

**CONCEPTUALISATION, OR NOT?
AN ETHNOGRAPHIC STUDY IN DESCRIBING
EARLY DESIGN COLLABORATION BETWEEN
WESTERN DESIGNERS AND CHINESE
DESIGNERS**

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ABSTRACT

This thesis brings forth a perspective on the need for an isolated conceptual design phase in the process models of designing. The perspective is made possible by identifying theories to describe designers in practice. The research sets out to describe concept negotiation during early design collaboration in cross-cultural teams of Western designers and Chinese designers. A series of ethnographic studies and in-depth interviews were carried out in a leading design practice in China on collocated and synchronous teams of Chinese designers from Mainland China, and Western designers from Germany, France and America. Themes were interpreted from the observations and interviews through inductive analyses using a grounded theory approach and a hermeneutic circle.

Silences among Chinese designers were first observed during design meetings, instead of verbal discussion in an argumentative process as anticipated by the social process of negotiation. Socio-linguistic reasons are understood to be influential but rectifiable by both Western designers and Chinese designers. Instead, patterns of their differences in concept articulation became evidential and brought about a subsequent hermeneutic turn to include describing concept generation. The description on their practice of concept generation revealed dichotomies in creative processes. Specifically it was found that Chinese designers tend to ideate and Western designers tend to conceptualise. To overcome the dichotomies, the company's elaborate design process with an abstract-concrete progression was simplified into a situationist design cycle in which designing happens in a creative space.

A literature review on design processes identified the isolated conceptual design phase as a fixated ideal from 1980s design models. Crucially, the conceptual design

phase with an abstract-concrete progression is equated with the early design stage when studying designers in collaboration. Conceptualisation and concepts remain very much influential today. The dichotomies in creative processes between Western designers and Chinese designers brought to light an epistemological comparison between the rationalist and the situationist. The dichotomies were at first posed as difficulties but later overcome by the cross-cultural teams by making their practice flexible without specific design process. Instead of commonly studying designers at the conceptual design stage and analysing design concept, this thesis identified the designers' differences in creative processes as factors to be considered when studying designers in collaboration.

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PUBLICATIONS IN ADVANCE OF THE THESIS

Findings of early studies, and part of the pilot studies were published as follows (See APPENDIX IV, page 320):

Nainby, P. (2005). West meets east: negotiating ambiguities at the early stage of designing. EP&DE, Edinburgh.

Nainby, P., S. Jie, et al. (2005). Design education in China from intuitive viewpoint: A cross-cultural comparison. IDEC 2005, GuangZhou, China.

Nainby, P., M. S. Gong, et al. (2006). Talking design: A Swiss/China cross-cultural collaboration. Engineering and Product Design conference, Salzburg University of Applied Sciences, Salzburg, Austria.

Chueng-Nainby, P. (2010). Where is the conceptual design stage? Describing concept negotiation in early design collaboration between Western-trained and China-trained designers. Cumulus Shanghai, Shanghai, China.

INTRODUCTION: DESCRIBING WESTERN-CHINESE EARLY DESIGN COLLABORATION

When one walks on the Huaihai Lu, the four miles stretch of road that runs through the heart of Shanghai, one realises how chaos is capable of resolving itself. Traffic lights are ignored, no one stops for pedestrians, and it is a brave soul who attempts to cross the road, yet few get hurt. Foreigners are advised by the locals to walk at their own pace, leaving time for vehicles to avoid them. The traffic system imposed on them is not taken seriously. Instead, a system is created by motorists responding to the situation spontaneously.

The approach to design echoes the traffic chaos in the heart of Shanghai: the supposed usefulness of prescriptive design processes is a myth. Throughout a designer's career, he or she deals with unique design problems that may never re-occur, and therefore no single method of designing is useful in every situation. One view is that a designer's main task is to invent an appropriate method of designing accordingly and that chaos is resolved through practice. Another view requires that the motorist follow a proper system to ensure the safety of the pedestrian. This thesis brings a direct comparison between these two views.

INTRODUCING THE MOTIVATION

This research aims to describe early design collaboration between Western designer and Chinese designer. The study of cross-cultural design teams was motivated by the rise of China, Brazil and India in manufacturing, followed by the creative

industries. The shift of design importance from the “central” countries, largely in the West, to the “periphery”¹ countries has brought Western designers to practice in these countries. Many design researchers have urged the centralised countries with advanced design industries to recognise the localisation of design discourse, design practice and design education in the periphery countries (Balaram, 1998; Bonsiepe, 1990; Eames, 1991; Margolin, 2005). Successful stories are now heard in Japan and Korea, where design practices with a local context are now established.²

Within half a decade, Mainland China grew from being a manufacturing centre to being a design centre. In response to the demands of the job market, the Chinese government increased the number of design graduates from two hundred in 1985 to the nearly thirty thousand undergraduates and two thousand postgraduates who graduated in 2004 (Lin & Liu, 2004). China now offers a whole package of low-cost designing and manufacturing, posing a threat to creative industries in the US and Western Europe, where manufacturing industries are dwindling. In addition, Chinese local design practices are now designing for the local market and, increasingly, international design consultancies are setting up branches in Chinese cities targeting the Chinese market.

Design collaboration activities between Western designers (WDs) and Chinese designers (CDs) like those I came across in Shanghai are increasingly common in China. The multinational design consultancies are typically set up with a Western design

1 Gui Bonsiepe (1990) termed “*periphery country*” while studying design industries in Brazil.

2 For example kansei engineering process (Nagamachi, 1999) and concurrent engineering process (Clark & Fujimoto, 1991; Imai, Nonaka, & Takeuchi, 1985; Takeuchi & Nonaka, 1986).

manager to lead CDs. WDs who are practising in China understand what is meant by localisation of design practice. Equipped with Western design education and practice, when they arrive in China, they become aware overnight, asking, “It is not the same in China, what is going on here? How shall I collaborate well with CDs?” I asked these questions at the beginning of the research inquiry.

Crucially, Chinese design industry is still seen as *ad hoc* work, and as consulting instead of design-led industry (Liu, 2004). German, Japanese and Russian are three important influences in the model of design education in China (Liu, 2004; Peng, 2005; Yuan, 2003; Zhang, 2001). However, some have expressed their doubts about the usefulness of adapting existing foreign design models and education for the Chinese context (Liu, 2004; Zhang, 2001). This view is shared by Richard Buchanan (2004), who compared the history of design education in the West and China and suggested that China would benefit from a non-western adaptation of design education.

The awareness of local-oriented design models for Chinese designers is on the increase. Research on the cultural issues of designing is being carried out at a few leading design institutes in China, Hong Kong and Taiwan. There are now journals publishing on the topic of cross-cultural issues in designing, such as the International Journal of Designing. In Europe, design institutes have carried out student exchanges with leading design institutions in China, such as the Wuxi-Zurich design exchange (Nainby et al., 2006) reported in this thesis. Also, research on intercultural design collaboration between Europe and Asian countries is developing such as (Bohemia et al., 2010; Bohemia & Harman, 2008) and Schadewitz (2007, 2009). These works are concerned with identifying patterns, differences and similarities during intercultural design collaboration, in the search for both theoretical and practical knowledge for a successful cross-cultural transaction.

INTRODUCING THE TOPIC

This thesis concerns early design collaboration when ideas can be tacit, ambiguous, and partial (unfinished). Views on ways of externalising these partial ideas to collaborate towards shared design solution are split in the design community. Co-design studies quite rightly tend to analyse the designerly act through externalisation, such as sketches analysis, or by forcing externalisation, such as think-aloud verbal protocols analysis (Ericsson & Simon, 1993).³ By analysing these verbal data, coding schemes were developed to trace co-designing. Some traced it through design moves (Goldschmidt, 1990) while others believed in seeing this move in a social process with an argumentation structure (Stumpf, 2001). On the other hand, researchers began to argue for the importance of designers' visual and spatial reasoning in understanding and tracing the designerly act (Keller et al., 2009; Liu, 1991, 1995, 1996, 2000; Liu & Lim, 2006; Oxman, 2002, 2008; Sass & Oxman, 2006; Van Der Lugt, 2005).

Complexity arises when one attempt to describe Western-Chinese early design collaboration. Naturally, one would focus on the cultural difference in co-designing. If so, what do they imply for design? However, the cross-cultural design team with different cultural background, language, and design education poses difficulty not only in the collaboration itself, but also on the description of the phenomenon. While social and cognitive issues are largely studied separately in design research (Cross, 2006),

³ As cited by Kelinsmann & Valkenburgh (2008), Co-design is defined as *“the process in which actors from different disciplines share their knowledge about both the design process and the design content. They do that in order to create shared understanding on both aspects, to be able to integrate and explore their knowledge and to achieve the larger common objective: the new product to be designed”*.

cross-cultural studies on these issues were not done on designers (Hofstede, 1991; Nisbett, 2003; Peng & Nisbett, 1999). Furthermore, studies on intercultural design team have identified the problem of cross-cultural models in describing the designerly act (Schadewitz, 2007, 2009).

Research within a frame of epistemology can be unbeknown to the other paradigms. Thomas Kuhn (1962) put forward the notion of paradigm shift, in the argument that science does not evolve gradually toward truth but instead goes through periodic revolutions, with changes of basic assumptions within the ruling theory of science. Many have urged a paradigm shift in design research, away from rationalist models of designing and towards identifying models for design research that focus more closely on the practice of design (Cross, 2006; Dorst, 2008; Schön, 1987). Among them, Cross (2006) highlighted the view that for design research to go forward, it is crucial to recognise “designerly ways of knowing” as neither art nor science. Descriptive research concerns the validity of this view have found alternative concepts to describe the creative practitioners in a collaborative setting (Bucciarelli, 1994; Schön, 1991). Despite this, many have argued that the concept of designing as a prescriptive problem-solving process remains influential and the problem lies in the design epistemologies (Dorst, 1997; Gedenryd, 1998; Heape, 2007). Crucially, in co-design studies, the importance of design epistemological issues is recognised as potentially cause bias when describing designers in collaboration (Dorst, 1997; Stumpf, 2001; Stumpf & McDonnell, 2002; Valkenburg & Dorst, 1998; Valkenburg, 1998).

INTRODUCING THE RESEARCH

How we see that designing determines how design collaboration is described and prescribed. When attempting to describe Western-Chinese early design collaboration, one faces problems owing to the divided views of co-design models, in terms of design

epistemological issues and socio-cognitive issues. To avoid the fixation on theories/models/methodologies that might arise from these issues, an explorative research methodology was chosen. The research began with the broad aim of describing Western-Chinese early design collaboration with a specific focus on investigating concept negotiation (Bucciarelli, 1994) between WDs and CDs. The research asked, “How does a collocated team of WDs and CDs **negotiate creative concepts** during early design collaboration?” The question was informed by early interviews with Chinese student designers, which revealed CDs unfamiliarity with the conceptual design phase (CDP) and the verbal debate that Western designers are accustomed to during team discussions.

In view of this, a series of in-depth interviews and three ethnographic field trips with these foci were carried out at an industrial design practice in China. The ethnographic fieldwork focused on collocated teams of WDs and CDs during early design collaboration on new product designs. The reflexive interpretation of the phenomenon was inductively analysed using the grounded theory approach. Implications were drawn from themes that emerged from the analysis and these were interpreted alongside current theories in design studies and creativity research. The studies progressed in a hermeneutic circle with each study informing subsequent studies. At the beginning, both social and cognitive differences between WDs and CDs were explored. The patterns point to a need for understanding the generation of creative concepts, and led to the inclusion of second research question: “How does a collocated team of WDs and CDs **generate creative concepts** during early design collaboration?”

The hermeneutic turn also brought theories from creative cognition research to bear on understanding the differences in the creative processes between WDs and CDs. This shed light on the fixation on prescriptive design processes and how it can be

identified and potentially overcome. Furthermore, the phenomenon itself is an adaptation of the creative practice when facing a cross-cultural situation. This position significantly raises interesting questions concerning the distinction between what designing is and what designing ought to be. Crucially, this research forged a significant link between disparate socio-cognitive issues and epistemological issues. The epistemological issues were possible to explore by describing the cross-cultural early design collaboration through design theories and models.

INTRODUCING THE THESIS

The research is exploratory and begins with the aim of describing the phenomenon of early cross-cultural design collaboration. The thesis therefore does not report in the chronological order in which the research occurred. For example, the early studies which set the research focus for the main studies are reported later in the thesis, while the theories derived from the outcomes are reported in the early chapters to give an easy understanding of the context of the research. This introductory chapter presents the research motivation, which influenced the undertaking of this research. Also discussed are related literature and concepts which provide a perspective on reporting the research, which has a wider scope than the thesis.

Only one specific perspective with enough coherencies to depict the research contribution was chosen for reporting in this thesis. Although the perspective is the outcome of the research, for easy reading, it is presented firstly in **Chapter 1** as the literature review on the design epistemologies in co-design studies and design studies. The perspective is also discussed in **Chapter 2**, along with discussion of the related theories derived from creativity research that underpinned this study. In **Chapter 3** I argue for the need for a reflexive ethnographic method and inductive analysis as the most useful research methodology to explore the research aim and to undertake the

research questions. **Chapter 4** presents the research journey undertaken by reporting on the early studies, giving an example of analysis of the fieldwork during main studies and presenting a summary of the research themes. This provides an overview that facilitates understanding of the narratives of the ethnographic fieldwork in **Chapter 5**, which is concerned with a first research question, regarding concept negotiation; while **Chapter 6** is concerned with a second research question, regarding concept generation. These two chapters present excerpts of evidence from the themes summarised in Chapter 4, alongside theories reviewed in chapter 1 and 2. In **Chapter 7** the reasons for the fixated ideal of design conceptualisation is discussed and it is argued that they need to be considered in co-design studies. The **Conclusion** summarises the research contribution and presents suggestions for future research.

CHAPTER 1: A REVIEW ON DESCRIBING EARLY DESIGN COLLABORATION

CHAPTER OVERVIEW

This chapter reviews relevant literature on design epistemologies and co-design epistemologies and their influences on designers and researchers in describing early design collaboration. I review a literature gap in co-design studies through a matrix of co-design models based on a combination of these epistemologies. Section 1.1 introduces concepts and literature related to two design epistemologies. Section 1.2 outlines two co-design epistemologies and a matrix of the existing co-design models and their paradigm shifts. Section 1.3 concerns the need for an inclusive co-design model to describe Western-Chinese early design collaboration. I argue for the integration of these epistemologies to be considered when describing the specific phenomenon of Western-Chinese early design collaboration.

1.1 TWO DESIGN EPISTEMOLOGIES

How we see designing, determines how design collaboration is described and prescribed. When analysing designers in collaboration, a framework to understand the socio-cognitive activities is required. Different frameworks provide very different ways of describing design collaboration, for example coding schemes for design discourse, observing behavioural or cognitive patterns or tracing creative processes.⁴ Dorst (1997) empirically concluded that the effectiveness of a framework depends on how we see

4 Oxman (2002) defines creative processes as the processes of reasoning that result in the emergence of form.

designing, or **design epistemology**, which dictates the outcomes of research analyses of design practice. He identified two epistemologies, which he suggested represent a paradigm shift from one to another: 1) Designing as problem-solving (Simon, 1969); 2) Designing as reflective practice (Schön, 1991). He created two sets of analysis coding based on these epistemologies and applied them to a set of thinking-out-loud protocols of designers working on a design project. Depending on the set of coding, the analyses demonstrate different outcomes. In addition, he outlined a theoretical framework proposing that the way designing is viewed depends on one's orientation in the model of designer, task and design process, and their relationships (Figure A). He argued that the problem-solving paradigm is a rationalist one. The reflective-practice paradigm, as I propose in section 1.1.2, is a situationist one. To understand this dichotomy further, each paradigm is discussed in the following sections.

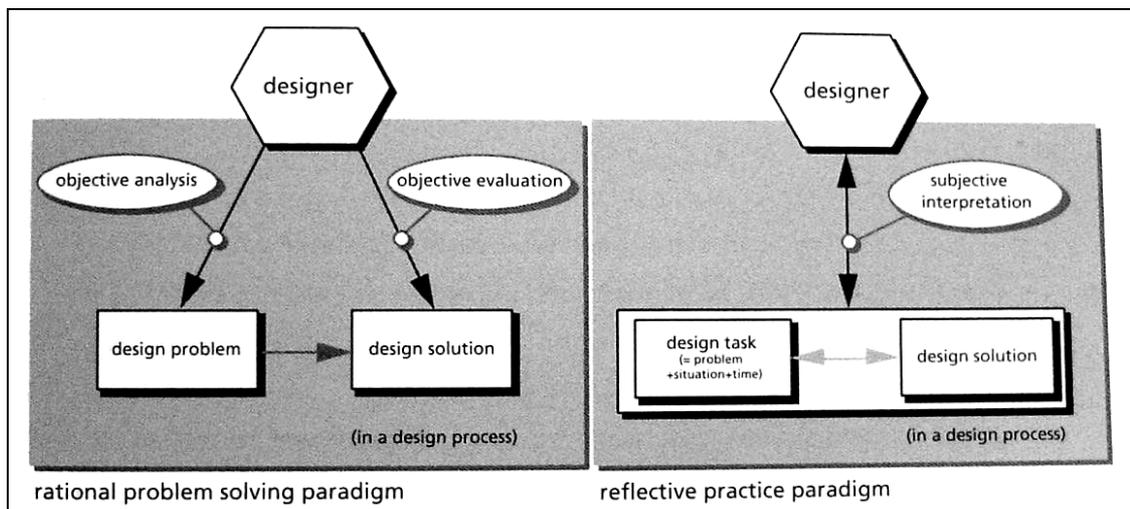


Figure A: Kees Dorst's two design paradigms (Dorst, 1997)

1.1.1 The Rationalist's Design Process

Within the problem-solving paradigm, the designer follows a prescriptive design process to objectively analyse design problems and objectively generate and evaluate the design solution⁵. The problem with the rationalist view lies in its restricted view of design as a prescriptive process, with a stage-by-stage progression to be followed by the designer. A design process, however iterative, is a process with separate phases that equates each stage with one part of the end design. Gedenryd (1998) argued that the process models is an idealist approach derived from systematic thinking. The essence of the rationalist view of design is in the externalisation and objectivity of this design process with a clear division between problem and solution (Gedenryd, 1998). Three types of design problem are identified: the well-structured problem, the ill-structured problem (Goel, 1995) and the wicked problem (Kunz & Rittel, 1970).⁶ Even though the wicked problem is seemingly a situationist view, the necessity to tame the wicked problem and define it before solving it (Rittel & Webber, 1973) is arguably a rationalist view, with problem-setting separated from solution-making, in contrast to a situationist view.

5 This rationalist view originates from Herbert Simon's "science of the artificial" (Simon, 1969).

6 Rittel (1972) made contrast of two kinds of problem: Tame and Wicked Problems. A tame problem is easy to be manipulated and controlled. However, a wicked problem has these four properties, in contrast to a tame problem 1) it cannot be formulated, 2) it corresponds to the solution and vice versa, 3) it has no stopping rule, 4) it can't be tested as true or false.

1.1.2 The Situationist's Creative Space

The situationist view I propose is a synthesis of practical views on the designerly act. The view is defined through the notion of reflective practice (Schön, 1991) and the concept of situated action (Suchman, 1987). The term “situationist” is inspired by Suchman’s (1987) seminal book “Planning and Situated Action”. Suchman examined cognition as situated, with the environment an integral part of the cognitive process. The theory of situated cognition combines perception, conception, and action. For Suchman, planning is an unnecessary action, just like the use of map to have a control on the path to the travel destination.⁷ Our actions are situated in *“an emergent property of moment-by-moment interactions between actors, and between actors and the environments of their action.”* (Suchman, 1987, p. 179) The concept of situated cognition grasps the complexity of the designerly act during early design collaboration, in ways that a process model cannot.

The term “situatedness” is also useful to explain the pragmatic view in which the designer’s idea depends on what is seen, and designing is a recursive process between making and seeing, in that “where you are when you do what you do matters” (Gero & Kannengiesser, 2004). In addition, the concept of designer as pragmatist began when Schön (1991) reported his observations in a design studio and coined the term “reflective practice”. The concept recognises that design process is in fact an iterative cycle of framing, naming, moving and reflection. It involves reflection in action, on action and in practice. In this cycle, the problems and the solutions co-evolve in a

⁷ In contrast to Rittel’s (1973) for whom planning is the core of his work in operation research.

creative space of possibilities, instead of a progression with control (Dorst, 2001). Designing is seen as a practical activity - a shift from the intellectual view of “knowing how” to the practical view of “knowing that” (Schön, 1985, 1987, 1991; Schön & Wiggins, 1992).

The concept of situated cognition complements the reflective practice view by recognising the interactive space of designers’ cognition as where the design activity is. With this combination, designing is seen as an activity that happens in a creative space of possibilities with designers working accordingly, framing situations as they arise. Not only is the process situated, but the designers’ thoughts and ideas are also situated in the creative space.⁸ The situationist take on the description of design collaboration is useful to explore this complex and chaotic phenomenon.

Design Epistemology	Rationalist	Situationist
Kees Dorst's Design Paradigm	Problem-solving	Reflective Practice
Seeing Designing as a	Design Process	Creative Space
Seeing co-design Activity as	Social Negotiation	Experiential Learning
Donald Schön's Design Activity as	Knowing How	Knowing That
The Philosophical View	Intellectual View	Practical View

Table 1: Design dichotomies

In summary, Table 1 shows the dichotomies of concepts related to the study of design I discuss in this chapter. As I have mentioned in the introduction, these dichotomies are relative, rather than being cut-and-dried differences. In short, I argue that seeing designing as a process activity and seeing designing as an activity that happens in a creative space is the essential difference between the rationalist view and

⁸ Chris Heape (2007) called this creative space “the conceptual space”. However, I reserve the word “conceptual” for now, to be discussed in Chapter 2.

the situationist view. However, describing the activity of design collaboration is more complicated than just identifying process-space and rationalist-situationist dichotomies. When designers collaborate during early designing, a wealth of factors is at play, such as cognition, sociality, psychology; which of these factors is in play is influenced by the design epistemology the design researcher takes. Consequently, reviewing these models requires adding another dichotomy to the rationalist-situationist and process-space dichotomies for design epistemology.

1.2 TWO CO-DESIGN EPISTEMOLOGIES

Studying designers working in a team, or design collaboration, is the core aim of co-design studies (Scrivener, 2005). The term **co-design** in this thesis represents the collaborative activity of designing (see definition at footnote 3, page 4). Co-design models include methodologies/frameworks/theories of the co-design activity itself, especially how researchers describe or analyse co-design activity. Similarly to design models, they vary in details, depending on design disciplines, the school of thought the researcher adopted, or even the type of data collected. Informed by Dorst's (1997) thesis on design paradigm shifts and Stumpf's (2001) thesis on co-design paradigm shifts I narrow this down by discussing co-design epistemologies in relation to the dichotomy of social negotiation versus experiential learning, as well as considering the process-space and rationalist-situationist dichotomies.

1.2.1 Co-Design as Social Negotiation

Seeing co-design as a social process of negotiation is a position popularised by Bucciarelli's (1994) "Designing Engineers", an ethnographic study of engineering designers in practice:

“The process of designing is a process of achieving consensus among participants with different 'interest' in the design, and that these different interests are not reconcilable in object world terms. There is no reminding perspective, method, (success) or terms. The process is necessarily social and requires the participants to negotiate their differences and construct meaning through (debate), and preferably face-to-face, exchange”
(Bucciarelli, 1994, p. 154).

This view originated in Rittel’s (1970) issue-based information system (IBIS). IBIS is a decision-making process with an argumentation structure to tame the wicked problem which also inspired research on design rationale (Shum, 1994). In this view, designing is a political activity of negotiation that can be traced as an argumentation process, with designers in a team constructing meanings through face-to-face debate and exchange in order to negotiate their different interests and achieve consensus (Bucciarelli, 1994; Détienne et al., 2005; Fischer et al., 1996; Stumpf & McDonnell, 2002; Trousse, 1996). The core characteristics of this epistemology relate to the development of coding schemes to trace co-design discourse. The problem with these coding schemes lies in the capture of design discourse through protocol analysis (Ericsson & Simon, 1993). Not only does it equate verbalisation and thoughts, it also places design productivity firmly in the negotiation process, rather than in the design outcome itself.⁹

9 Which later chapters of my fieldwork found otherwise when describing Western-Chinese early design collaboration.

1.2.2 Co-Design as Experiential Learning

To extend design epistemology to co-design epistemology, Stumpf and McDonnell (2002) proposed four design paradigms: Rational Problem-Solving, Social Process, Hypothesis Testing and Experiential Learning. Instead of Dorst's (1997) endorsement of Schön's (1991) reflective practice, Kolb's (1984) Experiential Learning is adopted as the paradigm to describe co-design activity that helps group learning and is comparable to the cycle of reflective practitioners. It contrasts with seeing co-design as a process in which designers negotiate different interests to achieve consensus. Instead, co-design is seen as reflective practice, with the emphasis on the collective work of a team working through an Experiential Learning cycle. The main characteristic of this epistemology is the capturing of team situations in addition to designers' interaction, which places less emphasis on the negotiation process between individual designers. The types of data collected can be multi-modal and can be captured *ad hoc* out of design meetings.

1.2.3 A Matrix of Co-Design Models

Co-design epistemology essentially concerns how we see the activity of design collaboration. This section is a review of related co-design models to demonstrate how the models can be categorised, and to illustrate the paradigm shifts between co-design models. There is a wealth of studies/frameworks/models that can be considered as co-design models. The models reviewed here are chosen for their significant contributions to the study of design collaboration. Also, although this thesis is essentially concerned with process models of designing, and with case studies on industrial designers, the models are chosen regardless of design discipline. This is due to the advancement and richness of co-design studies from design disciplines such as architecture and digital design, which I argue, are worth considering when reviewing at this macro-level.

	Co-design as Design Negotiation	Co-design as Experiential Learning
Rationalist Design Process	Social Negotiation Process (Bucciarelli, 1994). Observation of social process (Cross & Clayburn, 1995). Argumentation and critiquing system (Fischer, et al., 1996). Viewpoint management (Détienne, Martin, & Lavigne, 2005). Rich picture (Mazijoglou & Scrivener, 1998). Interaction and entrainment (Reid, 2000). Tang and Leifer's non-verbal cues (Tang & Leifer, 1991).	Fischer's Reflective Practitioner (Fischer, 2005). Structured reflection (Reymen & Hammer, 2002) Meta model of reflective communication (Maier et al., 2005). Dual mode of design methodology (Dorst, 1997) Story telling method (Lloyd, 2000; McDonnell, Lloyd, & Valkenburg, 2004)
Situationist Creative Space	Linkography (G Goldschmidt, 1990) Team Framing (Stumpf & McDonnell, 2002)	Reflective-Practice coding scheme (Valkenburg & Dorst, 1998). Reflective-Practice coding scheme (Dorst, 1997). Function-behaviour-structure (Gero & Kannengiesser, 2004).

Table 2: A matrix of co-design models

When reviewing co-design models, combining design epistemologies and co-design epistemologies is helpful to visualise the patterns. Table 2 shows four categories of this combination to be discussed in next sections. Whether the designers are open-minded in their design process is directly related to their design epistemologies on what design activity is. For example, designers with a rationalist view would adopt prescriptive design process with definitive stages. For them, it is possible to develop coding schemes to trace their designerly progress. In contrast, for situationist designers, who prefer to see designing as an act situated in a creative space, a coding scheme is difficult to develop to trace design progress based on the process.

Table 2 displays four categories of co-design models reviewed from the combinations design epistemologies and co-design epistemologies: Fundamentally, the combinations of these epistemologies, both design and co-design, was to eliminate the divide between social and cognition when studying designers working in teams

(Christopher, 2009). In the following sections, I discuss the paradigm shift from A to D with a brief review of co-design models in each category.¹⁰

A) Social Negotiation in the Rationalist's Design Process

These co-design models adopt a rationalist view in which design activity happens through the design process and is largely prescriptive, whereas design collaboration is done through negotiation of designers' different interests to achieve consensus. These are mostly older models, which see the design processes as fixed, and co-design can be analysed by examining the argumentation process. Two examples of models from this categories are: using coding schemes to study design and management arguments during early software design meetings, as described by Olson (2000; 1992); and analysis of the argumentation and critiquing system, as described by Fischer et al. (1996), who assume that design is negotiated and can be traced in the argumentation process. Recent approaches include work on viewpoint management, by Francoise Detienne (2006; 2005; 2006); and analysis on co-design interaction in design meetings, by Reid and Reed (2005; 2000; 2000). Although both works began by analysing design discourse by considering designers' verbal negotiation of viewpoints, they later extended their work to consider the multi-modal data, such as sketching and gesture. This is perhaps due to the stability of the prescriptive design process. The advance is in the coding schemes developed in work that now recognised the importance of analysing non-verbal cues and non-meeting co-design discourse. Examples are design activities analyses by Foley and Macmillan (2005) and the development of a non-verbal cues coding scheme by Tang and Leifer (1989).

10 Only established co-design models are included in the matrix.

This category of co-design models can be summarised by the Rich Picture method, which aims to structurally describe the complexity of co-design discourse. It is *“a method for augmenting design-activity data that incorporates structured transcriptions of verbal and non-verbal data which are related to drawing production and workspace resources...Rich picture is a data-ordering scheme that indexes data without loss of information”* (Mazijoglou & Scrivener, 1998).

B) Social Negotiation in the Situationist's Creative Space

Views of the structural design process and co-design analysis in category A have now progressed, and are seen as situated activity in creative space. Design is now regarded as a descriptive activity in cycles of situated frames in creative space, instead of a prescriptive process. This is a mismatch in epistemologies, as analysing co-design discourse has continued to rely on coding schemes that trace argumentation processes, as in Category A.

Linkography was the earliest method to analyse design moves using a coding scheme to trace the progress of ideas in design session rather than the progress of a prescriptive design process (Goldschmidt, 1994). Based on association theory, the analysis investigates the structure of design idea generation processes and compares design productivity to trace creativity (Goldschmidt, 1995; Goldschmidt & Tatsa, 2005). The method does not insist on a fixed design process to trace design moves, but because of the emphasis on protocol analysis, that equates verbalisation to thoughts, it is placed in this category. Fundamentally, protocol analysis is a method that represents design discourse as designers' negotiation during design meetings.

A recent development is team framing analysis (S. Stumpf, 2001; S. C. Stumpf & McDonnell, 2002) which traces the content of discourse by team framing. The types of

activities and the roles of participants are less important than the content of discourse. Because it adapts the situationist's creative space, with a combination of reflective practice and experiential learning, team framing could have been considered as category D but I shall put in category B and as marginally D. This is because the coding scheme to analyse team frames employs the New Rhetoric approach of argumentation, which is fundamentally an argumentation process, though a persuasive rather than dialectical one:

" The dialectical stance towards argument brings with it several shortcomings in examining arguments. Firstly, dialectical situations only deal with strictly delineated argument roles of proponent and opponent. Secondly, the dialectical perspective does not capture the mainly co-operative nature of team experiential learning. Thirdly, a conflict-based argument model only allows us to substantiate the extent to which the opponent disagrees based on the types of challenges made, but not why. To contrast, a rhetorical view of a team's argumentative processes allows participants to take roles as arguer and audience" (Stumpf, 2001)."

The essence of this category is its progress in moving from using coding schemes that trace the interactivity between individual designers in the team to tracing the team's design situation as a whole. For example, linkography traces the association of ideas between designers, while team framing codes the situated team frame.

C) Experiential Learning in the Rationalist's Design Process

As with B), this category is a mismatch of epistemologies. The approaches that fall into this category recognise a team's experiential learning yet embrace a design process that separates the problem from the solution. A classic example is the situated

function-behaviour-structure (FBS) framework to describe co-designing with a socio-cognitive orientation (Gero & Kazakov, 1998; Gero & Kumar, 1993). This goal-oriented model divides the expected interpretation world from the external world to capture the dynamic of designing through situated-ness and constructive memory, yet embraces the need for a predefined design process. It is similar to the embedded critic system (Fischer, et al., 1998), which is a system to detect problem situations within the Design processes, for the designer to understand the situation and work in a self-directed manner. Although it seems like experiential learning, it is essentially a design process with a separate problem definition stage. Gerhard Fischer's subsequent work, since the critic system, adopts an experiential learning model with a design process such as Meta design (Fischer & Scharff, 2000) and reflection-action-critique (Fischer, 2004; Fischer, 2005; Fischer & Scharff, 2000; Warr & O'Neill, 2005). Although claimed as reflective practice, the structure, with design problem and solution seen as separate, is influenced by a rationalist view.

Two doctoral research projects in this category are on structured reflection, by Reymen (2001), and on a meta-model of communications, by Maier (2005). Structured reflection proposed a linear structure to frame situated design cycles (Reymen, 2001; Reymen & Hammer, 2002). Similarly, the meta-model is a framework to support reflection through a combination of mechanistic and systematic approach (Maier, et al., 2005; Maier, et al., 2006). The model proposed that communication in engineering design can be conceptualised to analyse communication issues in industrial practice. It combines an information-centred view, reflecting the exchange of information, with consideration of interaction and situational aspects. The work focuses on the embodiment stage, which assumes separate stages of conceptualisation before

development, and therefore is a mechanistic and systematic approach in analysing co-design.

D) Experiential Learning in the Situationist's Creative Space

This category represents the focus of this thesis – a co-design model to describe team experiential learning through a situationist view of designing as it happens in a creative space. Only a handful of models can be considered as truly situationist experiential learning, with most claimed as reflective practice even though they embrace process models rather than the situationist cycles. This is a gap in the literature that this thesis is addressing, calling for its significance to be recognised.

Dorst and Valkenburg's work on reflective practice coding schemes (Valkenburg & Dorst, 1998) was discussed earlier. It was based on the notion that individual designers selectively attend to the design environment in order to form a problem situation (naming and framing), develop a solution out of local experiments (moving) and evaluate the outcome of these local experiments (reflecting). This coding scheme is applied to the analysis of design teams to support the synchronisation of the team's thoughts and activities by arranging coded episodes in a temporal sequence.

Another example is video ethnography of storytelling by designers working in teams (Lloyd, 2000). The ethnographic method used here is similar to that adopted in this research. The observation of designers telling stories, instead of the analysis of designers' arguments, gives a richer interpretation of the design discourse, which is predominantly designers' reflection in action, on action and in practice.

The use of ethnographic observation to capture co-design discourse and inductive analysis to interpret the discourse, in which coding schemes endorse the cyclical nature of the designerly act, is in contrast to the other categories discussed. Most ethnographic

studies of co-design studies can be considered in this category; I present only those ones that are significant to understanding co-design frameworks.

1.2.4 Co-Design Paradigm Shifts

One conclusion can be drawn from this review. Co-design studies are undergoing paradigm shifts influenced by design epistemologies. The pragmatic turn from rationalist to situationist in design models is also happening in co-design models, with a shift from social negotiation towards experiential learning. The turn is inevitable, due to the complexity of the design task and team and the dynamic of the design environment. Recent work has seen the integration of these dichotomies in Dorst's (2001) co-evolution of solution and problem spaces, and in earlier theoretical work such as (Coyne & Snodgrass, 1991). Essentially, the designerly way of knowing, with the "neither arts nor science" position, is arguably an integrative view of rationalist and situationist epistemologies (Cross, 2006).

As the review shows, co-design models, particularly of category b) and c) are ambivalent in their views on what designing is and how we study design collaboration. The problem lies in the researcher's refusal to recognise the designerly act as a practice more complex than a problem-solving task. To understand how designers work, one needs to understand the extent of what goes hidden in the work of practitioners. For example, Dorst (2004) highlights the level of expertise of the designer and its role in determining the level of problem-solving in their design methods. He suggested situationist problem-solving as a way of complementing the reflective practice cycle in the co-evolution model. He argues that designer's subjective experience becomes more important as their expertise increases, while the novice designer relies on design models introduced by expert designers. Similarly, Cross (Cross & Cross, 1998) identifies the importance of problem framing and the use of a

guiding principle as a design strategy. Otherwise, there is no rule in the practice of designers, as Schön (1987, p. 37) highlights in his discussion of this space of practitioner as the practicum:

"The practicum is a virtual world, relatively free of the pressures, distractions, and risks of the real one, to which, nevertheless, it refers. It stands in an intermediate space between the practice world, the 'lay' world of ordinary life, and the esoteric world of the academy."

This renders the emphasis on the tacit domain of knowing-in-action and reflection-in-action in Schön's account of reflective practitioners, who "*think what they are doing while they are doing it*". This important skill is seen as a professional ability to think on your feet, and apply previous experience to new situations (Schön, 1991). The tacit domain of the designerly act is unspoken but significant to designing. However, it is difficult to trace in co-design studies, and even difficult for practitioners themselves to describe what they do. So how might we as researchers be able to describe co-designing most accurately?

1.3 DESCRIBING WESTERN-CHINESE DESIGN COLLABORATION

One apparent similarity of the co-design models in the matrix is that none of the work investigates in a cross-cultural context. The thesis's aim to describe Western-Chinese design collaboration fills a gap addressed partly by Schadewitz's (2009) doctoral thesis on collaborative learning support for interaction student designer communities in Korea, Hong Kong and Austria. Her thesis and papers (Schadewitz, 2007, 2009) conclude that current co-design studies and cross-cultural research are limited to descriptions of the complexity of cross-cultural design collaboration. Her proposal for analysis of design patterns to identify activities in the design communities

is timely. Another extensive research project on cross-cultural design collaboration was led by Erik Bohemia at the Northumbria University. His research team studied cross-cultural design collaboration, predominantly for design education. One of the studies is a joint effort between his students and designers at Intel USA (Bohemia et al., 2010; Bohemia & Harman, 2008).

Two doctoral theses with a related focus (but not on cross-cultural design collaboration) that have examined process design process and co-design are Gedenryd's (1998) thesis on interactive cognition and Heape's (2007) thesis on design space. Gedenryd (1998) brings forward the failure of design methods with the accusation that it is an idealist view of what design ought to be rather than what design activity is. He further suggests that cognition in designing is not just thinking, but also an activity of inquiry. His proposal of an interactive cognition also takes into consideration the working environment. Heape (2007) proposed the concept of design space to explore the complexity of designing and co-design in an alternative view. The design space is to replace the linear progression of design process, and it is a construction, exploration and expansion of a conceptual space. These works provide this thesis, which aims to describe and analyse Western-Chinese early design collaboration, with a rich foundation for investigating co-design theories.

CHAPTER SUMMARY

In this chapter, I have explored epistemological perspectives on how designers work during early design collaboration. I have argued that the rationalist-situationist dichotomy of design studies is directly related to the process of the designerly act, and subsequently determines how co-design is described with the negotiation-experiential dichotomy. The review on significant co-design models shows an ongoing paradigm shift not only in design studies, also in co-design studies. I have also argued that there is

a literature gap informed by these epistemologies that needs to be addressed when describing the specific phenomenon of Western-Chinese early design collaboration. The review also raises two questions for co-design studies. Are cultural differences in Western-Chinese design collaboration an important question? If so, will integrative co-design epistemologies be a possible starting point for an inclusive co-design model? These are gaps in design studies yet to be addressed. To pursue this, in the next chapter I review DPs in detail, based on these epistemological dichotomies.

CHAPTER 2: CREATIVE PRACTICE DURING EARLY DESIGNING

CHAPTER OVERVIEW

This chapter begins by reviewing process models for early designing by comparing engineering design processes and creative cognitive processes. Due to the explorative and inductive nature of this research, the scope of review was informed by the outcomes of the research studies. The discussion is placed in this early chapter to introduce the perspective chosen to present this thesis. Section 2.1 is a review of engineering design processes, to reveal their generic patterns. An isolated CDP was identified as an ideal set in the 1980s. Section 2.2 described the limitations of the conceptual design phase and conceptualisation in the process models and its problems. Section 2.3 opens up the discussion to review related models and processes in the study of creative practice for early designing.

2.1 EARLY DESIGN PROCESSES

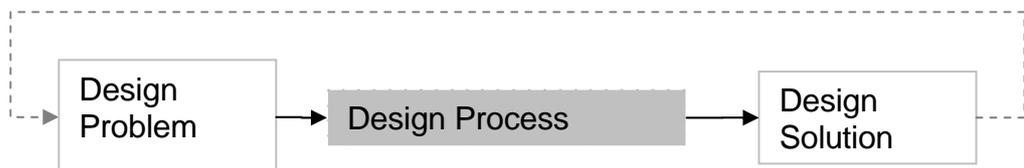


Figure B: The early stage of designing

As discussed in Chapter 1, there are ambivalent views on what the early stage of design ought to be, and how design collaboration can be studied. One common definition from engineering design process highlights that “*it is important to have a defined design procedure that finds good solutions. This procedure must be flexible and at the same time be capable of being planned, optimised and verified*” (Pahl et al., 2007, p. 9). Gedenryd (1998) reviewed the theoretical background of the process models and concluded that early design process is commonly viewed as a stage when abstract

representation of design ideas is dealt with before design development. An extensive summary of design models across the design disciplines of design practice, design research and design education, by Dubberly et al. (2004), began with a simple problem-to-solution progression in a linear process (Figure B). The design problem is the input and a design solution is the outcome. The model is the basis of the expansion into other models, represented here by Figure C to Figure D; or to Figure E. As I have discussed in Chapter 1, the direction the expansion of the models will go depends on how we see designing.



Figure C: Process archetype, adopted from (Dubberly, et al., 2004)

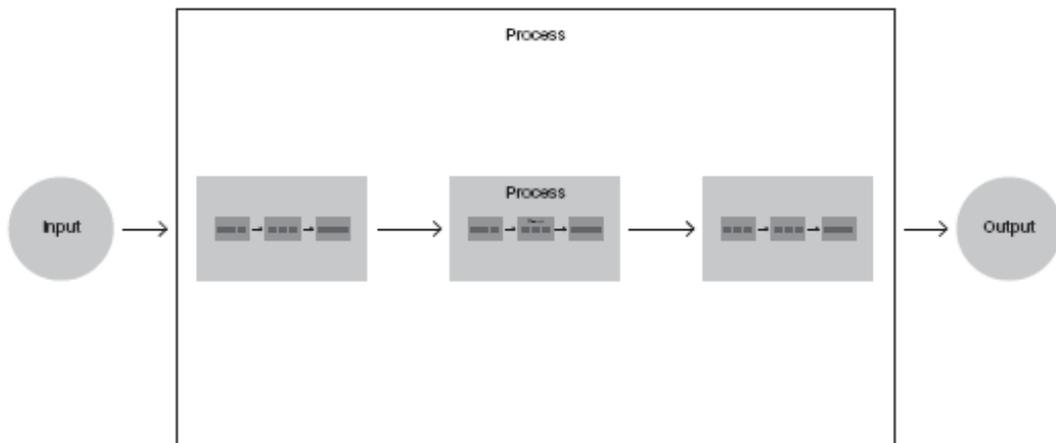


Figure D: The infinite expandability of process models, adopted from (Dubberly, et al., 2004)

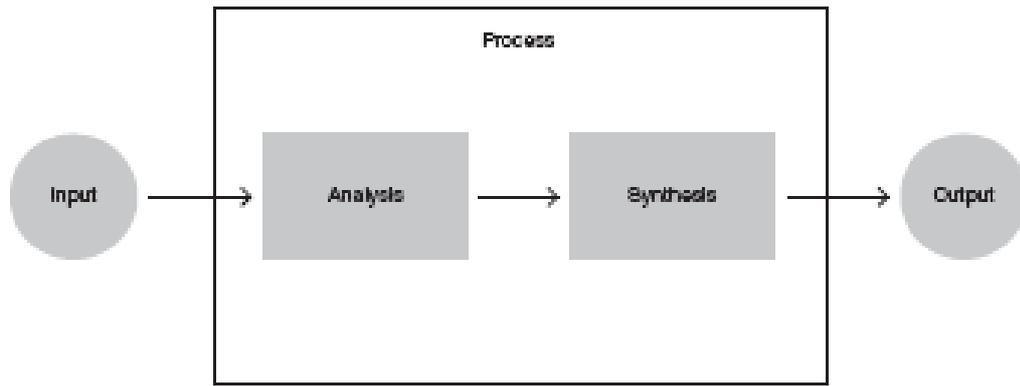


Figure E: Analysis and synthesis, adopted from (Dubberly, et al., 2004)

The interesting aspect about the review by Dubberly, et al. (2004) is that they have included models from design practitioners and consultancies as well as design academia, crossing theory and practice. At a glance, models suggested by academia are largely prescriptive processes with detailed procedural steps and loops, while design practitioners show flexibility within a cyclical model. The descriptive models can be explained as resembling the situationist view, which recognises the complexity of design activities with less definitive steps than the academic model. The prescriptive process models, although based on descriptive information to a certain extent, are commonly models proposed by design academia to teach students how to design, or by design researchers to analyse design activity. This type of prescriptive design process is generally procedural and divided into phases or steps, represented in flows and loops, in diagrams or in words.

The number of design processes reported by Dubberly, et al. (2004) is vast! It reveals the worrying state of design research; either none of these models works, or each model works only for a specific situation and henceforth ceases to be a model. One understanding we can draw from this is that a design process will be too generic to be useful if it can describe the complex activity of designing. In chapter 1, I argued for the

importance of design epistemology in reviewing the process models and the co-design models, which are separated between the views of the rationalists and the situationists. This dichotomy can be seen in a more focused review on process models by Howard et al. (2008). The review compares engineering design processes (DPs) and creative processes (CPs) in attempting to integrate them into a model of “**creative design process.**”¹¹ I will argue in this section that the comparison between DPs and CPs can be generally seen as a comparison between rationalist view and situationist view.

Establishing a need	Analysis of task	Conceptual design	Embodiment design	Detailed Design	Implementation
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Figure F: A generic design process, adopted from (Howard, et al., 2008)

Analysis phase	Generation phase	Evaluation phase	Communication/ Implementation
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Figure G: A generic creative process, adopted from (Howard, et al., 2008)

With the help of the tables of DPs (Figure I) and CPs (Figure J) in Howard et al (2008), I review the historical trends in DPs in relation to CPs. The DPs are mapped into six generic activity stages of establishing needs, analysis of task, conceptual design, embodied design, detailed design and implementation (Figure F). They argued that the CPs moved from the cognitive process of ideation-solution into an activity-based process of analysis, generation, synthesis and implementation (Figure G). Figure H shows the relations between these two processes in stages depicted from their analysis.

11 The framework combines FBS model by Gero & Kannengiesser (2004) with the analysis-generation-evaluation creative process to represent the non-linear creative design process which relates to design output. They found that the generation stage houses both conceptual and embodiment stage and has more bearing onto design output.

Interestingly, although DPs and CPs were developed predominantly separately, there was crossover from CPs which informed DPs. The Analysis-Synthesis process of CPs was introduced to DPs in the 1960s, but little of DPs has informed CPs.

Design Process					
Establishing a Need	Analysis of Task	Conceptual Design	Embodiment	Detailed Design	Implementation
Creative Process					
Analysis		Generation		Evaluation	

Figure H: Relating Design processes and Creative processes, adopted from (Howard, et al., 2008)

Models	Establishing a need phase	Analysis of task phase	Conceptual design phase		Embodiment design phase		Detailed design phase		Implementation phase		
Booz et al. (1967)	X	New product strategy development	Idea generation	Screening & evaluation	Business analysis	Development	Testing	Commercialisation			
Archer (1968)	X	Programming data collection	Analysis	Synthesis	Development		Communication		X		
Svensson (1974)	Need	X	Concepts	Verification	Decisions	X		Manufacture			
Wilson (1980)	Societal need	Recognize & formalize FR's & constraints	Ideate and create		Analyze and/or test		Product, prototype, process		X		
Urban and Hauser (1980)	Opportunity identification	Design			Testing			Introduction (launch)	Life cycle management		
VDI-2222 (1982)	X	Planning	Conceptual design		Embodiment design		Detail design		X		
Hubka and Eder (1982)	X	X	Conceptual design		Lay-out design		Detail design		X		
Crawford (1984)	X	Strategic planning	Concept generation		Pre-technical evaluation		Technical development		Commercialisation		
Pahl and Beitz (1984)	Task	Clarification of task	Conceptual design		Embodiment design		Detailed design		X		
French (1985)	Need	Analysis of problem	Conceptual design		Embodiment of schemes		Detailing		X		
Ray (1985)	Recognise problem	Exploration of problem Define problem	Search for alternative proposals		Predict outcome	Test for feasible alternatives	Judge feasible alternatives	Specify solution	Implement		
Cooper (1986)	Ideation	Preliminary investigation	Detailed investigation		Development	Testing & Validation	X		Full production & market launch		
Andreasen and Hein (1987)	Recognition of need	Investigation of need	Product principle		Product design		Production preparation		Execution		
Pugh (1991)	Market	Specification	Concept design			Detail design		Manufacture	Sell		
Hales (1993)	Idea, need, proposal, brief	Task clarification	Conceptual design		Embodiment design		Detail design		X		
Baxter (1995)	Assess innovation opportunity	Possible products	Possible concepts		Possible embodiments		Possible details		New product		
Ulrich and Eppinger (1995)	X	Strategic planning	Concept development		System-level design		Detail design		Testing & refinement	Production ramp-up	
Ullman (1997)	Identify needs Plan for the design process	Develop engineering specifications	Develop concept		Develop product					X	
BS7000 (1997)	Concept	Feasibility	Implementation (or realisation)								Termination
Black (1999)	Brief/concept	Review of 'state of the art'	Synthesis	Inspiration	Experimentation	Analysis / reflect	Synthesis	Decisions to constraints	Output	X	
Cross (2000)	X	Exploration	Generation		Evaluation		Communication		X		
Design Council (2006)	Discover	Define	Develop			Deliver			X		
Industrial Innovation Process 2006	Mission statement	Market research	Ideas phase		Concept phase		Feasibility Phase		Pre production		

Figure I: Design Processes, adopted from (Howard, et al., 2008)

Models	Analysis phase				Generation phase			Evaluation phase	Communication / implementation phase		
Helmholtz (1826)	Saturation				Incubation	Illumination		X	X		
Dewey (1910)	A felt difficulty	Definition and location of difficulty			Develop some possible solutions			Implications of solutions through reasoning	Experience collaboration of conjectural solution		
Wallas (1926)	Preparation				Incubation	Illumination		Verification	X		
Kris (1952)	X				Inspiration			Elaboration	Communication		
Polya (1957)	Understanding the problem	Devising a plan			Carrying out the plan			Looking Back	X		
Guilford (1957)	X				Divergence			Convergence	X		
Buhl (1960)	Recognition	Definition	Preparation	Analysis	Synthesis			Evaluation	Presentation		
Osborn (1963)	Fact-finding				Idea-finding			Solution-finding	X		
Parnes (1967)	Problem, challenge, opportunity	Fact-finding	Problem-finding		Idea-finding			Solution-finding	Acceptance-finding	Action	
Jones (1970)	Divergent				Transformation			Convergent		X	
	Search for data	Understand the problem			Pattern finding	Flashes of insight		Judgement			
Stein (1974)	X Fact-finding				Hypothesis formulation			Hypothesis testing	Communication of results		
Parnes (1981)	Mess finding			Problem-finding	Idea-finding			Solution-finding	Acceptance-finding		
Amabile (1983)	Problem or task presentation		Preparation		Response generation			Response validation	Outcome		
Barron and Harrington (1981)	X				Conception	Gestation	Parturition	X	Bring up the baby		
Isaksen et al. (1994)	Constructing opportunities	Exploring data	Framing problem		Generating ideas			Developing solutions	Building acceptance	Appraising tasks	Designing process
Couger et al. (1993)	Opportunity, delineation, problem definition		Compiling information		Generating ideas			Evaluating, prioritising ideas	Developing an implementation plan		
Shneiderman (2000)	Collect				Relate			Create		Donate (communicate)	
Basadur et al. (2000)	Problem finding	Fact finding	Problem defn.		Idea finding			Evaluate and select	Plan	Acceptance	Action
Kryssanov et al. (2001)	Functional requirements		Structural requirements		Functional solutions		Analogies, metaphors	Reinterpretation	X		

Figure J: Creative Processes, adopted from (Howard, et al., 2008)

Models	Establishing a need		Analysis of task		Conceptual design	Embodiment		Detailed design		Implementation	
VDI-2222 (1982)	X		Planning		Conceptual design	Embodiment design		Detail design		X	
Hubka and Eder (1982)	X		X		Conceptual design	Lay-out design		Detail design		X	
Crawford (1984)	X		Strategic planning		Conceptual design	Pre-technical evaluation		Technical development		Commercialisation	
Pahl and Beitz (1984)	Task		Clarification of task		Conceptual design	Embodiment design		Detailed design		X	
French (1985)	Need		Analysis of problem		Conceptual design	Embodiment of schemes		Detailing		X	
Ray (1985)	Recognise problem		Exploration of problem	Define Problem	Search for alternative proposals	Predict outcome	Test for feasible alternative	Judge feasible alternatives	Specify solution	Implement	
Cooper (1986)	Ideation		Preliminary investigation		Detailed investigation	Development	Testing and validation	X		Full production & market launch	
Andreasen and Hein (1987)	Recognition of need		Investigation of need		Product principle	Product design		Production preparation		Execution	
Pugh (1991)	Market		Specification		Concept design			Detail design		Manufacture	Sell
Hales (1993)	Idea, need, proposal, brief		Task Clarification		Conceptual design	Embodiment design		Detail design		X	
Baxter (1995)	Assess innovation opportunity		Possible products		Possible concepts	Possible embodiment		Possible details		New product	
Ulrich and Eppinger (1995)	X		Strategic planning		Concept development	System-level design		Detail design		Testing & Refinement	Production ramp-up
Ullman (1997)	Identify needs	Plan for the design process	Develop engineering specifications		Develop concept	Develop product				X	

Figure K: 1980s design processes, adopted from (Howard, et al., 2008)

Models	Establishing a need	Analysis of task Evaluation		Conceptual Design		Embodiment design		Detailed design	Implementation	
Booz et al. (1967)	X	New product strategy development		Idea generation	Screening & evaluation	Business analysis	Development	Testing	Commercialisation	
Archer (1968)	X	Programming	Data collection	Analysis	Synthesis	Development		Communication	X	
Svensson (1974)	Need	X		Concepts		Verification	Decisions	X	Manufacture	
Wilson (1980)	Societal need	Recognize & formalize	FR's & Constraints	Ideate and create		Analyze and/or test		Product, prototype, process	X	
Urban and Hauser (1980)	Opportunity identification	Design			Testing				Introduction	Life Cycle

Figure L: Pre 1980s design processes, adopted from (Howard, et al., 2008)

Models	Establishing a need	Analysis of task	Conceptual design			Embodiment design		Detailed Design		Implementation		
BS7000 (1997)	Concept	Feasibility	Implementation (or realisation)									Termination
Black (1999)	Brief/concept	Review of 'state of the art'	Synthesis	Inspiration	Experimentation	Analysis/reflect	Synthesis	Decisions to constraints	Output	X		
Cross (2000)	X	Exploration	Generation			Evaluation		Communication	X			
Design Council (2006)	Discover	Define	Develop			Deliver			X			
Industrial Innovation Process 2006	Mission statement	Market Research	Ideas phase			Concept phase		Feasibility Phase	Pre production			

Figure M: 2000s design processes, adopted from (Howard, et al., 2008)

Models	Analysis phase			Generation Phase	Evaluation phase	Communication/implementation phase		
Osborn (1963)	Fact-finding			Idea-finding	Solution-finding	X		
Parnes (1967)	Problem, challenge, opportunity	Fact-finding	Problem-finding	Idea-finding	Solution-finding	Acceptance-finding	Action	
Parnes (1981)	Mess finding		Problem-finding	Idea-finding	Solution-finding	Acceptance-finding		
Basadur et al. (2000)	Problem finding	Fact finding	Problem definition	Idea finding	Evaluate and select	Plan	Acceptance	Action
				Divergence-convergence at each stage				
Isaksen et al. (1994)	Constructing opportunities	Exploring data	Framing problem	Generating ideas	Developing solutions	Building acceptance	Appraising tasks	Designing process
Couger et al. (1993)	Opportunity, delineation, problem definition		Computing information	Generating ideas	Evaluating, prioritising ideas	Developing an implementation plan		

Figure N: Ideation-solution creative processes, adopted from (Howard, et al., 2008)

2.1.1 The Historical Context

One pattern is apparent when reviewing the trend of design processes - the existence of the Conceptual Design Phase (CDP) in these models varied over the years. The DPs can be divided into three periods: Pre-1980s ideation-solution, 1980s systematic approaches and 2000s simplified models. An isolated CDP was introduced to the 1980s design processes, taking design away from the ideation-solution or analysis-synthesis progression of the pre-1980s DPs. The ideation phase is now replaced either by the CDP or as a phase before the CDP. In the 1980s DPs, the CDP was typically performed after planning or definition of the problem and before embodiment design.

