt ... against epistemological individualism and the quest for certainty' (Schön 1992b:121) at the centre of Dewey's theory of inquiry.

Schön also acknowledged that much of his terminology is consciously appropriated from Dewey's vocabulary in order to construct a language aligned with his understanding of the generative role of ambiguity within concept generation (Schön 1967:20). Schön's theory of 'reflection-in-action' is an extension of Dewey's 'Theory of Inquiry' merged with a constructivist understanding of knowledge generation, both in terms of theory and language. This bridging of pragmatist and constructivist philosophies was first acknowledged in 'The Displacement of Concepts' (1967:6). Later the work of Vygotsky and Wittgenstein would become essential to strengthen the weaknesses he perceived in Dewey's theory, namely clarifying the differences and similarities between the methods of 'natural sciences' and 'commonsense' thinking and the potential 'types of rigour' appropriate to each, and the 'ontological' differences in our ways of seeing situations and constructing them as problematic or not (Schön 1992:123). To understand the practice of

reflection-in-action it is instructive to understand what Schön takes from his philosophical forebears and where he extends their theory.

Reflection-in-action and reflection-on-action

Schön's principal departure from Dewey's theory results from his constructionist view of knowledge generation and how it determines the nature of reflection-in-action. Schön acknowledges constructivist philosophers Lev Vygotsky, Jean Paiget, and Nelson Goodman. The belief that one constructs knowledge rather than passively receiving it and learns by doing is key to Schön's notion of reflection-in-action. Dewey's theory of inquiry was based on reflection, but he believed reflection took place *following* action not *within* action. Significantly, Schön advocated that reflection takes place in the 'action-present' (Schön 1985:25,1995:30) and that knowledge is generated as one reflects 'on-the-spot' (Schön 1983:308, Schön 1987:3). Where a design project lasts for weeks or months, reflection can happen in the slowed down time between physical design activity or as Schön says '...fast-moving episodes are punctuated by intervals which provide opportunities for reflection on reflection-in-action' or what is commonly known as reflection-on-action which mirrors Dewey's concept of post-action reflection.

Reflection-on-action makes explicit what has been implicit as 'spontaneous knowing-inaction' (Schön 1985:23). Because reflection-in-action is action based, it is associated with knowledge generation not simply knowledge assimilation as with rational problem solving. These two forms of reflection often appear to be blended together or confused with a kind of design meditation, an example being reflection defined as 'introspective contemplation' (Reymen 2002:1). Schön clearly distinguished the two types of reflection not only by their timing but by the type of intellectual activity and therefore knowledge employed:

Reflection-in-action need not be an intellectual or verbalised activity ... Reflection on Reflection-in-action is an intellectual business, and it DOES require verbalisation and symbolisation. (Schön 1987:4)

Because reflection-on-action is about assimilating discoveries generated by reflection-inaction both in terms of outcome and method, 'it is central to the work of criticism, coaching, learning, and teaching' (Schön 1992b:126). While reflection-in-action is about *doing*, reflection-on-action about thinking about previous doing and is therefore 'profoundly educative in intent' (Bamberger 1991:8). As a result, reflection-in-action is vastly under-represented within design research compared to reflection-on-action. Schön attributed the lack of dedicated research into reflection-in-action it's nature as an 'ephemeral action of inquiry', in that once the problem setting is finalised or the design need solved, the activity of reflection-in-action unless specifically addressed 'disappears' (Schön 1992b). In order to understand the central role of the designer's appreciative system this thesis specifically examines reflection-in-action.

Concept based situations

At the heart of Schön's theory is Dewey's theory of the legitimacy of 'thought entwined with action' (Schön 1995:30) and the concept of the 'transactional open-ended indeterminate situation' as opposed to a bounded or fixed problem. Schön believed that inquiry was 'knowledge-in-action' similar to commonsense know-how. Designers precede as normal until the flow of knowing-in-action is interrupted by surprise or uncertainty. Dewey argued that 'doubt' resulted not from the inquirer but from the situation. Once resolved, doubt creates a new round of doubt necessitating further inquiry based on new 'problems' (Dewey 1938:106), so that 'there is no such thing as a final settlement' (Schön 1992b quoting Dewey 1938:8). The notion that inquiry is 'transactional, open-ended, and inherently social' (Schön 1992b) became the basis of Schön's theory of design activity as a 'reflective conversation with the situation' (Schön 1955:125). Designers are not only actively engaged in resolving design situations but in 'creating and defining' them (Schön 1992a:4).

Schön observed that even where a design problem is clearly given expert practitioners will re-frame the design situation (Schön 1983:129). This is only possible because not only are design situations indeterminate, they are concept driven and therefore open to interpretation:

There are no things without concepts. It is only by a process of abstraction that we distinguish between concept-tools and the situations in which they are used. While a given situation can be conceived in a variety of ways it is always *a concept-structured situation* (Schön 1967:8).

The designer never approaches the situation as a problem but as a concept definition, or concept generation exercise in the broadest sense. Schön holds that well before the designer accumulates any information about a situation they design *their* approach to it.

The designer actively generates 'prior to what are usually considered design inputs, a personal design world' (Schön 1992b:131). It is the designer's 'personal design world' not the a priori problem space that determines the role of information within the design episode:

The practitioner selects things for attention and organises them, guided by an appreciation of the situation that gives coherence and sets a direction for action. So problem setting is an ontological process ... a form of world making (Schön 1987:5)

Design situations are structured around socially situated concepts and can therefore be restructured. Restructuring involves 'testing and modifying' (Schwandt 1994:125), or in Schön's terminology a 'move' involves an experiment (an evaluation) 'enacted on knowledge pertaining to the task' (Goldschmidt 1998:235). Designers do not clarify poorly defined problem criteria but re-conceptualise the situation through interpretation.

Schön named the ability to develop new concepts on the basis of existing ones 'seeingas', based on Wittgenstein's theories of 'seeing' and 'seeing-as' in 'Philosophical Interpretations' (Wittgenstein 1953). Wittgenstein's theory of 'seeing' offered Schön a model which rejected the positivist notion that all concepts are based on an a priori proposition that must be verified in order to be meaningful. In his essay 'Wittgenstein on Seeing', Denneson (1999) suggests Wittgenstein's notion of 'seeing' and 'seeing-as' rests on the idea that seeing is not a physical process which is then interpreted but that *interpretation* is the action of seeing (Denneson 1999:2).

Schön also acknowledges Wittgenstein's notion of 'theory laden concepts' and 'family resemblance' (Schön 1967, 1992b) as the basis of generative metaphors and frames. Schön held that if a concept is based on 'multiple concepts' (Schön 1967:9) then it can be the basis of a new concept or idea. If a concept does not have to be identical to another concept in order to relate to it, but can simply bear a familial 'resemblance' to other instances, then it is possible for one concept to *appear similar* to another without being the same. The process of sensing similarity between dissimilar concepts or the 'next instance' of a concept alters the designer's perspective of the original concept (Schön 1967:29).

The ability to affect a shift in perspective by seeing dissimilar concepts as similar is the basis on which a literal metaphor becomes a conceptual or generative metaphor. Problem setting is essentially a process that mirrors the development of generative metaphor. The

key to problem setting is not just seeing concept A as concept B (or overlaying the familiar on the unfamiliar), but for both A and B to be *transformed* in the process, so that the familiar is seen in new ways and the unfamiliar is recognised as something the designer can work with. For this to happen the original concepts cannot be fixed and the designer must be open to experiencing surprise and confusion within a unique design situation. Innovative problem setting depends on a shift in perspective, enabled through sensing similarity between dissimilar concepts, in order to construct generative frames.

RE-READING SCHÖN'S REFLECTION-IN-ACTION

Naming and framing

Reflective practice as a 'conversation' between the designer and the situation involves the designer being immersed in the design situation. Problem setting is a response to 'immersion triggers' (Schön 1979) which generate surprise or uncertainty, which disrupts the normal flow of 'knowing-in-action'. The designer *converses* by fitting the situation to an initial global frame (not the frame to the situation) which is tested and evaluated through local moves contrived to force the design situation to offer up information or 'back-talk' to stimulate further moves. The designer's personalised response to immersion triggers and back-talk represent a form of on-the-spot reflection. Rather than being an information search within a fixed problem space this conversation is based on the uniqueness of both the situation and the contribution of the designer.

Schön summarised problem setting as 'naming and framing', or the process by which designers name the 'things' they will attend to, and frame them using their appreciative system in order to direct design activity (Schön 1983:40):

When a practitioner sets a problem, he chooses what he will treat as the 'things' of the situation. He decides what he will attend to and what he will ignore. He names the objects of his attention and frames them in an appreciative context which sets the direction for action (Schön 1985:16).

In much the same way problem solving has been described as a mechanism of analysis, synthesis and evaluation, reflection-in-action has been described as a mechanism of 'naming - framing - moving - evaluating' (Roozenburg & Dorst 1998). As a model of reflection-in-action this mechanism lacks the subtlety of Schön's theory. In an attempt to compartmentalise the activity of reflection-in-action an understanding of the linking or

networking mechanisms have been lost resulting in a traditional analysis followed by synthesis structure:

In contrast, the model of reflection-in-action captured little of the rationale behind the many naming-actions and moves that were found in the parts of the protocols preceding conceptual design such as gathering and selecting information (Roozenburg 2006:36).

That information processing is inextricably linked with frame generation in reflection-inaction is not evident within the naming-framing model. This means it is unable to illustrate the agency of the designer within design activity and in particular the use of the appreciative system that Schön saw was central to the artistry of framing. Schön described the activity of framing as essentially an 'operation of selectivity and organisation' conducted by the designer (Schön 1994:30). Moves and frames result from information choices initiated and evaluated through the designer's appreciative system. To understand this process it is essential to understand the role of surprise within reflection-in-action.

Critical role of surprise

Schön elevated the concept of know-how from skill to artistry by articulating the role of surprise which shifts knowing-in-action to reflection-in-action. The break in knowing-in-action generated by surprise is essential to the reflective conversation. The acknowledgement of this break is a significant step forward in recognising the agency of the designer within design activity. Knowing-in-action is the knowledge of things we do in the *action present* of practice. *Knowing-in-action* is a smooth flowing process until broken by surprise, or when something within the action does not proceed as expected.

Surprise or doubt triggers a spontaneous on-the-spot moment of reflection in which the uncertainty is addressed and new 'strategies of action' or moves are initiated so that reflection-in-action 'hinges on the experience of surprise' (Schön 1983:56). Without surprise there is no reflection-in-action. Understanding how designers respond to surprise or 'immersion triggers' (Schön 1979) through 'seeing-as' is therefore vital to understanding reflection-in-action. These responses are largely based on what the designer personally brings to the conversation.

The designer: repertoire, appreciative system and stance

Schön as a constructivist believed knowledge is built on extant knowledge but, because design situations are unique, designers cannot rely on their 'store of professional knowledge' alone. Design knowledge is constructed using extant personal knowledge in addition to domain knowledge (Schön 1987:5). Schön describe this as the combination of the designer's repertoire, appreciative system and stance.

A designer's 'repertoire' (Schön 1983:138). is the sum of their domain knowledge, including both declarative and procedural knowledge, ranging from a 'library' of precedents to simulation skills. Schön believed expert designers when confronted with a strong correspondence between situations deliberately *set* them to make them more divergent, in order to stimulate a new reflective conversation. Frames are not rules or solutions but conceptual approaches which can be overplayed onto and transformed within new situations. A designer calls upon a exemplar during the process of 'seeing-as' (Schön 1983). A designer's repertoire represents their formal domain knowledge, and it has been the basis of more research than the appreciative system. Significantly, repertoire knowledge acts as a repository for 'exemplars' including traditional design precedents *and* frames generated using the designer's appreciative system that have been successful for the designer in practice. In this way the designer's appreciative system can seed repertoire knowledge.

The designer's 'appreciative system' (Schön 1983:135) is made up of their cultural, social, economic, and political background, which informs their personal experience, beliefs and value structures. The appreciative system is vital in design activity as it is the 'basis on which we make our positive and negative judgments of phenomena' (Schön & Wiggens 1992:138). Schön believes designers need to identify and clarify their 'likes and dislikes' (Schön 1985:65). or 'appreciations' to harness their appreciative system within problem setting. Appreciations are tacit expressions of judgment which guide the decisions that designers make. Schön considered the designer's appreciations to be vital because 'designing depends on such qualitative judgments' (Schön & Wiggens 1992:138).

The process of *fitting* the situation to a frame, rather than adopting a predetermined frame, is based on qualitative judgments formed by the designer's appreciative system which guides what the designer *attends* to in order to simplify the complexity of the situation. Schön notes Quist, a studio leader, reframes his students work into a 'coherent

organisation of materials from which he can make something he *likes*' (Schön 1985:44). This is not an arbitrary process because while the appreciative system guides which aspects of the situation and situational back-talk to attend to, in order to initiate sensing similarity as the basis of problem setting, it does not invent the situation arbitrarily. Reciprocally the situation enables the designer to access aspects of their appreciative system they may not have recognised as significant (Schön & Wiggens 1992). Critically, because the choice of what to attend to is informed by preferences and *goals* located within the appreciative system, it plays an essential role in motivating design activity.

The designer's 'stance' (Schön 1983:164). is their approach to the design situation at any point during the design episode. As a constructivist, Schön argues that designers take an open responsive stance from which they can recognise situational descriptions as *descriptions* of the situation, rather than as the *reality* of the situation. This frees them up to be able to 'play' with concepts rather than accepting them and to capture the richness of the situation 'without forcing it into existing categories (Schön 1979:280). This ability to play with concepts to stimulate a shift in perspective is essential in generating innovative frames so that the relationship between the designer's appreciative system and their stance is vital within reflection-in-action.

The stance the designer takes toward uncertainty or surprise is a vital part of their artistry. Schön noted that expert designers *allow* themselves to experience surprise (Schön 1983:68) and actively court it. He suggests that '... one must first attend to phenomena in *such a way* as to allow the experience of surprise to occur ...' (Schön 1992b:127). An open stance to surprise (usually expressed as a high tolerance for ambiguity) not only allows the designer to 'play with concepts' but to maintain 'double vision' in the midst of action (Schön 1983:164). The ambiguity induced or sustained by 'double vision' is essential to convert a literal metaphor to a conceptual/generative metaphor (Casakin 2004:3). It may also be vital in giving designers the confidence to employ the informal and unorthodox knowledge guided by their appreciative system in the early phases of design activity which is traditionally seen as too subjective to constitute valid design knowledge.

Professional artistry within problem setting

Schön believes a designer's professional artistry is most evident in the frame experiments they conduct as the mainstay of problem setting. Unlike rational problem solving, problem setting is not about discovering a way to make a problem 'manageable' but is a generative process of constructing 'a new way of setting the problem ... a 'frame experiment' (Schön 1983:63).

A 'frame experiment' is the first step in developing a global frame. It enables the designer to test the phenomena of the situation and establish what the designer will attend to. The results of the initial frame experiment generate further moves which finally generate a frame which is used to set the situation. The designer's ability to shape the situation through global frames and local move experiments is directly linked to their ability to form 'new appreciations' of the situation in response to surprise. Essentially designers use their appreciative system to motivate problem setting which begins when the designer senses a similarity between two dissimilar things. The objective use of personal and social knowledge within problem setting is not only structured and motivated, it accounts for what is generally understood as 'intuition' within design activity. Schön called this 'seeing-as' (Schön 1967) and while rarely acknowledged it may be the single most important aspect of reflection-in-action.

Seeing-as and altered perception

'Seeing-as' (Schön 1983:182) is a process not only of registering information but of constructing meaning. Seeing-as involves the recognition of phenomena as information, the identification of patterns or similarities, and the generation of meaning above and beyond the meaning of individual elements or concepts through a shift in perception (Schön & Wiggins 1992:135):

But the practitioner's moves also produce unintended changes which give the situation new meanings. The situation talks back, the practitioner listens, and as he appreciates what he hears, he reframes the situation once again ... the process spirals through stages of appreciation, action and re-appreciation. The unique and uncertain situation comes to be understood through the attempt to change it, and changed through the attempt to understand it (Schön 1983:132).

Designers introduce themselves to the reflective conversation by making an initial frame experiment in the form of taking a position (which may be completely unrelated to the situation) in order to make 'initial descriptions which guide further investigations' (Schön 1983:182). These initial descriptions trigger the 'phenomena of the metaphor', evoking a sense of the familiar in the unfamiliar. 'Seeing-as' is the process of triggering the metaphor leading one description to being mapped onto another (Schön 1979:259). Well before the basis of this similarity is established, the designer attends to this 'feeling as information' as the beginning of reflection (Schön 1985:26). 'Sensing similarity' is generative when it involves concepts which are usually perceived as dissimilar or from different domains so that 'one thing has the capacity to change everything you know about the second and visa versa' (Schön 1983:84-85). The process of seeing-as becomes a frame when it moves beyond initial description to *altering perception*:

When the two things seen as similar are initially very different from one another, falling into what are usually considered different domains of experience, then seeing-as takes a form that I call 'generative metaphor'. In this form, seeing-as may play a critical role in invention and design ... (Schön 1987:184).

What has traditionally been understood as intuition or imagination can be seen as 'judgments embodied in acts of seeing' or *altered perception* (Schön & Wiggins 1992:137). Interpreting informal and unorthodox information as design knowledge through sensing similarity between different domains is essential for altered perception.

Unlike concepts of idea generation based on imagination or intuition, 'seeing-as' is an action, a form of know-how, or a 'designerly way of knowing' that Schön believed was essentially learnable. As such, seeing-as is a form of domain-independent knowledge:

But the idea of reflection on *seeing-as* suggests a direction of inquiry into processes which tend otherwise to be mystified and dismissed with the terms 'intuition' or 'creativity', and it suggests how these processes might be placed within the framework of reflective conversation with the situation (Schön:1983:187).

All initial qualitative judgments within problem setting derive from the designer's appreciative system. The designer's altered perception of the situation allows for the generation of an initial frame-experiment. Designers use their appreciative knowledge to both *construct* and *evaluate* move experiments.

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Structured design activity

Schön's theory has been criticised because he did not explicitly define a 'good' frame (Roozenburg & Dorst 1998). Because design situations are open-ended by definition, there is no finite frame and a global frame cannot be determined in isolation from local moves. In this way the focus on what constitutes a good frame within reflection-in-action is misleading a good frame is a generative structure not a design solution in itself. Skilled problem setting involves establishing and managing the interconnectivity between multiple perspectives of the design situation not a single absolute reading. Schön called this a 'web-of moves' which corresponds to Goldschmidt's 'chain of moves' (Goldschmidt 1988:236) and Dorst's 'local network of links'. The designer's ability to maintain a web-of-moves directly relates to their ability to manage information and maintain the *double-vision* necessary to experience a generative shift in perspective:

His artistry is evident in his selective management of large amounts of information, his ability to spin out long lines of invention and inference, and his capacity to hold several ways of looking at things at once without disrupting the flow of inquiry' (Schön 1983:130).

A web-of-moves is structured around consequences, implications and anticipation of future moves (Schön 1985:43). A web-of-moves is the structure *through* which the designer establish and evaluate a global frame through interconnected local moves or experiments, and is as vital to problem setting or framing as Schön's concept of 'seeing-as'.

Web-of-moves, fidelity and evaluation

The structured use of the appreciative system relies on fidelity within a web-of-moves. Fidelity ensures that while local moves may be subjective, global frames maintain a 'kind of objectivity' (Schön 1992a:138). Designers frame situations to instigate a positive change in the situation and assess whether a move or frame has been 'positive' through 'fidelity' with their appreciative system and the web-of-moves or local decisions, not an abstract global problem (Schön 1983:135). Evaluation based on the concept of 'fidelity' is a vital but often overlooked aspect of reflection-in-action:

The evaluation of the frame experiment is grounded in the practitioner's appreciative system (Schön 1983:135).

While the appreciative system changes between design episodes due to reflection-onaction the appreciative system is generally stable within the design episode. The designer evaluates the notion of a 'positive' shift against their value and belief system which is at least temporarily stable. The 'constancy of the appreciative system' during a design episode allows frames to change without reducing design activity to a series of 'disconnect episodes' (Schön 1983:272) and for the designer to maintain 'double vision' without 'disrupting the flow of inquiry' (Schön 1983:130). It is the 'sequential structure' of 'seeing-moving-seeing' which involves evaluative fidelity checks that enables the designer to manage complexity (Schön & Wiggins 1992:143).

Evaluating move experiments using the reference system by which they were established seems like a circular and subjective process but Schön argued vigorously that, where a designer maintains fidelity to their appreciative system and the design moves within a design episode, they maintain internal consistency *and* rigour. Designers evaluate their moves 'in terms of desirability' not only against categories drawn from conventional domain knowledge but in terms of their 'conformity to or violation of implications set up by earlier moves in terms of appreciation of the new problems or potentials they have created' (Schön's 1983:101):

Thus he judges a problem-setting by the quality and direction of the reflective conversation to which it leads. This judgment rests, at least in part, on his perception of potentials for coherence and congruence which he can realise through his further enquiry (Schön 1983:135).

Fidelity involves building each step on the discovery of the previous steps taken – hence Schön's notion of the design activity as a web-of-moves with many 'branchings', each of which represents a line of investigation. While each 'branching' is made up of a series of local move experiments that facilitate discovery they are always interconnected within the web bounded by the appreciative system. Because the moves are all interconnected 'each local experiment then alters your framing' (Schön 1983). Each move is a local experiment that contributes to the global experiment of reframing the problem. Moves are interconnected by the relationship between the situational back-talk and the designer's reflection, which lead to 'new appreciations'. This *altered perspective* forms the basis of new 'action strategies' or moves. These action strategies are the evidence of tacit knowing-in-action becoming 'explicit knowledge *for* action' (Schön 1985:25).

As the complexity of branching inhibits 'the problem of discovering and honouring implications' (Schön 1983:99), managing a complex web-of-moves is one of the principle ways Schön differentiated novice and expert designers.

While novices are capable of generating frames, experienced designers are 'expert' at a kind of web navigation. They are able to maintain more complex webs and simplify them more quickly by leaving branchings or avenues of investigation open but unexplored.

Choice points, design nodes, and objectivity

The point at which a designer evaluates a move and decides to explore or abandon a line of inquiry based on fidelity within the web are known as 'choice-points' (Schön 1983:99). Choice points are vital to maintaining a 'kind of objectivity' within the design episode. Schön held that while the designer maintained internal consistency within the web-of-moves and could 'reflect' on or 'become aware' of mistakes, and presumably correct them, they maintained a 'kind of objectivity' (Schön 1992a:138).

The notion of the designer's choices being objective *within* the web-of-moves is significant as these choices do not need external validation. As long as they are faithful to previous moves and the designer's current appreciative system they can be considered objective within the design episode. Although seldom discussed the notion of a web-of-moves and choice points is fundamental to the theory of reflective practice because it not only represents moves taken by the designer, but the designer's anticipation of consequences of moves to be taken in the future (Schön 1985).

Within this web there are additionally significant points at which the designer commits to a course of action or decision. Schön calls these 'design nodes' which have 'binding implications for further moves' (Schön 1983:100). This is an idea which is reinforced by Goldschmidt's concept of 'departure points' as being vital in the generation of an 'interpretation' (Goldschmidt 1988:241). A design node is established when results of a move or experiment are reviewed against the designer's appreciative system and result in a positive 'feeling-clue' (Schön 1967:69). Schön discusses this notion in regard to generative metaphors well before he identifies the role of the appreciative system in producing the 'feeling clues':

Imitations of this kind are usually accompanied by feeling-clues. The metaphor is apt to seem peculiarly satisfying, intriguing, beautiful or simply to have a kind of 'pull' about it. There is often a feeling of increased vitality ... feelings of this kind act as a sign, pulling us along a path of solution, even though the choice of that path cannot be justified at the time (Schön 1967:69)

While often tacit within the design episode feeling-cues are based on a correspondence between the move and the designer's appreciative system and connect the idea of evaluation and internal consistency with the designer's motivation within the design episode. As long as the branch is consistent, the inability of the designer to 'justify' the 'choice of that path' against some external criteria is not significant.

The web-of-moves is clarified and simplified as the designer conducts more specific moves or 'switches to tighter', more controlled experiments to test their frame (Goldschmidt 1988:243) as their stance shifts from a position of open experimentation to commitment. The appreciative system may bring the whole process to an end on the basis of a 'feeling-cue' of satisfaction even when there are other alternatives. A web-of-moves is finalised or becomes 'stable' as a result of a positive 'feeling-clue' or sense of satisfaction (Schön 1967:67) which effectively clarifies the viability of a frame and finalises a web-of-moves even though other 'plausible alternatives' exist (Schön 1983:151).

Motivation, relevance, and altered perspective

Design activity which does not involve prior intellectual activity as evidence through the 'structured and motivated' use of domain knowledge has been labeled 'opportunistic' (Restrepo & Christiaans 2004) and a 'mutation' (Reymen et al 2006). However, the onthe-spot reflection or decisions characteristic of reflection-in-action rely on the structuring and motivational capacity of the appreciative system within a web-of-moves. Designing has been described as a 'path to selfhood' in which the designer modifies the situational circumstances to suit the problem or their 'aspirations' (Downton 2000:53). In effect, design activity is motivated by the designer's appreciative system.

The qualitative judgments used to evaluate moves and frames are evidence of the central role of the appreciative system within design activity. Schön noted that the qualitative judgments the student Petra made in constructing frames were crucial for evaluation and motivation within the design episode:

In the absence of such qualitative judgments, her designing would have no thrust or direction; it would be entirely unmotivated. She would neither be able to set problems nor to tell when she had solved them (Schön & Wiggins 1992:137).

Motivation in reflective practice is not imposed externally by a problem specified goal but is driven internally by self-set personal goals however tacit. The link between motivation, the appreciative system and the structuring function of a web-of-moves is best understood through a model of 'creative problem construction' developed by Mumford et al (2004), which bears striking similarities to Schön's model of reflection-inaction. 'Creative problem construction', as a descriptive model of 'real world creativity' (Mumford et al 2004:9) in many ways parallels, Schön's concept of professional artistry within problem setting. Like Schön, Mumford et al suggest that problem construction is based on experiential knowledge (Mumford et al 2004:11). 'Problem representations' within creative problem construction, are akin to frames, and are activated by 'stimuli' or 'surprising or incongruent cues' (Mumford et al 2004:12) which correspond to Schön's 'immersion triggers'.

Corresponding to Schön's understanding that the designer's knowledge is located within their repertoire, appreciative system and stance, Mumford et al suggest a wide range of 'individual and situational attributes' that contribute to the 'creative act' (Mumford et al 2004:4). They concur that novel design solutions result from 're-forming' domain information by mixing the designer's 'life history' (appreciative system) with their 'associational network' built on extant representations or precedent (repertoire).

Mumford et al argue that constructed 'problem representations' (or frames) are based on personally meaningful 'cues' (or triggers) and that *constructed* problem representations involving 'self-set' learning goals are more successful than those which are commonly *accepted* because they are 'highly personalised' (Mumford et al 2004:24) and enable the designer to 'construct a unique problem where none existed before' (Mumford et al 2004:29). From the initial point of sensing similarity, the designer is motivated and attends to what is *personally meaningful* to them. Designers are motivated to attend to cues, and select and maintain problem representations that correspond with their appreciative systems:

... this motivational component of the problem construction process suggests that people's creative efforts are also more likely to be successful in areas consistent with their own needs, values and interests ... this suggests that people will define and solve creative problems in a manner consistent with their prior life history and in a coherent fashion related to other aspects of their lives (Mumford et al 2004:29).

When evaluating a choice of problem representations designers will adopt 'highly activated representations' rather than extant or commonly accepted ones because they include a personalised goal component or a self-set 'learning goal' (Mumford et al 2004:24). The use of self-set learning goals enhances our understanding of the 'principle of relevance' established by 'organising principles' or frames, as self-set goals establish relevance outside of normative domain knowledge:

... it might be suggested that they seek out and attend to cues that they would not normally view as being relevant to the problem situation (Mumford et al 2004:33).

Self-set goals are based on the personalisation of social knowledge outside of domain knowledge which suggests they may be a vital key to understanding how designers stepout of commonly accepted discourses or descriptive categories in order to establish an altered perspective.

In addition Mumford et al held there were on going motivation effects within the empirical studies. They found that the respondents involved in problem construction applied a lot more time and effort within the design episode than those not involved with problem construction. In addition they found there was a connection between low self-esteem and the self-set goals *derived* from problem construction in which the self-set goals appeared to offset the negative motivational effects of relatively low self-esteem (Mumford et al 2004:19). It is logical that the negative motivational effects of low self-esteem, poor personal confidence or inexperience could negatively impact on a novice designer's ability to tolerate ambiguity. Establishing self-set goals through qualitative judgments within problem setting may support the tolerance for ambiguity necessary to maintain 'double vision' and achieve the altered perspective necessary for innovative design outcomes.

The connection between motivation, self-set learning goals and a tolerance for ambiguity is particularly relevant to understanding and assisting the transition from novice to expert designer. There may be a strong correlation between legitimising the use of the designer's appreciative system within problem setting and developing a tolerance for ambiguity. Despite being an attribute of design expertise, design literature tends to focus on either eliminating uncertainty as opposed to harnessing ambiguity, or the assumption that a tolerance for ambiguity is a skill predominantly derived from experience. Identifying, legitimising and structuring a novice designer's self-set goals may offer a way to build a tolerance for ambiguity within design education.

THE APPRECIATIVE SYSTEM WITHIN DESIGN PEDAGOGY

Hard knowledge and 'doubt'

Tertiary design education has traditionally been focused on the acquisition and application of domain-knowledge. Design expertise is equated with the 'possession of domain-knowledge that can be readily retrieved, applied to specific design problems, and implemented in their solution' (Goldschmidt 2004:3). Design outcomes, resolved in studio, are supposedly 'deducted from the knowledge gathered in the theoretical courses' (Findeli 2001:9). As a result the application of domain knowledge has dominated design activity research focusing on strategic domain knowledge (Popovic 2202, 2004), precedence (Christiaans 1993, Downton 2000, Oxman 1994, Restrepo et al 2004), and case-based reasoning (Chui 2002).

While design education rests on the analysis followed by synthesis structure, Goldschmidt (2004) has noted that there is little evidence to suggest that 'hard' knowledge filtrates into studio classes. A dependence on *knowing-that* or hard knowledge has been linked to an inability to tolerate uncertainty. This can inhibit design activity by substituting an extended information search for generative design activity (such as seeing-as) and by restricting the ability to 'step-out' of normative discourses. The focus on acquiring domain knowledge is as commanding to novice designers as it is to design educators:

They doubt their capacity to solve design problems on the basis that they don't have enough 'hard' know-that but the activity of framing can call on experience from any domain in one's life. (Schön 1979:254)

The designer's repertoire is vital to the design practice but 'hard' domain knowledge may be assimilated more thoroughly and productively once problem setting commences.

New perspectives on design education

The connection between the designer's appreciative system, motivation and tolerance for ambiguity offer new perspectives for design education. Schön (1987) noted that skilled tutors can particularise a design situation for an individual student, while simultaneously defeating the defensiveness or hostility that arises in students because they must begin designing before they know what they need to know (Schön 1987:8).

It can be reasonably assumed that the novice designer's 'defensiveness' represents the inability to tolerate the ambiguity inherent in design situations. While the novice (and many design educators) assume this is ameliorated with 'hard' domain knowledge, the reality is they can never possess all relevant information:

In order to cope with ill-defined problems, the designer has to learn to have the self-confidence to define, redefine and change the problem-as-given in the light of the solution that emerges from his mind and hand. People who seek the certainty of externally structured, well-defined problems will never appreciate the delight of being a designer. (Cross 1982:224)

Not only do contemporary design students face ambiguous design situations they face ambiguity within their learning environments. In her study of learning styles amongst tertiary design students Jenny Toynbee Wilson (2002) found that there is a significant disparity between the dependent learning modes of secondary education and independence required for 'learning by designing' at a tertiary level, to the extent that students preferred learning styles were incompatible with tertiary design teaching strategies (Toynbee Wilson 2002:402). She also noted that the changing criteria for entry into a design degrees contributed to the subsequent lack of visual literacy, and a poor understanding of the professional opportunities resulting from a design degree added to this confusion. Not only do novice designers have to design for unfamiliar situations. 'designing means learning in an unfamiliar way' (Toynbee Wilson 2002:403). Because of these conditions it is essential to address how we facilitate a tolerance for ambiguity, for novice designers, within their design education.

In her paper 'Connecting inquiry, process and community: Student Design Studio Learning' Quinlan (2004) notes that the search for creative solutions within design studio depends on the ability of the student to 'tolerate ambiguity and engage in abductive reasoning' (Quinlan 2004:64). Quinlan suggests that the knowledge needed within design projects should be articulated and strategies should be modeled that the students can employ to 'integrate and construct this knowledge in the project' (Quinlan 2004:70). To some extent the original research question for this thesis was based on trying to establish what these strategies were in order to communicate them. Through the research the focus has moved to modeling a designerly way of knowing which harnesses the appreciative system to structure and motivate socially situated design activity. Similarly Quinlan places a strong emphasis on supporting students' social knowledge and social design activity and states that within the studio programme 'students become more engaged in a

project if they can see relevance' (Quinlan 2004:70). The ability to establish relevance is directly linked to the motivational quality of the appreciative system. Findeli suggests that recognising the socially situated nature of design activity is the first point in establishing relevance.

Findeli (2001) has noted that the most common structure within design education is based on the belief that if the problem is well-defined the solution will follow. Design activity is therefore the 'causal link' between identifying the problem and imagining and describing a solution (Findeli 2001:9). Findeli suggests that a more situated model is one in which the design problem is substituted by state A of the system or situation and the solution is substituted by state B of the system or situation. The socially situated nature of design is based on the fact that the designer, users and stakeholders are all part of the system or the situation (Findeli 2001:9). If a novice designer identifies them self as part of the situation or system they are designing, and the goal, rather than *solving* an abstract problem, is a *positive shift* in that situation, then the novice is more positively positioned to legitimise the use of their own appreciative knowledge and tolerate the ambiguity of the situation. This does not mean that all design briefs must be targeted to the interests of the student cohort as is often assumed. Novice design students need to be able to position themselves within *any* indeterminate design situation as an agent of change.

Particularising demonstration

Quilan has suggested that 'the design tutor has an important role in modelling how disciplinary knowledge is transformed and constructed in real-world contexts' (Quinlan 2004:64). The socially situated nature of design activity in which the tutor and the novice designer are part of the situation necessitates the tutor particularising the design demonstration:

Moreover, he has to be able to describe and demonstrate in ways that are particularised. As Tolstoy said, to the difficulties and possibilities of THIS particular student at this time, to say the things, to discover the things, that will allow THAT student to understand (Schön 1987:8).

There are many ways to misunderstand this concept, not least of which is particularising it around extant domain knowledge. Schön acknowledged the influence of Vygostky (1985) whose concept of the 'zone of proximinal development', in which each student needs to be assisted to get from what they know to what they can potentially know with adult assistance, aids the understanding of Schön's concept of particularisation. Schön stressed that design education represented 'reciprocal reflection' in which the tutor particularised the demonstration of moves and the novice conducted 'reflective imitation' or 'imitative construction' based on the demonstration.

Schön held that novice designers construct their own 'meaning' in the context of reciprocal reflection. Unless a novice designer has experienced the situation before, the novice designer will discover 'gaps' in the instruction that they will have to resolve personally (Schön 1985:67). These *gaps* are deliberately generated within studio teaching to induce a state of ambiguity or uncertainty that mimics real-time design situations:

In order to get to the level of appropriate specificity, for her in this instance, he must say enough of the right sort of thing (right for her sense of problem and for her existing know-how) without trying to say everything (Schön 1985:67).

The role of the tutor is to model 'things to think with' or moves or organising principles for the novice designer. Goldschmidt argued that the concept of an 'interpretation' (or organising principles) is a 'process' not a prescription (Goldschmidt 1988:235). Tutors therefore must explicitly model the process of both the genesis and the application of an organising principle without being prescriptive. Design students do not respond well to abstract instructions. Toynbee Wilson found in her study of learning styles that students found instructions such as to being told to be 'more divergent in approach' or to 'think laterally' (Toynbee Wilson 2002:408) confusing and frustrating. Design students do however respond to being shown how to be divergent or lateral and then testing these moves for themselves. Imitable moves are the basis of Schön's framework of 'reciprocal reflection'.

Reflective imitation is not a process of reproduction but of construction in which the novice designer must decipher the salient qualities of the demonstration or what to attend to in the same way as reflection-in-action:

Imitation involved a process of seeing one thing as another and doing as another person has done, without necessarily being able to say in what respects the two performances are alike. Further, the imitator may transfer what she has made of an observed performance to a new situation, one both similar and different from the first and transform her performance to fit the new situation (Schön 1987:73).

It could now be argued that novice designers negotiate these gaps using self-set goals based on their appreciative systems. Particularisation is the process by which the tutor helps establish and bridge these gaps by encouraging the development and articulation of self-set goals

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Appreciative goals and a tolerance for ambiguity

While a tolerance for ambiguity is a characteristic of the designerly way of knowing exhibited by expert designers, there is evidence within protocol studies and in the following case study that in certain circumstances novice designers can harness ambiguity in association with self-set goals. In their paper 'Design Expertise Amongst Student Designers' (1994) Cross et al, identify a novice designer who alters his perception of design situation involving the design of a train carriage bin, by considering the 'context of the bin'. Cross et al interpret the designer's behaviour as applying 'rules' of 'creative thinking', usually employed by expert designers by deliberately attempting to expand the search space for the design problem. As the novice designer commented that he wanted to introduce 'crazy ideas' into the design episode (Cross et al 1994:56), this may represent a self-set goal which enabled him to step-out of the normative discourses associated with the situation in order to alter his perspective.

The relationship between motivation, self-set learning goals and problem setting is critical in educating a designerly way of knowing which enables the altered perspective essential for innovative design. Mumford et al (2004) hold that self-set learning goals are based on 'life history' and are both articulated by, and derived from, the action of problem structuring. While the expression 'self-set learning goal' implies both prior intellectual activity and target goals Mumford et al (2004) link self-set learning goals with the role of personal knowledge plays in motivating the designer's problem construction and mitigating against low self esteem in ambiguous design situations. Selfset learning goals can be understood as appreciative goals or goals stimulated and bounded by appreciative knowledge. Schön believed that design activity represented the desire to initiate a positive change in the design situation. The qualitative judgments involved in the evaluation of 'positive' are based on appreciative goals. An appreciative goal is the coalescence of preferences into an understanding which inform qualitative judgments. This is similar to the 'awareness' which is the basis of a 'designerly way of knowing' (Cross 2000:97). Appreciative goals are not necessarily predetermined or explicit but resemble a meta-interest, or a personal philosophy. In much the same way that a designer's application of domain knowledge is governed by their 'overarching' theoretical position (Schön 1983:164) appreciative goals govern, or are expressions of, the knowledge located within designer's appreciative system.
Novice designers may be adept at identifying and articulating their preferences, and utilising them to direct what they attend to, based on previous experience or they may need to have this practice *legitimised* and modelled for them. The ability to articulate appreciative goals within problem setting depends on the legitimisation of the informal and unorthodox knowledge associated with the appreciative system. Design education needs to support novice designers to *actively* determine and clarify their 'likes and dislikes' as expressions of their appreciative system (Schön 1985:65). The moves modelled in the particularisation of design demonstration should clarify and structure the use of appreciative goals.

Because appreciative goals influence what the designer attends to they are the basis of seeing-as or sensing similarity. This process is supported by Goldschmidt's (2004) observation of studio critiques in which she identified an *unanticipated* absence of normative domain design knowledge being transmitted by tutors or requested by students. Instead the focus was on the generation of a 'leading concept' or 'viable' socially situated organising principle:

Design instructors are part of the design culture. Their messages to students are not always explicit, but as in the desk critiques we have looked at the tacit message is clear; what the designer wants is the ultimate directive. A leading concept is essential and it should be 'strong' – we do not necessarily bother to check its validity. (Goldschmidt 2004:3)

Appreciative goals are the clearest expression of the designer's appreciative system in action. The use of appreciative goals enhances our understanding of the 'principle of relevance' established by 'organising principles' or frames because they motivate the designer to 'seek out and attend to cues that they would not normally view as being relevant to the problem situation' (Mumford et al 2004:33). Appreciative goals are not prescriptive but responsive to the situation. The relevance or viability of an immersion trigger, or back-talk, is established *through* appreciative goals not *against* abstract notions of validity. Significantly, appreciative goals support the novice designer to learn to tolerate ambiguity in order to experience the altered perspective essential to develop innovative frames and new action strategies. Seeing-as begins by overlaying the familiar with the unfamiliar. Especially for novice designers, appreciative goals represent the *familiar*, through which they can mediate *unfamiliar* formal or domain knowledge. Because appreciative goals are constructed from personal and social knowledge, they are the basis on which organising principles are generated. Organising principles are

adaptable because they are based on negotiable appreciative goals, thereby enabling the designer to step-out of normative discourses but remain connected to the design situations and their appreciative knowledge. Appreciative goals are therefore not an outcome themselves, and are transparent in the final design solutions.

Linking behaviour of designers

Qualitative judgments based on appreciative goals are essential to design activity. They represent the subjective local moves conducted within an objective global frame. Simon, Schön and Dorst all acknowledge that global design outcomes are based on local design moves. The designer's 'linking behaviour' (Dorst 2006) may represent a significant contribution to design pedagogy which focuses on design process or activity as well as outcome. The traditional preferencing of outcome over process within normative design education is challenged within writings on socially situated interdisciplinary design learning. In their paper 'Building the framework for educational change through interdisciplinary design learning: implementing Boyer', Quinlan et al (2005) liken interdisciplinary learning with Schön's model of reflective practice as 'scholarship of discovery' rather than the normative 'scholarship of application' (Quinlan et al 2005:6 quoting Braxton et al 2002), and suggest that reflection is essential for 'dealing with uncertainty' and 'implementing inquiry-based learning' (Quinlan et al 2005:9).

Just as Cross (1982) identified a tolerating ambiguity as key to a 'designerly way of knowing' within design as an 'interdisciplinary disciple', Quinlan et al (2005) acknowledge the central role uncertainty plays in interdisciplinary learning, suggesting key players in the design process must 'accept the challenge of uncertainty in constituting new knowledge and shared understanding of social action'. Quinlan et al touch on the connection between motivation and tolerating ambiguity, because the characteristics interdisciplinary learning generates that develop an 'aptitude for intellectual excitement', are the same as those which generate the ability to manage 'uncertainty'. They hold that interdisciplinary learning is characterized by the ability to 'analyse, synthesise, be agile and creative, solve problems and think meta-cognitively, reflectively and emphatically' (Quinlan et al 2004:6) and suggest that these abilities are used to 'construct understanding' and apply it within context.

In much the same way that problem setting, is domain-independent and situational, Quinlan et al suggest that interdisciplinary learning is *context* rather than *content* focused. The fact that interdisciplinary knowledge is 'mediated by social understandings, cultural backgrounds, lived experiences' (Quinlan et al 2003:3) suggests a strong parallel with appreciative knowledge, appreciative goals and the designer's linking behaviour within socially situated design activity.

Goldschmidt (2002) has suggested tutors take one of two approaches to design studio: either 'similarity based reasoning' or 'rule based reasoning'. The former involves an experienced designer demonstrating *their* approach to design activity and providing examples from their experience, while in the latter the design educator uses rules or design principles. Neither adequately initiates the linking behaviour of design practitioners because in both instances the student's appreciative system is ignored. Schön's concept of design studio as 'reciprocal reflection' theoretically establishes equality between the tutor and novice in a socially situated reflective conversation. However studies suggest reciprocity within studio critiques is rare. Goldschmidt holds that the entire studio system is premised on the idea that students 'absorb knowledge as well as attitudes and values that are transferred though desk critiques (and reviews) into their knowledge structures' (Goldschmidt 2004:6). The net result is that design education is not particularised:

Design instructors rarely try to verify that the student is in a position to understand their comments exactly as they are intended: design critiques ... are often long monologues by instructors with minimal participation of the student in the discussion (Goldschmidt 2002:5).

As studio times are compressed, class sizes increase, and on-line learning becomes important within design education, there is an increasing need to make the *knowing-how* essential to design activity, which has traditionally been assimilated through osmosis, explicit within design education. As Goldschmidt noted in her study of architect desk critiques, 'creativity cannot be taught but knowledge can' (Goldschmidt 2004:3). The structured and motivated use of the appreciative system within problem setting can be imitated and is therefore 'learnable' (Schön 1986:18).

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It represents a designerly way of knowing which is a form of domain-independent design knowledge. The 'linking behaviour of designers' which can be modelled within design education includes:

- generating initial frame experiments
- making 'initial descriptions' of the design situation to generate 'immersion triggers'
- testing for viability against appreciative goals to develop a tolerance for ambiguity
- identifying appreciative goals to motivate and direct 'selection and organisation' activities
- sensing similarity between dissimilar concepts or descriptions
- stepping-out of normative discourses /usual descriptions
- reading a 'feeling cue' as information to shift perspective and generate 'new action strategies'
- structuring activity through evaluation (against moves and appreciative system)
- holding multiple perspectives or double vision within a structured web-of-move
- developing a 'stabilising relationship' between the phenomena of the situation and the moves executed

As in all socially situated design activity this is dependent on the active and equal participation of both the tutor and the student in 'reciprocal reflection' and the clear understanding by both of the central role of the designer's appreciative system within design activity.

Assessing appreciative decision making

Despite the suggestion that there is little (immediate) transfer of 'hard knowledge' from theory subjects to studio activity within design degrees (Goldschmidt 2004) there is a significant lack of pedagogical research regarding what is used during the delay in the transfer of domain knowledge, such as appreciative knowledge. Quinlan et al (2003:3) in their paper 'Characteristics of Excellence in Student Design Projects' note that although 'tacit knowledge' contributes to overall excellence in design activity and is valuable to student learning, students perceive judgments regarding their use of tacit knowledge within academic performance as 'subjective' or perhaps un-assessable. Toynbee Wilson in her study on learning styles also noted the need to minimize students 'claims of subjective judgment based on aesthetic appeal' within assessments in tertiary design education. Toybee Wilson suggested this could happen by making students responsible for the 'usability of their work' (Toynbee Wilson 2002: 409).