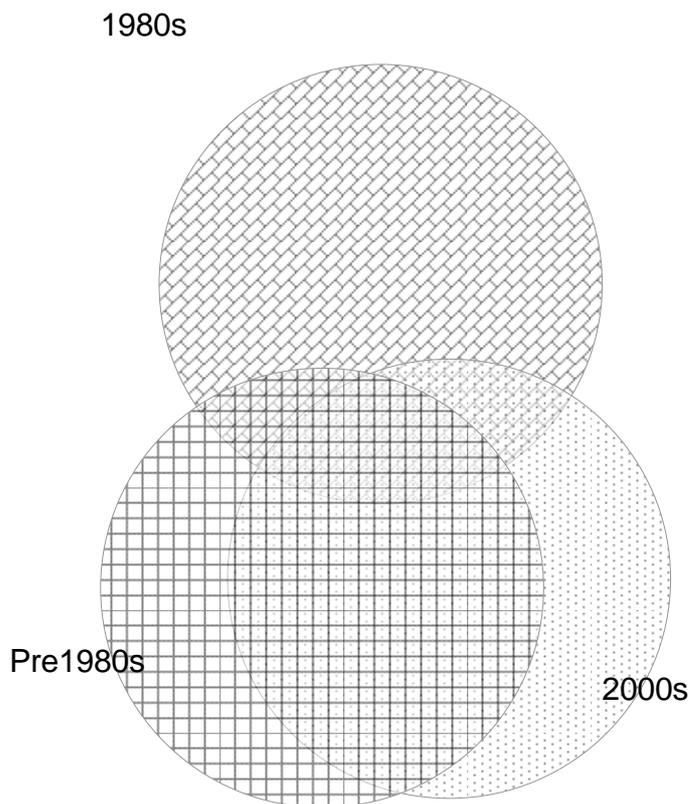


Figure O: The historical context of the design process

Apart from one model, the CDP was clearly defined and isolated from other design phases during the 1980s (Figure K). However, it was not introduced in pre-1980s ideation-solution models, even though some models had begun to equate ideation phase

as conception phase. In these models, ideas are generated in the ideation phase and transformed in a black box into solution (Figure L). These processes varied in terms of how they conceptualised ideation and where it was seen to lie. Interestingly, the CDP returned to the unidentified state in 2000s simplified models (Figure M). These latest models are now simplified into fewer phases, so I have named the 2000s models simplified DPs. The CDP in the 2000 models has either shifted to the beginning of the process, resembling an ideation phase, for example, (Black, 1999) simply has a concept phase at the beginning; or else it has disappeared altogether.

On the other hand, the generation stage of CPs remains represented as an idea-finding phase, for example in Osborn (1963), Parnes (1967), Parnes (1981), Basadur et al. (2000), Isaksen et al. (1994), Couger (1993); see Figure N. Others defined the generation stage with their definition of what ideation ought to be, such as divergence. Pre-1980s ideation-solution DPs are similar to the early CPs, for example, in the simplistic view of process that runs from fact-finding to idea-finding to solution-finding, such as Osborn (1957) (Figure N, page 36). Ideation in these models is a cognitive process of the synthesis stage, and solution-finding is considered an evaluation stage, differing from the 1950s CPs (Figure P), with a black box where cognitive activities of incubation and illumination take place, for example, Wallas (1926) and Helmboltz (1826).

Models	Analysis phase	Generation Phase		Evaluation phase	Communication/ implementation phase
Helmboltz (1826)	Saturation	Incubation	Illumination	X	X
Wallas (1926)	Preparation	Incubation	Illumination	Verification	X

Figure P: Early black-box creative process, adopted from (Howard, et al., 2008)

Referring to Figure H, the CDP is generally placed at the generation stage of CPs, which is normally the idea-finding phase of the CPs. This ambivalence between ideation and conceptualisation is further challenged by the latest Industrial Innovation Process (Figure M), which separates the ideas phase from the concept phase, with the ideation stage mapped as the CDP and conceptualisation as the embodiment stage. One question that emerged from the review was: Are there any differences between ideation and conceptualisation? If so, what are they? If not, why? In answering this, I further review the role of concept and conceptualisation in designing.

The isolated CDP was only popular in the DPs in the 1980s. Yet, its importance extends to today, and design concepts remain an important representation of design (Pahl, et al., 2007). In order to understand its origin, I traced the history of the use of “design concept” among British design communities. The earliest journal published on British designers is a collected series of “Designers in Britain” by the society of industrial artists and designers (SIAD), edited by Sir Thomas D. Barlow G.B.E., who was the chairperson of the council of industrial design (Barlow & Beddington, 1947). The series of seven journals published from 1947 to 1971 has no mention of the term of “concept”. Similarly, in a series of books published on twenty years of design in Britain by Blake and Blake (1969), the term “design concept” was not presented. On the other hand, the process nature of design development was noted as early as 1947, as a solution to teamwork and manufacturing production:

“...design is essentially a team job. The designer [...] must be given the information, the tools and the freedom of operation which will allow him to do this job properly. Manufacturers must see to it that the designer’s path into a particular company is smoothed and that the technicians and engineers – everyone concerned with the production and administrative side – co-operate with him. The first step in such a

process must, of course, be that of briefing the designer very thoroughly regarding the task he is expected to undertake” (Barlow & Beddington, 1947, p. 190).

One argument I can lay to rest is that the CDP is a relatively new concept introduced to the design communities through models from engineering design process, which is defined by the process-oriented manufacturing system. In the next sections, I unfold the characteristics of the CDP and its problems.

2.1.2 The Isolated Conceptual Design Phase

The isolated CDP was introduced during the 1980s, transforming pre-1980s DPs from what was mainly an ideation-solution subconscious process to the 1980s conscious process (Howard, et al., 2008). The CDP is a phase of making sense, and making designers’ thought known. As recently as 2007, Pahl, et al. (2007, p. 161) defined the CDP as separated from the embodiment phase and other development phases:

“Conceptual design is the part of the design process where - by identifying the essential problems through abstraction, establishing function structures, searching for appropriate working principles and combining these into a working structure – the basic solution path is laid down through the elaboration of a solution principle. Conceptual design specifies the principle solution.”

The CDP for French (1999), is heavily an intellectual process of abstraction in different forms. He defined the CDP as a stage where the complexity of design task is dealt with:

“[The designer]...takes the statement of the problem and generates broad solutions to it in the form of schemes. It is the phase that makes the greatest demands on the designer, and where there is the most scope for striking improvements. It is the phase where engineering science, practical knowledge, production methods and commercial aspects needs to be brought together”

The introduction of an isolated CDP into DPs took early designing away from what was a black box cognitive process of ideation in pre-1980s DPs. In fact, the CDP was only short lived in DPs – only introduced in 1980s models, not existing in pre-1980s models, and now having disappearing from the 2000s models. Also, the CPs has not endorsed the CDP. I argue that the isolated CDP is what differentiates DPs from CPs. The question is: do we see designing as a creative process or as an engineering process? Before I could answer this question, I had to examine two decomposing-recombination frameworks that are apparent in engineering design processes: analysis-synthesis and divergence-convergence. I discuss these two cognitive processes with the help of the design process models summarised by Dubberly et al. (2004).

Analysis-Synthesis

The analysis-synthesis process was introduced in the late 1960s (Archer, 1969; Asimow, 1962; Jones, 1970). The framework that influences engineering design processes has become apparent since. Generally, the process is one of analysing and decomposing an input of problem into sub-problems, followed by synthesis and recombining the ideas into an output of solution (Figure Q). The framework assumes that designing begins with analytical thinking, which presumes designing as a scientific activity rather than the creative activity of design (Lawson, 1997).

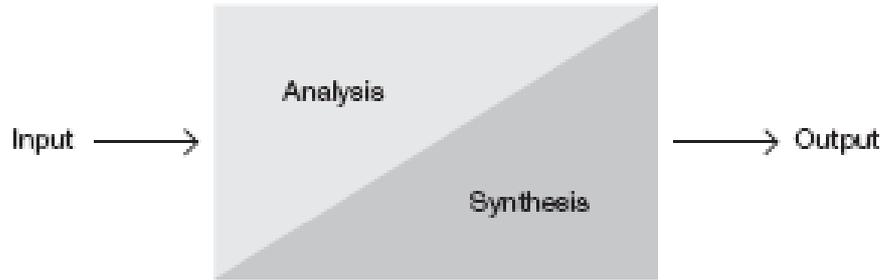


Figure Q: Analysis-synthesis design process, adapted from (Dubberly, et al., 2004)

Yet how designers begin is debatable. The analysis of design problems and the generation of design solutions can be an integrative process, with constant regeneration of new goals and identification of constraints. The synthesis phase can be found at the very early stage of the design process, while analysis is present throughout the design process (Akin, 1986; Eastman, 1968). One example is a fashion design process (Black, 1999) that includes two synthesis phases, with the first occurring before the analysis phase (Figure M). Recent models are increasingly solution-oriented, adopting not only an analysis-synthesis process, but also a divergence-convergence process (Jones, 1970). This is reflected in the ambivalent sequence when distinguishing from the CDP from the DPs with analysis-synthesis models. Also the recent introduction of an iterative divergence-convergence model (Banathy, 1996). The analysis phase is also a decomposing stage, in which: *"Analysis is the resolution of anything complex into its elements and the study of these elements and their interrelationships. It calls for identification, definition, structuring and arrangement. The acquired information is transformed into knowledge. If errors are to be minimised, then problems must be formulated clearly and unambiguously. To that end, they have to be analysed"* (Pahl, et al., 2007, p. 58).

Yet, whether or not designers do analysis-synthesis is doubtful: *“There is little evidence that designers analyse, synthesise, and then evaluate in either their small-scale or their large-scale design activity...where the three phases are advocated as a method, where there is an attempt to follow the method, it does not appear to yield a faster or better outcome.”* (Coyne, 1995, p. 225) Bamford (2002) reviewed the theoretical implications of the analysis-synthesis process as opposed to a conjecture/analysis influenced by Karl Popper. He explained that the scientific analysis-synthesis process is not entirely suitable to explain designing; the same applies to the inductive conjecture/analysis approach. The problem is in the types of design task. Decomposing a problem might be useful for more well-defined type of design problem; in contrast, guesswork is possible for meta-problem-solving of wicked problems.

Divergence-Convergence

The second characteristic of the 1980s DPs is the divergence-convergence process introduced by Jones (1970). Borrowing from work on the creative process, he suggested that designers require divergent thinking to be creative. The model identified three stages in the design process: divergence, transformation and convergence (Figure R). Divergence is a deliberate strategy to create alternative solutions. It is a stage when designers explore as many ideas as possible. The design problem, objectives, and boundaries are tentative and changeable. Problem setting at this stage is to establish limits, consequences, and paradoxes. Designers shift gears during the transformation stage when research is mostly done. Most aspects, relating to design problems such as objectives, boundaries and constraints, are now identified and fixed. During convergence, the designer re-establishes the final solution by narrowing down the choices to one. This is when these separate elements, such as sub-problems, variables and sub-solutions, come together as a single design.

Models	Analysis phase		Generation Phase		Evaluation phase	Communication/ implementation phase
Jones (1970)	Divergent		Transformation		Convergent	X
	Search for data	Understand the problem	Patterns finding	Flashes of insights	Judgement	

Figure R: Jones (1970) process, adopted from (Howard, et al., 2008)

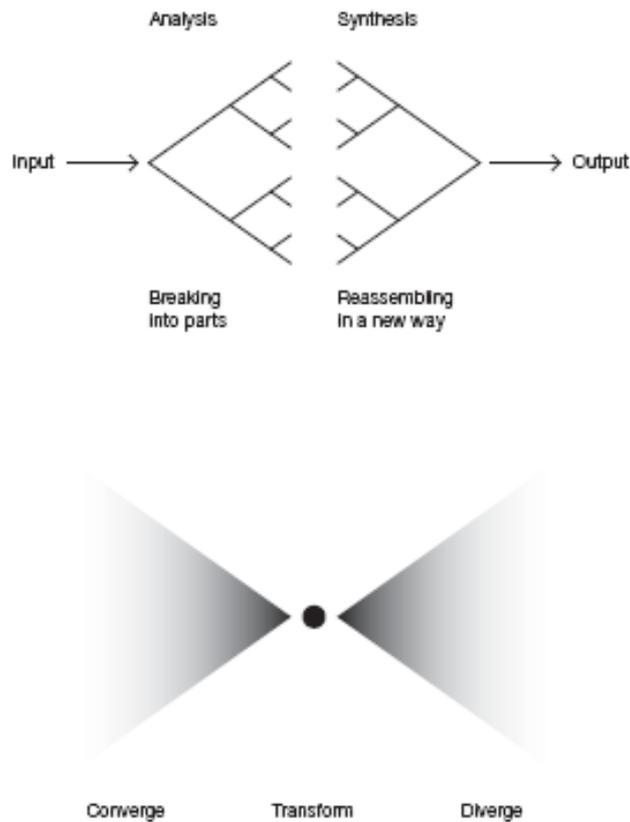


Figure S: Convergence-Divergence, adopted from (Dubberly, et al., 2004)

For Jones, divergence occurs during the analysis phase when the design problem is broken into parts. Convergence occurs when the parts of solution are recombined and synthesized into a solution. However, Dubberly et al. (2004, p. 22) argued that whether analysis precedes synthesis or synthesis precedes analysis, are two ambivalent propositions depending on DPs (Figure S): “*We may just as easily describe the process by reversing the sequence (narrowing down, expanding out). Analyzing a problem leads*

to agreement—to definition—a convergent process. At that point, hopefully, the “miracle” of transformation occurs in which the solution concept arises. Then, the designer elaborates that concept in greater and greater detail—a divergent process.”

In short, analysis or synthesis first; and divergence or convergence first, are two frameworks for defining the 1980s design processes. Models such as Booz et al. (1968), Black (1999) and Wilson (1980) placed the analytical stage after ideation. This suggests the split views on the sequence of analysis-synthesis and divergence-convergence. 2000s models emphasise situationist cycles of analysis-synthesis and divergence-convergence, or even no longer emphasise the need for these sequential processes. For example, a model by Liu et al. (2003) sees idea generation stages as a divergence-convergence process with multiple levels of abstraction to combine concepts. This ambivalence in DPs suggests that the isolated CDP is a position to be questioned. The rationalist ideal of the 1980s equated the CDP and early designing. Yet, crucially, studies on early designing are predominantly focused on the CDP, which risks compromising how studies on early designing are carried out. Consequently, when studying early design collaboration, one must not only consider where the CDP is, but also question the notion of conceptualisation away from the definition of CDP.¹²

12 Nagai, Taura & Mukai (2009) studied concept blending during the CDP and pointed out that “it is possible that the concept generation process occurs suddenly in the design process.”

2.2 CONCEPTUALISATION IN THE ABSTRACT-CONCRETE PROGRESSION

One similarity among DPs with an isolated CDP is the abstract-concrete progression of design concept during the design process (Asimow, 1962).¹³ A typical abstraction process involves generalisation, by only retaining relevant information of a concept or a phenomenon for a particular purpose. A thought process through abstraction distances ideas from objects, using a simplification strategy in which concrete details are left ambiguous or undefined. This reduction of complexity results in simpler conceptualisation, allowing for many specific scenarios to be understood in a generic way. In this view, the design concept is a generalisation of principle design solution “*achieved by abstracting the essential problems, establishing function structures, searching for suitable working principles and then combining those principles into a working structure. Conceptual design results in the specification of a principle concept*” (Pahl, et al., 2007, p. 131). Both the design concept and the CDP are typical of a rationalist view, where problems and solutions guide the progress of the designerly act, and generalisation and categorisation are the key activities. As Simon (1969, p. 59) described the abstract property of a concept in his seminal book “The Sciences of the Artificial”: “A ‘concept’ is defined extensionally by some set of cards – the cards that are instances of that concept. The concept is defined intentionally by a property that all the instances have in common but that is not possessed by any of the remaining cards.”

13 Although there is a confusion inof the methods in which Asimow (1962) separates design morphology (vertical structure) from problem-solving procedure (horizontal design process). I shall refer to his horizontal design process for this matter.

By ignoring the particulars and incidentals, abstraction is said to be useful for problem-solving because it helps avoid fixation on conventional ideas by focusing on what is ‘general and essential’, which leads to ‘the crux of the task’ (Pahl, et al., 2007). Working through the representation of the design concept at this abstraction level avoids getting into the details which are not ready to be considered (Brereton, 2004, p. 85). The design concept is a useful representation of design as it is flexible to progress from the abstract to the concrete while holding different kinds of information (Brereton, 2004, p. 87).

However, this abstract-concrete progression assumes that designing is the input of design problems, to be met through analysis and synthesis, with design solution as the output (Figure Q, page 42). Yet the design requirements and constraints in writing, the ideas in sketches and scale models and the design solutions in 3D models all represent different levels of abstraction. Especially when requirements and constraints are seen as criteria to be predefined and fulfilled through a design process, the designer is required to be abstract in thinking without working with concrete materials, making designing a remote act from the actual design. It is especially problematic when these abstract requirements and constraints are eventually to be transformed into a concrete solution.

The Representation of Design Concept

The usefulness of the abstract-concrete progression depends on the structure of the DPs. In the 1980s models, with an isolated CDP and a design concept which represented the transition between ideation and solution, the abstract-concrete progression is easily defined. However, it is not the type of information which dictates the level of abstraction suitable for the representation of a concept; rather “*the suitability of representation to a task depends on the enquiry that is being undertaken by the designer*” (Brereton, 2004, p. 86). The view on the usefulness of the abstract-

concrete progression is especially apparent in 2000s models, which are predominantly cyclical models without an isolated CDP. For example, the Industrial Innovation Process, cited by Howard & Culley (2008), places CDP at the embodiment stage of design process (Figure M, page 35), which is a more concrete phase than the pre-1980s' ideation phase and the 1980s' CDP. The shifts symbolise a change in DPs in the orientation of the abstract-concrete progression, and with this comes the change in the representation of design concept (Brereton, 2004, p. 86).

Another way of explaining the role of the design concept is in its representation of partial design. The design itself emerges from a set of memory structures external to the designers such as sketches, drawings, and so on. At each design phase, the partial design or ideas documented in these external structures serves as a stimulus to indicate designers' next moves in the design development. However, the abstract level of these memory structures varies. It can take many forms, such as schematic representation of a function structure, a circuit diagram or flow chart, a building block for more complicated design projects or just a simple line drawing of a design. As Pahl et al. (2007) put it, the problem of the abstract-level concept is that the working structure cannot be established until it is at the concrete level:

“Often, however, a working structure cannot be assessed until it is transformed into a more concrete representation. This concretisation involves selecting preliminary materials, producing a rough dimensional layout, and considering technological possibilities. Only then, in general, is it possible to assess the essential aspects of a solution principle and to review the objectives and constraints, It is possible that there will be several principle solution variants.”

When a design concept represents these solution principles in abstract, the problem and solution have to be separately dealt with. This is due to the structure of the solution cannot be attended to until the design concept has progressed into representing at the concrete level. In Chapter 1, I reviewed the popular belief that designers verbally negotiate their concept during early design collaboration and that co-design activities are commonly traced in this argumentation process through verbal protocol analysis. To be able to verbalise a concept, it is essential that the concept itself is abstract enough to be able to be put into words, and produces an argument. I argue that the verbal argumentation process is a problematic framework due to the varied abstraction level of design.

I have also argued for the situationist approach, with problem and solution co-evolving rather than progressing in a rationalist problem-solving process. The situationist design cycle requires a different representation from the current abstract representation of design concept. In fact, this is what designers do in practice. Schön (1963, p. 5) observed how a designer at practice referred to concepts:

“When we say that we ‘have’ a concept, that it is ‘applied’ to an instance, that it ‘fits’ or does not ‘fit’ that instance, we speak as though a concept were a kind of concrete thing. We speak of ‘big’ and ‘little’ ideas, ‘my’ idea and ‘yours’, ‘few’ or ‘many’ ideas. We spatialise ideas. We give them a certain generality – a single idea may ‘apply’ too many instances – but we speak as though they had definite limits and could be handled like spatial things. It is as though we thought of concepts as mental stencils superimposed on experience.”

Research in creativity has recognised that a creative concept can be represented at a much more concrete level, yet flexible enough to be manipulated, representing structure as it progresses, such as analogy, schema. I shall discuss relevant work from creativity research in next section.

2.3 THE CREATIVE PRACTICE OF DESIGNERS

When seeking to understand the creative practice of designers, one has to go back to the time when the concept of design was separated from the concept of craft making. The design process was formed to encourage designers' creative imagination at the abstract level, away from the fixation of the vernacular craftsman working with the concretes (Lawson, 1997). However, the process models have gone too far by attempting to make designing as clear as possible. When thinking of the design problem in abstraction, the ambiguities of designing just by working with the concretes can be missed. It is crucial that designers can work at the primitive, concrete level to perceive and manipulate spatial relationships; while on the abstract level they manipulate a concept which may be too big to do in relation to real things (Abercrombie, 1969, p. 120).

The balance of working between the abstract of a concept and the concrete of a thing cannot be done in the design process with an isolated conceptual design phase with the abstract-concrete progression. Rather, certain "black box" moments might have to be allowed when designing. Cross (2000, p. 78) described a black box method which emphasises the end design rather than the creative process: *"The starting point for this method is to concentrate on what has to be achieved by a new design, and not on how it is to be achieved. The simplest and most basic way of expressing this is to represent the product or device to be designed as a simple 'black box' which converts certain inputs into desired outputs."*

It is similar to a design method in the Japanese auto industry, in which the design team gives only a black box description to suppliers and leaves them with the widest possible latitude for designing and selecting the components at minimum cost (Clark & Fujimoto, 1991). This process-less black box method can be detected in the pre-1980s ideation-solution DPs, as well as the incubation-illumination pre-1950s CPs. These models value the uncertainties and ambiguities in the creative space by not prescribing the designers' practice in the work process. Rather, it is understood that there will be an "AHA" moment when design comes.¹⁴

In creativity research, this sudden insight was studied mainly during the 1990s (Csikszentmihalyi; Finke, 1989; Finke, 1995b; Kosslyn & Osherson, 1995; Liu, 1995; Oxman 2002; Smith, 1995; Suwa et al., 2000; Weisberg, 1995), in themes such as insight problem solving, preinventive structure and mental imagery. However, these studies are more concerned with the ideation of the creation than how the design processes are structured. On the other hand, the study on design cognition has focused on the importance of visualisation as a way of designing through visual reasoning and design emergence (Liu, 1995; Oxman, 2002). However, these studies depict designing as a process with a well defined problem and the design emergence of the visual form of design takes place during the isolated CDP.

2.2.1 The Creative Space

Recent work on design studies has combined with creativity research to understand early designing through designers' ideation through drawing and structuring

¹⁴ The Aha experience is the moment when designer suddenly achieves a clear solution through insight, after a period of stuck on a problem

with analogies (Cai, et al., 2010; Collado-Ruiz & Ostad-Ahmad-Ghorabi, 2010; Dogan & Nersessian, 2010; Hernandez et al., 2010; McLaren & Stables, 2008; Nagai, et al., 2009; Seevinck & Edmonds, 2008; Stones & Cassidy, 2010; Tseng et al., 2008). The research are concerned with the complexity of the designerly practice in a creative space, rather than through a controlled process. Particularly, the designer's ideation is studied with an open mind and acceptance of a black box method. These studies often work on designers' imagery on the internalisation of concept formation through imagery (Downing, 1992; Gill, Deshmukh, & Athavankar, 2000; Houtz & Frankel, 1992; Kavakli & Gero, 2001; Liddament, 2000; Miller, 2007; Shavinina, 1998). Among the creativity models, the Geneplore model by Finke, Ward, & Smith (1992) highlighted both the abstracts, such as verbal combination and categories, as well as the concretes, such as visual patterns and object forms, as part of the preinventive structures. The preinventive structure allows us to take advantage of structural connectedness without over-structuring the creative process by blindly adhering to a plan. This school of thought typically emphasises the importance of imagery for the emergence and structuring of design in visual form of design but without concerning the structure of design processes (Akin & Moustapha, 2004; Alexiou, 2010; Benjamin, 2009; Chamorro-Koc, Popovic, & Emmison, 2008; Halskov & Dalsgaard, 2007; Oxman, 2000; Paulus, 2000; Seevinck & Edmonds, 2008).

Emergence and Structure

Cross (2000, p. 25) argued that for ill-defined problems, sketching assists problem structuring by allowing problem and solution to co-evolve in the creative space, leading eventually to the emergence of a solution. However, this creative space, as argued by Coyne (1997), is difficult to define in cognitive terms. His understanding is that creativity is situated at a "commonplace", rather than arising solely from mental

function as cognitive scientist would claim. One view is that to collaborate in the creative space, it is necessary to open up for the design to emerge from the knowledge base available. For example, the emergence of design from ideas, even in the form of shapes, is seen as possibly encouraged by artists' collaboration through an emergent interaction system (Seevinck & Edmonds, 2008; Stones & Cassidy, 2010). The creative act in this knowledge space is therefore a kind of perspective structuring which requires associations to link these ideas. Finke (1995b, p. 304) explained that: "*it is important to distinguish between structured creativity and planned creativity. Creative ideas can be structured without being predetermined; in fact, having some degree of ambiguity in the structure allows new, unanticipated insights to emerge.*"

However, the structure alone does not guarantee good ideas. There should be realistic ideas in the structure, rather than unrealistic ideas in marvellous structures. Investigation of the structure of ideas is similarly to the research on problem finding. The difference is in the abstract-to-concrete progression. The emergence of ideas in a creative space can be done through a blend of abstract concepts and concrete ideas, without a set procedure to identify them. Often this leads to what may be called a "creative leap", by allowing the associations of totally unrelated ideas at first, but the design may take shape and emerge later (Kolko, 2010; Lai & Chang, 2006).

Casakin (2008) studied the correlation between creativity and the design problem among housing designers and concluded that restructuring of the design problem is the most significant activity for design problem-solving, in which "*an interaction between a redefinition of the design problem and a search for alternative solutions can enhance design creativity in housing.*" However, he dismissed the prior retrieval of knowledge as a contribution to creativity. Rather it is intelligence, gained from expertise and

experience, which might be the factor contributing to originality in restructuring the design problem.

In architecture and digital design, emergence through visualisation as a way of designing has been explored by a few (Akin & Moustapha, 2004; Liu, 1991, 1995, 1996, 2000; Liu & Lim, 2006; Oxman, 2002, 2004, 2006, 2008; Sass & Oxman, 2006). The centre of the concept is that, shapes and visuals can be manipulated as the higher level of visual language, as a way to structure and restructuring design schema.¹⁵ These frameworks values the creative space and sees design cognition as the fundamental basis of the designerly act.

2.2.2 Creative Practice for New Product Design

In order to explain how creative practice is related to new product design, it is useful to see intuitive scientists and creative artists as working on two different activities: the artist creates from nothing, while the scientist discovers from something (Bowers et al., 1995). New product design often requires designers to deal with both activities, often at the same time. When dealing with the knowledge base collected from market surveys or user's research, the designer is an intuitive scientist hoping to discover the market gap that will inform the solution. To do this, the designer is working towards a coherent insight into the product that is to be created. On the other hand, when designers are creating the design, they need to use judgement just like a creative artist, as there is not just one answer to the design, like the discovery of a

15 Or what they called "parti".

market gap. This is why new product design for innovation is complicated.¹⁶ It includes both discovery and creation in the same creative space, and requires a kind of scientific discovery to give rise to the kind of creative act.

I argue that this is where researchers have confused ideation and conceptualisation. Ideation is the act of a creative artist, allowing imagery and restructuring for the ideas to emerge; conceptualisation is more like scientific discovery, with an expectation of a definite answer by following a work process said to encourage the designer's creativity. This work process is rather a controlled-for-cost efficiency, rather than facilitating creativity for innovation. The problem is that conceptualisation involves categorisation. The kind of certainty the DPs intended is irrelevant when a designer is working on a probable concept, with a partial cue, which there is no way to categorise perfectly.

To conceptualise through categorisation will risk giving up on trying new ideas, and instead fixating on the obvious categorisation (Bruner, et al., 1956, p. 54). We can argue that conceptualisation can cause design fixation, which is what it sets out to overcome. Ostman & Yrkeshogskolan (2007) reviewed the types of conceptualisation on design and in design, and criticised them as impractical for a pragmatic profession. Nagai, et al. (2009) also mentioned that there is still no consensus on whether or not the process of aligning ideas is a concept generation process or an inherent trait, or that the conceptualisation could actually happen suddenly in the design process.

¹⁶ Creativity is producing new ideas; innovation is the process of both generating ideas and applying them to specific contexts. In product design, we are more concerned with the latter, and that the design process is aiming for innovation, not just creativity.

There are research studies close to the research topic of this thesis which are helpful to understand the diversities of the field of knowledge in which the research resides. The vision-based model for interaction design by Lerdahl (2001) is in line with the approach of this thesis, in terms of acknowledging the varied level of abstracts and concretes that designers have to deal with in a collaborative situation. The research provided a broad perspective on the social aspects of creative collaboration through interviews of practitioners and action research on student designers in mechanical engineering and industrial design. However, the research focused on the CDP of design process and neglected the significant influence of design expertise. The studies are action research on students with interview accounts from design consultants. Also cited earlier was the work on concept synthesization and blending by Nagai et al. (2009), which is currently ongoing in Japan. However, both works identify early designing with the CDP, which I have put forward as redundancy in section 2.1.

CHAPTER SUMMARY

I have reviewed design processes and creative processes and identified the isolated conceptual design phase of the 1980s DPs as a redundant fixation in researching design. Crucially, most research on early designing equates it to the CDP. In co-design studies especially, much attention is given to prescriptive methods of conceptualisation, but little to why designers conceptualise at all. I extended the argument presented in Chapter 1 by arguing that the specific phase of conceptualisation at the early stage of designing reflects the fundamental abstraction basis of the rationalist view of designing. I have also argued for a difference between ideation and conceptualisation by putting forwards the characteristics of conceptualisation in the abstract-concrete progression. I highlight the role of the design concept, as the representation of design is restricted in this progression. Lastly, I argued for the need to

identify the role of design conceptualisation through the study of designers' creativity. This is made possible by investigating the differences between Western designers and Chinese designers during their early design collaboration.

CHAPTER 3: RESEARCH METHODOLOGIES

CHAPTER OVERVIEW

This chapter describes the research journey - how the research questions were defined and refined hermeneutically as the research unfolded. Section 3.1 details the choice of ethnographic methodology for the research inquiry. Section 3.2 argues for the inductive analysis methods and the writing up analysis. Section 3.3 outlines the fieldwork acquisition journey.

3.1 REFLEXIVE ETHNOGRAPHY

Research methodology suitable for studying design collaboration in a cross-cultural setting is a topic in itself worthy of research. Firstly, communication and thinking at the stage of ideation can be ambiguous and implicit, which poses difficulties in recording and analysis. Secondly, designers from different cultural backgrounds may bring complications derived from socio-cognitive variance, in which current design theories/model/methods can be limited to describe the complexity of a cross-cultural setting (Schadewitz, 2009). Thirdly, the design research community remains ambivalent about the distinction between theory and practice in design. Following on from Chapter One, the study of designers' practice can be influenced by epistemological issues; duality (or even plurality) is inevitable but poses difficulties for a valid study.

In view of these complications, the ideal research methodology is explorative and holistic. A hypothesis-driven research design is too rigid for an exploratory investigation, which needs to be free of preconceived ideas from existing literature. Malinowski (2002, p. 9) highlights this importance:

“If a man sets out on an expedition, determined to prove certain hypotheses, if he is incapable of changing his views constantly and casting them off ungrudgingly under the pressure of evidence, needless to say his work will be worthless. But the more problem he brings with him into the field, the more he is in the habit of moulding his theories according to facts, and of seeing facts in their bearing upon the theory, the better he is equipped for the work.”

To observe early design collaboration requires an awareness of both 1) explicit and implicit cues, 2) social issues and cognitive factors. The researcher is at once confronted by rich, abstract and largely implicit and visual forms of information. Despite this difficulty in recording, interpreting and reporting the ethnographic evidence, the method is chosen because *“the value of ethnography is found not in its analysis and interpretation of culture, but in its decision to examine culture in the first place; to conceptualise it, reflect on it, narrate it, and ultimately, to evaluate it”* (Maanen, 1988, p. 140).

To study the specific phenomenon of Western-Chinese early design collaboration, I combined ethnographic fieldwork with self-reflexive interpretation and inductive analysis, to bring depth as well as breadth to bear on analysis of the socio-cognitive evidence collected. A mixed methods approach was chosen, with a triangulation of largely qualitative methods such as ethnographic fieldwork and in-depth interviews, realised in the hermeneutic circle of the research process. Data collected are ethnographic field notes, interview transcripts, audio-visual recordings, and related design evidence such as sketches, processes, and objects. The fieldwork is interpreted using a reflexive approach with a clear sense of ethnographic self. The interpretations were inductively analysed using the grounded theory approach, and reported in a

combination of realist, confessional and impressionistic accounts in this thesis. In this, the hermeneutic circle of the research process ensures flexibility to deal with changing views.

Ethnographic observation has generated significant research contributions in the field of design studies. Early work included observations at engineering design practices (Bucciarelli, 1984, 1988, 1994, 2002) and observation on architecture lecturer-student interaction (Schön, 1985, 1987, 1991). The observations on designers in practice reveal the complex world of the design studio and the uncertainties of the designerly act. This complexity tends to be overlooked by other research methods, which are limited in capturing the naturalistic nature of the design studio. Video documentation is an especially useful tool for capturing both social and cognitive cues important for the reporting of design discourse (Minneman & Leifer, 1993; Tang & Leifer, 1988). Recent studies also see the use of researchers' own interpretation and reflection to give rise to more detailed study on complex phenomena. For example, Chris Heape's (2007) hermeneutical phenomenology study on his student designers' work, over a prolonged period working with them, led him to emphasise in his conclusion the important role of conceptual space, rather than design process, in the designerly act.

Closely related to this thesis are two extensive works on cross-cultural design communities, by Moeran (1996, 2003, 2005), on a foreign culture in a Japanese advertising agency, and by Schaedewitz (2007, 2009), on cross-cultural interaction in student designers' communities in Hong Kong, Korea and Austria. Moeran introduced the importance of social and organisational differences in Japan. His work richly describes the creative discourse in the Japanese context through a Western interpretation. His work highlights that, while Eurocentric design process intends to structuralise in an objective manner, the social organisation and teamwork in Japan are

highly intertwined and inseparable. He argued for an alternative concept of fields, networks and frames in understanding social forms in a Japanese organisation. His defence is that his Western endeavour is in fact a strength in itself, in order to be highlight the differences (Moeran, 2003),

Moeran was only able to make use of the differences by using the ethnographic method, due to its holistic and explorative nature and its usefulness for investigating something unique. It was a good strategy for me to use it to explore the specific phenomenon of Western-Chinese early design collaboration. Clifford & Marcus (1986) urged that *“We must pluralize and diversify our approaches: a basic move against either economic or philosophic hegemony is to diversify centers of resistance: avoid the error of reverse essentializing; Occidentalism is not a remedy for Orientalism.”* In fact, cross-cultural research has reported Chinese variance not only in social terms, but also the cognitive (Kumar & Worm, 2004; Nisbett, 2003; Nisbett, et al., 2001; Peng & Nisbett, 1999). These studies were not done on the designers at practice. For example, cultural dimensions (Hofstede, 1991) popularly used to study socio-cultural issues, are reportedly limited when trying to understand design communities (Schadewitz, 2009).

3.1.1 The Ethnographic Self

Even when it seems doable with an ethnographic methodology, one has to define various stands to be able to interpret extensively but reasonably while in the field. When one speaks about studying another culture, especially the oriental, one invokes the underlying assumptions of an “Orientalist” thinking, with an erasure of the line between “the West” and “the Other” (Said, 1978). This duality is unnecessary when one reports with narration rather than vision. A scholar should have a dynamic variety of human experience, and give freedom of voice to “the Oriental” to be able to self-represent own narrative in studies on themselves. In this, similarly to Moeran, both personally (as a

Malaysian-born Chinese living in the UK) and professionally (as a designer and producer), I was able to gain access in the case studies by opting for a reflexive account instead of a positivist, detached observational one. This advantage is what I have called my ethnographic self (See Appendix I: My Ethnographic Self, page 299). I was hoping that my ability to translate the cultures between Western and Chinese people and between designers and researchers would add depth to the research, as “*a ‘good’ ethnography is one that gives a sense of the conditions of fieldwork, of everyday life, of micro-scale processes; of translation across cultural and linguistic boundaries; and of holism.*” (Marcus & Fischer, 1986, p. 25)

The ethnographer’s self has been seen as an increasingly important part of the fieldwork since the “interpretive turn” (Geertz, 1975). The value of a reflexive methodology lies in the way that reflexivity, by means of confessional accounts, serves to unmask the “*epistemological and ethical grounds of anthropological knowledge*” (Marcus, 1994). For this reason, the method is useful for this research, which is relatively untapped when dealing with a debatable epistemological issue. In addition, my insights as an insider to the cultural phenomena in the field served as an advantage, rather than a hindrance, to the analysis. Indeed, the fieldworker’s emotion is not to be taken for granted. Alversson and Skoldberg (Alversson & Skoldberg, 2000) argued that such critical self-analysis of feelings should not be taken as emotional catharsis. Listening to one’s feelings, interpreting and processing is important for empirical and theoretical work. This is relevant, for example, when facing informants during interviews – how do we feel, intuitively, about the interviewee, and the observed situations? Is there any reason that we hesitate to ask certain questions? Could we report how we sound during the interviews? In fact, “To see research work as not only a

perceptual and cognitive but also an emotional project can enhance its value.”¹⁷
(Alversson & Skoldberg, 2000, p. 217)

However, the majority of ethnographic research has chosen to steer away from the issue of the field researcher’s self and their reflexivity. Positivists have almost entirely erased the fact that the fieldworker is physically, mentally and socially “there” in the field. It is commonly known that field researchers leave the field physically and emotionally affected by the experience of the research. For positivists, the stress will lead to the risk of self-absorption. The emotional stress of the ethnographer in the field is seen as a difficulty to be dealt with outside the writing instead of an input to the analysis of the fieldwork and the fieldworker herself. The statement of the self is mostly limited to brief discussion of the relationship between fieldwork and biography. To isolate the personal text as such is impossible, as all written texts are personal (Lincoln & Denzin, 1994, p. 578). The difficulty lies in the assessment of the presented reality through a personal written text. It is viewed as personal and lacking in scientific

17 “...self-reflection and the critical self-analysis of feelings are an important part of the research process...this is a question not of emotional catharsis, but of interpreting and processing one’s feelings before and during the empirical and theoretical work...that researchers should listen to their feelings and process them, for instance when performing interviews. What does the researcher feel in face of the interview subject or the observed situation? What is the intuition impression? Does the researcher hesitate to ask certain questions? What is the underlying the tone in the descriptions given?”
(Alversson & Skoldberg, 2000, p. 217)

evidence. It has been said that there is only a thin line between self-indulgence and self-reflexivity (Lofland & Lofland, 1995, p. 11).¹⁸

Nevertheless, postmodernist ethnographers have striven to abandon the duality of the observed-observer dichotomy. Coffey urged for more detailed writing about their identity and emotion within the fieldwork: *“the writing of the self remains engaged with at a relatively superficial level”* (Coffey, 1999, p. 4). The authoritative writing and meta-narratives which postmodernist methods have to offer can be creative and could yield insights into the fieldwork (Hammersley & Atkinson, 1995, p. 120).¹⁹ Specifically, Mead argues that one’s inner drama and the external conversation with other individuals in the same society is the earliest experiential phase of the development of self through interacting with society. The inner drama enriches one’s insight into the reality of the field (Mead, 1934, p. 173).²⁰

18 *“Even when exceptionally well executed, reports analysing autobiographical data are often viewed by readers as borderline self-indulgence: when only competently executed, they are likely to be labelled “narcissistic” or “exhibitionist” and simply dismissed as uninteresting”* (Lofland & Lofland, 1995, p. 11).

19 *“Even though the emotional journey was condemned by positivists as too personal and risking being self-absorbed, ethnographers must seek to utilize creatively the insights of these postmodernist perspectives – insights that encourage incorporation of varying standpoints, exposure of the intellectual tyranny of meta-narratives and recognition of the authority that inheres in the authorial voice – while at the same time rejecting the extreme pessimism of their epistemological critiques”* (Hammersley & Atkinson, 1995, p. 120).

20 *“the internalisation and inner dramatization, by the individual, of the external conversation of significant gestures which constitutes his chief mode of interaction with*

In part, the notion of validity lies in the definition of self. Without a clear definition of self, even if the analysis adopts a structural grounded theory approach, one risks being self-indulgent. One useful way of defining self is Mead's (1934) notion of the division between "I" and "me", which together make the self.²¹ In contrast to "I", which is free from presumption, "me" constitutes the individual's social experiences and their reflections. My ethnographic self is oriented in the interaction between "I" and "me", on which Davies (1999, p. 24) further elaborates:

"'I' provides for creative variation no matter what the social and cultural determiners, we avoid the overly mechanistic and deterministic presentations of other selves as fully predictable and representative of other societies... 'me' is that part of the process that is easier to comprehend, in that it is constituted of the individual's social experiences and reflections on these experiences" (Davies, 1999, p. 23).

In everyday life, we rely on traditional media such as rituals, codified belief systems, and communal structures to capture the distinctiveness of a culture. As a fieldworker studying a foreign culture, in this case, a cross-cultural phenomenon, I was confronted by an unfamiliar cultural medium. In this situation, the concept of self is not

other individuals belonging to the same society – is the earliest experiential phase in the genesis and development of the self" (Mead, 1934, p. 173).

21 "The "I" is his action over against that social situation within his own conduct, and it gets into his experience only after he has carried out the act. Then he is aware of it. He had to do such a thing and he did it. He fulfils his duty and he may look with pride at the throw which he made, the "me" arises to do that duty – that is the way in which it arises in his experience. He had in him all the attitudes of others, calling for a certain response; that was the "me" of that situation, and his response if the "I" (Mead, 1934, p. 175).

just a superficial system of meanings, but determines how I interpret the observed phenomenon. In return, the interpretation transformed my concept of self.

In short, the concept of self is the dialectic between the observed phenomenon and my self (between 'me' and 'I'). The reflexivity between these two notions seems to justify both realist and pragmatic perspectives. For Mead (1934), the formation of self is based on the symbolic social interaction, differing from individual subjectivity, which is based on experience to which individuals alone have access. This helps the ethnographer to overcome the rejected view of not being able to gain knowledge of other selves and societies.²² *"If the self is continually under construction, then ethnographers' experiences when they participate in social interaction in another society clearly alter their own selves in accordance with the cultural expectations of others"* (Davies, 1999, p. 24).

The concept of self evolves through cultures: the ethnographic self can be mediated by the culture of the observed, especially as fieldworkers tend to change themselves in trying to fit in. For example, Kondo's (1990) identity (that of American-born Japanese) was transformed by her landlady to be more culturally Japanese. In addition, the interaction between herself and the field in which she is constantly negotiating her cultural identity has left her more self-reflective and has, in the end, transformed her (Kondo, 1990). The definition or, more accurately, the location of self is therefore crucial. In my case, which resembles that of Kondo's, the position of self depends on the symbolic forms of interaction and emerges through self-reflection in

22 *"...so long as they do not lose sight of their responsibility to seek explanatory abstraction and not primarily to report of individual experience"* (Davies, 1999, p. 24).

which the representation in positivist fieldwork is challenged by the postmodernist's de-differentiation (Davies, 1999, p. 14).²³ This unification of boundaries between the dichotomies of observer-observed, insider-outsider, subjectivity-objectivity and theories-reality, leads to the possibility of self-reflexive and interpretive ethnographic research (Davies, 1999, p. 14). Among these, the insider-outsider dichotomy is explored as being at the point of cultural embodiment.²⁴

3.1.2 The Insider/Outsider Dichotomy

Am I home now in China? I asked myself as the plane landed at Shanghai Pudong airport. It was my first trip to Mainland China, a land my Malaysian-born parents called home, a land my grandparents came from. My language, education and upbringing are as I understand it, immensely Chinese. The influence of Confucius, Taoism and Buddhism that defined Chinese-ness, shaped my community in Malaysia. These influences are still profound in mainland China, but with the influence of communism and new-found capitalism. The social change in China due to the economic development over the past twenty years is vast. The changes are what differentiate me, the Chinese-educated overseas Chinese, from mainland Chinese, as I learned during my

²³ *"Postmodernism is a process of de-differentiation, of breaking down boundaries and rejecting the autonomy of different realms. One of the first major consequences of this process for social research is epistemological – that is, it challenges the knowledge basis of such research by problematizing the relationship between ideas (theories) and reality. In anthropology this has been glossed as a crisis of representation – that is, a denial that the products of ethnographic research may be legitimately perceived as in any way representing the separate reality of another society"* (Davies, 1999, p. 14).

²⁴ It depends on the cultural context at the field, embodied within the transactions between the fieldworker and the community.

trips in China. Despite my Chinese-ness, I could be the insider and the outsider to the community I was to be observing at the design practice, Sang Design, which can be of a huge benefit for understanding the phenomenon.

The insider/outsider dichotomy has ceased to be a great concern in anthropology since the interpretive turn in ethnography. Stereotyping a minority culture group in a detached outsider account by a white anthropologist studying aboriginal peoples is increasingly impossible. Aboriginal people are now using mobile phones just as much as anyone else is in the world. We now share a part of cultural experience in one way or another, largely made possible by globalisation and multiculturalism - Occidentalism is as much recognised as Orientalism (Said, 1978).²⁵ The development of higher education in formerly colonised countries brings more non-white anthropologists into conducting research in their own countries. Similarly, there are now more Western anthropologists researching “at home”.

The emphasis has shifted away from cultural differences; instead, postmodernist ethnography embraces the shared experience between ethnographer and the observed community through interaction between the identities of both. The question of the insider/outsider dichotomy can be a question of the (perceived) identity of the fieldworker. In this, my relationships and transactions with my subjects consisting of WDs and CDs formed a large part of the research. The position of “the self” for me in the cross-cultural environment is embodied within my insider/outsider identity that is both defined by me and also perceived by others. Indeed, at the beginning of the

25 Orientalism is a style of thought based upon an ontological and epistemological distinction made between “the Orient” and (most of the time) “the Occident”.

fieldwork, I could not stop pondering: “Am I a Chinese or a Westerner to the community I am observing?” I learned the answer the hard way (Episode 1).

It was one winter afternoon in the sleek office of Sang Design in Shanghai. I was sitting in the glass box on the second floor listening to the negotiation between Mikael and Ong on the interface design of the next generation Roko phone. It was the second week into the project, a combined effort between Team A and Team C, chaired by Mikael, the German vice president of Sang Design. The research team was in the meeting to answer questions on any user or technical issues for the project. It was an important project for Mikael, and also an exciting project for us, including me. Mikael, Ong (Singaporean research manager) and Keiko (Japanese designer) were leading the discussion, but the conversation remained between the three of them with occasional questions from Mikael to specific CDs. Although not involved in the main discussion, CDs were whispering to each other in Mandarin Chinese within their subgroups. At least three conversations were going on at the same time among fifteen of us. The interactions, both verbal and sometimes through sketches, were at times a distraction for me. But all around me was a sense of purpose at its best among team members.

There were too many of us to fit us all into the glass box. Some of us were sitting on the high chairs surrounding the round table outside of the glass box while looking in to the sketches on the walls. Though discussions seemed to go off on different tangents within the subgroups, the focus of the conversations was never away from the project. We were two-thirds of the way into the project, and the design concept was shaping up and ready to be

“discussed”. The four walls of the glass box were full of design sketches. We were very excited about the project. Who wouldn't die for an innovative project on this scale? The door to the glass box was not shut, so apart from the conversations, we were also fighting off the music playing in the main office area. Ying (Shanghai project manager) was not involved in the project. Her desk was located just beside the glass box. So we could see her from the glass box. Our heavy lunch at the Xi Chuan restaurant down the road from the design practice had obviously added a sense of leisure for the afternoon, taking away the stress among us brought by the Roko project. It was a “showcase” project for Sang Design to Roko, of which Mikael expected highly.

It had been an exciting day and we were all so absorbed in our activities. But this did not last for long. In the midst of my observation, Ying came in to ask for me: “Yang (the Chinese president of Sang Design) is here for you.” (Ying’s job title is project manager but her main job role is to assist Mikael, and occasionally Yang, on the everyday running of the practice.) She had a look of urgency mixed with apology and a sense of authority which I had not seen in her before. At the time, I could not quite make out which was more prominent. Yang was standing outside the glass box, looking angry. Before I could utter out a friendly “hi”, he fired out his frustration with a loud authoritative voice towards me: “Have you not had time to do my translation or are you just not interested and can't be bothered?” I could sense the fifteen pairs of eyes staring towards us from the back. Although it was not the first embarrassing moment I had seen in Sang Design caused by Yang, it was certainly the first that involved me. I turned to Ying for an explanation, but to my disappointment, she looked towards Yang: “I told her (me) that you (Yang) needed the translation by 4pm.” I was

lost for words as I look at Yang. I felt wronged by Yang and betrayed by Ying. The atmosphere in the office took a sudden turn and became tense. All conversations stopped at once. I looked towards Mikael, and then the others, with a slight hope that someone would ease the tension.

No one said a word! I was overwhelmed by all sorts of feelings and trying to analyse them all in a small space of time. It was a complicated scene. Firstly, I feared the loss of my respect as an independent fieldworker in the company. Secondly, I thought that "this was it", Yang finally wanted rid of me as the researcher in the practice. Thirdly, I feared I would lose my confidence to continue with fieldwork after the embarrassment. These were real emotional responses. Yang stared at me and then at Ying, and finally commands, "I don't care who does it, I need this done before my flight to Beijing." Ying was quick to respond with a yes. I refused to respond. I did not think I need to. I stayed quiet; admittedly, I was very angry. Yang left very soon after; everyone was quick to return to their conversations, pretending it had never happened. I walked over to Ying to salvage my lost "face": "Here's the part of the translation which I have worked on until 4am this morning. I have not promised you that I can finish it, so you better do it yourself. My help stops here." Ying took it over and presumably finished it off as I never heard her mentions it again. I went back to the glass box and tried in vain to focus on the observation. For months afterwards, there was always this awkwardness between Yang and me, which obviously could not be captured by any research method but was indicated by writing about my emotional response using a reflexive narratives style.

Episode 1: My insider experience at Sang Design

The incident is vividly remembered by me to this day. The sense of embarrassment and betrayal has since subsided through the long quest of the fieldwork. I have come to understand the incident through the research itself. It all started over the “favour” asked by Yang. The access to Sang Design to do my fieldwork was a kind gesture from Yang and Mikael. As an ethnic Chinese, I understood that I “should” do some “favour” in return. Any translation work for the press was previously handled by Ying or Mei. The fact that I was asked to do the translation reflects the importance of the article for Yang.

When Yang sent Ying to ask me to translate his article from Chinese to English, I did not promise Ying that I could finish it on time due to the pressing schedule of fieldwork during that week. Ying had promised Yang that I would be able to finish it. However, she was caught between Yang and me. She had not been able to be specific in communicating what she wanted out of me. Consequently, I did not realise the urgency of the task and did not respond to her with a firm reply. I said, “I will try.” which was exactly what I was doing. I sincerely hoped that I could return the “favour” through the translation. However, the project in progress that week for the international mobile phone company, Roko, was hard to get by. After two weeks of waiting for a suitable project to observe, my priority was certainly on the fieldwork itself. In the midst of a full day of fieldwork at Sang Design and writing field notes in the evening, there was just no time left for anything else. Even so, I did contemplate the translation until the early hours the night before but eventually had to stop due to tiredness. I would have persevered if the urgency had been emphasised.

Ironically, the incident left me feeling both an insider as well as an outsider to Chinese. The feelings of being wronged, of injustice and betrayal were quite intense and left me to a lot of reflection for an internal resolution. Admittedly, I may not ever be

able to know the truth behind the incident. My interpretation of the incident is that I was caught in the communication breakdown between Yang and myself through Ying. To my dismay and surprise, even though we are all Chinese, the reason for the communication breakdown was entirely a cultural one between Yang - the traditional Chinese boss from post-Cultural Revolution, contemporary China and I – the Westernised, overseas Chinese from pre-Cultural Revolution Confucian China. Ironically, it was a much easier interaction with the German, Mikael.

I was very curious to know whether Yang had taken me as Chinese or foreign. I had seen his two tiers of treatment of staff in the practice. He could be very toughly fierce towards the local CDs but the foreign designers were treated nicely. The incident proved that Yang actually had taken me as an insider, though I felt an outsider incapable of comprehending their actions. Due to this incident, I got the trust (and sympathy?) from CDs, who were wary of my role as a possible spy from Yang or Mikael. The approval and trust brought freedom to the inquiry.

The fieldwork is an interpretive act instead of a mere observational or descriptive act (Agar, 1986). The interpretive process started through the explicit statement of the ethnographer's own preconceptions, biases, and motives, through dialectical dialogues between interpreters and interpreted. The reflection on my own identity during the fieldwork echoes Kondo's (1990) "halfie" study, through her interpretation of Japanese culture.^{26,27} The interaction between her western American self and her Japanese self

26 "Halfie" means *"those who are of the community that they study."*

27 Although according to Agar (1996, p. 21)., her study could have been more self-reflexive than she reported: *"her "hyphenated halfie" role comes up in some interesting*

was amplified by the expectation from the traditional Japanese culture of her part in the community. The Yang incident was a profound account of mismatched expectations. As the fieldwork unfolded, the cultural mass was interpreted through my self-reflexivity on the experience of the observation. I initially planned for a detached observation. However, it was apparent during the fieldwork that, my interaction in my fieldwork was naturally affected by my interpretation and self-reflection as an in-between, a notion I shall explain in the following section.²⁸

and important ways in the book, but it's pretty thin, in fact almost understated...it seems to me that her reticence might be an example of the very process of crafting a self that she portrays...or, perhaps in our politically sensitive times, she feels some tension around her half "halfie" identity, feels conflicted over her relation to the home of her ancestors, not to mention over her relation to Japan specialist colleagues who are white Americans...there's more going on with "halfie" statues that Kondo tells us about her book"

28 Although my personal experience motivated the research, I did not expect that influence of my cultural background of a third generation, Malaysian-born Chinese determined the decision on research methodology adopted. My schooling in Malaysia was one of those Chinese schools scattered around Malaysia, serving Chinese immigrants whom worship the Confucius school of thought. Three schools of thought shape my mind: Buddhism, Taoism and Confucianism. What differentiates me from Mainland Chinese is the kind of "in-between-ness" I have acquired from colonialism and multiculturalism in Malaysia. Plus, I am aware of the cultural sensitivity of the East/West dichotomy from a decade of experience of living in Britain and a cross-cultural marriage. While the "in-between-ness" evolves within me as I experience life, the original influence of the "in-between-ness" itself has moved on. Mainland China has evolved into contemporary China, having endured reforms after my grandparents set sail from the southern coasts.

The “In-Betweeners”

“The imagery of the fieldworker as naïve stranger or marginal native has long been propagated in texts on the conduct and epistemology of ethnographic research. The reality of fieldwork and the nature of estrangement is far more complex than any accounts suggest” (Coffey, 1999, p. 19).

Whether or not an ethnographer is an insider or outsider, in the postmodern era of ethnographic research this is of lesser importance than the validity of the reflexivity of the ethnographer. Often, the person who is supposedly an insider ethnographer can leave the fieldworker feeling like a total outsider. In contrast, an outsider white ethnographer may at times find themselves having an insider moment. In my case, although I might categorise myself as an insider for the fieldwork, at times I could be a complete outsider, especially when team spirit came into the picture. In actual fact, neither did I feel the dichotomy of insider/outsider, or de-differentiation of insider/outsider. The insider/outsider dichotomy is an issue more political than practical. There was a strong sense of tension between my cultural identity and my interpretation of the designers. During the fieldwork, I was living in a space between WDs and CDs. It is also a space of my past, being the third generation Chinese immigrant, rooted in my ancestors’ past as southern Chinese, and my present, living in the UK. Accordingly, I term the space the “in-between space” and myself, the “in-betweeners”.

My experience in the field has led me to the view that it is impossible to separate research settings and the researcher’s self. In this, the concern about the unfamiliar setting and the stranger’s self will subside over time, especially in my case, knowing both languages and culture to a certain extent. The personal embeddedness of the fieldworker is inevitable. In my case, it is the complexity of my self as the “in-

betweener” that captures the fieldwork. The “in-between space” is a dialectical space between my “self” as the insider of both cultures as the “I”, as well as the outsider of the “me” within the cultural medium.²⁹ The “in-between space” and the identity of the “in-betweener” are not static, neither are they homogenous. The position was defined by my “self” evolving within the social context I was in, which makes the “me”. The sense of identity is constructed by mutual expectation between the “in-betweener” and the observed, embodied within cultural diversity – that is 1) between “the” CDs and I; 2) between “the” WDs and I, and 3) within the embodiment of me in the cultural space between WD and CDs.

These mutual expectations interweaved, entangled and were embodied in a cultural mass within the social context. Within such a space, a totally objective observation is impossible and would be regrettable. A reflexive methodology is useful to bring out the richness of reflexive interpretation on the fieldwork. I am not the native, for *“only a ‘native’ makes first order ones: it’s his culture”* (Geertz, 1975, p. 14). I am

29 I look Chinese, speak fluent Mandarin, but it felt as if I was an insider among the CDs. But at the same time, confusingly too insider for the Westerner, I speak British-accented English with a monotonous twist of Malaysian slang. I drink and go to pubs as they do, am outspoken and not as apologetic as other Chinese. Therefore I felt completely the outsider among Chinese people during the first few weeks of the fieldwork. The feeling gradually subsided as I acquired cultural cues in practice. I tried to “fit in”. (Kondo, 1990) described her changes to fit in to the community she was observing: *“my physical characteristics led my friends and co-workers to emphasize my identity as Japanese, sometimes even against my own intentions and desires. Over time, my increasingly “Japanese” behaviour served temporarily to resolve their crises of meaning and to confirm their assumptions about their own identities. That I, too, came to participate enthusiastically in this recasting of the self is a testimonial to their success in acting upon me.”* (Kondo, 1990)

sitting in the in-between cultural space of WDs and CDs, observed and embodied in their everyday transactions. The writing of my fieldwork as the in-betweener consists of my interpretation and reflection on the phenomenon observed. Although my interpretation could risk being self-absorbed, the benefit is larger than the risk. The notion of “thick description” defends the importance of contextual knowledge in verifying the construction of an interpretation:

“Culture is public because meaning is. You can’t wink without knowing what counts as winking or how, physically, to contract your eyelids...how can you tell a better account from a worse one [...] if Ethnography is thick description and ethnographers those who are doing the describing... whether it sorts winks from twitches and real winks from mimicked ones. It is not against a body of uninterpreted data, radically thinned descriptions, that we must measure the cogency of our explications, but against the power of the scientific imagination... It is not worth it... to go round the world to count the cats in Zanzibar” (Geertz, 1975, p. 12).

The Voice: Subjectivity/Objectivity Dichotomy

One problem is to write about the embodied self within the “in-between” space. When personality, emotion and identity are involved, the question of subjectivity arises. For example, my interpretation of the Yang incident would not be fully understood without reflecting on the reason for Ying’s actions. The reasoning can only be done through reflection on my emotional response to her action. Admittedly I felt hurt by the betrayal and searched for an explanation for Ying’s act. My feeling of being betrayed by Ying was founded in the expectation of the “I” from her, but the situation is more a

“me” issue.³⁰ She was caught between friendship and authority, the social norm she was living in, from which I was gradually becoming an outsider.³¹

Even so, my interpretation of her action was helped by my understanding of how things work within the Chinese hierarchical structure. Ying had asked me to do the translation in a casual way: “Yang has a translation to do for an article. But we are all too busy with the translation for the book, if you have time, let me know.” I could sense her worry in asserting authority on me at an early stage. I was naïve not to read between the lines when she asked me to do the “favour”. She phoned me during lunchtime immediately before the Yang incident. She asked in a soft voice if I had finished the translation. When I replied no, she did not sound worried: “Never mind, I will try to do it myself.” My understanding is that Ying’s behaviour in front of Yang was very different from how she normally was. Her response during the Yang incident looked as if it was a betrayal to me, but it was not to be taken as such, especially when the crisis threatened her own livelihood.³²

30 I had come to Mainland China with an expectation of a Confucius gentleman in Chinese: “One shall never betray a friend”.

31 Ying and I could consider a friendship between us because we spent time together outside of the working hours for dinners and entertainment. There was a sense of connection between us and I admired her personal strength greatly. However, we never confronted each other on this issue. We just sort of let it go, in an unspoken Chinese way, and continue hanging out together during my fieldwork. After the incident, she had invited me to a few functions with her entrance tickets, which I presumed was a silent gesture of apology on her side.

32 The behaviour of a Confucian gentleman, which is in all circumstances standing up for your friend, was less of an issue for her in contemporary China. The stories of

In summary, my interpretation of the incident with Yang is partly reflection using my insider insight into Yang and also partly based on an outsider's collection of stories told by people about Mainland Chinese. Consequently, the subjectivity of my interpretation of the incidence is debatable. I am, as the researcher, the reference for the subjectivity/objectivity dichotomy. A positivist ethnographer may choose to condemn it; postmodernist ethnography has come to accept the thick description of personal insight and interpretation and the ambiguity in the subjectivity/objectivity dichotomy: "*We are our own subjects. How our subjectivity becomes entangled in the lives of others is and has always been our topic*" (Denzin, 1997, p. 27).

The presentation of self by my interpretive and reflexive narratives could risk making reflexivity sound self-indulgent. There is always a question of "who speaks? Who writes? When and where? With or to whom? Under what institutional and historical constraints" (Clifford & Marcus, 1986, p. 13). One useful concept is Davies' separation of individual reflexivity from social reflexivity. Thus, the researcher's individual reflexivity has a non-reflexive position preserved by social reflexivity. The stimulation between them is where the interpretive perspective of the researcher lies in a critical form (Davies, 1999, p. 8).³³

breaking promises are common in China. Ruthless as it might sound, friendship takes second place to survival.

33 "Ethnographers first came to consider the collective social dimension of reflexivity through identifying reflexive processes among the peoples that they studied...Such social reflexivity may be explicit, a deliberate and conscious reflection of a people upon themselves, but it is more commonly presented as fully revealed only through the interpretive insights of the ethnographer. However, social reflexivity, especially in this latter form, preserves a privileged, and essentially non-reflexive, position for the

As self-revealing autobiography became popular as a reflexive tool in ethnography, the subjectivity/objectivity duality ceased to be of any importance. When the personal voice is allowed, it recognises other voices in return. That is, my interpretative perspective on this research was founded on my reflection through my personal cultural background on the social context I was in. My voice is the main authority of the reflexive narratives.³⁴

3.1.3 The Issue of Validity

Defending a self-reflexive fieldwork raises the problem of validity. How could I report justly on the observed phenomenon as research evidence solely through my interpretation, informed by my reflection? If the ethnographer's self-reflexivity is the instrument for analysis, when do the author's assertions stop, when there is no public method to access the validity? Moreover, to what extent does the emotional, narrative text represent the reality without being self-referential (Atkinson, 1992)? It is crucially important to strike a balance between self and the representation of reality for the

ethnographer...When the insights of this sort of social reflexivity, especially those that are grounded in a relativist and/or interpretivist perspective, are combined with the reflexivity of the individual researcher in recognizing that data are very much a cooperative product, then they tend to stimulate reflexivity of a more searching and critical form which encompasses the knowledge claims of social researchers themselves" (Davies, 1999).

34 In addition, I am also presenting the narratives in multiple voices of the observed, in order to disclose the multiple meanings surrounding the phenomenon. Clifford and Marcus showed the potential of combining both researcher and native voices. They called it the dialogic and polyphonic authority in fieldwork representations. It is similar to the use of life histories in sociology, where sole space is given to the natives to tell their own tales (Clifford & Marcus, 1986).

validity of the research. Davies (Davies, 1999) noted that ethnographic research as such is normally judged by the reliability, validity, and generalisability of the fieldwork.

While reliability and generalisability are closely associated with measurements in the natural sciences, validity, the truth and correctness of the findings, is increasingly the researcher's decision: "*the validity of these results would depend on how they were interpreted and hence refers to the correctness of the theory developed to explain them*" (Davies, 1999, p. 85)³⁵. In this case, whether or not a reflexive text represents reality is very much in the hands of the fieldworker. Defining self is crucially important in distinguishing the difference between self-indulgence and self-reflexivity (Marcus, 1994): "*validity is subjective rather than objective: the plausibility of the conclusion is what counts. And plausibility, to twist a cliché, lies in the ear of the beholder. Validity, in short, is an interpretive concept, not an exercise in research design*" (Bruner, 1990).

However, without a public method for assessment, one risks being self-referential when using the reflexive method. Differentiating self-reflexivity from self-indulgence is therefore a crucial task for the reflexive ethnographer. Davies (1999, p. 199) suggests a research method to ensure the validity of the fieldwork while preserving the fieldworker's interpretation as part of the fieldwork. The solution is to structure research findings (even if it is self-reflexive narrative) in a detached way within a

35 "*...doubts about the validity of ethnographic research focus more on epistemological issues, in particularly, questioning the degree to which ethnographers can know anything other than that which expresses their personal standpoint and experiences as well as on whether they can attain inter-subjective agreement, that is reliability, and whether they can say anything of broader significance, that is the question of generalizability*" (Davies, 1999, p. 85).

theoretical context.³⁶ One of the possible methods of analysis is the grounded theory approach.³⁷ The analytical approach with an inductive, yet structural, process helps to regularise the analytical process, which is important in avoiding self-absorption. Davies (1999) defends the possibility of validity in reflexive methodology:

“Both good and bad research are possible, and some criteria – although clearly not in the form of rigid rules – must pertain to recognise the difference and thus to provide a basis for anthropological authority. Such criteria must fully incorporate the reflexivity that is part and parcel of ethnographic research, while avoiding sinking into a self-absorption that negates the possibility of any knowledge other than self knowledge”
(Davies, 1999, p. 199).

3.2 INDUCTIVE ANALYSIS

All research, whether qualitative or quantitative, comes with underlying assumptions of what constitutes valid research. Researching culture in the field of design at this point of time is held back by a lack of “home-grown” research methodologies. That research methods are borrowed from various disciplines. This

36 *“This I suggest can be done by promoting standards of ethnographic enquiry and reporting that accept that ethnographers’ data are about something other than themselves of which they are nevertheless a part. It thus requires candour regarding the theoretical influences that structured the research process as well as the variety of ways in which the ethnographer is implicated in the research findings”* (Davies, 1999, p. 199).

37 Grounded theory is a systematic approach to categorising qualitative data into concepts or later theories. The process involves structural categorisation as well as insight from the researcher in an iterative cycle. However, in traditional ethnographic fieldwork, lip service instead of a truly grounded theory approach is normally used.

research is empirically driven without compromising its explorative nature. However, the reflexive nature of the interpretation in ethnographic fieldwork requires further consideration in terms of generalisation and validity of the empirical work. Three issues were to be decided when the research unfolded: 1) what data to collect? 2) How to analyse the data? 3) How to present the research findings? These issues had been largely determined by the characteristics of the acquired case studies. The studies are ethnographic fieldwork combined with triangulation of data and carried out by mixed methods research (Guba & Lincoln, 2006; Hammersley, 2006; Moghaddam, et al., 2003; Wilson & Hutchinson, 2006).^{38,39}

Mixed methods can be a mix of qualitative and quantitative methods, a mix of quantitative methods, or a mix of qualitative methods. The use of triangulation can be traced back to “multiple operationism” which highlights the need for more than one method to eliminate the variance inherent in each method, so validity is ensured (Campbell & Fiske, 1959). Data triangulation (Denzin, 1978) was useful for providing a coherent validity to the research (Bryman, 2004).⁴⁰ The data collected were field notes, audio/video recordings, documents such as sketches and objects, and recorded design

38 Triangulation “refers to the combinations and comparisons of multiple data sources, data collection and analysis procedures, research methods, and/or inferences that occur at the end of the study” (Tashakkori & Teddlie, 2003, p. 717).

39 “Mixed method” is defined as a multi-strategy research employing the application of a number of different research strategies to a complex range of research questions and a complex research design (Bryman, 2004).

40 Denzin separates types into data triangulation, theory triangulation, and methodological triangulation. Data triangulation can be divided into: time triangulation, space triangulation, person triangulation. (Denzin, 1978, p. 291)

processes. In this research, the data is mainly qualitative, supported by quantitative data when validation is required:

“A major advantage of mixed methods research is that it enables the researcher to simultaneously answer confirmatory and exploratory questions, and therefore verify and generate theory in the same study”
(Teddlie & Tashakkori, 2003, p. 15).

3.2.1 The Grounded Theory Approach

Strictly speaking, there is no such thing as a linear research process of a separate analysis phase after data collection in ethnographic research. Clifford Geertz (1993) maintained that researchers start to analyse during fieldwork through interpretation of the observed - as soon as the fieldworker jots notes down in his/her own words to make sense of it during the fieldwork, an interpretation was done! Interpretive narratives form the major part of the analysis for this research. My narratives report my reflexive accounts on my interpretation of the fieldwork.⁴¹ As mentioned earlier, my voice is the authority of the meaning in this research. However, a structural generalisation of the amount of data I have accumulated from the fieldwork is needed to defend the validity of the research. As such, three analysis approaches are triangulated: grounded theory, interpretive narratives, and reflexive methodology. The narratives are to be presented in the styles of different tales. I have discussed interpretive narratives and reflexive methodology in earlier sections; grounded theory approach and writing up styles will be discussed in the following sections.

41 There are three types of interpretation: 1) my interpretation on the phenomenon, 2) interpretation of CDs on WDs and 3) interpretation of WDs on CDs.

It is standard practice in ethnography study to organise narratives into themes and categories for writing. The abstraction process I used is an inductive analysis method called the grounded theory approach (Glaser & Strauss, 1967), which they termed the grounded theory approach. Grounded theory is defined as:

"One that combines, by an analytic procedure of constant comparison, the explicit coding procedure of the first approach and the style of theory development of the second. The purpose of the constant comparative method of joint coding and analysis is to generate theory more systematically, than allowed by the second approach, by using explicit coding and analytic procedures.... this method of comparative analysis is to be used jointly with theoretical sampling, whether for collecting new data or on previously collected or compiled qualitative data" (Glaser & Strauss, 1967, p. 101).

The approach is now widely used in social research methods. It is an inductive analytical approach in which one discovers theories through generalising and inferring the data from the bottom up. This is done through a complicated analysis process from memo writing, coding, categorisation to concepts until the data is "saturated" (Bryman & Burgess, 1994, p. 5).

However "pure form" grounded theory is simply impossible: *"analytic induction properly followed is very demanding because the appearance of a single counter case necessitates further revision of the hypotheses and a return to the field. For these reasons, ethnography is generally committed to induction only as a lip service"* (Brewer, 2000, p. 108). There are not many genuine case of analysis strictly using a grounded theory approach. Instead grounded theory is an "approving bumper

sticker” as a description for qualitative approach to data analysis (Brewer, 2000). This type of grounded theory approach is also identical to the constructivist approach suggested by Charmaz (2005).

A constructivist grounded theory adopts grounded theory coding process as tools but does not subscribe to the objectivist and positivist assumptions in its earlier formulations of concepts or theories. The original Glaserian approach focuses on inductive logic and analytic procedure. There is an assumption of an external but discernible world, with an unbiased observer to discover theories by developing concepts through comparative methods. Later Strauss & Corbin (1990) modified the approach and emphasised meaning, action and process symbolic interactionism, with its root in pragmatism and symbolic interactionism.⁴² For Strauss the importance is the analysis process; while Glaser is concerned with the end results – theories generated (Charmaz, 2005, p. 509). The constructivist emphasises the studied phenomenon rather than the methods of studying it. Constructivist grounded theorists take a reflexive stance

⁴² *“Glaser’s approach to grounded theory emphasizes induction or emergence. Researcher’s creativity is encouraged to interpret data collected through stages of analysis. Glaser criticizes Strauss’ approach to categorising on the grounds that it promotes a premature leaping into theory because, unless the analyst is very careful, it would be easy to fall into personalized hypothesizing. An examination of transcripts of Strauss’s interactions with students whom he trained using his approach tends to provide support for Glaser’s concern. Strauss’s hypothesis generation and texting, from text fragment to garment, is very tedious. Evidently an hour or more easily could be spent speculating on how a single fragment might be explained. Given that a text protocol could consist of scores of fragments, the prospect of repeating the intensity of that kind of analysis throughout is daunting. It is perhaps for this reason that it is apparent from the transcripts of this training sessions that Strauss was inclined to settle on this confirmed hypotheses after going through just a few fragments”* (Rennie, 2000).

on modes of knowing and representing studied life... *“the conceptual categories arise through our interpretations of data rather than emanating from them”* (Charmaz, 2005). I adopt the Glaserian (Glaser & Strauss, 1967) coding process for comparative study and induction in combination with Charmaz’s constructivist view (Charmaz, 2005), in which conceptual categories are developed through interpretation. The method is usefully explorative without compromising depth of evidence.

Inductive Thematic Analysis

Despite its variations, the grounded theory approach is firmly a method of generalisation through an inductive approach. It is the core to grounded theory approach – abstracting theories/concepts through categorising data in a bottom-up manner. The main advantage is in its flexibility in starting out the research without pre-determined concepts on a phenomenon. The list of pre-identified categories can be a hindrance to discovery (Strauss & Corbin, 1990, p. 49).⁴³ With grounded theory, a literature review serves a different purpose than it does within conventional research methods:

43 *“for investigators using quantitative methods, the literature has very specific uses. It enables the user to identify previous research in an area, as well as to discover where there are gaps in understanding. It also suggests theoretical and conceptual frameworks that might be used to guide quantitative research projects and to interpret their findings... In contrast, with grounded theory research, rather than testing the relationships among variables, we want to discover relevant categories and the relationships among them; to put together categories in new, rather than standard ways”* (Strauss & Corbin, 1990, p. 49).

“There is no need to review all of the literature beforehand (as it is frequently done by researchers trained in other approaches), because if we are effective in our analysis, then new categories will emerge that neither we, nor anyone else, had thought about previously. We do not want to be so steeped in the literature as to be constrained and even stifled in terms of creative efforts by our knowledge of it” (Strauss & Corbin, 1990, p. 50).

Generalisation is an emergence of a set of theories or concepts through categorisation of data, or **themes** in this thesis. The inductive process without preconceived ideas from current literature is suitable for the topic of this research relatively unexplored, that the data will reveal the research inquiry itself (Glaser & Strauss, 1967). The analysis is theory generation process begins with unrelated propositions, but soon become interrelated as theories emerge and develop in abstraction. These theories become the core of the discovery, which in turn guide further collection and analysis of data. The process is rapid in crystallisation and emergence, and never ending in generating theory until publication of the study (Glaser & Strauss, 1967, p. 40).⁴⁴

44 *“When generation of theory is the aim, however, one is constantly alert to emergent perspectives that will change help develop his theory, these perspectives can easily occur even on the final day of study or when the manuscript is reviewed in page proof: so the published word is not the final one, but only a pause in the never-ending process of generating theory. When verification is the main aim, publication of the study tends to give readers the impression that this is the last word” (Glaser & Strauss, 1967, p. 40).*

In general, there are two types of relevant themes in the writing: 1) **core themes** are themes that are directly evidential to the thesis; 2) **sub themes** are themes that not enough to be individually substantial as core themes but when linked together can provide reasons or contexts for some core themes. Emerson, Fretz & Shaw (1995) explains the significance the linkage between these themes:

“The fieldworker must also consider how a selected theme can be related to other apparent themes. A theme that allows the researcher to make linkages to other issues noted in the data is particularly promising. Finding new ways of linking themes together allows for the possibility that some of the themes that might have been seen as unrelated and possibly dropped can in fact be reincorporated as ‘sub themes’”. (Emerson, et al., 1995)

However, the level of generalisation in grounded theory using ethnographic case studies is debatable. For example, one may ask if the two case studies of this research have enough evidence for the theories derived from the research. Glaser & Strauss (1967) defends the validity of empirical claims by dividing the generated theories into two kinds: substantive theory and formal theory, both work through generality but differ in terms of degree. Substantive theory was *“developed for a substantive, or empirical, area of sociological inquiry, such as patient care, race relations, professional education ...”* Formal theory was *“developed for a formal, or conceptual, area of sociological inquiry, such as stigma, deviant behaviour, formal organisation, socialisation, etc...”* (Glaser & Strauss, 1967, p. 32)

These theories generated are grounded from data through a constant comparative method with two characteristics: vagueness and abstraction. Generating the theories can

be a vague process at a level of abstraction. Consequently, unlike quantitative analysis, the outcomes can vary between individuals. There is no guarantee that two analysts working together will achieve the same results through this constant comparative method. The vagueness and flexibility of the process is what aid the creative generation of theory (Glaser & Strauss, 1967, p. 103).

Theoretical Sampling

Ethnographic fieldwork with few case studies (however in depth the data is) raises the issue of “how do we claim what we claim?” The rigour lies in the analysis process and the depth of reality reported. Although the evidence from a grounded theory approach often is not massive enough to claim as verification, the abstraction of what was interpreted from the fieldwork is an understanding of the reality. On the other hand, there is the structural categorisation process of theoretical sampling, which Glaser defined as:

“The process of data collection for generating theory whereby the analyst jointly collects, codes, analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges”
(Glaser & Strauss, 1967, p. 45).

The theoretical sampling in grounded theory is different from sampling in quantitative research; it is not “a version where n equals too few cases. It is simply a different kind of sampling” (M. Mead, 1953, p. 654). “*The key to making empirical generalisations from case-oriented comparisons is effective sampling of cases*” (Brewer, 2000, p. 79). Few factors determine the coherence of this different kind of theoretical sampling. Firstly, the collection of data while in the field requires a selection of location, time, events and people (Burgess, 1984, p. 53). It can be an opportunistic one instead of

a planned one, or even, a matter of sheer luck and fortune, as in the account of Whyte (1955), who came across his key informant on a bus.

When to start and when to stop and which informants and which activities to choose are choices a researcher has to make in the field. Ideally, the length of time should be long enough to experience and represent the full range of routines and behaviours. The sample of key informants is selected for “their ability to portray and make accessible aspects of the field” (Brewer, 2000, p. 81). Often, selecting an event over the others to observe is a calculated risk. After all, what is important is “experience” during the research. As Strauss and Corbin (1998, p. 122) defend their quantitative strand of grounded theory, “*we certainly had no intention of conveying the idea that we use “experience” as data. Rather, experience is an analytic device used to stimulate reflection about the data at hand.*” The experience includes writing up the fieldwork, which formed part of the analysis. The theory generating process therefore started in the field, when these decisions were made during the experience, instead of at the time of analysis.

Quantitative Analysis

A small part of the analysis was done with quantitative methods using Microsoft Excel charts. I carried out a quantitative calculation of variance in time between WDs and CDs in terms of verbalising, visualising or silence in the design meetings (Section 5.1) and (Nainby, et al., 2006). Comparative charts were exhaustively produced. The quantitative analysis was only carried out when data were straightforwardly a comparison of two variables. The result of these analyses was later feed into the inductive analysis of grounded theory as one of the phenomenon observed.

Analysis Software

The research analysis was made possible by the use of software tools. A variety of software was used to help analyse the vast amount of data collected. Interviews carried out during the early studies were analysed using QSR N6 student package. The ethnographic fieldwork of the main studies was analysed using QSR NVIVO version 7 and 8, an advance version of N6. The tools helped in organising, interpreting and categorising the vast amount of data, otherwise a much lengthier effort. Other software tools were used to digitise the data. Transcriber® was used to transcribe audio recordings, Transana to transcribe video footage, Adobe Premiere to edit video footage and Windows Picture Manager to edit and organise images; lastly Microsoft Excel was used for quantitative analysis. However, analysis using software tools can only help to a certain extent. There is a risk of losing the intuitive aspect of the grounded theory approach by rigidly following the use of software tools, as not only the researcher's intuition during theoretical sampling contributes to the analysis, but the writing of the research itself forms part of the analysis.

3.2.2 Writing as Analysis

“Ethnography is in itself an act of collective and individual memories”
(Coffey, 1999, p. 110).

Memories collected during fieldwork are interpretation through self-reflexive narratives. In this respect, reporting a piece of research carried out for two years was made possible by teasing out, interpreting and manipulating a collection of memories from the fieldwork into tales representing the reality. Describing this reality through a reflexive interpretation is made possible by researchers' memories in context with

related literature in design studies. The descriptive process of writing up the fieldwork is therefore part of the analytical process in terms of updating current literature.

Memories: In-Between Selves, In-Between Fields

Self-reflexive narratives are interpretively informative. My in-between space in the field is a dialectical space between myself as “I” and myself as “Me”. This space helped me to draw remarkably rich interpretation from the phenomenon observed. However, none of these narratives could be made without drawing upon memories, both individual and collective. I collected “mementoes” of memories on the fields, such as jot notes, audio/video recordings, photographs, sketches and various documentations.⁴⁵ Off the field, the mementoes collected contributed to the writing of field notes and analyses (Coffey, 1999, p. 110). It is vast! The work involved translating the mementoes into themes and choosing excerpts of writing to represent the fieldwork. The work is largely coded on-the-go from field notes, which were written either in the field or by studying the captured mementoes. Only specific episodes were rigidly transcribed and translated for the purpose of detailed analyses, mostly to shed light on cognitive issues.

45 Coffey (1999) termed the collected objects that holds memories from the fieldwork as mementoes. I adopted this term to make a distinction from terms such as memos and memories. Memos was used when referring to the grounded theory and writing up process, to describe the reinterpretation notes of the ethnographic episodes. Memories can be purely innate without mementoes to remind one of what happened in the fieldwork. Mementoes in this thesis refers to things such as jot notes, sketches, documents, photos, visuals, video, etc, which were collected during the research journey to remind me of the memories.

One important foundation of the writing as analysis is the in-between positions of 1) my self and other selves, and 2) between fields. The importance of my in-between self in this research means that my memories played a big part in constructing ethnographic stories, both through individual memories and collective memories (Coffey, 1999, p. 110). The abstraction through this dialectical form of writing is in itself a critical journey:

“...the search or struggle for a sense of ethnic identity is a (re-) invention and discovery of a vision, both ethnical and future-oriented. Whereas the search for coherence is grounded in a connection to the past, the meaning abstracted from that past, an important criterion of coherence, is an ethic workable for the future. Such visions can take a number of forms: they can be both culturally specific and dialectically formed as critiques of hegemonic ideologies. (Clifford & Marcus, 1986, p. 196)

Within the ethnographic research community in anthropology, it is now increasingly acceptable that fieldworkers’ interpretation and reflexivity bring rich understanding and insights to the research inquiry. Yet, in design research, positivism is still the force behind valid research methodology. Currently available research methodologies, especially in the field of co-design studies, although design-oriented, often risk being Eurocentric.⁴⁶ They are not entirely suitable for this research on cross-

46 Differentiating social issues from cognitive factor is in itself a Eurocentric discourse - while Westerners separates subject from object; Eastern is holistically emphasising the overall impression of the link between subjects and objects. (Nakamura, 1964)

cultural design collaboration between WDs and CDs, when design epistemologies are concerned.

A successful fieldwork lies in the reliability, generalisability and validity of the fieldwork. One may ask whether, without the objective public access method, the narrative accounts of my reflexivity through my interpretation would risk being too subjective? In my case, I could never be able to be totally objective in the in-between situation as such. Nevertheless, why should I? With an in-between position between the fields, there is a unique position of myself as the researcher, whom is both insider and outsider to the field. The reflexivity of an insider fieldworker could be a huge advantage if adequately carried out. My ethnographic self formed the major part of the mechanism in interpreting the Western-Chinese early design phenomenon. The issue of validity was overcome by combining multitudinous forms of data from the field, analysed using a grounded theory approach, which is data-driven without preconceptions of existing literature. The multi-locale fieldwork from other contributing studies also brings interconnected text-construction that merges micro and macro perspectives (Clifford & Marcus, 1986, p. 177): “*The ‘field’ is not an entity ‘out there’ that awaits the discovery and exploration of the intrepid explorer.... ‘the field’ of fieldwork is the outcome of a series of transactions*” (Atkinson, 1992).⁴⁷

Ethnographic Tales

The writing of ethnographic tales determines how the research is analysed, and the writing is also a form of interpretation and analysis (Denzin, 1997). The writing

47 See section 4.5 for the acquisition for the case studies for the fieldwork.

process of reflexive narratives can be at times emotionally overwhelming. Yet certain detachment is required to avoid self-indulgence. There was no perfect way to present the fieldwork apart from aiming for accessibility even by a “layman” as much as empirically just. Ultimately, it was anticipated that the writing should reflect the reality of the fieldwork through my interpretation, reflection and the perspectives of designers I have interviewed.

The ethnographic writing of Malinowski (2002) can be seen as his creation and his description. Many were appalled by his authorial writing. Malinowski was a functionalist, but he too recognised the importance of interpretation and reflexivity in writing (Stocking, 1983, p. 101). During the positivist era of anthropological study, writing as the first person account was simply unheard of. *“Interpretive social scientists have recently come to view good ethnographies as “true fictions,” but usually at the cost of weakening the oxymoron, reducing it the banal claim that all truths are constructed.”*(Clifford & Marcus, 1986, p. 6) For some, writing up fieldwork in descriptive form may risk being taken as travelogue; for others, a fictional travelogue with literary quality makes better sense:

“A work is deemed evocative or artfully composed in addition to being factual; expressive, rhetorical functions are conceived as decorative or merely as ways to present an objective analysis or description more effectively. Thus the facts of the matter may be kept separate, at least in principle, from their means of communication. But the literary or rhetorical dimensions of ethnography can no longer be so easily compartmentalised. They are active at every level of cultural science. Indeed, the very notion of a “literary” approach to a discipline, “anthropology,” is seriously misleading” (Clifford & Marcus, 1986, p. 4).

An ethnographer strives for reporting their fieldwork justly with details, and be able to derive themes from the phenomenon they have experienced and observed. The phenomenon is rich in information and chaotic in nature. However, the field of ethnographic study cannot avoid the duality between science and art. For some, the writing can be straightforwardly a descriptive account of what happened in a scientific manner possible.⁴⁸ Nevertheless, most recently, for others, writing culture is becoming an art, a literary writing one.⁴⁹ The observational detail in the writing is an advantage of “*realist tales [that] decry the abstract and celebrate the concrete reference*”(Maanen, 1988, p. 48) and the literary process has much to offer:

“Literary processes – metaphor, figuration , narrative – affect the ways cultural phenomena are registered, from the first jotted “observations,” to the completed book, to the ways these configurations “make sense” in determined acts of reading...A work is deemed evocative or artfully composed in addition to being factual; expressive, rhetorical functions are conceived as decorative or merely as ways to present an objective analysis or descriptive more effectively” (Clifford & Marcus, 1986, p. 4).

This thesis is written with theoretical contexts alongside the narratives, and at times, analysis through cognitive data. The writing of this research aimed for accessibility by a “layman” inasmuch as it is empirically evidential. The narratives reflect the reality of the fieldwork through my interpretation, reflection and the

48 Such as the work of Franz Boas, although there is a view of scientific activity as “inscription”. (Clifford & Marcus, 1986, p. 4)

49 Works by Clifford Geertz, Victor Turner, Mary Douglas, Claude Levi-Strauss, Jean Duvignaud, and Edmund Leach are a few (Clifford & Marcus, 1986, p. 3).

perspectives of designers I have interviewed. The styles of writing in bringing together the observer and the observed, presenting and interpreting the reality of the field can determine the validity of the ethnographic research. The parallel presentation of the observer and the observed brings rich context to the work, avoiding superficial abstraction of the phenomenon observed yet providing a rich picture of the fieldwork in thematic categorisation (Richardson, 1995, p. 203). As such, I avoid the risk of the writing being taken as a travelogue fiction.

The combination of various interpretations in the narratives requires various writing up styles. Particularly helpful in guiding and explaining the style of writing for ethnography fieldwork was Van Maanen's (1988) three types of writing: realist tales, confessional tales and impressionist tales. Realist tales "*provide a rather direct, matter-of-fact portrait of a studied culture, unclouded by much concern for how the fieldworker produced such a portrait.*" Confessional tales "*provide sharp contrast to their realist counterpart... focus far more on the fieldworker than on the culture studied*", and impressionist tales are "*personalised accounts of fleeting moments of fieldwork cast in dramatic form... carry elements of both realist and confessional writing*" (Maanen, 1988).

The fieldwork can be divided into three types of interpretation: personal, social and reality. To capture the richness from the three perspectives, a combination of writing styles is useful: the matter-of-fact realist tale when it is a formal moment; a confession tale when it is an insider account of my self as the researcher; and lastly my interpretation of informants' accounts. The narratives of this research will be presented in all three types of tales described by Maanen: realist, confessional and impressionist. Each style presents one of the facets of the fieldwork for which it is suitable. The combination of writing styles depends on whom, where and when. An impressionist tale

is suitable for presenting the everyday dramatic form of transaction between two cultural groups from both perspectives; a realist tale will describe the implicit cognitive cues; lastly, confessional tales would be useful to report my interpretation as an ‘in-betweener’ of the social and individual reflexivity on the phenomenon.

The choice of confessional tales over realist tales to present a reflexive account was obvious. The confessional tales unmask the fieldwork to the audience. For example, when I made entrance to my case studies and when I reported my relationship with the community observed. In this form, the “*missing data, incompleteness, blind spots...various other obscurities are admitted into the account... to lift the veil of public secrecy surrounding fieldwork*” (Maanen, 1988, p. 91). I could write about my own “*sightings, hearings, and interpretations, the soft subjectivity of the fieldwork experience begins to slip into fieldwork confessions in a way it does not in realist versions of a culture*” (Maanen, 1988, p. 91). These personal reflexive accounts written in the first person account of myself, the researcher, in the style of confessional tales, make up a large part of the fieldwork accounts. However, in some parts, the observation can be a realist account where my reflexivity is not required, for example in the accounts without my participation, such as video footage. Lastly, the interview accounts will be presented in multiple perspectives of the informants using impressionist tales.

After all, “*the ethnographer has the final word on how the culture is to be interpreted and presented*” (Maanen, 1988, p. 51). However unscientific writing up ethnography may seem turning interpretation into a reflexive narrative requires the researcher to be empirically sound and theoretically aware. The interaction between field notes and theories is a rich space to be presented the cultural material holistically through literary writing. A successful ethnography enforces by interpretation

(explanation with theoretical context); and a successful writing of ethnography enforces the validity of interpretation.

3.3 FIELDWORK ACQUISITION

Drawing from the implications from the early studies, the criteria of the case study are: 1) the subjects are co-located design collaboration, 2) conducted when concept negotiation took place, and 3) that the case studies are preferably in naturalistic settings, 4) between Western-trained designers and China-trained designers.⁵⁰ The choice of case studies was part planned and part opportunistic. Burgess (1984, p. 61) describes five criteria for a suitable site: simplicity, accessibility, unobtrusiveness, permissible-ness and participation⁵¹. These criteria guided my journey to China via Hong Kong and Switzerland in searching for design practices with design teams that collaborated on a regular basis from ideation to prototype when negotiation of concept is believed to have taken place. The preference of naturalistic inquiry reduces the number of possible case studies due to design practices' reluctance to give access to an observer due to copyright issues. Moreover, the prospect of finding collocated teams with Western-trained designers and China-trained designers collaborating on design

50 The choice of naturalistic setting of design practice for the main studies instead of easy access of student designers was a conscious decision due to the differences of design activity it may incur, depending on the expertise level of the designers.

51 Simplicity: *"the site allows researchers to move from studying simple situations to those which are more complex"*. Accessibility: *"the degree of access and entry that is given to the research"*. Unobtrusiveness: *"situations that allow the researcher to take an unobtrusive role."* Permissibility: *"situations that allow the researcher free or limited or restricted entry."* Participation: *"the possibility of researchers to participate in a series of ongoing activities"* (Burgess, 1984, p. 61).

projects was small.⁵² There were possibilities for studying CDs practising in Britain but observing design practice in a non-western environment was favoured, to avoid possible ethnocentric design context. Selecting the largely western-educated CDs in British design practice was not suitable for the goal of isolating the two issues influencing cross-cultural design practice, which I suspected to be pedagogic as well as cultural.

The journey of acquiring case studies is reported next to give an understanding of how the flexibility in adapting and adopting case studies is vital for achieving meaningful, ethnographic research. My early search for case studies was restricted to design practices in Chinese speaking countries. I sent over one hundred enquiry emails to design practices and institutions in China and Hong Kong⁵³. Several replies came from Hong Kong and various cities in China such as Beijing, Shanghai, Guangzhou and Nanjing. After a busy period of consideration and negotiation on the possibility and suitability, I travelled to via Zurich to Hong Kong and China to acquire case studies.

Zurich

Prior to Hong Kong and China, I took a detour to Zurich, Switzerland to attend Wuxi-Zurich design exchange (WUZU). WUZU is an annual design exchange workshop between school of designs at Zurich University of the Arts (HGKZ) in Zurich

⁵² Despite the significance of design collaboration, in practice where cost and time is concern, real time collaboration on conceptualisation is a myth. Apart from a few leading design practices, after the brainstorming stage, designers are commonly given part or the whole of a design project to work on individually. The realisation of what can be found for case studies is a realisation of what design practice is currently happening in the real world. The acquisition journey for suitable case studies is therefore a journey in itself, worth reporting as part of the research.

⁵³ Thanks to Rob Curedale for providing the contact list.

and Southern Yangtze University (SYTU) in China. The case study, written as other contributing studies, was an invitation from Professor Miaosen Gong of SYTU, who was interested in my research project.⁵⁴ WUZU is an educational platform initiated and funded by HGKZ to explore cross-cultural issues in design education context. Student designers from both schools collaborate at the early stage of designing until prototyping over two weeks period. Even though design education was not the focus of this research, WUZU was useful as pre-fieldwork exploration and several implications from WUZU provided explanations for some themes derived from my main fieldwork. I attended WUZU in 2005 when I was an observer; and in 2006 when I was one of HGKZ facilitators. During WUZU 2005, I realised it was impossible to be a detached observer as I was naturally given the role of cultural interpreter between HGKZ and SYTU. Section 4.6.1 details WUZU as one of the other contributing studies.

Hong Kong

Previously a British colony, Hong Kong is hybrid in culture, as the gateway between the West and China. Hong Kong is part of the Pearl River Delta, a manufacturing hub since the 1980s. Consequently, Hong Kong design practice and education are ahead of Mainland China. It is common to find WDs working in design practices in Hong Kong. However, CDs in Hong Kong design practices are hybrid-educated. Cognitive research has found that Hong Kong people can swap between

54 Mosen's insights on Chinese design education were particularly helpful. Gong was then the secretary of foreign affairs at the design school at the Southern Yangtze University. He organised the International Symposium of Industrial Design 2004, where he met Rob Curedale and a few other contacts who came in that were to come into useful for my fieldwork. He also arranged a few companies in Wuxi for my study.

Eastern and Western thinking by exposing them to images that suggest the culture (Nisbett, 2003, p. 118). The hybrid nature poses a difficulty for research aiming to explore differences between WDs and CDs. Also, the mostly Western-owned design practices were reluctant to have visitors so I left to China after having found no opportunity to study design practices in Hong Kong.

Shanghai

Correspondence with design practices and design institution in China prior to my arrival in Shanghai elicited many replies from people interested in being part of the research project. I narrowed them down to Howa Design and Sang Design. Howa Design is an American design company specialising in office furniture. At Howa, I interviewed designers from the ideation group that specialises in interaction design for office space; and the industrial design group that specialises in furniture design and manufacturing. Howa was not suitable as case study for this research as their designers were mainly American and Western-trained Malaysian rather than China-trained. Despite this, the interviews on negotiation of idea give useful insights to my research focus. After Howa, I visited Sang Design and finally found the design practice suitable as the main case study for the ethnographic fieldwork for this research inquiry. See section 4.5 at page 124 for further background to Sang Design.

CHAPTER SUMMARY

In this chapter, I have argued for the importance of a reflexive ethnographic method to investigate the specific phenomenon of Western-Chinese early design collaboration. The position of my ethnographic self as the in-between of the two cultures and my profession as designer allows an in-depth understanding. I have also highlighted the validity of the inductive analysis method using the grounded theory

approach and writing up ethnographic tales. The chapter ends with an account of the acquisition journey, of the fieldwork to be discussed in next chapter.

CHAPTER 4 RESEARCH STUDIES

CHAPTER OVERVIEW

This chapter describes the research journey - how the research questions were defined and refined hermeneutically as the research unfolded. Section 4.1 to 4.3 summarise the hermeneutical research process, the research questions, scope and definitions necessary for the inquiry. Section 4.4 highlights the implications of early studies in the research that informed the scope of the main studies' ethnographic fieldwork. Section 4.5 summarises the main studies. Section 4.6 outlines the other contributing studies with sub themes useful for the research. Section 4.7 provides a summary of research findings in themes, and their implications.

4.1 RESEARCH AIM AND QUESTIONS

The **research aims** to describe Western-Chinese early design collaboration, to investigate the differences in early designing, if any, between WDs and CDs, by studying their interaction in a collocated team in early design collaboration working on the same design project.

The research questions I asked were:

- 1) How does a collocated and cross-cultural team of WDs and CDs **negotiate creative concepts** during early design collaboration?
- 2) How does a collocated and cross-cultural team of WDs and CDs **generate creative concepts** during early design collaboration?

The research initially started with the first question, which was informed by the early studies. As the fieldwork progressed, the necessity to investigate the generation of

creative concepts became apparent. This is a turn from a social inquiry to include a cognitive inquiry. Informed by the outcomes from the pilot studies, second research question was put forth during main studies. The two questions complement each other in investigating the situationist approach of studying design collaboration.

4.2 THE RESEARCH PROCESS

The research journey began with an aim to describe Western-Chinese early design collaboration. The cross-cultural phenomenon requires explorative research free from preconceived ideas of design research. During early studies, in-depth interviews were carried out to define the scope of the main studies. The main studies consist of ethnographic fieldwork carried out at a leading design practice, Sang Design, in Mainland China. The data was collected opportunistically using mixed methods and triangulated to be inductively analysed in an ongoing process using the grounded theory approach. The analysis process included the writing up and stopped when research themes reached a saturation point suitable for reporting in the thesis.

The research process (Figure U) is explorative and opportunistic and takes place in a hermeneutic circle (Figure T). The analyses drive the direction of the studies, which were undertaken so that each study contributed to the scope and objective of the later studies. Each analytical stage was completed with a related literature review from design studies and creativity research to aid explanation of the phenomena observed. Every study contributes to the analyses at the end of the research. The outcome is not just the sum of the studies, but also an interconnected series of studies with ongoing analysis on the accumulated data. The data collection and analysis process are unique to this research and are reported as part of the inquiry. As mentioned, the research process is realised in a hermeneutic circle. Figure T outlines the flow of research from one study

to another in the hermeneutic circle. This allows unrelated implications or themes derived from the phenomenon during individual analysis to be considered as a whole.

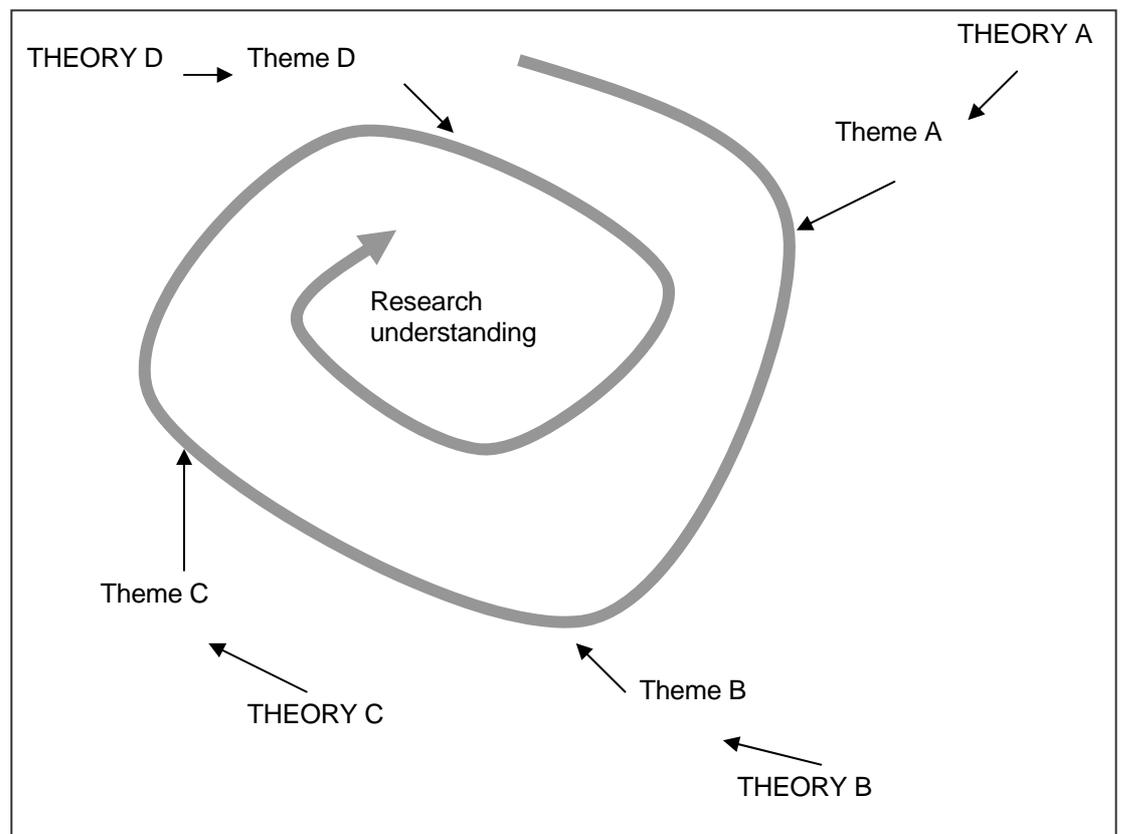


Figure T: The Hermeneutic Circle

For example, the research began by aiming to describe concept negotiation during early design collaboration. Early analysis tentatively classified social issues for the inquiry. The pilot studies from the fieldwork documented largely silences (Nainby, 2005; Nainby, Gong, Jie, & Krohn, 2006), which informed the focus of the main studies, namely, to investigate the reasons for them. The main fieldwork began with consideration of the social issues that might explain the silent moments. However, after one trip, the excluded themes that emerged during the early studies, in which it became apparent that Chinese student designers are not familiar with the CDP, were once again incorporated into the final analysis. The research took a hermeneutic turn, to search for cognitive issues in designing and in related evidence and literature. In this, various

stages of the research journey can find indirectly related themes and the respective theories (Figure U).

The term hermeneutics in this thesis also refers to the interpretive nature of the fieldwork. I combine hermeneutics and grounded theory, as suggested by Wilson and Hutchinson (Wilson & Hutchinson, 2006), as an innovative way to “eliminate distance” between nurse researchers and participants. Hermeneutics is concerned with “knowing how” and grounded theory with “knowing that”. The triangulation of the hermeneutical interpretation of the fieldwork and the inductive analysis through a grounded theory approach reveals the complexity of Western-Chinese early design collaboration.

The research inquiry was divided into four stages (Figure U, page 10). Each stage consisted of several studies: 1) Early Studies, 2) Pilot Studies, 3) Main studies and 4) Final Analysis. The earlier studies inform the later studies as parts yet are also more than the sum of the parts. Although each study was an individual analysis in the first instance, each later contributed to a pool of data for the final analysis (FA), as a holistic and an evaluative measure of the inquiry. At times, when implications arose, the inductive analysis could cross from one stage to another iteratively.

The early studies (E1, E2 and E3) consisted of three in-depth interviews with Chinese postgraduate student designers studying at design institutes in London (E1), Edinburgh (E2) and Italy (E3). These interviews explored cultural differences in how designers design in general. Each early study informed the question of the subsequent early study. Findings from the early analysis stage (EA) informed the research focus of the subsequent ethnographic fieldwork during the pilot and main studies. The pilot studies (P1 and P2) and main studies (M1 and M2) are ethnographic fieldwork carried out at Sang Design (Section 4.5), a leading industrial design practice in China. The

fieldwork included observations and interviews on WDs and CDs at the early design collaboration stage.

The analysis process, using Glaser's grounded theory approach and the hermeneutic circle is inductively exhaustive. There were four stages: Early Analysis (EA), Pilot Analysis (PA), Main Analysis (MA) and Final Analysis (FA) (Figure U, page 110). Every stage analysis was done alongside a review of the literature from design studies and creativity research, to aid description of the patterns that emerged from the observations and/or interviews. The outcomes are patterns of understanding that are presented as themes. During the final analysis stage, themes from every study were once again reanalysed and combined with the related literature review for evaluative purposes. The analytical process stopped at the end of the writing up stage, which was also a significant analytical process.

Writing up this complex research consisted of reporting the most significant perspective. The selection of the significant ethnographic tales, interview excerpts and relevant theories provides a holistic view of the studied phenomenon. In addition to the early and main studies, I also carried out other contributing studies in the form of fieldwork and interviews. These contributing studies were not intended as the focus of the research, yet some of the themes are useful to fill the gaps within the main themes. Section 4.6 presents the contributing studies and section 4.7.2 lists the contributing themes.

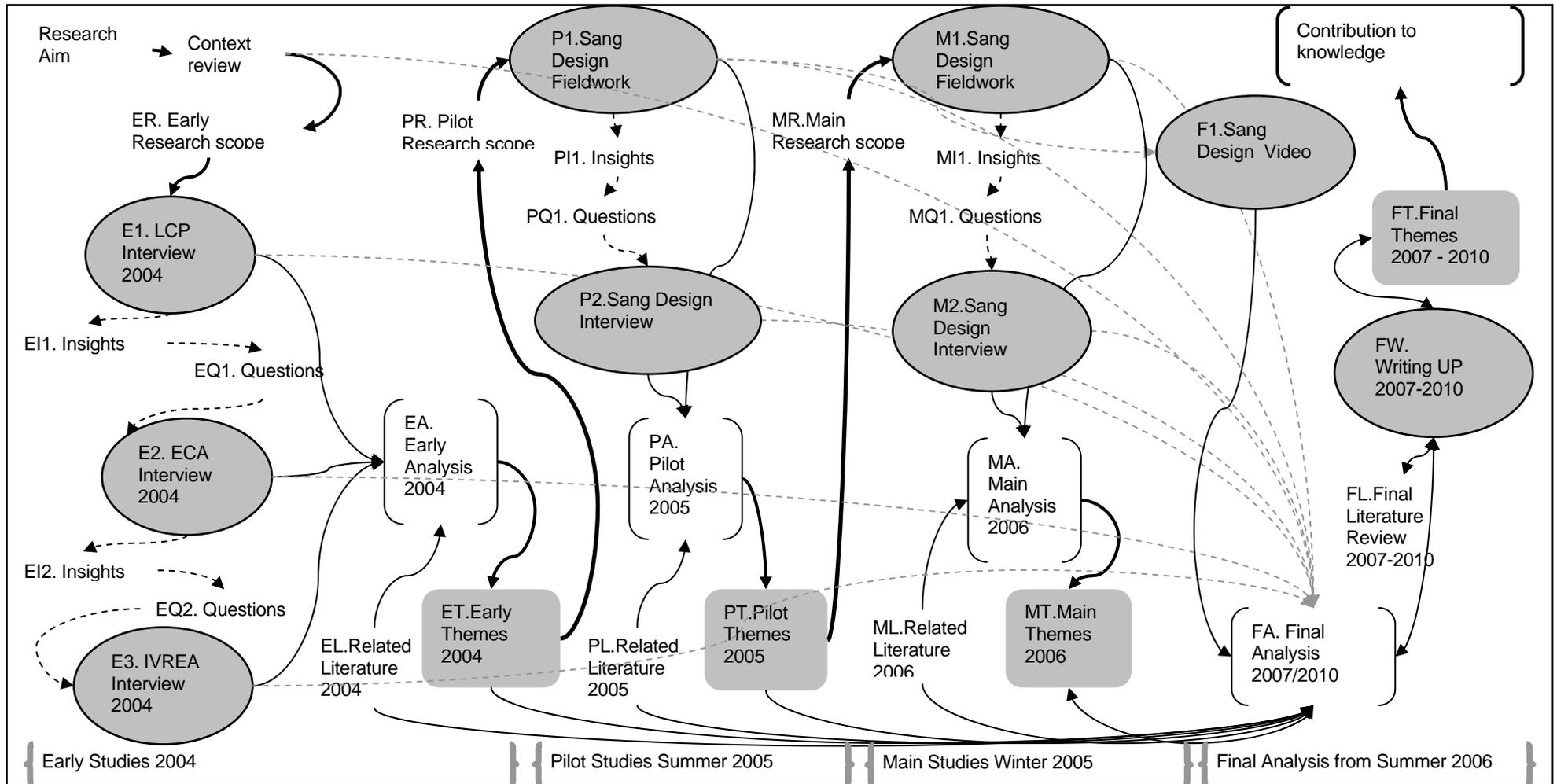


Figure U: The Research Process (without other contributing studies)

4.3 THE SCOPE OF CASE STUDIES

The choice of case studies varied from the early studies to the fieldwork during pilot studies and main studies by taking into considerations the outcomes from early studies and the availability of case studies. Three aspects were important in making the choice: 1) the definitions of WDs and CDs; 2) the level of design expertise and 3) design disciplines. These three aspects varied as the work progressed from early studies to the later pilot studies and main studies. Table 4 displays the details of these three aspects of each participant.