There does however need to be some acknowledgment within design education of the skill involved in the qualitative judgments which are the basis of a designerly way of knowing. In order for design students to understand that the assessment of their qualitative judgments is objective, they need to understand what makes these decisions objective and plausible, and how they are being assessed. Focusing on the linking behaviour of designers gives design educators a way to scaffold the structured and motivated use of students appreciative goals, and to assess the use of tacit knowledge whether it is gained though professional experience, as suggested by Quinlan et al, or through personal experience as suggested by Schön.

Findeli holds that 'the epistemological crux of the entire design process is located ... at the moment of decision-making' (Findeli 1994:61). While design is essentially decision making it is differentiated from other forms of decision making because of the way the final decision is 'legitimated' (Findeli 1994:60). Design decisions are not based on truth but whether they are 'more or less appropriate, more or less acceptable' or on their validity. Findeli holds that ethical design decisions are based on and validated through subjective qualitative judgments:

In epistemological terms, ... [scientific reasoning] rest on the postulate of a radical separation between subject and the object of the deliberation while the latter requires the involvement of the subject in its object. The main consequence is that the ethical decision must begin anew for each individual case (there is no universal truth, each case is particular, subjectivity is constitutive and necessary) (Findeli 1994:60).

The linking behaviour of designers is one way to capture this elusive decision making process on which design activity is based.

The focus of this literature review has been to locate the 'missing' designer (Dorst & Reymen 2004) within design activity, through a contemporary re-reading of Schön's theory of reflection-in-action. In exploring the 'professional artistry' Schön constructed framework and vocabulary to describe the most 'subjective' aspects of design activity. The re-reading of Schön's theory within this thesis has augmented this vocabulary and helped elucidate Schön's theoretical framework in association with contemporary theory

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regarding design activity. This framework can be used to strengthen the novice designer's tolerance for ambiguity by legitmising the structured and motivated use of informal and unorthodox knowledge within problem setting, and validating and scaffolding subjective, local qualitative judgments within an objective global frame.

Schön stressed that reflection-in-action was '... not only the exercise of physical skills but acts of recognition and judgment' (Schön 1995:29). The central role of the designer's appreciative system is directly linked to their ability to make valid qualitative judgments that form innovative frames or organising principles, which generate 'new action strategies' that result in ethical and appropriate design outcomes.

CHAPTER 3

METHODOLOGY

One of the critical issues for this thesis was the lack of research that explicitly dealt with a similar focus of inquiry. The design of the study was influenced by establishing the closest paradigm fit between the design theory being investigated and a research paradigm. The overall design of the study is based on constructivist philosophy, with the aim to locate the 'missing designer' (Dorst & Reymen 2004) within socially situated design activity, based on the designer's experience or perception of their design activity:

Critical theorists, constructivists, and participatory/cooperative inquirers take their primary field of interest to be precisely that subjective and inter-subjective social knowledge and active construction and co-creation of such knowledge by human agents that is produced by human consciousness (Lincoln & Guba 2000:167).

The design of the study is constructed around the phenomenological concepts and methods common to qualitative research using an emergent 'modified case study approach' involving analysis by 'constant comparative method' (Maykut & Morehouse 1994:151). The use of phenomenological principles is not uncommon within design research. Hermeneutic phenomenology, for example, has been used by Quinlan et al in examining interdisciplinary design learning within architecture studios (Quinlan et al 2005). Phenomenological methodology was also adopted by Toynbee Wilson (2002) for her study students' experiences of learning within tertiary design education as an alternative to the dominant 'formal' research models focused on causality.

The research for this thesis began with four simultaneous case studies intended to comprise a collective comparative case study. In response to the initial findings a decision was taken to concentrate on one of the four case studies as a single 'instrumental' case study (Stake 2000:437). The shift to a single instrumental case study was possible because of the design of the original study in which each case represented 'a concentrated inquiry into the single case' (Stake 2000:436). The emergent data and the literature review necessitated a deeper level of understanding than that available from a comparative case study in which non-comparative data can be ignored during the data analysis (Stake 2000).

A single instrumental case study is 'examined to provide insight into an issue or to redraw a generalisation' (Stake 2000:437). An instrumental case study is located in a spectrum between an 'intrinsic case study' which is specifically interested in a single person, event, or episode, and a 'collective case study' that offers the ability to 'learn from the case about some class of things' (Stake 2000:437). Due to the current lack of research within this area, the purpose of this case study is to offer pathways toward further research, not to develop generalisable theory. The aim of a single instrumental case study is to offer a rich description and interpretation of a designer's experience of their design activity within the established 'focus of inquiry'. An instrumental case study is not intrinsically about the specific designer. It employs a deep understanding of a designer's experience of design activity as *instrumental* in illustrating the theory being examined. This shift is not perceived as a limitation of the study as it is indicative of the emergent and evolving nature of phenomenological research, in which the data guides the inquiry. The development of the single instrumental case study involving the novice designer 'Halle' is discussed in detail, theoretically and methodologically, within this chapter.

Within a single case study the role of the researcher is not one of distanced objectivity but of an indwelling interpretive 'human-as-instrument' (Maykut & Morehouse 1994). The relationship between the researcher and participant is critical in establishing trust and coconstituting the outcomes of the study. As part of the transparency of the design of this study, the concomitant development of understanding between the researcher and participant is acknowledged, due to the close parallel between this position theoretically and methodologically and the role of the designer within reflection-in-action.

PHENOMENOLOGICAL RESEARCH APPROACH

The aim of this thesis is to generate a deeper level of understanding of novice design activity, specifically the role the designer's appreciative system plays in the qualitative judgments they make, and how they locate and utilise information within the action of design activity especially problem setting. While developing the proposal for this research, it became evident that in order to understand design activity, the focus of the research should be on the experience of the designer, emphasising how the designer generates meaning within design activity. Schön suggested that in order to avoid 'historical revisionism' within design research, the researcher had to look beyond 'repertoire building research' and examine the 'evolution' or 'path of inquiry' taken by the designer to develop a frame and reach an appropriate outcome (Schön 1983:317). Foregrounding the agency of the designer in research examining design activity has been supported within contemporary design literature. Lawson holds that design activity research should explore the designer's 'perception of design situations and in particular how they are recognised and classified' (Lawson 2004:457). Dorst has called for a 'neutral' research methodology, 'independent of the paradigms' to describe design activity in the voice of the designer in order to located the 'missing designer' (Dorst & Reymen 2004) within design research:

We need to find a way to describe the design behaviour at such a detailed level that it allows us to see the structure, the patterns of problem-related behaviour emerge, without being completely problem-specific ... (Dorst 2003:Sec4).

The choice of research approach and methodology for this thesis was clarified by the need to establish as close a paradigm fit as possible between the theoretical focus of the inquiry and available research paradigms. The rational problem solving paradigm as the basis of the rise in protocol analysis within design activity research is at odds with Schön's theory of reflection-in-action because the former is based on positivist principles and the later on constructivist principles. Similarly, qualitative research methods are governed by two dichotomous paradigms namely the positivist paradigm and the alternative phenomenological paradigm:

Positivism and phenomenology are the two overarching perspectives that shape our understanding of research ... Positivism involves objective inquiry based on measurable variables and a provable proposition where phenomenology is focused on 'understanding the meaning events have for persons being studied' (Maykut & Morehouse 1994:3).

Maykut & Morehouse (1994) argue that research questions must be carefully matched to the methods of collecting and analysing data as clarified by the appropriate research paradigm. There are significant philosophical and functional parallels between the alternate paradigms within research methods and design theory. Schön's theory of reflection-in-action bears strong similarities to phenomenology, in the nature of change and how it effects the development of knowledge. Schön's theory of reflection-in-action is based on his belief in the generativeness of change resulting from the unstable state of reality (Schön 1973). Maykut and Morehouse suggest change within positivism is mechanical and can be broken into discrete units which can be assembled one at a time. Change within phenomenology is 'morphogenesis' or organic, so that change is continual and each change effects consequent changes (Maykut & Morehouse 1994:15). This strongly resembles Schön's concept of the 'reflective conversation' and his concept of fidelity based on Dewey's notion of a biological contract. As a result information is organised differently within each paradigm. Where the positivist paradigm views information as hierarchically organised, phenomenology sees information as 'heterarchically' organised or organised within a 'web of meanings' (Maykut & Morehouse 1994:14). This resembles Schön's view that meaning is generated through a web-of-moves. Both Schön's epistemology of reflection-in-action and Maykut & Morehouse's qualitative approach based on phenomenological philosophy are essentially constructivist in nature, and based on the belief that 'the world is co-constituted' (Maykut & Morehouse 1994:11).

Central to the choice of a qualitative study is a focus on discovery. Schön's epistemology of reflection-in-action, as the theory being examined within the thesis, is a descriptive model of how we generate *new* concepts (Bamberger 2000). The positivist paradigm of research is about proof and 'verifying what has been already discovered by other methods' whereas the phenomenological position is 'oriented toward the discovery of salient propositions' (Maykut & Morehouse 1994:13). Discovery dictates the concept of an emergent methodology, and a descriptive and interpretive reporting methodology. In parallel with the principle of problem setting, Bogden and Biklen suggest that most qualitative researchers set aside part of their study to learn what the important questions are (Bogden & Biklen 1998:29). As the aim of this study is to examine the experience of the designer, quantitative analysis was rejected in favour of case study methodology to allow the emerging patterns within the data to inform the outcomes of the research (Maykut & Morehouse 1994:13).

Parallel approaches: 'perspectival' and a 'kind of objectivity'

Central to qualitative research is the desire to understand how people generate meaning within a particular context. Qualitative research often explores tacit knowledge in situations that are specific and unique. In parallel with Schön's concept of a 'kind of objectivity' within reflection-in-action' Maykut & Morehouse suggest that qualitative research is not subjective but 'perspectival' (Maykut & Morehouse 1994:20). From the phenomenological point of view the subjective is synonymous with the agency of the researcher or with the researcher's perspective. A researcher's perspective is the filter

through which they are able to establish patterns in the participant's speech and behaviour. To be subjective is to 'tend to' the subject or subjective aspects of peoples behaviour (Maykut & Morehouse 1994:20, Bogden and Biklen 1998:31). This is akin to the appreciative system guiding what the designer attends to within problem setting. Attending to the 'subject' is indicative of the socially situated nature of both design activity and qualitative research. The phenomenological paradigm suggests that, to understand the generation of meaning within the case, the researcher must become a human-as-instrument by indwelling within the complexity of the participant's reality. Indwelling is closely linked in purpose with the role immersion plays in sensing similar situations and similarities in different situations' (Maykut & Morehouse 1994:31). The process of indwelling as a methodology informs a study of reflection-in-action because the indwelling researcher is reflectively responding to an ill-structured situation (Stake 2000) in much the same way as the designer does in problem setting:

However by immersing oneself in the situation, and by looking for general clues, shapes and forms, the naturalistic inquirer can anticipate what is yet not plainly understood ...through the process of looking at the background, patterns begin to take shape, in Polanyi's language, these things become focal (Maykut & Morehouse 1994:31).

In much the same way that Schön stressed that the problem setting became objective through evaluating moves within a structured web bounded by the appreciative system, Bogden & Biklen suggest qualitative research is objective if the researcher is constantly confronting or testing his or her own prejudices within the data analysis (Bogden & Biklen 1998:42).

Multiple realities

Just as the designer must remain open to the situation's 'back-talk', the qualitative researcher must have a tolerance for ambiguity in order to allow the data to 'speak for itself' so that they can 'recognise and develop late-emerging issues' (Stake 2000:445). Maykut and Morehouse note that a tolerance for ambiguity is not based on suspending judgment but on holding multiple visions of the data in play simultaneously (Maykut & Morehouse 1994:31). Stake suggests that 'a tolerance for ambiguity and the championing of multiple perspectives' is possible because of the ambiguity or ill-structured nature of personal experience (Stake 2000:443), in much that same way that Schön holds that there is a relationship between uncertain design situations and maintaining 'double vision'

(Schön 1983:281). In qualitative research and the design activity the distinction between ambiguity and vagueness is critical. Unlike research located within a positivist paradigm, phenomenological inquiry focuses on the participant's perspective of their experience, so that it is the 'multiple realities rather than a single reality which concern the qualitative researcher' (Bogden and Bilken 1998:38).

DESIGN OF THE STUDY

Qualitative research seeks to establish meaning in the patterns discerned by close examination of peoples 'words, actions and documents' (Maykut & Morehouse 1994:16). The foregrounding of the voice parallels Schön's notion of design activity as a 'reflective conversation'. While there is agreement within design theory that the best paradigm fit for researching reflective design activity is a 'single-case study approach' (Dormer 1998), there is less agreement about what the focus of the inquiry should be. Dormer suggests concentrating on specific 'processes and sequences' within the 'patterns of behaviour' established by the designer in action. Unfortunately, while describing the designer's actions, this focus does not necessarily reveal the basis for the designer's underlying qualitative judgments. The design of this case study is guided by Brian Lawson's experience of interviewing expert designers regarding their design activity. Lawson, like Schön, used case study methodology and was similarly concerned about how expert designers rationalise their design decisions after the event. On the basis of his extensive experience Lawson holds that 'post-hoc rationalisation' can be at 'least partially eliminated' by focusing on the 'general concepts and issues' which emerge across a number of projects rather than examining a single project in detail (Lawson 2001:10).

Focusing on general concepts and issues in examining design activity corresponds with the eight key methodological characteristics of a phenomenological approach to qualitative research identified by Maykut & Morehouse. These criteria parallel those listed by Bogden and Bilken (1998) who suggest that not all need to be addressed equally or at all within a qualitative study as the majority will feature. The description of the design of the study within this thesis is framed by these key methodological characteristics:

- 1. an exploratory and descriptive focus
- 2. an emergent design
- 3. a purposive sample

- 4. data collection in a natural setting
- 5. emphasis on the human-as-instrument
- 6. qualitative methods of data collection
- 7. early and ongoing inductive data analysis
- 8. a case study approach to reporting research outcomes.

An exploratory and descriptive focus

This study is designed to observe a novice designer in the initial problem setting phases of design activity. It is an exploratory study designed to describe 'how' meaning is negotiated not just 'what it is' (Bogden & Biklen 1998:28). As such it makes no attempt to prove a hypothesis such as assessing the creative quality of the outcomes of design episodes (as is common in design protocol experiments) but focuses on the experience of the designer. Due to the lack of research regarding the focus of inquiry within this thesis, the aim of this research is to establish if a re-reading of Schön's theory of reflection-inaction could support a contemporary analysis of design activity and what this analysis could reveal to augment this re-reading. The use of unstructured in-depth interviews enabled the participants to guide the direction of the study within a focused inquiry rather than an a priori hypothesis. The descriptive approach enables the study to remain exploratory to the end, allowing clues to emerge from the data as to significant patterns of meaning even in the writing up of the outcomes. While the outcomes of the case study are not intended to be generalisable in the initial instance they meet the need for a richer, deeper understanding of design activity and offer an essential insight into socially situated design activity.

Emergent design

An emergent study is one in which the 'qualitative researcher plans to use part of the study to learn what the important questions are' (Bogden & Biklen 1998:29). As an emergent study, Halle's case study was guided by a 'focus of inquiry' (Lincoln & Guba 1985) which articulated the 'foreshadowed problems' (Stake 2000:440) expressed within the research questions. While the general focus of the inquiry remained intact throughout the course of the research the specific areas of exploration within the focus of inquiry were established in response to the 'clues' that emerged during the early and ongoing data analysis (Bogden & Biklen 1998:27).

Whilst the focus of the inquiry of this case study was to examine the role of the organising principles and information within problem setting, it became apparent due to the literature review and the data that the early emphasis on 'design strategies' was not an appropriate means to analyse reflection-in-action. Design strategies involve intellectual activity prior to action and are a function of rational problem solving. The emergent data resulting from the first round of in-depth unstructured interviews related to the motivational and structuring quality of the participants personal interests and experience. These emergent findings regarding the role of personal knowledge in design activity directed further iterations of the literature review which illuminated the central role of the designer's appreciative system within reflection-in-action. While the intention of the case study remained the same, the emergent findings revealed a more pertinent way to examine reflective design activity.

As 'it is the very notion of pursuing important or salient early discoveries that under grids qualitative approaches to inquiry' (Maykut & Morehouse 1994:46) the need for closer examination of the designer's use of their appreciative system necessitated the refocusing of the research. The focus on a single instrumental case study (Stake 2000) rather than a comparative case study was based on the understanding that comparative description between cases is the opposite of 'thick description' because it hides case knowledge which does not facilitate comparisons (Stake 2000). While the initial design of this study focused exclusively on the projects within the spatial studio it emerged that Halle's perception of her design activity within particular studios could not be compartmentalised. Halle's generic approach to design activity greatly facilitated an understanding of her appreciative goals as domain-independent knowledge. As a result of the initial analysis subsequent interviews were extended in focus and lengthened in duration to capture more detail of the 'particular' (Stake 2000:442).

Purposive sample

Stake (2000) suggests that a purposive sampling is critical within case study research not only because the studies are usually too small to warrant random selection but because part of the validity of the research depends on its ability to be instructive. A sample is therefore constructed 'leaning toward those cases that seem to offer opportunity to learn'. Stake holds that potential for learning is different and sometimes a superior criterion for representation. With this in mind the sample for this study was designed to incorporate variation within the limits of the study *and* to maximise the opportunity to learn. The four original participants were students enrolled in second year of a tertiary design degree at a internationally recognised, university within Australia. As the purposive sample was designed to reflect the student body, it was comprised of students who were Australian residents and had graduated from secondary education within Australia, during the four years preceding the commencement of the study. The sample was weighted toward female students in line with the gender balance within the degree.

While all enrolled in the same year of the same degree each participant was considered an individual case because they can enrol in any three of the six different design studios offered in second year. In order to participate in the study each participant was required to be enrolled in the spatial design studio as the initial focus of the case study.

The above criteria were supplied to all first year studio tutors who were asked to recommend students from within their studios who may wish to participate. Because of the small scale of the study and the reliance on in-depth interviews, the tutors were asked to nominate students who had both a high academic average and were considered articulate. The students were initially approached by their tutors and asked to supply contact details if they would like more information. All of the interested students were telephoned to confirm their interest and then sent an email in which I introduced myself and the study in more detail. They were then asked to confirm their desire to participate and the final sample came from those who both met the sample criteria and most actively responded to this introduction.

Single instrumental case study: Halle

Of the four original case studies Halle was chosen as the single instrumental case study because her commitment to her studio practice enhanced the 'potential to learn' from her case. The study took place over the course of the first semester of 2005 in which Halle was enrolled in the second year of a tertiary design degree. The degree Halle is enrolled in offers an unusual opportunity to analyse the design activity associated with problem setting due to its unique cross domain focus. The philosophy of the degree is closely aligned with the research methods and theory explored within this thesis and was described by the then, head of the School of Design Studies, in the school's first graduands exhibition catalogue: When the bachelor of Design was established in 1991 it drew on the writings of Massimo and Lella Vignelli. Their belief that 'design is one' influenced a new philosophy within design education, that design was not a series of independent disciplines but a discipline in itself. Such an approach analyses the problem-solving processes in those design disciplines for the common, fundamental principles and strategies that may be creatively applied to a broad range of design challenges. (Newman 1994:4)

This domain independent approach to design knowledge is realized within a common first year focused on conceptual design principles followed by three years in which students must take a number of different design studios simultaneously per year from a selection which includes, environmental/spatial design, applied/object design, graphic design, jewelry, ceramics, and textiles. During the case-study Halle was enrolled in the spatial, object and graphic design based studios. Each studio consists of a one hour lecture and a two hour studio/tutorial per week. In each studio a strong conceptual understanding is reinforced within a framework of design activity as an iterative, cyclical process of research, concept generation, concept development and final design/presentation.

At the time of the case study Halle was 19 years old and had completed her final year of secondary school the previous year, at a selective, co-educational, public high school. Halle was one of the first students to respond to the request to confirm her interest in taking part in the research and has been an enthusiastic participant ever since. At the time of the case study Halle was living in shared accommodation but during her first year had been living with her father, step mother, and two very young half-siblings, a considerable distance from the campus. This had certain advantages as her family home was light and comfortable and she had access to the internet at home, but by second year she moved closer to university due to the long commute. Halle had a part-time job as a waitress based on which she attempted to be self-sufficient. Halle's strongest interest outside of university involved playing the guitar and composing songs, which she performed at pubs. She was also a member of a well known acapella choir which performed regularly at both private and public functions.

During the course of the semester the spatial design studio students attempt three projects. Brief 1: 'Walking the walk' [which Halle refers to as the 'passage' brief] involved a site analysis and the presentation of a conceptual model and graphic. Brief 2:

as this was a skills based project it is not addressed within this research. Brief 3: 'Shelter', involved an analysis of the concepts of shelter, public, and private space, and the design of a conceptual shelter in response to this analysis. The full list of briefs discussed by Halle within the case study is provided (Appendix E-F).

Data collection in a natural setting

The paradigms that influence design activity research determine the research methodologies employed. To date, a significant amount of research regarding design activity has been conducted as talk-out-loud protocol experiments which have produced valuable but limited data. Protocols take place in an experimental environment, usually over a short period of time, and involve recording designers performing a design task and talking out loud. This activity is then analysed against a specified hypothesis using a priori coding systems. Protocols have been the basis for design activity research focused on analogous reasoning (Casakin 2004, Ball et al. 2003), information processing (Restrepo & Christiaans 2001, 2004), creative thinking (Cross 2004), design cognition (Eastman 2001, Gero & Tang 2002, Lawson et al 1995) and design thinking (Nagai et al 2003).

Despite its dominance over the last 20 years protocol analysis represents a conflict with this research in terms of 'paradigm fit'. Protocol analysis has been identified as being compatible with 'well-defined' problems and rational problem solving. It is not, in its current form, suitable for analysing reflective practice because protocols offer 'little freedom in representing the space of possible moves and solutions', so that 'underlying processes' are easily misrepresented (Craig 2000:3). Despite working extensively with protocol analysis Dorst acknowledges that due to the highly controlled nature of the variables and the need for subjective interpretation during the coding, they are to some extent self fulfilling. As a result Dorst concludes that 'the completeness of protocol data is an illusion' (Dorst 1995:141).

While novice designers are often the focus of protocol analysis there are very few case studies focused on novice design activity. Most case studies such as those conducted by Lawson focus on expert designers. Casakin (2004) offers a rare chance to hear the 'voice' of a novice designer in his paper 'Metaphors in the Design Studio: Implications for Education'. As a hybrid study Casakin augments quantitative results with qualitative description using a 'debriefing' interview with a single student following a protocol experiment. While this study offers a greater level of insight into the qualitative

judgments made during the protocol this takes place after the event and represents a form of reflection-on-action not reflection-in-action. Schön noted that a design episode, such as a student project can last for weeks (Schön 1987) during which it is possible to analyse reflection-in-action. While protocols do exist which take place in situ (Goldschmidt 1988, 1994), case studies that examine qualitative judgments from *within* design activity are uncommon. Schön's own case studies of professional practice are some of the rare examples of research that address subjective judgment within design activity, in situ (Schön 1983, Schön & Rein 1994).

In line with the belief in design as a socially situated activity and in order to mirror the observation that 'to divorce the act, word or gesture from its context is, for the qualitative researcher, to lose sight of significance' (Bogden & Biklen 1998:27), this research was conducted in situ. All of the interviews within this study took place on campus, either in an office or in vacant studio/tutorial rooms. The office used is particularly student friendly due to a large pin-board running the length of the wall covered with creative ephemera and shelves of student models, which the participants often commented resembled their design spaces at home. The interviews usually took place on days the participants had scheduled classes so that they were in their 'design school' mind set, so much so that it was often hard to refocus them from studio mode to interview mode. All of the non-participant observation took place within their allocated studio rooms and class times.

Emphasis on the human-as-instrument

In his paper 'Design as a Discipline' Cross (2000) noted that researchers had to be wary of accepting that design was like any other form of problem solving and that the ideal researchers of design were 'designer-researchers' (Cross 2000:98) presumably because they understood a 'designerly' way of knowing. This understanding is vital in establishing trust in all qualitative research and in particular, in single case studies. As both a lecturer and tutor within Halle's degree programme, and a practicing designer, I would consider myself a 'designer-researcher', who was able to function as the indwelling instrument of collection and interpretation. The fact that I am familiar with the participant's context, and am familiar *to* them within that context, facilitated open and comfortable communication. The openness of the research relationship led to the concomitant growth or 'mutual simultaneous shaping' of our understanding (Lincoln & Guba 1985) so that the outcomes of the case study were co-constituted, mirroring the social dynamic of both qualitative research and design activity.

Qualitative methods of data collection

Implicit in qualitative studies is the focus on the words and actions of the participant or the use of the 'participant's perspective' to find patterns of meaning (Bogden & Biklen 1998:27). In order to capture the participant's perceptive of their experience of designing the case study relied on in-depth unstructured interviews augmented by artefact analysis and non-participant observation. The in-depth unstructured interviews were used as the primary source of data as they allowed for 'prolonged engagement' (Maykut & Morehouse 1994:80) enabling a greater understanding to be gained of the 'participant perspectives':

Some qualitative researchers use the unstructured interview as their primary or only data collection method. Interviews are particularly important when one is interested in gaining participant perspectives, the language and meanings constructed by individuals. (Maykut & Morehouse 1994:82).

All four participants in the initial sample were interviewed three times, each interview averaging 90 minutes. The interviews were spaced over a 15 week semester, one after their initial studio briefing (around week two), one after their first presentation (mid semester), and one after their final presentation for the semester (week sixteen). I personally transcribed all of the interviews in order to capture the nuances within the recordings and to facilitate the early and ongoing analysis of the data.

The initial interview was based on the broad 'focus of inquiry' (Lincoln & Guba 1985) established by the research questions. In line with the belief that 'an interview is a conversation with purpose' (Maykut & Morehouse 1994:79) an 'Interview Guide' was used rather than an explicit set of questions (Appendix B). This allowed each participant's responses to guide the interview within the established focus. The guide was only referred to in order to refocus the questions when the interview stalled or became too conversational. Each subsequent interview was based on the preliminary coding of the previous interview. Again a set of probes or guides were developed which was used to either explore a theme established within the analysis or to re-focus the interview if it drifted, but the discussion was primarily directed by the participants (Appendix D)

While all four of the original participants completed all three interviews they were all informed from the first interview that on the basis of the initial analysis not all of the data would necessarily be used in this thesis. Because of the small scale of the sample and the timing of the project the decision to continue with all four case studies was adopted to protect the research against any participant's withdrawal. Because the study took place over an entire semester in which students are in transition (moving from a common first year to specialised studios in second year), there was the risk of students changing their studio choices, or transferring or withdrawing from the degree. In addition all of the participants expressed a desire to complete the study as it benefited their understanding of their design activity. In line with Schön's belief that interview questions alone can affect action, one participant described the interviews as a form of design 'counselling' in which their own answers revealed issues within their design activity which they had been unaware of and which proved to be helpful.

Each participant was supplied with the transcript of their first interview for their own information and to make comments if they wished and were offered copies of the last two interviews on request.

Halle's design activity as the single instrumental case study was subject to full triangulation. Taking a flexible approach, the data was triangulated through multiple interviews and by focusing across three studios. This data was augmented through artefacts analysis of Halle's journals and sketch models, from all three studios, and non-participant observation. As a single instrumental case study the purpose of triangulation was to clarify meaning through different perspectives of the situation rather than to 'verifying the repeatability of an observation or interpretation' (Stake 2000:444):

... acknowledging that no observations or interpretations are perfectly repeatable, triangulation serves also to clarify meaning by identifying different ways the phenomenon is being seen (Stake 2000:444).

The analysis of documents or materials that are 'not prepared specifically in response' to the case study is essential for triangulating the data (Lincoln & Guba 1985:226). Once the in-depth interview process was extended to accommodate the emergent focus on the appreciative system, the non-participant observation was abandoned because it revealed little about Halle's *perception* of her design activity. The analysis of Halle's journals was extended to all three of her studios, not just the spatial design studio that had been the original focus of the case study. Documents or texts that Halle saw as significant but did not have full records of, were traced and documented. Halle also confirmed certain understandings either in casual conversation (which were documented) or via email.

Design journals are unique in that they are both private and public documents. They function theoretically as both a private safe space for experimentation and as a public record of design activity. This record is reviewed on a weekly basis within design studio critiques. For many students the public role of the journal as an object for display takes precedence over the private role of design development. Halle noted in her interviews that she was much more likely to edit her journals for instance than her sketch models. The artefact analysis within this case study acknowledged this potential conflict, and Halle's perception of how she used her journals guided the artefact analysis. While Halle's journals did raise questions that helped guide the interviews, her journals were used primarily to triangulate the data produced within the interviews. The triangulation between three successive in-depth interviews, covering three studios, and artifacts produced independently of this study generated a significant amount of data which readily coalesced into patterns and themes within the early data analysis.

Early and ongoing inductive data analysis

In line with the concept that 'what is important is not predetermined by the researcher' (Maykut & Morehouse 1994:39) this study took an inductive approach to analysis:

Qualitative researchers tend to analyse their data inductively. They do not search out data or evidence to prove or disprove a hypotheses they hold before entering the study; rather, the abstractions are built as the particulars that have been gathered are grouped together (Bogden & Biklen 1998:29).

An inductive approach necessitates 'early and ongoing research activity' in order to inform future research activity (Maykut & Morehouse 1994:123). The design of this study adopted Maykut and Morehouse's 'Constant Comparative Method' of inductive analysis as the best means for developing a descriptive and interpretive case study. The interviews were all transcribed in their entirety and underwent initial coding after each round. The emergent patterns and themes guided further data collection and later iterations of the literature review, which helped illuminate detail in Schön's theory previously overlooked within design discourse. The coding followed guidelines developed on the basis of well established qualitative procedures. (Bogden & Biklen 1998:146-157, Maykut & Morehouse 1994:119-150).

These procedures were detailed in a Data Analysis Procedures Guideline (Appendix G). In summary the process involved the preparation of all of the data digitally. The data was then coded for 'units of meaning' which could be as little as a sentence or a few paragraphs from the transcript. Each unit of meaning was saved as a separate digital file and was referenced to the participant, interview number, the page number and line of text, so that they remained traceable. Within each interview these units of meaning were grouped for 'likeness'. At the same time I maintained a 'discovery file' for each interview, that detailed frequently used words or phrases, and developing patterns, which later informed the development of 'provisional categories', each of which contained several 'units of meaning'.

Once a significant number of 'units of meaning' were grouped together they were placed in a digital folder with a title file indicating the provisional category name and the rule for inclusion in that category. Once all three interviews and the artefacts had been coded into provisional categories, a cross comparison was made looking for overlap, and metacategories were developed. As acknowledged by Bogdan & Bilkan, the provisional categories and meta-categories were also a response to the focus of inquiry and the overarching theoretical position of the thesis. These meta-categories determined the 'outcome propositions' which informed the final description and interpretation of the case study. From dozens of units of meaning, the final meta-categories were, 'motivation in design activity', 'unity and clarity', 'random ideas', 'branching and linking', and 'social context' (Appendix G).

Both theoretically and methodologically this data analysis programme in many ways resembles the analysis of data within problem setting and was a very fluid, comfortable and fascinating process. It allowed for emergent findings which had not been anticipated but which became fundamental to the outcomes of this thesis.

A case study approach to reporting research outcomes

The need to locate the 'missing' designer (Dorst & Reymen 2004) within design activity research strongly suggested a 'modified case-study approach' (Maykut & Morehouse 1994) in line with the belief that a 'case study is not a methodological choice but a choice of what is to be studied' (Stake 2000:435). The lack of research regarding the objective use of subjective knowledge in design activity revealed in the initial literature survey suggested the need to make in-depth observations which could inform future research. The methodological conflict between protocol analysis, as the dominant research methodology for design activity, and Schön's theory of reflection-in-action necessitated locating a methodology with a closer paradigm fit. Stake calls the case study the 'epistemology of the particular' (Stake 2000:442). The aim of reporting in a case study

mode is not to lead to immediately generalisable knowledge but to offer an instructive rich description and interpretation that may not be visible within statistical interpretation:

By learning the perspective of the participants, qualitative research illuminates the inner dynamics of situations – dynamics that are often invisible (Bogden & Biklen 1998:30).

Just as the objective use of subjective knowledge within design activity produces appropriate outcomes, case study reporting which appears 'non-rational' (Stake 2000), can be the basis for knowledge generation because of the way the data is analysed. The 'rigorous and systematic' analysis of the data leading to inductively derived 'outcome propositions' not only allows the research reporting to 'stay close to the participant's feelings, thoughts and actions as they broadly relate to the focus of the inquiry' (Maykut & Morehouse 1994:126) but also reveals how the findings of the study can 'apply to other people or settings' (Maykut & Morehouse 1994:47). In much the same way as a designed artefact can progressively inform a design community and become generalised practice, the reporting of a case study can inform design research, theory and practice:

Knowledge is socially constructed so we constructivists believe, and, in their experiential and contextual accounts, case study researchers assist readers in the construction of knowledge (Stake 2000:442).

The outcomes of Halle's case study are documented descriptively based on the outcome propositions established within the data analysis. This is followed by a separate interpretative section in which these outcomes are related to the focus of the inquiry within this thesis. The nature of case study reporting is not determined by statistical data but like design activity, is determined by interpretation as a socially situated activity. That 'case content evolves even in the last phases of writing' (Stake 2000:441) mirrors the open and transactional nature of Schön's reflective conversation in which problem setting is not finite but generative. As such, the purpose of this reporting is not to be prescriptive but to offer pathways to further research.

TRUSTWORTHINESS

Chenail (1995:2) holds that 'reliability, validity, and generalisability' are based on openness within qualitative research and that 'reliability starts by you telling the reader what it is that you are planning to do in your study and then ends with you doing it' and in this sense this case study is 'reliable'. Trustworthiness is evident in the transparency

embedded in the design of the study. The major findings are all based on the convergence of triangulated data into major themes or patterns. These patterns were verified through 'member checks', in which Halle confirmed that the outcomes reflected her experience of her design activity at the time of the study (Maykut & Morehouse 1994:146).

The study maintained both a physical and digital audit trial in the form of interview transcripts, digital copies of Halle's journals, field notes, discovery memos, email correspondence, and each phase of the coding/analysis process. The design of the study was in strict adherence to the university's Code of Ethics and approval was given by the university's Ethics Committee prior to the commencement of the study, based on the design of the study, and the initial interview guide (Appendix B).

Maykut and Morehouse suggest that Mishler's (1990) view of trustworthiness is valuable to case study methodology. Mischer holds that trustworthiness depends on both the transparency of the research methodology, and more significantly, whether the relevant community 'believe the findings strongly enough to act on them' (Maykut & Morehouse 1994:147). Because of the lack of research in this field this single instrumental case study was designed to elucidate a new perspective on existing theory and to offer pathways to further research. Halle's positive member checks, and the transparency of the research methodology all ensure trustworthiness within the context of a descriptive and interpretive single instrumental case study.

ETHICS AND CONFIDENTIALITY

The participants anonymity has been preserved by the use of a pseudonym and the original tapes and transcripts have been locked in a secured environment. The coding was done manually using a basic word processing programme. All of the files have been stored digitally and will not be disseminated at the completion of the study. Each student signed a standard university consent form (Appendix A) that outlined the nature of the study, and offered them the right to withdraw from the study at any point. None of the students chose to withdraw from the study.

CHAPTER 4

OUTCOMES OF THE CASE STUDY

NOVICE DESIGNER: HALLE

As a single instrumental case study this research is intended to help elucidate the rereading of Schön's theory of reflection-in-action rather than to be explicitly or immediately generalisable. Halle's design activity offers insight into the central role of the appreciative system within socially situated design activity. The following interpretation of this new perspective of domain-independent design activity suggests pathways to further research within design theory and pedagogy.

For Halle the experience of a semester is one of multiple projects running in parallel, leap-frogging and blending together. Discussing the projects in micro detail and separately would give an unrealistic description of her experience and is contrary to the methodology selected for this single instrumental case study which is intended to examine broad conceptual patterns arising from Halle's perception of her design activity. This case study depends on in-depth, unstructured interviews supported by artefact analysis. These interviews were not restricted to a single project or studio but ranged across all three of Halle's design studios and some previous design activity. The reporting of the outcomes is based on the strength of the 'outcome propositions' resulting from the analysis of data derived from these interviews and a methodological decision to let the data speak for itself or to use as many direct quotes within the reporting as was possible. The only amendments to the original transcripts were the use of pseudonyms and replacing Halle's colloquial expression 'was like' instead of 'I said' or 'I thought' at her request.

It is interesting to note that one of the most common criticisms of case studies based on interviews is the potentiality for expert designers to rationalise otherwise subjective decisions after the event (Schön 1983, Lawson 2001:10). The focus on broad concepts rather than specific decisions within this case study, along with the interviews taking place within the design episode (or the design semester), helped ameliorate this problem.

It also became evident that Halle underestimated how structured and uniform her design activity was, suggesting that novice designers may be more equipped to discuss the subjective aspects of design activity than expert designers because they are not yet versed in rationalising their behaviour.

As individual episodes Halle's design activity could be interpreted as unsystematic, unstructured and unmotivated. Lawson has noted that it is not uncommon for novice design activity to be mis-understood, particularly their research practices, even within tertiary design schools:

Not only do they not very often take books out to read, but when they are in the library they spend a lot of their time just looking at the pictures! This cannot be serious study surely! Perhaps then more research and understanding of the need to develop design knowledge in the form of episodic memory might in turn help design schools to defend their practices from university authorities that find them hard to understand (Lawson 2001:13).

The focus of inquiry for this case study was on the role of the appreciative system in structuring and motivating design activity including establishing the relevancy of information. As suggested by Lawson it reveals this type of activity to date, has been difficult to articulate but is vital to our understanding of the agency of the designer within design activity. The coding of the case study involved generating emergent categories that were defined in terms of positional statements. These statements informed the description and interpretation of Halle's case study. The key features of the case study as they relate to the focus of inquiry are divided in six sections. The first section 'shaping Halle's perspective looks at the influences on her appreciative system. The next two sections 'relationship with origami' and 'being difficult / being different' explore Halle's appreciative system and appreciative goals. Her design activity is then described in the sections 'random ideas', 'branching', and 'linking'.

SHAPING HALLE'S PERSPECTIVE

From our initial meeting Halle projects herself as confident, open and conversational, she laughs a lot and is very animated. In the initial meeting Halle makes the point that while I have not taught her she 'knows' me because I was her first year lecturer. She made it clear several times during the study that she was happy to answer any questions I might pose, at any time, and she did. Halle has an expressive sense of humour that is most evident in word play both within conversation and within her journals.

Halle has a strong sense of self-determination and independence which reveals itself on many levels from her quirky attire, to wanting to be financially independent of her parents. Halle is not swayed by peer behaviour and in a telling episode, refused to demand a re-mark on a technical project despite complaints being lodged by many of her of her peers, because she thought the grading though harsh was fair and she wanted to move forward with other projects. While Halle is very pro-active in seeking out academics regarding her subject material and grades both in person and by email she has a very personal sense of what is fair or necessary based on her own sense of achievement and interests. Halle is very engaged with the process of her own education and regularly discusses the structure of the course, the quality of the teaching and design in general, in chance meetings with me around the campus. She is also interested in the quality of tertiary education in general and she is an active member of the Student Association.

One of the most notable characteristics of Halle's design activity is her determination to find the outcome and the process interesting. Unlike some of her peers whose aim is to establish and target their tutor's preferences, Halle personalises her briefs on the basis of her own likes and dislikes sometimes in direct opposition to the wishes of her tutors. Halle connects being interested with enjoyment stating 'if I am going to enjoy doing something I want it to be something I am interested in' and being interested with being stimulated saying 'I think just because I was interested in it, and I found it exciting when I found something new that was cool'. Halle also consistently associates personal interest with the role of motivation in the evolution of new concepts or ideas:

... I guess I choose the ones [stimulus/ideas] that I like the most. Or what is the most interesting to me because if it's not interesting I am going to get bored and it's better to find something that you are interested in so that you keep working on it a lot. (IT_H_3_16)

Halle associates her personal interests with significant relationships, episodes, or events, which have not only influenced the development of her personal knowledge but her perception of herself as a designer and her perception of her design activity. These personal interests, relationships, episodes and events are expressions of her appreciative system. While Halle is capable of becoming passionate about a new personal interest, quite rapidly her personal interests are generally cultivated and tested over a considerable periods of time. Her personal interests are often seeded years before they are fully developed, frequently by her family, especially her father.

Role of family and family friends

The most consistent and significant influence on Halle's appreciative system is that of her parents, especially her father. Halle's family environment encourages independent divergent thinking. There is a strong performance element within the family as all of her parents (including her step mother) sing in a choir and her father was an actor. Halle says her parents are 'all arty' because they are all either in creative professions or practicing artists, and additionally describes her father as a 'little bit eccentric'. Halle is quite comfortable with the creative legacy of her parents (and family friends) and mentions their influence regularly. She is proud for instance, that she is the first, second generation singer to perform in the alternative choir her parents helped form. In addition to singing with the choir, Halle also writes and performs her own music publicly indicating that this creative legacy does not define her, but enables her.

When assessing which tertiary degree to choose Halle used her family and family friends as reference points. Halle mentioned two significant events that influenced her decision to enroll in a multi-disciplinary design degree, which also helps introduce her approach to her design activity. The first involved work experience during high school with a friend of her fathers who was a prototype maker. The exposure to professional prototyping stimulated and cemented her passion for model making which still dominates her design practice. The second was the influence of her aunt who as an architect believed her own creativity was limited by the client relationship:

... throughout high school I went through phases of 'I want to be an architect', and then I thought, no I don't want to be an architect because my aunty is an architect and she said it's really hard to sort of do what you want to do as opposed to what someone is asking you to do ... (IT_H_1_2).

It's interesting to note that Halle's choice of degree was governed by her passion for making and her determination to protect her creative autonomy. Halle maintains a position of self-sufficiency toward creative endeavour. This position manifests itself in the motivation she derives from personalising design briefs and the faith she possesses in her ability to resolve briefs she has personalised. She is much less confident about her ability to resolve briefs she is not interested in and has not been able to personalise.

Halle's family has been significant in offering her directions and ways to think as opposed to prescribing her choices. Halle has been encouraged by her family to develop her own learning goals based on personal interests. The best example of this within the study is her 'relationship with origami' which her father encouraged. She noted she had the advantage over private school girls (who were struggling to adapt to being self sufficient at university) because she had never been 'spoon fed' the right answers either at home or at school. Halle's family have also encouraged her to challenge normative social perspectives with profound consequences for her design activity. Halle's father was insistent that she read Klein's book No Logo which is an indictment of multinationals, consumerism and branding. Although Halle delayed reading the text for two years when she did, over the break between first and second year, it sparked an interest in sustainability, which she had been introduced to at university but like many of her peers had ignored. Halle attributes her rapidly developing passion for sustainable design during the course of this case study to her father not to her design education. This is in part because his encouragement triggered her own self directed learning on the topic, and in part because of the apparent apathy her attempts to apply this knowledge were met with from her many of her design tutors. Because her interest in sustainability is based on a broader commitment to ethical behaviour embedded with her appreciative system the poor response Halle received from her tutors did not diminish her determination to develop sustainable projects. Halle's other major passion for modular origami was also stimulated by her father and is discussed in some detail in the next section.

The desire to challenge normative perspectives appears to underpin Halle's need to differentiate herself from her peers academically by taking a divergent stance toward academic instruction. Halle's persistent questioning of academic instructions such as design briefs has resulted in her belief that she can be a bit of a 'smart arse' and is perceived as being a bit 'difficult'. This is both an expression and a result of Halle's unusually high tolerance of ambiguity within design situations for a novice designer.

Halle's tolerance for ambiguity rests on her ability to personalise her briefs, via her appreciative goals, in order to motivate herself through finding an approach which is personally interesting, and which distinguishes her ideas from her peers.

It is significant that Halle perceives her knowledge of modular origami and sustainable design as personal knowledge despite her frequent attempts to apply this knowledge within design situations. Halle perceives these interests as personal because they were initiated by her father, because she is almost entirely self educated in both areas and because of her belief that the application of this knowledge has met with some confusion or resistance within her art and design education. Her determination to continue to develop these personal interests through her art and design education has reinforced her belief that she is perceived as 'being difficult' which in turn has reinforced the belief that this is personal not domain knowledge. Both of these personal interests offer insight into the development and application of appreciative goals within Halle's design activity.

RELATIONSHIP WITH ORIGAMI

Halle describes her personal interest in modular origami as an 'obsession'. She identifies modular origami as a personal interest because it was stimulated by her father, personally developed, and difficult to apply (until recently) within her art and design education. Halle's interest in modular origami developed rapidly and she quickly generated her own learning goals:

... I started off doing modular stuff when my dad bought me a modular origami book, and I got through all of that and thought 'Yeah that's cool. There's probably other stuff out there' ... and I found other stuff like architectural origami and like pop up stuff like that. Just things to make. I don't know why I did it, I think just because I was interested in it, and I found it exciting when I found something new that was cool (IT_H_1_30).

Halle stated in casual conversation that without her father giving her the book on origami she would never have found something she was *that* interested in. While Halle credits this discovery to her father it appears she already had a strong interest in mathematics, mechanical toys, modular systems, geometry and making things. Her rapid transformation of this stimulus into an obsession was based on her passion for making in combination with other extant interests. It appears it was Halle's father's ability to match these extant but minor interests with modular origami which found resonance for Halle: Like anything geometric, ... I am obsessed with geometry, I can't get away from it. ... all through high school, mainly year 11 and year 12 - everything that I did had something to do with atoms and then linking that to modules and then modular origami (IT H 1 8).

Halle is fascinated not only with the mechanics of folding paper but with the concepts involved in simplifying complexity with geometric and mathematical systems and animating forms through mechanisation. When asked about her frequent use of the word 'links' for instance, she immediately associated it with the unifying capacity of geometry stating 'I just think of geometry, and modular thingies linking and making something that's unified...' (IT_H_1_17).

What Halle describes as an 'obsession' is a form of *meta-interest* which represents and stimulates a whole range of other interests. As such Halle's interest in modular origami is not static but generative, constantly creating new opportunities for application and development. Not only is it based on long term interests, like mechanics which 'fascinated' her as a child, but she projects the interest forward by constantly being open to new variations of her interests and being open to finding the 'next level up':

... I spent hours on the internet looking for stuff like that and it took hours to find that and I thought you know 'this is really cool' and I haven't actually found anything cooler than that, in terms of origami, but there probably is something out there that I just haven't discovered yet. So I don't like the idea of ... my discovery just stopping and staying at the same standard I am now, as opposed to keep changing and getting to better higher places and cooler ideas (IT H 1 29-30).

Halle's 'obsession' is not a single interest but a set of interconnected interests and experiences that form a familial relationship which is strongly representative of her appreciative system and her appreciative goals. Halle's relationship with origami is evidence of Schön's concept of 'the constancy of appreciation'. It has matured with Halle through her secondary education, and survived her transition to tertiary education where she has utilised it in at least two of her first year design projects, and in two of her second year projects, each in unique and different ways.

The knowledge Halle associates with her relationship with modular origami is entirely self-generated with no specific purpose in mind other than personal satisfaction and the sense of discovery it fulfils. Halle repeatedly attempts to apply this knowledge within her design activity because she wants to uphold this sense of satisfaction. Her ability to sustain motivation with her design activity is linked to her personal interests because they

help her tolerate ambiguity. While she does not generally know how the relationship between her personal interests and the design situation she is applying it to will resolve itself, the fact she is motivated *by* developing a personal interest means the design outcome does not have to be initially apparent. She is motivated by her sense of discovery and by getting to 'higher places and cooler ideas' through experimentation $(IT_H_1_30)$. In this sense the application of Halle's personal interests represents self-set learning goals or appreciative goals.

Halle's description of employing origami in the final project of first year, indicates she uses modular origami to help facilitate 'initial descriptions' and 'seeing-as' within problem setting. The 'Macquarie Place' brief requires students to perform a site analysis on a historically significant park within the city, and to design a conceptual model to represent their analysis. Most students find it initially overwhelming due to the amount of environmental and historical data associated with the site. Halle drew on origami to generate a metaphor of a cyclical nature of both the natural environment and the movement within the space. In effect her personal interest helped generate an organising principle which established a 'principle of relevance' (Buchanan 1992:18) for the information associated with the site:

...[I thought] 'Oh my gosh, this is going to be hell unless I find a good concept' ... I did find a concept and I did relate it to geometry because I found this geometric shape that folds into itself and keeps folding out. So the idea of having the morning, what it's like in Macquarie Place and then in the middle of the day and when there are all these people drinking and just the different layers of it, that keep circulating around (IT_H_1_17).

In addition to using origami in the development of her ideas this meta-interest determines Halle's design preferences or what she attends to. Halle prefers working with model making over sketching, designing kinetic over static objects, working with a monotone palette over colour or texture, and prefers form over aesthetic detail which she perceives as superficial or decorative. These preferences influence her design activity from the initial interpretation of the brief. In a project called 'memory box' for her object design studio, students were asked to design a box to contain three memories, which among other design criteria addressed surface and texture. Halle's interpretation of surface and texture as 'crafty' was determined by her preferences for form over surface, which subsequently dominated her interpretation of the brief. Halle's initial response was to frame a memory box as a 'mousetrap' that snaps on memories, based on her interest in mechanisms. This set off a series of associations in which she incorporated a range of personal interests all embedded in either her meta-interest in modular origami, such as her interests in childhood toys, mechanisms and play, and her interest in sustainable design, involving ethics, consumerism and branding:

You know texture, surface, and all that kind of stuff, and I thought 'Uhh it's really like crafty kind of stuff' and I can't stand that kind of stuff. And so, I had the visual idea first of the mechanical kind of thing and then I thought of what I could do, and then in the holidays ... and I read *No Logo*, and I started getting into those kind of documentaries, and I thought of the idea, especially with the childlike mechanisms that I was going to have in it, of how like corporate branding and different corporations sort of use your memory to manipulate you into doing certain things and especially with children and so now I am looking at – my object is going to be a Maccas [McDonalds] toy, and it's going to be how your memory gets to remember something about the Macca's toy, and how it persuades you to go their [store] and eat the food, and get the toy (IT H_1_25).

When asked about her interpretation of surface and texture being 'crafty', Halle could not 'justify' this position logically from the brief because it makes no reference to craft. This interpretation is based on her appreciative system. There is no evidence that Halle understands the interconnectedness of these preferences which she believes are 'random ideas'.

Despite the numerous preferences that feed into her meta-interest in modular origami, Halle believes most of her ideas are randomly generated. During the case study she designs a space within an articulated kinetic roof, a memory box based on mechanisms, a see-saw table made of folded cardboard, and a shelter based on folding flexible geometry, all perceived as 'random ideas'. These ideas are 'random' only in the sense that they are based on her appreciative goals or informal and unorthodox knowledge as opposed to formal domain knowledge or criteria logically derived from the briefs. Halle underestimates the role her appreciative system plays in directing what she attends to or what she discovers 'randomly'. Halle's belief in the randomness of her associations is most evident when she finally finds the 'next' step in her interest in modular origami. This episode indicates that her tacit appreciative goals enable her to respond to information as surprising triggers which is essential in stimulating and motivating her interest because if the information she 'discovers' is deemed too familiar it is not considered 'cool' or interesting. Halle finds the 'next step' in her understanding of modular origami while conducting research for the 'shelter' project for her spatial design studio . Halle finds a book on Santiago Calatrava's theory of 'flexible geometry' (Tzonis 2001) which she immediately identified as the three dimensional extensions of her previous origami experiments.:

... then I got that book out and it just summed up everything that I was interested in including all of the mathematical stuff that I am interested in but can never find it and if I find it, it is too complicated for me to understand whereas this book, I understand it... Since I found all that tessellation origami stuff I thought 'there is nothing better than this, what am I going to do, what am I going to find?' and I mean I have known about that stuff for a few years now and now that I have found that book it is bringing it like into 3D structural kind of stuff and it's like, here's the next level up and so I was really excited when I found that book. (IT H_2 7)

Halle is so determined to understand this theory that rather that photocopying the images she transcribes pages of formulas into her journal until she can no longer understand the mathematics. There are no images of Calatrava's models in her journal. When I asked her about this she said she didn't need them, because she understood the mathematics behind the forms:

... I think that the Calatrava book is one book that I got out and I opened it up and I thought 'Wow! This is cool!' and like I have written down all the mathematical formulas that made sense to me about stability, in forms and uhm and then I got onto the little models that he'd had and started getting ideas for like – and I thought 'oh this looks like it would be fun to make' and I didn't really have any materials to make it with but uhm, and then I somehow got an idea from one of his visuals ... (IT_H_2_12).

From this text Halle identified a model of a 'foldable cube' (Appendix J, 1-2) as a potential form for her 'shelter project' which she then translated into a model (Appendix J, 3). This process alone involved some reflection because Halle could not copy Calatrava's materials directly and had to devise a way to reproduce the mechanics with different materials. It is interesting to note that despite knowing Calatrava's theory of 'flexible geometry' to be the extension of her interest in origami that she has been looking for, Halle still perceives the discovery of the 'foldable cube' as a random event:

And it was kind of like – it just happened as opposed to me going through so much research that I came to the idea. It just sort of appeared in front of me $(IT_H_2_12)$.

Halle's belief that this discovery 'just happened' illuminates her conviction that information sourced for her design activity on the basis of personal interests, is not easily justified or explained either to her peers or tutors. While Halle believes this form of knowledge is essential for the authenticity and ownership of her concept development she does not see is as a legitimate research because it is not design domain knowledge. This has significant ramifications for Halle's design activity, both in terms of justifying the use of this discovery and knowing how to develop it.

Halle believes the persistent use of her personal interests has met with some resistance within her art and design education. Halle feels that her repeated use of modular origami has been perceived as some kind of fixation or dependency. She intimates that teachers attempt to encourage her to explore other avenues suggesting they think she frequently uses modular origami 'because I've got no other things to do because it's all I know how to do but it's actually something more that's stylistic' ($IT_H_1_12$).

Halle recalls three significant events regarding the response toward her repeated referral to her meta-interest in modular origami. In the first she recalls an attempt to focus her away from modular origami, in the second the validation of her use of modular origami and in the third her personal belief that her use of flexible geometry as an extension of her interest in modular origami could not be reconciled within a specific design project.

Validating personal knowledge within design activity

Halle recalls her art teachers attempted to direct her away from using modular origami in her final secondary school art project as a significant event which revealed her determination to develop her personal interests:

My teacher always said why don't you choose something different and I couldn't, I mean I could choose something that didn't have as much to do with it but it would always have some effect on me just because I was obsessed by it and if I am going to enjoy doing something I want it to be something I am interested in (IT H 1 9).

Despite attempts to work with other media Halle finally reverted to using tessellation origami at the last minute and retrospectively applied a concept.

Her dissatisfaction with this process of retro-fitting an idea to an outcome is based on her belief in design as an experimental process or journey in which her personal interests motivate and unify her projects:

And I ended up just doing what I could do and I had to find an idea that linked to that and I ended up basing it on Chaos Theory. And it doesn't really have anything to do with it and so, it didn't really have that unifying thing. Because it ... wasn't so much a journey ... it was more fake (IT H 1 28).

It could be argued that had her teacher understood the potential of this meta-interest, as a means for generating ideas and not an outcome in itself, she may have been more able to support Halle to produce a more meaningful project.

Halle's second significant event represents just such an acknowledgment with very positive outcomes. Because Halle perceived modular origami as personal knowledge she did not perceived it as legitimate *design* knowledge. Her frustrated attempts to find a visual language without modular origami de-motivate her:

... I just wasn't really connecting with any of the briefs and I was just doing it because I had too, and then I ... started, getting into it a lot more because she sort of saw my sort of thematic, geometric sort of stuff and said okay great now we'll work with this and helped me to pinpoint that into design as opposed to just some sort of visual artistic element to it (IT_H_1_3).

This event took place during the second semester of first year in a project which involved the students researching and analysing the design of a coffee pot by a leading Italian designer (including all of the cultural, manufacturing and historical associations) and producing a conceptual outcome (including a model and graphics), and communicating their analysis. It was the first time the students applied the design principles they had learnt in first semester to a conceptual project. During a studio critique Halle presented her tutor with a series of sketch models or experiments using modular origami. Her tutor's simple request for her to continue with this line of experimentation validated, for Halle, the use of her personal interest or appreciative system for the first time:

... I just brought in something really random, I just brought in some origami stuff, that had nothing to do with - well it would have looked like it had nothing it but I found some sort of little way that it related and she sort of understood already and said make more of these and I said, okay so I am not on the wrong track, you know.
I have something obviously that is working if she wants me to make more of these and then I worked more that way and then I had more of an idea of what my style is ... (IT H 1 11).

While it sounds difficult to particularise a design demonstration to harness a student's appreciative goals this event suggests otherwise. Halle's tutor is not so much responding to the origami as to the fact that Halle 'found some sort of little way that it related' to the brief. It is Halle's ability to use this medium to make initial descriptions of the situation which the tutor validates, not the actual personal interest, which could be anything.

In validating her linking behaviour her tutor legitimises the use of her personal knowledge. Not only does Halle's tutor validate her use of modular origami she offers her the *language* to articulate what she was already been doing but could not describe, by referring to Halle's use of modular origami as her 'visual language' or her 'way of visually communicating something'. This event stands out for Halle as a significant step in her design education and is revealing both in terms of her design activity and the type of educational support she needs.

Underestimating the role of appreciative goals

The third significant event for Halle represents a design episode in which Halle believes she was less successful within a project than she would have liked, despite the fact she achieved quite a high grade. Halle's believed she did not adequately resolve the 'shelter' project because she was unable to reconcile her personal interest in 'flexible geometry', as a three dimensional extension of her interest in modular origami, with other ideas in her associative network, resulting in a project which lacked unity and clarity. On the basis of her discovery of Calatrava's 'flexible geometry', Halle identified a 'foldable cube' from his models as a potential form that she could reinterpret as a 'portable' shelter. Halle made a wire copy of Calatrava's dowel rod model which she presented to her tutor. Halle felt her tutor's reaction marked a significant event within her design activity:

... I was still really buzzing and I said 'I have something I have to show you' and I showed her this little model that I had made of what I wanted to make and she said 'Yeah that's really cool but you have gone a step too far and I don't want you to do that $(IT_H_2_12)$.

Both Halle and her tutor interpreted the model as a prototype of a final design rather than an extension of the experimental medium of modular origami. This response by her tutor, and her own belief that she had resolved the project because she had worked out how to make the 'foldable cube', resulted in the sense that she was finished or that she was 'done'. Halle believed that in the absence of any instruction she lost sight of the 'reality' of the project and it effectively stalled.

Halle believed that, because her tutor wanted her to focus on concept generation not her design outcome, her tutor didn't model *any* moves for her to develop the project with, and Halle was unable to initiate any herself. Halle was therefore unable to connect her personal and domain knowledge to the extent that she would have liked. Halle believed this resulted from the basically irreconcilable nature of the ideas she was trying to merge, and that her excitement in her personal interest in 'flexible geometry' had dominated the project:

But I think I was just - they were two really separate things and because the Calatrava thing just came to me one day when I was looking in his book and then I was looking at Bachelard's stuff it was like two separate things going on at once, and then I tried to bring them together at the end. And I think that didn't work and I think that's what [tutor's name] didn't want to happen. [tutor's name] wanted us to start with research and then build a concept and then conceptual development and then build a visual three dimensional language out of that, and I didn't do that at all because I got caught up in this little thing [the foldable cube model], which is what caused the problem (IT_H_3_11-12).

Halle responded to the 'foldable cube' form because she saw it as an extension of her personal meta-interest in origami and felt it corresponded with the initial frame she had established for her project of a 'portable' private shelter was based on philosophical ideas of poetic space she had previously researched. It is possible that, with the right design moves either being demonstrated or self initiated, the foldable cube model could have functioned as a 'move experiment' used to test her 'initial frame' of a 'portable' shelter and may have led to the development of a successful final frame. This seems to indicate that the Halle's inability to unify and clarify the project results from poor linking behaviour rather than the use of personal knowledge.

Interestingly, because this discovery was motivated by the strength of a personal interest and not the design problem, Halle has remained committed to flexible geometry. Despite not achieving the level of clarity and unity she wanted to in her project, for the first time Halle identified her personal interest as *knowledg*e stating, 'I mean now it's good because I've actually still found it and I still have that knowledge in my mind' (IT_H_3_2). As an epilogue, Halle successfully applied flexible geometry within the design for a portable theatre made of indigenous materials for a travelling educational forum in East Timor in her third year. In the process it seems Halle's relationship with modular origami 'seeded' multi-disciplinary knowledge including philosophy, human geography, politics, performance, and sustainability.

Halle's relationship with modular origami reflects one of Halle's principal appreciative goals which is to differentiate her design ideas by developing her personal interests, especially where these interests are not familiar to her peers. Halle notes she is motivated by employing information which is not familiar to her peers, noting she is motivated by:

Just things that interest me, on top of what I am already interested in. Trying to find new paths. Like I remember when - when I was first doing modular origami stuff and then I found tessellations, and I thought 'This is even cooler' and nobody, really that I knew even knew about that kind of origami (IT_H_1_29).

Halle aspires to developing authentic ideas which are 'new' to her and by association, new to her peers. Part of her characterisation of herself as being difficult relates to wanting to distinguish her projects through new ideas or new configurations of ideas.

BEING DIFFICULT

Halle perceives that she has a tendency toward 'being difficult' within her design activity. For Halle, 'being difficult' and differentiating her ideas, are interrelated design behaviours that are manifestations of her appreciative system and appreciative goals. At least one third of the concepts Halle develops for projects during this case study are generated initially by 'being difficult'. 'Weird' ideas that are difficult for her peers and tutors to initially associate with the criteria of the brief, which involve metaphorical reasoning, word play and humour account for almost all of her projects. It appears that 'being difficult' is about differentiating her ideas from her peers in order to motivate herself, not about being obstructive:

It's a little bit about competition. Like I like my ideas to be ... different from other people. So if other people use similar ideas to me then I get annoyed ... I don't like the idea of doing something that is the same as everyone else. Then it's boring. Like if everyone did the same thing then everyone would be bored, especially ... the tutor [laughing] (IT_H_3_8).

Originality in the sense of an idea being new to her (and her peers) is a primary motivation for Halle, which she associates with avoiding repetition within her ideas and as evidence that she is developing as a designer saying 'I don't like the idea that ... my ideas are not getting anywhere' (IT_H_1_29). Ironically Halle is more comfortable discussing being difficult than discussing being motivated by originality. Being difficult is discussed with a lot of amusement while Halle is reticent to admit originality as a motivation:

Yeah probably [laughs], if I was to be straight with you, because you know I want to look back on something like, say I look back at last year and I look at what I am doing now, and what I am doing right now is the same thing I was doing last year and it's like 'Where am I going? Absolutely nowhere!' And I find that troubling $(IT_H_1_29)$.

For Halle, 'being difficult' is not about being obstructive but about establishing originality of her ideas. It seems Halle is challenging within her studio classes but often seems to follow through on her ideas and gain the support of her tutors. Halle appears to find it harder to discuss 'originality' than 'being difficult' because it is associated within design education with research and rigour and her ideas are predominantly generated spontaneously using informal and unorthodox knowledge. While Halle consistently takes alternative approaches to projects to differentiate her ideas, *she* uses dismissive terms, such as 'being difficult' and 'smart arse' to describe this activity, seemingly because she does not believe it is a form of legitimate design activity. These labels are often associated with episodes in which Halle is trying to generate a level of personal interest in a brief she is not initially interested in or, in effect, when she is trying to apply her personal interests within her design activity:

And I used to get into arguments with my teachers and I think I could just be really difficult and ... I have always had a thing with just wanting to do ... that I wanted to do what I wanted to do and I'd do it, as opposed to what they wanted us to do. $(IT_H_1_24)$

Preferencing her own interests within her design activity obviously represents some sort of challenge to the normative position taken by her tutors and her peers which Halle uses to generate a strong sense of ownership of her ideas stating, 'I don't like the idea of making something that I am not going to like and really sort of feel like 'that's not mine'' (IT_H_1_24). She resists doing things that she 'has to ffdo' or in the way 'they' want you to, and prefers her choices to be governed by her personal interests. For Halle there is a direct correlation between ownership and motivation. Halle states that a brief must be personally satisfying because 'otherwise I won't be inspired to keep doing it' $(IT_H_1_{25})$ and that this satisfaction motivates her work because 'depending on whether I like my idea a lot or not is how much I will keep going further into the ideas or not'. $(IT_H_1_4)$.

There are numerous examples within the case study of Halle determining her own direction on the basis of her personal interests, values and beliefs, despite advice to the contrary, or in opposition to the most obvious course of action, such as that usually undertaken by the majority of her peers. Some examples include were Halle substituted 'ants' for a human community within a graphics project about targeted advertising, her refusal to design a table top object for a project which implied a hollowware or flatware design, and her determination to apply 'flexible geometry' to the design of a portable shelter, despite her tutor's reservations. In isolation Halle's initial process of 'being difficult' in each project seems questionable, but collectively these processes are evidence of the strong role her personal interests, values and beliefs play in determining her design activity.

Personalising briefs through loop-holes

In an episode Halle initially found very amusing, she decided to substitute ants for a human community within a graphic design project as a response to limitations imposed within a design brief. The brief asked for a community focused advertising campaign but the students were instructed to focus on a community they personally knew because, due to legal limitations, they were not permitted to use photographs of anyone they didn't know. Halle realised the brief did not stipulate a human community despite the fact it was implied. Halle's preference for taking an alternative approach from her peers to a new brief guided her search for an alternative community:

I've got my friends, and everyone is doing their friends so I didn't really want to do that, and then I couldn't think of any community that I was part of that I thought would be interesting to represent and I thought well 'Ants!' (IT_H_1_22)

That the 'ants episode' occurred in the first week of a new subject despite the negative association of 'being difficult', indicates how strongly Halle's desire to differentiate herself from her peers, influences her design activity. That it is based on her personal values and experience seems to over-ride any fear associated with using this strategy in an unfamiliar environment:

I don't know how I thought of ants. I think at first I was just sort of like, being, you know an idiot in class, and [Halle's tutor] was saying 'you know what kind of communities are?' and I said 'do we have to do a human community, like could we do something like ants' and [tutor's name] said 'I guess so' and I was sort of like 'Huh hah!' [smiling]. I just asked that just to be an idiot but then I started running with it ... (IT_H_1_22)

Halle's interpretation that she is being an 'idiot' underestimates the role her appreciative systems plays in 'being difficult.' Halle is motivated to extend the brief in order to align it with her appreciative system and to distinguish herself and her ideas from her peers. The role of her appreciative system is evident because while initial frames are generated spontaneously she rapidly adopts and develops them. If these initial frames were simply a form of obstructive behaviour, it could be argued that Halle's interest would provably dissipate quite rapidly. Halle's pleasure in recounting the ants episode suggests she thinks she is being clever. In this instance, Halle's personal interests and values direct her to find a 'loop-hole' within the brief, which she uses to trigger an innovative approach to meeting the need that the project be based on a community that she can photograph freely, and to differentiate her project.

The loop-hole as a surprising situational trigger generated an opportunity for sensing similarity, in this case, that humans and ants are both members of communities. Halle treated this idea as information which enabled her to propose ants as a community to her tutor. Halle's satisfaction with this idea then motivated her to research ants. Her discovery that ants are dependent on smell and touch for navigation, not vision, inspired a whole new interpretation of sensory stimulus in relation to space. Ants appear in Halle's very first sketches for the spatial analysis for her 'passage' project at the same time. Which project informed which is debatable, but cross-fertilisation between the projects occurred.

'Being difficult' is a means to begin the process of altering her perception. If know-how or 'designerly ways of knowing' mean 'to possess ways and means of acting and thinking that allow one to attain the goals one happens to have chosen' (Schwandt 1994:127 quoting Von Glasersfeld 1991:16), 'being difficult' represents a form of know-how which helps stimulate design activity in the absence of relevant domain knowledge. Schön noted expert designers establish frames, from which *they know* they can arrive at solution, that *they like*.

Halle triggered the ants idea by focusing her attention on 'something I could do' or something she 'could make work' in combination with her appreciative desire to work on 'something different':

... the fact that I couldn't think of anything off the top of my head, any community that I could make work, that was sort of ... I don't like the idea of making something that I am not going to like, and really sort of feel like 'That's not mine' and so I just started thinking of something I could do, and doing something different and that's when the ants idea just popped into my head, just randomly, and the teacher said oh you know 'I guess you could' and then I thought about it a bit more, well actually I could do that, whereas I was just trying to be a bit of a smart arse, I think at the time (IT H 1 24).

What Halle perceives as 'random' ideas seem to be much more structured and motivated design activity when considered as a group than when considered in isolation. However, this activity is structured and motivated using personal, rather than domain based declarative knowledge. Halle's desire to substitute ants for a human community was eventually refused by a new tutor but she employed this interest in a later project. While her frame experiment proved 'inappropriate' for one project she used it within the problem setting phases of another. This is another example of how once Halle adopts a personal interest or idea she is motivated to find an application for it because she finds it motivating. This corresponds with Schön's idea that frames from one design episode may be warehoused (as exemplars) for other design episodes regardless of whether they have been successfully applied (as is often assumed in design literature) or not. It also mirrors Mumford et al's belief in the motivational value of appreciative goals. Halle's use of ants indicates that appreciative goals work may in the same way as frame exemplars in that they enable the designer to sense the familiar in the unfamiliar in order to alter their perspective.

Personalising briefs through inversion/deconstruction

'Being difficult' can be productive because it is genuinely based on Halle's appreciative goals, not on being obstructive. During the case study her most productive application of this appreciative goal was an attempt to take a tangential approach to the 'top-of-the table' object design studio brief that asked her to design an object for the top of the table. The assumption was that the students would design something like flatware or hollowware. Halle had been 'apprehensive' about the brief because of her increasing awareness of conspicuous consumption and sustainability:

And so, I have been apprehensive to do my assignment because we have to design something for the top of the top of the table and I just think, anything we need for the top of the table doesn't need to be redesigned (IT_H_2_23).

Halle considers her interest in sustainable design a personal interest because while she has been exposed to sustainable design theory in her first year that interest lay dormant until she read Klein's book *No logo* as suggested by her father. She then actively researched sustainability and sustainable design theory and therefore considers herself, self educated in the area. Her approach to the top-of-the table brief was to some extent motivated by this conviction:

Like just this year I've sort of - everything that they have been showing in object goes completely against everything that I feel about mass consumption and the creation – the creation – people designing objects with no point (IT H 2 22-23).

Halle suggested her personal research into sustainable design was primarily motivated by her conscience saying 'I had a really bad conscience about things that I was doing and what effect they were having on the environment' and that 'it was really annoying because everyone else around me just seemed to be able to do whatever they wanted and I felt like I was in this little cage' (IT_H_3_26). On two occasions during this case study it was suggested to Halle that she abandon her sustainable design agenda to make her projects more manageable because her sustainable goals sometimes outstripped her own understanding or experience. Her personal interest meant Halle was frequently working well beyond her domain knowledge and ability with regards to sustainable design.

While it appeared that Halle was not always able to apply sustainable theory to her design projects successfully, her move experiments often lead to innovative initial approaches and ideas. Within the 'shelter' project Halle at first attempted to design a non-material system for a shelter in which 'tourists' are equipped to build their own shelters on a holiday island from local materials such as palm fronds. While she abandoned this idea it did inform her frame for a 'portable' shelter which also involved some physical engagement with the user.

The 'top-of-the table' brief was the first time Halle modified a brief by applying sustainable design criteria and achieved a viable result by working within an appropriate level of skill. She achieved this result by personalising her understanding of sustainable design rather than trying to transpose sustainable design theory directly as in the 'shelter' project. She did this by combining sustainable theory with 'being difficult' or with her

own appreciative goals. Halle regularly makes initial descriptions of a design situation based on a literal keyword search from the brief. In this instance, she searched for a synonym as a way of inverting or deconstructing the brief:

... So I went and I looked it up on the computer 'top of the table' and the definitions of it. And obviously it said the top of the table and then it said the synonym of it could be, obviously underneath the table, and different interpretations for that can be like a metaphor for things being in secret, and so then if you bring it onto the top of the table again it's like things being out in the open and sharing (IT_H_3_24).

Halle originally rejected the table idea entirely and elected to design a communal park bench, which fortunately was not rejected outright but required justification:

And so I went back and I asked [Halle's tutor] if I could do that and [Halle's tutor] said 'yeah but you still have to link that to the top of the table' and I said 'it is linked to the top of the table' and so I ended up making a see-saw which is a seat for underneath the table which is linked to the top of the table because you have to share it 'cause a see-saw doesn't work with one person. (IT H_3 24)

The notion of sharing and community stimulated both her preference for play and her understanding of social sustainability and ecological sustainability. Halle's see-saw idea was triggered by sensing similarity between park seating, sharing and playing.

The principal difference between being obstructive and 'being difficult' is the role of the appreciative system in motivating and sustaining this sort of innovative risk taking. Maintaining the ideas initiated by 'being difficult' involves reflection, planning, the development of new action strategies and negotiation as seen in Halle's discussions with her tutors. In this way 'being difficult' leads to a series of *legitimate* move experiments or design moves. In many ways these are defining abilities of a designer. In order for Halle to establish a viable frame for this project she had to deconstruct the brief by 'breaking' it into bits:

... with the see-saw it was definitely coincidence – because that signified my breaking the brief into bits and recreating it into something that was completely the opposite of what they wanted but I got away with it. But the coincidence was appealing to me as well, I was pleased that the outcome was about children interacting' (EM_09_06).

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Deconstructing the brief involves making initial descriptions of the situation that offer framing opportunities. Halle's deconstruction of the brief is motivated and structured by her personal experience, interests, values, and beliefs. Halle's belief that the introduction of the see-saw idea was an appealling 'coincidence' again underestimates the role of her appreciative system. During the case study Halle makes regular references to mechanical toys, kinetic objects and play in the early phases of her design activity. She suggested that childhood references often infiltrated her work because she has two very small stepsisters and because she identifies design activity as a playful/experimental activity.

Halle allays her apprehension by framing the project in terms of sustainability, folding, mechanics, and a childhood playground toy, none of which is logically derived from the brief but stem from her experience and beliefs. Her final design of a children's table which was made from cardboard, and based on a see-saw, was designed to encourage communal eating as a function of both social and ecological sustainability. The table requires additional engagement as it is constructed from its own packaging which is entirely recyclable. Halle applied her understanding of systems to support sustainable consumption and designed a retrieval system with the cardboard manufacturer. This is a clear example of Halle using her personal interests to set learning goals to motivate a project which unlike the original attempt at the 'shelter' projected enabled her to extend her knowledge without becoming completely overwhelmed. Here, it seems that her appreciative system supported the development of formal knowledge.

It is possible that Halle perceives this behaviour as 'being difficult' because she cannot clearly communicate what she is trying to do. She suggested on several occasions that because her ideas were not logically derived from precedent, or from the brief, this quality made her ideas difficult to communicate:

Well, I just think some people think I am really weird because of it ... I used it [metaphorical reasoning] and my tutor thought I was really weird when I told her about it (IT_H_1_13).

Halle holds two significant beliefs about her use of metaphorical reasoning in the early phases of her design activity; firstly, that her ideas are randomly generated, secondly, that they are at least initially difficult to communicate. As a result she doesn't seek to clarify her ideas with her peers because it is difficult to articulate their connection to the brief:

I think I just find it really hard to explain it to people and they sort of don't understand what I am doing, to know [what to offer]. Like they will give me ideas and stuff but they won't really ... have anything to do with what I am trying to do. (IT_H_1_11)

Halle's belief in the fact that her ideas are randomly generated and therefore not based on legitimate design knowledge has a profound effect on her design activity and how she communicates about her design activity, both of which have significant implications for her design education.

RANDOM IDEAS

One of Halle's most profound beliefs about her design activity is that her ideas are 'random'. Even when actively researching for a project she still insists her ideas are random as in the discovery of the 'foldable cube' while researching for the 'shelter' project:

And it was kind of like – it just happened as opposed to me going through so much research that I came to the idea. It just sort of appeared in front of me $(IT_H_2_12)$.

Halle describes random ideas as 'just like things that seem unrelated or out of place' (IT_H_1_14) which therefore appear 'strange' and 'weird'. Random ideas are associated with humour, spontaneity, and surprise. Random ideas are often generated as a response to immediate stimulus, either visual or verbal, that triggers memories and personal associations:

... [ideas] just sort of really randomly popped up into my head. Like I did have my ideas from last year were a little bit strange, and I don't really know how I got them. I think just sometimes it will pop into my head just from different things people say or things that I see, like I could look at a tree and go 'hey a tree, that's a good idea' which is kind of what I have done for [spatial design] this semester (IT H 1 6)

Random ideas are ideas typically associated with informal or unorthodox knowledge or the unorthodox use of formal knowledge directed by appreciative goals. Because random ideas are driven by Halle's appreciative goals, they enable her to shift her perspective and set new action strategies while still responding to stimuli as 'surprise'. Random ideas stimulated by appreciative goals are a way to begin design activity in the absence of relevant information and are therefore intrinsically linked with Halle's high tolerance for ambiguity. Random ideas stimulate the genesis of an organising principle and are not an outcome in themselves.

Random ideas are attempts at generating metaphors in which Halle forges concrete and abstract ideas together. The fact they are 'out-of-place' indicates that they are a response to a surprise and represent a shift in perspective. As such Halle's 'random ideas' are a form of seeing-as. Significantly, while random ideas do not appear logically out of a brief, Halle believes that random ideas lead to clarity through the network of associations they stimulate:

Going through random stuff to find something to go through it. So like the chaos theory where everything looks chaotic, and then in the chaos you find the system and then the systems relate to the brief ($IT_H_1_9$).

They begin the process rather than determining the solution or as Halle says they 'stimulate my mind to the brief'. Significantly, while Halle does not understand the association between random ideas and 'organising principles', she does understand that random ideas determine 'what' she will attend to and 'how' during the design episode:

Yeah that's true, so If I am sitting trying to think of something that will stimulate my mind to the brief I guess it is just random things that could be anything and that's how my mind will start working out what I am going to do and how I am going to do it ($IT_H_1_{14-15}$).

Random ideas depend on informal and unorthodox information for their generation or the unorthodox use of formal knowledge, rather than reference to precedents or case base reasoning. Seen individually, Halle's ideas do appear to be random but seen collectively many of them are associated with her meta-interests in modular origami. During the course of this case study Halle has designed a church with a kinetic roof, a 'shelter' which is portable and collapses like an umbrella, a container based on a mechanical mouse-trap, and a table which resembles a see-saw. While apparently random ideas, all four project are inspired by mechanisms and geometry. In addition both the 'shelter' and the 'see-saw' outcomes were inspired by social and ecological sustainability. Collectively these projects indicate that Halle consistently relies on well honed, strongly held beliefs within problem setting.

Random searches

Halle believes random ideas just 'pop into her head'. However over her three studios she consistently applies tacit means both to stimulate and to evaluate random ideas. Within a focus of inquiry governed by her appreciative goals authentic ideas are generated which differentiate her from her peers, and which she finds personally interesting. They include random searches, mind maps, word play, humour and stimulating memory. Random ideas, although directed by the appreciative system are a *response* to the brief, not an imposed criteria. Halle usually begins making an initial description of the situation by using a key-word search based on words often drawn from the title of the brief such as 'passage' for the passage project, and 'shelter' for the shelter project. Halle calls this doing 'the word thing':

I think it starts off with a general something that has come to my mind, automatically from looking at the brief and then I type in something random to do with it or I will just go to one of the sites and look at the contemporary stuff that they have got in there. ... and maybe they didn't have anything to do with the brief but it inspire me to think more 'Hey yeah I can get something cool out of this brief' and then I would find something really random that I thought was funny, that I could somehow link to the brief and then I would get more inspired to do it and then I'd start working on it a bit more (IT_H_1_18).

Halle bases her random searches and her initial interpretation of the results of these searches on spontaneous reactions. The simplicity of these initial searches allows Halle to stay open and responsive while making 'initial descriptions' of an unfamiliar and ambiguous situation. While Halle searches on keywords, she responds to visual stimuli, which she interprets or links to the brief:

I think, especially if I am lost with it. If I am bored with it and I don't really know what it's telling me or what I am doing I will look at it and then ... I'd just go and look on the net and look up things, that - any word that came to mind from what was in the brief, I'd search on that and look up visuals about it or just go to any sort of artistic or design type website and look at different people's ideas and look at the concepts behind what they had designed (IT_H_1_18).

In the initial instance, visual stimulation allows Halle to make qualitative judgments that are edited against her appreciative goals, not the criteria of the brief. Information is deemed relevant if it is 'funny' or 'cool'. This is Halle's way of reading a feeling (being amused) as information (the idea is generative), enabling her to form qualitative judgments which appear unedited or uncensored but which *are* being critically evaluated, just not against normative domain knowledge or logical criteria derived from the brief.

While Halle's ideas are playful she takes them seriously. She does not write initial ideas on her brief documents because she wants the brief to remain 'clear' to simulate fresh ideas. Halle writes her initial responses in her journal even before she can explain the association. This insures against losing ideas and the need to edit them. In this way Halle positions herself to hold multiple perspectives:

It's more random. I can get flashes and think that's a really good idea and start writing stuff down about it and other times I'll have some sort of idea and then go to class and talk about it and she'll say a word and I'll be like 'oh that's cool yep' and that relates to it more and work it in that way (IT_H_1_14).

Mind maps

Halle's 'mind maps' are an illustrated, interconnected network of ideas, usually expressed as works, drawn within her journal (Appendix I, 3), either in parallel with an initial word search, or as the basis of a second round, or conceptual, word search. Halle was taught to use 'mind-maps' as a concept generating activity in her high school art classes and came to associate them with unifying and clarifying her ideas:

... like for the [spatial design] one with passage at the moment I will write down 'passage' and do a kind of mind-map thingy, which is I think because they told us to do it in high-school and it kind of does help, ... it sort of clarifies it and then I get other ideas coming through to the original idea that I had to make it more of a unified idea (IT_H_1_6).

Halle insists that mind maps help her clarify ideas. A close examination of these mind maps suggests that they clarify ideas by illuminating and removing obvious connections from the field of inquiry to allow for more innovative idea generation. Halle's initial mind maps are not especially detailed or complex but they do often include interesting word-play and associated doodles which quite often have elements which find their way into her final frames, often without her comprehension. Her mind maps also help track her moves and ensure she doesn't lose 'bits' of her ideas.

Immediacy and memory

There are two key types of prompts which seem to trigger 'random ideas'. They are visual and verbal stimulus in her immediate vicinity, especially when she is actively engaged in thinking about a brief such as in studio or at her desk at home, and her personal memory, or a combination of both:

Well the first thing that comes to mind that's how I do it, obviously at different times I'll do it differently, if I am sitting there and the teacher will be explaining something and will say one word and that will trigger something in my memory and then I'll go 'hey that's a really cool idea' and it will just remind me of something really random and I'll start working with some sort of random concept or object or visual type thing (IT_H_1_5).

The process of triggering memory can also happen during more directed information searches. Here it seems to serve the purpose of linking theory to personal interest. Halle used the example of the 'memory box' brief to discuss the role of random ideas and branching within her design activity. Halle began with a key word search on 'memory' from which she discovered 'cognitive maps'. She linked cognitive maps, with maps generally and with 'puzzly kinds of things' which branched into associations with toys and branding:

I was reading something about memory for my object thing, I started getting this idea and they were talking about maps, the cognitive maps, and I started thinking about maps and puzzly kinds of things and - then I thought of my sister and how she got a marble track for Christmas and I thought, 'oh yeah you could have this marble track and then it flicks something and an image comes up and it's like the way your memory gets to the memory'. so when I was reading about the maps I was thinking about a literal marble track or some sort of cog like machine, a simple mechanism thing, and I also get stuff from primary school when we used to play with these little Lego kind of things that had pulleys and that kind of stuff. (IT H_1_16)

To construct a concept Halle often connects domain information with personal memories or immediate stimuli. It is possible that attaching complex information to personal interest through memory and immediacy serves the purpose of allowing Halle to respond to surprise and generate novel ideas without being overwhelmed by ambiguity.

Generative humour

Halle often refers to the role of humour in her concept development. As a rule Halle's final projects are not deliberately humorous but a lot of her initial design activity is. Humour and word play are Halle's favourite vehicle for sensing similarity between two dissimilar concepts. Humour is vital to Halle's idea generation because it is launches her out of the normative interpretation of situational discourses. What she refers to as 'funny' is not comical but the stimulation generated by the unlikely combinations of words or ideas. These amuse Halle *because* they are not logically connected to the brief and therefore offer the opportunity for altering her perspective and generating novel ideas.

Because these combinations amuse her they remain uncensored allowing her to remain open and responsive to surprising triggers both in terms of idea generation and evaluation. Because Halle deliberately looks for triggers which amuse her and which are 'out of place', they are not treated preciously and she can play with them. Halle rarely censors these ideas and then only retrospectively, once they have served their purpose of bringing her closer to a clarified idea. For Halle it is a way of making sure her ideas are unique combinations of information that are authentic and different. Halle's use of amusing childhood references for instance, are not only associated with her two young step-sisters, but the ability of childhood references to reinforce playfulness within idea generation and design activity in general.

This is especially apparent in the word play and amusing sketches within her journal. These frequently appear to be completely unrelated to rational design decisions but are 'conversational'. In her initial site sketches for her 'passage' project, Halle drew a tree in response to the trees around her with a trial of ants spiraling around it and wrote 'Twinkle, twinkle, little tree won't you be a space for me'. The 'tree' trigger set off a network of associations that led to her final project being based on circulation. In addition, the ants featured in her graphics project as a substitute for a human community. In another example Halle drew a tea bag in a cup of hot water as a way of playing with the idea of how mood and environment 'seep' into each other as part of her analysis for the 'shelter' project.

Halle's commitment to using humour to stimulate her ideas is visible on the front page of each of her studio diaries on which is written 'concept cumquats'. This is both a word play and a metaphor. She decided to name her diaries using a fruit because she wanted her ideas to be 'fresh and juicy' like fruit. When questioned about this a year after the

interviews it still amuses her. Similarly when she arrived for her third interview she insists on telling me that she and her best friend have invented a company name for themselves 'Hall-it-Park-Hard', which is both a play on computer company Hewlett Packard and their surnames. Word play also factors into much of her random searches as seen in the 'top-of-the-table' brief where she focused on the inverse idea of secrets below the table, not the specified objects above it.

Communicating random ideas

Random ideas as local move experiments enable Halle to process an otherwise chaotic and overwhelming array of information despite a lack of domain knowledge which could and often does, stall novice designers in the formative stages of their projects. The initial frame which stimulates branching, often becomes quickly redundant:

I mean when I am looking at a brief and I don't know what I am doing yet the journey that I go through to get to what I am doing, obviously everything leads to something else. So if I am going to say, 'hey a water bottle' and my next idea was something about water and how it effects - how it puts light on the wall when you shine a light into the water, I couldn't get to the idea of water without getting to the bottle first (IT_H_1_15).

Halle believes that her initial ideas appear 'weird' to her peers and tutors because her idea development is an iterative process in which random ideas evolve through branching. In this way, as in the Schön's 'reflective conversation' Halle's ideas are co-constituted between the situation and her appreciative system. Because they are not logically derived from the brief and are based on metaphors structured from her appreciative system they are hard to communicate:

So I have to get the random ideas before I can develop it into something that really makes sense and I think that's why I find it hard to talk to someone and get them to help me to clarify my ideas because where I started with the water bottle they're like 'I don't know what you're talking about' (IT H 1_15).

Halle calls the essential process of clarifying her ideas 'branching'. Her concept of a network of associations is very similar to Schön's web-of-moves and Dorst's 'local network of links'. Despite the fact Halle finds it difficult to communicate these initial frames she persists with this practice because she is motivated by 'cool ideas' which forge her extant personal interests with the design situation, extending her understanding of both:

Just things to make. I don't know why I did it, I think just because I was interested in it, and I found it exciting when I found something new that was cool (IT_H_1_30).

Cool ideas

Random ideas are initially evaluated against their potential to stimulate further ideas, not their direct capacity to solve the problem at hand. Halle adopts random ideas that are personally meaningful to her, which she often describes as 'cool':

... it sort of clarifies it and then I get other ideas coming through to the original idea that I had to make it more of a unified idea (IT_H_1_6).

Halle evaluates ideas using personal responses directed by her appreciative goals. These initial evaluations based on, whether is it amusing, she like it, it generates more ideas, and whether it can inspire her to think more positively about the brief. If Halle can not manipulate an idea to fit the situation it is dismissed. Cool ideas, therefore must be viable but not obvious:

And maybe they didn't have anything to do with the brief but it inspired me to think more 'Hey yeah I can get something cool out of this brief' and then I would find something really random that I thought was funny, that I could somehow link to the brief and then I would get more inspired to do it and then I'd start working on it a bit more. (IT_H_1_18)

Interestingly Halle does not assess random ideas against absolute values such as 'right' or 'wrong', only against her personal preferences, her motivation and their viability. She develops ideas and evaluates them using 'branching' through which she achieves her aims of unity and clarity:

I don't know how I do it, I guess I choose the ones [stimulus/ideas] that I like the most. Or what is the most interesting to me because if it's not interesting I am going to get bored and it's better to find something that you are interested in so that you keep working on it a lot. (IT_H_3_16)

BRANCHING

The principal aim within Halle's design activity is to establish 'unity' and 'clarity' within her ideas which she does through activities she calls 'branching' and 'linking'. Branching builds the associative network of ideas based on new information, extant knowledge and Halle's appreciative system. Branching resembles Schön's move experiments within a web-of-moves. 'Linking' connects the associative network of ideas established through branching both to the brief and to a potential solution. Establishing a viable 'link' mirrors the point of commitment Schön described as a 'design node'. As such, linking is far more difficult for Halle than branching. Casakin made a similar observation in his study of the use of metaphorical reasoning in design studio in which he suggested that novices find it easier to generate metaphors than to convert them to design solutions (Casakin 2004:8).

Authenticity and ownership

Halle believes that design activity is a 'journey', without which her design outcomes are 'fake' or lack 'that unifying thing'. Design activity as a 'journey' is based on experimentation and knowledge generation not assimilation. Halle never discusses her ideas in terms of being right or wrong only in terms of their unity and clarity and their correspondence to her personal preferences. Halle's principal aim within her design projects is to generate a unified and clarified concept that she can use to direct her design activity. She states that the most important part of her design activity is 'the initial part, getting the concept and ideas, otherwise I am lost. If I don't have some sort of idea that I like then I just won't get into it' ($IT_H_1_1$).

Halle's term 'branching' is used to describe how her ideas become 'unified and deeper, so that I do come out on top with something that I really like' (IT_H_1_26). Branching equates to early problem setting, which directs further design activity. For Halle this initial stage of the design episode, in which she constructs a 'concept' or frame, is so vital that without it, a project can be 'hell' (IT_H_1_17). 'Branching' corresponds with Schön's web-of-moves and Dorst's 'local network of links', and represents Halle's attempt to maintain multiple perspectives while establishing which perspective is most viable. Branching is based on the critical belief that information leads to associated information. This network of associated information, which initially appears chaotic, eventually leads to a level of clarity. Branching is the process by which Halle senses the similarity between a 'tree' and a road network at the beginning of the 'passage' project but arrives at a design for a church like space with a kinetic roof. In effect, the activity involved in branching is how Halle converts a random idea to a concept or 'frame'.