The choice of case studies progressed from an initial focus on multi-disciplinary student designers in the early studies to industrial designers at practice during the pilot and main studies. The progression was partly opportunistic and partly a choice. Sang Design practice gave given a rare opportunity to observe collocated teams of WDs and CDs collaborating during early designing. Specifically, I have chosen to observe and report only **new product design** projects, with a view to studying only innovative design processes, instead of design tasks more geared towards problem-solving. This choice was important because each kind of design problem requires a different kind of problem-solving process (Bamford, 2002).

The research scope was informed by early studies, which documented the uneasiness of CDs in dealing with innovation and conceptualisation during early designing. In view of this, industrial design practice was chosen for the established design process, and new product design projects were chosen for the wicked design problem.

4.3.1 Defining Western Designers and Chinese Designers

Culture is a system of learned behaviour patterns that is constantly reproduced by human communication using a certain set of symbols, of which interlocutors share the meaning or are in the process of developing a shared meaning. In this sense, culture is reflected in symbolic and material expressions. Hence, culture reproduces and is reproduced by certain patterns of human thought and activity (Hall, 1976; Hofstede, 1991).

“Western” and “Chinese” cultural groups are heterogeneous. I began the research with absolute confidence in the definitions of WDs and CDs but discovered during the research journey that, the definitions of WDs and CDs are as elusive as the definition of design/designing. Current definitions tend to prescriptively stereotype these two cultural groups into two homogenous groups of different geographical origin. Instead, the research challenges the definitions of WDs and CDs and reinstates the term at the end of the research journey. To set the scene of the research, I hereby explain in brief how the definitions evolve throughout the research journey.

I have started the research with a broad definition of WDs and CDs and progressed into a more specific definition during the main studies, based on the outcomes from early studies (See Table 4 for the background of the interviewees at early studies and Table 5 for that of designers at Sang Design). The early studies defined CDs as designers of Chinese ethnicity speaking Chinese as their first language, regardless of their nationality. Interviewees acquired for E1, E2 and E3 (Table 4, page 120) were designers of Chinese origin from Mainland China, Hong Kong, Taiwan, Malaysia and Australia. During the ethnographic fieldwork in the pilot and main studies, a CD was defined as a designer of Chinese origin from Mainland China, speaking Chinese as first language who had attended undergraduate design courses at design

institutes in Mainland China. The thesis continues to use the term CD to ensure ease of reading.

Table 4 displays the background of participants interviewed during early studies. Table 5 at page 129 displays the background of the designers who participated in the main studies at Sang Design. The choice of CDs changed from student designers of Chinese ethnicity regardless of nationality (as long as they were native Chinese speakers), for the early studies (Table 1), to only Mainland China-trained designers for the main studies (Table 3). The purpose of the change was to limit the influence of western education in their tertiary as well as design education, which is commonly found in Chinese speaking countries out of mainland China, such as Hong Kong and Malaysia. To limit the scope further, all CDs in Sang Design were graduates from design institutes in Mainland China⁵⁵.

The definition of WDs is broader than that of CDs. The criteria were that they spoke a Western language and were educated in the US or Europe. WDs in Sang Design came from America, Germany and France. The exceptional cases of WDs are Keiko and Ong, who are both fluent in English but were not of western origin. Keiko is Japanese but she is considered as a WD (relative to other CDs), due to her design education and time she had spent in Germany. Ong is Singaporean Chinese who speaks English as his first language. Due to his education in Singapore and in the UK, he is also considered as a WD rather than a CD. It was relatively straightforward to classify them as more Western than Chinese when their social behaviour in a team was observed.

⁵⁵ There was only one mainland Chinese design researcher also did her postgraduate study in the UK, however she was not observed for creative process.

Keiko and Ong both showed characteristics (such as power distance and subgroup formation) more similar to WDs in Sang Design than to CDs. Nevertheless, Ong, with his role as research team leader, and Keiko, as an interaction designer, were not in the centre of the observations of the designerly act.

The definition of WDs is rather wide in the study, due to the opportunistic acquisition of case studies. Also, WDs were not the subject of study in the early studies, but were considered later in the ethnographic fieldwork. A WD was defined as a designer from countries such as Europe, UK and US, who spoke Roman languages such as English, German, French and Italian as their first language.⁵⁶ They could be of Asian origin but trained in design institutes in these countries, which have a strong history of industrialisation in shaping design practice and education.

I also recorded the level of fluency in the English language of the designers. Although CDs in general had a lesser command of English, not all WDs are English-speakers. The question of language, as section 5.1.2 demonstrates, is not an issue as during design collaboration, they speak English to communicate, although native English-speakers such as the British and the American, do have an advantage in communication. However, as will be seen, language is not the main issue in the phenomenon.

⁵⁶ Robert Logan argued that alphabetical language brings abstract thinking to Westerners and therefore the ability to innovation. In contrary, Chinese with the pictorial language is more of a holistic thinker and lack of abstract thinking and therefore the ability to invent (Logan, 1986). Even though it is a focus beyond this thesis, I put this as a footnote to mark my awareness of this work.

In short, the acronym WD in this thesis refers to designers trained in the West and speaking languages such as English, French, German and Italian as their first language. The CDs in the early studies were designers of Chinese origin, with Chinese as their native language, regardless of nationality. The acronym CD in the pilot and main studies refers to designers from mainland China who spoke Chinese as their first language and trained as designers in mainland China.

4.3.2 Design Disciplines

The research, especially during the early studies, began with the assumption that studying designers at the early stage of design collaboration can be cross-disciplinary, and that the cross-cultural issues can differ little between design disciplines such as graphic, interior, fashion and product. The design discipline of the designers observed and interviewed was also refined as research progressed. Interviewees during the early studies consisted of graphic designers, interaction designers, interior designers and fashion/costume designers. Pilot studies and main studies deal solely with industrial designers practising new product design. The early studies were focused solely on the issues relating to cross-cultural design collaboration, which gave rise to the focus of pilot and main studies on early design process. In theory, there should be differences between design disciplines, but the similarities were chosen to be studied. Also, the choice on studying new product design practice brought the research to focus on innovation at the early design process which I argue is potentially cross-disciplinary in the context of cross-cultural design collaboration.

4.3.3 Design Expertise

The level of expertise has been recognised as an important factor when studying designers (Cross, 2004). The complexity of design issues, the wickedness in design

problems and the “learning by doing” nature of designing demand that designers gain designerly knowledge through experience (Dorst & Reymen, 2004). The Hubert Dreyfus skill-based levels of design expertise (Table 3) suggest that the design epistemologies can vary, depending on the designers’ expertise (Cross, 2004; Dorst & Reymen, 2004).

Definitions of expertise levels by Hubert Dreyfus, adapted from Dorst and Reymen (2004): <ol style="list-style-type: none">1. Novice: A novice will consider the objective features of a situation, as they are given by the experts, and will follow strict rules to deal with the problem.2. Advanced beginner: For an advanced beginner the situational aspects are important, there is a sensitivity to exceptions to the “hard” rules of the novice. Maxims are used for guidance through the problem situation.3. Competent: A competent problem solver works in a radically different way. He selects the elements in a situation that are relevant, and chooses a plan to achieve the goals. This selection and choice can only be made on the basis of a much higher involvement in the design situation than displayed by a novice or an advanced beginner. Problem solving at this level involves the seeking of opportunities, and of building up expectations. There is an emotional attachment, a feeling of responsibility accompanied by a sense of hope, risk, threat, etc. At this level of involvement the problem solving process takes on a trial-and-error character, and there is a clear need for learning and reflection, that was absent in the novice and the beginner.4. Proficient: A problem solver that then moves on to be proficient immediately sees the most important issues and appropriate plan, and then reasons out what to do.5. Expert: The real expert responds to specific situation intuitively, and performs the appropriate action, straightaway. There is no problem solving and reasoning that can be distinguished at this level of working. This is actually a very comfortable level to be functioning on, and a lot of professionals do not progress beyond this point.6. Master: With the next level, the master, a new uneasiness creeps in. The master sees the standard ways of working that experienced professionals use not as natural but as contingent. A master displays a deeper involvement into the professional field as a whole, dwelling on success and failures. This attitude requires an acute sense of context, and openness to subtle cues. In his/her own work the master will perform more nuanced appropriate actions than the expert.7. Visionary: The world discloser or “visionary”, consciously strives to extend the domain in which he/she works. The world discloser develops new ways things could be, defines the issues, opens new worlds and creates new domains. To do this a world discloser operates more on the margins of a domain, paying attention to other domains as well, and to anomalies and marginal practices that hold promises for a new vision of the domain.
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Table 3 Seven levels of Design Expertise (Dorst & Reymen, 2004)

Every designer studied in this research was categorised using Dreyfus’ seven levels of design expertise (Table 3, Table 4 at page 120 and Table 5 at page 129). The levels from the highest to the lowest are Visionary, Master, Expert, Proficient,

Competent, Advanced beginner, and Novice. The level of expertise of the student designers I interviewed at early studies varies from novice to proficient. The practice designers I observed and interviewed at Sang Design during pilot and main studies ranged from proficient to visionary.

In short, the scope of the case studies acquired was largely informed by the above three criteria that had emerged as relevant in the outcomes of the early studies. The change was also partly due to the availability of case studies for a naturalistic inquiry. The following sections will discuss in detail how each study is carried out and how its implications informed the research as a whole.

4.4 EARLY STUDIES (E1, E2, E3)

The early studies consisted of three sets of in-depth interviews carried out at two design institutes in UK and one in Italy. The recruitment of Chinese student designers interviewed for these early studies were not restricted to a particular design discipline and countries of origin. The three decisive criteria were that they are of Chinese ethnicity, spoke Chinese as their first language and had studied design in their home countries before studying further in the UK and Italy. See Table 4 for details of the interviewees.

4.4.1 Early Studies: Research Focus

Early studies deal with student designers rather than design practitioners due to availability, as well as the aim of exploring cross-cultural issues in designing through Chinese student designers' accounts and comparisons of their design learning experiences in the UK and their home countries. The interviews provided a perspective on cross-cultural design collaboration, regardless of design disciplines.

The early studies focus on exploring cultural differences between WDs and CDs in their design practice and design education by interviewing Chinese student designers studying further in the UK and Italy (See Appendix I, page 299 for interview questions). Implications from each study provided insights into the questions considered in later studies (Figure U, page 110). These studies explore Chinese student designers' views on their design learning and practice experience in London, Edinburgh and Ivrea, Italy. Insights from each early study informed the scope of the subsequent early study.

The first early study explored cross-cultural issues in design (E1) through a non-directive open interview with two design graduates from the London College of Printing (LCP). E2 explores Western-Chinese differences in design practice (design process and design thinking) and design education (learning and teaching) through four in-depth interviews with five postgraduate student designers at the Edinburgh College of Art (ECA). The third early study (E3) further explores concept negotiation issues in cross-cultural teams through three in-depth interviews with three interaction design postgraduate students at the Ivrea Institute of Interaction (IVREA).

4.4.2 Early Studies: The Interviews

The early studies use non-directive, unstructured interview to explore Western-Chinese design collaboration in design education and design practice. For example, I asked questions about San and Garrett's design experience, education and practice in the UK, in comparison to their experience in home countries. The outcomes provided further scope for defining the questions posed, in E2 and E3, that deal more specifically with early design process, early design thinking, design management, design communication, design identity and design education.

There are three analyses for each of the early studies (Figure U, page 110) when themes are refined and reinterpreted when needed until writing up stage. For example, the analysis of E1 was carried out immediately after the interview by listening to the recorded interview before the detailed transcription in order to draw out insights still fresh in my mind. The themes of these insights informed the setup of the in-depth interviews in E2. When early studies ended, translated transcriptions were coded using Nvivo7 together with transcriptions from E2 and E3. This was followed by the selection of a set of relevant themes from the existing literature. The coded transcriptions were again analysed during the final analysis stage (FA). During FA, the existing themes were reshuffled, renamed and recombined with related literature. The process was repeated and themes were finalised during writing up of the thesis. The same process applied with regard to E2 and E3. In short, the analysis process in Early Study 1 (E1) took this course:

Early Insight 1 (EI1): Insights derived through listening to the interviews.

Early Analysis (EA): Themes derived from transcription coded using Nvivo⁵⁷ alongside related literature.

Final Analysis (FA): Themes of the pilot and main studies were refined using Nvivo alongside related literature and concluded when writing up.

All early interviews were conducted in the Chinese language (in either Mandarin or Cantonese dialect, depending on the interviewee) and translated into English. As with E1, there were three analyses of E2 and E3: the first analysis is an insight analysis

⁵⁷ See www.qsrinternational.com

conducted after the study by listening to the videos to gather related themes. Secondly, at the end of all early studies, the transcription of E1, E2, and E3 interviews were inductively analysed using Nvivo, to identify themes that later informed the setting up of fieldwork for the pilot studies and main studies. After all the fieldwork was done, the final analysis stage once again explored the transcription, in order to revisit some issues that had come out during the main studies. For example, conceptual thinking was initially dismissed as the research focus during the early studies, but later become the core theme during final analysis when all studies were reanalysed (Table 12, page 146).

4.4.3 Early Studies: The Interviewees

Nick name, Gender	Consider as	First language	Origin	Design trained in	Design Disciplines	Design Expertise	English Fluency 0 to 5	Chinese Fluency 0 to 5
Early Study 1 at London College of Communication/Printing (LCP)								
Garrett, M	Chinese	Chinese	Hong Kong	Hong Kong/UK	Graphic	Expert	4	5
San, F	Chinese	Chinese	Malaysia	Malaysia/UK	Graphic	Expert	4	5
Early Study 2 at Edinburgh College of Art (ECA)								
Summer, F	Chinese	Chinese	PRC	PRC/UK	Graphic, Interior	Proficient	2	5
Jimmy, M	Chinese	Chinese	PRC	PRC/UK	Interior	Competent	3	5
Kathy, F	Chinese	Chinese	PRC	PRC/UK	Interior	Competent	2	5
Pan Pan, F	Chinese	Chinese	PRC	PRC/UK	Fashion	Proficient	2	5
Christy, F	Chinese	Chinese	PRC	PRC/UK	Fashion	Competent	2	5
Early Study 3 at Ivrea Institute of Interaction Design (IVREA)								
Patray, F	Chinese	Chinese	Hong Kong	Hong Kong/Italy	Architecture, Interaction	Competent	4	5
Chia, F	Chinese	Chinese	Taiwan	Taiwan/Italy	Computing, Interaction	Competent	3	5
Haiyan, F	Chinese	Chinese	PRC	Australia/Italy	Computing, Interaction	Competent	5	5

Table 4: Early studies interviewees

I interviewed ten CDs of various design disciplines for the early studies (Table 4). They have studied in their home countries for their first degree and later further studied

in the West. They are two graphic designers, three interior designers, two fashion/costume designers and three interactive designers.

E1 Interviewees

San, from Malaysia, and **Garett**, from Hong Kong, became practising designers after completing their degrees at the London College of Printing (now London College of Communication). San is currently working as creative director in London and Garett is a freelance print designer in London. San adopts the work structure of an advertising agency, which she suggests has a generic structure consists of creative director, copywriter, art director and account manager. Garett's work experience in HK could be divided into two parts: firstly with "China man" design company where he was the junior designer. Creative brief was very precisely creative director's idea and designer was there to visualise that, in contrast to British venture design company where designer has more space to creativity.

E2 Interviewees

I interviewed **Jimmy** and **Kathy** at the same time, because they were a couple who had done their design education together for ten years. Jimmy and Kathy were both from Shanghai. At 15 years old, they sat for the admission exam to the Central Academy of Art (similar to higher secondary to foundation) in Shanghai (中专). It took them two years to prepare for the exam. The exam consisted of two areas for admission consideration: Sketches (素描) and powdered colours (粉彩). Colouring uses something called powder painting, a cross between pastel colour pencil and water colour, invented in Russia. Kathy's father, who has an interior design business and likes painting, influenced her to pursue design as a profession. She liked drawing from very young age. Her choice of graphic design instead of an initial preference for fashion was due to the

popularity of the graphic design profession at the time. Jimmy's father worked at an art-oriented company which influenced Jimmy's choice to study design. Jimmy and Kathy spent four years in an arts academy. The first year was spent on learning the basics such as two-dimensional (平面), three-dimensional (立体) and colour (色彩). Sketches (素描) and colours (粉彩) were a major focus. Jimmy and Kathy would introduce themselves as artists rather than designers, as art and design are not seen as much different in China. Later they completed a four year, university level, interior design course in Shanghai. They had just finished their MA in interior design at ECA.

Summer had just finished her MA interior design degree show at ECA. Summer did her undergraduate degree in graphic design in Beijing, China. Before ECA, she worked as an interior designer and later as a project manager in Beijing. She learned interior design from books and through practising with her director. She came to Edinburgh to study further and to have a break from working life. Despite her graphic design background, Summer did her internship and later become an interior designer at an interior design company in Beijing. She was hired because of her ability to deal with graphics in detail. The unique and rich cross-disciplinary design work experience brought reflective answers that were lacking from other interviewees. Summer feels that graphic designers deal with two-dimensional graphics, whereas interior designers deal with three-dimensional spaces. Due to this, they think from a different starting point, in which the graphics designer sees the spot (点) before the surface (面) whereas the interior designer sees the surface before surface before the spot.

I interviewed **Panpan** and **Kity** at the same time. Panpan studied and practiced fashion design in Shanghai before coming to Edinburgh to undertake a Master's degree in fashion design. Her work experience brought new insights into her study. In contrary,

Kity found the study difficult for her because she has changed from fashion design to costume design. Both of them found the degree show in Britain inspiring for learning, something design institutes in China lack.

E3 Interviewees

Chia is Taiwanese Chinese. She finished her undergraduate in Taiwan in computer science, and did a master degree in the US. She specialises in sound design. She found the group debates at Ivrea a bit pointless as everyone just talked and little got done. She preferred to work on the design itself to proof her argument, rather than verbally debated about it.

Patray is Chinese from Hong Kong. She did her first degree in mathematics and later architecture. She did not expressed much about her experience on debates at Ivrea.

Haiyan was born in China and later migrated to Australia when she was six years old. She speaks Chinese as her first language. She graduated with a bachelor in Computer Science at Monash University in Melbourne Australia. She worked as a Software Engineer in Melbourne and later as a software developer in Toronto, Canada. She then went in to do a Multimedia graduate diploma in Toronto. After graduated, she became a Flash developer and design graphics for web. She found the form of design very abstract, not really visual but systems. After the job, she travelled for a while and decided to further study at Ivrea. She spoke of her cross-cultural experience in Australia as a difficulty of finding her own identity. She also identified the difficulty of being able to debate in group as influenced by her Chinese background.

4.5 STUDIES AT SANG DESIGN (P1, P2, M1, M2)

One of the outcomes from early studies is that a research focus on design practice is necessary for the main fieldwork. Consequently, the case studies for the main fieldwork are design practice rather than design education. So I went on to search for case study at design practices in Shanghai which I reported earlier in section 3.3. Sang Design was suitable as the case study. In contrast to the internationally operating Howa Design, Sang Design is a locally owned. The successful industrial design practice was founded by Yang (Table 5) in the 1990s, as a local Chinese design practice to serve OEM local manufacturers. Yang was a design lecturer and graduated with a Master's degree from one of the leading design schools in China. Sang Design has expanded to design for foreign brands such as Intel, Decathlon, Motorola, Samsung, General Electric, Haier, etc. Based in Shanghai, rather than the manufacturing bases of the Pearl River Delta, Sang Design manages to avoid manufacturer clientele. Mikael, the German design director has secured the affiliation with Afar Design, a design subsidiary of Siem⁵⁸ - one of the leading mobile phone companies in the world. There are quarterly staff exchanges between Sang Design and Afar Design. The international setup ensures client confidence, which advantage over local Chinese owned design practices. At the time of my fieldwork, Sang Design was the most talked- about industrial/product design practice in China. Despite charging high design fees in China, they command seventy projects per year with thirty percent annual growth. They serve a wide range of design services including conceptual design, prototyping, user interface design and Chinese market research. In addition to the large number of design projects carried out by teams

58 Due to NDA, I have given a nick name the company instead of the real name.

of China-trained and Western-trained designers, made Sang Design a suitable case study that fulfilled all the requirements⁵⁹.

4.5.1 Background

Before Shanghai, I contacted Sang Design's Shanghainese project manager, Ying (Table 5) who replied with an invitation to visit the practice. On the day, I arrived at Sang Design I was immediately ushered into a sleek-looking conference room with contemporary European interior design. It was during the middle of summer in 2005, the ceiling mounted air conditioning unit was busy pumping out cold air as I stood in front of the huge windows of the refurbished ex-factory, looking out admiringly to the busy street. Summer in Shanghai is so much hotter than Edinburgh. Despite the air conditioning running at full blast, I was sweaty and tired after negotiating the hustle and bustle streets of a city populated by twenty million people. Just as I started to appreciate a sense of calm in the meeting room, Mikael and Ying appeared and introduced themselves. Mikael, a German, in his fourth year in China, was the vice president of Sang Design. In his early thirties, Mikael effortlessly projected an authoritative air. The project manager Ying is Shanghainese, smart casually dressed in T-shirt and jeans, was the personal assistant for Mikael, perhaps due to her language skills.

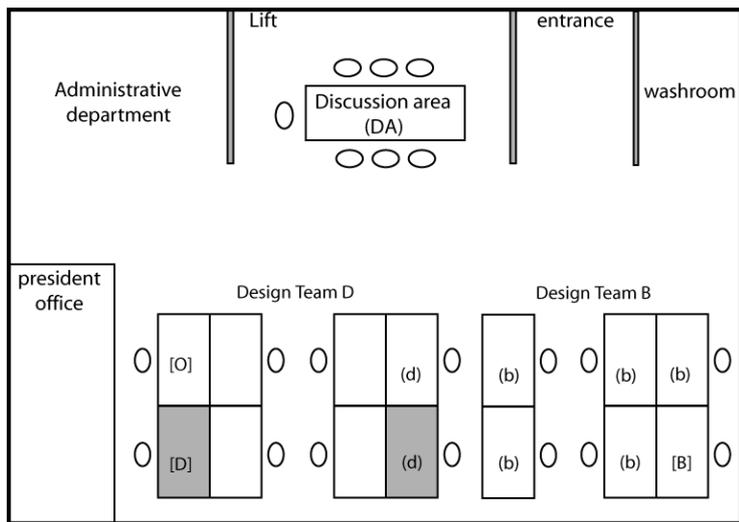
I presented my research plan, with a focus on observing team concept negotiation and the effectiveness of the design process. Mikael presented background information about Sang Design which is made into a CD-ROM for potential clients to view. He emphasised a stage-by-step design process and explained in detail: "This is the design

59 We later found that concept negotiation did not take place in Sang Design as expected. The phenomenon is the central focus of the research (Chapter 5)

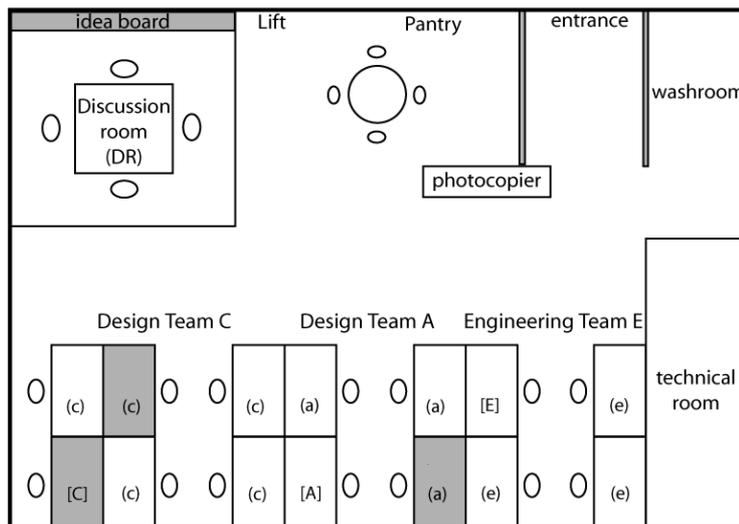
process we have adopted from Afar Design...” When he finished, I made a remark to him that risked being offensive: “It doesn’t work, does it?” Mikael sighed in relief: “You are right, it doesn’t work. This is for the benefit of the client. I have no idea what works!” I am convinced that this remark was the main reason I was given access to Sang Design for fieldwork. Mikael wanted to know what works. So do I, and so did everyone else. Mikael gave me a week to see if his staff responded well to me, after which I was given an unrestricted welcome to continue the research.

Physical Space

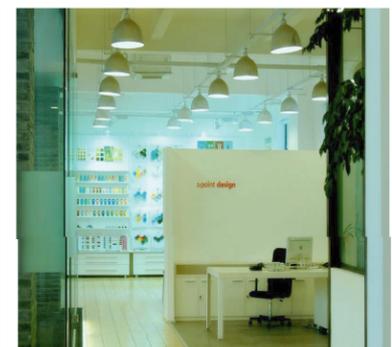
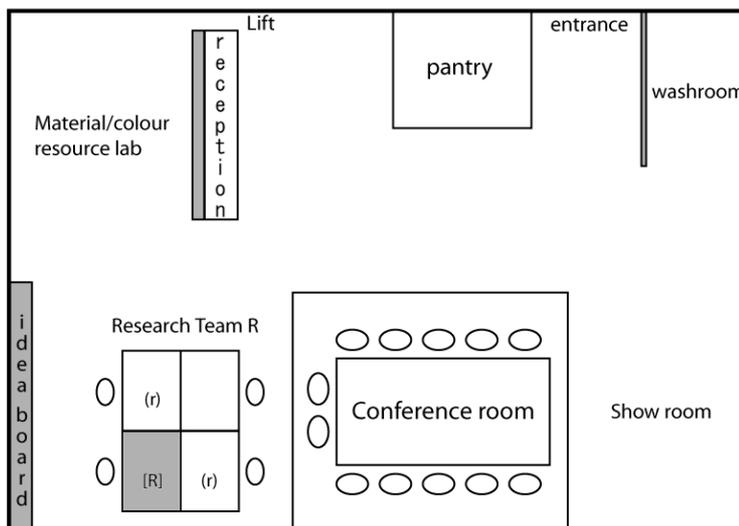
Sang Design is housed in a red-coloured, converted industrial building in Jing An District in the city centre. The office takes up three floors of the building with open plan spaces of more than 750 square meters each. The space consists of desks for staff, a model making workshop, a colour and material lab, product showroom, conference room and meeting/discussion rooms (Figure V, page 127). Only Yang and the financial controller have their own office. Each designer has a desk next to or opposite his or her team members and team leader. Design teams occupy the second floor and third floor, while the research team occupies the space next to the colour and material lab on the first floor and engineers sit next to the model-making workshop on the second floor. The floors are connected by an internal lift and external stairs.



THIRD FLOOR
 (b) team b member
 [B] team b leader
 (d) team d member
 [D] team d leader
 [O] Observer



SECOND FLOOR
 (a) design team a member
 [A] design team a leader
 (c) design team c member
 [C] design team c leader
 (e) engineering team e member
 [E] engineering team e leader



FIRST FLOOR
 (r) research team r member
 [R] research team r leader

Western Chinese

Figure V: Designers seating plan at Sang Design

Nick Name	age	Gender	Team	position	Year of practice	Consider as	First language	Origin	Country Trained	Design discipline ⁶⁰	Expertise level ⁶¹	Chinese fluency	English fluency
Yang	38	M	-	President	15	CD	Chinese	PRC	PRC	ID	V	5	3
Tian	27	M	A	Team Leader	5	CD	Chinese	PRC	PRC	ID	E	2	3
Gao	26	M	A	Designer	3	CD	Chinese	PRC	PRC	ID	C	5	1
Mei	27	F	A	Designer	1	CD	Chinese	PRC	PRC	ID	C	5	2
Tristan	24	M	A	Junior Designer	1	WD	French	French	France	ID	C	2	4
Ma	26	M	B	Team Leader	5	CD	Chinese	PRC	PRC	ID	E	5	3
Tina	30	F	B	Team Leader	7	WD	German	Germany	Germany	ID	M	3	4
Ming	25	M	B	Designer	3	CD	Chinese	PRC	PRC	ID	C	5	1
Yu	26	M	B	Designer	3	CD	Chinese	PRC	PRC	ID	C	5	1
Siang	27	M	B	Designer	3	CD	Chinese	PRC	PRC	ID	C	5	1
Hai	27	F	B	Designer	1	CD	Chinese	PRC	PRC	ID	A	5	3
Mikael	32	M	C	Vice President	6	WD	German	Germany	Germany	ID	E	3	4
Ying	26	F	C	Project Manager	4	CD	Chinese	PRC	PRC	ID	P	5	4
Keiko	28	F	C	Designer	3	WD	Japanese	Japan	Japan, Germany	ID	C	2	3
Wei	25	M	C	Senior Designer	3	CD	Chinese	PRC	PRC	ID	C	5	3
Lee	26	M	C	Designer	3	CD	Chinese	PRC	PRC	ID	C	5	1
Jie	23	M	C	Designer	1	CD	Chinese	PRC	PRC	ID	C	5	2
Svenja	30	F	D	Designer	6	WD	German	Germany	Germany	ID	P	1	4
Laura	33	F	D	Design Manager	10	WD	English	American	America	ID	M	1	5
Stephan	28	M	D	Junior Designer	1	WD	German	Germany	Germany	ID	A	1	4

60 ID = Industrial Design

61 V = Visionary, M = Master, E = Expert, C = Competent, A = Advance beginner, P = Proficient.

Tao	2 7	M	D	Senior Designer	3	CD	Chinese	PRC	PRC	ID	E	5	2
Xuan	2 6	F	R	Research Designer	3	CD	Chinese	PRC	PRC	ID	C	5	2
Lian	2 7	F	R	Research Designer	1	CD	Chinese	PRC	PRC,, UK	ID	A	5	4
Lou	2 5	M	C	Designer	1	CD	Chinese	PRC	PRC	ID	A	5	2
Ong	3 1	M	R	Team Leader	8	W D	English	Singapore	Singapore, UK	ID	E	4	5

Table 5: Designers at Sang Design

Design Teams

The staff consisted of thirty people, of mixed background (both CDs and WDs), working in six teams. Teams A, B, C and later D are design teams, members of team R are design researchers and team E is made up of industrial engineers. Each team consists of four to six members led by a team leader. The team leaders report to design manager, Mikael, who is also the vice-president and a partner in the practice, as well as the leader for team C. A design project is assigned to one team, or two joint teams for a big project. Team D was an addition when Laura, from San Francisco's Afar Design, joined the company. Her appointment was in order to expand the fourth design team to serve the American clients. Tao from team C was allocated to team D. Only one out of four team leaders are Chinese.

Negotiate Trust

I was introduced to everyone during the company monthly meeting on the first day of my observation. Mikael explained my role as an independent researcher, that the management of Sang Design had no role in my research, and that he hoped that everyone would give full support. I could sense they were weary of me at the beginning so I spent the first week to negotiate trust with CDs. The ability to negotiate myself into the community of Sang Design, among both CDs and WDs, drew on my native understanding of Chinese and my ten years experience of living in Britain.

My understanding of the issue of trust in Chinese culture suggested that I should distance myself from higher management such as Mikael and Yang during my first trip at Sang Design. Being closed to management might give an impression of me as assisting the management to check on their designers. Consequently, designers might not reveal their real opinions, fearing for their job security. One assertive CD jokingly made a profound remark: “you are not the spy sent by Yang or Mikael, right? How do I know you are not?” The Chinese design team leader Tian later confirmed this fear during his interview. However, the suspicion gradually subsided as the fieldwork progressed

In contrary, WDs readily voiced their concerns. There was less concern for higher authorities. Their concerns were personal privacy and professionalism. They asked whether the research would expose their personal information and their professional status while none of the CD expressed this as a potential problem. WDs would ask for clarity about the objective of the research and the use of the findings. Although it took some effort to negotiate trust with CDs, they were quick to respond to my requests for interviews and made themselves available immediately for me. The reason could have been partly Mikael’s requests for them to be cooperative, which I interpreted as the result of high power distance.⁶² However, I used more probing when interviewing CDs, who needed more interaction, in contrast to WDs who readily gave lengthy answers to questions.

62 Hofstede (1991) termed the power of higher authority to subordinates as “power distance”. The power distance of eastern culture is generally higher than Western world. In Chapter 5, the significance of power distance in studying this research is acknowledged.

4.5.2 Studies Undertaken

I spent a total of five months at Sang Design, divided into three trips: summer 2005, winter 2005 and summer 2006. Projects I have observed can be summarised as below. Design projects commissioned for Sang Design are rarely planned months in advanced. It is common in China that things happen at the last minute. Consequently, there were periods during the fieldwork when I was waiting for design projects to arrive. Yet during other periods, the projects were flooding in. At times, I had difficulty deciding which projects to observe. Priority is given to new product design projects though it takes one or two design meetings to know if the project is suitable. Consequently, I sat in a considerable number of project brief meetings to explore the suitability.

Trip	Project	Data collected	Interview
Summer 2005	Branding for Franctex	Field notes	Interview 1
	Measuring tools for Daka	Field notes, Images	Tian, Tristan, Ma, Ming, Yu, Siang, Stephan, Mikael, Svenja, Ying, Lee, Jie, Laura, Tao, Lou
	ABC Mobile phone	Field notes	
Winter 2005	Roko multimedia Phone project	Field notes, Audio recordings, Sketches, Documents	Interview 2 Tao, Laura, Wei, Tristan, Gao. Svenja, Jie, Tian, Lee, Keiko
	Olympic Torch	Field notes, Sketches, documents	
	Exhibito exhibition System	Field notes, documents	
Summer 2006	A buggy design	Videos, Sketches	NIL

Table 6 Observations and Interviews at Sang Design

I divided my time between second floor and third floors, depending on active design projects and teams. For practicality, I had a desk space one each floor, with good

visibility of the teams, but so I remained unobtrusive (Figure V). My typical day in Sang Design started with a hello to Mikael on the second floor to find out what project would have a meeting on the day. Some meetings were arranged but others were a last-minute arrangement, depending on the projects (especially design meetings). I got updates by taking a quick tour of the office, conference room and discussion areas. I also spoke to team leaders and designers about any possible meetings. A few designers were helpful in providing me with the information, especially through online chats.

Typically, I observed design meetings, interviewed individual designers and had *ad hoc* conversations with designers (Table 6, page 131). When observing a particular project, I actively joined in with the team, both in meetings and at their desks, hoping to access the *ad hoc* team discussion. When the need arose, I would ask individual designers question to clarify their acts. Out of the office, I joined them for lunches and walked with them in order to extend my observations and understanding. In this naturalistic setting, it was not always able to observe each project from beginning to end. The most completely observed project was the Roko project that I discuss in length at section 4.5.3.

The fieldwork at Sang Design was divided into two phases: pilot studies and main studies. The choice on what mementoes to collect were decided during the fieldwork, depending on the project and my understanding, which admittedly could be intuitive when immersed in the fieldwork. I used a Sony digital recorder Model ICD-MX20 to record design meetings and interviews for transcription purposes. When possible, photos of the setting were taken, otherwise I made hand sketches of seating positions. Jot notes are the basic mementoes I collected, which I later expanded into field notes and written into more elaborate episodes if chosen to be reported. Jot notes were taken during the observation when possible. Otherwise, it would be written soon after the

observation. Admittedly, there were times that it was simply not possible to make jot notes. This is when the mementoes in the form of audio recording come in handy. I also collected sketches when necessary in order to trace a designer's creative process.

Pilot Studies: Sang Design Summer 2005

The ethnographic fieldwork at Sang Design started with the pilot studies in summer 2005. The observations were followed by a series of in-depth interviews with available designers in the observed team at the end of each trip. The questions were based on insights gathered while in the field to confirm the patterns I had observed (Table 7). I would do a mock interview with one of the designers to refine the questions, so they were relevant to the study. The analysis was carried out at the end of the trip. Themes derived from the pilot analysis informed the research scope of the main studies in winter 2005.

Main Studies: Sang Design Winter 2005

The main studies were carried out on new product design projects available at the time of observation. Sketches, photos, audio recording, field notes, design processes and interview accounts were collected for the main analysis. Similarly, the pilot studies, in-depth interviews were carried at the end of the trip, with questions informed by insights gathered while in the field (Table 8).

Interview question		
Background questions	1	Please brief us your education and work experience?
	2	(For team leader) What is a typical daily work flows for you?
Core questions	3	When the project starts, in this case, for the design projects, how do you start to generate idea? Is there a difference to CD in your group?
	4	Do you find a difficulty in communicating ideas, despite language difference?
	5	Through the communication, do you find a difference between how you thinking to how western think?
	6	As the ideas developed, how do you and your group members make decision on an idea?
	6a	Is it a group decision? Or an individual (especially higher authority) decision
	6b	Is there an external influence on decision making on choosing an idea? What are they?
	7	At times, do you try to convince your group members on your idea? Do you see the difference between convincing Westerners to convincing Chinese?
	8	Is there any heated argumentation you have seen in this company?
	9	Is the design method/process in this company differing what you have learned at university?
	10	In your opinion, is there any room to improve in terms of the method?
Supplementary questions	11	What do you think of imitation? What is imitation for you?
	12	What do you think of the term design as a service industry?

Table 7: Sang Design Pilot Studies Interview Questions

Interview question		
Core questions	1	Can you describe how you generate ideas?
	2	Does design/research brief helps you to generate ideas? If yes, how?
	3	What other things help you to generate ideas?
	4	When do you start to sketch? What do you sketch?
	5	Between hand sketch and computer drawing, which one helps you more in conception? Why?
	6	Do you prefer working alone or working with someone when you generate concept? Why?
	7	Is discussion with someone important for you to generate concept? Why?
	8	Describe the types of meetings you have attended in this company at the stage of creation? Which one does discussion most likely to happen? Why?
	9	Give them a rank, at which type of meeting you discuss more, which meeting, is less? Why?
	10	Who will you first discuss with in the team? Why?
	11	Do you use what you have discussed to help generate concept?
	12	Comparing these types of meeting, which one do you feel the most at ease to present your idea in a team?
	13	Is language the biggest difficulty in communicating idea when working with Western/CDs? If yes, why? If not, what are the others?
	14	Apart from talking, is there other communication format to talk about design with team members? Which one is more effective?
	15	Is it important to convince your team about your idea? Why? How you do that?
	16	Do you always voice out your viewpoint in these meetings?
	17	What are the factors influencing you expressing your viewpoints? Why?
Supplementary questions	18	Meetings are quiet here, if you are team leader, how will you use the types of discussion settings?
	19	Have you done real collaboration that team members sketch together?
	20	What do you think of the post-its brainstorming method?
	21	If I am a foreigner team leader and I would like you to discuss more, what do you think I should do?

Table 8: Sang Design Main Studies Interview Questions

4.5.3 An Example of Analysis: The Roko Project

id	Date	Time	Type	Participant
a	20/12/2005	14:05:00	Formal first research meeting	All members of Team A, Team B, Team C. Team D and Team R
b	10/01/2006	14:05:00	Informal design discussion	Tristan, Xuan
c	10/01/2006	15:15:00	Interview designer	Jie
d	10/01/2006	15:50:00	Interview designer	Gao
e	11/01/2006	15:15:00	Interview designer	Gao
f	11/01/2006	15:55:00	Interview designer	Jie
g	12/01/2006	13:30:00	Informal design discussion	Gao, Wei, Tristan, Lee
h	12/01/2006	14:15:00	Formal design meeting	Mikael, Gao, Tian, Ong, Lee, Jie, Keiko, Xuan, Mei, Tristan, Wei
i	13/01/2006	14:45:00	Informal design discussion	Tristan, Keiko, Wei, Mei, Tian, Jie
j	13/01/2006	17:10:00	Formal design meeting	Team A and Team C: Lee, Gao, Jie, Xuan, Mei, Tian, Keiko, Tristan, Mikael, Ong
k	16/01/2006	14:00:00	Formal design meeting	Team A and Team C: Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao
l	17/01/2006	11:09:00	Informal design discussion	Tristan, Keiko
m	17/01/2006	16:11:00	Formal design meeting	Team A and Team C: Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao
n	19/01/2006	10:38:00	Formal design meeting	Team A and Team C: Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao
o	19/01/2006	13:31:00	Formal design meeting	Team A and Team C: Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao

Table 9: Observation timetable of Roko

To illustrate the process of research inquiry, in this section I report Roko project as an example of analysis. Roko was the most complete new product design project observed at Sang Design. The project contributed the larger part of the research themes. Roko is a leading international mobile phone company. The project was commissioned to several design practices in China. The brief was to design a next-generation, multimedia phone for the international market. Only design concept is required at the

end of the project. There was speculation that Roko was checking out competitors as well as searching for design partner in China through this commission.

Mikael divided the project into two phases of research and design. He was leading the design stage, while Ong lead the research stage. Due to the new product design goal, the research stage was seen as crucial. Ong received assistance from available members of design teams A, B, C and D to conduct market and user research. A sixty page research report in Microsoft PowerPoint format (Figure W) was produced for designers' reference. The research report visually displays facts and figures in diagrams, charts and pictures. The visual display is thought to help designers to easily interpret the information required. There were also visual examples of mobile phones currently available in the market grouped by features. Information such as phone user demographics and scenarios of potential users were also included. Due to confidentiality, I was only able to take a photo of the report on the wall (Figure W).

During the design stage, Mikael combined team A and team C into a team to work on the design concept. I observed several formal design meetings and informal discussion during the design stage, which lasted for three weeks (Table 9: Observation timetable of Roko). I also interviewed a few designers during the observation with *ad hoc* questions in related to the project. To get a feel of the project, I attended the first research meeting, which is when the brief is given to the teams.

The glass box (Figure V) was used as Roko project's workspace. Information, particularly the users' scenarios and design examples from research report was displayed on the four walls of the glass box. The glass box was designed to encourage ideation and discussion (Figure W). The walls were used as the information display throughout the design stage. Ideas, sticky notes, sketches, print out of final designs were

attached to the walls either by using magnets or sticky tapes. There was a square table in the middle of the room while chairs were pulled from designers' desks to the room when needed. The glass box was a small room so there were times when designers were sitting out of the box with the door opened. The nearest designers' desks were only one metre away so the background noise such as phone conversations could be heard at times during the meetings. The atmosphere was quite casual, with designers dropping in and out, as they pleased. Some designers preferred to work in the glass box between the meetings and informal discussions would take place.



1) PowerPoint document



2) Existing designs and ideas



3) Sketches

Figure W: Information on the walls during Roko Project

With a tight deadline, there was an average of four hours formal design meetings every two days and frequent informal discussions happened in the glass box. I observed seven formal design meetings and four informal discussions. I missed two design meetings. This problem was addressed by collecting a near complete set of designers' sketches. Informal discussions were mostly opportunistic, as they were not announced.



Figure X: Types of discussion during Roko Project

Several types of mementoes I recorded from Roko whenever possible are sketches, audio recording of the meetings, pictures, seating plan and field notes. These mementoes helped to enrich my interpretation of the phenomenon. One crucial discovery was through the sketches, which were initially taken to compensate for the

missing two design meetings, however, the initial analysis brought to light crucial themes on design thinking. A more elaborate sketch analysis was carried out after the first pass of analysis on Roko. The sketches collected are complete apart from the early doodles, which I compensated for by using with field notes compiled on *ad hoc* basis. By analysing the sketches, I outline designers' creative processes.

4.6 OTHER CONTRIBUTING STUDIES

Apart from early studies at Sang Design, I observed and interviewed for other case studies that are not focus of this thesis, yet the implications from those case studies gave rise to some insights, pre- and post- visiting Sang Design. In this section, I discuss these studies and their implications, which extended the main research themes derived from Sang Design. These other contributing studies focus on the Wuxi-Zurich Design Exchange and the Mosen Studio in Wuxi.

4.6.1 Wuxi-Zurich Design Exchange

Wuxi-Zurich design exchange (WUZU) is an annual design exchange between the School of Design in the University of Applied Sciences (HGKZ) in Zurich and the School of Design in Southern Yangtze University (SYTU) at Wuxi in China. Wuxi is a city located one hundred miles north of Shanghai with a population of five million. WUZU started in 2004 in Shanghai. I participated for two consecutive years: in 2005 in Zurich and 2006 in Wuxi. WUZU aims to explore cross-cultural issues between student designers from the two institutes and from various design disciplines. The invitation to WUZU2005 was initiated by Mosen Gong, a young Chinese lecturer from SYTU. He

replied to my email inquiry and suggested WUZU as my research platform.⁶³ I decided to participate in WUZU 2005 after viewing a DVD video that candidly captured the cross-cultural exchange during WUZU 2004. The educational setting of WUZU was a good platform to decide whether to study practitioner or educational settings during the main studies.

Background

WUZU is an annual student designer exchange. Table 10 summarises the setup at WUZU 2005 and 2006 and the data collected. Both WUZU 2005 and 2006 were divided into stages of research and design and stopped at prototypes. A design theme with a broad brief was given to cross-cultural and cross-disciplinary teams of student designers. Research was done during the study trip to identify design focus and problems to solve drawing inspiration from the surroundings. The design stage was done when students returned to the university.

Details	WUZU 2005	WUZU 2006
Duration	Two weeks	Three weeks
Location	Zurich	Wuxi
Study trip	Lucerne	Anhui ⁶⁴
Design theme	Tool for eating	Pleasurable living: traditional culture,

⁶³ Thanks to HGKZ for paying for my accommodation at Zurich in return for my help as interpreter when needed.

⁶⁴ The study trip is part of SYTU annual design trip, “Cai Feng”采风. “Cai Feng” is the tradition of art and design school in Chinese universities. Each year, students and lecturers go for a trip to old villages in China to explore the traditional art form. “Cai Feng” was held at the old villages where “Crouching Tiger, Hidden Dragon” was filmed, near the yellow mountain of An Hui Province in South West China.

		modern design
Data collected	Interview accounts, field notes, and videos.	Video, sketches.
Analysis	Video observation	Video Observations and sketches
Implications	Verbal/visual differences	Ideation Process

Table 10: WUZU details

My Roles

“What will they make of me?” I pondered curiously as I checked out from Zurich airport. I had arrived at Zurich airport an hour earlier than the SYTU group. This was their first visit to Zurich and the first time they had travelled out of Mainland China. I introduced myself to Michael from HGKZ who was waiting at the arrival hall. He was surprised to discover that I was Chinese, as he had been expecting a British-looking woman⁶⁵. My roles differed in WUZU2005 and WUZU2006, and consequently so did the research focus in the fieldwork. Whilst I was a full time observer in 2005, in 2006 I was one of two facilitators preparing and running WUZU for HGKZ.⁶⁶ The HGKZ lecturer did not participate in 2006. Four SYTU lecturers coached students on design while I facilitated during their absence. I also set up the design project theme and brief.

Considering the direct involvement in this role and the fact that I had collected enough data, I captured only video material and sketches at WUZU2006 as a measure to confirm several research themes observed at Sang Design. The videos recorded design

65 I then realised that by adopting my husband British surname confused them on my ethnicity and nationality. I did sense a slight disappointment for Chinese side that I am not white despite I was commanding Mandarin Chinese on the phone with Mosen. I realised later that the “privileged white” impression in China is apparent and it was only to my benefit to have a British surname in China to gain access.

66 HGKZ appointed me for the facilitator role, which brought me the funding and therefore the possibility to participate at WUZU2006.

discourse between Swiss and Chinese student designers during the design phase. Video material from WUZU was useful for evaluating design discourse. For example, when cognitive issues later become the core of the thesis, video analysis of the use of verbal and visual cues at WUZU provides a confirmation of my observation at Sang Design where videoing was not allowed.⁶⁷ In general, research implications from WUZU were interpreted from field notes and by watching the videos without detailed transcription. The choice of which video clip to analyse depended on how rich the cognitive cues were. The active interaction of LiuJia's team at WUZU2005 was chosen for analysis of verbal and visual cues, which is reported in Nainby et al,(2006).

4.6.2 Mosen Studio at Wuxi

Professor Mosen Gong, a lecture at SYTU design school, also the organiser of WUZU, runs a design studio at the Wuxi Industrial Park. In fact, most of the design lecturers at SYTU have their own design studios as a sideline. They employed their student designers to work for them on the design projects that are currently abundant in the developing Mainland China. One example is an interior design project for the cabins of Beijing-Tibet railway. It is also beneficial for the student designers to earn pocket money and build their design portfolio, which is essential when seeking design job after graduating.

During my first trip to China, Mosen organised a team design project for me to study cross-cultural differences in designing. The project was to design the interior of a spa-type sauna in the city of Wuxi. Richard, a design lecturer and designer from Edinburgh Napier University came along and participated as one of the team members.

67 There was trust to earn before I could do video recording at Sang Design.

I observed the collocated teamwork using video to identify the differences in early design process between Richard, Mosen, and two Chinese student designer teams. I collected video footage with audio recording and design sketches, and analysed them using the same method as in the fieldwork at Sang Design. A useful sub theme was derived from the analysis. Richard's mind mapping to ideate is different from the CDs' ideation, which depended on sketching in shapes, without reliance on words. I discuss this difference in early ideation process in section 6.4.

4.7 RESEARCH IMPLICATIONS FROM THEMES

I previously argued for an inductive analysis method using the grounded theory approach to study Western-Chinese early design collaboration. Using this research method, patterns of the design discourse emerged from the collected data. This section summarises the themes derived from the studies undertaken for the research project. The themes are divided into sub themes and core themes. Sub themes from early studies are substantiated into core themes during the final analysis when there are matching pairs with themes derived from the main studies; and when sub themes became related to sub themes from main studies, and managed to be substantiated with theories/models during the final analysis. This process is iterative and hermeneutic (Figure U, page 110). The analysis process only stopped at writing, when literature and the central perspective to report this research were chosen. During the analysis process, the themes might fall inside or outside of the research scope, as I identified the significant perspectives for the writing of this thesis. This section displays only themes directly related to the central contribution of this thesis, situated at the end of the analysis. Table 12 gives a general summary of the themes, which includes both core themes (in bold type) and sub themes from all the studies undertaken. Figure Y shows a snapshot of a thematic diagram to demonstrate the inductive process that linked the sub themes and core themes between

studies and theories. Table 11 displays the themes at the end of the main analysis, which I present in Chapter 5 and 6 by writing the narratives alongside the creative design literature. This triangulated analyses between the final literature review (FL), final analysis (FA), and writing up (FW) revealed the final themes, and the thesis came together as a whole, as I discuss in Chapter 7. In the next two sections, I outline themes derived from the early studies and the other contributing studies. The discussion will be brief as these are only sub themes, which contributed to core themes from the Sang Design fieldwork. The core themes derived from the research at Sang Design will be discussed alongside relevant literature in Chapters 5 and 6.

MAIN THEMES	CHINESE DESIGNER	WESTERN DESIGNER
The use of sketching	Immediate use	Research and problem definition
Sketching process	Vertical	Lateral
Idea generation	Unstructured	Structured
Conceptualisation	Depth	Breadth
Education	Instructional	Inspirational
Design inspiration	Imitative	Innovation

Table 11: Themes after main analysis

Study	Themes observed	
	Chinese	Western
E1	Imitative. Instructional design lecturers. Lecturer focus on imitation and techniques.	“Conceptual”. Closer hierarchical distance with boss. Design lecturers focus on innovation.
E2	Instructional design lecturers. Imitation in designing. Uneasy with debates in team discussion. Unsure with the Conceptualisation phase. Higher power distance with Chinese instructor.	Inspirational design lecturers. Innovation in designing. Debates all the time! Emphases on Conceptualisation. Lecturers are like “friend”.
E3	Uneasy with debates in team discussion. Prefer working on concrete idea than discussing idea in team. Something to “show” as evidence of work. Unsure with the Conceptualisation phase. Rather refine one idea to in-depth level.	Debates all the time! Working on abstract concept in verbal discussion. Emphases on breadth of concepts generation during conceptualisation phase.
P1	Silence in design discussions.	Dominating design meeting.