Halle perceives a lack of uniformity within her design activity because of her practice of developing 'random' ideas through branching. While this practice enables Halle to generate a fit or 'link' between these ideas and the demands of the brief, eventually

leading to a unified concept, the fact that she feels it lacks 'uniformity' indicates that she is unsure about the legitimacy of this practice as formal design activity:

And so each different thing that I think of will remind me of something else that I associate with it and somehow those little branches will get me somewhere closer to a unified concept for the brief. But it's not really uniform ever, in the way that I work, I think that's why I have to take a lot of time to think about it just in case I don't somehow get a branch that leads directly to the brief and I have to keep branching out ($IT_H_1_6$).

Halle however, applies this practice to all of her design projects during the case study. Her perception that her design activity lacks uniformity is based on the combination of random ideas, based on informal and unorthodox knowledge, and a networked rather than linear process. Her 'branching' activity is motivated by appreciative goals and structured though the associative network she forms to develop her ideas. This is evident in her personalised evaluations of initial description, 'cool information' and the use of her journal to back-track ideas.

Early branching activity

In the absence of any other linking device Halle will begin to construct 'branches' by connecting domain information to her personal memory. These memories are never evident in the final project, they are simply a means to begin branching. As seen in the earlier discussion of the 'memory box' project, Halle began with a key words search and reading about memory in order to make initial description. Branching began when she connected the concept of 'cognitive maps' from her research into 'memory' with maps in general, and then connected maps with puzzles via with her own memories of 'puzzly kinds of things' (IT_H_1_16). She then associated puzzles with her sister's mechanical marble track toy and her own childhood Lego which also involved mechanical elements like pulleys This early branching activity enabled her to reframe the 'memory box' as a toy.

In the absence of any associated memory Halle forces a connection by making a subjective evaluation of the information she has sourced. She frequently begins branching by asking 'how it makes me feel?' in order to trigger a connection:

Well I know I did that a lot for Macquarie Place for last semester. I knew kind of what I wanted to do and I just went to design sites and started looking at contemporary stuff that people were building and they had like one person had made this model and it was like a blue painted wall and then they had these wires coming out with clouds which kind of bobbed there and I thought 'that looks really cool'. And thought about what kind of - how that would make you feel standing in front of that and if I could use some sort of concept like that in my brief to talk about Macquarie Place and think that's where I got my idea, and I had the idea of the canopy and how it makes you feel and then the pathways leading in kind of like a Y-shape and then my final concept was about the peacefulness of it and so I had the peace sign which was like the pathways (IT_H_1_7).

Halle frequently begins 'branching' based on appreciative responses to information she finds stimulating when she has no other relevant criteria to evaluate against. This first round of evaluation establishes the initial connections in branching.

Establishing relevancy: cool information

Halle's regular reference to cool information illustrates the role of branching, in the structured and motivated use of the appreciative system in design activity. In order for information to be deemed 'cool' or relevant it must be familiar enough that it is not 'baffling' and unfamiliar enough that it constitutes a 'discovery'. By 'branching' her information searches and ideas Halle is able to approach the unfamiliar while remaining connected to the familiar, allowing her to connect new to extant knowledge:

... if I am completely baffled by it and I can't work it out it could be interesting for a while but if I still can't work it out it's like 'Argh, get it away from me' but if it's got some sort of element that I don't know about, that will be the thing that I go for. Because I don't want to keep doing the same things that I have been doing. I want to feel like I have gotten somewhere new (IT_H_3_16-17).

If information is too far removed from her appreciative system it is rejected outright in much the same way as if it is boringly familiar. Her appreciative system both stimulates and supports the expanding web of her design knowledge. In this way 'cool information' is the basis of seeing-as for Halle, as in the 'ants episode' in which she substituted an ants community for a human community because the alternatives were too familiar and therefore too boring for her. On the other hand she will abandon a line of inquiry, but not an entire idea, if it is 'completely baffling'.

Branching means that abandoning an idea does not lead to a new disconnected design episode but the abandonment of an element or branch of an idea *within* the design episode. This is a means by which she clarifies her network of associations. That Halle would only 'abandon ship' entirely on instruction indicates her confidence in branching and the agency of the designer to establish a link between random ideas to the situation or the brief.

I think I just go back to the stage prior to it and try and work out another passage from it ... I think I would find it really hard to abandon ship. I probably wouldn't be able to do that unless I was forced to and the teacher said 'It's bad and you're going to fail if you don't change your idea' and then I will start freaking out, and I will spend every second of my time thinking about what I am going to do. Or like if I am on a bus going to work I will be thinking about it and looking at things there and going 'How can I relate that to the brief ? (IT_H_1_13-14).

The role of Halle's appreciative system in evaluating the relevance of information is illustrated by a library search on the word 'shelter' for the shelter spatial design project. In much the same way that Halle made an interpretation of the words 'surface and texture' as 'crafty' in the 'memory box' brief, she made an immediate assessment of a book based on its aesthetics and rejected it as irrelevant. Halle found two books with the word shelter in the title in the library catalogue. She rejected one book immediately on the basis of its appearance. It was covered in canvas and contained old fashioned line drawings of cave man dwellings. Hale stated that she knew she could learn something about shelter from the text but would rather learn from a source that was 'cool'. While she rejected the book as being irrelevant she conceded that the idea of subterranean insulated house (like a cave) was interesting (because of her interest in sustainability) just not in that format or context. Rather than being a purely aesthetic judgment the text was in effect too familiar to be interesting:

Which is interesting but I can learn it from somewhere else which is more interesting, like I have learnt that from another book like something about keeping warm so you put the house underneath the ground so that it's insulated by earth $(IT_H_3_16)$.

Halle's evaluation of the relevance of 'cool' information suggests that 'branching' corresponds with Schön's concept of fidelity within a web-of-moves. Halle evaluates against her appreciative system (the familiar) and past and future moves (an assessment of whether she can 'work it out').

Fidelity: tracking moves

Branching involves linking moves so that Halle can move beyond her extant knowledge and tolerate ambiguity within a structured design episode. The interconnection of ideas means Halle can 'backtrack' and not 'lose little bits' or associated ideas which add depth to her concepts. While Halle's principal aims are unity and clarity within her ideas and design outcomes, she is comfortable with a notion of the design activity that lacks clarity, especially at the beginning. This 'philosophy' that design activity begins chaotically and is gradually clarified underpins the way Halle sources and processes information, generates ideas, expresses and develops those ideas, and communicates her design intentions. There is a strong link between this belief, her motivation and her tolerance for ambiguity.

Halle believes her journal is vital in tracking branching ideas in order to move from chaos to clarity, stating 'I get other ideas that branch out from it and then I start writing down in my journal'. Well before she can explain their relevance, she documents initial frames such as 'water bottle' or 'mouse trap' as soon as they occur. In effect her journal acts as a safe house for sensing similarity which is then 'unified and clarified' through branching. Because these 'feelings' are difficult to explain in the raw state, Halle's 'conversation' with the situation takes place in her journal:

We were just sitting in class and the teacher was talking about different ways to make a box and somehow, I don't know how, I got the idea of a mouse trap. I just thought of it in my head and the idea of your mind looking for something, and it reminds you of something, and how your memory gets to realise what it's reminding you of, and it's like a mouse trap snapping on a mouse. You snap on a memory. And so I got that idea and I wrote it down in my book and I started thinking about that more and my concept has developed from that. So telling somebody that I am using a mouse trap they are not really going to understand what I'm talking about but then once everything else I've got is clarified then I explain it to them and then they understand (IT_H_1_12).

Halle uses her journal to track the development within branching ideas. This backwards – forwards motion seems to support her tolerance for ambiguity and the internal consistency of her projects:

Well I think just so that I don't forget I do that and I can always look back on it and think 'Oh that's what I was doing' and maybe take an element from what I was originally doing ... at the time ($IT_H_1_10$).

Annotated images

Halle has a historical preference for making over drawing. She also has a strong desire to generate complex ideas. These appreciative goals determine how Halle maintains fidelity within her branching activity. Halle's journals are dominated by word-play, single phrases, metaphorical doodles, photographic images cut from magazines or downloaded from the internet, and diagrammatic sketches. There are very few sketches of final designs because Halle predominantly used her journals to track early branching activity and uses model making to resolve her final designs. Her journals are used to ensure she does not lose little branches or ideas that add to the complexity of her frames as she expands her associative network:

So I would do the word thing [keyword search] and then last semester I would go onto the net and I'd look at different things and say 'hey that looks cool', and 'that looks cool' and take those onto my 'desktop' and print them out and put them in my journal and then start writing notes from them and then start forming ideas from that $(IT_H_1_7)$.

Writing in her journal is also used to evaluate ideas, both against her appreciative goals, such as the 'ones that I like the best', and against her moves, such as 'which ones could I modify?':

Well depending on what the image is I will look at what draws me to the image and I will write that idea down next to it so that I don't forget and then look at all of them and look for the strongest, which ones really relate or which ones could I modify that could relate to my brief and then I take the ones that I like best and then just start working with that. Just fiddling around with it (IT_H_1_7).

It appears that, rather than re-reading her journals, Halle uses the process of documenting ideas to secure them within an associative network. In the 'passage' project for instance, Halle said she had no recollection where the Fibonacci proportioning sequence came from in her final design, and yet the very first drawing in her journal, shows a tree with a spiral around its trunk and lights among the leaves. She connects this tree to movement through the concept of circulation. Several pages into her journal, but well before she articulates her final concept she connects natural fluid forms to a sunflower and has written on the page 'Fibonacci' and circled it. Towards the end of the project she drew a structure based on leaves rotating around a central stalk. This structure was based on the way leaves rotate around a plant to maximise photosynthesis using the Fibonacci proportioning system. Halle interpreted this as a random idea but it was based on an early

response to the site which she documented in her journal. In this way Halle's journals help her establish her web-of-moves or her associative network of ideas and maintain a level of internal consistency within her design episodes.

Halle's preference for making over drawing means she is rarely satisfied with her two dimensional representations and notes 'I don't do that much drawing unless I am forced to' (IT_H_1_20). She finds poor visual representation de-motivating because of the accompanying loss of complexity even within the safety of her journal. She insures against this loss of complexity by annotating her drawings saying 'so usually I just write what I am talking about and it'll stimulate my brain to remember what I was trying to draw' (IT_H_1_21). In this way writing and word play are vital tools in dealing with ambiguity, managing complex associative networks determined by Halle's appreciative system:

I'll see it in my mind and I won't be bothered to draw it because it will take me too long. Especially if I see it in my mind and I draw it and it looks nothing like what it looks like in my mind. That drives me crazy and so I just - it de-motivates me as well and I think 'it doesn't look anything like what I want to do' and then by that stage my idea is sort of un-clarified and I've forgotten little bits that I thought were really cool and they're gone (IT_H_1_21).

Halle would rather tear a drawing out of her journal than have it confuse her. To insure against a threadbare journal she rarely draws in her journal and her most expressive images are on loose paper which she store in her journal. Halle's reticence to draw bad images appears to reflect the role her personal preferences have in managing complex ideas and tolerating ambiguous situations in the absence of other domain knowledge such as skilled image making:

I think I just find it harder to represent my ideas in 2D as opposed to 3D ... I think it's just that when I am making something 3D I know what I am doing $(IT_H_1_20)$.

Halle's move from sketching to model making indicates a sense of unity and clarity within her 'concept', not only because of her preference for making but because she no longer needs to use her journal to track her ideas or as a reporting device for her tutors.

Unity and clarity

Halle extends her branching activity using a second round of information searches based on conceptual key words as opposed to brief key words. For instance, once Halle arrived at the initial frame of a 'portable' shelter, she searched on the word 'portable' within the library catalogue, which led her to tensile structures. This process repeats itself until she begins to feel her idea has some clarity. In this case, it eventually let to Calatrava's 'flexible geometry' and the 'foldable cube' that inspired her collapsible 'portable' shelter.

As soon as Halle has a concept she likes, that she feels has some unity and clarity, she shifts from using her journal to making three dimensional representations of her idea however conceptual. This shift mirrors Goldschmidt's concept of moving to 'tighter moves' in order to test a frame or concept (Goldschmidt 1988:243). She transitions between these phases by diagramming what she will make three dimensionally:

Well say I have an idea of a concept and I start thinking of visual ways to represent it in my models then I start drawing pictures of it and start writing ideas next to it $(IT_H_1_10)$.

Because of her confidence in making, Halle is much more likely to be able to articulate an idea, once she has started model making, then at the sketching stage. Significantly, Halle's appreciative preference for making motivates her to shift from idea speculation to idea generation:

If I kept going with that I could just - my concept could just get more and more diverse and turn into something that wasn't, isn't unified at all, so as soon as I get some sort of clarification in my concept, that's when I start making and trying to think about how it's going to end up unified in its 3D form (IT_H_1_28).

Halle's journal represents initial descriptions and early speculative moves whereas her model making represents tighter, more directed moves:

I'll make some sort of model and if that works I'll keep working from that and I might go back and research something more about that from another book or things that are related to that otherwise I'll just keep making. (IT_H_1_28)

Halle's preference for making however can undermine projects by leading her to think she has a resolved idea when she hasn't:

And was really caught up in trying to make the models – the little white model, work. Which took me a while and when I finished that I thought 'Yeah! Done!' [laughing] and I didn't really think more about it $(IT_H_3_2)$

This was the case with Halle's use of the 'foldable cube' model for her 'shelter' project. Once she had invested the energy in resolving how to mimic Calatrava's model she developed an unrealistic sense of completion which was not helped by her tutor's insistence that she stopped working on the form. Halle in effect substituted the skill of making (knowing-that) for innovative thinking or linking (knowing-how) to the detriment of her project.

LINKING

One of the most enlightening aspects of Halle's design activity is her belief in her capacity to link a random idea to the brief. Random ideas are about play and discovery so by definition they are not logically associated with the brief. Halle perceives her main objective within early design activity is determine the link between her random ideas and the brief, and establish some sort of unity between the two:

Different things stimulate my mind sometimes. Obviously I have to get something that doesn't – that stimulates me but has nothing to do with the brief and so I guess it just depends on what's there to stimulate you and whether it does just happen to have something to do with it. It just depends on what's there and what the brief is and whether there is any sort of link, and whether my mind picks it up or not and that's what makes it kind of that random idea, because it seems chaotic and through the random stuff you get to a ... (IT H 1 16).

Halle's belief in the agency of the designer within design activity is evident in the motivation she derives from personally framing the design situation:

I would find something really random that I thought was funny, that I could somehow link to the brief and then I would get more inspired to do it and then I'd start working on it a bit more ($IT_H_1_8$).

Halle's idea of making a 'link' between the brief and a random idea is in effect fitting a situation to a frame, where the frame represents her associative network of ideas.

Halle's biggest struggle is with clarifying this network. As a result her frames are often not fully resolved which in turn makes it difficult to fit the situation to the frame. Halle suggests the hardest thing to do is:

... to filter out a final design that showed all the things in my concept that I wanted to show. And I think [that was hard to do] because I had too many ideas in my concept, to be able to find an easy 3D option (IT_H_3_9).

Ironically the moves needed to clarify a network of ideas appear to be those which are least visible in Halle's design instruction. The only clarifying 'move' that is demanded of Halle is to generate a 'concept statement' for her spatial design project, which she manages to avoid doing until the night before her presentation.

Linking experiments

Halle belief that in order to clarify chaotic random ideas you first 'find the system and then the systems relate to the brief' (IT_H_1_19) emphasises the vital role of interconnected 'linking' design moves in forming generative situational frames. Halle uses writing in her journal as the process for generating an associative network of ideas, and linking this network to the brief and to a potential outcome. This writing is based on 'little statements'. In effect, these little statements are move experiments which are all interconnected within an associative network:

I read [the brief] and I write down the most important points and then I'll start just writing things down in my book, like little statements or little lines that I can link to things. Then just try and make little links to information I have found and my concept, ... and trying to link that to the idea of shelter and then trying to link that back to the information that I have got. So I do it through my diary (IT H 3 18).

Halle always talks idea generation in terms of *her* ability (or inability) to link her random ideas to the brief, using expressions like 'whether I could relate something to it'. Halle does not talk in terms of things being right or wrong but whether she thinks there is a potentially interesting connection. As such 'linking' is the ultimate expression of the agency of the designer. Halle's 'links' are almost always based on the combination of her appreciative system and new information, but not necessarily domain information:

It was what I was doing at the time and it was something that I had been already previously been interested in and I thought 'Oh yeah this is cool'. I mean it is a space but it turns from an umbrella into a cube if you wrap that in material, it is a space – 'this could be my shelter' as opposed to thinking of it like 'wow this is a really good example of a shelter' it was more like a 'what can I make as a shelter ... hey that would be really cool as a shelter' (IT_H_3_14-15).

This is not a linear process and if Halle becomes stuck and cannot establish a link she returns to the brief which she will read 'over and over and over again' looking for 'what kind of conceptual thing I could do to link all the ideas together' (IT_H_1_5) which often involves exploring further branches within the network.

As the semester progresses Halle used the work 'links' more than 'random'. As she moves further into the projects, and her own expectation of her performance increases (in line with her appreciative goal of constantly developing her ability), it is the process of making the links or connections between her random ideas, the brief, and the potential outcome which becomes hard for her to manage. Early branching activity such as making initial descriptions through keyword searches and responding to triggers through random ideas is not as difficult for Halle as linking. The process of tightening her associated network of ideas into a communicable frame in order to direct the development of an appropriate outcome is where Halle fails to negotiate the 'discovered gaps' that Schön suggested were necessary for 'reciprocal reflection' within her design demonstration. In Halle's case this appears to be because the 'gaps' are too wide or incomprehensible and there is a lack of demonstration of imitable moves.

What do I do next?

The associated network of information based on a random idea which Halle develops using 'branching' does not automatically become a generative frame. Halle acknowledges that she often needs assistance to unify and clarify her ideas and while she prides herself on being an independent thinker she says that her basic approach to her studio classes is 'look what I have got, what do I do next?' (IT_H_3_19). The need for regular guidance in terms of the 'next' step in her design activity is critical and without it she says she resorts to 'just sort of scavenging for something that's just going to go 'yep, next step!'' (IT_H_2_5). Identifying moves to refine ideas is much harder for Halle than stimulating them in the first place. Halle suggested that 'scavenging' for the next move happened when she had not prepared adequately for a class and when she was given confusing or abstract instructions.

Halle frequently begins her projects strongly, establishing interesting connections between ideas but is sometimes unable to refine these ideas into an outcome that is as clear and unified as she would like. Halle often interprets this as being the result of choosing the wrong information to link together, an example, for her, being the 'shelter' project in which she struggled to link ideas regarding poetic space, portability and the 'foldable cube' form.

While Halle sometimes disagrees with her tutor's advice, some of the most significant leaps forward in terms of her understanding of her design activity have been when moves have been demonstrated for her, which she can develop and make her own. Halle is most responsive to design demonstration, which enables her to develop her own ideas and interests. Design demonstration that is too abstract or too prescriptive seems to confuse or frustrate her. In her research into learning activity within tertiary design education Toynbee Wilson (2002) also observed that abstract instruction led to confusion and frustration in novice designers. For Halle, examples of constructive demonstration, that enabled her to work with her personal interests, values and beliefs, included the validation of her use of modular origami, and in particular being given the language to develop this understanding, and the demonstration of how to shift a literal metaphor to a conceptual metaphor for the 'passage' project.

An example of design demonstration that Halle perceived as being unhelpful involved being instructed to develop a graphic presentation based on 'trial and error'. In this instance Halle was struggling to clarify her concept for her 'shelter' project and had avoided writing a concept statement despite her tutor's request. Halle recounted several times that she had asked her tutor how to present her complex network of associated ideas graphically, and was told she had to work it out by 'trial and error':

That's what I was having problems with in my conceptual development, was trying to articulate what I wanted to say, what my concept was in 2D and I just couldn't get it all out without writing an essay on it. And that - I got really confused at that stage because that's when [Halle's tutor] said 'you know, you learn graphics through trial and error' and I said, 'I don't have time for trial and error, I just need to know how to do it...' (IT_H_3_10).

While Halle found this advice frustrating she did attempt to learn by 'trial and error' by evaluating senior students work which was on display at the time. In hindsight Halle realised that she needed guidance regarding how to unify and clarify her ideas. Although she achieved a high grade for this project Halle believed it did not facilitate any understanding of how to unify and clarify her ideas:

I actually have no idea and I think that's one of my problems, I am not very coherent in creating – having a lot of information and simplifying it into a small amount for people to just understand. Because if something's complex obviously – but everything is important, you just can't cut things out and have like the core elements. It's not what I am interested in, the core elements, I am interested in the whole complexity of it and how it all fits together and I find that hard to show simply and clearly (IT_H_2_16).

Halle suggested that a more successful approach had been based on using a design move which she had written in her journal from a previous lecture. It had been suggested during this lecture that a concept could be clarified and tested by the simple process of trying to name it. For Halle, the process of naming her 'shelter' project 'skin and bones' helped tie her ideas of an internalised poetic space and a portable shelter together and 'skin and bone' became the final frame for the project. Halle's use of this design move indicates that she is quite responsive to having certain types of design moves either described or modelled for her, which she then personalises through application.

Learning linking behaviours

Halle's 'what do I do next' approach to design studio is not about being given answers which she loathes as being 'spoon feeding' but the acknowledgement that she needs assistance to achieve the level of resolution she wants within her projects. It indicates that while Halle is very independent both in terms of her practice and the information she chooses to employ in her projects she does not have the experience or 'know-how' associated with design expertise.

Halle found the moves demonstrated for her by her tutor in the 'passage project' facilitated her ability to clarify and unify her design ideas. In the initial site visit, Halle's tutor offered the group an initial fame for evaluating the space, which is a park bordered by a major road and road tunnel exit. This demonstration enabled Halle to begin her analysis of the site based on her sense of similarity between the site and a tree which became her own initial frame experiment:

... [the tutor] said you have to look at it from this [a vertical] radius [circles the with her hands] and this radius [horizontal circle] so a three dimensional radius and as soon [Halle's tutor] said that I just ... I looked at a tree and I thought 'tree!'. And then I thought of how the roots represent the tunnel and then the trunk represents where we walk around and then the branches represent the sky $(IT_H_1_21-22)$.

Halle frequently senses similarity between ideas based on a personalised response to her tutor's instructions or something in her immediate vicinity. Halle often makes a very literal interpretation based on these immersion triggers. In this instance the tutor's demonstration helped move her initial literal association of a tree to a more conceptual idea involving 'circulation':

... [the tutor said] 'Oh you've got this whole circulation idea with trees and stuff' and the water goes thought the roots and up to the branches and then they form glucose ... and it makes this unified thing, and that's what I started off with. And so I had the concept of a tree unifying the space, and then automatically I just started thinking about how my end result was gonna be some sort of tree like ... building that was like a tree trunk or a tree house or something like that.

And then [the tutor] said that's more your concept, it doesn't have to be a literal form, you take elements of that and you put it into something else, and that's when I really got more clarified about it ($IT_H_1_22$).

This feedback is significant enough for Halle to have written it in her journal. Against the second drawing of the tree in her journal she has written 'End not based on tree. Not tree' obviously referring to the tutor's caution against being too literal. And then the tutor demonstrated a linking move and showed her how to connect two abstract ideas:

... [Halle's tutor] said the thing about circulation and then [Halle's tutor] said you can link that back to humans and that's like veins and how our body works and how we relate that to the space and how it circulates with people in the park and the traffic and the trees, and stuff like that. (IT_H_1_22)

Halle's overriding interest in the site related to the speed of the traffic compared to the stillness of the park. Her original 'random idea' was of a pool of water used as a metaphor for slowing down the movement of the traffic. Making the connection between the tree and human circulation gave Halle a means to pursue her idea. Her tutors move is suggestive rather than prescriptive but directly focused on the point she is at within her idea development. This meant that she had a means to begin to develop and personalise her ideas. Halle's interest in movement led her to translate veins to pathways of light, similar to the illuminated pathways on airplanes. In a typical Halle approach, the brief asked the students to consider how the environment effects mood, which Halle inverted to consider how mood effects the environment, using light to represent mood.

Within her journal Halle has images of light being manipulated through screens and blinds, and she spoke in the interviews about the mechanics of blinds manipulating light (Appendix I, 10). Halle thereby found a way to connect the concept of circulation to mechanics, kinetics and movement. Halle investigated this idea by making small rectangular boxes with a variety of different slits along the top, creating three dimensional versions of the light images in her journal.

Halle made a sketch of these boxes in her journal, stacked into a three dimensional cube, which resembled a Rubik's Cube puzzle, against which she wrote 'that game puzzle thing relates to circulation, can circulate anywhere along the path, idea of moving cubes in any formation within square'. The vertical stacking of the boxes as a metaphor for movement became the basis of her final design.

Again she has used her interest in modularity and mechanisms to construct an idea. In her first project Halle drew a tree with a spiralled pathway around it as a literal metaphor representing the configuration of the site and the types of movement within the site. Later, following the puzzle sketch, Halle drew a plant which mimicked the Fibonacci growth pattern in which leaves grow in proportion to each other, both in terms of size and distance apart to maximise light penetration to the plant. Halle had linked the Fibonacci proportioning system to the project earlier in her journal but did not recall this connection later. Halle then replaced the leaves with the light boxes in her sketch. Interestingly, Halle did not use the mathematical proportioning system on which the plants growth is based, but the concept of maximising light penetration to her light boxes by rotating them around a central plant stem. The Fibonacci proportioning system is taught to first year students as a naturally generated system that can be used within design. This is the only application of domain knowledge within this project, and even then it represents an unorthodox use of formal knowledge.

In the next sketch the plant is removed leaving a vertical stack of light boxes rotating around an invisible central axis. This form is then drawn in plan and elevation with the addition of some dimensions. At the same time as she explored another branch within her associative network, Halle also explored the concept of light by drawing an arc representing the movement of the sun from east and west. Somehow, and Halle is not sure how, she merged the arc of the sun with the plan drawing of the rotating light boxes (which visually resemble an arc if it is read as a section drawing) and arrived at the idea of a mechanical roof made up of light boxes moving across an arc. This became the basis of a kinetic roof for her 'cathedral'.

Halle designed the roof well before she knew what to do with it. She only identified her design as a 'cathedral' type space when her tutor insisted she produce a conceptual design based on an 'actual space'. Interestingly, in her journal next to the images of indirect light penetrating grids or blinds, Halle has written 'a path to trace' and 'a beam of light to walk to'.

These sound like references to sacred light and indeed alle connected the notion of light and circulation to the interior of a cathedral during choir practice, which takes place in a church although the choir is secular:

I found the right environment for me to put all my conceptual ideas into ... I can't remember what I was going to make before the cathedral but it was just nothing $(IT_H_2_8)$

Her final drawing is not of a cathedral but the passage up the aisle between the pews with the words 'prayer creates a peaceful environment' which is written over the top. At this stage Halle stopped drawing and began making her concept model believing at this point that her concept is clarified. Again she perceived this to be a 'random' idea but on examination it is part of a network of associated ideas mediated by her appreciative goals. When asked if she researched cathedral spaces she noted that she did not because she felt she had 'knuckle down' and develop the design. She said in hindsight that it was one way she could have further developed the idea, which ended up looking 'barn like' and 'unresolved'. Interestingly, she commented in retrospect that she could have looked at Le Corbusier's Ronchamp Chapel for instance 'which I am really interested in now but I didn't look at, at the time' (IT_H_2_8).

Retreating to fairyland

In his study on the use of metaphors in design studio, Casakin notes that novice designers have the 'cognitive capability' to form generative metaphors but still fail to apply these metaphors or frames to produce design solutions. Unfortunately he doesn't say why (Casakin 2004:8). Halle's case study offers some insight into her inability to unify and clarify her projects to the level she aspires to. Halle never assesses her ideas and solutions being as right or wrong, but only good or bad in terms of her perception of the needs of the project and her personal interests. A bad idea is one where she cannot link all the elements she wanted to link together and then fit these ideas or frame to the brief. Within the 'shelter' project Halle could not establish a strong link between the elements in her associative network and between this 'frame' and her brief. In terms of research the 'shelter' project represented a more complex project for Halle than the previous 'passage' project because of her attempt to incorporate a lot more formal knowledge. Halle attempted to link Aristolean philosophy of space, Bachelard's philosophy of poetic space, and Calatrava's 'foldable cube' together as a portable internalised private space. In the end, she was not able to develop the idea fully and simply replicated Calatrava's model at a larger scale with the application of a 'skin':

... [the foldable cube and poetic space] were two really separate things and because the Calatrava thing just came to me one day when I was looking in his book and then I was looking at Bachelard's stuff it was like two separate things going on at once, and then I tried to bring them together at the end. And I think that didn't work and I think that's what [Halle's tutor] didn't want to happen. She wanted us to start with research and then build a concept and then conceptual development and then build a visual three dimensional language out of that, and I didn't do that at all because I got caught up in this little [foldable cube model] which is what caused the problem (IT_H_3_11-12).

The fact that Halle could not link these two ideas does not mean that they are incompatible, just that she did not have the know-how. Schön stressed that frame construction is based on taking two dissimilar concepts and seeing them as similar which is what Halle did. What she couldn't achieve was the next step in which the two dissimilar concepts transform each other and in the process create a new concept on the basis of altered perception. While Halle was able to transform her understanding of shelter from something fixed with a roof, she could not see the foldable cube as anything but a foldable cube. Once Halle had resolved the mechanics of the 'foldable cube' she mistakenly thought she had resolved her design project which she recognised in hindsight saying 'I worked out a mechanical way of making it work but I didn't work out an actual end product'.

Making a successful 'link' is therefore the ability to generate a new concept based on altered perception. The ability to determine the relevance of information on the basis of one's appreciative goals although vital is not enough. Halle is very competent in this area but still struggles to establish strong links in several of her projects. Halle attributes the responsibility for her inability to make a successful link to her passion for 'exploring new design type things'. Halle believes her appreciative goals or personal passion to develop her interest modular origami through flexible geometry meant she 'got kind of caught up in this little fairyland' (IT_H_3_2). This may have resulted from her belief that this is was not legitimate domain knowledge in the context of the brief. Because Halle did not perceive this interest as legitimate knowledge in this context she wasn't able to use it to stimulate the altered perspective necessary to generate a strong link. Halle identified an interesting connection but did not have the know-how to make the link. It appears it is this know-how that needs to be demonstrated within design education.

The tutor's role to some extent within 'reciprocal reflection' is to help locate the novice designer within a focus of inquiry or the situation by modelling moves they can imitate. In the absence of any moves to imitate, Halle avoids the elements of the project she did not know how to address:

I don't know I think it's [fairyland] just my way of trying to filter out things that I don't need to think about at the time ... (IT_H_3_3)

Halle's sense of being in 'fairy-land' appears to be a way of coping with information overload especially in terms of managing the information she is trying to connect with a 'concept' or frame for the situation or brief.

Halle suggested that while other students were addressing the 'aesthetics' of shelters she was attempting to question the very concept of shelter (IT_H_3_3). Her project was an attempt to connect the work of two separate philosophers and theory regarding ethics, sustainability, and flexible geometry within a private portable space. Halle attempted to do this by moving through a series of literal metaphors including an umbrella, a swag, a bubble, a tent, and finally the idea of the skull (bone and skin) as the most portable of private shelters. Halle concluded in the final interview that she had 'too many ideas: in her concept' and 'didn't know how to make it concise enough to make that much sense'. The process of concepts transforming each other to produce a new concept prioritises elements within a frame and while ideas can inform a frame they are not necessarily visible. It is possibly Halle's fear of losing the detail within her ideas which prevents her from clarifying a final frame.

While she transformed her perspective of the self, the body, and shelter, Halle was unable to transform her perspective of the foldable cube in order to apply this geometry in an innovative or more appropriate way. Once Halle found the 'foldable cube' her aim was 'making it better and finding things that it does relate to'. Halle, in effect, constructed her own 'zone of proximinal development' (Vygotsky 1962) motivating herself beyond her own knowledge level, which she could not self-support:

... at the start I thought 'oh, I can make this work' and she was saying 'No, don't get onto 3D yet, don't get on to 3D yet' and I thought 'Nah, I can make it work' [laughing] and I obviously didn't and so I think next time, I definitely will try and if I find something 3D I will put it to one side till I work on like nailing the research ($IT_H_3_15$).
Halle's basic approach to design studio of 'look what I have got, what do I do next?' (IT_H_3_19) means that without moves being demonstrated which stimulate her 'reflective imitation' she believes she will 'lose reality' (IT_3_19) or avoid design activity she finds too difficult:

I'd be looking at research and I still wouldn't be able to make any links between the two of them, and that's where I put that in the too hard basket and put myself into that sort of not reality sort of 'yeah it's working, it's working alright' when it wasn't (IT_H_3_15).

Halle notes that she works best in classes where she is 'pushed' ($IT_H_2_22$). Being pushed involves having moves demonstrated with the expectation that she will build on this knowledge. Halle says that when she is 'pushed' she feels that rather than just 'scavenging' for the next moves she is 'more directed in what I am doing, as well as my own self direction, but my other classes I just feel like I am a little bit lost' ($IT_H_2_4$).

Possibly one of the reasons Halle can not always independently construct moves is because she does not perceive the application of her interests to be legitimate design knowledge as in the case of the 'foldable cube'. The lack of legitimacy in this case seemed to overwhelm the motivational quality of the discovery. In order to know what to do with new knowledge it needs to be legitimised, in the same way that her use of modular origami was validated by her tutor:

I think that was completely off the topic of [spatial design] and was for my personal stuff more, but I sort of found the next link for what I was trying to look for after the tessellation stuff ($IT_H_3_{20}$).

Interestingly Halle's language regarding her design activity changes during the course of the semester. Where she uses the words 'random', 'unity', and 'clarity' frequently at the beginning, 'linking' and 'branching' dominate the end of the semester. This reflects Halle's increasing awareness of her difficulty in managing complex ideas rather than responding to cues and generating initial frame experiments. Halle suggested that while her language had changed her design activity was essentially the same. The change in language represented a change in priority from developing unique combinations of information to ensuring the frames are manageable and viable. This represents a maturing within Halle's design activity and a desire to produce stronger outcomes.

In terms of Halle's satisfaction with her projects, her most successful project during the case study was probably the 'top-of-the-the-table' project because she was able to link all of her interests together and connect them with the requirements of the brief or the situation. The design of a see-saw table for children represented a shift in perspective in all of the areas that contributed to the project including dining, the structure and materials involved in furniture making, consumption and play. It is possible that unlike the open spatial design briefs, this may have been a result of the narrowness of the brief but it does suggest that the altered perspective necessary to form a *generative* frame is possible for novice designers.

SEEDING DESIGN KNOWLEDGE

Schön believed that the 'designer's artistry' *mediated* the use of research based theory in practice (Schön 1985:92). Halle employs a wide range of informal and unorthodox knowledge within her design activity. The formal knowledge she employs if often non design domain knowledge which is employed in much the same way as her personal knowledge. Halle's appreciative system mediates the use of formal and informal knowledge by creating a principle of relevance against which she is able to evaluate her initial interpretations of the situation and new knowledge. While Halle does not always establish strong final frame she still seeds knowledge through the application of her preferences through cross-fertisation and stimulating dormant knowledge, both of which help seed new knowledge including domain specific and domain-independent design knowledge.

Cross-fertilisation

The cross fertisation of imagery within the initial description Halle makes of design situations suggests that a surprise trigger in one situation can become an initial, albeit tacit, frame in another. This becomes a kind of short-hand which enables her to make the quick qualitative judgments on which her initial organising principles are formed, in the absence of any other evaluative criteria. What may be a situational trigger in one area can become an initial frame in another. Schön suggested that designers needed to position themselves to be open to surprise. It is their qualitative judgment in response to surprise that creates a principle of relevance which connects new and extant knowledge.

It appears from Halle's design activity that seeing-as is more than just sensing the familiar in the unfamiliar. Designers can *generate* surprise by inserting anomalous information into a situation when the information is familiar to them but not the situation. This is a very proactive way of dealing with the ambiguity of the situation and may be an insight into how designers alter their perspective or 'step out' of normative understandings of situational discourses. This practice accounts for why Halle's apparently random ideas do not appear to unsettle her. Her ideas are random within the context of the situation, but not to her, because they are guided by her appreciative goals.

The cross fertilization of triggers and initial frames is most evident within her journal sketches for her first project in each studio which took place simultaneously. In the initial sketches for the 'passage' project Halle drew ants around the trunk of the tree and related the opening of the road tunnel to a mouse hole. In the object studio she used the metaphor of a 'mouse-trap' for a memory box. Again simultaneously she substituted 'ants' for a human community in her graphic design project. While these triggers appear to be 'random' they all relate to her personal interests, values and beliefs.

While less apparent in the second round of projects Halle's projects were again all interrelated but used a more abstract stimulus. Both her spatial design project and her object design project were stimulated by kinetic mechanisms and the and how the human body engages with the built environment and objects to determine communal or private activity. In both projects the final design required the physical involvement of the user to take form. Halle's 'shelter' as a collapsible, portable space was designed for private contemplation in the midst of 'semiotic waste' [Halle's reference to Manzini's term] or visual overload and could be carried and assembled anywhere. Her see-saw table conversely did not work unless two people participated, thereby facilitating communal activity.

While this is tacit, it appears to correspond to Schön's belief that it was essential for novice designers to identify their likes and dislikes in order to make qualitative judgments in the absence of relevant domain knowledge. Schön believed designers use exemplars to help sense the familiar in unfamiliar situations. It is often assumed that exemplars are frames that have been successful applied in previous situations but Schön asserted that they could be unused frames which were not appropriate in one situation but could be stored and applied to another (Schön & Wiggens 1992). Schön also believed that the imitable moves demonstrated by tutors could become exemplars (Schön 1985). In this

way they don't have to have been tested there is just an appreciative sensitivity toward them that helps the designer to create a principle of relevance for information and to alter perspective to create new knowledge. It appears Halle began to develop a sensitivity toward certain triggers, such as ants, mouse holes, mechanics, and movement which acted like exemplars in other situations because they corresponded with her appreciative goals. This cross fertilisation of exemplars strongly supports the central role of the appreciative system and the agency of the designer, in determining relevance within design activity as opposed to the design problem.

Convergence

It is well acknowledged within design literature that new knowledge must be considered relevant to take a foothold. This often manifests itself in design briefs that are targeted to the interests of the student cohort (Quinlan et al 2003). It could be argued that this caters to the dependence in current student cohorts on extrinsic motivation as opposed to the development of intrinsic motivation. Not all design situations are immediately interesting, so that an essential skill within a 'designerly way of knowing' is to create personal interest through the application of the designer's appreciative goals. In much the same way, novice designer students must be guided to take 'personal ownership' of their learning (Toynbee Wilson 2002:406) if they are to connect new and extant knowledge. Goldschmidt's (2004) observation that 'hard' knowledge rarely penetrates studio classes indicates that within design education relevance cannot be established for novice design student's, only the means by which they can establish relevance. Toynbee Wilson hints at the vital nexus between motivation and tolerating ambiguity in identifying that 'ownership of learning' can be motivated in an 'environment of positive encouragement that stimulates intrinsic motivation' (Toynbee Wilson 2002:406). This suggests that it is not the situation or the design problem that motivates the novice designer but the legitimacy of their personal interests or appreciative system within problem setting in any design situation.

Halle is extremely proactive embedding her personal interests into design situations which are not intrinsically interesting to her. It is the convergence between an appreciative goal, and a learning need or experience, that stimulates Halle to convert dormant information into knowledge.

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During this case study there are several instances where Halle draws on dormant information which has part of her design education but largely ignored. It is only activated when it is associated with a personal interest, particularly her meta-interests in modular origami and ethical sustainability. Interestingly the motivation to convert information to knowledge is not drawn from an interest in the project per say but from finding an application for her personal interests *within* her design projects. For Halle, this has more to do with the legitimacy of personal knowledge than the topic of the brief.

During both first and second year students are taught about sacred architecture. Halle noted that it wasn't until she designed the 'cathedral' space for her 'passage' project that she developed an interest in sacred spaces such as Le Corbusier's Ronchamp Chapel. Halle's 'cathedral' was really an experiment in the geometric manipulation of light. Until she connected her interest in geometry with light and space she had no interest in the theory of sacred architecture.

Similarly until Halle read the book *No Logo* as suggested by her father, she had no interest in the sustainable design theory she had been taught in first year. Halle's interest seems to be stimulated by her conscience in response to her family values. Halle actively researched sustainable theory and attempted, despite the protests of her tutors to apply this new understanding and lectured both her friends (and me) about this newfound knowledge.

Halle's attempts to apply this knowledge within her design projects was motivated by her own beliefs not by externally imposed criteria. Max DePree (1997) of Herman Miller, one of the largest furniture design companies in the world, believed that 'innovation is change' and that assimilating change required 'acceptance' followed by 'adoption' and finally 'advocacy'. Innovative design activity relies on intrinsic motivation, which also plays an essential role in learning. Halle's advocacy of sustainable issues reflects the intrinsic motivation, which stimulated her ability to convert dormant information into new knowledge and to apply it innovatively.

Probably the most profound example of the need for the appreciative system to converge with a learning need in order to seed new knowledge is Halle's passion for Calatrava's 'flexible geometry'. While Halle had been exposed to multiple examples of Calatrava's architecture and sculpture she had never researched it personally. It was only the combination of her frustration at designing a portable shelter and her quest to find the 'next step up' in her passion for modular origami that she found Calatrava's 'flexible geometry'. While her initial attempt to apply this knowledge was not very successful it become an exemplar for her, a way of seeing design situations which has become extremely influential and which she has subsequently applied successfully within third year projects

Relevance within multi-disciplinary design activity

Any new knowledge Halle has successfully assimilated during the course of this casestudy appears to have been attached to an appreciative goal based on her personal interest, values and beliefs. During the course of the study Halle researched and attempted to apply information regarding cognitive theory, ancient philosophy (Aristotle) and modern philosophy (Bachelard), architectural theory, ethics, sustainability, biology, and economics within design projects in three different design domains. Each of these new areas of knowledge is attached to her *personal* knowledge through the structured and motivated use of her appreciative system. Halle described this most succinctly when she noted she is only investigates things 'that interest me, on top of what I am already interested in' which she describes as 'trying to find new paths' ($IT_H_1_29$).

This chapter has identified the following content domains emergent in the case study of a novice designer. The key headings are:

- Shaping Halle's perspective
- Relationship with origami
- Being difficult
- Random ideas
- Branching
- Linking
- Seeding

The significance of these content domains will be discussed in the next chapter, particularly with reference to the theoretical framework of the study established in the critical literature review.

CHAPTER 5

INTERPRETATION & CONCLUSION

INTERPRETATION OF THE CASE STUDY

This chapter refers to the theoretical understanding of the central role of the appreciative system within socially situated design activity established in the literature survey to form an interpretive structure for the conclusion of the study. This framework based on a re-reading of Schön's (1983) theory of 'reflection-in-action' augmented by contemporary theory, including Dorst's (2006) 'design paradoxes', Cross's (1982) 'designerly way of knowing', Buchanan's (1992) 'principle of relevance' established by 'organising principles' and Mumford et al's (2004) insight into the motivational nature of 'constructed representations' within 'creative problem construction'. The re-reading of Schön's theory offers a framework through which to interpret the case study described in the previous chapter.

'Random' ideas are not random

As isolated design episodes, Halle's design behaviour can appear opportunistic. It is only through the analysis of her design activity over the course of a semester and in studios involving three different design domains that some patterns emerge within her design activity. The emergent themes within Halle's case study, of 'random ideas', 'branching' 'linking' and 'seeding', all support the reinterpretation of Schön's theory of reflection-in-action within this thesis. It also illuminates the structured and motivated use of appreciative system as evidence of the agency of the designer within design activity. Halle's 'random' ideas strongly resemble Schön's concept of 'initial frames'. They are 'random' because they are based on 'out-of-place' knowledge and altered perception. As suggested by Schön's understanding of 'fidelity' within a web-of-move bounded by the appreciative system, Halle generates and evaluates her random ideas using her appreciative goals rather than criteria determined by the design problem or derived from formal domain knowledge.

Schön held that the appreciative system informed both the genesis and the evaluation of moves and frames through the qualitative judgments necessary to structure design activity

within a web-of-moves. Halle's persistent reference to her meta-interest in modular origami, her strategy of 'being difficult' in order to differentiate her ideas, and the cross fertilisation of triggers, initial frames and information within her projects, reveal the highly personal preferences that inform her projects and the central role of her appreciative system in her design activity.

Schön's concept of design activity as a web-of-moves 'bounded' by the appreciative system is supported within by an examination of Halle's 'relationship with origami' and her faith in 'random ideas' leading to unity and clarity through 'branching' and 'linking'. These emergent findings suggest novice designers maintain a constant appreciative system during individual design episodes based on well honed personal interests, beliefs and values. Halle's case reveals that the appreciative system not only directs what the designer attends to, but enables the connection between new and extant knowledge based on the self-set appreciative goals, formed by the coalescence of a number of interests into a meta-interest.

It is evident from Halle's design activity that *personal preferences* or appreciations, determine *design preferences* because appreciative goals *motivate and mediate* design activity. Expressed as qualitative judgments, appreciations are essential for innovative design activity because they direct the development of new design moves through the evaluation of new information and previous moves. The motivational and structuring role of appreciative goals is evident in Halle's evaluations of 'cool' information and ideas. Mirroring Schön's description of 'seeing-as', Halle is motivated by information which is unfamiliar enough to generate a sense of discovery, and familiar enough not to be dismissed as 'baffling'. This thesis argues that a convergence between learning or situational needs and the designer's appreciative goals is essential in motivating design activity and in establishing a connection between or 'seeding' new and extant knowledge.

Halle's 'random ideas' illustrate that a novice designer will employ appreciative goals not only to compensate for the absence of formal domain knowledge but to capitalise on the generative potential of informal and unorthodox knowledge, within ambiguous situations. Halle structures 'random' information searches to position herself to be open to surprise. Because Halle's principal motivation stems from her appreciative system not the design problem, she is able to work beyond her domain knowledge. The use of informal and unorthodox personal knowledge enables Halle to 'fiddle' about with ideas, or early design moves, which she evaluates against her appreciative goals, not the design problem. Halle's design activity reveals, through the various content domains identified in the previous chapter, that it is the ability to evaluate early design moves against an appreciative goal, not the design problem that enables the novice designer to 'read' a feeling or spontaneous response to a design situation as information. This ability is vital in generating the altered perception essential for innovative frame generation.

Schön suggested that the purpose of problem setting is to fit the situation to a frame, not the frame to the situation. In this sense problem setting is about setting the situation to the designer's appreciative system. Both Schön and Dorst acknowledge that a generative frame or the reinterpretation of a situation requires altered perspective or 'stepping-out' of normative discourses. This thesis has highlighted how essential the appreciative system is in generating the altered perspective necessary for developing a tolerance for ambiguity and innovative design activity. Halle's case supports the view that what is generally attributed to 'intuition' is often altered perspective generated through 'a kind of' objective use of subjective knowledge based on the structured and motivated use of the appreciative system.

Evaluation plays a critical role in structuring a web-of-moves and in establishing the 'kind of objectivity' Schön associates with the 'professional artistry' within problem setting. Evaluation against an appreciative goal assesses for viability not validity. Viability is focused on the potential to generate a stabilising relationship, not only between the phenomena of the situation, but between the designer's local moves or 'linking behaviour'. Halle's objective of achieving 'unity and clarity' within her design concepts is a quest for a stabilising relationship or structure. Halle identifies the point at which she shifts from sketching and writing to model making as the point at which she has achieved this stabilising relationship or sense of 'unity and clarity'. This indicates that novice design activity is both motivated and structured through the evaluative links established between local moves. This corresponds with Schön and Dorst's notion of subjective local moves supporting the development of objective global frames and Dorst's call for further examination of the 'linking behaviour of designers' (Dorst 2006).

Linking behaviour of designers

While Schön's theory has been summarised as naming-framing (Roozenburg & Dorst 1998) based on the idea that the designer first identifies and names the elements of the situations they will attend to and frames them according to their 'appreciative context' (Schön 185:16), Halle's case highlights that focusing on specific 'frames' is almost as

inadequate as focusing on the 'design problem' in terms of revealing the agency of the designer within design activity. Problem setting is a design activity not an outcome in itself and is often transparent in the final design solution. Schön held that there is no such thing as a finite frame (which is why design situations are transactional and open-ended). It could be argued that the most significant function of problem setting is structuring design activity, not the frame produced, because frames can change within the design episode and become exemplars within other design situations even when untested. The type of objective use of subjective knowledge which Schön called 'professional artistry', results in the stabilising structure or relationship developed as part of problem setting. Halle has a high tolerance for ambiguity because she works within a structure, which she identifies as 'branching' and 'linking', which parallels Schön's web-of-moves and Dorst's 'local network of links'.

Halle's reliance on 'branching', and the ability to 'back-track' along 'branches' of inquiry using annotated drawings, corresponds with Schön's theory of fidelity to moves and the appreciative system. This structuring within Halle's design activity suggests novice design activity while based on personal knowledge is both structured and motivated. As she explores new 'little branches' they remain connected to her overall branching activity and her design episodes remain intact and traceable. Her moves are 'viable' if they generate future moves without disconnecting from previous moves. Halle's choice not to pursue branches of inquiry when they become 'baffling' represents moves which enable her network of associations to continue without ending the design episode.

Halle is able to generate structured complex associated networks of ideas but not always to simplify and clarify them. Halle attempts to maintain 'multiple perspectives' by investigating several divergent 'branches' simultaneously. However, she often uses 'branching' in an attempt to link all of these divergent branches rather than to clarify which branch is of most merit. If she is unable to establish a link between two divergent concepts she abandons the branches, putting them in the 'too hard basket'. Once that has been done, Halle either develops new branches in order to clarify her position or simply ignores the lack of a link and enters 'fairy land' (IT_H_3_2). This usually occurs for Halle when she is trying to work with new theoretical or formal knowledge which is not necessarily from a design domain but which is not part of her appreciative system or extant repertoire.

The belief that more information will clarify the web is indicative of novice design activity and supports Schön's observation that maintaining 'double vision' and managing a complex web of associations is expert behaviour. That novice designers struggle to manage complex webs-of-ideas is well documented within design literature (Casakin 2004). How to support and develop this activity is less well documented.

The linking behaviour of designers is essentially the process by which they structure qualitative judgments. When Halle retreats to 'fairyland' she is in effect suspending her ability to make qualitative judgments. This isolates her from immersion triggers and back-talk, which in fact would help clarify her concepts and stalls her design projects. An inability to make qualitative judgments undermines the designer's ability to generate or consolidate design knowledge because 'making a judgment employs knowledge' (Downton 2000:51). When Halle enters 'fairyland' it is a response to an overwhelming amount of unfamiliar information. More importantly it reveals a lack of confidence in the information she has selected to attend to.

Halle interprets her inability to link ideas to inappropriate information. From the data in the interviews Halle has had one experience in which the use of her personal interests were validated and legitmised within her design activity. Although profound the legitimisation of the use of her personal interests within her design projects remains an isolated incident and Halle continues to feel that her use of spontaneous associations and personal knowledge is not legitimate design activity based on a legitimate designerly way of knowing. Entering 'fairyland' (IT_H_3_2) may be averted by demonstrating how to bridge formal knowledge (both domain specific and domain-independent) and the use of informal and unorthodox knowledge within design activity. Supporting the linking behaviour of designers therefore necessitates a new perspective of design knowledge, which legitimises the use of their appreciative system and know-how in developing and clarifying design moves.

Halle responds well to particularised design demonstration that focuses on the qualitative judgments she has made but not the immediate outcome, as represented in the validation of her use of origami. This process supports the use of her appreciative system in motivating and structuring her design activity. Particularising design demonstration does not require the tutor to hold a comprehensive life history of the student but for the tutor to focus on the connections the student makes between, dissimilar concepts, new and extant information, or their 'linking behavior'.

Halle's case, in combination with the literature review, suggests that the linking behaviour of designers as 'professional artistry' is based on the kind of objective use of subjective knowledge which is structured and evaluated by appreciative goals. This is a much more instructive concept for design theory and pedagogy than the belief that it is based on intuition or imagination. This is evident in Halle's response to the demonstrations of her tutors. The most productive moves demonstrated by her tutors support the application of her appreciative goals and thereby build on her intrinsic motivation as seen in the demonstration of converting a literal metaphor into a conceptual one. The moves her tutors demonstrate are least productive when they involve abstract non-particualarised instructed to use 'trial and error'. This mirrors the confusion and frustration regarding abstract instruction generally felt by design students (Toynbee Wilson 2002).

CONCLUSION

The overall objective of this thesis was to examine the designer's experience of design activity in order to suggest pathways for further research in design theory, practice and pedagogy. This objective arose as a response to the increasing awareness of a need to develop a description of design activity, which is focused on the 'missing' designer (Dorst & Reymen 2004) in order to advance current understanding of domain-independent design activity. This could in turn support the current development of a domain-independent model, mapping the transition from novice to expert designer, both pedagogically and in design practice.

The research questions posed in this thesis specifically set about describing the problem setting design activity of novice designers: in particular, the relationship between problem setting and information processing. A critical literature review was employed to develop a 'focus of inquiry' which is elucidated using a single instrumental case study of a novice designer. Case study methodology based on phenomenological qualitative research methods was utilised to offer an illustrative description of the designer's own experience of design activity.

The literature review revealed a poor understanding of Schön's theory of reflection-inaction within design discourse due to the dominance of the rational problem solving paradigm and specifically the concept of the fixed design problem in determining the design activity. An analysis of the designer's experience of designing necessitated a new view of both the design problem and design activity. A re-reading of Schön's theory of reflection-in-action offers a new approach to the examination of socially situated design activity focused on the agency of the designer. This re-reading involved an extensive analysis of both the philosophical premise for Schön's theory and his publications over 30 years. This directed a review of contemporary design activity theory which was used to clarify and augment Schön's theory, specifically referencing 'design paradoxes' (Dorst 2006), 'organising principles' (Rowe 1987), a 'designerly way of knowing' (Cross 1982) and 'creative problem structuring' (Mumford et al 2004).

Summary of contributions

The re-reading of Schön's theory clearly identified the agency of the designer and specially the central role of the designer's appreciative system in socially situated design activity. This new perspective supports the view that problem setting as the core activity of reflection-in-action is a domain-independent design activity based on the appreciative system of the designer. This position identifies Schön's concept of 'professional artistry' as a form of a 'designerly way of knowing' or domain-independent design knowledge based on the role of negotiability and adaptability of personal and social knowledge in the genesis and use of frames as organising principles. While the use of subjective knowledge had been traditionally dismissed or marginalised within design discourse as intuition, this thesis demonstrates the term 'intuition' is often used to describe a learnable activity based on the kind of objective use of subjective personal and social knowledge which Schön referred to as 'professional artistry' within design activity.

Where the use of subjective knowledge has traditionally been seen as opportunistic this thesis argues that it can be structured and highly motivational. The basic model of Schön's theory as 'naming - framing - moving - evaluating' (Roozenburg & Dorst 1998) has been extended here in order to adequately describe the role of the appreciative system, and therefore the agency of the designer, in structuring and motivation design activity. This thesis identifies the critical link between the constructivist concept of valid knowledge and design situations as ambiguous instead of vague, as being critical to understanding structured reflective practice. These concepts help explain the open-ended, transactional nature of design situations, which enable the negotiation and generation of knowledge. Schön's model of design activity as a web-of-moves bounded by the appreciative systems appears illogical when assessed through the rational problem solving framework of design as an information search, in which the validity of knowledge is determined by external forces, namely the design problem. However,

because the reflective designer determines validity through fidelity to their moves and their appreciative system, they are able to structure and motivate design activity, generating a 'kind of objectivity' because the design episode is 'internally consistent'. Validity is established through a *stabilising relationship* not on externally determined validity. Rather than using more information to clarify a vague problem, problem setting involves harnessing the negotiability of an ambiguous situation in order to alter perspective.

This analysis of the reflective conversation is supported by Dorst's (2006) framework of design problems as paradoxical paradoxes. Dorst's paradoxical situations similarly require the designer to formulate an understanding of an ambiguous design situation through subjective interpretations which enable the designer to 'step-out' of the normative discourses underpinning the design situation or alter their perspective. Because of the similarity between Dorst's 'local network of links' and Schön's web-of-moves the re-reading of Schön's theory in this study, in turn, offers possible avenues to examine Dorst's notion of the 'linking behaviour of designers' as a new way of examining design activity focused on the experience of the designer. Schön's concept of 'professional artistry' helps elaborate on Dorst's concept of 'linking behavior' because the designer's appreciative system is central to altering their perspective of the situation. This is identified within this thesis through the analysis of the vital nexus between a establishing validity, a tolerance for ambiguity, maintaining multiple perspectives, sensing similarity, and seeing-as, in the development of generative frames.

The single instrumental case study describing Halle's design activity corroborated the structured linking behaviour of designers, identified in the re-reading of Schön's theory of reflection-in-action. Halle clearly uses her appreciative system to guide the generation and evaluations of her qualitative judgments and therefore to connect the new and extant knowledge on which these judgments are based. Halle deliberately structures her design activity around informal and unorthodox personal and social knowledge in order to differentiate her ideas. This is a clear example of harnessing ambiguity to alter perspective.

The case study highlighted the role the appreciative system plays in motivating and directing design activity. The constancy of appreciation which Schön saw as essential for stabilizing a structured web-of-moves, seems to be the principal motivation for novice design activity. The constancy of Halle's appreciation is exemplified through her meta-

interest in modular origami. Based on the identification by Mumford et al of the correlation between 'highly active representations' and self-set goals as motivating design activity Halle's design activity is clearly motivated by the application of self-set *appreciative goals*. The role of appreciative goals within Halle's design activity suggests new pedagogical perspectives.

Implications for design theory and research

The re-reading of Schön's theory indicates that the use of the appreciative system is central to socially situated design activity because of the role it plays in the altered perspective essential to generating innovative design frames and solutions. Rather than producing arbitrary design outcomes, designers consistently produce appropriate outcomes based on the objective use of subjective knowledge within structured and motivated design activity.

The question is not whether this takes place but what more is required to legitimise the use of informal and unorthodox personal knowledge within structured design activity? Embedded in this question are others: how do we research this activity, how do we discuss it and how do we pass this way of knowing from expert to novice? A lot of what we condemn as 'historical revisionism' (Schön 1983:317) or 'post-hoc rationalisation' (Lawson 2001) in interviews with expert designers, results from the dominance of the rational problem solving paradigm and its emphasis on using logical domain knowledge. Until the use of informal and unorthodox knowledge is legitimised, as design knowledge, our understanding of design activity will be impoverished.

An analysis of frames is almost as unhelpful as analysing the design problem in terms of understanding the agency of the designer. Time spent on further research into the central role of the designer's appreciative system would be well spent by focus on the domainindependent nature of problem setting and in particular the linking behaviour of designers. In order to legitimise the role of informal and unorthodox knowledge, further research needs to focus on the way the stabilising relationship which structures local subjective moves, establishes a 'kind of objectivity' at a global level. The structuring and motivating role of the appreciative system must be examined with the same rigour design theory applies to the generation of domain knowledge. Future research could focus on how designers evaluate both new information and their own design moves, and how they establish validity, and principles of relevance within action in order to locate new and extant information. Understanding how designers 'read' their initial feelings within 'seeing-as' as information and how this facilitates altered perspective is also vital to our understanding of the agency of the designer within design activity. In addition, it would be beneficial to examine this at all the levels of transition within the new models of design expertise to help facilitate the transition in practice.

While the single instrumental case study within this thesis offers an insight into design activity, further research is needed to develop methods which can offer a generalisable understanding of the role of the designer's appreciative system. Lincoln and Guba (2000) suggest research paradigms are 'interbreeding' and that rather than debating the paradigm fit, it is more constructive to ascertain 'where and how paradigms exhibit confluence and where and how they exhibit differences, controversies and contradictions' (Lincoln and Guba 2000:164). Casakin's (2004) paper 'Metaphors in the design studio: implications for education' as a hybrid study, using both qualitative and quantitative elements, offers a path forward. In this study Casakin augmented quantitative results using the 'voice' of a single student in a debriefing interview following a protocol analysis. Unfortunately this could be read as an after thought but in principle, combining protocol analysis with indepth interviews might offer a new direction in design activity analysis focused on the designer's understanding of the experience. As seen from the case study within this thesis, any form of hybrid study would ideally evaluate multiple design episodes to establish the broad patterns within the designer's activity associated with the appreciative system.

Implications for design pedagogy

While the discussion regarding the use of personal knowledge design activity discourse has tended to focus on the personality of the designer and intuition, Schön's concept of 'professional artistry' highlights a kind of objective use of personal or subjective knowledge that is learnable. The focus on legitimate design knowledge over a personality trait, means that professional artistry is not only a learnable activity, but that it is a traceable and therefore communicable activity. This offers new perspectives for the education of multi-disciplinary designers who need to communicate their reasoning using a common language.

Because the key role of 'seeing-as' in generating altered perspective within problem setting, analysis of formal research does not necessarily come before synthesis. Not only is there the co-evolution of the problem and solution but the co-evolution of formal and informal design knowledge, and the co-evolution of domain specific and domainindependent knowledge. Specifying that students should conduct analytical research prior to commencing design development is not the same thing as focusing on problem setting prior to problem solving. Problem setting is about setting the designer's appreciative system to the problem and can be either problem or solution focused because problem setting implies implementation. This is especially important for novice designers. Educating novice designers in problem setting is about developing structuring relationships in order to alter the designer's perspective within an internally consistent design episode, not necessarily the accumulation of formal domain knowledge followed by its application.

Schön believed skilled design educators had to reduce the hostility novice designers developed in response to the ambiguity of design situations. Toynbee Wilson offered further insight into the hostility of contemporary design students in her examination of their learning styles which revealed a significant disparity between the preferred dependent learning styles reinforced within secondary education and the independent style required for tertiary design education. Poor visual literacy skills resulting from no-specific entry criteria and a lack of understanding and therefore aspiration toward professional opportunities available to design graduates results in significant confusion for design students. Not only do novice designers have to design for unfamiliar situations 'designing means learning in an unfamiliar way' (Toynbee Wilson 2002:403). A tolerance for the ambiguity inherent within design situations is mirrored for the novice designer within the ambiguity of design learning. How we address this within design education is more critical than ever.

There may be a strong correlation between legitimising the use of the designer's appreciative system within problem setting and tolerating ambiguity. Despite being an attribute of design expertise, design literature tends to focus on eliminating uncertainty, rather that educating designers in how to harness ambiguity. A tolerance for ambiguity is assumed to be an innate personal attribute or a skill derived from experience. Schön suggested the design educator needed to 'discover the things, that will allow THAT student [Schön's emphasis] to understand' (Schön 1987:8). Identifying, legitimising and structuring a novice designer's self-set appreciative goals may offer a way to build a tolerance for ambiguity within design education. Casakin noted that metaphorical reasoning enabled design students 'to find their personal way to the design solution without being influenced by the instructor's experience or the normative approaches such as case-based learning' (Casakin 2004:8).

Managing complex webs-of-moves can be difficult for novice designers. This process is made easier when moves are modelled for them based on the structuring and motivating role of their appreciative goals. This does not require comprehensively understanding their personal history but focusing on their linking behaviour. This thesis has demonstrated that it is critical to focus on the meaningful connections or structuring relationships generated by the novice designers as evidence of their appreciative system in action. In line with the linking behaviour listed in the literature review this means focusing on the triggers, the initial descriptions, sensing similarity, their selection and organisation activities, their attempts to alter their perspective, and in particular what motivates these qualitative judgments. Particularised demonstration should support the novice designers development of a 'stabilising relationship' between both the phenomena of the situation and the moves executed based on their appreciative goals.

Final remark

The aim of this study is to locate the 'missing' designer (Dorst & Reymen 2004) within socially situated design activity. Comprehending the full scope of the role of the designer's appreciative system within design activity involves re-thinking the paradigmatic structures that underpin our perspectives of the design situation, the design problem, and the resulting design activity. Without a critical review of the dominance of rational problem solving there is not basis on which to understand objective use of subjective knowledge within design activity. This is why 'intuition' is so often used as a convenient short hand to explain this type of activity. Unfortunately 'intuition' is both an inaccurate description of this activity and arguably impossible to teach through anything but experience.

Understanding the agency of the designer is dependent on understanding design as a socially situated activity in which both social knowledge or the discourses which underpin our understanding of design situations, and the designer's personal knowledge, are negotiable and therefore adaptable and malleable. The designer's ability to make interpretations or qualitative judgments is essential within socially situated design activity.

New avenues for the exploration for multi-disciplinary design activity and domainindependent design knowledge need to acknowledge the essential role qualitative decisions based on personalised informal and unorthodox knowledge play in design activity particularly in managing information by establishing a 'principle of relevance' within frames or organising principles and in facilitating the altered perception essential for innovative problem setting and innovative design solutions.

This study has illuminated how novice designers personal and social knowledge impacts on their experience of design activity and their design education. The study argues that the content domains identified in the case study in the previous chapter, are important considerations for the design education of novice designers. Socially situated design activity extends our understanding of the domain-independent design activity and domain-independent knowledge, which is becoming critical in multi-disciplinary design situations. The focus on the agency of the designer within design activity does not advocate arbitrary design outcomes but is a structured a motivated activity which involves a kind of objectivity. Findeli (1994) suggested decision making is at the heart of design activity. What distinguishes the type of decision making within design from other forms of decision making is the agency of the designer. The qualitative judgments necessary for innovative 'ethical' design activity by definition respect and honour the uniqueness of both the design situation and the designer in co-constituting an appropriate design solution or positive shift in the situation. While ever the agency of the designer is marginalised within design discourse our understanding of ethical design activity will be limited. This study, in exploring the central role of the appreciative system within design activity is an attempt to locate the 'missing' designer (Dorst & Reymen 2004) within a more comprehensive understanding of socially situated design activity.

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Appendix A Letter of Consent

Ethics Approval No

University name

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM

Project Title: Identifying the design strategies of novice designers

[Participant selection and purpose of study]

You are invited to participate in a study identifying the design strategies of novice designers. I hope to learn what types of design strategies novice designers employ when trying to solve poorly defined design situations and how this affects their information seeking behaviours (both in terms of accessing and processing information). This is a qualitative study designed to focus on the phenomenon of human behaviour in a specific setting. It is an exploration of your words and behaviour to help deepen our understanding of the design activity of novice designers rather than to prove a specific hypothesis.

You were selected as a possible participant in this study on the recommendation of a previous tutor. The criteria for selection were that your had strong academic grades, were a recent school leaver and Australian resident or citizen, and that you enrolled in the Environments Studio in Second Year.

[Description of study and risks]

If you decide to participate, I will interview you three times during the first semester of 2005. It is estimated that the initial interview will take between one and a half and two hours with the following two interviews taking from forty five minutes to an hour. The interviews will take place at the beginning, middle and end of the first semester – approximately six weeks apart and will be conducted in a private office at [faculty name] or in your normal study environment depending on which is most comfortable and convenient for you.

These interviews will be audio-recorded to ensure an accurate transcription of your words. You will be given a copy of the transcription of the audio-recording and the right to make feedback about the details of the transcription. In order to guarantee confidentially you will be given a pseudonym and all documents involved in the study and publication of the results will use your pseudonym.

In addition in order to observe your design activity in a natural setting you will be observed working during a studio class and a presentation. These visits will be part of the general bench-marking process for the course evaluation and a range of students (not involved in the study) will be observed so as to ensure the confidentiality of your participation within the study.

This study not only hopes to contribute valuable understanding regarding the design activity of novice designers to education and design management theory, it also hopes to offer the students who participate a detailed understanding of their own design activity. While we cannot and do not guarantee or promise that your will receive any benefit from this study it is our hope to offer students who participate this insight or meta-cognition into their process which is seen as a vital characteristic of successful designers.

[Confidentiality and disclosure of information]

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, except as required by law. If you give us your permission by signing this document, we plan to publish the results and use them in verbal and/or written presentations. In any publication, information will be provided in such a way that you cannot be identified.

Complaints may be directed to the Ethics Secretariat, [university details] Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

[Your consent]

Your decision whether or not to participate will not prejudice your future relations with [university name] If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice.

If you have any questions, please feel free to ask us. If you have any additional questions later, I will be happy to answer them, just email me at [researchers email]

You will be given a copy of this form to keep.

[university name]

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM (continued)

Project title: Identifying the design strategies of novice designers

You are making a decision whether or not to participate. Your signature indicates that, having read the Participant Information Statement, you have decided to take part in the study.

Signature of Research Participant
(Please PRINT name)
Date
Signature of Witness
(Please PRINT name)
Nature of Witness
Date
Signature(s) of Investigator(s)
Please PRINT Name Date

REVOCATION OF CONSENT

Project title: Identifying the design strategies of novice designers

I hereby wish to WITHDRAW my consent to participate in the research proposal described above and understand that such withdrawal WILL NOT jeopardise any treatment or my relationship with [university name], (other participating organisation[s] or other professional[s]).

Signature Date

Please PRINT Name

The section for Revocation of Consent should be forwarded to : Monique Bacic [faculty name]

Appendix B Interview Guide

- This interview guide (for unstructured interviews) consists of topics and broad open questions to be used to begin the interview and to be referred to if the informant veers too far from the topic or needs prompting.
- The intention is to allow for naturally evolving questions
- The first interview is intended to explore broad concepts of their process and not the specifics as recommended by Bryan Lawson
- Follow-up interviews to allow for emergent questions and general reflection on their current design activity

Personal introduction

- Name
- enrolled in a Masters of Design by research
- introduce supervisor and joint supervisor
- This interview is part of the research I am doing for my Masters of Design.
- You are one of 3 students who are currently taking part in the study

Statement of Purpose

The purpose of this study is to explore how novice designers approach design situations (design problems) and what sort of strategies they use to try and solve them. Most of the research in this field has been conducted using limited protocol experiments where novice designers are observed performing a set task and talking about their process out loud. This study is particularly interested in *your* experience and perspective of working through design briefs within your study programme (or part time work) so that we can gain a better understanding of the reality of the design activity of novice designers. This information will contribute to the education, mentoring and managing of novice designers.

Statement of confidentiality

- Inform the interviewee that they will not be identified or described in any way that would reveal their identity
- Inform them they will be given a pseudonym and any information which could identify them will be changed

Statement regarding tape recording and note taking

- Clarify how the interview will be recorded (digital/tape record) reassure that this is about capturing *their* words and ideas
- Let them know you will be taking notes during the interview (as both tape backup and to keep track of the interview)

Request permission to audio-tape

• Turn on tape recorder and request permission to audio-tape

An explanation of why the interviewee has been selected for interviewing

All the students taking part in this research have been recommend by a previous tutor. The criteria for selection were strong academic grades, recent school leaver, Australian resident or citizen, and enrolment in the Environments Studio

A. Design activity – general questions

- A1. Can you describe your own design activity for me?
- A2. What do you think are the most important stages of the design activity for you?

Probes (Pertaining to their current project to help them elaborate)

- Can you tell me some of the most significant things you learnt about your own design activity in first year?
- What do you think you do particularly well?

B. Structuring/framing the design problem

- B1. Can you explain how you usually approach a new design situation (problem/brief)?
- B2. How do you make a new brief more manageable?

Probes (Pertaining to their current project to help them elaborate)

- How would your describe your current brief in terms of the constraints or lack of constraints it offers your?
- How do you intend to approach your current brief?
- What do you perceive to be the biggest challenge for you within this brief?
- How will you tackle that challenge?
- Are there ways you have made the brief more relevant or interesting for yourself?

C. Design Strategies

- C1. Can you tell me what you do to try and generate new ideas?
- C2. What kinds of little tricks or rules-of-thumb that you use to help within your design activity?

Probes (Pertaining to their current project to help them elaborate)

• How much does your previous experience or knowledge factor into what you do within the design activity?

D. Information processing

- D1. How important is gathering information in helping you resolve a new design situation (problem/brief)?
- D2. How do you know what information to look for?
- D3. Can you tell me how you go about using the information you find?
Probes (Pertaining to their current project to help them elaborate)

- When do you find information confusing and when do you find it stimulating?
- What sort of information do you think you need to explore at this point?
- How did you decide what sort of research to do?
- How will you go about sourcing that information?
- What are your next steps (predict)?

E. Information and Idea generation

- E1. Can you describe how you generate new ideas?
- E2. How do you organise information to help you to generate new ideas?

Probes (Pertaining to their current project to help them elaborate)

- How did you arrive at your initial ideas for this project?
- Why did you modify your initial ideas? How?

Appendix C Transcript referencing

For coding purposes all of the original interview transcripts were numbered by interview, page and line. The referencing system used within this thesis to identify Halle's quotes is very similar. A example of a reference used for the coding could have read IT_H_1_26:7-12 indicating the quote is from an interview transcript [IT], for Halle [H], interview number 1 of 3, page 26, lines 7-12. Because of the limitations for line and section numbering within this document, Halle's quotes are referenced by page, but not line number.

A full transcript of each of Halle's three interviews is located at the end of this document following the appendices. Each has discrete page numbering in which the interview number appears before the page number. Within the transcripts attached, the page number 2.6 therefore indicates page 6 of interview 2.

If a quote was referenced IT_H_1_4 within the body of this thesis, this would indicate that it was sourced from page 4 within the transcript for interview 1, or page 1.4.

In addition, EM indicates Email correspondence and IO indicates Interviewer observation. The transcripts are located at the end of the thesis.

Appendix D Probes for Second Interview

Topic: Information search: library

- In the last interview you talked about books creating links to new ideas. Can you tell me how you actually use books? How you find them, where you look, what you copy and how, what does she do with it, does she go back to it or only refer to it once, what is she looking for?
- Do you use look in the index/bibliographies/table of contents?
- Any tricks like reading the introduction?

Topic: Skill

- De-motivation creating lack of faith in concept worse with drawing than with model making Why? Why is it not as big an issue with models which she can just "chuck out"? Why cant she chuck out bad 2D ?
- Possible ideas:
- a. time involved in the work,
- b. comparison to expert designer,
- c. communication issues.?

Topic: Passage Brief

- When we last spoke her idea had progressed to the use of coloured light but hadn't manifested itself in anyway how did that final solution come about?
- Did she feel like she met her personal objectives for the project?
- What went well?
- What would you have done differently in hindsight?
- How did you feel about your final solution and the presentation? Does she feel like the project was unified and deep [her words]?
- How did you feel about the feedback from the tutor?
- What sort of affect do you think this project is going to have on how you work in the future?

- What was the most significant thing you learnt especially regarding process?
- Review working with Leya consequences, affect on outcome, future plans?
- You commented that you front-load your research, doing more at the beginning that the end. Did this end up being true for the Passage Project?
- Talk to me about time management and its affect on process. Were you stressed at the end? Why? What was the result?

Topic: Shelter Brief

- Walk me through your approach to this project, from receiving your brief, in as much detail as you can?
- What stuff is being used as stimulation for the current project?
- Connection to the brief? Does she feel it? How has it manifested itself?
- Said in last interview that you get a random idea and it just keeps branching out and branches connect to the brief. If you like it you keep going with it are you doing the same thing with this brief can you elaborate?

Topic: general

- How does your perceived skill level affect your process?
- Has anything supplanted the origami obsession
- What makes something you see/find a cool idea for you? How does that affect your design activity?
- You talk about trying to unify your projects about staring at the wall until you can 'find a way to bring these things together" can you explain how you do that?
- You talked about issues you have explaining your work in order to get feedback/clarification how is that going?

Appendix E Halle's briefs

FIRST YEAR, Semester 2 2004

- Brief 1: Dalisi/Alessi: Coffee Pot
- Brief 2: Persian Paradise: Carpet
- Brief 3: Different trains: music
- Brief 4: Macquarie Place: Site

SECOND YEAR, SEMESTER 1, 2005

Spatial design studio

- Brief 1: Passage Brief (site analysis translated into a conceptual model/graphic)
- Brief 2: Measured Drawing
- Brief 3: Shelter Brief (investigation of public and private space, design of shelter)

Object studio

- Brief 1: Memory Box
- Brief 2: Top of the Table

Graphics studio

- Brief 1: Community: Target Market advertising
- Brief 2: Font design
- Brief 3: Magazine or Billboard design

Appendix F Spatial Design briefs

PASSAGE BRIEF:

Y 2 Design Studio: Design Studio Environments

SESSION 1

'walking the walk' or making connections

An Investigation and analysis of urban space

Preamble

This project is designed to encourages the development of imagination, creativity and critical thinking through observation the acquisition the practical skills involved in giving form to ideas. Students will also begin to develop understandings of basic design concepts and principles, language, materials, techniques and processes by which they are expressed.

This project requires you to call upon existing skills and understandings to Investigation and analysis of the elements of design in our environment

Brief

Students will design an environment from the experience of the ground they walk on, in conjunction with changing mood. The project will evolve through research, drawing, and construction, it will evoke the concept of passage. The final work will reflect how the environment (in this case the ground) effects mood and how mood effects the environment – a two way process. This process for this project will begin with an initial visit/walk with lecturers during Studio time, but should also entail subsequent visits to complete the project. Information may be initially recorded using any drawing technique you wish, ie. sketches, rubbings.

Learning Outcomes

At the completion of this project students should be able to:

- develop skills in observation and representation,
- communicate ideas and intentions through the use of simple modeling and descriptive drawing
- analyse the relationship between space, time and inhabitation
- carry out apply and understand research as part of the design activity
- experimentation with and extension of your visual language, and

 continue to develop clarity of presentation and communication both visual and verbal

Presentation

Presentation will consist of

- Research your best 10 "drawings"
- Concept models and sketches
- Design selection and organisation of drawings and models to evoke intention

Assessment:

This Project is Due in Week 4 of Session 1, and will constitute 25% of your possible marks for this course.

SHELTER BRIEF:

SESSION 1

Design Studio1: Environments - Concepts and Process

PROJECT 3 'Shelter'

An investigation of structure, habitation and private shelter and public space.

Preamble

This project is designed to encourages the development of imagination, creativity and critical thinking through observation the acquisition the practical skills involved in giving form to ideas. Students will also begin to develop understandings of the use of concepts, principles, language, materials, and techniques in the design activities.

This project requires you to call upon existing skills and understandings to Investigation and analysis of the elements of design in our environment

BRIEF

Students will design an environment, a shelter, a place of refuge an escape from public gaze. You will de given three (3) pieces of text from which you will choose one (1), this text will be the basis of your design. The project will involve through research, drawing, and construction. The final work will convey your understanding of space, particularly personal and private space and it's relationship to public space

LEARNING OUTCOMES

At the completion of this project students should be able to:

- develop skills in observation and representation and more diverse thinking processes,
- communicate ideas and intentions through the use of simple modeling and descriptive drawing
- analyse the relationship between space, time and habitation and describe various dynamic relationships those three elements create,

- carry out apply and understand research as part of the design activity
- understand the use of and development of concepts in the design activity,
- experimentation with and extend of your visual language, and
- continue to develop clarity of presentation and communication both visual and verbal

PRESENTATION

Presentation will consist of

- Research and Analysis
- Concept models and sketches
- Concept Development
- Presentation

ASSESSMENT

This Project is Due in Week 14 of Session 1, and will constitute 50% of your possible marks for this course.

Additional Quotes for Shelter Project:

"The inside of the tree felt private ... the walls surrounded them were glossy and golden. It was surprising how much green-tinted light entered from the cedar forest. The rain echoed in the canopy of leaves above, that beat against the sword ferns, which twisted under each drop. The rain afforded an even greater privacy..." D. Guterson, Snow Falling on Cedars Bloomsbury Paperbacks 1955

"Lying in a burnt out basement with the full moon in my eyes I was hoping for a replacement when the sun burst through the sky" Lyrics, Neil Young After the Gold Rush 1970-71

"Sitting across from midnight and time dragging by" Lyrics by Tony Joe White

Appendix G Data Analysis Procedures

Prepare data:

- Transcribe all interviews
- Type memos, journal entries, meeting notes
- Establish location codes which refer to document type, participant date, page and line references
- Digitally Photograph all journal pages from Students Environments Journals Print full copies of transcripts
- Similarly create location codes for documents
- Read and re-read.

Unitise data:

- Developed within MS Word. digitally Copy of the original highlight keywords, phrases, paragraphs, noting provisional unit meanings title and supplementary information in box within left margin.
- Separate unit of meaning: each copied into its own file which included a source code [interview, page and line reference] title, quote and any supplementary information
- Some part so text became multiple units of meaning so copied into several different folders
- Each unit of meaning must be understandable or stand by itself except for knowledge of the researchers focus of inquiry [Maykut and Morehouse]
- Prepare discovery "sheet" within word this was a file of recurring keywords/phrases, concepts, "images" metaphors themes and patterns which arose in the text As discovery sheet develops each "discovery" is compared to others, provisionally grouped, and clarified/refined

Create provisional categories:

- Provisional units of meaning identified during transcribing
- Provisional categories to which units of meaning belong established during further readings (Bogden & Biklen)

- provisional categories taken from discovery sheet.
- Category titles typed on a separate sheet
- Units of meaning compared to and placed in categories
- Categories titles revised on looks like-feels like comparison.
- Establish rules for inclusion. Established once categories have been allocated a small number of Units of meaning.
- Each rule for inclusion stated as a proposition
- Categories re-examined and refined
- Categories coded into meta-categories or umbrella codes or major codes in which minor codes reside [Bogdan & Bilkan 1998]
- Establish *outcome propositions* where two or more rules for inclusion appear linked conceptually
- Outcome propositions reveal relationships and become the basis for case
- Select possible quotations.

Write-up:

"We refer to the propositions that are formed by connecting two or more other propositions as *outcome propositions*" (Maykut & Morehouse 1994:144)

- Proposal as starting point
- Integration of theory, methodology, outcome propositions, and data and transformed into narrative
- Analysis in the writing
- Consider appropriate metaphors / analogies.
- Consider alternative ways to present material.

Appendix H Coding Categories

META-CATEGORY: MOTIVATION WITHIN DESIGN ACTIVITY

Category: This interests me

Rule: Motivation is based on whether the ideas being used to frame the design problem interested Halle or not

Category: Ownership of the ideas

Rule: Halle needs to distinguish her ideas from her peers so that she feels she has ownership of the ideas she is using, in order to stay motivated

Category: Criteria for evaluating ideas/information

Rule: Halle forms an impression of the value of information based on whether she thinks it is "cool" or not. This does not necessarily seem to correspond with her peers.

Category: self directed learning

Rule: Not only is information assessed on whether it is cool or not, "cool" ideas are actively sought out

Category:: relationship of discovery to Tolerating ambiguity

Rule: Halle is motivated to learn new things, which she will research tenaciously simply on the basis that they interest her not because they are immediately necessary

category: self directed learning: analysis through imitation

Rule: Halle enjoys learning through imitation and replication. She will work out how to replicate something in order understand it. Successfully replicating something gives her a strong sense of achievement and pushes her forward

Meta-category: Motivation within design projects

Category: Unique and Original Ideas

Rule: Unique and original ideas are ones which Halle has not been yet exposed to and which her peers have not been exposed to. Halle is motivated by unique and original ideas not only because this distinguishes her work but because it is evidence that she is learning/progressing

Category: Being a "smart arse"

Rule: In order to distinguish herself and her work Halle challenges conventional approaches to situations, which she perceives sets her apart from the approach taken by her peers. She seems to positively associate this with learning – not being simplistic, finding the next "cooler" thing - with her ideas not becoming stagnant.

META CATEGORY: RANDOM IDEAS

Category: visual stimulus

Rule: Halle often begins her research looking for visual stimulation which she assesses on the basis of what ideas/associations she derives from the form and aesthetics. She then takes an idea from an image and modifies it to fit the brief. She tends not to search for explicit precedence. This may also be a way of dealing with information overload or a form of visual literacy?

Category: preferred ideas are not logically derived from brief

Rule: A random idea is one which "appears" to be unconnected and un-aligned to the brief. While not immediately obvious to her these ideas are however often based on her personal experience, interests and preferences. [What Halle calls random Leya calls "stumbling" in both instances these words undervalue what they are doing and lead to uncertainty]

Category: random idea are based on personal memory or interests

Rule: Halle's perception is that Random ideas often have nothing to do with the brief but are a way of getting started – they significantly revolve around her personal experience/interests

Category: Random ideas are often funny/quirky

Rule: Random ideas are often selected because they are funny in the unusual quirky sense. The humour in random ideas is linked to unique combinations and originality. Any information/stimulus is considered legitimate as long as it is amusing/spurs new ideas

Category: books are easier to generate random ideas from

Rule: Halle uses books in the way we perceive the internet/hypermedia to be used. They are not read but flashed through for ideas. The original chapter as the source word and then just jumping around.

Category: Random selection of information

Rule: Random selection of information as a strategy helps deal with information overload and a lack of domain knowledge because it gets the idea generation process underway even though you are operating in the dark. Once the process is underway more explicit information searches can take place

Category: immediacy of stimulus material

Rule: Random ideas are often generated from verbal or visual stimulus in the immediate vicinity and she then constructs the connection [cues and triggers/ seeing-as]

Category: memories as stimulus

Rule: "random" ideas are often based on personal memories of things or events which are triggered by associations with the brief/design situation

Category: cross fertilisation

Rule: Halle's projects interpenetrate each other with ideas/stimulus which she thinks is amusing

Category: random ideas are about play

Rule: Playing with "random" ideas and information is a way of staying fluid and open, it allows for unusual combinations of ideas, which facilitate generative metaphors. These unusual combinations ensure the ideas are unique to Halle, giving her "ownership" of the ideas.

Category: Random ideas and the agency of the designer

Rule: Halle prides herself on fitting/linking seemingly tenuous ideas/information together and to the brief. This "ownership" of the idea is directly related to her motivation Category: Random ideas are difficult to explain

Rule: Halle believes random ideas are difficult to articulate and justify, that they don't make sense to her tutors and peers until she has clarified them

Category: Metaphors

Rule: Halle often starts developing ideas using simple visual metaphors which become more complex and generative over the course of the project

Category: Origami as an "exemplar"

Rule: Halle uses origami or her interest in folding/mechanics/making to explore and express ideas. [exemplars progressing from project to project]

Category: How does it make you feel?

Rule: in much the same way as Halle uses what is immediately around her to stimulate ideas she repeated analyses spatial ideas based on how she imagines it would make you feel to be in the space

META-CATEGORY: CLARITY AND UNITY

Category: Good projects have unity and clarity

Rule: A good project is one in which the concept has clarity and in which the ideas are unified both internally and to the brief. Unity and Clarity relates to explicit communication

Category: Unity and clarity is about making ideas that are implicit, explicit.

Rule: Halle cannot get feedback from her tutors or her friends to progress her project until she has a certain level of unity and clarity

Category: "deep" ideas

Rule: While Halle aspires to clarity within her concepts she likes her ideas to be complex webs of ideas.

Category: writing in journal helps construct web-of-moves

Rule: Halle writes in addition to drawing so that she doesn't forget her ideas. It helps her to hold onto the "little bits" and to retrace her steps when she becomes lost in a way that drawing doesn't do

Category: annotated sketching

Rule: Halle sketches mostly because she has to for her tutors, she would rather make a model. Sketching works best for her when it is combined with text. She likes it best when it is about metaphorical/analogous ideas not project specifics

Category: Mind Maps

Rule: Mind maps are a technique/exemplar [she learnt in HSC art] which help expand associations with keywords from the brief. Her initial information searches are based on these formative word-games.

Category: Immersion

Rule: When Halle is stuck or close to a deadline she isolates herself, controls the stimulation (visual and audio around her and focus exclusively on the project for a significant block of time. She believes this generates significant results. Often involves staring at the wall above her desk

Category: Making

Rule: Halle prefers making as a form of development to drawing – having a natural tendency/personal background with form over graphics. Making in 3D is both a way for her to explore, clarify and express her ideas

META CATEGORY: BRANCHING / LINKING

Category branching ideas lead to a unified concept Rule: 'branching out' lead to new ideas and then back to the brief

Category branching involved linking ideas Rule: branching is the means by which Halle turns her mind to the brief

Category: Branching activity is related to motivation Rule: Halle will only keep branching if she is interested in the ideas being generated

Category: Branching involves immersion

Rule: even when Halle appears to generate ideas from immediate stimulus she has usually immersed her thinking in the project. Quite often this involve shutting off and appearing to zone out.

Category: Abandoning an idea

Rule: Ideas will only be abandoned if Halle cannot establish a link between ideas or to the brief. Abandonment involves not fully resolving an idea as opposed to not using it entirely. This only happens when linking theory and form.

META CATEGORY: SOCIAL CONTEXT

Category: Role of family and family friends in generating personal interests Rule: Halle's dad has been instrumental in introducing her to key passions/interest she applies to her work such as origami and the culture of consumerism [No Logo]

Category: Eliciting Feedback from tutor

Rule: Halle actively tries to elicit feedback from tutor through her journal and conversation. She takes notes of what they say and uses "keywords" they introduce.

Category: Tutor Legitimating her passion/personal interests

Rule: One of the most fundamental learning experiences for Halle was a first year tutor suggesting it was legitimate for her to use her origami "obsession" as a visual language to describe her ideas. The legitimisation of this passion helped her to view it in a more "designerly" way giving her a more strategic/disciplined tool to use and giving her confidence

Category: Working with peers doesn't usually work

Rule: Working with peers doesn't work because they don't understand what she is doing and cant offer her anything new. This is because in the initial stages she works with metaphors not solutions and cant articulate them. Recent Exception, Leya who can get into her "headspace" ie understand her ideas

Category: "theft" of original ideas

Rule: Doesn't want to reveal her ideas because they then turn up in everyone else's work- [interestingly Polly didn't want to reveal her work because it could be wrong]. Thismakesherdismissiveofclassdiscussion

Appendix I Passage Project Images



Image 1.



Image 2

Jupanese gardens. store. d technology-circulation + communication = communication of ideas efficiently TV. telephone internet. Elevator

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Product Busting.





Image 4.



Image 5.



Image 6.



Image 7.

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Image 8.

cathedral

ENVIRONMENT EFFECTS MOOD

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Image 10.

Appendix J Shelter project models



Image 1 & 2: Calatrava's 'foldable cube'



Image 3: Halle's 'portable shelter'

Interview Transcript 1

TITLEFIRST INTERVIEW WITH HALLE – Interview 1DATE23.03.05 (Week 4 of semester)TIMEApprox 3.19 – 4.40 (chatted until about 5.00pm)LOCATIONCarol Longbottom's OfficeDESCRIPTION:see observation notes

TRANSCRIPT NOTATIONS:

- [dash] represents a split in sentence by respondent

... represents a pause in sentence by respondent

[?] represents a lack of clarity in recording.

Italics represent emphasis by the respondent.

MB: So Halle, as you know my name is Monique Bacic. I am a lecturer in Second year here. I am doing a Masters of Design but I am doing it with Design education as well. I started out wanting to look at how the digitalisation of information affected how novice designers were thinking but it was like five PhD's and everyone said you can't do it. So the more research I did the more I thought there's something missing, there's a thing that I think is missing in the way we teach, and I don't know exactly what it is, which is why I am going to the students to find out.