	<p>Early ideation with sketching of shapes. Visual articulation of concept. Instructional lecturers. Simplified design process. Separate individual conceptualisation and combine into shared concept. Subgroup formation. Silence in presence of higher authority. Language difficulty exists but can be overcome. vertical conceptualisation (Depth)</p>	<p>Conceptualisation from functional aspect. Verbalisation to articulate concept Inspiring lecturers. Established design processes. Discussion into shared concept. Individuality. Domineering in design meetings. Language is less problematic. Lateral conceptualisation (Breadth).</p>
P2	<p>Fluent at sketching and CAD visualisation. Imitation as designing. Prefers ideation with shapes. Use visual sketching to communicate.</p>	<p>Fluent in mind mapping. Innovation as designing. Conceptualisation with words. Design language exists.</p>
M1	<p>Fluent at sketching and CAD visualisation Ideation with shapes, skipping research phase Ideation with “feeling” and “shaping” Making up story afterwards Successful brainstorming with visual sketching Collective discussions within subgroups Feature-follow-form. Thinking sketch. Vertical sketch process. Better sketching skill. Ideation with sketching first through shapes. Less phases in simplified processes Ideation before research. Combining ideas into one shared concept. Vertical (Depth) conceptualisation. Quick and dirty depth-first ideation. No specific conceptual design stage.</p>	<p>Fluent with mind maps. Ideation with discussion in words. Encouraging explanation during conceptualisation. Design meeting with debates. Individuality in discussions. Talking sketch. Lateral sketch process. Separate stages in processes. Ideation after research. Discussion between individuals into one shared concept. Lateral (breadth) conceptualisation. Linear, sometime iterative, breadth first process. Specific conceptual design stage.</p>
M2	<p>Feature-follow-form. lack awareness on individual ownership of design concept</p>	<p>Form-follow-function Awareness on individual ownership of design concept</p>
F1	<p>Ideation at concrete levels in creative space. Visual oriented.</p>	<p>Conceptualisation at abstract level in Process. Words oriented.</p>
W1	<p>Silence in design discussions. Early ideation with sketching of shapes. Visual articulation of concept. Instructional lecturers.</p>	<p>Domineering design discussions. Conceptualisation from functional aspect. Verbalisation to articulate concept. Inspiring lecturers.</p>
W2	<p>Ideation with imagination. Visual oriented.</p>	<p>Conceptualisation with Process. Words oriented.</p>

Table 12: Research themes after final analysis

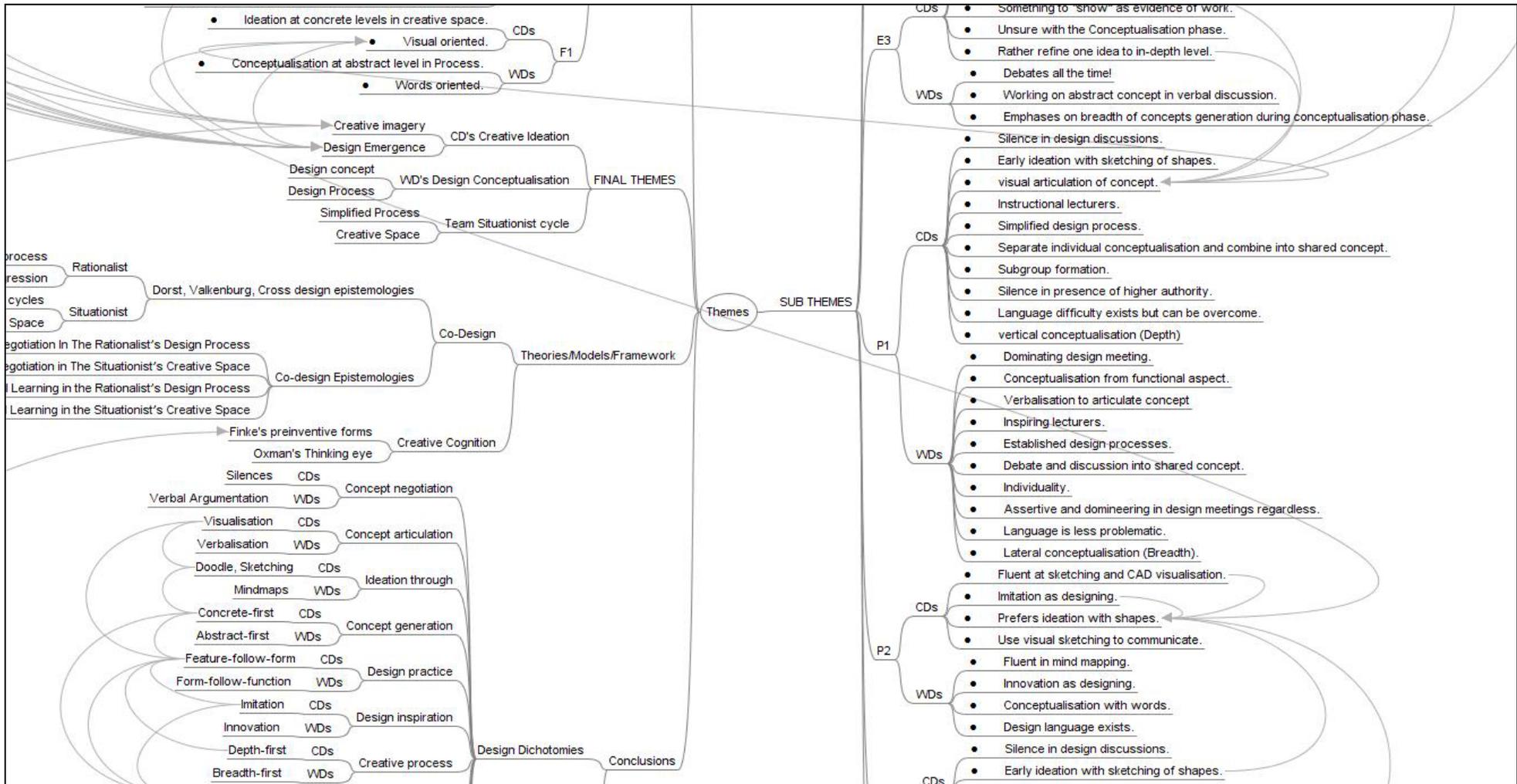


Figure Y: A snapshot of inductive analysis in thematic diagram

4.7.1 Implications from Early Studies

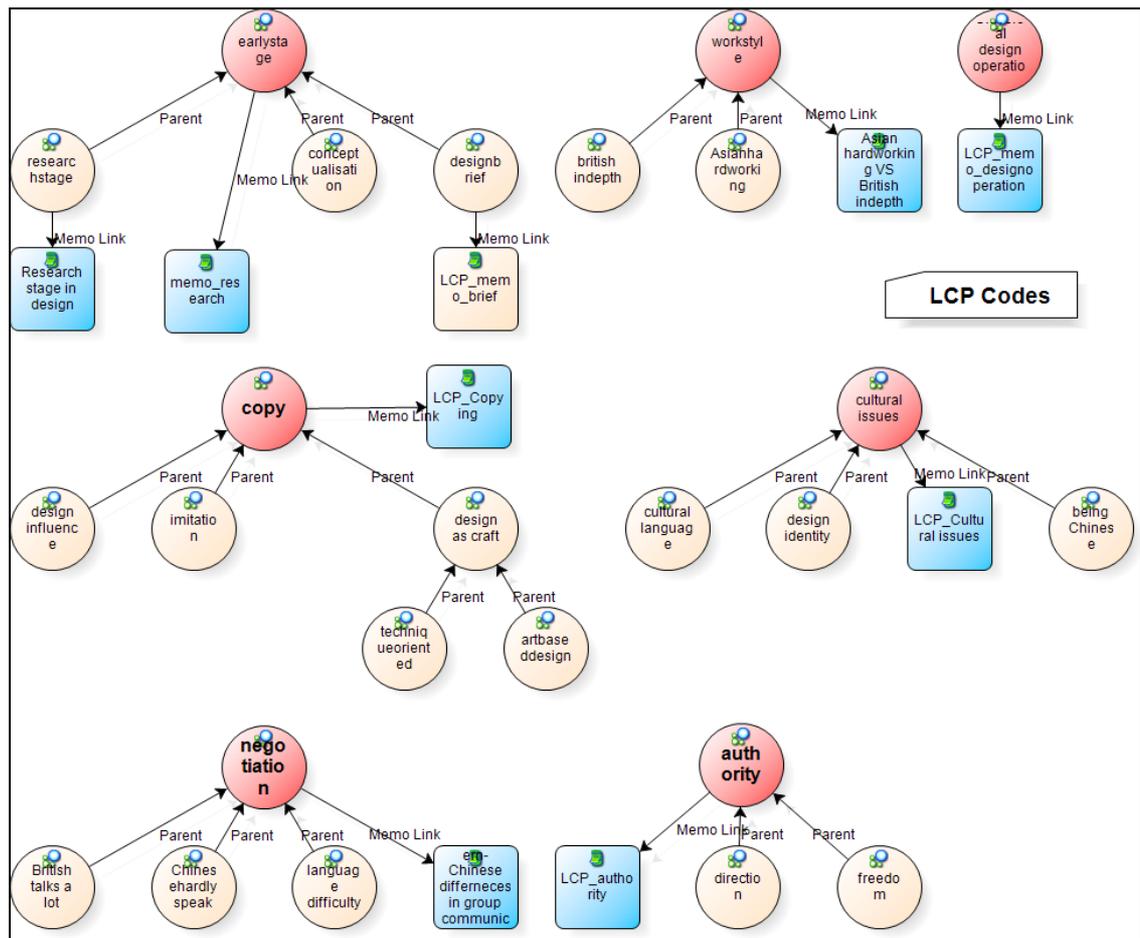


Figure Z: An example of themes with Nvivo7, an analysis on E1

The early studies were in-depth interviews to explore the research topic with a view to revealing themes for later studies. The early studies generated an initial set of themes. These are sub themes with possibilities to be substantiated into core themes when they matched themes and theories during Main Analysis and Final Analysis, and during writing-up. I analysed the early studies using Nvivo7 by tagging and giving codes to excerpts of text. I then categorised the related codes into early themes. Figure

Z is a screen capture of the coding scheme generated by Nvivo7 from E1. Table 13⁶⁸ displays the early themes of each early study after first round of analysis and the implications for the scope of next study. The early themes were crude and dispersed at this stage, providing possibilities for exploration, which I discuss with the support of narratives.

68 Sub themes in Table 13 are slightly different from sub themes in Table 11 (page 146) as they are results of after analysis at different time. Sub themes in Table 11 have been contextualised with themes from pilot and main studies after final analysis.

Early Themes		
E1	E2	E3
Instructional Chinese design teaching. Home countries emphasis on drawing technique copying. Chinese boss with less freedom. British students debate in group discussion. British are more conceptual. British boss gives more freedom. Hybrid Malaysia and Hong Kong. Universal design language.	Instructional Chinese design lecturers. CDs tend to imitate when designing. CDs are uneasy with debates in team discussion. CDs are unsure with the Conceptual Design Phase. Higher power distance with Chinese instructor. Western design lecturers are inspirational. WDs are innovative when designing. WDs debate all the time in group. WDs emphasise on the Conceptual Design Phase. Western design lecturers are like "friends".	CDs are uneasy with debates in team discussion. CDs' prefer to work on concrete idea as evidence of design rather than discussing idea in team. CDs are unsure with the CDP. Rather refine one idea to in-depth level. WDs debates all the time! WDs work on abstract concept in verbal discussion. WDs emphasise on breadth of concepts generation during the CDP.
Implications for next study		
Study CDs from Mainland China. Study early designing in group. Study other design disciplines. Study Chinese design lecturers.	Study Conceptual Design Phase. Study innovation VS imitation. Study early design collaboration.	Study early design process. Study design practitioners with expertise of proficient and above. Study early design collaboration. Study design ideation. Study New Product Design projects for creative process in innovation.

Table 13 Themes derived from the Early Studies

Hybrid Chinese Designers

When asked to represent the Chinese way of designing, both San and Garrett used the term "hybrid" to represent their East-meets-West design identity. East in San's case means Malaysia while in Garrett's case means Hong Kong. San regarded her Malaysian-Chinese hybrid culture as a plus for her as a designer practising in London when there are design project requires cultural sensitivity in South East Asia. They also reported

that design education in hybrid countries such as Hong Kong and Malaysia is divided into Western- influenced and Chinese-influenced. San went to the Western-influenced design institute in Malaysia while Garrett went to the Chinese-influenced design institute in Hong Kong. The dichotomy between their practices can be seen in their accounts, even though there are similarities. The implication informed the next study, namely interviewing only Mainland Chinese student designers in E2 and observing during the fieldwork at Sang Design.

Universal Visual Language for Designers

San insisted there is a kind of visual language that is universal among designers, which overcome language difficulty to articulate her design in English:

“In my opinion, there won’t be a problem if it is a good idea. Creative industries are the same as everywhere in the world. We work with people with same wavelength who speaks the same graphic language in this industry. Graphic and visual communication is the language. That is what I do as a profession. I believe even though there is limitation in command in English and the grammar, it should be possible to use simple language to tell the idea to people with same wavelength.”

Account 1: San on graphic language shared between designers

Various designers in the later studies also reported the notion of a universal visual language that operates despite language difficulties. Garrett, however, found it hard to articulate his ideas to British clients and bosses. However, his reason was that it was due to the differences in work expectations. Freedom of thought was not appreciated in his current practice, which was more of a printing company, in contrast to San’s advertising agency. The differences in their experience reflect differences in their

worldviews in design – their work process. San’s agency allowed more freedom for creative ideas, while Garrett’s printing company was more production-oriented.

Thinking, Process and Practice

While San had established a work process in which she became familiar with a client’s expectation by drafting the design brief together, Garrett found it frustrating:

“[the client said nothing], not even any single word of the objective or audience, nothing else, just the job title. I used to get a creative brief sent to the client. But it is dead. It is no more. Because this is not a proper design practise or design house. So it is quite hard. So I need to do a job. It is a logo, it is a flower shop. So what else? Nothing else. I have to play, to guess, and to do research on my own.”

Account 2: Garrett on the lack of briefing

Garrett guessed the brief by considering the clients’ personality getting clues from the bits and pieces in discussion during their work. San saw the problem as relating to the business nature of Garrett’s clients:

“Maybe it is not a proper agency or client. That is why they don’t have a system.”

Account 3: San’s expectations of a design agency

The system suggested by San was a kind of work structure for creative production that she had adopted since her earlier days in Malaysia at the advertising agency:

“Like a creative production structure. Like thinking, like the way how the work is handed down. It is like a big committee with creative director, art director, copy writer... bla bla bla... art worker, production manager, sales executive...you know the whole structure. Now that I work here. I work with the non-advertising agency. There is no structure but I still adopted the same sort of method of working in this company. Even though it is not successful, but I know how things work. And then I realized that the method of working with the agency here it would be the same. It is similar sort of approach.”

Account 4: San on creative work structure

The agency system/method/structure seemed to work for San, regardless of whether she is working in Malaysia or London. This “creative production structure” was important for San as a way of knowing “how things work” even though the system/method/structure might not be working. San ambivalently equated the “creative production structure” as thinking or working method. Her optimism was reflected in her flexibility in the work process. She was ready to see the design problem as a wicked one (Rittel & Webber, 1973). In contrast, Garrett was expecting a well-defined design problem to be given by the client. The differences could be due to the nature of both their practices and the clients they dealt with - Garrett’s printing company compared to San’s advertising agency. The differences influenced the later research focus, when I resolved to study only new product design projects at design practices.

Jimmy and Kathy pointed out that there are two types of interior design methods/processes in China: one taught at college and one at companies. Both started with a floor plan, followed by finding functionality for the spaces, then dividing space for use, before finally finishing with decoration. The design process in companies is

more hands-on, with less planning. The research stage is very important in the UK but not in China. Chinese interior design focuses on results and emphasises on presentation - whether it looks good, whereas in the UK the design process is more important. They highlighted that the use of sketchbooks at ECA to trace the students' thought process was not important in Chinese education. Designers in Britain are allowed freedom in creation by the customer, who gives more trust to designers' in their professional work. Customers give design briefs with only a theme and leave the details to the designers to work on. In China, customers dictate designers' works without respect for the profession.

On Design Education

This type of thinking system/structure/method, as San immediately remarked, informs the different approach in teaching design in Britain:

“...In term of thinking, studying here (Britain/Western). Lecturer will try to teach different...approach the student in a different way. They want the student to speak out.”

Account 5: San on Western-Chinese difference in design teaching

San and Garrett compared the design education of their home institutes and LCP. They suggested that British design education puts more emphasis on personality and the identity of the individual student and the lecturer tends to give more freedom. Exploration was encouraged without giving any specific restriction:

“I suppose oriental people like to respect and follow order and command while doing something or to achieve something. It is as if there is a philosophy

of this. In Western country like Europe however, the education system allow students to explore, experiment and speak out on a given brief.”

Account 6: San on WDs' freedom

Summer said that the design course at ECA is designed without lectures. She found it a good opportunity for her to complete her own thinking process by herself without having to follow instructions from a lecturer. Though this method can be quite spontaneous, it makes it harder to know which direction to go. Unlike Eastern way of learning, teaching style is more of a duck feeding method (填鸭式) where a lecturer will dictate student's direction. Her view was there is a change in design education in China now that the failure of duck feeding education to inspire student designers has been recognized.

Summer said that lecturers in Britain give more freedom for students to think and explore independently. It is the other way round in China, where lecturers (who are addressed as “teacher”) can dictate students' work. Jimmy and Cathy recognised this difference in teaching style between Chinese and British, and that students have more room to make their own decisions in Britain. They were quite confused at the beginning of their study as their British lecturer (which they addressed as tutor) did not give exact direction or answers to their enquiries. They were left to their own devices without much guidance. This is significantly different from the “duck feeding” way of teaching in China. There is no hierarchical distance between “tutor” and students in the UK but in China, the lecturer is called “teacher” and they can dictate students' learning. Kathy and Jimmy also suggest that unique personality is not valued in China, which could be a hindrance for student designers. A general conclusion from Chinese student designers E2 is that the one year of postgraduate study in Britain has brought out their identities, helped by encouragement from their British design lecturers. Unfortunately, lecturers in

China tend to give negative opinions on student's work that is discouraging for creativity. Chinese lecturers base their judgement more on how it will be useful at the workplace in future.

The "Conceptual" British

San and Garrett both preferred their design learning experience at LCP to their home design institutes. They found the latter more instructional, with an emphasis on techniques, particularly drawing, which students learn through imitation. In contrary, LCP is more conceptual and gives them more freedom to find their own identities. However, San did not pin this down as a cultural difference in design learning, but suggested that it depends on the institutes, as LCP is more a conceptually-oriented institute. Every design institute has its own characteristics. Their views of WDs as conceptual can be traced back to their design experience in London. When asked if British designers are more "conceptual" - a term I did not elaborate on - San and Garrett agreed and Dan replied that to conceptualise is to create something novel, as opposed to copying:

"Yes, they are more conceptual. For instance, we would have to ask why although Chinese work hard, they seldom create something (new) for themselves. In China especially, everyone is so good at copying, for example artwork, embroidery or vase painting."

Account 7: San on WDs' being more conceptual

Design learning in China and in Chinese-influenced design schools is lacking in an emphasis on the research/conceptual stage of design process, even though Jimmy and Kathy claimed that the design education in China is also influenced by Bauhaus and

Russia. It is hard for them to grasp the conceptual design phase and research phase in the design process.

On Design Collaboration

One generic interview accounts from CDs is that WDs tend to be more outspoken and articulate about their ideas during big group discussions. Discussion of idea during brainstorming for British is genuinely collaborative decision making of ideas. Whereas among Chinese, conversations tend a proposition of a design decision already made, that the ideation is more internalise among Chinese.

Summer viewed China as a higher power distance country than Britain. The “boss” gives designers directions in detail, without freedom for individual ideas. In contrast, the British are less hierarchical so that subordinates’ ideas are valued. The solution lies in allowing the emergence of these ideas. Summer elaborated that CDs individually develop their design idea/concept before meeting up to discuss in a team context. Chinese negotiation is therefore on decisions already made, in contrast to Western settings that feature collaborative discussion and idea/concept formation. Jimmy and Kathy had the same view: that the British tend to be free but Chinese are more cautious about whether their design is “valid”. The view is that British designers enjoy the process more but the Chinese approach is more result-oriented.

4.7.2 Implications from Other Contributing Studies

Several patterns were observed from the other contributing studies, firstly at Wuxi-Zurich design-exchange (WUZU) and secondly, the Mosen Studio. I will only discuss the themes that fill the gap by supporting or substantiated core themes from the early studies and ethnographic fieldwork. The sub theme from WUZU that fills the thematic gap is the verbal-visual dichotomy in concept articulation, which I reported in

Nainby, et al. (2006). The study analysed a transcription of an interaction between Swiss and Chinese student designers and concluded that WDs verbalised more than CDs during early design collaboration. The patterns of association and dissociation of design ideas were also reported on. WDs generated more dissociated ideas than CDs; and WDs tended to begin with dissociations and end with associations, in contrary to CDs, who were more even throughout. One sub theme derived from the Mosen Studio research is particularly related to this verbal-visual divide. The WDs' use of mind maps in words, in contrast to the CDs' use of sketching shapes as an ideation tool, supported the dichotomy of verbalisation and visualisation. This theme is discussed further in section 5.2 and 5.3.

CHAPTER SUMMARY

In this chapter, the research journey from the beginning to the end was outlined, by means of description of the research process, case studies, research studies, analysis samples, and research themes. The themes, and how they were derived and substantiated, formed the focus of discussion. The journey, enriched with narratives, provides a background for understanding the main themes that are reported on in the following chapters.

CHAPTER 5: NEGOTIATING CONCEPT AT SANG DESIGN

CHAPTER OVERVIEW

This chapter describes my journey into answering the first research question: How does a collocated and cross-cultural team of WDs and CDs **generate creative concepts** during early design collaboration? Section 5.1 reports on the first pattern that emerged from the fieldwork during the main studies – CDs’ silences during design meetings. I first explore possible socio-cultural reasons for the silences by using the existing framework from cross-cultural research. I explain why these reasons were dismissed as significant factors to pursue in this thesis. Section 5.2 turns attention from these socio-cultural issues to design cognitive issues of concept articulation between WDs’ verbalisation and CDs’ visualisation. This opens up a discussion on the significance of an internalised creative process in CDs, which will be fully addressed in chapter 6.

5.1 NEGOTIATING SILENCE AT SANG DESIGN

After early studies carried out in the UK and Italy, I set off to conduct my fieldwork in China. I was equipped with a literature review with the research aim of investigating differences between Western and Chinese designers in concept negotiation. This study of early design collaboration by tracing the argumentation process through conversational protocols is quite commonly done in design research. However, informed by early studies, I was sceptical as to whether I would be able to see the expected verbal discussion, defence and debate. Despite this scepticism, I had the confidence that existing design theories would be adequate for me to understand this Western-Chinese design collaboration. Two of the books in my luggage were “Design Engineers”, by Louis Bucciarelli (1994) and “Developments in Design Methodology”,

edited by Nigel Cross (1984). These works, and a large collection of electronic journals on my laptop, are the core material of design studies. I thought I was well equipped.

How wrong I was! My first visit to Sang Design was a revelation that confirmed my scepticism. One vivid remark was from the German design director Mikael, after my observation in a design meeting he was leading at Sang Design (Account 8). Prior to Sang Design, I have also received similar remarks from WDs at Howa Design and Swiss lecturers at WUZU2005.

“You want to know why the meeting was so quiet. Maybe you can tell me. I have been here for two years but I could not get my CDs to argue with me. I wished they did. It would be better if they do fight (argue) with me, then I could know if my idea is questionable. So I could think further and respond.”

Account 8: Mikael, German Design Manager on CDs' Silences

Also, the American Team Leader at Sang Design, Laura, expected exchange of ideas in the form of heated debates. She moaned at the end of her busy day at Sang Design (Account 9):

“I am so dying for a conversation in the office. There is little chance to bounce off ideas with me in that office. I am desperate for exchanges of ideas.”

Account 9: Laura, American Team Leader on CDs' Silences

Laura was a successful American designer from Seattle who had practiced in several internationally acclaimed design practices in California, such as Frog Design and Siemens' Design Affairs. She had arrived in Shanghai three months ago, before my

second trip to Sang Design in winter 2005, as part of a staff exchange program between Sang Design and Afar Design's San Francisco office. Laura took up the exchange due to her curiosity in Chinese culture and the thriving design industries in China. Her role in Sang Design was to lead a team of two WDs (Germans) and two CDs for American design projects. Again, she emphasised her expectations regarding the silences during team discussion with CDs:

"I have the feeling that it is not something explicit like "my idea is the best" here which is different from what I used to before. I fought in San Francisco for years. It was very vocal, very competitive. Everyone was always [saying] "me, me, me" and sort of [expressing themselves with] boisterous acts. It was something like argumentation between my idea and your idea. It was very argumentative and loud. We would argue over why a design is better and more famous than the others are. However, here [in China], everyone seemed to be good and content. No one would even question if one of us just summarised the ideas and combined them and took it as [our] own idea. They would just let it go."

Account 10: Laura on viewpoint and argumentation

Drawing on my early research focus on observing concept negotiation, I asked Mikael: "*If they don't argue, how do they express their viewpoint in the meeting? How do you work together?*" Mikael gave me a shrug and invited me to a design meeting he was chairing on the day of my arrival at Sang Design. It was the first meeting to design an industrial measuring tool for the German company, Daka. Several days before, in a briefing meeting, Mikael had verbally given a design brief to team C members (Table 5, Page 129, for the list of team members). There was no design meeting between briefing

and design. Instead, designers worked individually on their concepts until the design meeting. Episode 2 describes the design session for the Daka project:

Everyone brought a sketchpad filled with sketches of their design concepts into the glass box. Mikael started the meeting: "Now, let's see what we have here." One by one, the team members presented their work. Wei (CD, graduated from Tsing Hua University) was first to explain his sketches in English. With a soft voice, he seemed shy, speaking with his head down when presenting his idea, like the majority of CDs at Sang Design. He explained his design by pointing to his sketches with a pen. He stopped frequently to think of a suitable word. The atmosphere was solemn. Just when he seemed to run out of words to articulate his design Ong, the Singaporean research leader, joined in the meeting. Ong was educated in Singapore and the UK. He spoke fluent Mandarin as well as English and was unofficially the interpreter between the Western team leaders and CDs in Sang Design. Wei seemed relieved and elevated his voice to describe his design to Ong in Chinese. It seemed he was hoping Ong would do the translation but Ong was not responding. Abruptly, Wei finished his presentation: "Ok! This is my design." Despite the fact that he might not have articulated his design to the group, no one asked further questions to understand the design. Mikael then gave his comments on Wei's design. Similarly, the other team members showed their work, followed by Mikael making comments. The meeting was quiet and formal and no one seemed to raise questions. Mikael did most of the talking, despite encouraging suggestions from his team members. Mikael also made the decisions in the meetings other than when research leader,

Ong or team leader A, Tian, were in the meeting.

Episode 2: Team C Daka Design Meeting

Wei did not attempt to describe his concept further and neither did other designers ask him for further explanation. It was either that the sketches were easy to understand or that no one was willing to speak in the design meetings. My understanding is that it was the latter. This type of atmosphere is generally observed among CDs. I observed two more design meetings in Sang Design during that week (Episode 3). Each repeated the silent moments observed in the above-mentioned meeting.

As Tristan's presentation finished, the design meeting proceeded into teamwork. Lian displayed a matrix of empty spaces to be filled in between two categories of key terms. They were laid out horizontally⁶⁹ and vertically⁷⁰. Lian gave a short brief to the team on generating brand name using this matrix. Mikael seemed tired by now; Ong took over the leading role: "Do you know these words? If you don't know, please ask me." But there was no response. So he pressed on: "Ok, may be you can start by drawing."

Tristan took the initiative to record. He walked to the flipchart beside the projection screen, grabbed a marker pen and prepared to

69 "enlightment", "innovation", "enjoyment", "reliable", "support", "advisor", "comfort", "aspiring", "discovery", "fun", and "freedom".

70 "material", "color", "animal", "people", "nature", "action", "equipment", "technology", "health", "relationship", and "sport".

record ideas from team members. Mikael asked Lian to record the contribution in the table of data. The rest of the team members seem to get ready too with their seats positioned towards Tristan and the projector screen. Wei finally got his head up and looked towards Tristan, occasionally peeped towards Mikael's direction. Mikael looked around while checking out what others were doing, in a casual way.

No one said a word for three minutes, Tristan suggested the start: "so we have here "material" and "enlightenment". Mikael interrupted: "Let's skip "material" first and let's start with a light one. Now don't think about products, don't think about brand names, just think about these combinations of words." Ong started to fill up the empty boxes while Tristan records "Buddha, Buddha? I don't know" he looked at Tristan. Mikael: "Jade, Jade (in Chinese). Yu? Yuuuu? yuuu?.." Ong: "(Jade in Chinese) Fei Cui?" Lian giggled. Mikael gave directions whilst others continue suggesting words. Lian giggled a lot. Ong referred to dictionary and some catalogues to find inspirations while Tristan recorded the words on to the flipchart.

At the end of the meeting, Mikael finalised the meeting into one direction by combining the good features, which were predominantly the design form of each idea. When it was a smaller project or there was a tighter deadline, like this one, the designer with the most features was chosen to finalise the concept for approval by Mikael. For big design projects, each designer would be told whether to continue working on their sketch for to refine the concept for the next meeting or to try to find a new concept based on what was discussed.

Episode 3: Silences during Franctex branding meeting

The talking occurred in three formats: 1) between CDs and Ong or Tian, predominantly regarding decisions on which features of the concept to keep; 2) Chinese subgroup discussions in very low voices, even when other designers were discussing or presenting; and 3) among WDs, especially Mikael, Ong and Tristan.

5.1.1 Counting Silences

It is easy to dismiss these CDs' silences because of my subjective observation. To begin with, what do I mean by silence? Can anyone be silent at all? The differences are relative instead of absolute, cut-and-dried differences. I observed that CDs are much more silent compared to WDs. To confirm this, a quantitative study on the silent moments in design meetings was carried out. Table 15 at page 167 summarises the silence time. This quantitative study gives solid evidence for the exploratory research, in order to eliminate possible bias in observation.

I chose one session of design meeting from the Roko Project, that is representative of design meetings in Sang Design. A two hour Roko project design meeting on 13th January 2006 in the second floor discussion room was chosen (Appendix III, Table 22, session 29, page 316). The meeting was at the stage when designers were ready to present for the first time on their early sketches. The choice was made after I had previously sat in on a few meetings to understand what a typical design meeting was. I also listened to recordings of a few design meetings in order to make the choice. The conversation in the meeting was recorded on a Sony digital recorder Model ICD-MX20, transcribed using Transcriber® transcription software, and analysed using Microsoft Excel to compare talking time between WDs and CDs. Table 14 shows a

sample taken from the transcription. The study traced the statistics of the talking time and silence time of each individual.

Each utterance is timed and coded to “Silence”, “Presentation”, “Chinese talk”, “Western talk”, “Chinese Subgroup” (Table 15). To clarify, by reporting silences among CDs during the design meeting does not imply that CDs do not speak at all. **“Silence” is coded when an utterance receives no response** - for example, when a designer gave suggestive or inquisitive utterances and received no response. Silences between utterances unrelated to the discussion are not counted - for example, when designers were handling prototypes or waiting for the next designer to present. The “presentation” time is not counted as talking time, as designers individually presented their concept without expectation of a response from the others. Subgroup discussions among CDs are not counted as talking time, as the conversations were mostly inaudible and did not involve the team as a whole.

Utterance	Time	Designer	Codes	Transcription
303	78.092	JIE	Presentation	This is also a module with a (inaudible) and the function, with the function module with big screen of keypad or the game keypad if you want. When you buy this phone, you can choose the module to have it. And also have the like this more camera module when, because, you can insert three or two module. One time where you put in on the desk, you want to take some picture of yourself. You can insert this camera part the size of the screen. If you want to take photos. Hmm, of balancing, you can put the camera behind it. Ah, this is my concept.
304	22.18		Silence	{passing around model} AC left.
305	13.264	JIE	Presentation	May be we, I have seen about the screen. Because always if may be we want the screen, may be we can get the screen fix in this part.
306	1.865	NC	Western talk	So you can change whenever you want?
307	10.283	JIE	Chinese talk	Yeah, if you ... em... if you want the

				gaming kit, you just insert the gaming keypad. so you have the
308	1.289	MIKAEL	Western talk	The screen is fixed.
309	1.073	JIE	Chinese talk	Yeah the screen is fixed.
310	3.458	MIKAEL	Western talk	May be, yeah may be this is a bit too modular.
311	10.331	TIAN	Chinese talk	I think may be the function that may be play game. You can include to play movie function here.
312	0.458	MIKAEL	Western talk	hmm.
313	14.981	TIAN	Chinese talk	Don't have to need too many functions. But the Mp3 also has a module so it seems too many modules. May be just the one. I think may be just the one piece can play movie, can flip it.
314	29.086	MIKAEL	Western talk	But then why do you not just flip it like this. We already have hinges. If we can do that, why should I take it out? Then put like this? The context will break after some violent. You know. So, if it is just one, or two, then it is too less, we can do it like that. If we need more, we can think about it.
315	4.464		Silence	(Silence)
316	5.104	MIKAEL	Western talk	It can be a concept but it needs to have a bit more reason why.
317	8.031		Silence	(Silence)
318	11.631	MIKAEL	Western talk	And always consider if you have frame the can keep two of these. You always add useless space. It is always bigger.
319	14.744	JIE	Chinese talk	Because it's modular, it is separated. Ah... it is separate material. May be there still slim. So I think it won't be very thick.

Table 14: Sample transcription and labeling

Code	Description
Western Talk	When WD talks to discuss design
Chinese Talk	When CD talks to discuss design
Chinese Subgroup	Discussion between Chinese in-group members in Chinese language
Presentation	Designer is presenting own design
Silence	When no one talk

Table 15: Codes and countable as talking time

Speaker	Origin	Position	Time (in seconds)
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			Chinese talk	Western talk	Presentation	Total
Mikael	Western	Team Leader	NIL	2554	340	2894
Ong	Western	Team Leader	NIL	104	NIL	104
Tian	Chinese	Team Leader	145	NIL	101	246
Gao	Chinese	Designer	32	NIL	323	355
Tristan	Western	Designer	NIL	221	252	474
Wei	Chinese	Designer	207	NIL	239	446
Xuan	Chinese	Researcher	24	NIL	247	271
Keiko	Western	Designer	NIL	326	367	693
Jie	Chinese	Designer	245	NIL	210	455
Lee	Chinese	Designer	77	NIL	149	226
Mei	Chinese	Designer	40	NIL	85	126
Total			770	3208	2313	7286

Table 16: Individual designer talking time

Time (Seconds)	Chinese Talk Time	Western Talk Time	Presentation Talk Time	Chinese Subgroup	Silence	Total Time
Talk time	770	3208	2313	423	572	7286
Talk time (Exclude Mikael)	770	654	1973	423	572	4391
Talk time (Exclude leaders)	625	550	1872	423	572	4041
Average Time	110	802	210	423	572	662
Average Time (Exclude Mikael)	110	218	197	423	572	439
Average Time (Exclude leaders)	78	275	234	423	572	505

Table 17: Quantitative analysis of talking time

One factor to be considered in the analysis is the absence and presence of Mikael's talking time in contributing to WDs' talking time. This was due to Mikael's high authority position creating a power distance effect on CDs in the meeting. It was also because a large part of his talking time consists of feedback and instructions to the

team. Ong and Tian, both leaders from other teams, were not acting as team leaders for the Roko Project. However, to be sure, I include one total which exclude their talking time (Table 17).

Western/Chinese comparison of	Ratio
Talking time includes Mikael's	7
Talking time excludes Mikael's	2
Talking time excludes Team leaders' (Mikael, Ong and Tian)	4

Table 18: Western to Chinese Ratio in Talk Time

The analysis is a direct comparison of the talking time of WDs and CDs. There were only four WDs in the team, significantly fewer than the seven CDs. Consequently, the average time was calculated and compared rather than total time. Table 18 shows the ratios of WDs' talking time to CDs' talking time, 1) when including the talking time of Mikael; 2) when excluding the talking time Mikael; and 3) when excluding the talking time of team leaders. These respective figures are 1) 7 to 1, 2) 2 to 1, and 3) 4 to 1. On average, WDs were likely to be approximately twice as active in verbal discussion as CDs. CDs' talking time comprised only 10.6% of the whole design meeting, despite their being seven of them, while the four WDs took up 44% of talking time. Out of presentation time, there was also no active discussion as a team for 20.8% of the time. 11.50% of the time is traced as total silence and 9.3% as Chinese subgroup discussions that generally involved only CDs and were inaudible to the team. In general, the analysis confirms that when designing in a team, WDs are met with silence from CDs.

5.1.2 Socio-Cultural Reasons to Silence

CDs' silences during design meetings puzzled WDs as well as me. My pilot analysis and main analysis of the silences was based on the concept of designing as a social process of negotiation (Bucciarelli, 1994), with a focus on cultural dimensions to

identify cultural differences (Hofstede, 1991). Even though my early studies on Chinese student designers (Table 12, page 146) found both social and cognitive patterns, the latter were ignored during pilot studies due to the early research focus on socio-linguistic issues. Only during the main studies, when I managed to collect more visual data, such as sketches and videos, did the cognitive issues become core themes in the final analysis. This turn was also informed by the interviews from the pilot studies at Sang Design, which dismissed the significance of these socio-linguistic issues on the designerly act. Consequently, in the main studies and the analyses that followed, I turned to investigating the cognitive reasons for the silences.

The hermeneutic turn – from studying the explicit to the implicit – draws attention to the complexity of the cross-cultural phenomena observed. Even as an insider, I had presumed that cultural differences in social interaction during collaboration, and language difficulties, would be important. Admittedly, I had my preconceptions when analysing the fieldwork during the pilot studies. I had interpreted the fieldwork with models of cultural dimensions from social-cultural research such as work by (Hall, 1976; Hofstede, 1991).

This also draws attention to another problem in design research, a new field that borrows from disciplines such as cognition studies, sociology, engineering, management, etc., which contain diverse views and often conflicting ideas (Cross, 2006). When studying a lone designer, the division is useful. However, when studying designers in collaboration in the complex design context, both social and cognitive issue are influential and should not be separately studied (Alexiou & Zamenopoulos, 2008; Nigel Cross, 2006). I have also proposed in Chapter 1 that the situatedness of the designerly act goes beyond this socio-cognitive division. In view of this, the socio-linguistic implications, despite having been dismissed as significant for this research,

are valid sub-themes that should be considered when interpreting the fieldwork. The following section briefly describes three socio-linguistic sub-themes and the reasons for their exclusion.

Language Difficulty

Language is a difficulty at Sang Design. Although most designers are Chinese, English is used as the language for communication at Sang Design. However, it was not only CDs at Sang design who spoke only entry-level English. Several WDs from non-English speaking country spoke only slightly better English. It was the same situation in the other contributing studies. Consequently, language difficulty was the prime suspect as a cause of the silences during design collaboration. So I asked questions about language difficulty when interviewing thirteen designers (WDs and CDs) at the end of the pilot studies at Sang Design. Language was indeed acknowledged as a difficulty. However, contrary to common assumptions, it was quickly dismissed as a reason to the silences. Table 5 at page 129 shows the level of English commanded by designers at Sang Design. Ten of them recognised language difficulty as rectifiable problem over time. Shanghainese project manager Ying was particularly adamant (Account 11):

“Although there was some language problem during interaction but basically we were all working on designing so the meanings communicated are similar, therefore there was not much of communication problem, basically we understood each other.”

Account 11: Ying on language difficulty

At first, I suspected that CDs’ claims that language difficulty is rectifiable were due to worries about “losing face” and admitting to weakness in their command of the English language. However, even Laura, the American team leader dismissed the

difficulty, suggesting that, regardless of background and language, designers share a kind of “design language” (Account 12). This design language was reported at the first early study when I interviewed San and Garrett. It implies a possibility of a universal language exists among designers.

“...it was actually very easy for me to follow their thinking because they were drawing while they talked. I don’t need that description in English at that point because, you know, I understand, you know, from my point of view, I understand how the brain works to design something. ...For me it is easy to understand the design they intend.”

Account 12: Laura on design language

The fact is that apart from Laura and Ong who is native English speaker, language was a difficulty faced by both WDs and CDs at Sang Design. Therefore, language difficulty can be ruled out as major contributing factor to CDs’ degrees of silence.

Subgroup Formation

One generic pattern observed at Sang Design is that CDs would form subgroups and sit closely together, while WDs tended to sit individually. The subgroup was a collective of several designers that formed during design meetings. Figure AA shows seating plans I observed during Roko design meetings. Generally, CDs would cluster together away from the screen or presentation board where the team leaders sat, while individual WDs were scattered about, close to the team leaders.

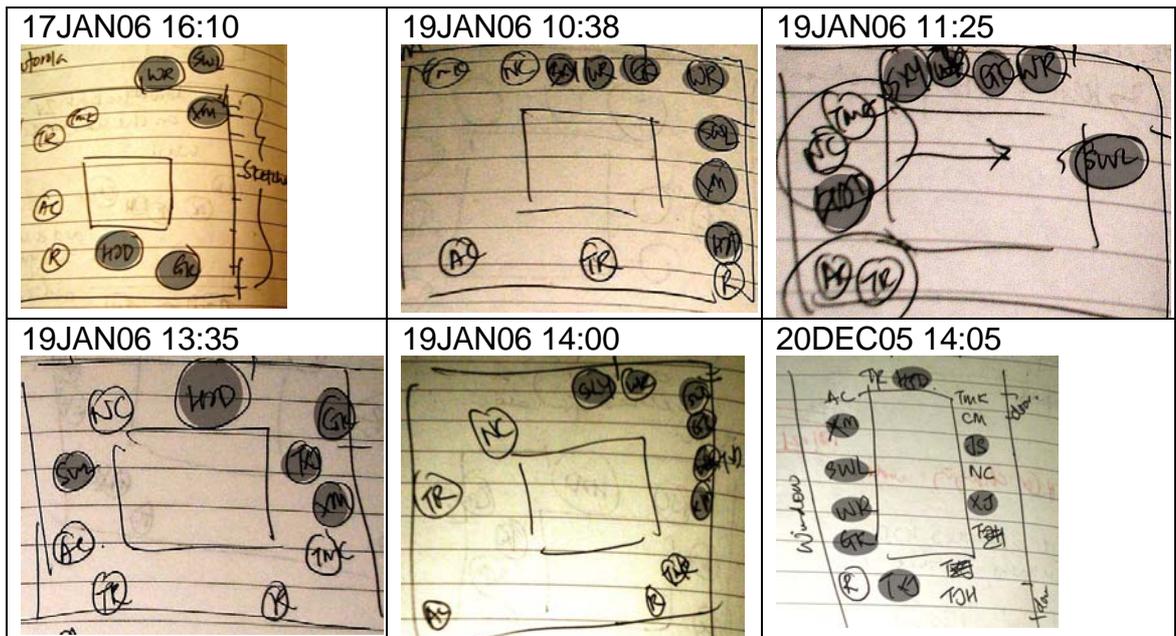


Figure AA: Seating Plans (Grey nodes are CDs)

Within the subgroup, even when other designers were presenting or discussing, CDs would chat between themselves in low voices only audible to them. These chats were not discussions in the form of concept negotiation, but were rather for sharing and confirming their opinions on what was happening in the meeting at the time. At WUZU2006 this collective behaviour reportedly prompted the Swiss facilitator to ban parallel chatting within Chinese subgroups. The Chinese design team leader at Sang Design, Tian, suggested that subgroup formation posed a difficulty for good design as it led to lack of discussion in the design meetings.

“CDs would discuss when they were together in a small group. Discussion is rare for CDs during big meetings. This is not good for design.”
(Tian, Chinese design team leader)

Account 13: Tian on CDs’ subgroup discussion

This duality of behaviour of CDs in and out of the subgroup can be explained by in-group and out-group difference. In-group members are close family members and

friends whom are given more interests than other out-groups members (Triandis, 1980, 1989). The subgroup members were not fixed, but all were CDs. Somehow, I was considered as one of the subgroup if I happened to sit nearby. CDs would whisper to me in Chinese and that was how I got to know what the chat was about. Intriguingly, the whispers were their sharing of opinions on what was going on at the meetings. Some were opinions on the design of the designer who was presenting at the time. Understandably, WDs at Sang Design found themselves left out from the subgroup (Episode 4).

The physical distance between Chinese subgroup and WDs can be discouraging. Episode 5 describes Mikael's attempt to persuade CDs to sit close to him during a brainstorming meeting for FrancTex, a company based in France that specialised in bespoke sports equipment. This pattern of interaction was frequently seen in Sang Design. Mikael's effort to break into CDs' subgroup was hindered by power distance, evident when Lian, Wei and Xuan started to speak to each other in a relaxed manner when Mikael walked out of the conference room. The socio-cultural issues can be overcome. The French designer, Tristan, spoke of his efforts to negotiate himself into the CDs' subgroup (Account 14).

It was Sang Design's Christmas party in 2005, in the first floor, colour lab area. After mulled wine, goulash and gift exchanges, CDs disappeared upstairs to their desks. Mikael, Stephan, Svenja and Keiko sat around the table and downed more mulled wine. With his eyes fixated at the lit candles, Mikael sighed: "It is always like this, only the foreigners are left behind, the Chinese just go away. Why don't they stay and chat?"

Episode 4: Mikael on fitting in

Mikael was leading a brainstorming meeting to generate a new brand name for Franctex, a French sport equipment company. The team members in the meetings were the CDs Xuan, Wei, Lian and the WDs Tristan and Ong. Mikael sat alone at the right side of the long meeting table while the others sat directly opposite him. Only Ong sat at the end of the table. Half way through the meeting, while Tristan and Lian were presenting with a flip chart at the opposite end from Ong, Mikael interrupted and asked CDs: “Can you guys come to sit near me? I feel like you are doing the presentation just for me.” His question was directed to Xuan and Wei. Mikael glanced towards Wei who sat with his head lowered: “Wei?” Wei raised his head and had a quick look at Mikael before putting his head down and declining in an almost inaudible voice: “I am OK sitting here because I am looking at Lian’s laptop screen.” Mikael persisted by glancing towards everyone in the room. While Tristan was looking at Mikael, Xuan and Lian exchanged eye contacts but Wei remained with his head down. Eventually after two minutes, Xuan volunteered: “Ok, I will come over.” She walked towards Mikael and sat beside him. Mikael nodded with delight. In truth, before Mikael’s question, Wei had been looking at the big screen on the board rather than Lian’s.

Episode 5: Mikael in Franctex’s brainstorming meeting

Tristan: “I think at first it is not easy. The difficulty is not about gaining respect because Chinese has perhaps too much respect for foreigners. But it is not easy to integrate well at the beginning. They may see me as a French guy and they don’t know if I am down-to-earth or not. I told them that I am normal and treat them as friends and as colleagues. Slowly, they started to be open to

me. This is not only at the workplace. We go to play sports after work. I joined them to play badminton and go to restaurants with them without any problem. Some people said that Chinese can be friendly to you but not really see you as friends because they always want to keep distance between you and them. But I think I managed better...I think among Chinese they always help each. We really work in a team. When someone is doing something, you can ask somebody else and try to improve it. Design is teamwork. It is not our own concept. It is the concept of a team. So we can really... I think it is not just me, it is among Chinese too, it is a really team spirit.”

Account 14: Tristan on fitting in with CDs’ subgroup

Bonds between CDs within a subgroup are strong. Within the subgroup, CDs spoke freely, joked and teased. Lunches were taken and dinner ordered together. During design meetings, when mixing with WDs or other teams, the subgroup would automatically assign a leader as the communicator for the group members. Agreement was easily sought within the subgroup. The discussions were *ad hoc* and mostly out of design meetings, or even through other communication channel such as online chats, similarly to the pattern reported by Schadewitz (2007). The discussions are very rarely verbal and argumentative in defence of viewpoints, as Laura had expected.

High Power Distance

At Sang Design, CDs verbalise less when higher authority is present, while WDs are not influenced by the presence. The reasons are manifold. One is Chinese high **power distance** - the distance between higher authority and their subordinates (Hofstede, 1991). The effect of power distance is easily observed at Sang Design among CDs. During design meetings, active exchanges happened predominantly between team

leaders and WDs, while CDs sat watching or responded only when asked. In general, the pattern that is evident is that CDs talked less when higher authority is present, but WDs were not influenced by this factor. Western team leaders in particular tried to encourage interaction, but often failed. For example in Episode 5 (page 175), Wei disregarded Mikael's invitation to sit near him while Xuan took some pushing to agree. Mikael tried to encourage teamwork, with himself as a team member equal to the CDs, but to no avail. Laura reasoned that silences in design meeting were related to the presence of higher authority (Account 15).

“During brainstorming sessions, only people with higher authority talked and the others just quietly listened. I would be interested to know why CDs were so quiet. They just listened to other people talking. I think it was unfortunate, but I have to understand that it is common here [in China]... everyone comes in, is given a task, gets comments on their work and they go back to their own desk and work. There is no discussion, no exchange.”

Account 15: Laura on CDs' silences

Sang Design employs a team-based project management structure. Through observations and interview accounts, I came to an understanding that the four team leaders of Sang Design - Mikael, Laura, Tian and Ong – each has a different leadership style. Although it is not the focus of this thesis, I acknowledged its significance when interpreting and analysing silences in design meetings. The German design director, Mikael, preferred formal design meetings to informal discussion, while the Chinese team leader, Tian preferred informal discussion at designers' desks, rather than formal design meetings in meeting rooms. Laura tended to balance formal design meetings with informal discussions at designers' desks. In addition to leadership style, these team

leaders also differ in their approaches to the work process. For example, Laura's was less hierarchical than Mikael. Tian worked like one of the designers in his team, apart from the fact that he also calls for meetings, meets manufacturers and makes decisions.⁷¹

Despite their preferences, the team leaders, except Tian, expressed their frustrations about silences and the lack of discussion during design meetings. I observed that the level of silences in meetings varied between team leaders. Tian agreed and gave his analysis, which was that CDs feared the social consequences of talking (Account 16). For Tian, the silence was not a concern. However, he was equally aware of the lack of discussion among his team members, despite using the Chinese language with his team (Account 16). On the other hand, Laura's meetings were generally more verbally active than Mikael's. Even so, Laura repeatedly expressed her frustration about not hearing challenging views from CDs (Account 15 and Account 10).

“To compare three meeting situations, when Mikael is there they discussed the least, and then more when I am there without Mikael, but the most when they are without Mikael and I. This is perhaps due to environment that influences a person; they feel that it is better not to talk.”

Account 16: Tian on power distance

71 So when interpreting the fieldwork, I took into the consideration on what pattern can be drawn, and what not, depending on the team leader. Admittedly, this elimination of patterns was done intuitively at times.

Laura viewed this as one of the differences between bosses in the US and her Chinese boss, Yang (Account 17). Episode 6 illustrates her first-hand experience of seeing how Yang treated CDs.⁷²

“Indeed, it is a very different culture. I used to have a boss that I could go and talk to and have a conversation with him. I don't get this with Yang. It is always been when he told me something, I reply with my opinion but I never did get it through. He would tell me what to do. This is very different from what I'm used to.”

Account 17: Laura on Yang's authoritarian management

It was ten o'clock in the morning but Tao was not in the office yet. Yang, the president of Sang Design asked Laura of why Tao was not in the office. Laura had no idea where Tao was but she was less concerned as Tao was working until midnight the previous day to finish a design. At twelve o' clock, Tao eventually got into the office. Yang asked Laura into his office and told her to inform Tao not to come in late again. Laura explained the reason but Yang insisted something has to be done: “If you don't do it, then I will do it, and it is going to be nasty.” Laura had no choice. She sat beside Tao: “Hey...what happen today, you are a bit late?” Tao smiled and Laura smiled back to him: “I woke up late and then went shopping.” With a cheeky grin, Laura informed Tao:

72 Interestingly, Yang treated WDs as equal. It seems he is aware of the flat hierarchy in Western management.

"We have to be in by 9 am." Laura felt bad about doing this. For her, it did not matter that Tao had taken the morning off after an evening of hard work. There was also not much to do in the office after the project anyway. Therefore, she quickly got back to her desk and brought up her MSN messenger in which Tao was on her contact list. Instead of talking in person, they were exchanging messages online: "Sorry, actually Yang wanted me to tell you this. But I knew you worked late last night." Tao replied with a smiley emoticon. Next morning, Tao arrived at the office at eight-fifty and Laura was upset for not standing up for Tao to Yang.

Episode 6: Tao and Yang power distance

Laura's disapproval of Yang's management recalls early themes on design education observed at WUZU2005 (Nainby, et al., 2006; Nainby, et al., 2005) and interviews carried out in the early studies (Section 4.4). Chinese student designers reported that Chinese design lecturers like to instruct students in contrast to Western design lecturers who give a lot of freedom to the students. Mostly, Chinese student designers prefer the freedom given by Western design lecturers and they see the instructional teaching style of Chinese lecturers as restricting creativity (Account 18).

"Yes, there is a lot of freedom here to work on your own interests. It is not the same in China, where there is a lot of limitation from either lecturers or fellow students. However, if you have an idea here, they will encourage you to develop the idea, or to expand it. I find this as an encouragement to myself to develop into a better idea. So when there is encouragement, we will work to be better. But in China, when you have an idea and bring it to the lecturer. The lecturer may say "oh this idea doesn't seem to be realistic enough." That

immediately made us feel deflated and to discard the early ideas but to rethink of other idea.”

Account 18: Kathy on instructional teaching

At WUZU2005, I observed that the Chinese design lecturer was giving very detailed ideas to the students, while the Swiss design lecturer was guiding. In a contradictory note, Chinese student designers also expressed the view that they preferred to be given work instructions (Account 19). The contradiction is perhaps the habit of Chinese designers, which subsequently influence their creative process. Although it seems the instructional teaching is linked to high power distance, later analysis shows that the pattern is also linked to the theme of the generation of concept, which will be discussed in Chapter 6.

Researcher: “How did you deal with the freedom here?”

PanPan: “I am not used to it, because in China, we were given many instructions.”

Kity: “Yes, we were given a lot of tasks to be finished by certain time; otherwise there won’t be any mark. Here, the lecturer says there is no constraints in terms of time, deadlines, what to do. I asked my lecturer here the other day, ‘How many project is there?’ She said, ‘It is up to you.’ ‘How many costumes shall I make?’ She said, ‘It is up to you.’ Ha ha. I really could not stand this. I would see her as irresponsible if she is in China.”

PanPan: “Our lecturer (in Britain) is quite good; she gives complete instruction on what to do.”

Kity: “Yes, their lecturer is quite good, as she would consider everything.”

Account 19: Kity and PanPan on freedom in Britain

In summary, along with subgroup formation and language difficulty, the presence of higher authority does discourage active discussion between team leaders and CDs. These are three contributing factors to be considered when analysing the fieldwork. However, they are not the main reasons for the silences that the design community should be concerned about, and they were thought by WDs and CDs as rectifiable over time.⁷³

5.1.3 Negotiating Viewpoint

So the question remains – what causes CDs’ silences? The silences are evident even in a non-critical, brainstorming session proposed by Osborn (1957) as an event “*to practise a conference technique by which a group attempts to find a solution for a specific problem by amassing all the ideas spontaneously contributed by its members.*” The CDs’ silences posed a difficulty for Laura (Account 20), for she expected designers to have individual voices.

“How am I going to get them to brainstorm? Oh my gosh! I think that is very important. I think it is...ahm... from my past years in design. It is about what inside of you, [and that] you are in kind of your voice. After you gone through a thought process, then you need to collaborate, and then you need to have the ability to know what is good about yours, and what is good about theirs. What elements can work together and how that blend. But there also has

73 I am not denying research which stressed the importance of social issues in Co-Design such as (Warr & O'Neill, 2005).

to be aaa... you have to have a certain independent thought. It is very critical on this profession.”⁷⁴

Account 20: Laura on brainstorming and expressing viewpoint

Détienne, et al. (2005) described this type of individual voice as a designer’s “viewpoint”. She analysed design meetings by identifying characteristics of viewpoints through an argumentative process. An ideal design meeting is a discursive space when designers gather to confront and integrate viewpoints into a shared concept. The design task is divided into sub-problems and distributed as sub-tasks to each designer. Conflicts between designers’ viewpoints will arise and negotiations of viewpoints follow. Design collaboration happens through negotiating these viewpoints through an argumentation process, mostly in a verbal form. The study of student designers talking in studio settings by Fleming (1996a, 1996b, 1998) reported that arguments were used to support and justify their ideas. This position is also shared by (Brereton, et al., 1996; Cross, et al., 1996).

However, negotiating concepts in this form of debate, with bouncing off of ideas between WDs and CDs can be an illusory in relation to CDs’ silences as reported earlier. At times, it became a hindrance during design meetings, as designing was thought to be not progressing without verbal debate. Interview accounts gathered during the early studies indicated that CDs’ were uneasy with verbal debate in design meetings. In understanding the cross-cultural issues in the use of verbal debates, it is useful to look at the extensive work on cognitive difference between Westerners and Chinese carried out

74 The lack of expressing viewpoints among CDs is reported in the earlier studies. See Appendix for the report.

by Nisbett and Peng (Nisbett, 2003; Nisbett, et al., 2001; Peng & Nisbett, 1999). It began when Nisbett's then-doctoral student Peng remarked that his Chinese thought process is a circular line while Nisbett's Western thought process is a straight line.