Traditionally, I think this is in the stuff I emailed you, the way they test the sort of knowledge that young designers have is you sit in a room, you do a design project and you say verbatim what you are doing and they go back and say what you have done but it's very prescriptive because it might not be the sort of thing you would normally do and they give you limited sets of information, and they might not be the sorts of information you would normally use, and it's all a bit artificial. I still have not found a single qualitative study that actually goes to students and asked what do you do? So that's what

I am trying to do. So anything you have to contribute, absolutely anything, anything is relevant to this there is not right or wrong

My supervisor is Carol Longbottom, which is why we get to use this office, My cosupervisor is Kim Snepvanger who works in Design and Art Education and we also have Dr Penny Mckeon who is the Head of Art Education helping out on the project so there is a lot of good people involved.

(discussed confidentiality, withdrawal from the project, Interview Guide)

HALLE: I Halle give Monique Bacic permission to record my voice

MB: Can you tell me how you came about, to come to [design school] to do a design degree, and did you do design in high school, that sort of thing.

HALLE: Okay. Cool. Well, my parents are creatively based, like my mum was a graphic designer when she was younger and just music as well as art, and uhm, I started off and I got really into Japanese stuff like origami, then I started getting into more modular sort of things like geometric stuff and found that, through origami, and then through high school I was sort of developing this and it sort of became this obsession, like everything geometric, everything to do with – not sort of animal origami, it doesn't interest me at all, but modular geometric kind of.

And uhm, throughout high school I went through phases of "I want to be an architect", and then I was like mmm, no I don't want to be an architect because my aunty is an architect and she said it's really hard to sort of do what you want to do as opposed to what someone is asking you to do, so I thought about it more and I thought maybe that's not for me. Then, one of my dads friends, a prototype maker and I did work experience with him in year ten and I started thinking about furniture design and that's - I think that's still a spark, I haven't let go of that completely, so I might actually end up doing that.

So I kept changing my mind, I could have gone through maybe interior as well, but I just kept changing my mind, I didn't know. And then I did art all through out high school but I didn't do DT (Design and Technology) because, it's ... (smiles/smirks – suggests she doesn't think much of the subject) it didn't get a very good scaling, and so I didn't want to do that.

So I did an origami thing for my art major work which was tessellations, making them out of paper, and they sort of flatten down into that sort of thing (shows with hands), and then I just when I, I think when I came out of high school I was looking at different design things and this was my first preference. [design school] was my first preference and then SCA the object [?] and I got into [design school] so I came.

So it was mainly because it was so broad and I didn't know exactly what kind of design I wanted to do... and I was like

MB: So how do you feel about that broadness now?

HALLE: (Cough) Well maybe last year I was sort of a bit unsure and like "what am I doing here, I don't know if I am supposed to be here" but this semester definitely I have found my place and have the majors that I really want to do and I am really interested in all of my briefs, that I have to do at the moment and I feel like I am getting somewhere so it's really good.

MB: So tell me about your first year more in terms of what you think you learnt in terms of process, coming from an art background not a design and technology background, what did that first year do for you in terms of process?

HALLE: Well first semester is pretty muffled, I don't really remember it as clearly. I feel like I have been at uni for three years or something, and I look back to my first design semester and think that was so long go but I have only have two and I feel like I have five. I had some guy and I didn't think he was very good in terms of, like I just wasn't really connecting with any of the briefs and I was just doing it because I had too, and then I got into second semester and I had Tutor A as my design studio teacher and started, getting into it a lot more *because* she sort of saw my sort of thematic, geometric sort of stuff and said okay great now we'll work with this and helped me to pinpoint that into design as opposed to just some sort of visual artistic element to it.

And then I just came into second year, and I don't know I just feel like I am on more of a path than just doing what they're asking me to do. I think that's got a lot to do with choosing majors as well thought

MB: So the majors you have chosen are Environments, Objects and Graphics [Halle: Yeah] So you've got a very strong sort of traditional grounding, you have really chosen -

I don't know if you know, what used to be the core of the degree [HALLE: Yeah, nodding]

Tell me, You are saying at the moment you feel like you have really connected with the briefs, lets just take a step back a bit to first year, no, even now, how would go about generally describing your design process. From the time that you get given a brief ... it probably shifts and changes every time [HALLE: Yeah] but in the most general, broadest sense?

HALLE: In general I would sort of start out with the brief and depending on whether I already could relate something to it, like, I generally look at a brief an I will read it and maybe I will sit at my desk and generally look at things around me like this kind of stuff (indicates Carols pin board) like where there's all my stuff around on the walls and stuff.

And I will sit there and read over the brief, depending on how complicated I find it, over and over and over again, until something just pops into my mind, and then I get this idea and then I start running with it and then I get other ideas that branch out from it and then I start writing down in my journal. Depending on whether I like my a lot or not is how much I will keep going further into the ideas or not.

It's generally through stimulating my mind with visual things. Just like looking on the internet, last year I did a lot of looking on the internet for the Macquarie Place brief, at designboom.com and looking at visual forms as opposed to conceptual things and it kind of worked backwards for me in that I had more visual ideas and then brought a concept into it afterwards, which I don't think usually works well but it worked out for me last year ... And books as well, and reading about stuff, that's what I've been doing this semester.

MB: All right, lets just have a look at some of those things. You say that when you first look at a brief you go over it several times trying to work out how complicate you think it is ...

HALLE: Looking at the different elements of it

MB: Okay, so is that what you actually have to present or what the question is they are actually asking you...

HALLE: Yep, what the question is, what kind of conceptual thing I could do to link all the ideas together

MB: So when you say all the ideas ...

HALLE: Of the elements of the brief

MB: Alright, so you start looking of something that is going to bring the whole things together [HALLE: Yep] and you literally do that by sitting and going over and over the brief?

HALLE: Well that's the first thing that comes to mind as to how I do it, obviously at different times I'll do it differently, if like I am sitting there and the teacher will be explaining something and will say one word and that will trigger something in my memory and then I'll go "hey that's a really cool idea" and it will just remind me of something really random and Ill start working with some sort of random concept or object or visual type thing.

But if I am really struggling I will just sit at my desk and just think about the brief and sort of try and get myself in the head space of what I have to do and where it's got to go and what they are expecting and that kind of stuff. If I don't already have and idea.

MB: So you said that you write in your journal, do you mark up your brief, anything like that?

HALLE: Not as much because I like to keep it, sort of unmarked, I mean sometimes I will mark it or draw little things at the bottom but generally if I have something to write down I will write it in my journal and I will have my brief in front of me so I can just stare at it on the wall.

MB: So it's like a clean slate, you can keep going back too

HALLE: Yeah

MB: So what sorts of things do you end up writing in your journal at that really initial stage?

HALLE: This year or last year?

MB: Just generally, I mean if you want to refer to a specific project, like one that stood out In your mind as one that worked particularly well you can do that ...

HALLE: I think, I usually start making [?] if I have some sort of concept, or like for the environments one with passage at the moment I will write down "passage" and do a kind of mind-map thingy, which is I think because they told us to do it in high-school and it kind of does help, I always thought it didn't but then my year 12 art teacher was always like, "do one", "do one", "do one", and I'd be like "okay" and then I'd do it and it sort of clarifies it and then I get other ideas coming through to the original idea that I had to make it more of a unified idea.

But I don't actually remember how I started getting the ideas for last year, they just sort of really randomly popped up into my head. Like I did have - my ideas from last year were a little bit strange, and I don't really know how I got them. I think Just sometimes it will pop into my head just from different things people say or things that I see, like I could look at a tree and go "hey a tree, that's a good idea" which is kind of what I have done for environments this semester and I have worked from that, and then from talking to my teachers or with my friends I will start getting more of a clarifying idea of what I want to.

MB: These mind-maps that you do are they all word based or do you build them with images, sketching, anything?

HALLE: It's mainly word based first and I will just have like little ideas all around the page

MB: And would you call that 'concept generation' or would you call it something else?

HALLE: I think it is based, kind of based on concept generation but based on the ideas that form the concept

MB: so another thing that you said before was that last year you found yourself looking at the internet for visual stimulation. Is that as abstract as a tree [HALLE: No Well] or are you looking for things related to a particular question?

HALLE: Yep, I think so. Well I know I did that a lot for Macquarie Place for last semester. I knew kind of what I wanted to do and I just went to design sites and started looking at contemporary stuff that people were building and they had like one person had made this model and it was like a blue painted wall and then they had these wires coming out with clouds which kind of bobbed there and I was like "that looks *really* cool".

And thought about what kind of - how that would make you feel standing in front of that and if I could use some sort of concept like that in my brief to talk about Macquarie Place and think that's where I got my idea, and I had the idea of the canopy and how it makes you feel and then the pathways leading in kind of like a y shape and then my final concept was about the peacefulness of it and so I had the peace sign which was like the pathways.

MB: So that was based on your analysis of an unrelated piece of work?

HALLE: So I would do the word thing and then last semester I would go onto the net and I'd look at different things and say "hey that looks cool", and "that looks cool" and take those onto my 'desktop' and print them out and put them in my journal and then start writing notes from them and then start forming ideas from that

MB: so this process of taking visual stimulation and writing notes next to it. What sort of things are you writing next too it, what sort of information are you taking from what you have found?

HALLE: Well depending on what the images is I will look at what draws me to the image and I will write that idea down next too it so that I don't forget and then look at all of then and look for the strongest, which ones really relate or which ones could I modify that could relate to my brief and then I take the ones that I like best and then just start working with that. Just fiddling around with it. And I can sometimes, if I get really lost I will just sit there and stare at the wall and try to think of someway of bringing these things together and making it work with the brief and what it's asking me to do.

MB: Is that a question of time, taking time?

LB: Yep, and silence, like I had to do an assignment here yesterday in the labs and it took me so long just to write a sentence that was clarified because there was all this talk around me and I couldn't handle it because I am used to being in my room, sitting down writing and stuff like that.

MB: I am exactly the same so I am quite interested in this because a lot of people work with the radio on, the TV....
HALLE: No I can't do it, if I listen to anything I listen to classical music.

MB: What do you think that's about? What do you think the silence is about? What's your brain doing while you're being silent?

HALLE: I think it's just being able to let it uhm work it's ideas out without anything else coming into your brain space. So if I am sitting at my desk and I look at something on the wall that will go through my brain and I start to think about that. So your in control of what your stimulating your brain with, through vision, so I can close my eyes and not have anything that I am looking at whereas the music is always going and if you have got music that has word in you can start singing along.

Like I can't listen to any sort of music that has vocal in it if I am trying to write something down or if I am looking at the brief unless it's – actually I could probably listen to Bjork because she's, and her video clips as well - it's something I can get visual stimulus from. But anything else I will just start singing along and my brain just turns off at that stage

MB: so you are really editing out anything that doesn't directly affect what your working on. So Bjork is a form of stimulation...

HALLE: Well she sort of tells a story more in it where as most other songs are - unless you know exactly what they are talking about - are really mindless, where as she has like these conceptual ideas within the songs and if you know what they are about it can really stimulate - well I find it can stimulate my mind as well.

MB: You know how you talked about the paper experiments you have done and you have just referred a particular set of music which you find stimulating, do you have a little pool of things that you repeatedly use [HALLE: Yep], That you go back too [HALLE: Yep], it's like my little thing that sets me off in the right direction [HALLE: Yep], so what are the things

HALLE: Like anything geometric, like Bucky Balls [?], you know things that make up shapes, like I am obsessed with geometry, I can't get away from it. And every - in year 12 especially, or all through high school, mainly year 11 and year 12 - everything that I did had something to do with atoms and then linking that to modules and then modular origami.

My teacher always said why don't you choose something different and I couldn't, I mean I could chose something that didn't have as much to do with it but it would always have some affect on me just because I was obsessed by it and if I am going to enjoy doing something I want it to be something I am interested in.

MB: Does it represent something to you in particular?

HALLE: Not really, I don't actually remember how I started getting into it. I mean I got into Japanese stuff just by doing Japanese at high school and then I went to Japan on exchange for two weeks and had a really bad time [laughs] and came back and was like - I've taken all the bad experienced out of it and look back and go "Yeah, loved Japan . I so want to go back " which I do and I was going to go on exchange there but I am not sure about that any more.

MB: So how does working with geometric forms make you feel?

HALLE: [long pause] That's a good question. I don't know, I think with origami sort of like a mindless patience thing that I do and I was doing folding in Year 12 when I was really stressed and it was sort of like I where I could stop thinking, and thinking what was I going to write in my English essay and that was the only thing I could listen to music with, generally I wouldn't.

MB: Now there is a couple of things that you are talking about in the initial stages that seem to be themes and I need you to tell me whether they are. Quiet, stillness time, there's a sense that you really have to mediate over things at the beginning of the process do you think that's accurate, and can you clarify this for me because I don't think this is relay common. Do you think this is how most of your peers approach a problem?

HALLE: I have no Idea. I don't really - I will see what they have done but you never really know how they have gotten to that point. Like you'll go okay, you see them at Uni and then you both go home and then you'll come back the next day and I don't know whether they have gone straight home and they have been sitting working on it the whole time or whether they have just done it really quickly in the morning.

Which a lot of people tend to say, whether it's true or not I don't know, but I can't leave anything to the morning before. I have never been able to do that. I need to sort of like a - my brain to know that I have as much time as I need to think about it and then start working through it after I have clarified by thoughts on it.

So, I mean there probably are instances where I can listen to music and do that stuff, especially with models, if I know exactly what I am making I can sit and listen to music and it won't affect me but it's when I am trying to work out my concept or essays definitely, I can t listen to any sort of music unless it's Mozart or something weird like that.

I mean my - the way I - it's something I don't really think about, how I do it and my stylistic ways of doing it so I don't know how clarified my thoughts are about it and if I am making much sense.

MB: It doesn't matter you don't have to make "sense", don't worry about that. What else goes into your journal, you said mind maps, pictures that you download ... [Halle goes to get her journal but I tell her we'll look at it later]

HALLE: Well say I have an idea of a concept and I start thinking of visual ways to represent it in my models then I start drawing pictures of it and start writing ideas next to it and I don't know if that actually gets me anywhere apart from the fact that I can go to the tutor and say "this is what I have so far" and then they start explaining things to me and I start writing it down and then I'll go home and think about what they have said ... and try ...

MB: So how important is that dialogue to you?

HALLE: Well I think just so that I don't forget I do that and I can always look back on it and think "Oh that's what I was doing" and maybe take an element from what I was originally doing into my, wherever I am at the time,

MB You said earlier that you talk to you tutors and your friends about your work ...

HALLE: But that's only recently that I have started to talk to friends about my work but I mean in terms of, especially with this environments one because we had the mix up with teacher and we were all really confused and had no idea what was going on me and a friend of mine got together and we'd spend a little bit of time talking abut one of our works and talk about how it would work together and then we'd go "Okay swap" and then we'd talk about the other persons

MB: How did you find that as process?

HALLE: I think it depends on who you do it with, and the person I am doing it with, which I think you are interviewing her as well, Leya? [MB: mmm] And we, it just sort of like, I got elements in what I am doing now that are sort of stylistically more her an she has stylistically more of my stuff in it. But I - I like I - the night, we did it in one night, and usually I am not good at all at doing any sort of team work things with people like that I just don't get anything out of it, but I found it really helpful and we both seemed to help each other a lot with clarifying what we were doing and just getting somewhere with it. We were both just really confused about what we had to do and what the brief was asking us.

MB: So you said that that's only a really recent thing that you have started to do, in the past was there a reason you didn't do it, why don't you come away dissatisfied?

HALLE: With talking to people [MB: Yeah] I think because they don't really grasp my ideas especially when I am first starting off because, everything is in my mind that I want to do but I can't explain it, how it's going to look or anything. Like last semester, Tutor A keeps saying "you know, last semester you used to say some really random thing about what you got to do" and Id be like "What are you talking about?" and the next week I'd bring in a model and she'd be like "Oh okay I get it now".

I think I just find it really hard to explain it to people and they sort of don't understand what I am doing to know, like they will give me ideas and stuff but they won't really be – to have anything to do with what I am trying to do.

MB: So how would you rate your dependence on feedback from the tutor?

HALLE: It depends on the tutor, but definitely with Tutor A I got a lot out of her and going and seeing her about my ideas and clarifying with her *really* helped me along the way. But I think that has a lot to do with the fact she knew where I was going and what I wanted to do. And was trying to help me relate it too the brief – what I was trying to build

MB: So how come Tutor A knew?

HALLE: I don't know, she just sort of like one – the coffee maker one I just bought in something really random, I just bought in some origami stuff, that had nothing to do with [pause], well it would have looked like it had nothing it but I found some sort of little way that it related and she sort of understood already and was like make more of these and I was like, okay so I am not on the wrong track, you know.

I have something obviously that is working if she wants me to make more of these and then I worked more that way and then I had more of an idea of what my style is as opposed to always doing geometric stuff and it just being because I've got no other things to do because it's all I know how to do *but* it's actually something more that's stylistic to what I do, I think as opposed to that

MB: Now you just said that you found some little way that it connected, is this something that happens a lot, that you get an idea and you ... [HALLE: Yep] okay explain that to me, how does it feel, how do you get it to happen?

HALLE: I think it happens in different ways, one of the recent ones was, for our Object first brief, this semester we have to make a memory box, and uhm, I changed classes after the first week to a different teacher and I didn't know what was going on, I hadn't even looked at the brief because all the stuff was going on in environments and I was like it's due in two weeks and I'm stressing out and I wasn't thinking about anything else, and we were just sitting in class and the teacher was talking about different ways to make a box and somehow, I don't know how, I got the idea of a mouse trap.

I just thought of it in my head and the idea of your mind looking for something, like say your looking at something and it reminds you of something and how your memory gets to realise what it's reminding you of and it's like a mouse trap snapping on a mouse, you snap on a memory.

And so I got that idea and I wrote it down in my book and I started thinking about that more and my concept has developed from that. So telling somebody that I am using a mousetrap they are not really going to understand what I'm talking about but then once everything else I've got is clarified then I explain it to them and then they understand.

MB: Okay so what that is really a metaphor [HALLE: yes] for something [HALLE: yeah] so do you think these funny quirky these things that you call these quirky little things do you think that's what they are? Do you think you are using metaphor a lot in your concept construction?

HALLE: Yep I did it last year as well

MB: You say that like your guilty

HALLE: Well, I just think some people think I am really weird because of it - last semester I did for the - What's the one for the carpet? I used it and Tutor A thought I was *really* weird when I told her about it. I said I was - you know the fruit brand Fruitopia, and she was like "yeah" and I was like okay you have the idea of the Persian carpets, which are supposed to represent paradise, and paradise they see as is like an oasis in the middle of a dessert and so you have fruit and so you have you idea of fruit and utopia being paradise so you have Fruitopia.

And I ended up linking that to ... the way carpets are made and how they are made of natural dyes. So dying it with natural juices from the fruit from Fruitopia bottles and my model was kind of like, I had a little Fruitopia bottle splashing juice onto the wall which was getting woven into the carpet.

MB: Great, Okay: In terms of your design process, what do you think the most important stage is?

HALLE: The initial part, Getting the concept and ideas, otherwise I am lost. If I don't have some sort of idea that I like then I just won't get into it.

MB: So what happens if you develop an idea and you find it's going down the wrong path? Has that ever happened? [HALLE: yeah] What do you do when you turn a corner and you hit a brick wall?

HALLE: I think I just go back to the stage prior to it and try and work out another passage from it.

MB: So does that mean that there are certain things in the concept generation that you will always go back to or do you ever just abandon ship?

HALLE: I don't think I have yet. I don't even remember all the assignments we did, in like first semester last year, no idea except for something about a mobile [laughs] that's all I remember.

Yeah, but I think I would find it really hard to abandon ship, I probably wouldn't be able to do that unless I was forced to and the teacher was like 'It's bad and your going to fail if you don't change your idea" and then I will start freaking out and I will spend every second of my time thinking about what I am going to do. Or like if I am on a bus going to work I will be thinking about it and looking at things there and going "How can I relate that to the brief?". That's when I am really stressed. If I am not stressed I tend not to do that but if I've got this brief and it's due in a few weeks and I am really behind then I spend all my thinking time thinking about that

MB: So do you tend to have flashed then when your doing that or is it a much more gradual process than that?

HALLE: It's more random. I can get flashes and think that's a really good idea and start writing stuff down about it and other times I'll have some sort of idea and then go to class and talk about it and she'll say a word and I'll be like "oh that's cool yep" and that relates to it more and work it in that way.

MB: Now you use the word random a lot [HALLE: yeah I know] that's not a judgment call, what I want to know is exactly what does "random" mean?

HALLE: Just like things that seem unrelated or out of place.

TAPE FINISHED [FIRST 30 MINS]

MB: Okay, going back to the idea of random, so you have just said you have used random everyday. I think what I was saying to you before was the act of something random or out of place was the 'other' [?] used. Tell me how important that is to you in terms of your design process?

HALLE: I don't know whether it relates to my design process as much or whether I can see a conscious link to it but just in general in my everyday life, I say random a lot, the point where I have thought I really need to get a thesaurus and find another word means the same thing. Cause I have been saying it for two years and I just can't stop saying it, there's no other word that can describe random, and I guess unconsciously that does relate to my design process somehow but I don't know how.

MB: It's obviously important to you so lets try and work it out? [HALLE: okay] Two words that you jut connected were random and out - of - place. When you are really stressed you actively look for this thing to happen...

HALLE: Yeah that's true, so If I am sitting trying to think of something that will stimulate my mind to the brief I guess it is just random things that could be *anything* and

that's how my mind will start working out what I am going to do and how I am going to do it.

MB: Having said that how important is the collection of information for you in beginning the process of the brief?

HALLE: I think it's sort of -I mean when I am looking at a brief and I don't know what I am doing yet the journey that I go through *to get* to what I am doing, obviously everything leads to something else. So if I am going to say, "hey a water bottle" and my next idea was something about water and how it effects - how it puts light on the wall when you shine a light into the water, I couldn't get to the idea of water without getting to the bottle first.

So I have to get the random ideas before I can develop it into something that really makes sense and I think that's why I find it hard to talk to someone and get them to help me to clarify my ideas because where I started with the water bottle their like "I don't know what your talking about" and I think they just find it hard too ... I don't know I sound like I am talking like I am really individual and nobody does the same thing as me but I have never really found that people - I mean I did find that it did work with this brief and talking to Leya about it and it has worked with some friends who have similar taste to me or just know what my taste is to how to help me but I think when your taking to other people who are doing the same assignment it's *really* hard to talk to someone else and help them when you're completely unclarified yourself.

It's only when you've got your idea and you're like "Yeah I'll help you" because I've got my idea and *I'm really* on top of mine. I think that's why it generally doesn't work. Whereas if someone was in a different class and wasn't doing the same assignment then maybe you could talk to them about it but maybe they couldn't grasp it as well cause they haven't thought about the brief and don't really know about it that much.

MB: This is why I have always wanted to have inter-year courses so you could talk to older students [HALLE: yeah] who are not affected by your brief. Anyway lets go back to this random thing, so does information and seeking information fuel random ideas or does it come after?

HALLE: I think both, it can come when I am reading something like, when I was reading something about memory for my object thing, I started getting this idea and they were

talking about maps, the cognitive maps, and I started thinking about maps and puzzly kinds of things and - then I thought of my sister and how she got a marble track for Christmas and I was like oh yeah you could have this marble track and then it flicks something and an image comes up and it's like the way your memory gets to the memory and so yeah ...

MB: Are you thinking in visual images when your thinking this?

HALLE: Yeah, so when I was reading about the maps I was thinking about a literal marble track or some sort of cog like machine, a simple mechanism thing, and I also get stuff from primary school when we used to play with these little Lego kind of things that had pulleys and that kind of stuff.

And so each different thing that I think of will remind me of something else that I associate with it and somehow those little branches will get me somewhere closer to a unified concept for the brief. But it's not really uniform *ever*, in the way that I work, I think that's why I have to take a lot of time to think about it just in case I don't somehow get a branch that leads directly to the brief and I have to keep branching out.

MB: So when you say it not uniform ever, are you talking about the process?

HALLE: Yeah, the process.

MB: What's not uniform about it?

HALLE: Different things stimulating my mind sometimes. Obviously I have to get something that doesn't – that stimulates me but has nothing to do with the brief and so I guess it just depends on what's there to stimulate you and whether it does just happen to have something to do with it. It just depends on what's there and what the brief is and whether there is any sort of link, and whether my mind picks it up or not and that's what makes it kind of that random idea, because it seems chaotic and through the random stuff you get to a \dots

MB: Okay, now, you've talked about things you saw in primary school, things you have on the wall at home, memories of things of your own, memories of things that your siblings have. How much does your experience factor into this process?

HALLE: I think this year definitely it's had a large - actually yep, no, it always has I think. Whatever is going on around me, and it always seems to happen, I don't know

whether it's just luck or whether it's just the way it is always. Anything that's going around me, like if I've got one brief, then I will start connecting it to another brief in some sort of way, like the ideas for one will somehow have something to do with the ideas for another, even if it's in the most ... strangest way possible I will still sometimes find a link between it.

And things that happen outside of class as well, I can't think of one but I do remember going "hey that's really weird because I am doing an assignment about that" and now I am learning about something that I would, that I wouldn't have found unless I was doing this assignment or something like that.

MB: Now you talk about using random a lot, you use the words links, connections, webs [HALLE: yep, yep] a lot, what do these things mean to you?

HALLE: Well I think as soon as you said links, I just think of geometry, and modular thingies linking and making something that's unified, I don't know why but that's just what came to mind straight away. I don't actually have any sort of ... anything that comes to mind when you say links. Like there's nothing that makes me think, yeah I always say links because blah, blah, blah, blah, but that's just what comes to my mind, like I never thought that I say link a lot

MB: [Laughing] but you do think that you say random a lot

HALLE: Yeah I know I say 'Random' a lot. I think it started because I said it to my uncle and my uncle was like "Random! That's cool!" and then he started saying random and it was funny and that was about two years ago

MB: When you get briefs, I know you said that the beginning half of first year is a bit blurry to you now, what's your first emotional response.

HALLE: It depends on what it is. Macquarie Place was like "Oh my gosh, this is going to be hell unless I find a good concept" which I ended up - I did find a concept and I did relate it to geometry because I found this geometric shape that folds into itself and keeps folding out. So the idea of having the morning, what it's like in Macquarie Place and then in the middle of the day and when there are all these people drinking and just the different layers of it, that keep circulating around. I keep losing what you say initially ...

MB: That's okay. So when you get a brief that you think is going to be boring or difficult or challenging do you have any ways you go about making it more manageable?

HALLE: I think, especially if I am lost with it. If I am bored with it and I don't really know what it's telling me or what I am doing I will look at it and then I last year I would have just gone on the net straight away because that was when I was living at home, id just go and look on the net and look up things, that - any word that came to mind from what was in the brief, I'd search on that and look up visuals about it or just go to any sort of artistic or design type website and look at different peoples ideas and look at the concepts behind what they had designed.

MB: So you go to the internet – how do you know what to look for? Your taking about so much information, how do you contain that?

HALLE: I think it starts off with a general something that has come to my mind, automatically from looking at the brief and then I type in something random to do with it or I will just go to one of the sites and look at the contemporary stuff that they have got in there. Design boom, the one that I told you about before – Vaughn told us to look at that site last year and I only realised half way through last year that I should be looking at it and it's got this cotemporary section which has got all the different Milan design and I was looking at it and there were some really cool things in there which just gave me ideas.

And maybe they didn't have anything to do with the brief but it inspire me to think more "Hey yeah I can get something cool out of this brief" and then I would find something really random that I thought was funny, that I could somehow link to the brief and then I would get more inspire to do it and then I'd start working on it a bit more.

MB: So you just said two things there that you look for something that inspires you and something you think is funny. Are these important things to you at the beginning?

HALLE: Inspiring definitely cause otherwise I just won't be motivated to do my work [MB: Funny?] I don't know, sometimes. I just ... I don't know if I do that on purpose but sometimes I like with the Fruitopia thing, that was funny and just kept running with it and it ended up working for me.

MB: Okay so, the inspiration doesn't have to be directly linked to the project but has some propelling thing for you, is that part of your random search ...

HALLE: Going through random stuff to find something to go through it. So like the chaos theory where everything looks chaotic, and then in the chaos you find the system and then the systems relate to the brief. Maybe, something like that.

MB: So would you call that a little "trick" or a little "thing which you do? Do you have any little tricks or rules of thumb or things which you do repeatedly to help you to make these connections?

HALLE: Mmm, I don't think so. Definitely If I am stuck with visual stuff I will go straight to looking at images or reading books that I think has something to do with it or looking at the reading list. That what I have started to doing this year, I have started using the library which last year I didn't really use it a all, I'd just go straight home and use the internet a lot but I don't have the internet anymore at home, so

MB: So is the library becoming a substitute for the internet?

HALLE: Yep, but I think it's also just me realising that I have to start using the library and I can learn so much whereas last year I'd just sort of, my class is over I am going home now, whereas now, my class is over and if I go home I have absolutely nothing to do, because I have no sort of - nothing to look at so I go the library and start looking up stuff that maybe doesn't have anything to do with the brief but has - that I have ideas in my mind and I'll start thinking about what kind of stuff, where I could find it in a book, and then look up stuff like that.

MB: So are your library searches similar to your internet searches or are they structured differently?

HALLE: Uhm, I think, in a way they are structured differently because the library I more like you can't just find a book that's on the whole thing. Like you might have to find a book that has a chapter on what you are talking about whereas the internet you type something in and it's going to have an article on it, and it's a lot easier to find, whereas the library – the good thing about books I guess is that you look something up and it won't give you a whole book on it, it will give you a book that has something to do with it and the rest of the book will link to it, so it will give your more ideas as to where else you can go. Which I guess you find through internet as well, through having articles, that have the same things in it.

But generally I'm sort of moving away from technological stuff like that and trying to use the library and, drawing, actually literally drawing, as opposed to drawing stuff on the internet using Illustrator, and stuff like that for my initial stuff, because I think it's more *real* as opposed to technology kind of stuff. I'm just not into my computer at the moment

MB: So, when you say "real" are you feeling like the technology is putting some sort of barrier between you and your creative ideas?

HALLE: Yeah, and also just making it look more professional than it really is.

MB: Where's the problem in that?

HALLE: Like if I draw something in illustrator it looks more ... I don't know, it just seems like a real easy way out like I don't really want to – you know like, I want - when I have a concept if – generally I want it to sort of have quiet a lot of information in it as opposed to something that's just obvious [?]. And I don't think I can get it through computers as much as just writing down or drawing or whatever. I mean I don't do that much drawing unless I am forced too.

MB: Why is that?

HALLE: I get the idea that I can't draw little [?] little models and stuff but I did some last night that I did like, and I thought "maybe I can do this now". Generally I write more.

MB: Is this a skill thing? Confidence in skill thing?

HALLE: Yeah, I think so

MB: So do you do much three Dimensional work, have you started to do sketch models?

HALLE: Yeah, I mean I have made boxes for environments and last year I did origami stuff, but in terms of drawing, like the whole thing where we have to have 10 concept drawings for Environments I'm like "oh". Like I like working in 3d more than I like doing 2d stuff I think, I don't really know why I don't really like 2d stuff.

MB: So when your doing it, you say you don't really like doing it ...

HALLE: I think I just find it harder to represent it, my ideas in 2d stuff as opposed to 3d. In terms of handing it in and saying this represents my concept. It's not as unified MB: what is it about the process of 3D that enables you to express yourself better?

HALLE: Mmm. I don't know, I think it's just that when I am making something 3d I know hat I am doing whereas in 2d I'll draw a picture here and then down the bottom I'll draw something else, and it won't have anything to do with it and I can't – it won't make as much sense as the unified 3d thing that I already know what I am making. But I guess you've got to use the 2d things to get to what you want to make in 3d.

MB: So are you saying that when your doing this you actually know what the 3d is going to look like but you don't know what the 2d is going to look like?

HALLE: I think it's, just that the 2d one, as opposed to drawing it unconsciously, I'll see it in my mind and I won't be bothered to draw it because it will take me too long. Especially if I see it in my mind and I draw it and it looks nothing like what it looks like in my mind. That drives me crazy and so I just - it de-motivates me as well and I'm like "it doesn't look anything like what I want to do" and then by that stage my idea is sort of unclarified and I've forgotten little bit's that I thought were really cool and there gone. So usually I just write what I am talking about and it'll stimulate my brain to remember what I was trying to draw.

MB: So you say that frustration representing ideas in 2d actually unclarifies your ideas for you and you just used the expression that "little bit's drop off"

HALLE: Yeah, and it just de-motivates me. Like I'm like "Oh that looks really bad" which makes me think that my concept is bad. Like I do that with models as well but then I just chuck them out.

MB: Alright, when you have your concept established and you are looking for new information to supplement that concept, how do you know what to look for then?

HALLE: I think that's when I start taking words in my concept and looking them up or I start talking to people about things like – or for environments I started with the idea for the Passage one, that the teacher in the first week was talking about - we're doing the Eastern Distributor down there [pointing to site] and he's like you have to look at it from this radius [vertical] and this radius [horizontal with hands] so three dimensional radius and as soon as he said that I just - cause we were sitting in the park and I looked at a tree and I was like "Tree!" . And then I thought of how the roots represent the tunnel and then the trunk represents where we walk around and then the branches represent the sky.

And then the next week we had another tutor, some guy called Chris and I talked to him and then he was like 'Oh you've got this whole circulation idea with trees and stuff' and the water goes thought the roots and up to the branches and then they form glucose and whatever and it goes – and it makes this unified things, and that's what I started off with. And so I had the concept of a tree unifying the space, and then automatically I just started thinking about how my end result was gonna be some sort of tree like ... building that was like a tree trunk or a tree house or something like that.

And then the Chris guy was like that's more your concept, it doesn't have to be a literal form, you take elements of that and you put it into something else, and that's when I really got more clarified about it and he said the thing about circulation and then he was like you can link that back to humans and that's like veins and how or body works and how we relate that to the space and how it circulates with people in the park and the traffic and the trees, and stuff like that.

And so then I started looking on the net about circulation and then I started talking to Leya about circulation as well and colours came into like blood and blue and red blood and stuff like that. And then looked at - in the library in - stuff about passage, and I got a book out on, I think it's in the reading list, Monumental Design or something, and it talks abut natural structures like ... like honeycomb and stuff where it uses geometry in it. Yeah that book was really pretty cool actually. And I think I also got that book out as well because in Graphics we have to chose a community and represent it and I am doing ants and that had something to do with ants in it as well.

MB: So this didn't have to be a human community [laughs]?

HALLE: Well they said, they were like you can't take photos of anyone you don't know so I was like "What community am I going to do?" I've got my friends, and everyone is doing their friends so I didn't really want to do that, and then I couldn't think of any community that I was part of that I thought would be interesting to represent and I thought well "Ants!"

I don't know how I thought of Ants. I think at first I was just sort of like, being, you know an idiot in class, and she was saying "you know what kind of communities are?" and I was like "do we have to do a human community, like could we do something like ants" and she was like "I guess so" and I was sort of like "Huh hah!" I just asked that just

to be an idiot but then I started running with it and it mean I can photograph whatever ant I want because they can't sue me for it [smiling].

MB: So your brief said for graphics, well talk about graphics because this is relevant too, your brief said that you couldn't photograph anybody that you didn't know

HALLE: The University says that we can't photograph anyone that we don't know now, cause it's - for privacy reasons

MB: Yeah, for litigation reasons. So your way of dealing with this limitation, because in effect it means you can only do a community you know, your way of dealing with this limitation was to think ants?

HALLE: I don't know why ants came to my head but they did. And also, I think their always in communities, whereas like, something like bees, ...

MB: [laughing] oh don't try an justify it too me, no just joking

HALLE: Yeah but something like - I actually like ants, I don't like them when they are touching me or on me, that's when I get really scared but from afar ... they interest me.

MB: The thing that interests me about this discussion is, I would imagine most people in the class were like yeah I'll do my grandparents or my church fellowship da, dah, and you were driven to alter the brief because of the limitation. Is this something you do a lot or have you done it before?

HALLE: When I told my friends what I was doing they were like "here we go again", so I don't see that I do it a lot but maybe I do.

MB: So when your friends said "here we go again"

HALLE: Or like, "That would be right, that's something you'd do"

MB: so were they making fun of you at the time?

HALLE: Yeah they were just sort of laughing at the fact I was being difficult I think

MB: So you call it "difficult"

HALLE: Yep

HALLE: What, "difficult"? Yep. High school, art teachers, so many problems with high school art teachers just in terms of subjectivity. Always through high school I thought a teacher can't fail me on something I that I do, especially if it's something that I like myself, because I've done it, because it so subjective, because you can't mark art.

And I used to get into arguments with my teachers and I think I could just be really difficult and ... I mean especially when I was younger cause I didn't really have any idea of relating to them as a person as opposed to just being my art teacher, which I learnt in year twelve. But, yeah I have always had a thing with just wanting to do ... Like one of my teachers in high school goes "Did you go to a Steiner school?" and I was like "Yeah I actually at one stage" and she was like "Yeah, you seem like the kind of kid who would go to a Steiner School" and I was like I didn't actually like it [her opinion]

MB: What does that mean?

HALLE: Yeah I don't know, maybe that I was just – that I wanted to do what I wanted to do and I'd do it, as opposed to what they wanted us to do.

MB: Can I ask you if you think this has anything to do with confidence? Not general personal confidence necessarily, [HALLE: Yep] don't need you to comment on that if you don't want to [HALLE: Yep] certainly truth to your design ideas, confidence in your design ideas?

HALLE: Yeah, I think, well for Graphics, the fact that I couldn't think of anything off the top of my head, any community that I could make work, that was sort of ... I don't like the idea of making something that I am not going to like, and really sort of feel like "That's not mine" and so I just started thinking of something I could do, and doing something different and that's when the ants idea just popped into my head, just randomly, and the teacher was like oh you know "I guess you could" and then I thought about it a bit more, well actually I could do that, whereas I was just trying to be a bit of a smart arse, I think at the time.

MB: So the process of taking a brief and finding something in it that's going to satisfy you is important?

HALLE: Yep, cause otherwise I won't be inspired to keep doing it. So Like my memory box or object I started with that Idea of the mousetrap and the marble thingy and I was like "okay, I've gotta choose an object", and that kind of really just bores me, the idea, cause as soon as I saw the brief, it was like you have to take an object that you have all thee different memories of and represent it in a box. You know texture, surface, and all that kind of stuff, and I was like "Uhh it's really like crafty kind of stuff" and *I can't stand that kind of stuff.*

And so, I had the visual idea first of the mechanical kind of thing and then I thought of what I could do, and the in the holidays I started watching a lot of documentaries on - and I read No Logo, and I started getting into those kind of documentaries, and I thought of the idea, especially with the childlike mechanisms that I was going to have in it, of how like corporate branding and different corporations sort of use your memory to manipulate you into doing certain things and especially with children and so now I am looking at - my object is going to be a Maccas [McDonalds] toy, and it's gonna be how you memory gets to remember something about the Maccas toy, and *how it* persuades you to go their and eat the food, and get the toy. So Ronald McDonald is like the clown and that represents fun, stuff like that.

And so I guess getting that idea of something I am really interested in and feel quite strongly about, just helps me to keep working on it, as opposed to just go I am really bored with this, *I don't want* to do it *but I have to*, like a really boring essay in school or something like that

MB: This process of looking at what I would call the cultural, social, philosophical aspects of this, is this something you have come too recently, and how much do you think it is affecting your work generally?

HALLE: Political stuff or whatever's on my mind?

MB: Well you've just talked about cultural issues to do with branding ...

HALLE: [cutting in] Well I *didn't* really know as much about that before. My dad read the book about 2 years ago and he'd go "listen to this, listen to this" and he'd read me a part of the book, and I'd be like "yeah Cool" and I just wouldn't listen too it at all and he'd get really angry at me, and he'd just be like – you know some of the stuff in there is quite shocking, the stuff that you don't know.

And when I read it myself, I'd start telling people about it, and friends would be like "Yeah but what can you do about it" and I'd be like Grrrrr, and so it just really helps me if I have something that I feel really strongly about or something that really interests me in and I can somehow put that into my work so that it gives me that little bit of a push too keep working on it, so that can keep working on it to make it more unified and deeper, so that I do come out on top with something that I really like and I am really happy with as opposed to something that I am really ashamed I made

MB: Allot of what we have been talking about is the concept generation phase. Do you have any idea how you get from the concept generation to producing something – actual outcome?

HALLE: [pause] Mmm, well I guess it depends on what my concept is. Cause sometimes I'll have a visual idea in my head and that will stimulate my concept idea, so I already have the visual concept for it but when I don't, like for the environments things, with circulation, like I started off with a tree and I was like I am not gonna do that anymore because it's too literal. And I had to start thinking about it and I was thinking about circulation and how people move and my initial idea was to make a swimming pool that had a slide and a stair case, and I was going to do something with Fibonacci, I can't remember why, I don't know if it had anything to do with it.

And I was going to have a stair case and you'd be going up the tree really slowly, and then you'd dive off the diving board or you'd go down the slide and it would take you like half the amount to time to get down than it would to go up the stairs and so it was like the idea of the eastern distributor and if you didn't go through the ED you'd get to north Sydney in like ages, and if you did go through the ED you'd get there in like ...

[SECOND SIDE OF TAPE FINISHED IE 1 HOUR INTERVIEW TIME]

MB: ... [continuing off line conversation?] the whole thing with analogue vs. digital is fascination. I did so much research for that for the beginning part of my masters, because I really wanted to know how it was affecting perception. And I think it has huge affects [HALLE: Yep] not having a thing that can corrupt, and age and damage, or belief that they don't.

HALLE: And you can interact with it so much easier. Like at the moment I am doing - working with an artist doing graphic stuff and I sit in front of my computer for 7 hours

and I can feel my eyes getting *weaker* and waiting for the day when I'm gonna have to get glasses and I don't like that idea. And the fact that I could spend 4 hours doing some sort of work and the computer crashes and I lose it all and have to do it all over again, like word processing ...

MB: I think it's a valid thing to be thinking about – do you want to spend your life as a creative person sitting in front of a computer for 12 hours a day [HALLE: yep, no way] Now you're at very early stages but even in terms of the way you do your projects – your moving from - you have a certain level of technical skill and your now trying to do that by hand, so that's a really interesting process for you, it's almost like the inversion of what most people do when they come to university

HALLE: Yeah, I think I got quite excited at the fact that technology was here, that Illustrator and Photoshop and all that sort of stuff, I got really into it and did learn quite a lot of it and I'm looking back and I look at people who have done stuff on their computer and I am like "ugh", you know it just seems so really pretentious whereas you have these people who have done something by hand and it's got so much more emotion into it, and personal stuff, where as the computer kind of stuff is so much more sterile

MB: So do you think you have a general philosophy of what design should be? Are you forming one?

HALLE: I don't know if I have. If I do it's all in little broken up parts in my mind. So I don't think it's completely unified yet but I definitely have *different* opinions that I do feel strongly about, but I guess they change all the time as well because I wouldn't have said that a year ago about computers. I would have been like "Yeah, I am gonna get a computer and I am going to do everything on my computer" so..

MB: When do you know when to stop? When do you know that you have got enough information?

HALLE: Information or when do I know when to stop 3d making models?

MB: In your design process, what are the cut off points, when do you know when to stop researching, when do I stop concept development, and I move to the next phase? Do you think those phases are clearly articulated?

HALLE: No, I think they work more in a sort of blocky bit's because I will do some research and then I'll get ideas, and they'll formulate into visual things and I'll try to make some sort of model.

I mean this doesn't always happen I mean sometimes I slack off but if I get really into it I'll I can do that and I'll make some sort of model and if that works I'll keep working from that and I might go back an research something more about that from another book or things that are related to that otherwise I'll just keep making. But generally I don't sort of research, I don't know, I think I might do - I don't think I do as much research in the end part as I do in the first part.

Although last year Tutor A kept saying "You've got to keep researching, researching should be – keep going all throughout it" which I guess does makes sense I'm just not used to doing that ... but I think doing research...

MB: how do you define research?

HALLE: ...going to the library and reading. If I kept going with that I could just - my concept could just get more and more diverse and turn into something that wasn't, isn't unified at all, so as soon as I get some sort of clarification in my concept, that's when I start making and trying to think about how it's going to end up unified in it's 3D form.

MB: Do you ever start knowing what you want to make and justify it so you go backwards?

HALLE: Yep, but it's a lot harder

MB: You think it's harder, why's that?

HALLE: Just in terms of my object, trying to find something that links a really particular object to a brief, uhm, I did that with my year 12 major work. I just wanted to do origami, cause - I went though about 5 or 6 different ideas, and I kept going to my teacher "I've got this great new idea" and by the end of it she was like "Okay, you'd better stick to this one" and she was getting really stressed out because I wasn't going to get anywhere.

And I ended up just doing what I could do and I had to find an idea that linked to that and I ended up basing it on Chaos Theory. And it doesn't really have anything to do with it and so, it didn't really have that unifying thing. Because It was more of like, it wasn't so much a journey as I am at the end and I just need to backtrack a little bit. And it was more

fake as opposed to ... what I was trying to say is what I have got in my model, do you know what I mean.

MB: So the process of the journey for you, how important is that?

HALLE: I think it does play a big part in what I make and stuff like that. And I do, if I do get some sort of visual idea, I generally end up - if I use it, it ends up not as good as what I thought it would be. But I think generally I usually let go of it when that stimulates my mind to something else that links to the brief.

MB Do your past projects stimulate your current projects or do you feel that haven't done enough work yet to be able too...

HALLE: Uhm, I think, I don't like the - I think if I looked up on something else I think I might use the same idea in a new project and I don't like the idea that ... my ideas are not getting anywhere. Like I think about what I am doing now and I think "Yeah, I wonder what kind of ideas I am going to be using in like another year". Like, am I actually ever going to run out of ideas, and have to keep using the same ones that I've used, which kind of *scares* me, but it hasn't happened yet. So not completely.

MB: So does this mean that originality or uniqueness is something that you strive for?

HALLE: Yeah just – *well?* Yeah probably [laughs], if I was to be straight with you, yeah probably because you know I wanna to look back on something like, say I look back at last year and I look at what I am doing now, and what I am doing right now is the same thing I was doing last year and it's like "Where am I going? Absolutely nowhere!" And I find that troubling.

MB: How do you measure where you are going? What exactly are you looking for?

HALLE: Just things that interest me, on top of what I am already interested in. Trying to find new paths. Like I remember when - when I was first doing modular origami stuff and then I found tessellations, and I was like "This is even *cooler*" and nobody, really that I knew even knew about that kind of origami. I mean I found it quite – I spent *hours* on the internet looking for stuff like that and it took *hours* to find that and I thought you know "This is really cool" and I haven't actually found anything cooler than that, in terms of origami, but there probably is something out there that just I haven't discovered yet

So I don't like the idea of ... my discovery just stopping and staying at the same standard I am now, as opposed to keep changing and getting to better higher places and cooler ideas.

MB: So when you did the tessellation stuff, and you said you spent hours doing it, would you say you had a very clear idea of what you were trying to find? Why were you so doggedly determined?

HALLE: I think it was just looking for different things I could make out of paper because I just got to the point like I think, - I started off doing modular stuff when my dad bought me a modular origami book, and I got through all of that and thought "Yeah that's cool. There's probably other stuff out there" and I found it a lot harder going to book stores, especially as I was living in the northern beaches and there's limited stuff down that end and I just started going home, like this was in high school, I'd go home and I would just go on the net, and I'd sit on the net, and just be maybe talking to friends on the net and then just looking up origami stuff. And I found other stuff like architectural origami and like pop up stuff like that. Just things to make. I don't know why I did it, I think just because I was interested in it, and I found it exciting when I found something new that was cool.

MB: Have you been as interested in anything since?

HALLE: Uhm [long pause]. Maybe, can't think of anything right now. Origami is like my main thing though, I usually – I do tend to use it quite a lot in what I do.

MB: And you are still using it?

HALLE: Yeah, but in terms of my visual language, that's what Tutor A would describe it as, *my* way of visually communicating something.

MB: In terms of talking about your general process do you think there is much more that you can add at this point or do you think we should look at your journal. You have talked a lot about the specifics of your current project but I wouldn't mind having a quick look in your journal?

[TAPE OFF WHILE SHE GETS JOURNAL]

HALLE: ... I can't actually think of anything at the moment process wise ...

MB: We do two other interviews later in the semester when we're looking at – there's sketches in here [looking at the journal]

HALLE: I started, see I started, my initial idea was about noise, and sound, and I was going to make a little xylophone thing that you interact with and you push down these little things, which are like steps towards the tree, and there's ants in there – see ants, Graphics [smiling]

MB: [smiling] connecting your projects

HALLE: Yep, I think it's just because I had different things on my mind, and they sort of accidentally intertwined with each other. But I was going to have this little thing like a xylophone and it was like the idea of time and duration, which leads to rhythm and music and the different sounds in the spot or the silence in the spot.

MB: Does time play - does it have recurring thing in your project or is it just something that has come up in this one because of the particular site?

HALLE: Time, in terms of music is one of my interests, I think it comes up.

MB: Can you explain that to me because I am not musical and I don't know what you mean?

HALLE: Just sound in general. I have been recently thinking about what I want to do when I finish this course and whether I am going to keep doing other things or not, and I started thinking that I would do sound engineering. As like, go back to uni and do sound engineering as well because it's like *art* and music are both my main, sort of areas that I am *really* interested in. I play music and it's sort of like my outlet.

Like music is my clarifying outlet, of uhm, emotions and stuff, and art is where I have a lot of fun doing it. And so the idea of music comes into my design as well, just 'cause I'm - I don't know what it is I'm just interested in sound and making music and stuff like that.

MB: So you say that art is where you have fun, and music [Halle interrupts]

HALLE: I still have fun doing music but I can't - you know how some people express their emotions in painting and whatever, I don't - that doesn't help me as much as playing guitar and singing. Like that's really - like if I am upset I'll do that and I can feel 100% better after playing a few songs, whereas I can't do it with art but I am still really interested in art, and it's still something that I like doing.

MB: so what do you think your design work satisfies for you?

HALLE: I think just visually interesting in the way things work and the way things look and that kind of stuff. I don't really know how it relates to it prior to that ... [pointing to page in journal] that's the swimming pool idea, and also the pool was like – it was a stupid idea now that I think of it but the pool was like, the way you move in water is a lot different to how you can move on land, it slows you down a lot, which is like the opposite to how you move through the tunnel, it being fast, so you are force to move at a different speed like you're in the tunnel. That's what I initially thought of and then ...

MB: So which one of these ideas are you running with?

HALLE: I'm running with, I've started looking at – 'cause *then*, at that stage I got stuck and I went back to the brief and I looked at it and it was like "how mood affects the environment and how the environment affects mood" and I was like "What am I going to do?"

And I started thinking about circulation so the idea of lines, and I started thinking about light because *light* has a really big impact on mood, and so I made, these sort of conceptual thingies [grabs two boxes with slit's cut out] which are like light boxes, I don't know if they work here but look at it under bright light [MB: 'oh yeah' while looking inside them] and it kind of move around so I thought of this idea of having them in some sort of building or in some ones house - small cracks in the ceiling where there is like a window but really thin where the sunlight goes through it and puts lines on the floor. Or like, I've got photos, like in building when there is wooden slats [shows magazine images in journal]. Like this kind of stuff.

And then, started thinking about, so that's how the mood affects environment, and then the idea of how the environment can affect the mood or how you can swap it around having like blinds, or colourful blinds that come over and put a different colour into the room, or artificial light as opposed to natural light. And so that sort of likes to how you block out – how you affect the mood as opposed to the mood just being, affecting you.

MB: And how does this relate back to circulation again?

HALLE: Uhm, circulation, so I was looking at this sort of idea [points to hand image in journal] so the circulation in your body, and then in, say you were in a dark hallway and there was this one line of light running across the floor, it's forming a path for you to circulate through. And then I thought of more playful ideas where the line goes up the wall and you sort of follow it with you eyes as opposed to walking up the wall, and you sort of follow it and it creates this circulative kind of effect.

MB: It's interesting looking at this journal, you've got this abbreviated form of drawing ... would you agree that there's a visual form of short hand going on here?

HALLE: Yeah, and I think I try and relate it to this idea, with the tea bag affecting the water [points to image of a tea bag in a cup]. I try to think of, different, sort of everyday ways of the idea, of the mood effecting the environment. So it's like you're affecting the water with the tea bag. I just sort of start thinking about that stuff to maybe clarify my mind on what I am trying to think of and different ways of representing it.

MB: What I will do later is take some photos of some of the pages so I can relate them to the text. So what's the next step for you ... what are you going to do next? You have break week and then you present in week five. How are you going to get this up and running?

HALLE: Right. I was gonna start making. I was actually thinking I was going to have these as part of my end result and I was going to make some out of Perspex maybe but that could take me a really long time. Uhm, and then have cellophane, where you could put like - and my colour scheme is white, red, and blue, like veins and running through the system and so I would have a white Perspex box and you'd look inside it and there'd be like little slit's or whatever in the top of it and then somehow – I want to do it mechanically but I'm not sure if it will take too much time because a lot of my assignments are due in the same week.

Uhm and so you've got – you can interact with it, you put on a bit of blue cellophane and it changes the colour of the light that goes in there. And Tutor A started talking about actual spaces that you can apply this too and I mean my idea, I think I can apply to sort of building, just the idea of light because the idea of light – any space that you have the idea of light is a part of it, even in outside, outdoors and stuff like that

Next, I think - I don't know I have to sit down and think [coughs]

MB: When you get to this stage of a design project where you have established your concept, you have some visual experiments that you have done, do you just keep moving in the same way, inch by inch or do you tend to plot out what you have to do?

HALLE: Well, in the past, my end results, have generally been little things that all relate to each other, like little light boxes but I would have a series of light boxes in my end result as well as you know pictures, conceptual picture, and then maybe something else that was more of an environmental form, like I was going to do something with having little blocks of wood, maybe Balsa wood or something and how the light, *and* shadow plays a part in, something like that.

And I don't know how I am going to unify the whole thing I think it's just sitting down and thinking about it a bit more and generating some sort of thing to make it more of a unified idea. And then looking back on the idea of circulation and trying to work out something to bring it all together

MB: So is it fair to say at the moment you don't have a clear solution to this problem?

HALLE: nup

MB: It doesn't seem to be bothering you too much?

HALLE: Oh [laughs], I've got a really bad concept of time at the moment. I actually – I'm gonna get really stressed soon about all of my projects but it's really good when I get really stressed because I just say "Nup, not doing anything else, going to the library, going home, gonna do this, gonna do that" otherwise I'll be like "oh yeah environments " [wistful voice] I'll do it later, or I'll do a little bit and someone will be like "let go to the pub", or "lets go to the movies" and I'll be like "Yeah okay, I've got time". Whereas if I'm stressed I'm not going to do anything but that, and that always is what I find I need.

MB: So pressure [HALLE: Yep] that sort of real pressure at the end [HALLE: definitely] really forces you to come to a conclusion. [HALLE: Yep]

So hypothetically, if you didn't have an end point what do you think would happen?

HALLE: Like if I got to the day before it was due and ...

MB: Say there wasn't a due date, say you could hand it in when your ready?

HALLE: Ah, I wouldn't be able to do that I don't think. *As well*, like I'd probably – my end result wouldn't be as clarified as I think it would be having an end date because it's forcing me to think about it whereas not having a date due I can sort of put it off until whenever I want, and I won't think of it in big block which makes a difference.

MB: So tell me exactly what the pressure at the end of a project does. What does it force you to do?

HALLE: I think if forces – it's mainly about forcing me to think about my idea – like to bring everything together and to think about only of that. Not to go "I've got environments and oh yeah that's right, and I have to call that person ..." and "oh yeah" and it's like you know dinner and that kind of stuff, I'd just be like this is what I am thinking of, and it has to be done *now* and it makes me bring it altogether and makes me do it. As opposed to have other things that get in my way and make me forget about what train of thought I was on and stuff like that.

MB: So the pressure at the end of the project that makes you have that absolute focus, does that affect things like how you make decisions?

HALLE: [pause] I don't know, maybe. I haven't had an assignment due yet. Well actually I had one yesterday and I forgot about it [laughs] I had to spend all afternoon doing it. Uhm yeah I don't know.

MB: You know what I think we should do know I think we should stop. You've done really well, we've been chatting for ages, but your getting tired of talking about what you do so we'll leave it for now.

Interview Transcript 2

INTERVIEW	Interview 2
TITLE	Second interview With Halle
DATE	18.05.05
TIME	Approx 3.15 – 4.30 (chatted until about 5.00pm)
LOCATION	Carol Longbottom's Office
Description :	Interview Observation 18.05.05 document

HALLE: I give Monique permission to record my voice.

MB: Basically what we are doing in this interview, and hopefully it will be a bit shorter, is - I just want to find out how you wrapped up the last project and how you felt about what happened there and then to look at what you have done for the shelter project, okay.

HALLE: Okay

MB: So. The last time we spoke about your project you were up to the stage where you were looking at using colour but you didn't know how to manifest it yet. You didn't know what you were going to do in terms of forms and things like that, uhm do you have any recollection about where you were up to at that point?

HALLE: Yeah semi.

MB: You were thinking about what sort of space it was going to be but you where nowhere near the cathedral idea – you had your boxes with the splits in – so do you just want to see if you can reconstruct what happened after that?

HALLE: After that?

MB: Yeah, after that point.

HALLE: Okay, uhm, I'd got my colour, my colours because I think we were only supposed to use a limited colour palette and I used white, blue and red, through the idea

of circulation. And so - I think I had that at that stage though, which was in my end design, it was blue and red and white.

And the idea of a cathedral actually came to me when I was in choir practice and I was in a cathedral and I was thinking of circulation, places where people circulate around, and the whole idea of how circulation affects a spiritual feeling. And – in fact I am not sure I am a bit hazy about it – somehow – that's how I liked it to the idea of the cathedral, having like the sound, the noise and the rhythm, and then this sort of circulation through the middle part, like the aisle, and that's kind the main circulation and then circulating around it and then how light affects that, and that's how I got that – the light bit's.

MB: So how did you arrive at that final form? It's not a direct replica of a cathedral, so you are talking about the light coming in and being inspired by that. How did you translate that into an actual form?

HALLE: Well the top part – like the whole cathedral that I made wasn't actually, it didn't look anything like a cathedral it was more a conceptual idea. It was like a barn house I think.

MB: It had barn like elements [both laughing]

HALLE: But the top section – I was looking at – cause my first idea was about circulation in trees and I started looking at Fibonacci and trying to work out how I could put that into it, and that top section was kind of based on Fibonacci, like, I drew up this [pointing to page in journal] and tried to make them so that they all went at a uniform tilting, and I actually made that top section first and then I was like 'What am I going to do with this?' like, it was kind of like my next conceptual model after the first ones and kind of bringing them altogether, and showing it – Tutor A was talking about using like the idea of time and when you walk through the space every step that you take, the different feeling of it, so it started with organic, kind of moon like shapes that were supposed to look like the imprints of light through trees and then it moved on to the lines, which is like circulation on the road and then it went back to the blocks which was like the pool sort of thing which is on the other side of the road, and that's how they got their different lines going though it.

MB: These are the elements on the top?

HALLE: Yeah, so when you tilt it – and you can turn it and that was just to show how the sun moves through and how the sun projects the light at different times of that day. So that was sort of looking at time and the idea of time through the light and how the sun moves.

MB: And what where the bit's inside the barn?

HALLE: Well they were just sort of abstract things to show – 'cause I thought 'oh yeah I could make little church seat' like a hundred of them and I didn't really want to do that so I just put that in there like. And there were columns which were like columns in a cathedral, and then their were different – like there was one that was more raised which was supposed to represent like the road or the middle part between the *- the aisle* and then the other parts were lower which were sort of like the park and the pool bit on the other side of that road down there.

And I didn't – I just – that was just like a last minute thing so ideally that shouldn't have been there but I just couldn't, I couldn't think of a better way to represent what I was trying to represent, just sort of in an abstract kind of conceptual way as opposed to literal.

MB: So how do you feel about the project generally?

HALLE: I think it would have been better if I had a better idea, like my time management was better and all – the criticism that everyone got about how design, how it was overall you have you are sort of seeing - people being able to look at your models and your graphic stuff and be able to go 'yep, yep, yep, yep, yep, completely understand' and not have to say anything about it whereas everyone's including mine had to be explained.

Cause without me saying 'my concept, my environment is a cathedral, or an element of a cathedral' people would have not idea because nothing said anything about a cathedral. But I think it's also about time management and people get to the last night and go 'I have just got to finish my model' and then it's like Graphics.

MB: So do your graphics come after your model, once you have your presentation model sorted?

HALLE: Yeah, but most of my graphics I got out of my book and some of them I had done previously to the night before but some of them I did have to do really quickly at the end. So ...

MB: So how did you actually go? What was Tutor A's feedback like? Did you think her feedback was valid?

HALLE: Yeah. Yeah, I mean she sort of said stuff about I need to say stuff about how I need to work on my graphics.

MB: I seem to remember she was pretty positive about the project.

HALLE: Yeah, Yeah I did I got a HD, so I mean, that's what I mean. Yeah, no any criticism she gave I thought was true and stuff that I do have to work, but I am still like it's time management as well and I haven't got any control over my time management.

MB: 'Time management' are words that can be used to describe a thousand evils – what are you talking about?

HALLE: I just find it hard to, to get everything done in four different subjects, like I have got two things due in week 13, *three* things due in week 13, and two things due in week 14, but like, each week their on days that are right after each other.

And to assign myself time to do one and then time to do another and to have balance of where I am at with all of them I can't do. it's like I get my head just stuck in one of them. And I think that also is affected by the teachers and whether they are sort of helping me, pushing me forward, or whether I am just sort of talking to them for 5 minutes and then going 'hey, time to go and explore' and try and get to another stage with it, which I am finding with a lot of my other subjects as opposed to environments. I feel like I am more directed in what I am doing, *as well as* my own self direction, but my other classes I just feel like I am a little bit lost.

MB: Oh so it's not environments that your not being pushed in, your actually more pushed than your other classes?

HALLE: Yep, definitely

MB: So it that, that you are given actual targets about things to achieve for the next week or just avenues to explore? You say your being pushed, what do they push you to do?

MB: Well I guess also stimulation, like all your, the stuff that you show in your lectures always, at the end of it, it's *really* relevant to what I am trying to work out with whereas my other ones I just go to the lecture and they don't have anything to do with assignment

or where we are supposed to be going and I just come out of there and then tutorial time I get about 5 minutes with any of my tutors because there are so many people in each class and I just generally talk to them about it and sometimes they will give me some sort of direction and then other times I'm like 'Okay I guess I just have to do it myself' and have to go the library and start just trying to work out things in *no* sort of uniform way just sort of *scavenging* for something that's just going to go 'Yep, next step!'

MB: So do you find that you have to make decisions because you are at a point where you have to or ..?

HALLE: Yep, at this stage yes because I have so much to do and so little time. But time management also with work.

MB: Your paid work?

HALLE: Yeah paid work.

MB: So scheduling paid work and study together?

HALLE: Yep. And at the moment – recently – like I don't have this stress now but for the past maybe month, and it's only ended last week, uhm, for the past month I had a - I started playing gigs at pubs and it's – I've stopped doing it now for a while because it is just so hard cause generally if I have an assignment to do I will stay up as late as I have to but in the future I have to keep myself from getting sick which means I need to get sleep, I need to keep myself warm, all that kind of stuff that I just don't care about when I've got just uni, so, that made it a lot harder for me in terms of time management.

MB: Do you feel like you met your own objectives in terms of the last project?

HALLE: Yeah I do in terms of where I was at, obviously now I can look back and on it and go, well it wasn't - I don't think it was very good. Like I think in terms of my conceptual objectives, *yes*, but in terms of my overall presentation no. But at the time I wasn't really living in the reality of what my presentation should look like, I was sort of still sort of lost as to how – what a good presentation looks like.

MB: So in hind sight is that one of the key things you learnt from the project?

HALLE: Yeah it is

MB: How to present that sort of data?

HALLE: Yeah, and be able to show it to like, say if I was presenting it to a client and for them to be able to look at it and just completely go 'Yeah I get it'

MB: So similarly, in hindsight are there any other things about process that you feel like you have come out of the project with a stronger understanding about?

HALLE: I don't really know *yet* even thought we are onto the next even thought we are onto the next assignment, like Tutor A is sort of making compulsory sections for us to do now which we didn't do last time and I didn't do last. But I think, in terms of that, yeah there are things that people should do along the way but everyone works in a different way – their processes, and sometimes the compulsory stuff that is set doesn't work for some peoples processes.

Like I find my process just changes all the time, like sometimes I will need to go through all the stuff *before* it to get to a really good concept and sometimes a really good concept will just like, just appear and I'll be like 'yep' and there is not reason why I have got it like there is no sort of background as to how I got it unless – except for like I picked up a book and I opened it and saw something and I read something.

MB: So what do you do then, if it just materialises, what do you spend the other 7 weeks doing?

HALLE: Uhm, making it better and fining things that it does relate to. Like that happened with this next one that's coming up and I just found – and it's in that book [Points to a book of Santiago Calatrava sketches on Carols book shelf – she is actually referring to version about his models] the Calatrava book, that I found this shelter type thing that I wanted to do.

MB: Alright, were jumping ahead a little bit but what did you find?

HALLE: Uh, in his ideas of foldability of forms, uhm I am making a swag which is also an umbrella, but it's all fold-up-able and portable.

MB: This is for environments?

HALLE: Yeah, it's a portable environment.

MB: So what were you looking for?

HALLE: In that book?

MB: Yeah, why did you choose the Calatrava book?

HALLE: Well you keep putting him in lectures [laughing], you know I just had a dream about someone starting with C, no ... [laughing]

MB: [Laughing] you had a vision!

HALLE: I think I just started looking up stuff in the library, getting different books out on people like him and Gehry and stuff like that, that I had heard so many other people talk about and I thought 'maybe I should look at them too' and then I got that book out and it just summed up everything that I was interested in including all of the mathematical stuff that I am interested in but can never find it and if I find it, it is too complicated for me to understand whereas this book, I understand it, well the first half of the book I understand [laughing]. The rest of it is a bit to mathematical, but yeah.

MB: Well he is an engineer so it's alright to find it a bit difficult. So this is kind of a side question but does that give you a progression with that whole origami [HALLE: Yep] obsession as you called it [HALLE: Yep!] Your getting all excited now aren't you? [Laughing]

HALLE: Yeah I was, when I first found that book, like it's in here [referring to her journal] I've got all this stuff and I'm like '*I love this book!*', like because every time that I find something that I am interested in I'm like 'there is nothing better than this, I am never going to find anything better than this, you can't get anything better than that' and then I am sort of like well 'where am I going to go from here?' I don't want to stay here all the time.

Since I found all that tessellation origami stuff I was like 'there is nothing better than this, what am I going to do, what am I going to find?' and I mean I have known about that stuff for a few years now and now that I have found that book it is brining it like into 3D structural kind of stuff and it's like, heres the next level up and so I was really excited when I found that book. And all the stuff, the little models made out of wood ...

MB: Yeah he's a beautiful model maker now doubt about that at all. In terms of the actual project, you said that you felt you had met your conceptual objectives, what do you mean by that, can you explain that too me?

HALLE: Like the idea of like - I had the idea of light and how light affects people and then, prior to me having the cathedral idea and what actual space I was going to put it into, and I felt that - and I can't remember my whole concept completely, like it's obviously going to be somewhere in my book here.

I found that the cathedral had all the elements that I needed and that's what I mean by 'conceptual', I found the right environment for me to put all my conceptual ideas into which prior to that I can't remember what I was going to make before the cathedral but it was just nothing.

MB: I think you were talking about a domestic space.

HALLE: That's right.

MB: You said you were in choir practice when you did this. Did you do any research about cathedrals?

HALLE: Nup [MB: Okay]. I didn't even look at them. I didn't even look at a cathedral. Now that one way that I could have kept developing it by looking at Cathedral and like the one, the Le Corbusier one, and all those ones that you show as well, which *I am* really interested in *now* but I didn't look at them at the time.

MB: Do you know why?

HALLE: Uh, maybe because I just didn't have time and I just have to knuckle down with it as opposed to keep researching. Which obviously isn't very good but time management and just running out of time.

MB: When you, you used a couple of interesting words in your last interview about when a project is good. What your conceptual aims where and you said that you were looking for something that was both unified and went deep. Do you think you project did that?

HALLE: [laughing at being quoted back to herself] I don't think it was very unified in terms of all the elements together, definitely not. And I think the only – I really think the only good part about my model was the top part, which was the main part. Like the rest
of it – I did want to create some sort of kinetic thing – like it did move but it didn't move very smoothly. I liked the idea of it being able to move but it didn't do it very well. I thought it was kind of clunky in the end.

MB: I think clunky is a good word [for it].

HALLE: Yep, definitely.

MB: But that's okay, that sort of refinement is something that comes later, it's something you work on. Okay. One other thing I wanted to ask you about, was, both you and Leya talked to me about the newness of working with someone [they also talked to me about how they talked to each other about talking to me about it i.e. not revealing a confidence].

How do you think that went in hindsight?

HALLE: In terms of us working together?

MB: Yeah

HALLE: I think it's, it's kind of like a form of, instead of when you get stuck, emailing your tutor, or your lecturer and waiting for that to get back to you, you just call them up and start talking to them about it. And we did a lot of sort of sessions with each other because we live really close to each other as well, or we'd ring each other up and start talking about it or we'd see each other at lunch and just be talking about it all the time and just swap from each others idea and try and work on them more. I think in that way our idea – they looked completely different and we were completely different in ideas but there were a lot of elements that were similar, because I think we have a lot of similar interests in terms of design stuff.

MB: So how do you feel about that because I know some students get concerned about losing the integrity of their designs. It's obviously not something you and Leya are concerned about?

HALLE: Well no. I think it depends on who you are doing group work with, like we've just done another group work thing now which I was in the same group with Leya but we had another one of our friends in it. And it's just - I think if you don't have, if you're not on the same wavelength with them it's a lot harder.

Like I don't think I could talk to anyone else in my environments class and – oh well, that's a little bit shallow of me because I haven't talked to everyone in my environments class, but my experience of talking to other people, I never feel like they can help me because, they've got all this other stuff that they are trying to work out themselves, and they don't have the capacity to try and think about mine. And really think about it, and where I could go with it, especially when they don't, they don't know my history of what I am interested in and what I want to do, whereas Leya seems to be able to have a really good understanding of that even thought I haven't known her for years and years and years.

MB: So it's quite important when you go and speak to somebody that it's not just general chit chat, that it actually is focused structured time?

HALLE: Cause I find when I talk to other people they can give me ideas and stuff and I am like 'Yeah? Nup, doesn't do anything for me.' whereas she has given me ideas that have made me think more and be like 'Oh yeah that's true' and then think on another angle.

MB: Just to recap – I do have more directed questions this time because they are the result of the last interview – one of the things that you said was that you tended to front-load your research. So that tail end of the project, you just said that you didn't look at anything to do with cathedrals, did you basically cease to research or were you doing it in a different way?

HALLE: Well I think it was just that, and I actually remember now, I was trying to look at - I got to the point where I was maybe a week or two weeks before it was due and I was thinking I have got to know what this is going to look like in the end. And I talked to Tutor A about it and I'd be like I need some sort of space that you know you look in and you see the little gap and it's like a dark space and there's like forms or like walls and you would walk around it so it's like looking at this little kind of house kind of thing.

But there was – I had no direction as to what the space actually was, like why would somebody be walking in a dark space that has little dots or little lights lines or whatever. When I got the idea of the cathedral it was just sort of like that is somewhere where light plays a really important part and the idea of, a sense of feeling like the spiritual feeling inside there is really important. So it was more – that was still conceptual even though it was a physical environment, it was still a conceptual element.

MB: How close to the end of the project did you get that idea?

HALLE: Pretty close I think [smiling]

MB: Come on tell me the truth [laughing]

HALLE: I actually can't remember. How long – I don't ... it was either a week or two prior too it. Maybe it could have been – I don't know. I think I spent a lot of time going 'how am I going to build a cathedral – I don't want to build a cathedral'.

MB: Had you finished the roof section?

HALLE: Yep, I had that for ages.

MB: So you had that but you didn't have a cathedral

HALLE: Yeah. I had just the roof section but not the bit that moved, just the roof section, and I think I got the idea for the bit that moved idea from that ... the idea of - I was trying to work out a way of making it tilt to show how the sun would go, and I was going to have a light that would go over that but then I was like that's kind of clunky. I mean my – in the end it was clunky anyway but I think I was looking at sort of like a fish scaly kind of thing.

MB: A fish scaly kind of thing – where did that come from?

HALLE: I don't know maybe one of my lectures [laughing – I assume referring to my lecture about Frank Gehry]

MB: Alright, we could keep going over this but what we will do is move onto your new project. Do you want to walk me through it, so from the time you got the brief what happened with the new project?

HALLE: Can't remember ... I can't – did we have Tutor A from the beginning? And the measured drawing [the assignment they had between the Passage Brief and the Shelter Beef] was like – I did that over a period of four days, two of which I was working all day. So I think I got quite burnt out after that.

MB: So are you saying, you started this project a bit behind the eight ball because of the measured drawing project?

HALLE: Yep, and I was just, I'd does done so much work in such a short amount of time that I was like - I need to sleep. Uhm, I think we started with Tutor A was just like "I want to do this group work thing' and so we started doing the group work stuff and then I just was like okay I am going to start researching, I'm going to look at visual things and try and get some sort of stimulation from visuals of different types of shelter, and I got books out on shelter. A lot of – and I sifted through a lot of stuff that I felt wasn't very relevant at all and then I started looking at - I got a book out and it was talking about Aristotle and Bachelard's ideas of space and the notion of home and the notion of familiarity. And that's what our group started looking at and the idea of public, private and shelter, and then I think that the Calatrava book is one book that I got out and I opened it up and I was like "Wow! This is cool!" and like I have written down all the mathematical formulas that made sense to me about stability, in forms and uhm and then I got onto the little models that he'd had and started getting ideas for like - and I was like 'oh this looks like it would be fun to make' and I didn't really have any materials to make it with but uhm, and then I somehow got an idea from one of his visuals and I went to class the next day and Tutor A was talking about our group work and developing our concepts and our ideas of public and private space and shelter.

And I was *really* like – this is the day after I have read all this Calatrava stuff and I was like still really buzzing and I was like 'I have something I have to show you' and I showed her this little model that I had made of what I wanted to make and she was like 'Yeah that's really cool but you have gone a step too far I don't want you to do that' and because all these other people were around she was like "I don't want you to confuse people with this step, you have gone to far'. And it was kind of like – it just happened as opposed to me going through so much research that I came to the idea. It just sort of appeared in front of me.

MB: Okay so take me back a step, she's got you working in groups right up to the final design or just for the conceptual development part?

HALLE: Now we've finished. Our ideas of public and private space and shelter were group work and then our statements we did individually and we showed that last week and presented it and that goes towards our final mark and then next week we have another one on the development of our concepts to a better stage.

MB: Okay so lets talk about this - she is giving you very clear guidelines obviously. How

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HALLE: 'Cause no one did it last time so she felt like people got to the end of their presentations and still felt like 'I don't have any idea what I am doing' which was completely true. Like as much as I really liked my idea of the cathedral and was happy that I had found it I was still sort of like 'Is that right or is it not right ?' and I think she is just trying to fill in the gaps that nobody every knew that – thought to fill in.

MB: How do you feel about being taught process?

HALLE: I think – I mean it is definitely beneficial but it just doesn't seem to work with the way that I work. And I mean – and we got our marks back yesterday and I didn't get a very good mark and I wasn't very happy about it but I talked to her about it today and what she said kind of made sense.

MB: So what did she say?

HALLE: Just that our idea wasn't shown clearly enough in our models and I was trying to illustrate that I had done a lot of research into the idea of poetic space and public space and I felt – cause when I saw everyone else's presentation I felt that my idea of it was a lot more complicated and emotional as opposed to just sort of analytical [like] ' A private space is something that people can't see into and a public space is something that you can see into'. And I – and we – my group spent so much time trying to work out this model to make and we ended up coming up with this idea that we thought was cool but, I guess it wasn't completely successful in articulating it and showing it clearly without for people to understand without us having to explain it for like and hour. Which – that makes sense but I am still a little bit confused as to how I could have done it any better last week because I just found it so complicated in terms of articulating what I am trying to say that I found really complicated.

MB: So do you think if you had to do it again or using it for the final design with the feedback that she has given you, you would be able to do that better?

HALLE: Not right now. Cause she said that to me and I was like yeah okay that makes complete sense. How do I develop my visual graphic sophistication and she said it was kind of like trial and error, things that work and things that don't work. And in terms of the end of this project I don't think trial and error is going to give me a really good mark ... because there is only two weeks, three weeks left.

MB: What about the other member of the group, do you think you all had equal levels of understanding about what you were trying to say?

HALLE: Yep

MB: So what are they say about how to resolve that concept?

HALLE: We have got – that's the concept of public and private and shelter and then our individual ideas now so our group is just completely – we're not in a group anymore it was just that first section.

MB: So you said that you then had to do the concept statement presentation, is that right?

HALLE: So we showed our group stuff and then each one of us would show our individual stuff on the concept, so our statements.

MB: And how did you find actually articulating the concept clearly?

HALLE: Well I ... it wasn't completely – I found it kind of hard in that we had a minute to talk about it and I just, was kind of like blah, blah, blah, blah, and then she was like 'Oh good, next person' But there are so many people in our class, I don't think that is anyone's fault.

MB: Did you present visually?

HALLE: Yeah I had three models but I mean my models weren't that great anyway but their conceptual models.

MB: So what is you concept?

HALLE: I got the 'sitting across from midnight and time dragging by' [one of three quotes they had to choose from as a starting point] and I got this idea of like – the idea of sitting across from midnight, see I am still a little bit hazy as to how it works but I see 'sitting across from midnight and time dragging by' as in this guy – visually in my mind I see this guy sitting outside over like a river or something and like the moon being up in the sky and him sitting there and feeling sort of out in the open and just like anything can get him right now, like he is quite vulnerable to all of the elements. And he is waiting for midnight to come so that everything is dark so that he can sort of feel more relaxed and

safe, like the idea of private space being dark so that no one can see you and no one can – yeah, I mean, that's what I sort of – not on a very deep level – that kind of idea.

And then I – something gave me the idea of a guy fishing and how their waiting for a fish, and so I got this idea of fishing for midnight and then when midnight comes it's like caught the fish and creates this kind of private bubble like a meditative, state that's timeless, has timelessness in it so there is not - not waiting around for something.

MB: Do you think that was clear what you just said?

HALLE: Nup

MB: Did you actually write a concept statement?

HALLE: Nup

MB: Why not?

HALLE: Ah I just didn't write one

MB: Were you asked to write a concept statement?

HALLE: She generally asks us to write a concept statement and I probably should have but I didn't

MB: Do you know why?

HALLE: Nup, I just didn't do it.

MB: Do you want to take a guess?

HALLE: [pause] Because I don't – I can't – there was too much in it. I couldn't actually write that in one sentence. Most probably, like I could sit down and I could write a page on it, cause I am just not clarified in it.

MB: Do you ever write short concise concept statement?

HALLE: Yeah, I did last year but that's cause Tutor A made us do it. [laughing]

MB: So it's not your natural inclination [HALLE: No] So, how would you naturally present those ideas if you didn't have this artificial structure being place on you?

HALLE: I actually have not idea and I think that's one of my problems, I am not very coherent in creating – having a lot of information and simplifying it into a small amount for people to just understand. Because if something's complex obviously – but everything is important, you just can't cut things out and have like the core elements. it's not what I am interested in, the core elements, I am interested in the whole complexity of it and how it all f it's together and I find that hard to show simply and clearly.

MB: I can understand that completely. So up until the point of finding the Calatrava stuff what were you sort of using for stimulation for the project until then?

HALLE: I got that book out - I was just looking at different architects I think ...

MB: You said something before that I wanted to ask you about, you said you had got a whole lot of stuff about shelter and a whole lot of it was irrelevant. So what was irrelevant about it?

HALLE: Like I went to - I mean I went to the [design school] library and everything is out, any book that you want is out is *always out*, so I went okay 'I'm going to go to [university library]' so me and Leya went to [university library] one afternoon and just got heaps of books out on shelter. There were two books that were actually called 'Shelter' and we were like oh this is good [laughing] we don't have to sort through everything, the whole book is on shelter! We opened it and it was like this primitive stuff about cave men, that just seemed kind of irrelevant. And there were just a lot of books that were on – we thought would have to do with public and private space and shelter and they would just go about it in a way that was too hard to understand and too off the track for us to spend too much time working on. Yeah.

MB: So what was the relevant stuff you found?

HALLE: One book that was talking about Aristotle's idea of the home and your the first place – the first place that you have boundaries is like the womb and then you move from your home and we're always moving, everyone is always moving, and so there's this idea of being in unfamiliar places but just being used to that and so everything you have being portable. And so your home is actually everything around you, like this is Carols room and she's got her desk and her computer and all of her stuff and that's what creates her home as opposed to, the room. It's what you put up in the room that is your stuff.

MB: Is this were you have the notion of portable space?

HALLE: Yeah so something that you can carry with you and take along and just put up anywhere. And our group had the idea that your private space is your mind, because of this whole thing about private space, people not being able to see it or enter it it's like the space of your body, no-one can actually enter my arm unless they cut it open, no-one can get into my mind and see my thoughts. And so it's like you have this room in your brain which is your private space and it's like your house and then everything *in* reality – and that's – we got this idea of Poetic Space from Bachelard's *The Poetics of Space* and then that sort of – that kind of space can't be shown geometrically in reality but you project all those ideas that are in your head out here. So everything that you see here is familiar too you because it's familiar in things that are in your mind. And so the idea of 'familiarity' is what we worked on and how you can access your private space like imagining.

Like when you day-dream, you have got to be feeling comfortable like in some sort of element that you are familiar with that reminds you of your private space. So the idea of you being in a bus and you being in a public space, but sitting on this bus and being able to day-dream and just – daydreaming you have got to be relaxed to day-dream, you can't be really uptight or anything and *why* is it that you can do that on a bus when there are all these people around you.

And most people, a lot of people won't be able to do that on a bus but I know that I can and Leya said that she can because we have spent so much of our time on buses. And you are just so familiar with the bus and the noise of the bus. Like when the bus turns off, no way, like I was sitting on a bus last night and it kept breaking down, and every time the engine turns off and the bus is silent it's like 'where am I?'

MB: How is this notion of familiarity manifesting itself in your project?

HALLE: I haven't actually manifested it yet.

MB: Do you plan too?

HALLE: Yeah, I just - it's all this time management stuff in terms of I can't at the moment – I used to be able to do it in high school, I don't know why I can't do it now – I can't work a little bit on Environments, a little bit on Objects, a little bit History, a little bit on Graphics. I get really into one or I get to the point were I am like 'I really actually have to do some work for this' and I have to just put everything else down. And that's what's happened here and I haven't actually done any Environments for about a week.

MB: So you're a little bit disconnected from the project at the moment?

HALLE: Yep

MB: Okay so what is your plan, given that we are in Week 11 now and you handing in, Week 14, so really you have two weeks thinking and one week making maybe...

HALLE: Yeah but I have got graphics – not graphics, Object, due the day before environments and an essay and a presentation due in week 13 on the same day and I have Graphics due the day after that. So it's kind of looking at now – I am at the stage where I am looking at what's due next, what's the first thing that's due and that's my history stuff so I am trying to work on that. And I've actually – that's what a lot of this week – I've taken time up doing that, because all the history essay questions are boring.

And I have tried finding things that I would find interesting, something that I could do that is interesting because I don't like doing essays on things that I am not interested in, I just wont do it. And it has taken me a while to actually work out which one I was going to do and the particular person I was going to focus on in that.

MB: So does that mean that you actually have found something that you are interested in for your history question?

HALLE: yeah, kind of yep. Cause I was trying to work out – I'm doing it - there's one question about a theorist and looking at their theory, a contemporary theorist, looking at their theories and how they are shown in design now. And I wanted to do Le Corbusier and I went and asked the teacher and she said he's not contemporary enough and said that contemporary was 1980's, and I just thought, I was just, I started thinking ...

MB: What, just the 1980's?

HALLE: From the 1980's up. But I just found it a little bit hard to find somebody who was going to have said something that was *already* going to have affected designers that have designed something, that's already finished now because the 1980's weren't that long ago. But uhm I am doing Ezio Manzini and sustainability...

MB: I'm a big fan. He's pretty cool.

HALLE: yeah, but I have only just started looking at his stuff yesterday.

MB: Ah the man! The man says it's the designers job to identify the hidden need, and the hidden need leads to sustainable design because you're truly answering an appropriate question. Big fan of Ezio Manzini.

HALLE: Well I had heard of him but I hadn't actually looked any of his stuff up.

MB: It can be difficult to read when you first read it, but he's good.

HALLE: Mmm Hmmm. What I read yesterday was interesting and I am *absolutely* obsessed with that Cradle to Cradle book by William McDonough. Have you read that book?

MB: I haven't read the book but I know a lot about William McDonough's theories. He wrote a beautiful speech that you should see if you can find on the internet which was delivered at a cathedral in New York. Do you know about this speech? Fantastic.

HALLE: yeah, go to the library – it's on a short three hour loan and just read the first chapter. It's crazy! Like the books not made out of paper and the first chapter says 'This book is not a tree' and it's made out of plastic that's been recycled by this special manufacturing person over in the USA and all the parts can be unzipped and then recycled and then made into another book.

MB: He has done some amazing stuff, he worked out how to recycle carpet and stuff like that.

HALLE: Yeah, was it him or ...

MB: In conjunction with a Swiss company and using organic dyes in carpet and that sort of thing, but were not here to talk about William McDonough [both laughing]

HALLE: Yeah that's true [laughing] but get that book out anyway

MB: I will, I will have a look at it. So what I need to establish now that you have had a break and had this loss of focus ...

HALLE: Well I have been working consistently up to last week, it's only one week that I have been out of it because I did so much for it last week and then I am like I have done too much for environments and I have actually got to work on some other ones.

MB: What are you going to do though? You walked in here earlier and said you don't think you are going to get all of this stuff done. That's one approach - I am not going to finish everything. What are you going to do if you want to finish everything on time?

HALLE: The next step is -I actually want to make a -I have a prototype of my environment but it's made out of wire but it doesn't work very well in terms of being stable and working the way I want it too so I was going to try and make it out of aluminum rod because it's light.

MB: Yeah also it's very susceptible to being bent. Is this the model you have shown Tutor A already?

HALLE: Yep

MB: Are you comfortable submitting that as your final project?

HALLE: No, I will show it too you [gets it out and we take some photos]

So it folds up like and umbrella, and it pushes out – you can take a video on that [referring to my digital camera]

And so if it was made out of something ...

[Halle makes it move in the various ways it can move]

MB: Can you explain to me what it is I am looking at?

HALLE: This is a prototype of what my portable space will look like except it is without the material.

MB: Can you tell me where this came from?

HALLE: it's probably in that one [pointing to the Calatrava book on Carols Shelf] I don't know if it's in that one because that's number two.

MB: No it wouldn't be because that's his sketches not his models.

HALLE: Oh okay. Well it was one of his models that he had made out of - you know his little dowel models that he has got in there. This was showing the idea of movable - it's

flexible geometry. That's what it is based on and so he was just showing – it was just the initial stuff on flexible geometry and this was just the first one so it about stuff like how you fold an umbrella up, so it is kind of like an umbrella but it turns into when you pull it out, come on, and that's why this is a bad concept model [struggling with the model] but I couldn't work out any other way to make it.

So you can turn it into an umbrella, so that's an umbrella, for like rain, so that's like a public shelter, cause it's like – a form of public shelter from rain or sunlight or wind and then at night you can pull it out and it turns into a swag.

MB: So do you have a plan about what you are going to do with this?

HALLE: Nup. I am gonna go and look – because obviously I want material to go over it and yesterday I had the idea of putting, fleece, whatever that stuff is called - you know the stuff that is recycled out of PET bottles? [MB: Mmm]

That material, the fleece material, because it waterproof and it's also warm. But then I wanted to have some sort of material that you can see out but you can't see in. So this women that I work with has just had blind installed in her house and it's this black material that you can kind of see out of but you can't actually see in it. And originally I was going to use that but then I thought maybe the idea of recyclable, sustainable kind of stuff was better. Because I am really interested in that whole idea of sustainability at the moment and not having a bad impact on the world.

MB: It is a space that you are meant to be designing so how are you going to make this truly spatial?

HALLE: Uhm ... I don't know [laughing]. I hadn't thought about that, it's kind of like – it was just - the fact that it just did dawn on me make it ...

[Carols returns to office - interview temporarily interrupted]

MB: Alright, so, we have the umbrella form which is based on Calatrava's dowel model and at this stage you don't know what you are going to do with it other that perhaps cover it with fabric...

HALLE: Well it's kind of like a tent.

MB: So what sort of scale do you imagine it's going to be at?

HALLE: Well a scale that can fit a sleeping human in it.

MB: So how big is that going to be to carry around do you think?

HALLE: [laughing] Yeah pretty big. See I haven't thought about this stuff that's why I am kind of a little bit behind, but then again I have already thought of things that other people haven't thought of yet. Not that other people really matter in terms of what I am doing, but yeah, there is a lot of stuff to do that I still haven't done. Which, I don't know if I will get done. Like I know what I expect – what I would ideally want my whole presentation to look like but in the end it's not going to look like that cause that idea I now want in my Objects presentation *and* in both my – all my other presentations, and to get to that level with all of them is just crazy. Especially, when they are all due at the same time.

MB: So what are you going to do?

HALLE: Whatever I can? I am already kind of sacrificing Graphics but I think – I also think that whatever ones I am doing are the ones that I am being pushed in the classes and we've had so much stuff going on with Graphics like we've had – this is my third teacher and because she has just come in she doesn't feel she has the power to push us around and tell us what to do and everyone is just like 'yeah' and I haven't really done anything for it. And I think well I should do some stuff for it but I am not as interested in it as I am with the other two. Even thought I feel a bit like that with Objects as well

MB: One of the things that you said in your last interview is that you like to feel connected to the brief. Is what you are saying to me that you feel connected to the environments brief and not to the other two briefs or is it more to do with the structure of the classes?

HALLE: Well connection is also about being stimulated in the lectures and stuff. Like I – I think with my objects lectures I don't feel like I have learnt anything this year from my object lecture, nothing. And I don't feel like I have been at all stimulated by what I have been shown or like excited by what I have been shown. Like just this year I've sort of - everything that they have been showing in object goes completely against everything that I feel about mass consumption and the creation – the creation – people designing objects

with no point. Like for example all the concept boards up in F-Block. Some of them, nup - and I am completely against that and both the object teachers seem to have this idea.

MB: How does that make you feel when you walk along ...

HALLE: [jumping in] It makes me *angry*. There are two in particular and they are just – I just want to rip them down, find the person who did it and be like 'You could be doing things for that can actually benefit the environment as opposed to something that is going to make Australia more obese and lazy'. There just stupid things and I feel that I have this idea but I am finding it hard to self direct myself – like find out all these connections that I want to know all on my own through looking in the library or on the internet. And my teachers, aren't showing me anything about sustainability, like they speak about it and their like 'you have to think about it' but they don't teach us any of it and I think that's what they need to do. I mean for me anyway, definitely. And so, I have been apprehensive to do my assignment because we have to design something for the top of the table and I just think, anything we need for the top of the table doesn't need to be redesigned. Or anything that we don't have that someone is going to make some sort of innovative design, that is going to be stupid and we don't need it.

MB: Alright, well this is a really valid argument but let me ask you when do we need design? What justifies a new piece of design?