The Westerner's preference of debate style is parallel with the standard hypothesis-evidence-conclusion rhetoric. Western students are trained to use debating as a self-conscious reflection process to validate one's ideas (Nisbett, 2003, p. 209). The skill to debate as a strategy of analytical thinking is not common in Chinese education, as not only that they socially tend to keep harmony in a group (Becker, 1986),⁷⁵ there is also the philosophical influence of naïve dialecticism in Chinese thinking that assumes truth can be attained from two opposing proposition and therefore debate implies no winning position. Due to this dialecticism, concepts and words are flexible to human actions, therefore truth and reality shall not be attained through verbal debate and argumentation (Peng & Nisbett, 1999).

This view of co-design studies is also echoed by Stumpf and McDonnell (2002). They warn of conflict-based dialectical argument, which only deals with argumentation roles of proponent, and opponent, and can undermine the collaborative nature of team designing. In a lighter note, Dean Tjosvold, from a management studies perspective,

⁷⁵ *"There is certainly a long tradition in the East of equating silence rather than speech with knowledge. Lao-tzu: "He who knows does not speak, he who speaks does not know." Analytic thought, which dissects the world into a limited number of discrete objects having particular attributes that can be categorised in clear ways, lends itself to being captured in language. Holistic thought, which responds to a much wider array of objects and their relations, and which makes fewer sharp distinctions among attributes or categories is less well suited to linguistic representation."* (Nisbett, 2003, p. 210)

adopted a Western teamwork model of cooperation and competition in analysing intercultural team innovation with Chinese in China, Hong Kong and Singapore. Rather than conflict avoidance, he argued for the possibility of overcoming CDs' silence by conflict management by promoting cooperative goals (Chen, Liu, & Tjosvold, 2005; Chen & Tjosvold, 2002; Tjosvold, 2002a, 2002b, 2004; Tjosvold, Andrews, & Jones, 1983; Tjosvold, Hui, Ding, & Hu, 2003; Tjosvold, Hui, & Law, 2001; Tjosvold, Law, & Sun, 2003; Tjosvold, Tang, & West, 2004; Tjosvold, Yu, & Hui, 2004).⁷⁶ This goal-oriented approach when put together with Nisbett and Peng's work on cultural cognition, gives rise to the possibility of investigating CDs' silences during concept negotiation, in the light of concept generation.

After observing many silences, I also collected visual materials and documentary evidence to trace the creative process in operation. New themes emerged from the data, such as sketches and work processes, highlighted the differences between WDs and CDs in the practice of design. In addition to the dismissal of socio-linguistic reason (Section 5.1.2) and the cognitive issues in the study of verbal negotiation, my study at

⁷⁶ He argued that although Chinese tends to avoid conflict and prefer to keep harmony, it is possible to overcome it by conflict management when certain conditions are met. Western's interaction with a problem solving or a blaming approach with interdependence goals of each team member affects the ability of the teams to learn from errors. Chinese people avoid conflict because they assume that conflict requires confrontation and persuasion is preferred. Therefore, cooperative goals within groups are more likely to promote team learning than competitive goals. A field study also indicated that confirmation of face helped Chinese people discuss their frustrations cooperatively and productively. Persuasion helped team members to be open-minded to seek mutual benefit. The influence was found to result in feelings of respect, cooperative relationships, and openness to the other person and position (Tjosvold & Sun, 2000).

WUZU2005 showed WDs and CDs differences in the use of verbal and visual cues, as well as the association formation process (Nainby, et al., 2006). All these patterns seem to disperse at first, but when the simplified design process adapted at Sang Design was observed (Section 6.1), identifying the links between them was possible. I began to realise that there is an alternative creative process for CDs and the research journey took a hermeneutic turn from investigating concept negotiation to concept generation.

The hermeneutic turn resembles Thomas Gladwin's study on the islands of Puluwat (Gladwin, 1970). He was trying to understand Micronesian methods of navigation by charting their navigation map. Before long, Gladwin witnessed how efficiently Puluwat people can navigate without a map. Similarly, I was seeking to describe concept negotiation in the form of verbal discussion during design meetings. When silences were observed, I began to ask if the silences are due to their differences in concept generation, instead of concept negotiation. Next section defends the necessity of this hermeneutic turn in the research.

5.2 CONCEPT ARTICULATION AT SANG DESIGN

The main issue about design collaboration is that, designers are required to articulate their design to communicate. Prior to the fieldwork at Sang Design, I investigated concept articulation among Swiss and Chinese student designers at WUZU2005 (Section 4.6.1 and 4.7.2). WDs tend to verbally articulate their ideas in team, while CDs prefer to sketch, gesture or use objects to communicate (Nainby, et al., 2006). The lack of verbal articulation was supported by CDs' interview accounts in the early studies. This theme was confirmed by the data on silences observed at Sang Design (Section 5.1.1). I have dismissed the focus on socio-linguistic issues in section 5.1.2. I then argued in Section 5.1.3 that the negotiation of viewpoints is rare among CDs due to possible cognitive differences between WDs and CDs.

5.2.1 Verbalising Visuals

I shall begin by discussing the expectation that designers should articulate verbally what is essentially visual (Episode 7):

Members of Team D had been working on the design of the Beijing Olympic Torch for two weeks. Laura (team leader) gathered her team members for a progress meeting. Siang was first to explain his design concept, which was presented through a hand sketching pinned up on the wall near his seat. Laura liked the concept very much and got really excited. The team then moved to Tao's desk to look at the digital 3D model of Siang's design that Tao had helped to create. Tao described Siang's design for the Olymp Torch to the team with the help of the digital model on Tao's computer screen. Laura was very pleased with Siang's beautiful design. The project was an inter-teams competition in Sang Design, so there was urgency to the project. Tao explained the design by describing the forms followed by the functions of the design. He spoke firstly to me in Chinese so that the other CDs would also understand. He then spoke to Laura and Svenja in English while frequently looked towards my direction presumably seeking reassurance on his use of language. Laura and I later agreed that the story was made up as he speaks. Words were invented to articulate the design. Tao frequently searched for approval from me on the usable of the words in Chinese to English and repeatedly mumbled to himself in Chinese: "That should do, she [Laura] will be convinced with this [story]". I seek confirmation from Tao after the meeting. He was indeed making up the story as he was presenting his design.

Episode 7: Tao's "making up story"

This phenomenon was commonly observed in at Sang Design and Wuxi-Zurich. CDs would made up a story while presenting the design, except when the design was very well formed, such as Jie's presentation of his prototype for the Roko project (Figure DD, page 209). The pressure of being able to verbally articulate one's design with a story is generally expected in design practices, and as I have argued earlier, in the study of co-design with the use of verbal protocols. Being able to articulate design concepts in words is a skill for professional design practice (Tomes, et al., 1998; Yair & Press, 2000, p. 470). At the early stage, representing concepts with words is preferred so as to avoid fixation on visual examples, therefore allowing further space for ideation (Jansson & Smith, 1991, p. 161; Pahl, et al., 2007). CDs' silences are therefore met with astonishment among WDs such as Mikael, Tristan and Laura. They stressed the importance of articulating concepts to convince team members and clients. They questioned CD's ability to negotiate concept in a verbal argumentative process as an ability to design.

“Crits” Sessions

I spent a great deal of time with Chinese design lecturers at Wuxi-Zurich design exchange and several visited me from China in my department at Edinburgh Napier University. I interviewed them on differences between Western and Chinese design education. They highlighted their fascinations with the “crits” session, or critique system in design studio setting. The active verbal debate in the “crits” sessions between lecturers and students is rare in the teaching design education at Chinese design institutes. This teaching method is part of the tradition of studio design commonly taught at Western design education for the exercise of design practice. As Schön (1985) describes the studio culture:

“The studio tradition builds examples of practice and critical reflection on practice, into the core experience of learning architectural design. Design education is organized around manageable projects of design, individual or collective which are more or less closely patterned on projects drawn from actual practice. The studio contains its own traditional events – master demonstrations, “design reviews”, “desk crits”, “juries” – all of which have grown up around the central theme of practice in designing.”

The use of “crits” sessions to assess student designers’ ability to defend their ideas through dialogues is typical of Anglo-Saxon design education, as well as the US and parts of Western Europe. “Crits” involve students presenting their design in a visual format (object or graphic), with verbal explanation. The purpose is for the instructor to understand and explore the focus of the design concept in relation to the outcomes of the focus. Student designers are trained to verbally explain design concepts in a specialist language that culturally reinforce professionalism among designers - to be able to “reason their intuitive thought” (Fleming, 1998; Lloyd, Lawson, & Scott, 1996). To achieve this, design lecturers would give criticism on student designers’ verbal articulacy.

Fleming (1996a, 1996b, 1998) analysed “crits” session between professors and student designers in order to understand the discourse of designer-designer collaboration. Although he identified the rhetoric of negotiation between lecturer and student as important for design discourse, he also suggested that the picture is an important part of the design negotiation. This observation recalls CDs’ use of sketching, objects and gesture to articulate concepts. Physically, one would not see much difference between a Chinese design studio and a Western design studio. For example, in Sang Design, there are designated areas for discussions and for project work areas

(Figure V, page 127). It is only during design collaboration, when WDs work alongside CDs that the differences are vivid. The ability to verbalise, which is seen as a prerequisite to design reasoning, learning and practice, does not extend to the CDs' context.

Verbal-Visual Translation

Yet without words, there is no justification of thought. Western thought has a tradition of seeing thoughts as something that can be externalised in words, and that it is possible to represent thinking in words (Pylyshyn, 2003, p. 429). Knowing the content of your thoughts is a consciousness one must possess. To verbalise is to make clear ones' thought. In design, training in concept articulation is not just a design practice sales pitch; there is a wide belief that verbalisation is a reasoning tool that adds to intuitive thinking about what is essentially visual in the design concept. Press and Cooper (2003, p. 145) explained the role of verbalisation when designing:

“[...] after the initial design brief, expressed by the client verbally and in written form, the designer begins with a process of ‘verbal deconstruction’ – verbally reworking the brief, that is, ‘getting it down to a little nugget’ that encapsulates the essential requirement of the brief. The next phase in the process is described by the team in terms of ‘making routes’ during which word-play and verbal punning are used to find an interpretation. These are then turned into a visual translation of the word-play, which can draw upon recycled imagery that the client is familiar with. There is evidence of the existence of a ‘verbal-visual dictionary’ between designer and client which is developed through their continuing relationship over time.”

This communication across the verbal–visual divide is seen as a tool to decompose design requirements for design solutions, a mid-point between language-based and visual forms of cognition. (Press & Cooper, 2003, p. 146). Cross (2006, p. 10) explained this verbal-visual divide as two separate codes which complement each other. While the non-verbal codes *“translate ‘messages’ either way between concrete objects and abstract requirements; they facilitate the constructive, solution-focused thinking of the designer”*; the verbal codes *“facilitate analytic, problem-focused thinking; they are probably the most effective means of tackling the characteristically ill-defined problems of planning, designing and inventing new things.”*

Verbal articulation is proof of designers’ clear understanding of his concept which *“explicates and challenges the rationale behind the image, identifying hidden and potential problems and focusing on processes rather than their tangible outcomes”*, albeit a useful way to realise the designer’s potential creativity (Yair & Press, 2000, p. 466). Similarly, Tomes et al. (1998) described this verbal-visual translation space as a space for mutual understanding and as integral to all phases of the design process.⁷⁷ In other words, the design process is very much a verbal endeavour to tease out the visual ideas that can be studied through verbal protocols. It is therefore essential that designers are “fluent and confident” in translating between verbal and visual modes of communication. That the reworking of the design brief from visual to verbal and vice versa enriches the design concept attempt. The space between the visual and verbal can be a creative trigger to refine client requirements and design solutions, especially

77 Her critical analysis found that the verbal language is part of the self-identity of the designers, representing as a verbal culture separating from their clients.

concerning “feel” and “mood”, which may be excluded from the formal design brief (Press & Cooper, 2003, p. 145).

This was what Laura had been expecting - that words should already be there when an idea is generated, not made up after a design is done.⁷⁸ However, despite the emphasis on designers’ ability to verbalise in design education, the extent to which every designer is able to verbalise designerly thoughts and to do such a verbal–visual translation is anyone’s guess. Lawson (1997, p. 307) argued that written words are not designers’ natural communication channel, but a *post hoc* rationalisation process to sell the design with a “right” answer to conceal their weaknesses and doubts. Strictly speaking, making up a story after designing, like Tao did (Episode 7, page 187), is not something new among Western design practitioners. Design experts accept that the ideas sometimes “just come”, without a proper thought process (Cross, 2004; Dorst, 2004).

5.2.2 Verbalisation versus Visualisation

This verbal-visual translation space between WDs and CDs is an ambivalent one. CDs’ preference of visual articulation over WDs’ verbal articulation represents variance in design thinking. CDs’ concept articulation in visual terms can be explained as their tendency to use visual thinking over verbal thinking. When interviewed at Sang Design, CDs mostly expressed a view that WDs are more rational in thinking and therefore easier to accurately articulate their concepts to convince people on their ideas. On the other hand, WDs also reported that CDs have little confidence on their designs as they

78 When interviewed after (Episode 7, page 71)

are not reportable and therefore negotiable. Tristan gives a vivid account this dichotomy of verbal-visual thinking (Account 21).

“They (CDs) are more visual. I always find Western thoughts express the real use (function). So everything is nearly understood. So it is quite easy to say that: ok, this one is very good. I try to have a meaningful design. So it is obvious to say that this is good. I think if you propose too many without reason behind than may be you may have a lot of nice design, very good shapes but it is very difficult to say ok this is better, this is not good, because it is just the matter of feeling.”

Account 21: Tristan on CDs’ visual oriented design

Tristan’s account addressed the idea that being able to articulate verbally is proof that he has been designing by generating functionalities first, a form-follows-function method. This kind of abstract-concrete progression was reviewed in the discussion of design processes in Chapter 2. From Tao’s account of making up a story and CDs’ silences, I can conclude that there is a difference in the practice of design with WDs verbalisation and CDs visualisation. Although in my collected themes, there are a handful of dispersed patterns showing Western-Chinese dichotomies but I could not use them to refine the research direction.

On Friday 05/01/2007 11:07, an email arrived in my inbox from TU/E at Eindhoven, sent by Martin, a Dutch student designer who had participated in WUZU2006. He had returned to Eindhoven after his three months exchange student programme in the Wuxi design school in China. In his email, he sounded excited yet confused. The email described his design experience with Chinese students and Chinese design education, in particular the ideation process. Martin’s email arrived at a time

when I was fixated on social issues and unable to formalise the fieldwork into a conclusive model or theory, at the level expected of a PhD thesis. His email inspired the hermeneutic turn towards the study of creative process in design (Account 22).

“...In projects at the TU/E we students often like to use creativity tools for "idea generating". The process was visualised in mood boards, sketches. The process of the Chinese students was less visible. It seemed that the Chinese students came up with great original ideas from scratch, the process found place in their minds. Especially when working in a team, this was difficult for me. I learned that it is important to respect this process, but that it's necessary to occasionally ask about the progress and what they're thinking about. Interesting ideas appear and can be combined with your ideas which will lead to good solutions...”

Account 22: Martin from WUZU2006 on CDs ideation process

Martin's email described the core problem of design collaboration between WDs and CDs, raising my already increasing doubts during the fieldwork: while the design process is externally available to be followed in the western design team, the CDs' way of working is an internal mechanism of ideation; a black box. Each method is incomprehensible to the other and therefore hindered design collaboration. I was stuck on the social reasons for what I had seen until I received Martin's email. Earlier issues on cognitive variance were now taken into consideration.

When cognitive variance is considered, I can now explain that Tao's making up of a story (Episode 7, page 187) was a form of confabulation. Even though one may not know how they made a particular choice, they nonetheless make up a coherent story explaining their actions. Pylyshyn (2007) called this a state when “*there is the feeling-*

of-knowing (or the feeling-of-not-knowing) which often convinces us that we either know something that we do not, or that we do not know something that is just below the conscious horizon", so we make up answers even though they might not be true. This use of words to encode concepts may impose a restriction on creativity, as cognitive experience is suspended. Koestler (1964, p. 601) cited the physiological experiments carried out by Penfield and Roberts (1959), who concluded that the brain's conceptual mechanism is structurally and functionally separate from the speech mechanism. He subsequently argued for unarticulated concepts as an important part of the ideation process.⁷⁹ The unarticulated concepts and ideation process are addressed in section 6.3.1.

The CDs' internalised creative process, as reported by Martin, is difficult to trace when studying early design collaboration. Current methods are split between 1) studying the abstract representation in the form of verbal protocols, or how designers talk about their design; and 2) studying the concretes of design representation in the form of drawing, sketching, doodles, objects and non-verbal phenomenon. Although the formal method is easily transcribed and analysed, it is questionable how accurately it describes what is going on in designing (Lloyd, et al., 1996); the latter is unique to the design context, how to analyse concrete materials such as drawings and synthesise them into a coherent understanding is underdeveloped in design cognition.

⁷⁹ *"We have seen that a considerable portion of mental activities is of a non-verbal character – in the nature of experiences which "cannot be put into words", which remains incommunicable and inarticulate, and nevertheless play an important, sometimes even a dominant, part in a person's life. We now see that even in articulate verbal thinking, a distinction must be drawn between the ideational process and its conversion into verbal currency."* (Koestler, 1964, p. 602)

To describe a design phenomenon fully demands consideration of both verbal and visual material in design discourse. The translation space between WDs verbalisation and CDs visualisation provides a platform for interpreting the internalised and externalised practice of design. The case studies of Western-Chinese early design collaboration therefore uniquely reveal these dichotomies in design discourse that would otherwise be unidentifiable.

CHAPTER SUMMARY

In this chapter, I have addressed the research question of the differences between WDs and CDs in the negotiation of creative concepts. I described the silences among CDs during design meetings and the themes relating to the reasons. I have argued that socio-linguistic reasons are valid but were not significant enough to pursue further in this thesis. Instead, the reasons for CDs' silence in design meetings relate to the divide between WDs' tendencies to verbalise and CDs' tendencies to visualise. I have also contextualised the expectation of verbalisation in Western design practice and design education. Given that an internalised creative process is widely observed among CDs, in contrast to WDs verbalisation within an argumentation process, I concluded by arguing for the Western-Chinese early design collaboration as a sound platform for studying dichotomies in design practice of both internal and external processes.

CHAPTER 6: CONCEPT GENERATION AT SANG DESIGN

CHAPTER OVERVIEW

This chapter describes the practice of design at Sang Design and other case studies to answer the second research question: How does a collocated team of WDs and CDs **generate creative concepts** during early design collaboration? In section 6.1, I describe the simplified design processes adapted by design team leaders at Sang Design. Section 6.2 discusses narratives, interview accounts and analyses with Western-Chinese dichotomies in related to concept generation process. I present episodes in narrating the creative processes derived from the case studies in the context of design theories. This leads to a discussion of designing with imagery in section 6.3, where I argue for early sketching and early structuring, as used by CDs, to be seen as valid creative processes for designing.

6.1 THE SIMPLIFIED DESIGN PROCESS

While the first pattern that emerged when seeking to describe concept negotiation was CDs' silences, the first pattern that emerged when seeking to describe concept generation was the simplified design process. When Sang Design was affiliated with Afar Design of Germany, their extensive design process was introduced to the Chinese teams as an important design tool.⁸⁰ In the four years since Mikael joined Sang Design this design process has evolved into a situationist cycle that depends on clients, projects, teams, team leaders and deadlines (Figure BB, page 200). The Afar design process was

80 Due to confidentiality, the design process and the sketches introduced by AFAR design are not presented in this thesis.

simplified by team leaders into four-phased iterative cycle of research, concept, design and development. Even so, it is not always in the same sequence, and not always goes through all four phases. Despite this, during my first visit, I was presented with the process model from Afar Design. The reason, I suspected, was in order to present professionalism. However, I gave a bold remark, guessing about its redundancy (Section 4.5.1, Page 125). Mikael admitted that the elaborate design process is now a client-facing tool to ensure customers' confidence on the design service. Even so, he would refer to the Afar design process before a massive project "just to be sure" himself. Even Ong's research document for the Roko Project (Figure W, page 139) has a section dedicated to the Afar Design process, though in practice, it was rarely followed. As I have discussed in Chapter 1, this fixation on the importance of a prescriptive design process derives from a rationalist view of designing, and the need to present as a professional design practice.

In practice, the situationist view prevailed. My bold remark to Mikael was informed by the other contributing studies I had carried out before the fieldwork (Section 4.7.2). The previously Western-influenced design process prescribed by team leaders and lecturers gradually simplified into only a few milestones. These simplified processes, are not the typical design processes with the problem-solution and abstract-concrete progressions, as reviewed in Chapter 2. Instead, the phases are iterative and flexibly defined as the team goes along with the project. The sequences can be changed depending on the design projects and deadlines.

In practice, not having a design process explicitly referred to during projects did not seem to bother the designers. For example, no one went around telling each other the phase they were now in or what they should be doing next; neither did their sketching pads have any process flowchart in sight. What they did was to keep track of

the next milestone given out by team leaders. In the Roko Project, for example, Mikael briefed the team that the research phase would commence before the design phase without saying specifically when is the swap-over date. Only the final deadline was given, as the date to get ready for client presentation. At the end of every meeting, he would brief them on their progress as a whole, on his expectations and on the schedule for the next meeting. Even so, the schedule changed depending on the progress. Mikael would casually check with everyone on their progress at their desks before the next meeting. Depending on the progress, he might pull the meeting forward or delay it. He said, “There is no need to meet if there is nothing to see.” There were some moans from designers on last-minute changes of schedule, but nothing major. The only thing they fear is the final deadline to be brought forward. Even so, it would be the team leaders’ fears rather than the designers’ fear.

Design collaboration at Sang Design works at a concrete level. The designers would already have very well-formed sketches at the first design meeting after the project brief. The setup of the team and the format of the design meeting, according to Mikael (Account 23), evolved from his experience:

“What should I do? I tried to do discussion and brainstorming here. But it never works. So I divide them into teams. Each group works on a project of its own, it is more effective.”

Account 23: Mikael on teamwork

6.1.1 Feature-Follows-Form

Figure BB is a diagram showing the typical process of design projects at Sang Design. Every project is handled by one or two teams. A team leader would meet the client to understand and collect design requirements. Either the client or the team leader

would produce a design brief in the Adobe Acrobat file format or in PowerPoint. In the case of the Roko project, it was an effort by the research team. As early as the first design meeting, which was supposedly a brainstorming meeting after the project brief meeting; designers had their sketches ready to be discussed. The meetings were not as interactive as expected. As I have reported earlier, there was not a lot of discussion. Instead, the design meetings were a silent version of “crits”.

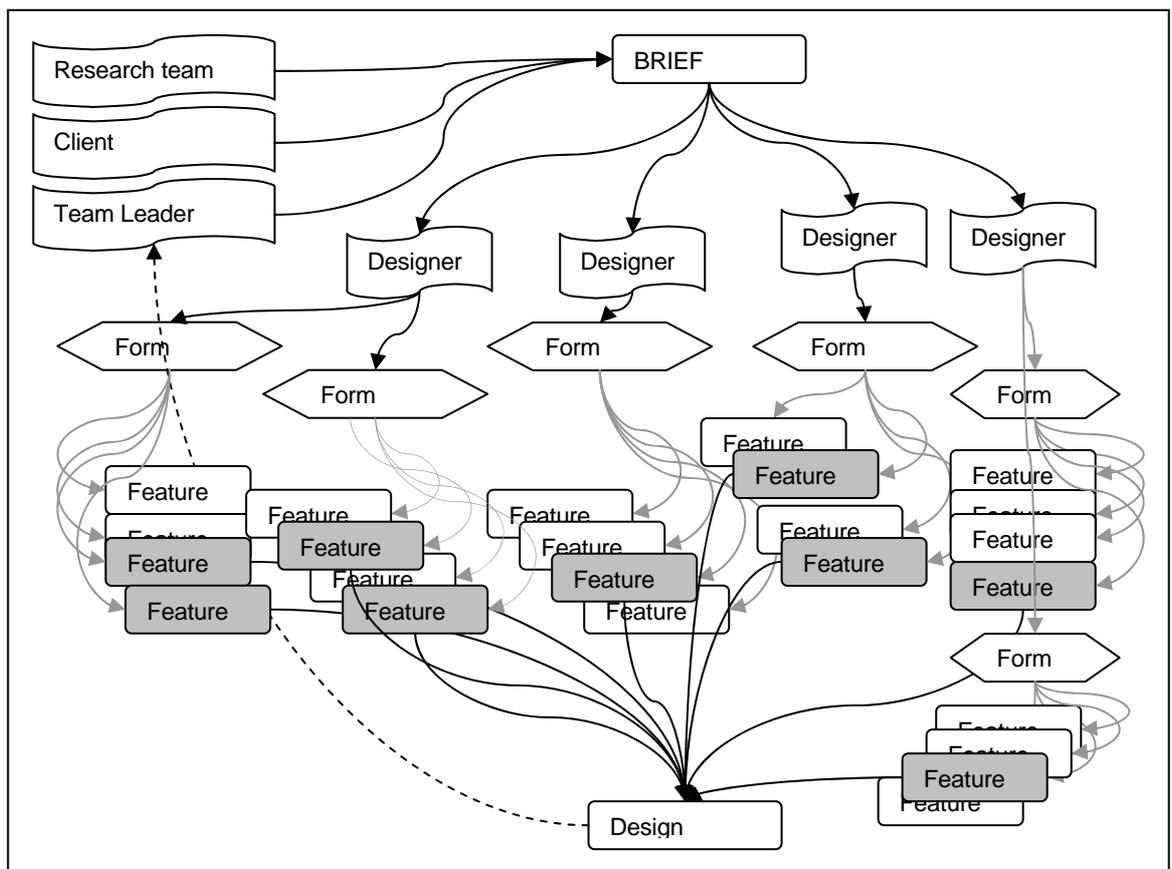


Figure BB: A typical work process at Sang Design

6.1.2 Working at the Concrete Level

Mikael changed the normal “forms follow functions” design process to a sketch-first creative process.⁸¹ By looking at the sketches, he interpreted the functionalities, or what he called “features”, and then chose among them to combine them into a final design (Figure BB).⁸² Picture 1 in Figure DD shows the list of features gathered during the Roko project by using the sketches. Among themselves, designers commented on and compared sketches to reach a conclusion. This same process went on in cycle until Mikael was satisfied with the design or when the deadline was imminent.

This kind of work process is perhaps not that alien in design practices. The difference is in the form-feature progression, which differed from the design processes I reviewed in Chapter 2, that show an abstract-concrete progression. Tristan highlighted that it was difficult to understand one’s design and to articulate and negotiate in a team without knowing the reasons for a design (Account 21, page 193). He rationalised this in terms of CDs’ preference for visualising, which partly explained the concrete-first creative process. Both Laura and Mikael also remarked that it was easier for them to work at the concrete level with CDs by commenting on the sketches at the concrete level.⁸³

81 Even “form-follow-function” as a concept of architectural and industrial design is now criticised as an outdated 20th century proposition influenced by systematic thinking.

82 I will continue to use the term “feature” rather than “function” to differentiate them. Feature includes shape, but function might not necessarily have any form attached to it yet.

83 Laura called this design language (Account 12, page 172).

This pattern was also observed at Mosen Studio (section 4.7.2) where WD used mind mapping to begin designing, while CDs used “shaping” (Figure CC).⁸⁴ The ideation episode in the Sauna project is an example of this kind of starting point. The Sauna project was a design collaboration project between WD Richard and CD Mosen and two other CDs. The design brief was to design a sauna area for a public bath in China. Richard is an expert practising product and interior designer and lecturer from Edinburgh; Mosen is also an expert practising industrial design and design professor from China. I collected their sketches to trace the ideation process. The interesting implication of the study concerns how the role of sketching can be different between WDs and CDs. WD Richard used mind mapping to analyse design problems and context, before proceeding by drawing a few creative concepts comprehensible to potential clients; while CD Mosen first sketched some shapes which seemingly provide contextual information to inspire next sketches.⁸⁵

84 I did not managed to record the images of Tristan’s and other WDs’ mindmaps at Sang Design. At the time I did not think it was necessary to record mindmaps other than sketches. So I have substituted other contributing studies as evidence.

85 When I asked Mosen to submit all the sketches to me as a record, he sent me finished sketches but omitted the early sketches with shapes. I had to repeatedly ask them to photograph these early sketches, but Mosen only managed to send me his. The other two Chinese student designers did not submit these early sketches, saying “they are too draft to understand.”

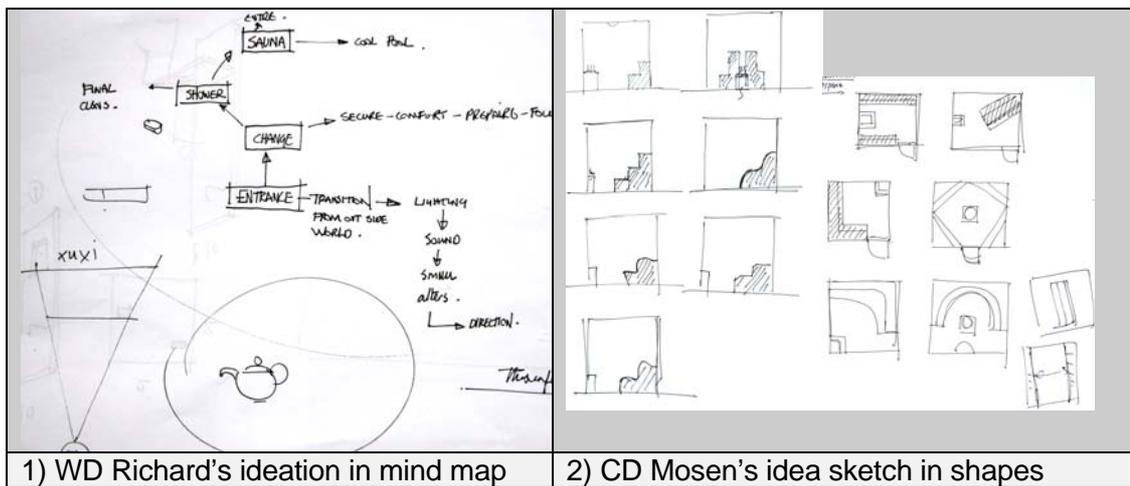


Figure CC: Ideation differences in Mosen Studio

When interviewed, the general understanding from WDs was that CDs prefers to work on something “can be seen”, even though it is visually concrete. Instead of avoiding it, WDs and leaders embraced the difference by adapting to it. One example was Mikael’s sketch-first collaborative design process for the team. Another was Ong’s breadth-first scenarios setting. Ong produced a picture-rich sixty-four page research document for the Roko project. The PowerPoint document detailed the demographic of users and lifestyles complete with images of mobile phones currently in the market. Crucially, the user scenarios were on display in the glass box for reference (Picture 2, Figure DD, page 209).⁸⁶ For example, one scenario was to design for a sport fanatic, Lee, a 22 year old male living in Germany. Lee had just finished his college and his past time activities were snowboarding and listening to hip hop music. According to Ong, it is easier for CDs to design for scenarios rather than by dealing with the abstract design requirements.

⁸⁶ Due to confidentiality, I was not allowed the full research document. After much negotiation, I was only able to capture some of the documents displayed on the wall.

Many have published on cultural differences between Western and Chinese on both social issues and cognitive variance. One of the major claims is that of Chinese concrete thinking due to the pictorial-based language. Nakamura (1964, p. 178) argued that:

“Chinese concepts are expressed in highly concrete form. Nearly all words express particular ideas – forms of existing things perceived in a particular state. They aim at expressing things by individualization and specification rather than by analysis.... On the other hand there is no one word which corresponds to a Western word expressing a general and abstract idea. Because of their synthetic and particular character Chinese words are more nearly proper nouns than the common nouns of Western languages. “

It is also said that Chinese relies on visual perception and seek intuitive understanding through direct perception, a mechanism called concrete perception. By using symbols, Chinese expresses abstract concepts through concrete images (Nakamura, 1964, p. 181). In his “The Alphabet Effect”, Robert Logan (1986) went further to offer a provocative proposal that pictorial language accounts for Chinese lack of innovation, due to the lack of abstract thinking, whereas phonetic alphabet language speakers are fluent in classification and systematic thought.⁸⁷

87 Logan (1986, p.18) argued that *“learning how to read and write with the alphabet has brought us more than literacy and a model for classification. It has provided us with a conceptual framework for analysis and has restructured our perceptions of reality”*. The phonetic alphabet, Logan argued, is believed to have provided a ground for abstract,

I have also collected details of designers' native languages in my case studies. At Sang Design, CDs were all native Chinese speakers who read and wrote the pictorial language, while the WDs were all native Europeans and America who read and wrote alphabetical languages. However, the abstract-concrete divide between WDs and CDs was not drawn along this language distinction line. Instead, it was first drawn through my investigation on their verbalisation/visualisation divide and creative processes that gave rise to the theme. The language aspect of Logan (1986) helps to understand the possible reason.⁸⁸

At Sang Design and Wuxi-Zurich, CDs seemed to be able to have think through a creative space in concretes ideas, while most WDs concept happen in an abstraction form in a process. This way of thinking seems like a limitation for CDs to pursue innovation in their design. Even pragmatists such as Dewey have noted that thinking only happened at the abstraction level. The crucial question is, if CDs are to think through the concretes and that conceptualisation is essentially abstract, how could

logical, and systematic (Western) thought, which helps to explain why science started in the West but not in the East, even though Chinese technology surpassed that of the West from ancient times until at least the 16th century. The absence of Western style abstractions and classification schemes in Chinese culture is related to the differences in writing systems. The Chinese writing system is based on drawn, concrete characters and reflects itself throughout Chinese thought, discouraging the development of the abstract notions of codified law, abstract science, and deductive logic, which are prerequisite for the development of science. If Logan was correct, then the difference between the alphabetic English language and the non-alphabetic Chinese language would be an important factor producing differences between Americans and Chinese in reasoning styles, including categorization preferences.

88 I must stress that the alphabetical effect is only a proposed concept yet to be proven. Also the reasons for these differences fall beyond the focus of the thesis.

design conceptualisation be possible? Is design thinking through the concretes a possibility?

Laura and I had countless discussions on the possibility for successful design collaboration between WDs and CDs but we failed to find a solution. At the end of my last trip in Shanghai at Sang Design, and after countless discussions between Laura and me, we decided to try a possible technique to get design collaboration working in her team. The first thing that came into my mind is the brainstorming with post-its technique (Isaksen, Dorval, & Treffinger, 1998) that was extensively used at Ivrea Interaction Design Institute in Italy, observed during my early studies. The technique was successfully used among the international students. I thought this non-judgemental and spontaneous way of capturing ideas might work. Laura had experienced the post-it technique during her work experience at Frog Design and Design Affairs, both leading design practices in the Bay area. We grabbed the first opportunity of a new project and tried the technique for a modular system for Exhibito Design, an American company specialises in exhibition design. Episode 8 illustrates the successful session.

Team B and Team D were collaborating for this project. The project was unique due to the combination of product design, industrial design and interior design. Most designers in Sang Design were industrial design-trained. It is a relaxing winter afternoon in Shanghai. We sat at the Discussion Area on the third floor, at the same table we had a sumptuous lunch together earlier. The third floor always gave me a much more relaxed feel than second floor (where Mikael's Team C and the engineering team are) and first floor (where Ong's research team and conference room are). Clearing the lunch boxes away, Laura seized the opportunity: "Hey, what shall we do with the Exhibito project?"

Any ideas? Shall we come out with some keywords?” “Maybe we could try this new method, which Priscilla and I think might be fun to use. It is very easy, just write your ideas down, or even draw on these sticky notes, and then stick them on the glass wall.” Everyone was given a stack of 3” by 3” post-its and a marker pen. Some of them looked towards me with a “question mark” spelling out, so I translated Laura’s instruction but insisted that I will translate their ideas.

It took no time for Svenja and Stephan (who are both German) to start to stick a few notes up the wall. Their notes were all written in English words, with only a few sketches/doodles. There was a little awkwardness among CDs at the beginning but that changed as Svenja and Stephan started filling up the glass wall with their sticky-notes full of ideas. Their actions encouraged CDs to do likewise. They drew and wrote on theirs, churning out dozens of sketches and words, both in English and Chinese. At times, they peeped into each others’ notes, giggled when they found others’ ideas amusing. It was a fun meeting; the atmosphere was welcoming and exciting. Even Yang (the company president) deliberately walked in several times to see what the fuss and laughter in this meeting was about.

Episode 8: Brainstorming by sketching on the post-its

Even though there was not much of an interactive debate or even a conversation as such. Laura and I managed to gather a vast amount of ideas from the teams. It was indeed a successful brainstorming meeting, the first in Laura’s experience at Sang Design. I could see Laura’s cheekiness in her grins towards me and I was equally excited. After five months of fieldwork, I was also getting desperate to know what worked. Similarly, Mikael and Yang had repeatedly asked for a possible solution to “overcome” silent moments in Sang Design meetings.

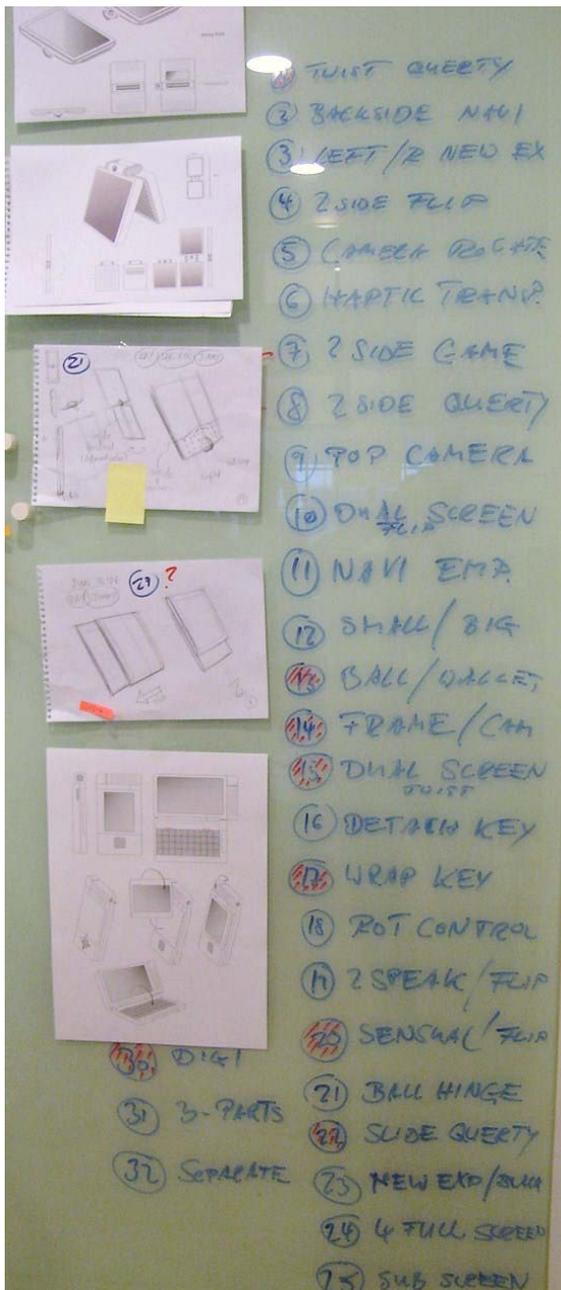
The post-its brainstorming session above was useful as a counter action to Laura's previous attempts to get CDs to challenge her ideas in the design meetings. The success of this brainstorming session lay in the adaptation of the above brainstorming session by using the post-its for a non-verbal session and the possibility of submitting visually rather than in words, to accommodate CDs' visual ideation. The adaptation avoided both the social issues of high power distance and overcame the verbal-visual cognitive divide.

Osborn (1957) believes brainstorming to be effective for several reasons: in particular, when anyone puts forward an idea, it not only raises associated ideas in his own mind but also stimulates the associative powers of all the others. The rivalry of team members trying to compete with each other in idea generation can have a stimulating effect. When one picks other's ideas and develops it approvingly, this reinforces idea generation. The difference between this post-its brainstorming to Osborn's original idea of brainstorming is in the reinforcement of idea generation through rivalry. The original method of brainstorming as a freewheeling ideation tool was not useful for CDs due to the verbalisation methods and the ideation with words. By overcoming this, it became an easy tool for CDs to capture their ideas. This was a pleasingly successful episode.

6.1.3 The Shared Creative Space

Apart from formal design meetings, Mikael avoided to impose verbal discussions to CDs. He overcame this by using the glass box (Figure V, page 127) as the project room. He also left stacks of post-its on the table and urged the team to put their ideas on the wall whenever they liked. The shared creative space strategy worked. The designers would hang around the glass box to pitch for ideas, and sometime informal discussion happened when more than one designer were in the project room (Table 6, page 131). In

this creative space, the concretes such as prototypes, objects, sketches; and the abstracts such as the research documents, a list of requirements, comments on the sketches were on displayed during the project. Designers are free to use the glass box, to fill the wall with more ideas or to sort them around. This is shared creative space extend to digital space too. Ong has created a file folder on the central computer system where designers can post their latest design file to share with the others.



1) Lists of features



2) Sketches according to each scenario



3) Early Prototyping

Figure DD: The Creative Tools of Roko Project

6.2 CREATIVE PROCESSES AT SANG DESIGN

To begin to understand CDs' seemingly concrete-first creative process, this section highlights a few themes observed at Sang Design on the differences between WDs and CDs, which contributes to understanding their respective creative processes. As I have argued in Chapter 5, their verbalisation/visualisation dichotomy provides a rich platform for exploring their differences in the generation of creative concepts. The patterns were vividly expressed by interview accounts that I shall discuss in the following themes.

6.2.1 "Feeling" and "Shaping"

There is a demand in design studies that the research stage should be as objective as possible. Knowing the reason for one's design, according to Tristan, is an important design skill (Account 24), and he thought that CDs, with their emphasis on visualisation, lacked this reasoning ability.

"Chinese concepts are more about personal feeling. I think it is good to have personal feeling but you also need to be able to convince people that it is a good idea. A good designer firstly should be able to know the product, to know the client and to be able sell his idea to colleagues and to the clients. The first step is to explain to the colleague that your ideas are good. You don't really work for you, you work for the team but at the end the first step it is your idea because the first sketch comes from your mind. Then when you refine you can work in a team. CDs are less convincing compared to lots of European people... their idea is more related to one opinion, sometimes a shape. With shapes, you either have the feeling of whether you like it or not but you don't know why. For me, I try to explain my idea not just based on feeling but

convincingly through explaining why I chose the idea...”

Account 24: Tristan on CDs' shaping and the importance design reason

The account highlights a significant difference between WDs and CDs in the practice of designing - the importance of knowing what they do. Tristan suggested that the reason of CDs lack ability to verbalise their concepts is due to their ideation through personal feeling and shapes rather than functionality. It is easier to reason through functionality and therefore easier to articulate the concept. However, it is difficult to reason through feeling and shapes and therefore articulate. Consequently, it is less convincing with a concept without “real-use” – a difficulty when facing a client. Tristan’s remark however, did not extend to Jie on his ideation process (Episode 9).

Team B and team D were collaborating on the Roko project. The two weeks research phase had just ended, and were in transition to the design phase. Each designer was given sixty-four pages of PowerPoint document consisting of research outcomes. Ong, leader of the research team, had given the designers a brief introduction to the document. As everyone gradually moved out from the glass box, I noticed Jie, from team B, had started to do “something” at his desk. So I took a seat beside him hoping to observe and to have a chat.

Jie was trying to “conceptualise” (想概念) his design.⁸⁹ “I am just working on the design concept”. Using his mouse, he scrolled up and down the picture-

⁸⁹ The Chinese translation of conceptualisation is discussed in Chapter 7.

rich PowerPoint research report rapidly without reading the document. Whilst doing this, he sketched some shapes into his A4 size sketch book. When asked why he is drawing shapes: “I am trying to make sense of the concept.” When asked what he is doing, Jie mumbled while scratching his head: “I am trying to get a feel of where to start.” He continued scrolling up and down the document. When asked if he is reading the document: “I don’t think reading can help much anyway, just getting a feeling from some of the charts in the document. “

Episode 9: Jie on “feeling and shaping”

In contrast to what we thought that Jie might be a novice designer, Jie’s design was constantly praised throughout Roko’s project. His engagement was active and features from his sketches were chosen, and he is one of the most articulated CDs in Sang Design. What we were witnessing was a kind of ideation through “feeling” to make sense of the situation through an understanding not established through words and logical reasoning. Instead, Jie doodled to develop shapes to get a feel of the ideas. I termed this activity “shaping”. “Feeling and shaping” seemed to help him to start his creative process. This visual way of working can sound obscure to WDs at Sang Design and at other contributing case studies, who begins ideation by planning, using tools involving words, such as mind maps and brainstorming to capture their ideas. In practice, “feeling and shaping” is a useful tool for CDs to ideate. Although in DPs, visualisation is seen as fixation if done too early in the process, research have started identify this visual reasoning tool to manipulate the higher level of cognitive structures through visual reasoning (Liu, 1995; Oxman, 2002).

The Need to “Know”

The importance of knowing when designing insisted on by Tristan is in opposition to the “feeling and seeing” way of ideation by CDs and recalls the story of George Sturt at the Wheelwright’s Shop (Jones, 1992). Sturt was wondering why the wheel on a wagon was “dished”. In fact, the hub of the wheel was recessed from the plane of the rim, so that all spokes reached slightly outward from hub to rim. Sturt the craftsman knew it had to be this way, but could not explain why. Many years later, as author, he hit on it: the gait of the horse imposes a side-to-side rhythmic swaying of the wagon; the wheel must be slightly dished to resist this force. This exemplifies the difference between “designing” and “making”. The problem is in the need to know one’s design when “doing” it.

Tristan is a French junior designer, fresh out of university before he embarked on his design practice in China. He brought with him what he was taught in France. After one year in Sang Design, his recognition of the situationist approach was not yet as strong as Laura’s or Mikael’s, who had more design experience prior to working at Sang Design. Laura and Mikael were not only leading their teams, they themselves became reflective practitioners and situationists to embrace the differences. Mikael now practised a design process similar to a black box. In this, the level of design expertise influences how WDs tackle CDs’ different creative process. A designer’s level of expertise is crucial to understanding this tolerance of not knowing what is going on during designing. Cross and Cross (1998) studied three designers at practice, in the fields of engineering design, product design and automobile design. The intermediate level designers saw strategic process knowledge as an emphasis of a flexibility of problem and its context. The expert level designers tended to draw on their own

experience and knowledge, which was largely tacit. In contrast, the lowest level designers drew upon explicit, articulated knowledge.

The need for knowing decreases when the level of expertise rises. Similarly, Kees Dorst (2004) proposed that the level of expertise of the designer determines the level of problem solving, rational, in their design methods. His co-evolution model combines both the subjectivity and the objectivity of designers. In this model, designer's subjective experience becomes more important as their expertise increases, while novice designers rely on design models introduced by expert designers. WDs might be shocked at the creative differences at the beginning, but their adaptations quickly replaced their own methods. At the end of the day, Sang Design is successful; the cross-cultural teams brought interesting design to their practice. Along the way, WDs got use to the silences, the lack of verbal argumentation and the differences in creative process of their Chinese peers. After all, as designers themselves, they found their way around these differences and made the most of the differences.

In theory, the need to know to design "properly" is debatable, as Polanyi (1967) wrote, "*...and we can know nothing without relying upon those things which we may not be able to tell*". If concept articulation is limited to verbalisation, the view of design is limited to a rationalist knowing. As Polanyi argued, creativity and discovery depend on implicit, personal knowledge, that exploratory acts are motivated by critical interrogation with others in the form of "tacit knowledge". To tell or not to tell, that is the problem. One may reason that the silent moments and the use of visualisation among CDs is a problem in designing. It was problematic only at the first instance when WDs were reluctant to understand and respect the internalisation of designing.

Before design processes were introduced, craftwork where designers made directly with objects could be highly practical and beautiful. “Feeling” and “shaping” were important then, with craftspeople recognised as people with high levels of design ability. The belief remains, with some professional designer seeing their design as vernacular design (Cross, 2006, p. 20). The problem lies in the need to “scientific” designing. It was argued that the scientific design methods were developed “*based on the assumption that modern, industrial design had become too complex for intuitive methods*” (Cross, 2006, p. 97). The failure to separate these two aspects – design and knowledge – brings confusion and, as a result, a general recognition of rational problem-solving method in design studies.

“*But the design process is illogical, but all this knowledge is logical*” (Jones, 1984, p. 15). In Sturt’s case, the knowledge about the wheel is a matter of logical knowledge, but the design process that brought him to design a new wheel of a new kind of vehicle is illogical. This is where we confuse knowledge and designing. Knowledge is valuable for reproduction of another wheel and is most likely valuable if Sturt’s aim is to make improvement to the wheel. When Sturt is to make a wheel for a totally different vehicle, the knowledge of why the dish is useful would be helpful, but it is not necessary when designing the wheel for the new vehicle. The systematic approach that tries to combine scientific knowledge and design thinking is contradictory. The reason is that, if we try to clearly speak and reason about design like a scientist analyses people and thinking, the design process has to be a rational one. This is where WDs and CDs differ.

6.2.2 “Quick and Dirty”

Admittedly, I had an earlier suspicion on that CDs in the case studies might be under-trained novice designers and “stopped at the craftsman level”. The truth is

otherwise. CDs in the case studies were graduates from the top ten design institutes in China with average more years of experience than WDs. Also WDs in Sang Design have expressed their admiration on the “different way of designing” yet producing good design⁹⁰. Episode 10 illustrates Laura’s discovery of how fast Tao’s creative process was.

“I told Tao yesterday afternoon that we need to stop research and get the concept proposal done in a PowerPoint document by the end of today. Tao said “OK”. At lunchtime today, we had a quick meeting to check on progress. Tao was still doing research. Apparently, he misunderstood what I said so he had nothing to show at noon today. I was quite worried as the deadline for the proposal is at the end of today. Tao had only few hours to finish off the concepts. Tao got stuck in and finished off the concepts. Actually, it was somewhat annoying really, because his concept was on the same line as mine, only difference was that his concept was better finished than mine was. It was unbelievable how quickly CDs can do “quick and dirty” concepts just like that. “They are really good at styling. He is very good at styling, almost embarrassing that CDs can come out with a good style so quick.”

Episode 10: Laura on Tao's “quick and dirty” creative process

Laura’s remark (Episode 10) highlighted that CDs seems to work in a “quick and dirty” way and are very good at styling. “Quick and dirty” is commonly used by WDs to refer to CDs ideation process of generating concept. For Mikael, it was a myth about

90 In contrast to what we known here as “Chinese design”, which are merely manufacturers’ undersigned products.

how CDs get to their design. CDs in the case studies, in general were more “fluent” in sketching than WDs and fast in generating concepts.

The “quick and dirty” ideation can be explained as an intuitive method rather than the rational conceptualisation method WDs are familiar with. The drawback of the intuitive method is the internalisation of reasoning. The non reportable method poses a problem if one is to collaborate with WDs who expect articulation of their creative process. Hence, despite the speed, the ideation method is seen as a disadvantage in the context, which subsequently is seen as irrational.⁹¹ Even though CDs’ “black-box” type designing works, we would discard the method for the lack of evidence, as Jones (1984) argued: “...*what is striking is that each method begins with a first stage that is extremely difficult to do, which has no description of how to do it, which is intuitive.*” That all the design methods start with non-rational step of intuition, yet this intuition has to be based on experience and imagination, otherwise it is hard to be believed (Jones, 1984). Unfortunately, Intuition was marginalised as disadvantage in the early edition of the design textbook “Engineering Design: a Systematic Approach”:

“As a rule, intuitive thought processes involve fairly complex associations of ideas, elaborated in the subconscious mind... a purely intuitive approach has disadvantages... - that the right idea rarely comes at the right moment since it cannot be elicited at will. – the result depends strongly on individual talent and experience, -

91 I acknowledged the differences between geographical and cultural contexts of the design industry. For example, it is possible for designers in China to do last minute changes at their manufacturer, just before moulding. It is unlikely in the West where all details are planned. However, I have no intention to pursue this issue in this thesis.

there is a danger that solutions will be circumscribed by one's special training and experience" (Pahl & Beitz, 1996, p. 31).⁹²

To shed lights on the CDs' intuitive ideation, I outline further observations on creative processes observed at Sang Design.

6.2.3 Breadth versus Depth

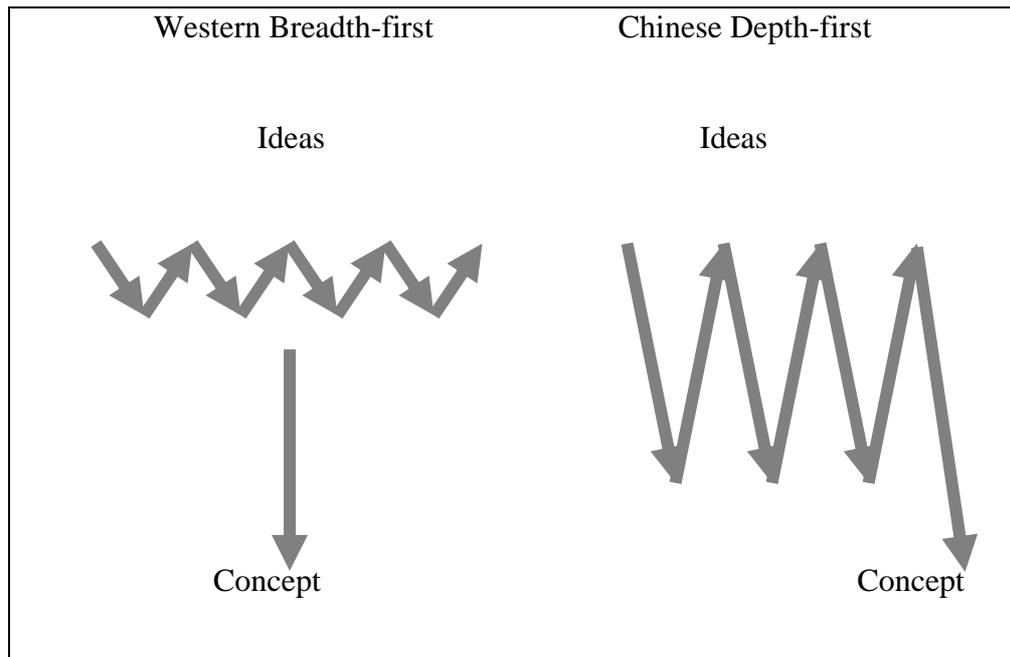


Figure EE: Design Ideation - Breadth versus Depth

My understanding of the fuzziness of CDs' creative process begins with an early remark by Mikael (Account 25).

92 The change of mind about intuitive methods can be seen in the 2007 edition: *"any logical and systematical approach, however exacting, involves a measure of intuition; that is, an inkling of the overall solution. No real success is likely without intuition"* (Pahl, et al., 2007).