HALLE: Well exactly and that's the kind of stuff – what I am kind of saying is saying 'we don't need art it's a waste of time' but I think we need everything in a balance because without art there wouldn't be – art is interesting and I really enjoy art but I wouldn't be –at the moment I wouldn't be able to live off just making and selling art works because I have got this conscience about the affect I am having on the environment and pollution and where it's, where we are taking everything and we could be creating things that are more sustainable and less degrading the environments and stuff like that. So – I always say 'stuff like that'! I have to stop, yeah.

MB: Stop what?

HALLE: 'And stuff like that' I always say 'Stuff like that'. And that's another thing I learnt from the last presentation actually the amount of times that people say uhm! it's so much better when people don't use those sort of, uhms and ahs and stuff like that.

MB: You know something you haven't said "random' [HALLE: yeah I know] Why what happened to the whole random thing?

HALLE: It comes and goes, it's pretty random [laughing]

MB: So what is happening to the notion of randomness?

HALLE: Well everything is still random I have just eliminated from saying it this time. Like my tent is random. I opened a book and I randomly got an idea from it.

MB: Can I ask you a couple of general questions and then we can finish up because we have gone a bit longer than I expected too.

HALLE: yeah that's fine.

MB: One of the things that fascinated me when I read over your transcript was that you didn't like to draw your ideas in 2D, but you were quite comfortable making a bad model and chucking it out. Have you found that it's the same on this project and why do you think it is, why can't you just chuck out a bad drawing?

HALLE: I think it's because I have gone through so many stages of getting an art diary or something and going 'I am going to make this look really good'. Like all those diaries that you see of and hear of that look really good like Leonard Di Vinci's

MB: [Laughing] Your comparing yourself to Leonard di Vinci!

HALLE: No, no, well that's what the funny thing is, people look at what they like and like what people expect. You know how people say 'It never looks as good – it doesn't look as good as I expected it too' because peoples interest - they are interested in something. So say someone is really interested in Leonard Di Vinci's, and they are like that looks so great and 'I am going to make something great' and to make something that you are interested in you obviously want it too look great and too make something. And so to make something that you have done – to make it look like what you wanted it too look like, ideally is probably not going to happen and I was talking to my cousin about this the other day and she is doing fine arts and she wasn't happy with the mark that she got for one of her exhibitions – a work that she had done for an exhibition and she was really critical of herself and she ways saying ' you know like 'It wasn't grabbing people" and all this stuff. And it's like where do you get this idea of a successful exhibition, it's by going

to good exhibitions that you really like and that have such a big impact on you and that's what you think a successful exhibition is and you're still studying, like you can't expect you to be at this stage yet.

MB: So you are saying this to your cousin or she is saying it to you?

HALLE: I am saying it to her.

MB: So how come you can't live that

HALLE: Oh like just in terms of – I can and if I do a bad drawing I'll be like 'that's so ugly, I don't want people to see this' and I'll rip it out and my book will be two pages long.

MB: You'd rather not do the drawing than pull it out of your journal – is that what you are saying?

HALLE: It depends on *how* bad they look. Like messy drawings yeah I can see that they look kind of cool and they work with the elements but if - I just don't like the idea of my diary being un-unified and really disjunct and everything sort of not relating.

MB: Why is that do you think?

HALLE: I don't know maybe, an aesthetics thing that I just like my book to look ... clean, but it doesn't it has lots of ugly drawings in it.

MB: it's an interesting point of view ... lets see, you said when you came in here that you had about twenty books and that you were not getting to read them all. Is your book in take getting higher?

HALLE: Yeah, I didn't get them all at the same time, I just keep getting more

MB: What I wanted to ask you quickly is, what do you do when you get a book. I know that sounds like a funny question but I have a real methodology about how I get information out of a book ...

HALLE [jumping in] well, generally – that defiantly stems from stuff that I learnt in high school in terms of getting books out to look at. I remember when I studied Romeo and Juliet in year ten and I read the text and it just didn't make any sense to me and there

were all these people talking about these ideas in it and I was like 'how the hell do you know that? How do you know that from the text?' and then I realised that they ...

[phone rings – Childcare Centre ringing to say my son Miles must be collected because he is sick. Phone husband to collect son]

MB: Sorry about that, this is the call that I always wait for, that I always have my phone on for. So, how do you do the book thing?

HALLE: So with that example of Romeo and Juliet, I then realised there was an introduction in it and generally I would never read the introduction, but then I read it and it actually analysed half the book and I got really into that particular text. I mean that is just an example but ever since then I sort of start and I read the introduction, see cause it generally gives me an overview of what – what direction these people are trying to get into in terms of their books, I mean it's not with every book, obviously I'll check and if it's boring I'll be like 'nuh'. And then if I am looking for particular stuff I will go to the index and I'll look it up otherwise I will start at chapter one.

MB: Okay, well I think that's covered all the stuff I wanted to go over ...

HALLE: Do you want to look at my Fruitopia ideas?

[discussion about last years journal and getting images off her computer and an example of tessellation origami, photographed current journal

Interview Transcript 3

INTERVIEW:	Interview 3
PERSON	Halle
TITLE	Third interview with Halle [final interview for S1_05]
DATE	24.06.05
TIME	10.21-11.27
LOCATION	Carol Longbottom's office

Rainy cold day - very wet outside - rained through most of the lecture

Halle arrived a bit late but seemed very comfortable as usual. She sat away from the table in a relaxed manner sometimes leaning forward onto the table to make a point or drink her coffee. Began by joking about a company name she and Leya had generated for themselves [Hall-it Park-Hard [?] based on Hewlitt Packard]

MB: Halle do you give me permission to record your voice

HALLE: Yes

MB: I do have a list of questions here because the middle interviews had some big gaps in them because everyone was very stressed so were going to go back over some of that ground. And them some general questions about your process, but we'll start the same way we did last time.

Do you just want to give me a wrap up of how your project went, because last time you had the wire model of Calatrava's folding form – what happened after that?

HALLE: I kind of got caught in Graphics, two dimensional representation because I wasn't really doing very well in that at all, and we had progress marks that Tutor A had been setting us – in those I was doing really badly 'cause I was just not putting very much time into them, and also just my 2D stuff was just *really* bad.

And I spent a lot of time doing that and forgot – well not forgot but didn't really look at my 3d much because I thought it was more – you know I thought I had it underway and then I go to the end and, I think my 2d – well it wasn't perfect but it was defiantly working a lot better than my previous stuff that I had done and my 3d just – I don't know – wasn't really finished in terms of a design. Like I worked out a mechanical way of making It work but I didn't work out an actual end of product

MB: Why do you think that was?

HALLE: I don't really know I think I just got caught up in lots of things happening and just tried to finish it. And was really caught up in trying to make the models – the little white model, work. Which took me a while and when I finished that I was like 'Yeah! Done!" [Laughing] and I didn't really think more about it.

Like I talked to Tutor A afterwards and she said 'we have to work on you – like getting your ideas into an actual real designed form in the end'. Which before that I didn't actually think about it and when she said that, I was like "Yeah that's true". I didn't really finish it, I sort of left it half way but my ideas were finished.

MB: So this process of - you know how you found that thing and you were fascinated by it, what do you think the impact of that was on your design process?

HALLE: Mmh, I think it was – I mean *now* it's good because I've actually still found it and I still have that knowledge in my mind but in terms of it coming up at the time when I had that project I think it wasn't very good for me because I didn't actually do anything if I looked at it from a ...

MB: But at the time what did you think you were doing?

HALLE: Exploring new design type things. I don't know I got kind of caught up in this little fairyland I think.

MB: That's interesting that you say that because I was just reading through some of the things that I wanted to ask you about in terms of the last interview and one of the things you said was that for your last presentation you just weren't living in reality in terms of what you needed to present. So obviously you have checked yourself on that.

HALLE: Well that's when my 2d stuff came out

MB: So you have tried to really focus on that. This process of living in reality or fairyland that you were just talking about – why do you think it happens?

HALLE: I don't know I think it's just my way of trying to filter out things that I don't need to think about at the time. Which obviously there is a lot of that in reality. Like you can't – like if I have got to do work I don't want to sit down and start thinking about some other problem I have go going on, I just, you know, need to do the work.

MB: So how do you make sure you ground yourself in reality in your projects?

HALLE: I have no idea. No idea. [laughing]

MB: So taking a step backwards, how clear do you think you were in the last project about what you actually needed to do?

HALLE: I think I was defiantly clear on *what* we had to do, and I was defiantly clear on my concept but in terms of having a design that showed my concept it wasn't really - I don't think it was that [pause] great. I think it was just sort of like - I defiantly think it was more conceptually as opposed to physically type design, which annoys me but I can't do anything about that now.

MB: Why does it annoy you?

HALLE: Oh just because I sort of got to the end and I didn't even realise that I hadn't really finished it and when Tutor A said that to me and I was like 'Yeah, that's totally true' but there is nothing I can do about it now. Which it only annoys me –it doesn't – I mean it only annoys me to an *extent* because I have learnt something from it this time. Yeah

MB: You've just said that your project was more conceptual, can you tell me what that means? [HALLE laughs] No this is serious because I have come to the conclusion that that work has thousands of meanings so I want to know what *you* mean by 'conceptual', what your project is doing when it's in a 'conceptual' domain?

HALLE: Alright. Uh, just in terms – as opposed to me going 'I am going to design a shelter' just on purely aesthetic, j whatever I want it too look like, just so that it looks pretty and it shelters you from whatever you want it to shelter you from either physical or emotional things. *Mine* sort of looked more at ...shelter. Well obviously my design didn't have that much aesthetic, like a look to it, like I didn't even have a finished shelter it was

like the mechanics to how my shelter would look in the end so I guess because there wasn't a finished product and I hadn't *really* designed the finished product properly, it was more conceptual in that the real thing wasn't there.

And it was the concept that was behind it, like the idea of shutting yourself off from all the semiotic bustle around everywhere. I don't know if you read my 2d stuff

MB: No I didn't get a chance

HALLE: Well that's what my shelter was about. I had pictures of like Tokyo and McDonalds and had my shelter set up outside it

MB: I did see that

HALLE: Yeah. Putting yourself into this little bubble and letting yourself ... oh there was one part where I ... "Step out of the rubbish and into your shelter" and then I had a cube that had a picture of the outside of the rubbish bin so it's like you are stepping outside of the rubbish bin and into the shelter and everything outside of the shelter is rubbish. That kind of idea, which sort of ... Something that Ezio Manzini was talking about actually, that's where I got that idea.

MB: So the Ezio Manzini stuff that came from the essay you were writing didn't it?

HALLE: Yep

MB: So that fit into your environments project. So What did he say that inspired this idea?

HALLE: He was talking about different types of pollution and he said something about semiotic waste and how there is just so much stuff going on, and I think it is really evident, really clearly in Tokyo especially, in photos where they have just – they have a really strong culture there but in terms of in the city life it's just – all these different cultures come together and he talks about it as semiotic waste in the semiosphere. And, which takes away culture and you lose a few senses where you are and what is actually there so it's like a type of pollution but through ...

MB: At what point in the project did that come into your thinking?

HALLE: That came more to the end

MB: Now I shouldn't quote another respondent in the project but given that you and Leya know what's going on and talk about it, she kept talking about your project in terms of skin and bone and I had never heard you refer to it that way. Is that just her idea about your project.

HALLE: Yeah that's what I called it.

MB: Did that come out in the presentation?

HALLE: Yeah it was on the top of the 2d panels and then behind it [the smaller text] it said S and B. But that came out at the end like that was when I looked back in my journal, from that last project when you did that lecture about what we need to do/ And I always thought I needed a name for it and I didn't know what I was going to call it. And when I started to my 2d stuff that's when I did that and that was a lot closer to the end because I was trying to work out how to make my 2d stuff work.

MB: So what did that process of naming it, because there is really strong imagery involved – how did that effect your concept or did your concept affect that? How did it all link in?

HALLE: Well skin and bones I got it from the idea that the ideal shelter is you. Like you mind is you and then you have one shelter which is your skull and then you have another shelter which is the skin that surrounds it and the way to get to you mind is through your eyes and so it was like this shelter from vision. And that's how my concept – that's pretty much what my concept was about, a shelter from vision.

And so having this tent that portable and you just jump in it and you can't see anything, like it's completely white or completely black so that all the information that's in your head you can just sort through it and work out what you don't need and what you do need and not having anything else coming in and distracting you from just sorting stuff out. So skin and bones came from the idea of the skull being the real shelter for your mind

MB: Now that's not something you said to me in the last interview so is that something that came later as you were pulling the whole thing together

HALLE: Yep. That was when I was doing my 2d – it actually started when I started writing stuff down and I writing out what my concept was about. I'd start thinking of new things and writing them down and then ... that's how it came out.

MB: Up until that point you actually hadn't articulated fully your concept had you?

HALLE: Nup. Nup. But I was, but I had already been influenced by Aristotle's stuff about the womb and Bachelard's poetic space type stuff but I hadn't put Ezio Manzini into it.

MB: so how much did the poetic space end up influencing the outcome or the concept?

HALLE: Well I think that poetic space is kind of like the space in your mind and I'd looked at sheltering the mind as opposed to sheltering the whole body, so it did, I think it did. It wasn't evident in the end of it but it was defiantly needed to get to that end point.

MB: What do you think would have happened if the skin and bone and the Ezio Manzini stuff had of come in earlier in the process?

HALLE: I don't know actually. I don't think it would have changed by 3d, Cause I didn't actually realise until afterwards that I had done that. Oh Unless I had gone to - I'd had a few more tutorials and been told that I need to work on that. [Laughing]

MB: And that didn't happen?

HALLE: No, cause – it is my fault because my time management got to the point where I was just all over the place with all my things. I had two things due in one week and then the next week I had one thing due and I wasn't on top of *anything, at all.* And so I went to about two tutes and I was like 'I haven't got anything'. I haven't really done anything because I have to finish this before I go onto the next thing. And I had a problem – like we had a history – me and Leya did a history presentation together and it was a nightmare. And that just cause more problems

MB: Why was it a nightmare? I was going to ask you about the whole collaboration thing.

HALLE: Yeah, it was pretty – well ... it was hard to do work when I would prefer to just sit there and talk about whatever. You know or go to the pub.

MB So this is friendship affecting your work?

HALLE: Yeah. Which I have done it before and it has worked but it just didn't work this time which and maybe it's because we couldn't find any information on the topics. And

we asked other groups that did it and they said they – could it was on Hong Kong interior design, I think I told you about it, maybe? No. It was on Hong Kong interior design and Australian Interior design and similarities and differences and we couldn't find *anything* on Hong Kong interior design. And one of the other groups when to Google.HK and wrote everything in Chinese and found stuff.

MB: Did the whole class have to do it?

HALLE: No, there were two groups in our class had to do it. I don't know why but yeah. So we found it really hard and we weren't really interested in it at all so we were just doing our other assignments, and then we got to the point were we were like, 'maybe we should start'. And then we ended up getting an extension. But extensions always make it harder I think. Like the environments one was really good cause I never would have gotten it finished if we hadn't gotten the extension but with history it just meant that I didn't have another week to focus on something I would have preferred to have focused on. But I still had to do it.

MB: What sort of plan do you think you had at the beginning of the project? Can you tell me what your plan was and whether you think you stuck to it?

HALLE: I don't think I really had a plan, I think I just had – I just wanted to make some sort of ground from the last one. So like in the end to have a better, more sophisticated presentation than the last one, because my last one the presentation was just really bad.

Uhm, and I think I just started working with it and I started trying to look at the research – like I started researching stuff like Aristotle and all this stuff, and that was great and that helped me and we had a group thing that we had to do with research and that helped me as well. Although I don't really like group work with design presentation type stuff where you start with group work and then move into your own individual parts.

MB: Why is that? What do you think it does to the way you work?

HALLE: Oh it was more like, If I have ideas I want to use them in my project and I don't want to tell other people my idea. Which is selfish but I just, I don't know

MB: Can you explain to me why you don't want? Is it about competition, is it about watering down ideas, what's it about?

HALLE: It's a little bit about competition. Like I like my ideas to be ... different from other people. So if other people use similar ideas to me then I get annoyed. Which happened in the last project *and* in this project. Like whether it was just my mind playing games with me, or whether they were actually getting ideas from mine – like another girl in my class was doing a portable shelter, which is *fine*. It not like she can't but ... it was just strange that I had said something and Tutor A had said something to the whole class about mine being portable and then the next week she bought in this portable thing and then ... Which is probably in my mind but it just gets up my ... I would just prefer that mine was the only one that was like that. Which is unrealistic but yeah.

MB: What is it about having a unique idea that is important too you?

HALLE: Uhm, I think ... I don't know. I don't like the idea of doing something that is the same a everyone else. Then it's boring. Like if everyone did the same thing then everyone would be board. Especially you, the tutor [laughing]

MB: So for you, what do you think was the biggest challenge in this project?

HALLE: Mmh, the 2d. At the end if I looked at it that wasn't the biggest challenge but through the process, defiantly 2d because I kept handing stuff in like in our development stages and just seeing that it looks Like crap. And I asked Tutor A what to do and she just told me that it was like, with graphics it just trial and error.

MB: And did that help?

HALLE: No

MB: So what did help?

HALLE: Just telling myself that I have to do this and looking at other ways that – like if the third years had something on, I'd sort of poke my head in and had a look at what they had done. And just sort of being more aware of the layout of different graphic information whether it was a magazine or a poster or whatever it was

MB: YOU just said that during the course of the project you thought 2d was the biggest challenge but having finished the project you don't think it was. So in reflection what do you think the biggest challenge was?

HALLE: I think the biggest challenge was most probably bringing – was bringing – was going from my concept to the final design. And trying to filter out a final design that showed all the things in my concept that I wanted to show. And I think because I had too many ideas in my concept, to be able to find an easy 3d option. Because I didn't really look at that either.

Mb: Do you think that this artificial process that was put on your class had any affect on that?

HALLE: I didn't like it. Because – did it have any affect on it? Maybe. But I don't know whether it had a bad affect but it definitely didn't have a good effect. It just didn't – I don't think it did anything for me. Maybe, in the initial stuff with research, and talking in my group about ideas of shelter. That was good, and I did like that even though I didn't want to give any ideas away, even if that wasn't really about ideas, that was about talking about what shelter was, uhm, but in terms of the other development ones, I just didn't really do them. Didn't put much effort into them.

Because I don't work – I don't think I work in a really sort of, 'okay I have done my research now I am going to start on my concept', 'Now I have got my concept now I am going to develop that now'. Like I don't think I really work in that sort of way, and so I didn't do very well in all of my marks because of that. And maybe I work – the way that I work is bad because I cram it at the end, but I don't think – I didn't feel really forced to be working on my concept all the time. I was just like, I don't care, I'll just get it done, it's not due now – you know, so I think it was a good idea but I don't think it worked. It definitely didn't work in terms of helping me, cause I was just sort of going around in circles there for a while, and then I was like '*Ends coming*, argh!' And just did whatever I had to do to get it done.

MB; One of the things you said in the last interview was the process of knowing when to do things, you know, you said in the last interview that you felt that you couldn't continue to research something because you were running out of time but in hindsight it probably would have been a good idea. How are you feeling about that now, that knowing about when to do things? Do you feel like you have a better idea about that or do you still feel quite confused about it?

HALLE: About when I should start researching?

MB: You know, researching, designing, the various phases of what you have to do?

HALLE: It depends on the, on the design. If I am say 5 days away from when it is due, and I am trying to finish it up and then I get this really good idea but it is going to take me a while but I really like it then I will do it. Just because if it is better then I will want to do that . If I have go the idea of it being better then I am not gonna want to show something that's not as good as the best I could think of at the time, so even if I did think I had to stop working on that and start thinking about how I was going to present it, I wouldn't.

But I defiantly can see that you know you cannot leave everything to the last minute with these kind of things. And even now I defiantly should – you know I should have days where it's at the stage where it's at the stage that I had it when I pinned it up before it's due so that I can, like pin it up at home so that I can go 'What does it need now?' because I didn't do that. I didn't – I just printed out my 2d's from my 3d and put them down.

MB: That evaluation thing is very important?

HALLE: Yeah. And I have never done that, and I think that is something that hopefully will come in time.

MB: The other thing about what you just said was that this process of - that you had too many ideas in your concept to produce a simple 3D. And it was something that came up in the last interview was this notion of managing complex information ...

HALLE: And I found that in 2d as well. That's what I was having problems with in my conceptual development, was trying to articulate what I wanted to say, what my concept was in 2d and I just couldn't get it all out without writing an essay on it. And that - I got really confused at that stage because that's when Tutor A was like 'you know, learnt graphics through trial and error' and I was like, 'I don't have time for trial and error, I just need to know how to do it', but you know, and so.

MB: So do you think having gone through that process of how to do it yourself that you have worked out any strategies that will help you next time?

HALLE: Nup.

MB: So it wasn't an effective learning process then?

HALLE: No. Well in terms of my graphics stuff.

MB: But you said you thought they were better

HALLE: Yeah they were better, but I think it just sort of came out of nowhere. Like I remember going home after work and going like 'Okay, I have to start on my graphics' and sat down and just – I had – I mean in my book I've got – like I bought out a little piece of paper of my concept, and it was about that much writing, but little short statement type things, and then I did it in illustrator and I just wrote the little things and then I thought of little images to go with it that would work or images that I had already used. So it wasn't really like, 'Okay for a 2 d to be effective, I need to do this. It should look like this so that it is clear.' I mean I don't think it was perfect but it was definitely a step up from the last one because the last one didn't have anything.

MB: Okay. In the end what do you think was the most significant influence on this project?

HALLE: Mmm. Calatrava

MB: So the little model.

HALLE: Yep. Well in terms of the design, obviously yes, definitely but in terms of concept probably Bachelard's stuff.

MB: And do you think they really did mess well together in the end?

HALLE: No

MB: So why do you think they didn't?

HALLE: I don't know actually because I still haven't thought about how it would go to the next stage and I don't really want too. I'll just let that one go and start on the new one next semester.

But I think I was just - they were two really separate things and because the Calatrava thing just came to me one day when I was looking in his book and then I was looking at Bachelard's stuff it was like two separate things going on at once, and then I tried to bring them together at the end.

And I think that didn't work and I think that's what Tutor A didn't want to happen. She wanted us to start with research and then build a concept and then conceptual development and then build a visual three dimensional language out of that, and I didn't do that at all because I got caught up in this little thing, which is what caused the problem.

MB: Which leads me onto my next question, what do you think – what do you think the strengths and the weaknesses were of your project? Lets make it simple, what do you think was the weakest part of what you did?

HALLE: Uhm, probably looking at my concept and having my – having a design already set out and having to link a concept to the design. Which I do all the time. I've done that before and that's just a bad thing that I do.

MB: Why do you do it?

HALLE: [laughing] I don't know it just happens. It happened in year 12 for my art major as well. Where I get this idea that I like what I am making or whatever and then I have to fill in a concept that goes with it.

MB: Well your obviously very making focused, like all that origami and tessellation stuff and everything you do. How do you think you could avoid it though? Or if you are going to do that how could you strengthen the process so that it doesn't stall?

HALLE: I don't know how it will work if I keep doing it but I think it's looking at visual stuff with the intention of finding something that I want to design, which is what I think I did when I was looking in the Calatrava – oh no I was actually just trying to read about him but then I came across all of this stuff that he had done and that got me onto my 3D stuff as opposed to keep going with the research first.

MB: I know you said you did all that conceptual research at the beginning but at that point did you know what sort of shelter you wanted to design?

HALLE: No

MB: So did the form that you found affect that?

HALLE: Yeah, I think it did, in terms of uhm, when I went to the tutorial with that little wire thing I was like, 'yeah it's like a portable shelter' and then I started thinking - I had

to obviously link that into my concept. So, I did have to bring them together but they didn't come together very well. Because it was two ideas coming into one, instead of getting one idea, and making it bigger.

MB: So having identified that as a bit of a weak link in the chain what do you think was the strongest part of the project? What do you think you did really well?

HALLE: Well I think I defiantly did a lot more research with this one than I did with any of the other ones and in terms of - I kept researching, because the idea of shelter is still just strange I think because there is so many different types of shelter that you can have, it's kind of confusing but yeah with other, uhm projects I didn't do that much research at all. Didn't use the library at all whereas this one I did.

MB: If the brief had of been much tighter, if it had asked you to design a shelter for this demographic and this site would you have preferred that?

HALLE: It would have been easier I think, but I don't know ...

MB: [laughing] that wasn't what I asked

HALLE: Yeah I don't know whether it would have been preferred because as much as I feel I am confused about the idea of shelter I do have a lot more of an understanding of what shelter is just in terms of - and I think in terms of having that quote as well that through me off a lot as well. And so it became this bit that Id forget about and then I'd be like 'Oh yeah, the quote' mmmh.

MB: So there was an issue for you about trying to juggle the quote which was a requirement of the brief?

HALLE: Yep and that's why – and that – also my concept had – and I forgot about this – my concept had all these other different little ideas in it as well, like - that I didn't show in my 2d because I didn't have enough time and I didn't know how to make it concise enough to make that much sense.

MB: This process, that we were talking about before if they had written a much tighter brief, is there a reason you don't artificially impose that stuff on the brief yourself?

HALLE: I never really too.

MB: Alright, so given you have just gone through your first semester of second year, has your perception of your design process changed?

HALLE: I can't remember what I said about it before

MB: Okay, how would you think about it now? What have you learnt abut what you like to do or how you like to work?

HALLE: I think I like to work in a round about kind of way which is *really* annoying but it's just the way that I do it. Like even when I am being forced to try and do it in a more systematic way it just doesn't help.

MB: What do you mean by round about as opposed to systematic?

HALLE: Well like how I got my design before I had finished my research even though I was supposed to be doing my research I still came across the design. And maybe that wouldn't have happened if I hadn't read the Calatrava book but it just would have happened with something else because I was already looking for "Okay Shelter, what am I going to design, what am I going to design?" as opposed to "Okay shelter, what is shelter" lets look at different types of things and then think about what type of shelter I want to build.

MB: So why are you mentally running ahead? Why were you so keen to find a form?

HALLE: I think because the form, mmmh, that's what I want to look best. I want something that looks interesting, as opposed to something that is really conceptual even though that's the way mine came out anyway. Like the concept is really important to me as well but having some sort of really interesting design is, I think – I focus on more. And my form was interesting to me but in terms of the finished design it wasn't finished.

MB: How do you know what the right form is if you don't have a resolved concept though?

HALLE: Mmm. Dunno

MB: Well how did you know that was the right thing to play with?

HALLE: I think I don't. It was what I was doing at the time and it was something that I had been already previously been interested in and I thought "Oh yeah this is cool'. I

mean it is a space but it turns from an umbrella into a cube if you wrap that in material, it is a space – 'this could be my shelter' as opposed to thinking of it like 'wow this is a really good example of a shelter' it was more like a 'what can I make as a shelter ... hey that would be really cool as a shelter. Even though it

MB: How do you think your experiences this semester have affected how you source and generate ideas then?

HALLE: Umh. I think I do have more of an idea of – as much as I didn't work in the way that Tutor A wanted us to work I think I still have some sort of idea of things that I should or shouldn't do in terms of trying not too... Because at the start I thought 'oh, I can make this work' and she was saying 'No, don't get onto 3d yet, don't get on to 3d yet' and I was like 'Nah, I can make it work' [laughing] and I obviously didn't and so I think next time, I definitely will try and if I find something 3d I will put it to one side till I work on like nailing the research.

Because otherwise I am, I am – I think what happened was I was looking at research and then look at the thing and then I'd look at the thing and Id be like 'Nah' and then I'd be looking at research and I still wouldn't be able to make any links between the two of them, and that's where I put that in the too hard basket and put myself into that sort of not reality sort of 'yeah it's working, it's working alright' when it wasn't.

MB: So do you have a clearer idea after this semester about how you go about selecting ideas and committing to it as opposed to letting something go. You know you said in the beginning that some of the information you found was about primitive shelters, it was just about huts and bones and stuff. And there was nothing to say that that wasn't a legitimate thing to look at but you were both like 'pwwttt' [spitting sound] and you were like nuh forget it not using that ...

HALLE: No, but it was like pictures of a cave man ...

MB: Still you could have used it, see your doing it now

HALLE: Yeah that's true

MB: What was it about it, that made you both so ...

HALLE: It wasn't that I wasn't interested in the cave man thing but I think the type of cave man thing that they were talking about wasn't relevant. Like it wasn't cool, like the little yurt type things or little tree house things, it was like , they live in a hole in a rock. Which is interesting but I can learn it from somewhere else which is more interesting, like I have learnt that from another book like something about keeping warm so you put the house underneath the ground so that it's insulated by earth.

MB: So this process of selecting and idea, what is the key to holding onto something or to letting it go?

HALLE: In terms of that book [laughing]

MB: No I just bought it up. I just remember at the time noticing that you were both so ...

HALLE: Anti ...

MB: Yeah like pwat [spitting noise] gone. You were both very determined that that was not the right information, so what do you think governs that

HALLE: I don't know. I think if you saw it you would understand a little bit more – it was like one of those canvas – it was covered in canvas and so you were like ' Oh, what's going to be inside?' and then you open it and it's just ...nup. It was just bad.

MB: Alright, in opposition to that ...

HALLE: How do I filter out the good stuff and the bad stuff? I don't know. Do you mean as well like if I have a lot of good stuff and I have to get rid of some of it and stick with some of it?

MB: That too.

HALLE: I don't know how I do it, I guess I choose the ones that I like the most. Or what is the most interesting to me because if it's not interesting I am going to get bored and it's better to find something that you are interested in so that you keep working on it a lot.

MB: And is that interest based on what-I-Know or what-I-don't-know?

HALLE: It's definitely a little bit of both. Because if I don't know – like if I am completely baffled by it and I can't work it out it could be interesting for a while but if I still can't work it out it's like 'Argh, get it away from me' but if it's got some sort of

element that I don't know about, that will be the thing that I go for. Because I don't want to keep doing the same things that I have been doing. I want to feel like I have gotten somewhere new. As opposed to being in the same spot after a semester

MB: Okay that makes sense. Now another thing that was a really big issue for a lot of people in this project was juggling the notion of 'site' which is a very real constraint on a project and concept. How do you think that affected this project, the notion that you had to put the shelter somewhere, you had to know were it was going to go?

HALLE: Well I think was able to get around that because mine was portable and you can put it anywhere

MB: So you circumvented the problem

HALLE: Yeah but, I don't think I did it on purpose but previously to that I just don't think I even thought about it. Like there is a lot of things that you know you already mentioned today that make me think 'oh yeah I never thought about that' but in realistic design you have to think about, but in the design things we're doing I haven't thought about yet. Like, the idea of site or the idea of giving myself parameters to design something against. Like working my concept to the type of shelter that I am going to build.

[Carols landline phone rings]

MB: So think you have learnt any sort of new design strategies or any new ways of approaching things this semester?

HALLE: It's hard to say if I learnt anything from last time because right now I just know what I know and whether I knew that before I can't remember but I think definitely – I mean I keep talking about research but I really just didn't do any research last time or the time before.

MB: The time before this?

HALLE: Mmh. Maybe I did a little bit on , what was the last one on..

MB: Passage

HALLE: I definitely didn't do anything on passage. I defiantly did something on light because that was what I was interested in and that was what I was working on but I didn't actually start off and research. I did more like go to the site and look at the site which is important as well but I think you need both of them.

MB: Site analysis actually is research. So you say research, you say research has become more important to you. Can you actually tell me what you mean by research?

HALLE: Well research in terms of concept. So like peoples idea of shelter, peoples – the different types of shelter because obviously there are lots of different types of shelter not just one type and then also research into three dimensional form. So I kinda got caught up in the first three dimensional form that I found as opposed to going somewhere else because it sort of clicked with other things that I had been looking for outside of this in terms of origami, tessellations type stuff

MB: personal interest stuff

HALLE: But I defiantly think researching other visual forms is really important as well which we get in the lectures from stuff that you show us from buildings and ideas and stuff like that

MB: And in terms of the research, can you describe for me what you actually do when you find the information . How do you go about trying to deal with it?

HALLE: I read it. I write down the most important points an then I'll start just writing things down in my book, like little statements or little lines that I can link to things. Then just try and make little links to information I have found and my concept, and what were actually supposed to be doing like the statement 'standing across from midnight and time dragging by' and trying to link that to the idea of shelter and then trying to link that back to the information that I have got. So I do it through my diary.

MB: So this process of finding connection, you do predominately through writing?

HALLE: Yep. And maybe little drawings next to it. Which I don't think I've said. I think when we initially started doing this I don't think – I think I said I don't write that much, but I think I do. Maybe not that often, but I do and it is important and it helped a lot

MB: Do you think one of the issues about communicating with your tutor is that process of writing?
MB: Well they can't sit down and read it every class

HALLE: yeah that's true, yeah possibly. But I didn't write that stuff down until the end for this project anyway. But when I have talked to whichever tutor it's always talking as opposed to looking at what I have written and so I am going to forget something sometimes which ..

MB: Did you read in that Calatrava stuff anything about his design process?

HALLE: Uh no. It didn't say anything. It was about his creative process but I got caught up I the mathematics of the fold-ability of forms. I don't know if it actually said, I did read the whole introduction and then the beginning of the fold-ability of forms until it got into mathematics that I didn't understand. Like I did understand a lot of it because I did maths in high school but obviously and there was a lot that I could apply to help me understand the equations but then it got to a point where I was like 'nuh'.

But it didn't say anything about him saying 'well first I go down to my local library ...' It didn't say anything like that so ... [laughing]

MB: I think we have kind of covered this but lets go back a bit of a way. You said that in the absence of support or just because things are so limited time wise that one of the things you do in order to find the next step is that you just go and scavenge around the library. That process of finding the next step, how do you go about doing it? Is it that you always just try and light on an idea or are their other ways you do it?

HALLE: Well if already have something prior to that obviously I've got to have something that I am going to want to take to the tutor and go 'Look what I have got, what do I do next?' If I don't have the tutor there, which I think is actually bad because that's when I lose reality, So if I have gone to a tute will all of my stuff prior to handing it in – like if I had taken what I had handed in to the tute prior to handing it , she probably would have said 'You really need to work on your 3D" and I could have bought it to the next stage and it was my fault that I didn't have everything underway prior to that.

But obviously I have learnt that I *really* need to get time management working otherwise I am just going to get screwed up next time as well, but if I don't have the tutor there I will take ideas that I have already got – so if I have the idea of tents, maybe I will go and

look at -I will type tents into the library thing. Or - when I did that the I came up with, what's his name, some guy that makes tent forms? Uhm, tensile forms

MB: The German guy, Otto something?

HALLE: That's it, something like that ... Frey Otto. I got some books out on him. I didn't actually have time to look at them but I looked at some of the pictures which were interesting. I didn't use them though, but that's what I would do.

I would go and take idea's elements of what I have got and try and find them in other places. Like when I got the Calatrava book and it said something about the fold-ability of forms and flexible geometry, that's what I started looking at firstly.

And I think that was completely off the topic of environments and was for my personal stuff more, but I sort of found the next link for what I was trying to look for after the tessellation stuff. But I couldn't find anything in our library on it. I think I will have too actually buy a book , cause there is not that much on it maybe. Or definitely not in the [design school] library.

MB: No but there may be in other libraries. Sydney Uni has a very good architecture library

HALLE: Well I have been to all of the libraries around us for that history presentation. We went to every single university library around

MB: And UTS didn't have anything?

HALLE: We're UTS library members now too! [laughing] Wow!

MB: Well you know as you said it's what you have to do because as you said the [design school] library is under such pressure and it doesn't have a very large architecture section.

So I think we have covered everything. What I'd like to do now is just ask you what you would like to achieve next semester ?

HALLE: I think I wanna get myself into more of a, you know, designing-for-realisticthings as opposed to this conceptual idea. Like conceptual is cool, it's fun but in terms of the real world it's still fun but I don't think it's very productive. I mean it is still needed otherwise the world would just be boring. I've sort of gone into this – all semester I've sort of gone into this sort of 'It's useless we don't need art" even though in the back of my mind we do, otherwise the world would be really boring.

MB: What do you mean by art?

HALLE: Not just art but a lot of things are pointless there are things that need to be done and there is such a small amount of people doing them like, sustainable type design and so ... yeah so next semester so... whatever I design for the next brief to have them more realistic so they could actually be utilised in the real world as opposed to just, designed for my universities second year, second semester brief.

MB: Can you tell me why sustainable design shouldn't be aesthetically pleasing?

HALLE: No that's not what I meant - I meant just for designing for the sake of aesthetics without looking at the idea of sustainability. And I meant that when I said art, I say art because my cousin does fine arts and immersed in a lot of art stuff around me and from what I've been researching and what she's been researching I just feel like I am on a completely different level even thought I know it's not right that she's on the wrong level. It's just that there are things that need to be worked out before you can go off and play art games. But I know in the back of my mind that we still need that kind of stuff, like ... Does that make sense or am I just ...?

MB: No it makes complete sense. How did you incorporate sustainability into this project?

HALLE: Well that was something that I had a lot of problems with and I think that causes a lot of problems for me because through the conceptual development stages I was trying to work out some sort of design in terms of materials for the tent that would be sustainable or would some how have a more long lasting effect. Or you know some sort of sustainable idea whether it was that it was sturdy and made of good materials or whether it was about to be just broken down and then re-created through new materials.

So I started off with that whole Idea of the island. You remember when I was doing it when the portable tent was like taking it when you are going hiking and being on an island and as opposed to buying the tent you hire from people that you work out your holidays on the island with and they hire you – they give you the structure but it doesn't have the cover over it and so when you get onto the island. You have to create the cover

out of whatever you can find which is completely unrealistic because who is going to do that? Nobody. I was doing it in terms of trying to find someway of creating a sustainable design, but obviously I am still really confused in my ... there are all these ideas about what sustainable design *is*.

Whether it's not hurting the environment or whether it's designing something that will last a lot longer and there are clashes between that, you know like making – like the book that I am reading right now, talking about book design and the creation of books, and the ink on that pages means that you can't recycle it properly because it's got metals and stuff in it but then if you create a book completely environmentally friendly on recycled paper with soy ink it will just fall apart.

And I was trying on the side to get my head around what sustainable design really is and I don't even know if there is a perfect idea of it. And then trying to get my design to do it and I remember in one of my concept design things I was just really like - I was the last person in the class to talk to Tutor A

[phone rings - tape switched off briefly]

MB: You know on of the things that is interesting about what you have been saying is that when we were talking before about whether you were applying constraints to the project you said no but it doesn't say anywhere in the brief about sustainability.

HALLE: Mmmm. That's true but – what I was saying before, when I had the concept development assessment with Tutor A and I was the last in the class to talk to her and she was – it was the day that everyone was like RAH RAH RAH RAH and she got to the end of the day and was like , couldn't talk to me about it at all so I just had this really vague talk to her about it as opposed to "This is what I have done and this is where I am at, and I want a good mark for this!'

I talked to her about what I hadn't doesn't and just had more of a conversation with her about how I wanted to put sustainable design into it and I was just having a lot of trouble doing it and my design was going to the point where the tent was just becoming completely ephemeral and I didn't want that. And she said you have got to make the compromise.

You have got to design something either completely conceptual where there is no actual shelter there or you have got to let go of some of your sustainable, don't want to hurt the

environment type idea. And I think I took that side because I didn't want to do the ephemeral thing, cause it's too arty.

MB: Yeah okay, so next semester the thing that you would like to achieve most in term of your design is to make your projects more realistic ...

HALLE: And sustainable. I still want to work on that. I don't want to let go of that

MB: Okay I think we will end there, unless there is anything else that you would like to add about you know designing, the process, what has gone on this semester? I mean you guys had a lot of issues in terms of tutors and time, which is a really big problem quite obviously.

Given that there are time limitations in class and one of the things you just said was that as one of the last people to see Tutor A that conversation was not as productive and as effective and you also mentioned before that you didn't go to tutorials ...

HALLE: No I went, but I just went and then I would say 'I don't have anything for you'

MB: So how are you going to manage this thing next semester?

HALLE: I think I just have to get on top of everything instead of just working a lot on one and then going to the other ones which I did do a lot this semester . I just did a lot of work on environments and then as I got to the stage where I was like I really need to work on Graphic or I really need to work on object and I would have to let go of that completely because I would be so behind in the other two. I think I need to juggle them all three more and keep them at a similar level.

MB: So they are all moving forward rather than this thing going on?

HALLE: Yep because that just doesn't work especially if they are all due at the same time. Like I had an essay – before we had the environments extension, object was due Tuesday, and environments was due Wednesday and I never would have gotten either of they finished. I just wouldn't have.

MB: Tell me how your object thing went, that was the table top thing wasn't it?

HALLE: I think my tutor liked it. I did a see-saw. Did I tell you about my concept? I can't remember what I told you about it.

MB: The only discussion we had about it was that we were talking about was you were talking about how inane you thought the brief was.

HALLE: Oh yeah, Okay, Oh that's cool. Well actually I was sitting in class one day and I was like 'This is so crap I just don't want to do this at all' and she was going around the class talking to everyone. Cause this has happened in all of my classes now, it's not like a whole tutorial and they stand at the front and talk to us all, it's like one on one stuff. And so I sat there for two hours and then I would be one of the last people and then she'd talk to me and I wouldn't get any help really and so I went to the computer room and looked up the idea of tabletops, or the top of the table, that's what it was.

It said on the top of the brief 'Top of the table' and then it said 'Go deep. The deeper you go the more likely you'll find something of value'. That's what it said on it. And then it had some quote by Bruce Mau but I can't remember what that said but anyway ... So I went and I looked it up on the computer 'top of the table' and the definitions of it. And obviously it said the top of the table and then it said the synonym of it could be, obviously underneath the table, and different interpretations for that can be like a metaphor for things being in secret, and so then if you bring it onto the top of the table again it's like things being out in the open and sharing.

So I thought I am going to do that instead because that helps with my idea of - when I was going to do that park bench. And so I went back and I asked her if I could do that and she was like 'yeah but you still have to like that to the top of the table' and I was like 'it is linked to the top of the table' and so I ended up making a see-saw which is a seat for underneath the table which is linked to the top of the table because you have to share it cause a see-saw doesn't work with one person.

So I made it out of cardboard that could be recycled. So you buy the seat and then when it gets ruined you take it back to the manufacturer and then they can recycle it – and it's not coloured or anything, it doesn't have any dies in it – and they recycle it and then they can make the new one for you and it works in like – there are bowls in it that slot in. You don't have to cut it or anything. And it was for kid because it was about interaction as well, social interaction on the top of the table so it's about kids being able to interact together and make a see-saw. And the see-saw – the seat part fit into the box and then you take the seat part out and the box turns into a triangular prism that's the bit that it see-saws on, and then you can unfold it and pack it away and put it in the cupboard

And I think she liked it because there no – there were like three people in my class that actually tackled the idea or even closely anything about environmental issues. Everyone else was like creating whatever objects could go on the top of the table. And I think she was more interested in the ones which were more environmentally aware, because they haven't had any focus on that in object which I think they should, personally anyway. And uhm so I think she liked it. I haven't got my marks back yet but uhm ...

MB: Did you get your marks back for Environments?

HALLE: Nup, But I don't think I am going to do that well. I got the impression from Tutor A that I wont cause of my 3D

MB: How do you feel about that?

HALLE: Uhm. I don't mind because I think it's justified and I think I will learn something from it for next time where as Graphics I got a really bad mark for and I don't think it was justified at all and I was actually really angry about that and I don't know how I went in bench-marking but I am still going to be really angry if my marks don't get changed for it.

MB: So what are you going to do?

HALLE: I don't know. I want to know what I got for benchmarking because if I appeal like benchmarking was all of graphics people – it was all three graphics tutors, one of them being the Head of Graphics so I don't think it's going to help but I probably will go and talk to the head of graphics about it because I do think it was unfair. And I do think it was a lot because my tutor just didn't understand what I was doing because she wasn't – she didn't understand my graphic style. Like I was really sarcastic and she just didn't get it.

MB: That's Interesting

LB: Yeah she just didn't get it. But yeah my environments I am fine if I get a bad mark. Like obviously it's not good but I think that is a learning curve.

MB: And it does seem to me from what we have discussed that there is a lot you're taking out of it which is really good and a lot that you took out of the first project which is really good. That's what being at design school is about, it's about that creative progression

3.25

LB: And that is one thing I have realised this semester. I started off this semester thinking was going to nail it. I am going to get HD's or try to get HD's for everything but in the end I don't think that that is realistic and I don't think that is good either. Cause I am not going to learn as much

MB: You're not going to take as many risks and that where you run a ground. The risk taking is really important. Anyway we are going to end the tape here.

[Have a chat off line and then decide to put the tape on again]

MB: Why are you interested in sustainability?

HALLE: Uhm . Go back to the start of last year and I had no interest in it, didn't even know abut it. Had no idea about anything, I just wasn't aware. I mean I think that was the case with a lot of things. Like political stuff as well, I just want as aware as I am now but from that point – we had a class, Interactive System and I had Alan Walpole and I think he's great. I mean there is a lot of stuff in that class that wasn't very interesting but it did look at a lot of the environmental stuff and that's when I started looking at that stuff and when we went to the Powerhouse [museum] and looked at the Ecohouse it just made me more aware of the effect we are having on the environment and that's when it started and that's when I – I had a really bad conscience about things that I was doing and what affect they were having on the environment.

And I'd still be doing stuff but I just had this really guilty thing happening that I - it was really annoying because everyone else around me just seemed to be able to do whatever they wanted and I felt like I was in this little cage. Which is good I think, it means I'm not – I want to do something about it as opposed to just put it to the back of my mind, but that's when it started and then I think I just got more into it this year from – I don't know, I can't remember, I was gonna, maybe – stuff in maybe your lectures that was on sustainable stuff. Something tweaked my memory on it and I stared looking at it again and I got that *Cradle to Cradle* book which I am reading now and it just followed on from there.

[formal interview concluded]