“I have to pull them back otherwise they will wander off to somewhere else”, Mikael sighed.”

Account 25: Mikael on CD’s creative process

When interviewed, WDs were surprised by how quickly CDs can produce a solution without producing a concept in breadth. There are two different processes for achieving the same goal. WDs explore alternative ideas exhaustively in abstraction and choose one to refine further. CDs would refine one idea to the concrete level and if it was not working then start again from another idea, taking previous design into consideration, until they get to the final solution (Figure EE). Tristan illustrates how they work differently yet both take the same time to reach the final design (Account 26).

“What I didn’t expect is that usually [Chinese] designers go from one idea [or] one concept and they refine it very well from the very beginning. But I just do very rough concepts. I [only] begin to put more refinement before the final product. I am more user-oriented and they are more product-oriented [...] We worked independently until the first meeting with Mikael when we revealed our concepts. So during this meeting they showed more detail stuff but I showed more rough stuff that I had to refine anyway. But sometime they had to change because as they might go too fast in one way, when they reviewed with Mikael or Tian, they might have to redo, or changed the design, or to refine again, but in a different way. However, at the end, we all arrived at the same time.”

Account 26: Tristan on Breadth versus Depth

On the other hand, CDs expressed their admiration for Westerners’ ability to innovate during the conceptual design phase in a breadth-first approach. The need to

diverge was discussed in Chapter 2 as a creative process to expand abstract ideas in the problem space⁹³. This breadth-first approach is preferred by WDs for creating a variety of concepts in rough form and choosing one for further development. In contrary, the depth-first approach is seen as novice behaviour, which risks fixation by sketching first. The breadth-first approach was not observed in CDs sketches and during design meetings. Curious, I asked Tian how they produce design sketches for the first meeting. He said that although they should not be looking at each other's concepts, but they would secretly make sure that their concept is different. Therefore, before first meeting, they have already liaised with each other on the concepts they are producing. The physical structure of the workspace makes that easy. However, he also mentioned that this act is to fulfil Mikael's requirement for alternative ideas to fulfil the divergence of concepts.

Figure EE display the differences in ideation between WDs and CDs that I gathered in the fieldwork. WDs' breadth-first approach involves creating several concepts in abstraction without committing to details. One concept will be chosen later for further development into detailed design. The early ideation happened at the higher level of abstraction. The disadvantage is that it leaves little time for development. The depth-first approach can be too rigid and leaves little room to explore alternative ideas.

93 *"The purpose of divergence is to seek questions not answers. The effect of divergence is to deliberately create muddle and confusion in one's own mind, to upset one's own reality and to seek new possibilities. There is no reason to fear chaos: it is our name for another form of order: that which we see as yet only in part. After exploring chaos one tries to "surface", to recover one's mental balance, to create a new picture of the problem, a transformation of the familiar and the contradictory world in the light of the many different worlds it could become."* (J. C. Jones, 1984, p. 8)

When working in a Western-Chinese design team, this breadth-depth dichotomy is a mismatch of creative processes that reduces the possibility of creative collaboration.

At Sang Design, Ong overcame this by introducing scenario setting for the Roko project (Section 6.1, page 208). It is a deliberate breadth-first approach to expand the creative space. The breadth-first expansion was done at the research phase by the research team with the help of designers themselves to set the scenarios. Several scenarios are given to the designers to create two designs each. The scenario-based design method, with its breadth-first approach, seemed to work very well for the depth-first CDs. During the project, the design discussions were easily referenced to the names of the scenarios: “So, what do you think of the design for Lee? He likes sports, perhaps we could think of a waterproof-type phone?” This concrete level of designing worked for CDs and, intriguingly, also worked for WDs. The scenario setting is a useful design tool for all.

6.2.4 Innovation versus Imitation

Another factor to understand CDs’ concrete level of designing is in the inspiration of designer’s ideation. CDs’ imitative way of designing was first recorded in my early studies by student designers who highlights that they were taught to copy and draw. The phenomenon was also observed during the main studies at Sang Design and Wuxi-Zurich Design Exchange. The preconception of Chinese design as imitation was widely perceived, and seen as corresponding to the earlier days of Japanese, Korean and Taiwanese design. The reason is partly that the cheap products imported from China are not necessarily designed. Yet it is also partly true that CDs tend to imitate.

Laura and I were interested in understanding why CDs imitates. We had seen cases of CDs’ misuse of research phase, for example, surfing the internet for visual

examples. The forms and shapes inspired their creativity. Laura felt that one cannot be innovative by copying or imitating, so she intended to stop them from downloading existing designs. She hoped to steer them towards the “right” process of designing. At the end of my last trip at Sang Design, we finally had a chance to intervene to see if it was necessary for CDs to have these “visual sparks” (Episode 11).

Laura (American team leader) was leading team D to design a portable exhibition system for Exhibito Design. Her team members were Stephen (German junior designer), Tao (Chinese senior designer) and Siang (CD). The project was to design an assembly of exhibition systems that might consist of fifteen to twenty parts. Exhibito Design is a leading exhibition system company from the US. The design brief was an unfamiliar call for a product designer, as the understanding of space was crucial. Innovation was essential to the success of this new product design project. Laura produced a project brief and gathered her team members for a brief meeting. As usual, Laura explained her brief, project plan and timeline. However, she had a cunning plan to swap around the research phase and conceptual design phase, so the designers would start with conceptualisation before going into the research phase. Laura defended her decision on creation as the first step: “This is such a weird, boring, dry type of project that I think, if we're going to get anything innovative, we'll need the creative phase to happen sporadically now, and then concentrate more on the conclusion of the research.”

Stephen understood Laura’s brief immediately. Without needing to refer to the brief, he jumped into his chair and started to do some concept.

He made a mind map that linking the fragments of the problem to related features. Tao and Siang were having trouble in understanding the project brief as an abstraction of the design problem. Tao and Siang teamed up to understand the brief together. They were confused with the change of phase. Tao and Siang sought permission from Laura to look at what is on the market, but Laura reminded them to start creating immediately. “No internet!” she warned. Knowing they were probably too shy to ask questions in person, Laura used online chat to prod Tao and Siang for some. Siang was quiet in person but he asked Laura some questions through online chat. After a few questions, he said he still had some questions but would ask Tao. Later, Tao asked Laura a few questions through online chat. Laura replied with mini-paragraphs, trying to convince them to leave research to tomorrow. She insisted that this day was solely for sketching and asking “why”. After a few sessions of chat and explanation, they finally seem to understand Laura.

Tao was concerned about how to start the ideation. Having no clue how to start, Tao and Siang pored over the brochures from the client on the desk, while Laura secretly looked over from her desk opposite theirs. For a long time, Tao and Siang had no questions, even when Laura probed: “How’s it going?” In fact, they were having trouble in understanding the brief, written in words at an abstraction level, which requires an association to concrete design. In a soft voice, Tao asked Laura some informative questions on the design problem itself. The questions were mainly on the concrete elements of the design problem. Tao and Siang started to discuss when Laura left her desk for a few minutes. Tao got into discussion with

Stephen. Stephen spoke a lot, and Tao managed to ask some questions, but Siang remained quiet. Several hours later, Laura noticed that Siang and Tao were not sketching but surfing the internet for clues.

Episode 11: A swap of process for the Exhibito Project

Laura later expressed to me that she felt frustrated because CDs like to copy existing designs while she held innovation in the highest regards. It is what CDP is all about, separating details from ideas, avoiding fixated concepts. The practice of designers is to innovate from scratch. In this, an innovative concept will be fixated by visual but not idea. However, one may have a false judgement of CDs' imitation as not being innovative. Turner defended the unique notion of imitation in Chinese design as a valid concept of innovation (Turner, 1993, 1995, 2002).⁹⁴ Laura had only spent one year in China, and at Sang Design. Her frustration was a mismatch of expectation in what is considered as innovation and being innovative. For her, innovative design required a design process with an abstract-concrete progression but, for CDs, the process does not matter, the most important thing is the result. Jimmy, from the early studies highlighted this during his interview (Account 27).

“Chinese students can be too goal-oriented. They have too strong opinion on the direction they wanted to go [...] Because they have this clear

94 Turner (1993) carried out an archive search on plastic flowers in Hong Kong and discovered a well documented archive of patented designs in Hong Kong dated back to the early 20th century. They are plastic flowers or fake jewellery, the types of products that are hardly considered as innovative design in the West.

goal to run towards, they will not enjoy the process of getting there. They do not look at that through this process, I can arrive at this destination. Take an analogy. When we arrive in new city, we can buy a new ticket to jump on a bus and just go with the flow and see where it brings us to. But it is not for [CDs...], so [they have] focused on the destination that they have forgotten to enjoy the scenery along the journey. This is what I think a big difference between WDs and CDs.

Account 27: Jimmy on result oriented CDs

In contrast to Laura, Mikael, who has spent longer time with CDs, has embraced this result-oriented design. He has implemented a situationist's design cycle that allows a kind of creative space to be explored by WDs and CDs in collaboration.

Imitation is a cognitive phenomenon in which the preference for copying visuals is currently misunderstood as non-innovative. Chinese student designers in the early studies highlighted that imitation through copying visuals was a common teaching method used by Chinese design lecturers. The imitation or copying visuals is commonly taught in the art-oriented design institutions in China where mastering drawing technique is an important skill to design. Ming at Sang Design spoke of his entrance exam into the most prestigious design school in Mainland China. One of the tasks used to examine the hopefuls for intakes was drawing a vase on display. Garrett and San, during my first interview for this research, reported the emphasis on techniques in their Chinese design education as differing from their study experience in the UK.

There is only a thin line between the novel imitation of learning and the mere imitation of copying. Imitation can be novel and creative when the thinking takes the rapid process of rich stimuli, yet mere copying will not give rise to thinking (Dewey,

1909, p. 160). These two acts are differentiated through the act of pattern-making through mental imagery in the novel act of learning through imitation that gives rise to rapid intuitive thinking.

6.2.5 Ideation with Sketches

Designers sketch (Tversky & Suwa, 2009). The most direct way to investigate designers' ideation is through their sketching. Much research has been done on the importance of sketching as a tool for concept generation in team (Bucciarelli, 2002; Downing, 1992; Ferguson, 1992; Fleming, 1996a; Fleming, 1996; Goel, 1995; Goldschmidt, 1991; Lahti, et al., 2004; Matsubara & Nagamachi, 1997; Reid & Reed, 2005; Tovey, et al., 2003; Van Der Lugt, 2005; Verstijnen, et al., 1998). Sketches are the most elaborate mementoes I collected to trace the Chinese ideation process after observing mostly silences in design meetings. It is thought that sketches is at its peak during early stage of CDP (Rodgers, Green, & McGown, 2000). It was also convenient to collect sketches when CDs are fluent in sketching and largely articulate design concepts through visual sketching. The use of drawing as a representational tool to manipulate design ideas is what differentiates vernacular design process from modern design process.⁹⁵

At the early stage of designing, an unfinished sketch can be interpreted in very different ways. The ambiguity and indeterminacy of sketching process, as argued by Goel (1995), can help designers to visualise their idea. Similarly, Purcell and Gero

⁹⁵ The design process *“encourages experimentation and liberates the designer’s creative imagination in a quite revolutionary way, making the process almost unrecognisable to the vernacular craftsman.”* (Lawson, 1997, p. 24)

(1998) highlight that the reinterpretation of these sketches can help creative problem-solving, as the sketches can stimulate and inspire new ideas. Sketches can also be used as the records to share parts of designers' external memory with the groups as an access to their earlier ideas (Van Der Lugt, 2005). Goel (1995, p. 12) argued for the importance of sketching as an ideation tool:

“Sketching dominates the preliminary-design phase. As one moves from preliminary design to refinement, the forms of sketching become more constrained, until they become a full-fledged drafting system during the detailing phase...these symbol systems have different properties that affect their expressive capacities and cognitive functions. We need to take seriously the structure of the symbol systems in which we construct, use, and communicate our concepts, and our theoretical framework must allow for the possibility that different thought contents may require different symbols systems for their expression”.

Yet I left Sang Design with an impression that sketching is now of lesser importance for WDs in the case studies. The analysis on the sketches collected in the fieldwork shows the duality of the use of sketching between CDs and WDs, as I shall elaborate below.

Generally, there are three types of sketching in a team setting: the thinking sketch, the talking sketch, and the prescriptive sketch (Ferguson, 1992). **Thinking sketches** are

used for individual thinking processes⁹⁶. **Talking sketches** help communication during group discussion in presenting a common graphical setting for the idea in generation. **Prescriptive sketches** are used at the later stage of designing, when engineering details are involved. **Lateral and vertical sketching** are two notions suggested by Goel (1995). In a lateral transformation, a slightly different idea is sketched. In a vertical transformation, more detail for the same idea is sketched.

Thinking sketches were used almost immediately by CDs when given a brief; while WDs compiled a concept of the idea in written language.⁹⁷ Talking sketches of CDs were supported by gesture and objects in design meetings whenever verbalisation proves difficult. CDs tend to sketch into the details, a vertical sketch of a depth-first creative process; in contrast, WDs' would sketch a few alternatives before choosing one to sketch in details, a lateral sketch of a breadth-first creative process (section 6.2.3). This freehand sketching was evidentially used immediately by CDs, while WDs sketched much later on after mind mapping.

The most intriguing analysis from sketches is CDs' early doodle-like thinking sketch. It is a kind of doodles with shapes only self-intelligible. It is more primitive and happened much earlier than the brain sketches reported by Van Der Lugt (2005). Most CDs were doodling on their sketch book while "reading" their design brief (Episode 9, page 212); while WDs were working on their mind maps. However, confusingly, for

96 That is particularly useful at the early stage of designing when the design concept is deliberately left ambiguous. This is similar to the idea-sketch posit (Verstijnen et. al (1998).

97 Schnabel (2001) observed a similar phenomenon among CDs, using visual that is tangible at the early stage of designing.

CDs who are good at 3D graphics software, ideation seems to bypass prescriptive sketches, into detail drawings with digital three-dimensional graphics. Tian saw this as a drawback instead of an advance in design practice (Account 28) in which Tristan echoed (Account 29). Intriguingly, this pre-conceptualisation doodle-like thinking sketch can sometimes happened at the same time with the post-conceptualisation 3D drawing.

“I think Chinese is quick with software, so the sketch is complex. I personally don't agree with using software because software can limit our idea. It can't make us explore more on idea and can't be fast to see outcome. You can only focus on one concept. Although I think it is not good, but I can't ignore the temptation to have more presentable graphics by using software...it can limit innovation and imagination. Hand sketch is better. It becomes a habit for CDs to use computer to go further on an idea without exploring other ideas”

Account 28: Tian on CDs' use of computer graphics

“I first draw sketch on the paper but mainly a lot of my colleagues they start by computer. And so when you work on computer, you will go straight away to one idea I think”.

Account 29: Tristan on CDs' use of computer graphics

6.3 THE CREATIVE IMAGERY

To understand these contradictions, we have to start from the sub theme of “feeling and shaping”. As mentioned in previous section, “shaping” is how CDs begin to conceptualise, or more adequately, “ideate”. This CDs' doodle-like sketch was not

reported in analysis on design sketches such as (Akin & Moustapha, 2004; Kavakli, et al., 1999; Marakas & Elam, 1997; Suwa & Tversky, 1997; Tversky & Hard, 2009; Tversky & Suwa, 2009). Research in design cognition also reported the phenomena of shaping among designers (Liu, 1995, 2000; Liu & Lim, 2006) and is said to be useful for visual reasoning as a means for design emergence of the design form (Oxman, 2002).

6.3.1 Visualising Internally and Externally

The creative imagery is similar to the mental imagery suggested by Finke (1990) called the “preinventive form” which can be manipulated inwardly through generating and exploring mental images. It occurs at the very beginning of the creative process, as a means to manipulate structure through visuals⁹⁸. As Martin’s email suggested, it is the kind of internalised ideation among CDs (Account 22, page 194). These visuals are “in their heads” in the form of mental imagery. Research on imagery has shown its capabilities in facilitating creativity through emergence and restructuring of ideas through the innate process of visualisation (Bowers, et al., 1995; Finke, 1990, 1995a, 1995b; Finke, et al., 1992; Goldschmidt & Smolkov, 2006; Hasirci & Demirkan, 2007; Kavakli & Gero, 2001; Miller, 2007; Paulus, 2000; Pylyshyn, 2002; Svensson, et al.,

98 He distinguished the difference between convergent insight and divergent insight based on divergent and convergent thinking by Guilford (1950). In convergent insight, “one discovers a creative structure or solution that makes sense out of apparently disconnected facts. [...] it is particularly useful in solving mysteries, where one must collect relevant clues and then discover a coherent explanation for them”. Divergent insight “occurs when one begins with a structure and seeks to find novel uses for it or novel implications of it” (Finke, 1995a, p.256) For example, an artist’s exploration of an interesting structure without specific goals in mind but to discover the possibilities offered by the structures. It is a function-follows-form, rather than a form-follows-function approach (Finke, 1990).

2006), and has been proposed as a tool for creative problem-solving (Finke, 1989; Finke, 1995b; Gill, et al., 2000; Goldschmidt & Smolkov, 2006; Kavakli & Gero, 2001; Kozhevnikov, et al., 2005; Liddament, 2000; Purcell & Gero, 1998; Kosslyn, 1995).

Instead of fixation visual sketches may bring to the design process, the creative imagery of CDs is a kind of structuring tools to work with the preinventive forms which seemingly give rise to design features⁹⁹. I have described Mikael's adaptation of the simplified process to collaborate with CDs which combined features derived from forms to give rise to the final design (Figure BB, page 200). In this, the abstracts and the concretes of ideas contributed to the design are evolving between the preinventive form and sketches and finally emerge as the finished design. On the other hand, I have also shown that Jie's use of prototypes (Figure DD, page 209) and CDs' use of 3D software to sketch finished design earlier than WDs in their creative process. These actions are not co-incidences but CDs' preference to use visualisation to create, ideate, and innovate, both internalised in their creative imageries and externalised in their sketches and 3D images. CDs' use of visualisation might be easily taken as fixation of not being able to diverge in their creative process to explore further alternatives. In this, their "quick and dirty" way of designing (Episode 10, page 216) described the kind of divergence through restructuring of ideas, albeit at the concrete level, they arrived at the same time as the WDs who diverged at the abstract level.

99 The mental imagery is defined by Finke (1990, p. 2) as: "The mental invention or recreation of an experience that in at least some respects resembles the experience of actually perceiving an object or an event, either in conjunction with, or in the absence of, direct sensory stimulation."

Furthermore, imagery and visual cannot be taken as the same thing. Verstijnen et al. (1998) studied sketching behaviour with the aim of improving computer-aided sketching. The study highlighted that pictures and mental images are not to be inspected in the same ways. The type of reasoning using mental imagery is more than words and visuals. It is through inner dialogues or mental images in one's mind's eye (Pylyshyn, 1981, 2002, 2003a, 2003b). In architecture, Gill (2000, p. 230) described this imagery as concrete imagery:

“The experiences of concrete imagery of spaces and building forms were common even at a very early stage. Surprisingly these experiences occurred long before the spatial issues were even touched on, almost as early as the discussion on the brief started. Most of this imagery was built on “stereotypes” of architectural and interior spaces.”

The creative imagery cannot be reasoned in words, neither in visuals, yet powerful in imagination, beyond spatial and forms can facilitate. It is said to be a mean to manipulate concept by structure and restructure ideas and concepts through association formation. Jie's “feeling” and “shaping” is a kind of reasoning through pattern-making in the minds of CDs that is triggered by learning and structuring through their mental imageries. With the visualisation in their heads, and through sketching, CDs uses a powerful cognitive faculty of human beings as a kind of visual modelling of ideas (Archer, 1978). Kozhevnikov et al. (2005) has suggested that there is a kind of spatial imagery which differs from visual imagery. Spatial imagery is a useful analytical tool to visualise strategy. It is especially useful for a visual thinker who has this kind of ability. To traverse around this spatiality, we can infer thoughts indirectly without prejudging from experience.

Yet this type of fast, intuitive reasoning through manipulating concepts in our mind is yet to be fully understood and often doubted. Most crucially, it can't be shared (Fish, 2004, p. 157) which adds difficulty when describing Western-Chinese design collaboration. It is perhaps for this simple reason that there is general lack of study to investigate designers' imagery when studying design collaboration, but many chose to analyse verbal protocols. The designers' imagery is simply too mysterious to research.

6.3.2 Structuring and Emergence

However, it needs not to be mysterious, I realised as I began to unfold creative processes at Sang Design. What is of significance in this modified and simplified design process in Sang Design is its elimination of a controlled order and prior planning. The design planning stage before design development was influenced by system engineering and operational research made popular in the 1960s and 1970s (Rittel, 1972; Rittel & Webber, 1973)¹⁰⁰. The problem with planning is that, structure is fixed at the beginning of designing. When CDs imitate the shapes, and doodle through shapes, we are seeing a different way of planning that directly enacts their mental imagery into a rapid reasoning and structuring of ideas. The preinventive form begins before the specific planning stage, and continues throughout the design cycles until the design is formed. Plan for CDs is tentative, as well as structure. The design process is situated cycle rather than a controlled order.

This situationist approach works well in CDs group, but when collaborate with WDs who prefer to sketch much later on and ideates with words through mind maps,

100 It was so influential that at Ulm, the artistic influence during Max Bill time was soon replaced by analytical methodology when Maldonado arrived (Broadbent, 1988, p. 252)

there simply is not possible to collaborate synchronously. For start, the level of abstraction differs because of the type of innate ideation CDs preferred in contrast to WDs conceptualisation in an abstract-concrete progression. Mikael's adaptation of a simplified process, or rather more accurately a design cycle, is to facilitate design emergence from a creative space of possibilities without prescribing a process.

Another framework useful for explaining early creative structuring is meta-cognition. Meta-cognition refers to the executive processes that oversee, regulate, and orchestrate the activities of cognition. Armbuster (1989) explains that one's creative thinking to make association is in one's meta-cognition. This ability develops late and is used during the incubation stage of creativity.¹⁰¹ This ability is quite unconscious; *"conscious attempts to guide and control creativity too early in the process seem doomed to failure"* (Armbuster, 1989). This type of associative formation is different between WDs and CDs, as observed at the Wuxi-Zurich design exchange (Nainby, et al., 2006). It is a type of design reasoning used to associate dispersed partial ideas into a design and made possible by abductive reasoning, which Cross (2006, p. 33) describes as the logic of design:

101 Using (Wallas, 1926) outline of five stages of the creative process: preparation, incubation, intimation, illumination, verification.

“...design is abductive: a type of reasoning different from the more familiar concepts of inductive and deductive reasoning... the more useful concept that has been used by design researchers in explaining the reasoning processes of designers is that design is abductive: a type of reasoning different from the more familiar concepts of inductive and deductive reasoning, but which is the necessary logic of design – the necessary but difficult step from function to form.”

6.4 IDEATION VERSUS CONCEPTUALISATION

The abductive reasoning is one of the key characteristics of design reasoning which sets apart ideation from conceptualisation. Visualise internally and externally with imagery and sketching is not a deductive process but rather they are correlated and use both the abstracts and the concretes to traverse design problem space for design solution. With this view, ideation happens in a creative space of possibilities where structuring and restructuring of ideas give rise to the emergence of design through designers' internal or external visualisation; while conceptualisation happens in the design process with an abstract-concrete progression from problem to solution. It is this contrast that sets apart WDs and CDs from collaborate successfully during early designing, which lead to the simplified process. As a result, an abstraction-concrete progression became redundant.

Table 19 summarises the dichotomies derived from the case studies discussed in Chapter 5 and in previous sections in this chapter. These dichotomies are related one to another. It all started when CDs' silences in design meetings was observed. The silences has prompted me to collect visual mementoes such as sketches and design process which eventually brought cognitive implications to the study originally aimed for the sociality of Western-Chinese early design collaboration. I then continue to observe the

generation of concepts that revealed CDs visualisation at a concrete level in a depth-first creative process. Also, the adaptation of a feature-follow-form design practice in a situated design cycle confirmed the alternative way of designing by CDs. With this outcome and drawing from the early studies, I suspect that the visual oriented CDs is related to their seeking of design inspiration through imitation.¹⁰² I then discussed creative imagery and the situated nature of CDs creative process, which leads into discussion in Chapter 7.

Design Dichotomy	Western Designer	Chinese designer
Concept negotiation	Verbal Argumentation	Silences
Concept articulation	Verbalisation	Visualisation
Ideation through	Mind maps	Doodle, Sketching
Concept generation	Abstract-first	Concrete-first
Design practice	Form-follow-function	Feature-follow-form
Design inspiration	Innovation	Imitation
Creative process	Breadth-first	Depth-first
Design reasoning	Logical abstraction	Visual analogy
Design Process	Iterative design phases	Situated design cycles
Design Epistemology	Rationalist	Situationist
Early designing	Conceptualisation	Ideation

Table 19 Reported design dichotomies

I argued in Chapter 1 that how we see designing dictates how we research designers in collaboration. The silences signify the contradictions of ideals between the rationalists WDs and the situationists CDs. During Western-Chinese early design collaboration, two ideals of design practice came into a direct comparison. With the

102 The cognitive reasons for this are beyond the scope of this thesis, although there are pointers towards the hypothesis by Robert Logan (1986) that alphabetical language speakers tends to be abstract thinkers and pictorial language speakers tend to be concrete thinkers.

rationalist view, co-design is an activity of verbal negotiation while design is realised through a controlled process with the abstract-concrete progression. On the other hand, the situationist view sees co-design as an experiential learning activity within the team, while design is realised in a creative cycle of reflective practice. Both harboured some truths in their views when describing Western-Chinese early design collaboration.

Admittedly, there were similarities as well as differences in the design methods,¹⁰³ but the differences, as the hermeneutic turn informed, is a perspective more significance to the design research to write up for this thesis. The silences were a symbol of differences, partly influenced by designers' social preferences, but mainly by the mismatch in their creative practices. During early design collaboration, both visual and verbal thinking are in function, and therefore at both abstract and concrete level. Yet, WDs' verbalisation and CDs' visualisation when articulating design concept brought me to question if the DPs with an abstract-concrete progression is an inclusive design framework for designers? In view of this, I reviewed the trend in DPs and found that the CDP is the key to the abstract-concrete progression of DPs with an isolated phase specifically for design conceptualisation and is seen as the early design stage. This is different from the CPs of which ideation instead of conceptualisation is seen as early designing.

The abstract-concrete progression in conceptualisation was not possible during Western-Chinese early design collaboration due to the mismatch between WDs' verbalisation as working at the abstract level and CDs' visualisation as working at the

103 For example, Schadewitz (2007) has chosen to report the similarities in her thesis on cross-cultural interaction design communities.

concrete level at Sang Design. In theory, the abstract-concrete progression of DPs was prescribed to prevent fixation of idea by not visualising design too early in the ideation process. In practice, CDs preference over visualisation, both internally and externally, give rise to the emergence of design is an ideation process, rather than a conceptualisation process. With this, I conclude this chapter by arguing that ideation is different from conceptualisation in theory and practice. With this, I call for co-design communities to consider the designer's creative process when studying designers in collaboration.

CHAPTER SUMMARY

In summary, I have presented a series of core themes derived from interpreting the phenomenon of concept generation during Western-Chinese early design collaboration. The earliest pattern that emerged was the simplified design process adapted by Western design team leaders in situationist cycles. The differences in creative process led to the conclusion that the abstract-to-concrete progression expected of a design process is not applicable to CDs, and therefore for the Western-Chinese teams. Despite this, WDs and CDs are equally competent in their practice. Through CDs' preference to ideate through visualisation, both internally and externally, I highlight that their creative process is an ideation process instead of WDs' conceptualisation process. In conclusion, I argued that the ideation process is as valid as the conceptualisation process, albeit their differences.

CHAPTER 7: IDEATION OR CONCEPTUALISATION

CHAPTER OVERVIEW

In this chapter, theories and themes from chapter 1, 2, 5 and 6 are brought together into a discussion of the perspective adopted in this thesis and its contribution to the field of study. Section 7.1 addresses the isolated conceptual design phase, revealing the limitation of design conceptualisation by means of a discussion of the abstraction of the design problem in design processes. Section 7.2 addresses the characteristic of situated creative ideation in a creative space. Section 7.3 provides a macro view of the thesis research.

7.1 SITUATING THE CONCEPTUAL DESIGN PHASE

The CDP, as reviewed in Chapter 1, is a fixated ideal of 1980s process models of designing, incorporating a rationalist view. The unsettling position of the CDP and ambivalent progression of analysis-synthesis and divergence-convergence raises questions about the need for a problem-solving process with an abstract-concrete progression, both in theory and in practice. The themes derived from my studies on Western-Chinese early design collaboration (Chapter 6), which suggested that a simplified design process is practiced by CDs and adapted by the Western-Chinese design teams.¹⁰⁴ The creative ideation process is one that values the situationist view. I have proposed in Chapter 6 that CDs use creative imagery to ideate, create and innovate, through structuring and restructuring of their ideas for an emergence of design. Consequently, when WDs collaborate with CDs at Sang Design, the commonly used

¹⁰⁴ Or, more appropriately, design method, as it is more than a design process.

DPs, with an isolated CDP, became redundant; instead design was realised in a situationist cycle of experiential learning within a team. The supposedly articulate, rational, and externalised process of design conceptualisation was not observed, but silences and simplified processes were evident.

At the end of chapter 6 I argued for the difference between ideation and conceptualisation to be taken consideration when studying early design collaboration. One wonders where the creative ideation and design conceptualisation lies, if it is not visible in the process. I argue that it does not lie in specifically in a process. The design concept is a situated representation of partial structures of ideas and concepts to be manipulated and structured for new insight. Design concept, as a term, was used extensively in Sang Design as a term to represent unfinished design; it was also used interchangeably with “design idea.” The design concept assumes no definitive form – it is not an abstract representation of design, but rather a situated representation of the design situation - how much the designer’s have for the design. Depending on the design projects, and the time of meeting, the design concept can take the form of a hand sketch, a CAD sketch, a concept statement, a prototyped object or even project status. Its role is broader and representative of both the abstracts and the concretes.

7.1.1 Conceptualisation in an Abstract-Concrete Progression

The difficulty of design collaboration begins when a team member must collaborate in scenarios where levels of abstraction and concretes are mismatched, in the case of Western-Chinese early design collaboration. For example, while designer A is trying to figure out where to fit the buttons of the mobile phone so that the design of the next generation handset will look absolutely cutting edge, his peer, designer B, is intrigued by a new material in the market for making buttons. The new idea potentially changes how designer A will considers the location of the buttons altogether.

Meanwhile designer C is seeing no point in designing the buttons for the handset as the software interface of touch screen mobile phone is now so advanced that one can do without any physical buttons. With such a variety of constraints and possibilities, discussion between A, B and C is no longer a collaborative effort with an abstract-concrete progression. Instead, it is an embodied space of constraints and possibilities for them to make sense of collectively.

7.1.2 The Abstract Representation in Design Processes

I have proposed in chapter 2 that the common characteristic of design processes lies in the abstract-concrete progression. The abstract representation of design offers more flexibility for designers to work on during the design process while avoiding fixation.¹⁰⁵ Design processes are abstract artefacts for bringing the specific design requirements to bear on a practical outcome. The object representation of this progression is commonly referred as design concept, and so it can be communicated, examined, criticised and modified (Dasgupta, 1996, p. 14). The level of abstraction varies from the most abstract, such as a requirement list, to the most concrete scale models (Brereton, 2004, p. 85).

I also argued in Chapter 6 that the CDs' creative process is an ideation process which does not follow this abstract-concrete progression. Rather their ideation begins

¹⁰⁵ *"Designers represent – and design representations are made – before, during, and after the process of designing any entity, regardless of whether the designed entity is being constructed, manufactured, or assembled as a 'real' product...the process of designing involves the production of sequential representations, until a "satisficing" solution is reached".(G. Goldschmidt, 2004, p. 203)*

with preinventive forms in their creative imagery, which can be both concrete and abstract at the same time. This kind of abstraction without logical generalisation is echoed by many in design research. French (1999, p. 10) argued for creative abstraction as the representation of design with a purpose: *“More abstract does not always mean more general. If we want to design an elastic beam, the highly abstract but very specialised view of the beam as two flanges and a web, the flanges taking all the moment and the web all the shear, is immeasurably more useful than the very general theory of elasticity.”* Brereton (2004, p. 86) suggested that the level of representation depends on the kind of information available in a representation, and the suitability of the level of representation depends on the design task. Similarly, Goldschmidt (2004) put forth the notion of “interactive imagery” as a representation to refer to the way a design team facilitates the flow of ideas in different abstract levels of representation, such as gestures and artefacts.

7.1.3 The Problem of the Design Problem

Despite these open views on abstraction in design studies, it remains a fixated view that designing shall be done at the abstract level before the actual development at the concrete level. Gedenryd (1998, p. 56) argued that the fixation dates to the 1960s, when the classic model of “analysis, synthesis, evaluation” was introduced to the design process (Figure Q). I have argued in Chapter 2 that the divergence-convergence and analysis-synthesis progressions are contradictory characteristics of design processes in the context of an abstract-concrete progression. I now argue that the reason for an abstract-concrete progression lies in DPs with an isolated CDP - a rationalist view of designing as problem-solving in which the problem space is separated from the solution space. The DPs see the design problem as prior to the design solution.

Speaking of “problems” implies a scientific view of designing (Snodgrass & Coyne, 2006, p. 269). The elimination of the need of a predefined design problem began as early as the 1960s. Archer (1965) identified the redefinition of the design problem in order to get rid of the influence of the systematic approach borrowed from computational and management theories. Jones (1984, p. 19) accepted the instability of the design problem, while Schön (1991, p. 40) viewed design problems as unstable. That a practitioner works on problems at a concrete level:

“In real world practice, problems do not present themselves to the practitioner as givens. They must be constructed from the materials of problematic situations, which are puzzling, troubling and uncertain. In order to convert a problematic situation to a problem, a practitioner must do a certain kind of work. He must make sense of an uncertain situation that initially makes no sense.”

Even wicked problem suggested by Rittel (1972, 1984; 1973) contains the idea of a separate problem space and solution space. I argue that designing with a design problem predefined before a solution is in mind, however wicked it is, is fundamentally a rationalist view. In Chapter 1, I argued that this problem-solution dichotomy is the basis of many co-design models that remains very influential today and that is continued in the view that co-design is social-negotiation. In Chapter 5 and 6 I presented the patterns of WDs’ preference for verbally articulating design concepts with a breadth-first creative process. The patterns suggest that the abstract-concrete progression is still very much a Western design practice, within a problem-solving design process. These fixated ideals in design processes and co-design models can be traced back to the need to abstract. I also reviewed in chapter 1 the way in which recent design and co-design models have moved towards situationist views, which see problem

setting as an ongoing process during designing. Practitioners must work through the uncertainties of the design situation and make sense of the design problem in an ongoing process of framing: “*Problem setting is a process in which, interactively, we name the things to which we will attend and frame the context in which we will attend to them*” (Schön, 1991, p. 40). In short, abstract thinking is a problematic concept when we see problem setting as an ongoing process.

7.2 SITUATING IDEATION IN THE CREATIVE SPACE

Design as a practice requires a different kind of framework to replace the abstract-concrete progression if we are to understand problem-solution cycles. In chapters 2 and 6, I introduced the concept of creative imagery put forward by Finke (1990, 1995a; 1992), to describe CDs’ creative ideation as observed at Sang Design. Their ongoing structuring and restructuring of design concept, both internally through creative imagery in preinventive form, and externally through sketching, suggests that they are traversing the creative space of design possibilities for the solution to emerge. Problem setting, in this creative space, is also an ongoing process of structuring and restructuring.

In this framework, designers traverse between their imagery and sketches to find patterns in ideas in a creative space of possibilities. Buchanan termed this space as “placement” and argued that placements are different from categories. Categories have fixed meanings, while “*placements have boundaries to shape and constrain meaning, but are not rigidly fixed and determinate. The boundary of a placement gives a context or orientation to thinking, but the application to a specific situation can generate a new perception of that situation and, hence, a new possibility to be tested. Therefore, placements are sources of new ideas and possibilities when applied to problems in concrete circumstances* (Buchanan, 1995b, p. 10)”.

For new product design projects that requires design for novelty, it is the designer's intelligence which is important for finding patterns among the possibilities; while structuring and restructuring the design concept for the emergence of a design solution, which also defines the design problem. The designer's expertise is said to determine how explicit a designer has to be. Expert designers have their own creative strategies, largely working in a black box, as opposed to junior designers, with a practice of externalising conceptualisation (Cross, 2004; Dorst, 2004, 2008). In a black box, designing happens in imagery, largely in a tacit form. The more expert a designer is; the more situationist the designer becomes. There is no process to follow with a situationist approach. However, during design collaboration, expert designers working in their own black boxes would be problematic. A framework is needed to situate the ideation in the creative space for design collaboration.

7.2.1 Analogical Representation

Buchanan (1995a) argued that a designer's forethought in making is the thought process that distinguishes design from arts and crafts. To argue that a designer is someone who can forecast design without doing it has been challenged by research on design practitioners. The question is what if this forethought is not just abstract thought? Although CDs' creative imageries and sketches can be visually concrete, they are flexible enough to be manipulated through analogical representation. Abercrombie (1969, p. 120) proposed design abstraction by using analogical representation and argued that designers need to work with material to detect certain ambiguities and that this is only possible by working with the concretes. The use of analogy works at this concrete level of working, yet allows one situation to transfer to another one, through similarities of their relationships (Goldschmidt, 1995). The transfer is made possible through the activation of the cognitive mechanism of visual imagery.

Work on analogical representation has suggested that concrete words and visuals can be more flexible than abstract representation as a means of design (Ball & Christensen, 2009; Casakin & Goldschmidt, 1999; Findler, 1981; Visser, 1996). Tseng, et al. (2008) stressed the importance of inspiration through analogy as a powerful tool for further research. The open goals method, which works by applying distant information to designing, has a positive effect for creating complex design. Similarly, Schön (1990) suggested a kind of generative metaphor which helps transform design space into an inquiry space. Analogy is a useful metaphor for representing the design concept in a concrete form but which is also abstractly able to represent the concept itself.

With the analogical representation operating at both levels, the duality of abstract and concrete is therefore unnecessary. It is when one has the concept of problem-solving in mind while attempting designing that the duality of working in an abstract-concrete progression becomes apparent. In a creative space, ideation and conceptualisation are situated in a space of design possibilities. In this space, design dichotomies such as abstract or concrete, problem or solution, are not to be viewed in separation.

7.2.2 Restructuring for Transformation in Creative Space

I have until now only managed to strip away the influence of the abstract-concrete progression in the understanding of designing by arguing the limitation of the rationalist view and by introducing the notion of a creative space to eliminate design dichotomies. Without a framework to understand this, I risk taking design research

“backwards”,¹⁰⁶ towards the craft process of ideation-solution. Indeed, that is exactly the point I am making. Conceptual thinking, which sets apart design and craft, is not necessarily just of a systematic approach. Heape (2007, p. 368) suggests an alternative concept of design process as a design space, a conceptual space where construction, exploration and expansion take place, in which design process is principally initiated by inquiry. Similarly, Gedenryd (1998) proposed that the concept of interactive cognition brought the view on designing to a non-systematical approach. For Boden (1990), creativity is achieved through manipulation and investigation of conceptual spaces.

The creative space I described is conceptual, in Boden (1990) and Oxman (2002) sense, and as Heape (2007) suggested, the space where design ideas happen is where the concept itself is located. The concept in the creative space is not an abstract representation, but rather a slice of the space itself. When one thinks of this framework, it is easier to understand how the generation of novel ideas can be done through a transformation of space. Boden (1990) identified two types of creativity: improbabilist and impossibilist. Improbabilist creativity involves novel combinations of familiar ideas; while impossibilist creativity generates novel ideas through some transformation of the space. The situationist is an impossibilist who gains new creative insights through restructuring of the design ideas/concepts. CDs’ depth-first, yet quick and dirty, creative process is an activity of restructuring for concept transformation.

When we talk about a transforming space through restructuring, the analysis-synthesis process ceases to be useful. The design is formed through association formation rather than analytical categorisation. Goldschmidt (1996) proposed

106 In contrary to the history, craft is not just vernacular, or inferior to design.

linkography to trace design ideas, through interconnection of the ideas with a model, to evaluate the quality of the ideas. Van der Lugt (2005) extended the work to trace the creative process of ideation, and concluded that ideas are largely interconnected instead of “self directional”. It is this view of interconnectivity of ideas that I suggest provides a possible framework for explaining the creative space. If we see the ideas as the units (the partial ideas) to be combined into design solution, represented by the design concept as the slice of creative space where the idea happened, divergence for alternatives is assumed as self-directional ideas linked in an abstract-concrete progression.

The situated concept is a reference to help generate design in a creative space with fuzzy design cycles. It is a framework that Cross (2006, p. 85) argues is similar to the concept of frame outlined by Schön (1984), which “*permits and encourages the designer to explore new design “moves” and to reflect on the discoveries arising from those moves.*” This situated concept, however, is less definitive than the situated Function-Behaviour-Structure model by Gero and Kannengiesser (2004). This situated concept takes any types of ideas or links at any level of abstraction and concretes, as and when a situation arises.

The CDP is no longer an isolated stage, but a situated state at any one time when it fits the creative process. The situated concept, in this case, is a schema, a situation or, strictly speaking, an abstraction at the time of need. Abstraction, in this case, takes a different form from that previously known. The problem space and solution space are now a co-evolved space. The situated creative concept is a concept with a structure that links together ideas related to the finished design attempt. These ideas need not be the sub-solution to the solution, rather they can be anything from a partial solution to a partial linkage between ideas, which relates direct or indirectly to the partially defined

design problem and the partially formed design solution. The structure is a network of these partial ideas and partially defined; which ultimately gives rise to the final structure of the design solution. The situated concept is now a representation of a design situation that forms a reference point for team work, rather than being an entity to be fulfilled for designing. The role of CDP is now embedded into the situation-led cycle, rather than existing as the isolated phase it used to be.

Consequently, it is a challenge to be able to collaborate in a shared creative space. It is not only that the shared “commonplace” has no definitive forms; it is constantly in an unstable state of transformation. Research to create models to describe this situated creative space is ongoing and is yet to be established fully. Nagai et al. (2009) has written of a similar framework called concept blending, in which the ideas are combined dissimilarities rather than similarities but the work assumed the CDP is an isolated stage of designing. Stumpf and McDonnell (Stumpf & McDonnell, 2002) proposed a team framing approach to capture the shared creative space between designers in a situationist approach, yet saw co-design as rationalist social-negotiation. Similarly, Alexiou & Zamenopoulos (2008), while urging a socio-cognitive model with a distributed creative space, remained rationalist in seeing co-design as only able to coordinate rather than collaborate. The situated Function-Behaviour-Framework might be the closest to depicting this situated creative space, yet it is based on a rationalist view of what design ought to be in an abstract-concrete progression (Gero & Kannengiesser, 2004). This thesis only managed to make sense by getting rid of the DPs models. As a consequence, I will not attempt another design model to simplify the complexity of co-design. I am hoping that my analyses and their implications will be valuable input for researchers when depicting their co-design models. By considering designers with different backgrounds, I am hoping for an inclusive co-design study.

7.3 A NOTE FOR DESIGN STUDIES

The reality in practice, however, can be to the contrary. One evening, after a few drinks at the local British pub in the middle of Shanghai, Laura (American design team leader) and I had a big debate about how we see designing. I explained to her the situationist view. After two field trips in China, my view is that the notion of reflective practice is the most adequate framework to describe how CDs work. That was what I thought at the time. Despite my explanation, Laura shouted in frustration Account 30:

“I don’t understand what you meant by reflective practice! Yes, we all have to look at the situation but design has always been problem-solving for me. I can’t imagine working without a design problem. How could anyone design without a design problem? It has to have some constraints toward the product development.”

Account 30: Laura on design as problem-solving

It was my second trip to Shanghai. I was in the middle of trying to make sense of the fieldwork. I had also accumulated an understanding of the related literature in the research discipline of Design Studies. In general, the paradigm shift from problem-solving to reflective practice has ushered in hybrid models of design. That is in theory. In practice, Laura’s assertion was a total surprise for me. A practitioner, while practicing a situationist view, remains true to the rationalist view. Has design practice stopped at a rationalist view while design research has been progressing towards a situationist view? It is precisely the beauty of this research that by observing WDs working alongside CDs, one gets to expose contradiction in both design practices. The similarities and the differences observed between CDs and WDs vividly illustrates the characteristics of Western design practice in between making and designing.

Both practices work. But, in theory, how can two differing and largely opposed approaches work? The reason lies in our failure to appreciate design as a complex endeavour because we have relied on universal views of models and methods in design research. We have come to a dead end in design research, building without questioning the validity of the foundation we are building on. Archer (1978, p. 7) first urged researchers to pay attention to the epistemological quest some thirty years ago. Most recently, Dorst (2008) predicted an epistemological revolution in researching design, in which he discussed anomalies and possible ways to reconceptualise, extend and develop design research. Similarly, work by Cross (2006) on the designerly way of knowing calls for researching designing as a unique discipline, unlike other arts and sciences. Despite the awareness, the propositions are yet to be proven. For design to be adequately researched, a change of design epistemology to an inclusive and pluralist view is needed. The quest will be an attempt to redefine design practice, as an alternative to currently dualistic views between arts and science.

Social and cognitive issues are intertwined in the study of designers working in team. I have studied designers using the symbolic system approach of cultural anthropology and the analysis of cognitive aspects of design studies. Through the failure of describing concept negotiation between WDs and CDs working in teams, I brought the thesis to investigate concept generation, and consequently to question the design processes in terms of design conceptualisation and the role of the design concept. However, at this point of time, questions about the nature of the differences in creative processes between CDs and WDs must remain unanswered.

At the turn of 21st Century, we are equally, if not more, indecisive about the definition of design. Definitions of design are largely confusing, or more accurately “heterogeneous” and contextually varied. While practitioners recognise and respect

heterogeneity, theorists try their best to model a universal view of design by combining characteristics of these design disciplines. These theorists/researchers' models are practically unsuccessfully yet theoretically convincing to inform future research. Design practitioners who learned through these theories during their design education face problem when they are practising.

The conclusion reported in this thesis is only an interim one. Whether or not these differences are purely cultural in terms of design education or thinking, or epistemological, or both, is a question beyond the scope of this thesis and for as long as design studies remain compartmentalised. The differences in design practices between WDs and CDs at Sang Design, and as documented in other contributing studies, is at first easy to put down to cultural issues. Yet the phenomenon is hauntingly familiar to WDs in practice. Could this be a difference merely between design education and design practice? For decades, we have had thinkers in design studies urging for rethinking in designing, but still the knowledge is built upon earlier assumptions and remains fixated on preconception of what designing ought to be. Donner (1998, p. 8) has remarked on the plurality in the act of designing: *"...it is clear that these ingredients of the process do not constitute a theory of thought in design. This engineer designs in this way, uses no sketches at all, but likes to chat a lot with his colleagues. Another one doesn't like teamwork at all, but likes to bury himself in his thoughts and reappears after days with brilliant ideas. Another one likes to produces sketches, but hates CAD. Is there one (optimal) process of designing? Absolutely not! How designing work is done, how thinking proceeds from a cloudy ideas to the clear picture of a machine is dependent on a lot of personal and environmental conditions and on the characteristics of the task"*.

I have arrived at a harsh analysis of the current state of design as a profession. Designers are fixated by the design processes and models they were taught. Apart from the expert designer, designers are more likely to follow design process and defend them with more verbal translation of the visuals. Consequently, when facing the reality of a client-oriented market, the failure of such design models affects their professional confidence. The trust in models and methodology has taken away designers' ability to reflect on design situations that are largely unpredictable and unique at times. The supposedly situationist profession is on the risk of getting watered down into a rationalist view of controlled, process-led activity.

The book "Design Methods" by Jones (1992) addressed this complex issues of the act of designing a long time ago: *"To think of designing as "problem-solving" is to use a rather dead metaphor for a lively process and to forget that design is not so much a matter of adjusting the status quo as of realising new possibilities and discovering our reactions to them. To make or invent something new is to change not only one's surroundings but to change oneself and the way one perceives: it is to change reality a little."* Jones' book was first published in 1970 and, thirty five years later, with design studies extended to co-design, the act of designing remains seen as problem-solving in design research. While design methods/phase/process/models and design methodology developed in the early 1960s are mostly seen as impractical by design practitioners, design education, which is informed by design research, continues teaching designers prescriptive process models of designing.

In summary, this thesis presented an interpretation of Chinese design practice and Western-Chinese design discourse informed by current models/theories in design research undertaken largely in the West. The dualities observed during the Western-Chinese design collaboration are the result of the tug-of-war between design practice

and design theories in the West. When working alongside CDs, WDs have brought with them design theories/models/methods/processes learned during design education, and informed by design research. The dualities between these two ways of designing in practice were immediately felt. The design models I brought with me are not inclusive enough to account for what happened in China from our fieldwork. The silences that Mikael and Laura experienced yields an issue more complicated than the experience. The experience potentially informs an alternative concept of designing – a proposition beyond currently Eurocentric theory and practice in design studies. Although we understood that design thinking and design communication is to a certain extent culturally influenced, this thesis is not attempting to investigate the reason for that. Also, this research does not attempt to develop yet another prescriptive design model to eliminate the dualities between Western and Chinese design practice:

“We set up a model based on things which are familiar to us with the world we know, and use this model as a way of explaining things we not know or cannot see or which in other ways are beyond our experience...these methods work for physical objects, machines, engineering or building structures and so on but difficulties seem to arise when we employ them in the study of human affairs. Our models tend to be over-simplified. We can devise hypotheses about human behaviour by analogy with billiard balls, we can think of them responding mechanically to whatever stimulus we give them, but after a while such models become inadequate. People refuse to behave like machines and if we press the analogy too far curious things start to happen. The experiment itself starts to change what people do.” (Broadbent, 1988, p. 56)

To suggest a model or a theory at this point is a generalisation too early for the research topic. Consequently, this thesis stops at contributing to understanding the design collaboration between WDs and CDs at the micro-level. The outdated, post-industrialised design methods of the rationalist view are to be blamed for fixating design research. The thesis supports a pluralistic and inclusive view for a revival of design theories. This is in the hope that we can look forward to a revolution in design research, with a new set of design theories, which mutually informs design practice and design education (Cross, 2006; Dorst, 2008).

This thesis is dedicated to the design practitioners. The inquiry into the designerly way of knowing was carried out on practitioners with the help of design theories. Design models should be modelled on and by the practitioners, rather than academics or educators. I shall end with a statement from Christopher Alexander on the lack of usefulness of design theories due to their detachment from the practitioner:

“And there is so little in what is called “design methods” that has anything useful to say about how to design buildings that I never even read the literature any more. I think I just have to be consistent here. I would say forget it, forget the whole thing. Period. Until those people who talk about design methods are actually engaged in the problem of creating buildings and actually trying to create buildings, I wouldn’t give a penny for their efforts.”(Alexander, 1971)

CHAPTER SUMMARY

In this chapter, I further confirmed that the isolated CDP is a redundant concept for the situationist view. Following this, I presented possible frameworks for understanding the creative space, drawing theories and models from creative, cognition

and design studies. Lastly, I argued for the epistemological turn design studies in need of.

CONCLUSION: SITUATING INCLUSIVE CO-DESIGN STUDIES

At the turn of 21st century, we are still deciding what design is (Roth, 1999). Nearly fifty years since its beginning in the 1960s we are yet to agree on a unifying view of what design really is, or whether a unifying view is at all necessary. At the time of writing, design research, design practice and design education are disparate, and each have their own ideals loosely informed by the others. The problem is that design research as a new field lacks its own research ontology. Design theories and models are largely compartmentalised and borrowed from more established disciplines, such as cognitive, sociology and artificial intelligence. Consequently, design studies are engaged in an epistemological search for definition (Cross, 2006, 2007; Dorst, 2008).

A SUMMARY OF CONCLUSIONS

This is a descriptive thesis which has explored the specific phenomenon of early design collaboration between WDs and CDs. It turned out to be a direct comparison of rationalist and the situationist creative practices. By describing Western-Chinese early design collaboration, I have revealed a phenomenon that is concerned with epistemological issues in co-design studies. The dichotomies between WDs and CDs are essentially a tug-of-war between the rationalist and the situationist views on the practice of design. Through thick descriptions of the case studies, which largely show dichotomies in creative processes, I came to understand that the rationalist-situationist dichotomy is not just an epistemological divide; it is also cognitively influenced. With the help of models and theories from design processes and creative cognition, I interpret the cross-cultural phenomenon and reported the differences in creative practices between WDs and CDs. Table 19 (page 236) shows the design dichotomies between WDs and CDs derived from the research. Specifically, CDs' designing through creative

ideation in a design cycle is in contrast to WDs' designing through design conceptualisation.

Most crucially, whether or not designers ideates or conceptualise at the early stage of designing depends on their cognitive preferences in doing design. A review of DPs revealed that the isolated CDP is an ideal set in the 1980s. The pattern symbolises a fixation on seeing designing as a rationalist process of problem-solving in an abstract-concrete progression. The pattern was also observed in the case studies, which displayed the same dichotomies, as well as the collaborative situationist cycles. Yet it the isolated CDP is commonly studied as the early stage of designing in co-design studies. I therefore argue that it is the fixated ideal which has influenced the practice of WDs, who prefer to verbalise and practice in a prescriptive process. The contrast is particularly clear when compared to CDs trained in art-oriented design institutes, who prefer to visualise and practise in a cycle. When WDs and CDs, the resulted simplified process for cross-cultural collaboration shows that the team leaders who changed their work process to accommodate designers with different creative processes have adopted the situationist view.

In other words, there is no right or wrong in the undertaking of the designerly act. However, the dichotomies pose difficulties for researchers who aim to accurately describe designers in collaboration. The data I collected, the coding schemes I generated, and the stages I chose to study are all influential to the outcome of co-design studies. In view of this, I argued that the designers' creative process determines how designing is seen and carried out. The thesis calls for a culturally inclusive as well as epistemologically inclusive co-design model that takes into the consideration of these variances and the divided views of rationalist and situationist.

I began chapter 1 with this sentence: “How we **see** designing, determines how design collaboration is **described** and **prescribed**.” At the end of the research journey, I rephrase that to: “How we **do** designing, dictate how we **view** designing, and therefore determine how design collaboration is **described**.”

ADDRESSING THE RESEARCH AIM

The **research aim** was to describe Western-Chinese early design collaboration, and to investigate the differences in early designing, if any, between WDs and CDs, by studying how they negotiate creative concept in a collocated team during early design collaboration while working on the same design project. However, I observed mainly silences among CDs, and that the teams have adopted a simplified process. These two patterns demanded a hermeneutic turn in the research, prompting also investigation of their concept generation. With this, I was able to describe the differences between WDs and CDs in creative processes and social-linguistic variance. The research was therefore able to fulfil the research aim by depicting the phenomenon with thick description, and concludes by calling for an inclusive model.

ADDRESSING THE RESEARCH QUESTIONS

The research questions I asked were:

- 1) How does a collocated and cross-cultural team of WDs and CDs **negotiate creative concepts** during early design collaboration?

- 2) How does a collocated and cross-cultural team of WDs and CDs **generate creative concepts** during early design collaboration?

The research questions were investigated by describing and analysing the differences between WDs and CDs in designing. The formulation of the research

questions in this exploratory research within a hermeneutic circle is, in itself, part of the journey of further understanding of the phenomenon of Western-Chinese early design collaboration.

In addressing the first research question, I revealed silences instead of the verbal debate anticipated in a team setting. The negotiation of concept is therefore a difficulty for the cross-cultural teams. In section 5.1 I discussed social-linguistic reasons for the silences, but excluded them from the thesis because they are rectifiable problems. In section 5.2 I described the differences in concept articulation between WDs' verbalisation and CDs' visualisation. I concluded that concept negotiation was not happening through verbalisation in an argumentation process, as the social process of negotiation suggests. I subsequently argued for turning the research from social inquiry and towards inclusion of the cognitive issues of the internalisation of the designerly act by investigating also concept generation.

The conclusion regarding the first research question necessitated the second research question on concept generation was also informed by the outcomes from the early studies. When describing concept generation in cross-cultural design teams, it was observed that a simplified process was adopted by the team (section 6.1). The pattern, also informed by early studies in which CDs are unfamiliar with design conceptualisation, led to a review of the DPs in engineering design, and identified the isolated CDP as a fixated ideal set in the 1980s. This position is supported by the differences in creative processes between WDs and CDs reported in chapter 6. WDs' externalisation and verbalisation of concept and CD's internalisation and visualisation of ideas prompted the conclusion that there are two distinctively different views on designing. Whilst WDs follow a design process that begins with logical analysis of

design problem to generate design solution of functionalities, Chinese early designing is through visual reasoning and creative emergence through forms.

To understand these dichotomies, I discussed the isolated conceptual design stage as evidence of a fixated ideal from the systematic approach of designing that is still influential to co-design studies. I argued that the essence of the rationalist problem-solving process lies in design conceptualisation in an abstract-concrete progression which does not apply to CDs' creative ideation through emergence in a situationist design cycle. With the dichotomies, this thesis concludes by questioning the necessity of an isolated CDP and consequently the notion of design concept as it is currently defined. The conclusion is an interim one that is only the beginning of a potentially bigger turn for design studies. In this respect, it is noteworthy that, very recently, Dorst (2008) has urged that design research should not to be equated with researching the design process:

“The overwhelming majority of descriptive and prescriptive work in design research focuses on the design process, to the exclusion of everything else. Therefore the design methods and tools that are being developed inevitably focus on enhancing the efficiency and effectiveness of design processes. And apparently, this total ignoring of the design content, the designer and the design context allows us to claim that we are constructing models, methods and tools that will be valid for every designer, dealing with every possible kind of design problem, in any situation” (Dorst, 2008).

The expectation for following design processes with an abstract-concrete progression is fixated by the historical events in the Western world which influenced

the practice of design. Yet design practice, design education and design research are built on this ideal of designing. In this thesis, it was possible to examine the fixation of Western design theories in the field of engineering design on post-industrial revolution ideals by describing Western-Chinese early design collaboration, significantly yielding a rethinking of design theories.

A CRITICAL EVALUATION OF THE STUDY

The thesis is an ethnographic study of industrial designers collaborating on new product design projects in a professional design practice. Despite the focus on industrial designers, literature and theories to describe the phenomenon observed were gathered from architecture, engineering design, digital design and other design disciplines without differentiating the disciplines. The ambiguity of design disciplines is an inevitable limitation of the inquiry. Despite this, I adopt this ambiguity, partly due to the excellent works by design researchers, especially in the field of architectural design and digital design; this also partly due to the scope of studies of the early stage of designing, which has been taken as cross-disciplinary in design studies. However, I am aware of the differences between architectural projects and new product design projects.

This thesis was made possible only by generalising the differences between WDs and CDs, which implicates the differences in early design process between the rationalist and the situationist. I have identified these dichotomies through the fieldwork and review of literature. The outcomes are inductively derived from the ethnographic fieldwork. Due to the length of the Ph.D. project, I could not analyse in detail every single episode of the fieldwork with currently available coding schemes. The outcomes are therefore drawn from an inferred analysis of the patterns arising, which can be interpreted by cross-examining them with theories. One should bear in mind that any dichotomy is only a relative measure rather than an absolute, cut-and-dried category.

There certainly is some “Chinese-ness” in a Western designer; or some “Western-ness” in a Chinese designer. Similarly, there certainly is rationalist view in a Chinese designer, or situationist view in a Western designer.

The thesis describes the differences between WDs and CDs, but I am not regarding them as cultural differences between Westerners and Chinese. The scope of research to undertake such investigation into cultural differences in socio-cognitive issues would be beyond the scope of this thesis. Furthermore, to dwell on the cultural differences between Western and Chinese would require further investigation of the definition of these two cultural groups, which are increasingly heterogeneous. This would have limited the narratives and case studies this study could provide.

I have chosen a perspective within the field of co-design studies to report on the cross-cultural design phenomenon. The perspective yields significant understanding of creative practice. However, I am also aware of other possible perspectives to portray the fieldwork. They include: the issue of the CDs’ visual reasoning in design cognition; the situationist cycle in team design management, and even the flexibility of manufacturing to facilitate the situationist CDs.

One position I have held throughout the thesis concerns the CDs’ alternative way of designing. However, it is still too early to be able to claim that there is a “Chinese way of designing.” I am only able to identify the differences between WDs and CDs, without suggestion of a co-design model. As I previous noted, due to the heterogeneous cultural groups, this is a difficult debate to engage. Also, whether or not their differences in creative processes are due to their cognitive variance or design education, or both, is beyond the scope of this thesis.

Sang Design gave me rare and generous access to a design practice which makes the research possible. However, there are materials such as documents, sketches, and videos that I cannot disclose in this thesis as it involves customer confidentiality. As a result, the writings on these materials are compensated for with elaborate narratives, or evidence from other contributing studies.

The research stopped short of proposing another co-design model for the cross-cultural team. The reason is due to the research itself, which is about the redundancy of prescriptive models of designing. At a micro- level, understanding cultural differences in socio-cognitive issues has yet to be achieved. At a macro- level, the design epistemology is split between contrasting views. To impose another model would risk pigeonholing the study into a particular view that is not suitable for the cross-cultural setting. Investigating with current available design theories may risk adopting the underlying assumptions for knowledge acquisition:

“One of the dangers in this new field of design research is that researchers from other, non-design, discipline will import methods and approaches that are inappropriate to developing the understanding of design” (Cross, 2006, p. 103).

Instead, the exploratory research revealed a mismatch between the creative practices of WDs and CDs, which provides an inclusive understanding on the study of co-design that design researchers can take away and investigate further.

THE RESEARCH CONTRIBUTIONS

The contributions of the study are two folds. The micro- level contributions concern the description of a cross-cultural design teams at leading design practice in China, on competent designers in a naturalistic setting. The access to observe new

product design projects in a professional design practice, interpreted through my ethnographic self, allowed more in-depth cultural understanding of the creative practice than other research on cross-cultural design, with controlled case studies of student designers. The focus on concept negotiation informed by my early interviews during early design collaboration was a significant angle, useful for studying the phenomenon by crossing social and cognitive issues. The subsequent focus on investigating concept generation brought to light the dichotomies of creative processes between WDs and CDs. By associating these dichotomies with the team's adaptation to overcome them, I arrived at a rich interpretation of creative practice in team settings.

The macro- level of contributions concerns the direct comparison of the rationalist view and the situationist view made possible by describing Western-Chinese design teams. My theoretical reviews of design processes and co-design models (Chapter 1) revealed two contrasting epistemological views: the rationalist and the situationist. The rationalist view regards designing as a problem-solving process and co-designing as a social process of negotiation; the situationist views designing as a reflective practice cycle and co-designing as experiential learning. These reviews were informed by the themes derived from my fieldwork which indicated the need to further review the epistemological issues. This is when my study on a seemingly cross-cultural issue of Western-Chinese design became a comparative study between the rationalist and the situationist views. In my study, WDs appear to be the rationalists due to their fixated view in design processes; while CDs appear to be situationist, with an ideation-based design practice. In this regard, the isolated CDP with an abstract-concrete progression creates difficulties for the study of design collaboration when a situationist view is required to understand the complex socio-cognitive environment.

In a hermeneutic turn, I drew on theories from creativity cognition research to understand the differences in the creative processes between WDs and CDs. This shed light on the fixation on the prescriptive design processes and how it can be identified and potentially overcome. Furthermore, the phenomenon itself is an adaptation of the creative practice when facing a cross-cultural situation. This position significantly brings an interesting aspect to distinguishing between what designing is and what designing ought to be. The epistemological issue is ironically possible to explore by describing the cross-cultural early design collaboration using existing design theories and models. The hermeneutic turn filtered the important aspects of co-designing to be considered for co-design researchers. Thru this, the thesis brought a perspective that significantly links the disparate socio-cognitive issues and epistemological issues, as a contribution to co-design studies.

Inclusive co-design studies

The existing co-design models I reviewed in Chapter 1 are split between rationalist and situationist views and, crucially, were based on studies of design teams working in design processes with an isolated CDP in early designing. My study shows that early designing can begin as early as the ideation through creative imagery in the designers' head and can work simultaneously with design prototyping, which was brought forward. The simplified design process adopted by the cross-cultural teams and the CDs' forms-to-features ideation enhances understanding of the diversity of designers' creative processes. Design conceptualisation and design concept are situated rather than fixed and defined. This research therefore contributes significantly to a call for the consideration of designers' dichotomies in creative processes when studying co-designing. By extending the integrative model of designing (Cross & Dorst, 1998; Dorst, 2001) to co-design models, the research draws attention to the need for an inclusive co-

design study to integrate the situationist's ideation and the rationalist's conceptualisation.

Designers' diversities

Designers are creative practitioners with diverse preferences in their creative processes. This diversity is reflected in the observed design dichotomies that prompted the adoption of a simplified team design process. This position has not been taken up by current co-design studies, which tend to disregard the significance of designers' individual processes as they are brought into the design team. Current co-design studies are split between social investigation and cognitive analysis of the phenomenon, but rarely combine both perspectives in one model. The exception is Alexiou (2010) proposed a model of design as a distributed process that links together cognitive and social dimensions of design activity, and used this model to understand the role of emergence in design. The theoretical framework explicates the relation between emergence, complexity and coordination, as a vehicle for linking individual and social conceptions of design. My study brings the framework forward with evidence to suggest that such a distributed process is situated in a creative space which facilitates emergence, complexity and collaboration between both rationalist and situationist designers.

A holistic perspective

In Chapter 1, I reviewed co-design studies and concluded by identifying a need for further studies on the non-verbal data of designers. The study depicts what designers actually do, which differs from what designers ought to do. The collection of designers' sketches, accounts of the internalised creative process, and their creative processes, provides a useful framework for the study of co-design from a holistic perspective. This

is a perspective that is not possible when undertaking a deductive analysis of the phenomenon. The explorative research methodology creates the possibility of describing cross-cultural early design collaboration with thick description rather than analysis with coding schemes that have a predefined epistemological influence, and allows a rigour by the abductive and inductive reasoning of the fieldwork.

The influential design processes

I started this research with the assumption that the early design process is cross-disciplinary. After the studies and the reviews on design processes, I came to the conclusion that the process model of designing is strongly influenced by the engineering process, particularly in the role of the conceptual design phase, which is therefore influential in the early designing phase.

The creative imagery

Studies on design cognition that focus on visual reasoning of designers (Liu, 1995; Oxman, 2002) have stopped at designers' visualisation for the emergence of design forms to solve well-defined design problems. This research has highlighted a concept of creative space, derived from the fieldwork, which facilitates feature-follow-form types of designing. The preinventive form of one's mental imagery suggested by (Finke, 1995a) is also reported in CDs' creative processes. The research therefore contributes to the study of designers' imagery by extending the study of externalised visuals to include the internalised preinventive forms, through non-central data on creative processes, such as interview accounts.

To elaborate, creative models proposed in creativity research identified early ideation, when one uses creative imagery to manipulate preinventive forms (Finke, 1990, 1995a, 1995b; Finke, et al., 1992). The creative imagery is flexible for structuring

ideas and possibilities for the emergence of a concept, without the problem of fixation. This early ideation begins before conceptualisation and is situated throughout the creative processes, but is rarely reported in co-design studies. Early ideation was seen to happen among CDs in the studies that aimed to describe concept negotiation and concept generation during Western-Chinese early design collaboration. I described this mental capacity among CDs and the simplified design process adopted by WDs, with a view to accommodating difference in creative processes.

Research applications

In short, this research also implies the following:

1. Western-Chinese early design collaboration is a useful research platform for studying differences in creative processes between verbal and visual thinkers during concept generation.
2. Co-design studies should take a verbal-visual divide between designers into consideration when attempting to describe early design collaboration.
3. Design studies should take structuring as a situated process, rather than a plan prescribed early in the process, into consideration.
4. Design models with a prescriptive process should be reconsidered as descriptive models to describe designers' cycles, and situated process as examples of occurrences in specific contexts, rather than a universal model for all.
5. Collaborative process in a new product design project should be in itself an ongoing consensus seeking within the team.

CONTRIBUTIONS TO OTHER DISCIPLINES

Bower (1995) suggested that the difference between the creative artist and the intuitive scientist lies in the open-ended scope of an artist's work, contrasted with the

definitive end to the nature of a scientist's discovery. New product design projects harbour both types of creativity – the user's requirement to be discovered, and the design to be created. My study on new product design projects brings attention to a suitable platform for creativity research, to discover the differences between creative artists and intuitive scientists.

On the other hand, the study on the cross-cultural design team brought to light an important insight. The creative practice of designers cannot be studied with current cross-cultural theories formulated on the basis of studies on non-designers (Hofstede, 1991; Nisbett, 2003; Nisbett, Peng, Choi, & Norenzayan, 2001; Peng & Nisbett, 1999). Schadewitz (2007, 2009) particularly reported the difficulty of depicting cross-cultural design teams with these theories. In my study, the dichotomies between WDs and CDs in their creative processes at professional design practice further confirmed this position.

SUGGESTIONS FOR FUTURE RESEARCH

CDs' fluency in using mental imagery to manipulate forms and structure was particularly apparent in the study, in comparison to WDs. I am interested to understand if the differences are culturally or pedagogically influenced. One possibility is the method pursued by Alexiou et al. (2009). They studied designers' cognitive processes by analysing their brain images. Studies in brain research have begun to identify the differences between Western and Chinese brain activities as verbal versus visual. It is anticipated that future research will yield reasons for these differences.

On the other hand, the notion of the creative space is only an interim framework and requires further work to explore more fully issues in early design collaboration. This can be done through action research at Western-Chinese design practice that will fill in the gaps that arise from a naturalistic inquiry.

FINAL REMARKS

My inquiry began with a recognition of the designerly way of knowing (Cross, 2001), with tension between art and science, and similarly between theory and practice in design. As Bruce Archer (1979, p. 17) first introduced the term in 1979:

“...mathematical or logical models, however correctly they may describe the flexibility, interactiveness and value laden structure of the design process, are themselves the product of an alien mode of reasoning. My present belief, formed over the past few years, is that there exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating, and as powerful as scientific and scholarly methods of enquiry, when applied to its own kinds of problems.

With this, I would like to end this thesis again with this sentence: how we **do** designing dictates how we **see** designing; how we see designing determines how design is described and prescribed.

REFERENCES

- Abercrombie, M. L. J. (1969). Perception and construction. In G. B. A. Ward (Ed.), *Design methods in architecture* (pp. 118-127). London: Lund Humphries for the Architectural Association London.
- Agar, M. H. (1986). *Speaking of ethnography*. Beverly Hills: Sage Publications.
- Agar, M. H. (1996). *The professional stranger: An informal introduction to ethnography*. Maryland: Academic Press.
- Akin, O. (1986). *Psychology of architectural design*. London: Pion Limited.
- Akin, O., & Moustapha, H. (2004). Strategic use of representation in architectural massing. *Design Studies*, 25(1), 31-50.
- Alexander, C. (1971). The state of the art in design methods. *DMG Newsletter*, 5.
- Alexiou, K. (2010). Coordination and emergence in design. *CoDesign: International Journal of CoCreation in Design and the Arts*, 6(2), 75 - 97.
- Alexiou, K., & Zamenopoulos, T. (2008). Design as a social process: A complex systems perspective. *Futures*, 40, 586-595.
- Alexiou, K., Zamenopoulos, T., Johnson, J. H., & Gilbert, S. J. (2009). Exploring the neurological basis of design cognition using brain imaging: some preliminary results. *Design Studies*, 30(6), 623-647.
- Alverson, M., & Skoldberg, K. (2000). *Reflexive methodology*. London: Sage Publications.
- Archer, B. (1969). The structure of the design process. In G. Broadbent & A. Ward (Eds.), *Design methods in architecture*. London: Lund Humphries.
- Archer, B. (1978). Time for a revolution in art and design education. *RCA papers*, No. 6.
- Archer, B. (1979). Design as a discipline. *Design Studies*, 1(1), 17-20.

- Armbruster, B. B. (1989). Metacognition in creativity. In J. A. Glover, R. R. Ronning & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 177-182). Frankfurt: Springer.
- Asimow, M. (1962). *Introduction to design*. Englewood Cliffs, NJ: Prentice Hall.
- Atkinson, P. (1992). *Understanding ethnographic texts* (Vol. 25). Cardiff: Sage Publications.
- Balaram, S. (1998). *Thinking design*. Ahmedabad: National Institute of Design.
- Ball, L. J., & Christensen, B. T. (2009). Analogical reasoning and mental simulation in design: two strategies linked to uncertainty resolution. *Design Studies*, 30(2), 169-186.
- Bamford, G. (2002). From analysis/synthesis to conjecture/analysis: a review of Karl Popper's influence on design methodology in architecture. *Design Studies*, 23(3), 245-261.
- Banathy, B. H. (1996). *Designing social systems in a changing world*: Plenum Press.
- Barlow, T. D., & Beddington, J. (1947). *Designers in Britain* (Vol. 1). London: Allan Wingate Publishers Ltd.
- Becker, C. B. (1986). Reasons for the lack of argumentation and debate in the far east. *International Journal of Intercultural Relations*, 10, 75-92.
- Benjamin, G. S. (2009). *A cognitive account of collective emergence in design*. Paper presented at the Proceeding of the Seventh ACM Conference on Creativity and Cognition, Berkeley, California, USA.
- Black, S. (1999). *The fashion and textile design process*. Ph. D., London College of Fashion, University of the Arts, London.
- Blake, J., & Blake, A. (1969). *The practical idealists: twenty-five years of designing for industry*. London: Lund Humphries.

- Boden, M. A. (1990). *The creative mind*. Great Britain: George Weidenfeld and Nicolson Ltd.
- Bohemia, E., Greenough, T., Oakley, N., Smith, N., & Toes, H. (2010). Mobile Computing now: on the move 2. In N. University (Ed.), <http://issuu.com/hannahtoes/docs/2010intelbookletjune2>. Newcastle: Northumbria University and Intel Corporation.
- Bohemia, E., & Harman, K. (2008). Globalization and product design education: The Global Studio. *Design Management Journal*, 3(2).
- Bonsiepe, G. (1990). *Industrial design in the periphery*. Paper presented at the History of Industrial Design, Milano.
- Booz, E., Allen, J., & Hamilton, C. (1968). *Management of new products*. New York: Booz, Allen & Hamilton Inc.
- Bowers, K. S., Farvolden, P., & Mermigis, L. (1995). Intuitive antecedents of insight. In S. M. Smith, T. B. Ward & R. A. Finke (Eds.), *The creative cognition approach* London: MIT Press.
- Brereton, M. (2004). Distributed cognition in engineering design: negotiating between abstract and material representations. In G. C. Gabriel & W. Porter (Eds.), *Design representation* (pp. 83-104). London: Springer-Verlag London Limited.
- Brereton, M., Cannon, D., Mabogunje, A., & Leifer, L. (1996). Collaboration in design teams: how social interaction shapes the product. In N. Cross, H. Christiaans & K. Dorst (Eds.), *Analyzing design activity* (pp. 319-341). Chichester: Wiley.
- Brewer, J. D. (2000). *Ethnography*. Buckingham: Open University Press.
- Broadbent, G. (1988). *Design in architecture: architecture and the human sciences*. London: David Fulton Publishers.
- Bruner, J. (1990). *Acts of meaning*. Cambridge: Harvard University Press.
- Bruner, J., Goodnow, J. J., & Austin, G. A. (1956). *A study of thinking*. London: John Wiley & Sons, Inc.

- Bryman, A. (2004). *Social research methods* (2 ed.): Oxford University Press.
- Bryman, A., & Burgess, R. (1994). *Analyzing qualitative data*. London: Allen and Unwin.
- BS7000. (1997). Guide to managing the design of manufactured products. *Design Management Systems* (Vol. 2). London: BSI.
- Bucciarelli, L. L. (1984). Reflective practice in engineering design. *Design Studies*, 5(3), 185-190.
- Bucciarelli, L. L. (1988). An ethnographic perspective on engineering design. *Design Studies*, 9(3), 156-168.
- Bucciarelli, L. L. (1994). *Designing engineers* (4 ed.). Cambridge, MA: MIT Press.
- Bucciarelli, L. L. (2002). Between thought and object in engineering design. *Design Studies*, 23(3), 219-231.
- Buchanan, R. (1995a). Rhetoric, humanism, and design. In R. Buchanan & V. Margolin (Eds.), *Discovering Design: Explorations in Design Studies* (pp. 23-68). Chicago: The University of Chicago Press.
- Buchanan, R. (1995b). Wicked problems in design thinking. *The Idea of Design*, 3-20.
- Buchanan, R. (2004). Human-centered Design: changing perspectives on design education in the East and West. *Design Issues*, 20(1).
- Burgess, R. (1984). *In the field: an introduction to field research*. London: George Allen & Unwin.
- Cai, H., Do, E. Y.-L., & Zimring, C. M. (2010). Extended linkography and distance graph in design evaluation: an empirical study of the dual effects of inspiration sources in creative design. *Design Studies*, 31, 146-168.
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56, 81-105.

- Casakin, H. (2008). Factors of design problem-solving and their contribution to creativity. *Open House International*, 33(1).
- Casakin, H., & Goldschmidt, G. (1999). Expertise and the use of visual analogy: implications for design education. *Design Studies*, 20(2), 153-175.
- Chamorro-Koc, M., Popovic, V., & Emmison, M. (2008). Using visual representation of concepts to explore users and designers' concepts of everyday products. *Design Studies*, 29(2), 142-159.
- Charmaz, K. (2005). Grounded theory in the 21st century: application for advancing social justice studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *The sage handbook of qualitative research* (pp. 507-536). Thousand Oaks: Sage Publications.
- Chen, G., Liu, C., & Tjosvold, D. (2005). Conflict management for effective top management teams and innovation in China. *Journal of Management Studies*, 42(2), 277-300.
- Chen, G., & Tjosvold, D. (2002). Conflict management and team effectiveness in China: the mediating role of justice. *Asia Pacific Journal of Management*, 19(4), 557-572.
- Christopher, A. L. D. (2009). *Situated design: toward an understanding of design through social creation and cultural cognition*. Paper presented at the Proceeding of the seventh ACM conference on Creativity and cognition, Berkeley, California, USA.
- Clark, K. B., & Fujimoto, T. (1991). *Product development performance: strategy, organization and management in the world auto industry*. Cambridge: Harvard Business School Press.
- Clifford, J., & Marcus, G. E. (1986). *Writing culture: the poetics and politics of ethnography*. Los Angeles: University of California Press.
- Coffey, A. (1999). *The ethnographic self: fieldwork and the representation of identity*. London: Sage Publications.

- Collado-Ruiz, D., & Ostad-Ahmad-Ghorabi, H. (2010). Influence of environmental information on creativity. *Design Studies*, 31(5), 479-498.
- Corbin, J. M. (1998). Alternative interpretations. *Theory & Psychology*, 8(1), 121-128.
- Coyne, R. (1995). *Designing information technology in the postmodern age: from method to metaphor*. Cambridge, Massachusetts: The MIT press.
- Coyne, R. (1997). Creativity as commonplace. *Design Studies*, 18(2), 135-141.
- Coyne, R., & Snodgrass, A. (1991). Is designing mysterious? Challenging the dual knowledge thesis. *Design Studies*, 12, 124-131.
- Cross, N. (1984). *Developments in design methodology*. Chichester, UK: John Wiley & Sons.
- Cross, N. (2000). *Engineering design methods - strategies for product design* (third ed). UK: John Wiley and Sons.
- Cross, N. (2001). Designerly ways of knowing: design discipline versus design science. *Design Issues*, 17(3), 49-55.
- Cross, N. (2004). Expertise in design: an overview. *Design Studies*, 25(5), 427-441.
- Cross, N. (2006). *Designerly ways of knowing*. London: Springer-Verlag.
- Cross, N. (2007). 40 years of design research. *Design studies*, 28(1).
- Cross, N., Christiaans, H., & Dorst, K. (1996). *Analysing design activity*. Chichester: Wiley.
- Cross, N., & Clayburn Cross, A. (1995). Observations of teamwork and social processes in design. *Design Studies*, 16(2), 143-170.
- Cross, N., & Cross, A. C. (1998). Expertise in engineering design. *Research in Engineering Design*, 10(3), 141-149.
- Cross, N., & Dorst, K. (1998). *Co-evolution of problem and solution spaces in creative design: observations from an empirical study*. Paper presented at the

Computational Models of Creative Design IV, University of Sydney, NSW, Australia.

- Csikszentmihalyi, M. Creativity: Flow and the psychology of Discovery and Invention.
- Dasgupta, S. (1996). *Technology and creativity*. New York: Oxford University Press.
- Davies, C. A. (1999). *Reflexive ethnography: A guide to researching selves and others*. London: Routledge.
- Denzin, N. K. (1978). *The research act* (2nd edition ed.). New York: McGraw Hill.
- Denzin, N. K. (1997). *Interpretive ethnography: ethnographic practices for the 21st century*. California: Sage Publications.
- Detienne, F. (2006). Collaborative design: Managing task interdependencies and multiple perspectives. *Interacting with Computers*, 18(1), 1-20.
- Détienne, F., Martin, G., & Lavigne, E. (2005). Viewpoints in co-design: a field study in concurrent engineering. *Design Studies*, 26(3), 215-241.
- Detienne, F., & Visser, W. (2006). Multimodality and parallelism in design interaction: co-designers' argument and coalition. In P. Hassanaly & T. H. G. K. M. Zacklad (Eds.), *Cooperative Systems design: Seamless Integration of Artifacts and Commentias - Enhanced concepts of Infrastructure for communication*: IOS Press.
- Dewey, J. (1909). *How we think*. London: D. C. Heath & Company.
- Dogan, F., & Nersessian, N. J. (2010). Generic abstraction in design creativity: the case of Staatsgalerie by James Stirling. *Design Studies*, 31(3), 207-236.
- Dorner, D. (1998). Thought and design - research strategies, single-case approach and methods of validation. In E. Frankenberger, P. Badke-Schaub & H. Birkhofer (Eds.), *Designers: The Key to Successful Product Development*. Darmstadt, Germany: Springer-Verlag London.

- Dorst, K. (1997). *Describing design: a comparison of paradigms*. PhD Dissertation, TU Delft.
- Dorst, K. (2004). On the problem of design problems - problem solving and design expertise. *The Journal of Design Research*, 4(2).
- Dorst, K. (2008). Design research: a revolution-waiting-to-happen. *Design Studies*, 29(1).
- Dorst K, C. N. (2001). Creativity in the design process: co-evolution of problem solution. *Design Studies*, 22.
- Dorst, K., & Reymen, I. M. M. J. (2004). *Levels of expertise in design education*. Paper presented at the International Engineering and Product Design Education Conference, Delft, the Netherland.
- Downing, F. (1992). Conversations in imagery. *Design Studies*, 13(3), 291-319.
- Dubberly, H., Baker, G., Reposar, R., Crane, A., Colman, E., Franus, N., et al. (2004). How do you design? Retrieved from <http://www.dubberly.com/articles/how-do-you-design.html>
- Eames, C. (1991). Reprint of The India report by Charles and Ray Eames in Design Issues 7:2 (1958): 65–73. *Design Issues*, 7(2), 65-73.
- Eastman, C. (1968). *On the analysis of intuitive design processes*. Paper presented at the The Design Methods Group First International Conference, Cambridge, Massachusetts.
- Emerson, R. M., Fretz, R. I., & Shaw, L. L. (1995). *Writing ethnographic fieldnotes*. Chicago: The University of Chicago Press.
- Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: verbal reports as data*. Cambridge, Massachusetts: The MIT Press.
- Ferguson, E. S. (1992). *Engineering and the mind's eye*. Cambridge, MA: The MIT Press.

- Findler, N. V. (1981). Analogical reasoning in design processes. *Design Studies*, 2(1), 45-51.
- Finke, R. (1989). *Principles of mental imagery*. Cambridge, Massachusetts: The MIT Press.
- Finke, R. A. (1990). *Creative imagery*. New Jersey: Lawrence Erlbaum Associates, Inc.
- Finke, R. A. (1995a). Creative insight and preinventive forms. In R. J. S. J. E. Davidson (Ed.), *The nature of insight* (pp. 255-280). Cambridge, Massachusetts: The MIT Press.
- Finke, R. A. (1995b). Creative realism. In S. M. Smith, T. B. Ward & R. A. Finke (Eds.), *The creative cognition approach*. Cambridge, MA: MIT Press.
- Finke, R. A., Ward, T. B., & Smith, S. M. (1992). *Creative Cognition*. Cambridge: MIT Press.
- Fischer, G. (2004). *Social creativity: turning barriers into opportunities for collaborative design*. Paper presented at the Proceedings of the eighth conference on Participatory design: Artful integration: interweaving media, materials and practices - Volume 1, Toronto, Ontario, Canada.
- Fischer, G. (2005). *From reflective practitioners to reflective communities*. Paper presented at the Proceedings of the HCI International Conference (HCII), Las Vegas.
- Fischer, G., Lemke, A. C., McCall, R., & Morch, A. (1996). Making argumentation serve design. In J. C. T. Moran (Ed.), *Design Rationale: Concepts, Techniques, and Use*, (pp. 267-293). Mahwah, NJ: Lawrence Erlbaum and Associates.
- Fischer, G., Nakakoji, K., Ostwald, J., Stahl, G., & Sumner, T. (1998). Embedding critics in design environments. In W. W. M. T. Maybury (Ed.), *Readings in Intelligent User Interfaces* (pp. 537-559). San Francisco: Morgan Kaufmann.
- Fischer, G., & Scharff, E. (2000). Meta-design: design for designers. *Proceedings of DIS2000*.

- Fish, J. (2004). Cognitive catalysis: sketches for a time-lagged Britain. In G. C. Gabriel & W. Porter (Eds.), *Design Representation* (pp. 151-184). London: Springer-Verlag London Limited.
- Fleming, D. (1996a). Can pictures be arguments? *Argumentation and Advocacy*, 33.
- Fleming, D. (1996b). *The Rhetoric of Design: Argument, Story, Picture, and Talk in a Student Design Project*. Doctor of Philosophy in Rhetoric, Carnegie Mellon University, Pittsburgh, Pennsylvania.
- Fleming, D. (1998). Design talk: Constructing the object in studio conversations. *Design Issues*, 13(2), 41-62.
- Foley, J., & Macmillan, S. (2005). Patterns of interaction in construction team meetings. *Codesign, Volume 1, No 1*, 19 - 37
- French, M. J. (1999). *Conceptual design for engineers* (3 ed.). Lancaster: Springer-Verlag London Limited.
- Gedenryd, H. (1998). *How designers work*. Ph. D. PhD, Lund University, Lund, Sweden.
- Geertz, C. (1975). *The interpretation of cultures*. London: Hutchinson & Co.
- Geertz, C. (1993). *Local knowledge*. London: Fontana Press.
- Gero, J., & Kannengiesser, U. (2004). The situated function-behaviour-structure framework. *Design Studies*, 25(4), 373-391.
- Gero, J. S., & Kazakov, V. A. (1998). Evolving design genes in space layout planning problems. *Artificial Intelligence in Engineering*, 12(3), 163-176.
- Gero, J. S., & Kumar, B. (1993). Expanding design spaces through new design variables. *Design Studies*, 14(2), 210-221.
- Gill, N., Deshmukh, H., & Athavankar, U. (2000). *Imagery as a private experience and architectural teamwork*. Paper presented at the CoDesigning 2000, Coventry.

- Gladwin, T. (1970). *East is a big bird: navigation and logic on Puluwat Atoll*. Cambridge, Massachusetts: Harvard University Press.
- Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: strategies for qualitative research*. New York: Aldine De Gruyter.
- Goel, V. (1995). *Sketches of thought*. Cambridge, Mass: MIT Press.
- Goldschmidt, G. (1990). *Linkography: assessing design productivity*. Paper presented at the Cybernetics and System '90, World Scientific, Singapore.
- Goldschmidt, G. (1991). The dialectics of sketching. *Creativity Research Journal*, 4, 123 -143.
- Goldschmidt, G. (1994). The designer as a team of one. *Proc. Delft Workshop, Analysing Design Activity*.
- Goldschmidt, G. (1995). The designer as a team of one. *Design Issues*, 16, 189-209.
- Goldschmidt, G. (1996). The designer as a team of one. In N. Cross, H. Christiaans & K. Dorst (Eds.), *Analysing Design Activity* (pp. 65-91). Chichester: John Wiley & Son.
- Goldschmidt, G. (2004). Design representation: private process, public image (G. Goldschmidt, Porter, William L., Trans.). In G. Goldschmidt & W. L. Porter (Eds.), *Design representation* (pp. 203-217). London: Springer.
- Goldschmidt, G., & Smolkov, M. (2006). Variances in the impact of visual stimuli on design problem solving performance. *Design Studies*, 27(5), 549-569.
- Goldschmidt, G., & Tatsa, D. (2005). How good are good ideas? Correlates of design creativity. *Design Studies*, 26(6), 593-611.
- Guba, E. G., & Lincoln, Y. S. (2006). Epistemological and Methodological Bases of Naturalistic Inquiry. In A. Bryman (Ed.), *Mixed Methods* (Vol. 1). London: Sage Publications.
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5(9), 444-454.

- Hall, E. T. (1976). *Beyond culture*. New York: Doubleday.
- Halskov, K., & Dalsgaard, P. (2007). The emergence of ideas: the interplay between sources of inspiration and emerging design concepts. *CoDesign: International Journal of CoCreation in Design and the Arts*, 3(4), 185 - 211.
- Hammersley, M. (2006). The paradigm wars: reports from the front. In A. Bryman (Ed.), *Mixed Methods* (Vol. 1). London: Sage Publications.
- Hammersley, M., & Atkinson, P. (1995). *Ethnography: principles in practice* (second ed.). London: Routledge.
- Hasirci, D., & Demirkan, H. (2007). Understanding the effects of cognition in creative decision making: a creativity model for enhancing the design studio process. *Creativity Research Journal*, 19(2), 259 - 271.
- Heape, C. (2007). *The design space: the design process as the construction, exploration and expansion of a conceptual space*. PhD thesis, University of Southern Denmark, Sonderborg, Denmark.
- Hernandez, N. V., Shah, J. J., & Smith, S. M. (2010). Understanding design ideation mechanisms through multilevel aligned empirical studies. *Design Studies*, 31(4), 382-410.
- Hofstede, G. H. (1991). *Cultures and organizations: software of the mind*. London, New York: McGraw-Hill.
- Houtz, J. C., & Frankel, A. D. (1992). Effects of incubation and imagery training on creativity. *Creativity Research Journal*, 5(2), 183 - 189.
- Howard, T. J., Culley, S. J., & Dekoninck, E. (2008). Describing the creative design process by the integration of engineering design and cognitive psychology literature. *Design Studies*, 29(2), 160-180.
- Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (1998). *Toolbox for creative problem solving*, Buffalo, NY. Buffalo, NY: Creative Problem Solving Group.
- Jansson, D. G., & Smith, S. M. (1991). Design fixation. *Design Studies*, 12(1), 3-11.

- Jones, J. C. (1970). *Design methods: seeds of human futures*. New York: John Wiley.
- Jones, J. C. (1984). *Essays in Design*. Chichester: John Wiley & Sons Ltd.
- Jones, J. C. (1992). *Design methods* (2nd edition ed.): John Wiley & Sons Inc.
- Kavakli, M., & Gero, J. S. (2001). Sketching as mental imagery processing. *Design Studies*, 22(4), 347-364.
- Kavakli, M., Suwa, M. Gero, J. S. and Purcell, T. (1999). Sketching interpretation in novice and expert designers. In J. S. Gero and B. Tversky (Ed.), *Visual and Spatial Reasoning in Design* (pp. 209-219.). Sydney: Key Centre of Design Computing and Cognition, University of Sydney.
- Keller, I., Sleeswijk Visser, F., van der Lugt, R., & Stappers, P. J. (2009). Collecting with Cabinet: or how designers organise visual material, researched through an experiential prototype. *Design Studies*, 30(1), 69-86.
- Kleinsmann, M., & Valkenburg, R. (2008). Barriers and enablers for creating shared understanding in co-design projects. *Design Studies*, 29(4), 369-386.
- Koestler, A. (1964). *The act of creation*. London: Hutchinson & Co.
- Kolb, D. A. (1984). *Experiential learning*. Englewood, Cliffs, NJ: Prentice Hall.
- Kolko, J. (2010). Abductive thinking and sensemaking: the drivers of design synthesis. *Design Issues*, 26(1), 15-28.
- Kondo, D. K. (1990). *Crafting selves: power, gender, and discourse of identity in a Japanese workplace*. Chicago: The University of Chicago Press.
- Kosslyn, S. M., & Osherson, D. N. (1995). *Visual cognition - an invitation to cognitive science*. Cambridge, MA: MIT Press.
- Kozhevnikov, M., Kosslyn, S., & Shephard, J. (2005). Spatial versus object visualizers: A new characterization of visual cognitive style. *Memory & Cognition*, 33(4), 710-726.

- Kuhn, T. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Kumar, R., & Worm, V. (2004). Institutional dynamics and the negotiation process: comparing India and China. *International Journal of Conflict Management*, 15(3), 304-334.
- Kunz, W., & Rittel, H. W. J. (1970). Information science: on the structure of its problems. *Information Storage Retrieval*, 8, 95-98.
- Lahti, H., Seitamaa-Hakkarainen, P., & Hakkarainen, K. (2004). Collaboration patterns in computer supported collaborative designing. *Design Studies*, 25(4), 351-371.
- Lai, I.-C., & Chang, T.-W. (2006). A distributed linking system for supporting idea association during the conceptual design stage. *Design Studies*, 27(6), 685-710.
- Lawson, B. (1997). *How designers think: the design proces demystified*. Oxford: Architectural Press.
- Lerdahl, E. (2001). *Staging for creative collaboration in design teams: models, tools and methods*. Doctoral thesis, Norwegian University of Science and Technology, Trondheim, Norway. Retrieved from <http://www.aarhus.dk/2ad/artikler/Lerdahl.pdf>
- Liddament, T. (2000). The myths of imagery. *Design Studies*, 21(6), 589-606.
- Lin, Y. T., & Liu, G. Z. (2004). *An analysis on current state of industrial design industry in China (in Chinese)*. Paper presented at the 2004 China International Industrial Design symposium: The innovation and competition of Chinese design, Wuxi, China.
- Lincoln, Y. S., & Denzin, N. K. (1994). The fifth moment. In N. K. Denzin & Y. S. Lincoln (Eds.), *The handbook of qualitative research* (pp. 575-586). Thousand Oaks, CA: Sage.
- Liu, G. Z. (2004). *The China route to industrial design (in Chinese)*. Chang Sha: Hunan technology publishing.

- Liu, Y.-T. (1991). Schematic-designer: a knowledge-based CAD system for schematic design in architecture. *Design Studies*, 12(3), 151-167.
- Liu, Y.-T. (1995). Some phenomena of seeing shapes in design. *Design Studies*, 16(3), 367-385.
- Liu, Y.-T. (1996). Is designing one search or two? A model of design thinking involving symbolism and connectionism. *Design Studies*, 17(4), 435-449.
- Liu, Y.-T. (2000). Creativity or novelty?: Cognitive-computational versus social-cultural. *Design Studies*, 21(3), 261-276.
- Liu, Y.-T., & Lim, C.-K. (2006). New tectonics: a preliminary framework involving classic and digital thinking. *Design Studies*, 27(3), 267-307.
- Liu, Y. C., Chakrabarti, A., & Bligh, T. (2003). Towards an 'ideal' approach for concept generation. *Design Studies*, 24(4), 341-355.
- Lloyd, P. (2000). Storytelling and the development of discourse in the engineering design process. *Design Studies*, 21(4), 357-373.
- Lloyd, P., Lawson, B., & Scott, P. (1996). Can concurrent verbalisation reveal design cognition? In N. Cross, H. Christiaans & K. Dorst (Eds.), *Analysing design activity* (pp. 437-462). Chichester: John Wiley & Sons.
- Lofland, J., & Lofland, L. H. (1995). *Analyzing social settings: a guide to qualitative observation and analysis* (Third Edition ed.). Belmont, CA: Wadsworth.
- Logan, R. F. (1986). *The alphabet effect*. New York: Morrow.
- Maanen, J. V. (1988). *Tales of the field: on writing ethnography*. Chicago: The University of Chicago Press.
- Maier, A. M., Eckert, C. M., & Clarkson, P. J. (2005). A meta-model for communication in engineering design. *CoDesign*, Vol. 1(No. 4), 243-254.
- Maier, A. M., Kreimeyer, M., Herfeld, U., Frank Deubzer, Lindemann, U., & Clarkson, J. (2006). *Reflecting communication: a key factor for successful collaboration*

between embodiment design and simulation. Paper presented at the International Design Conference - Design 2006, Dubrovnik - Croatia, May 15 - 18, 2006.

- Malinowski, B. (2002). *Argonauts of the Western Pacific: an account of native enterprise and adventure in the archipelagoes of melanesian New Guinea* (Vol. II). London: Routledge & Kegan Paul Ltd.
- Marakas, G. M., & Elam, J. J. (1997). Creativity enhancement in problem solving: Through software or process? *Management Science*, 43(8), 1136-1146.
- Marcus, G. E. (1994). What comes (just) after "post"? The case of ethnography. In N. K. Denzin & Y. S. Lincoln (Eds.), *The handbook of qualitative research* (pp. 563-574). Thousand Oaks, CA: Sage.
- Marcus, G. E., & Fischer, M. M. J. (1986). *Anthropology as cultural critique: an experimental moment in the human sciences*. Chicago: The University of Chicago Press.
- Margolin, V. (2005). A world history of design and the history of the world. *Journal of Design History*, 18(3), 235-243.
- Matsubara, Y., & Nagamachi, M. (1997). Hybrid Kansei engineering system and design support. *International Journal of Industrial Ergonomics*, 19(2), 81-92.
- Mazijoglou, M., & Scrivener, S. A. R. (1998). The rich picture of design-activity. *Automation in Construction*, 7(2/3), 157-175.
- McDonnell, J., Lloyd, P., & Valkenburg, R. C. (2004). Developing design expertise through the construction of video stories. *Design Studies*, 25(5), 509-525.
- McLaren, S. V., & Stables, K. (2008). Exploring key discriminators of progression: relationships between attitude, meta-cognition and performance of novice designers at a time of transition. *Design Studies*, 29(2), 181-201.
- Mead, G. H. (1934). *Mind, self and society*. Chicago: Chicago University Press.
- Mead, M. (1953). National character. In A. L. Kroeber (Ed.), *Anthropology To-day* (pp. 642-667). Chicago: University of Chicago Press.

- Miller, A. I. (2007). Unconscious thought, intuition, and visual imagery: a critique of "working memory, cerebellum, and creativity". *Creativity Research Journal*, 19(1), 47 - 48.
- Minneman, S., & Leifer, L. (1993). *Group engineering design practice: the social construction of a technical reality*. Paper presented at the Proc ICED'93, The Hague, August 17-19 1993:.
- Moeran, B. (1996). The orient strikes back. Advertising and imagining Japan. *Theory, Culture & Society*, 13, 77-112.
- Moeran, B. (2003). Fields, networks and frames: advertising social organization in Japan. *Global Networks*, 3(3), 371-386.
- Moeran, B. (2005). Tricks of the trade: the performance and interpretation of authenticity. *Journal of Management Studies*, 42(5), 901-922.
- Moghaddam, F. M., Walker, B. R., & Harre, R. (2003). Cultural distance, Levels of abstraction, and the advantages of mixed methods. In A. Tashakkori & C. Tedlie (Eds.), *Handbook of mixed methods in social behavioural research*: Sage Publications.
- Nagai, Y., Taura, T., & Mukai, F. (2009). Concept blending and dissimilarity: factors for creative concept generation process. *Design Studies*, 30(6), 648-675.
- Nagamachi, M. (1999). *Kansei engineering; the implication and applications to product development*. Paper presented at the Proceedings of the IEEE International Conference on Systems, Man and Cybernetics.
- Nainby, P. (2005). *West meets east: negotiating ambiguities at the early stage of designing*. Paper presented at the EP&DE, Edinburgh.
- Nainby, P., Gong, M. S., Jie, S., & Krohn, M. (2006). *Talking design: A Swiss/China cross-cultural collaboration*. Paper presented at the Engineering and Product Design conference, Salzburg University of Applied Sciences, Salzburg, Austria.

- Nainby, P., Jie, S., & Gong, M.-S. (2005). *Design education in China from intuitive viewpoint: A cross-cultural comparison. (in Chinese)*. Paper presented at the IDEC 2005, GuangZhou, China.
- Nakamura, H. (1964). *Ways of thinking of eastern peoples* (1997 ed.). London: Kegan Paul International.
- Nisbett, R. E. (2003). *The geography of thought: how asians and westerners think differently - and why*. London: Nicholas Brealey Publishing.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic vs. analytic cognition. *Psychological Review* 108, 291-319.
- Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human-Computer Interaction*, 15(2&3), 139-178.
- Olson, G. M., Olson, J. S., Carter, M. R., & Storrosten, M. (1992). Small group design meetings: an analysis of collaboration. *Human-Computer Interaction*, 7(4), 347-374.
- Osborn, A. F. (1957). *Applied imagination: principles and procedures of creative thinking*. New York: Scribners and Sons.
- Östman, L. E., & Yrkeshogskolan, S. (2007). *Conceptualisations in design research*. Paper presented at the Design Inquiries 2007.
- Oxman, R. (2000). Design media for the cognitive designer. *Automation in Construction*, 9(4), 337-346.
- Oxman, R. (2002). The thinking eye: visual re-cognition in design emergence. *Design Studies*, 23(2), 135-164.
- Oxman, R. (2004). Think-maps: teaching design thinking in design education. *Design Studies*, 25(1), 63-91.
- Oxman, R. (2006). Theory and design in the first digital age. *Design Studies*, 27(3), 229-265.

- Oxman, R. (2008). Digital architecture as a challenge for design pedagogy: theory, knowledge, models and medium. *Design Studies*, 29(2), 99-120.
- Pahl, G., & Beitz, W. (1996). *Engineering design: a systematic approach*. London: Springer-Verlag.
- Pahl, G., Beitz, W., Feldhusen, J., & Grote, K. H. (2007). *Engineering design: a systematic approach* (K. Wallace & L. Blessing, Trans. 3 ed.). Darmstadt, Germany: Springer-Verlag London.
- Paulus, P. B. (2000). Groups, teams, and creativity: the creative potential of idea-generating groups. *Applied Psychology*, 49(2), 237-262.
- Penfield, W., & Roberts, L. (1959). *Speech and brain mechanisms*: Princeton University Press.
- Peng, K., & Nisbett, R. E. (1999). Culture, dialecticism, and reasoning about contradiction. *American Psychologist*, 54, 741-754.
- Peng, L. (2005). Reflection on art and design education in Contemporary China - The current states and problems of the design education in the manufacturing superpower, (in Chinese), from http://www.dolcn.com/data/cns_1/article_31/paper_311/pgen_3119/2005-11/1132878386.html
- Polanyi, M. (1967). *The tacit dimension*. New York: Anchor Books.
- Press, M., & Cooper, R. (2003). *The design experience: the role of design and designers in the twenty-first century*. Hants, England: Ashgate Publishing Company.
- Purcell, A. T., & Gero, J. S. (1998). Drawings and the design process: a review of protocol studies in design and other disciplines and related research in cognitive psychology. *Design Studies*, 19(4), 389-430.
- Pylyshyn, Z. W. (1981). The imagery debate: analog media versus tacit knowledge. In N. Block (Ed.), *Imagery*. Cambridge, USA: MIT Press.

- Pylyshyn, Z. W. (2002). Mental imagery? In search of a theory. *Behavioral and Brain Sciences*, 15(2).
- Pylyshyn, Z. W. (2003). *Seeing and visualizing: it's not what you think*. Cambridge, Massachusetts: A Bradford Book, the MIT Press.
- Pylyshyn, Z. W. (2007). *Things and places: how the mind connects with the world*. Cambridge, Massachusetts: The MIT Press.
- Reid, F. J., & Reed, S. E. (2005). Speaker-centredness and participatory listening in pre-expert engineering design teams. *Codesign, Volume 1*(Number 1), 39 – 60.
- Reid, F. J. M., Culverhouse, P. F., Jagodzinski, A. P., Parsons, R., & Burningham, C. (2000). The management of electronics engineering design teams: linking tactics to changing conditions. *Design Studies*, 21(1), 75-97.
- Reid, F. J. M. R., S. (2000). *Interaction and entrainment in collaborative design meetings*. Paper presented at the Collaborative Design: Proceedings of CoDesigning 2000, London.
- Rennie, D. L. (2000). Grounded theory methodology as methodical hermeneutics. *Theory & Psychology*, 10(4), 481-502.
- Reymen, I. M. M. J. (2001). *Improving design processes through structured reflection: a domain-independent approach*. Ph.D. thesis, Technische Universiteit Eindhoven, Eindhoven, The Netherlands.
- Reymen, I. M. M. J., & Hammer, D. K. (2002.). *Structured reflection for improving design processes*. Paper presented at the International Design Conference - Design 2002, Dubrovnik.
- Richardson, L. (1995). Narrative and sociology. In J. V. Maanen (Ed.), *Representation in ethnography*. Chicago: Sage Publications, Inc.
- Rittel, H. (1970). *Issues as elements of information systems*. Institutes of Urban and Regional Development, University of California. Berkeley.

- Rittel, H. (1972). On the planning crisis: systems analysis of the 'first and second generations'. *University of California Berkeley*.
- Rittel, H. (1984). Second-generation design methods. *Developments in Design Methodology*, 317-327.
- Rittel, H., & Webber, M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4(2), 155-169.
- Rodgers, P. A., Green, G., & McGown, A. (2000). Using concept sketches to track design progress. *Design Studies*, 21(5), 451-464.
- Roth, S. (1999). The state of design research *Design Issues*, 15(2), 18-26.
- Said, E. (1978). *Orientalism*. New York: Vintage.
- Sass, L., & Oxman, R. (2006). Materializing design: the implications of rapid prototyping in digital design. *Design Studies*, 27(3), 325-355.
- Schadewitz, N. (2007). *Design patterns for cross-cultural computer-supported collaboration*. Degree of Doctor of Philosophy, The Hong Kong Polytechnic University, Hong Kong.
- Schadewitz, N. (2009). Design patterns for cross-cultural collaboration. *International Journal of Design*, 3(3), 37-53.
- Schnabel, M. A. a. K., T. (2001). *3D Maze: getting lost in virtual reality*. Paper presented at the 5th Iberoamerican congress of digital graphic SIGRADI 2001, Chile.
- Schön, D. A. (1963). *Displacement of concepts*. London: Tavistock Publications.
- Schön, D. A. (1984). Problems, frames, and perspectives on designing. *Design Studies*, 5(3), 132-136.
- Schön, D. A. (1985). *The design studio: an exploration of its traditions and potentials* (1985 ed.). London: Riba Publications Limited.

- Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass.
- Schön, D. A. (1991). *The reflective practitioner: how professionals think in action* (first edition 1983 ed.). Aldershot, Hants, England: The Academic Publishing Group.
- Schön, D. A., & Wiggins, G. (1992). Kinds of seeing and their functions in designing. *Design Studies*, 13(2), 135--156.
- Scrivener, S. (2005). Aims & scope of co-design. *CoDesign: International Journal of CoCreation in Design and the Arts*.
- Seevinck, J., & Edmonds, E. (2008). Emergence and the art system 'plus minus now'. *Design Studies*, 29(6), 541-555.
- Shavinina, L. V. (1998). On Arthur Miller's insights of genius: visual imagery and creativity in science and art: what do we know about it? *Creativity Research Journal*, 11(2), 183 - 185.
- Shum, B. S. H., Nick. (1994). Argumentation-based design rationale: what use at what cost? *International Journal of Human-Computer Studies* 40(4), 603-652.
- Simon, H. A. (1969). *The sciences of the artificial* (1996 ed.). Cambridge, Massachusetts: MIT Press.
- Smith, S. M. (1995). Getting into and out of mental ruts: a theory of fixation, incubation, and insight. In R. J. S. J. E. Davidson (Ed.), *The Nature of Insight* (pp. 229-252). Cambridge, Massachusetts: The MIT Press.
- Snodgrass, A., & Coyne, R. (2006). *Interpretation in architecture: design as a way of thinking*. Oxon: Routledge.
- Stocking, G. W. (1983). The ethnographer's magic: fieldwork in British anthropology from Tylor to Malinowski. In G. W. Stocking (Ed.), *Observers observed* (pp. 70-118). Madison: University of Wisconsin Press.
- Stones, C., & Cassidy, T. (2010). Seeing and discovering: how do student designers reinterpret sketches and digital marks during graphic design ideation? *Design Studies*, 31(5), 439-460.

- Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: grounded theory procedures and techniques* (1st Edition ed.). Newbury Park, California: Sage Publications.
- Stumpf, S. (2001). *Analysis and representation of rhetorical construction of understanding in design teams' experiential learning*. Ph.D., University College London.
- Stumpf, S. C., & McDonnell, J. T. (2002). Talking about team framing: using argumentation to analyse and support experiential learning in early design episodes. *Design Studies*, 23(1), 5-23.
- Suchman, L. A. (1987). *Plans and situated actions*. Cambridge University Press.
- Suwa, M., Gero, J., & Purcell, T. (2000). Unexpected discoveries and S-invention of design requirements: important vehicles for a design process. *Design Studies*, 21(6), 539-567.
- Suwa, M., & Tversky, B. (1997). What do architects and students perceive in their design sketches? A protocol analysis. *Design Studies*, 4, 385-404.
- Svensson, N., Archer, T., & Norlander, T. (2006). A Swedish version of the regressive imagery dictionary: effects of alcohol and emotional enhancement on primary & secondary process relations. *Creativity Research Journal*, 18(4), 459 - 470.
- Tang, J. C. (1989). *Listing, drawing, and gesturing in design: a study of the use of shared workspaces by design teams*. Ph.D. dissertation, Stanford University.
- Tang, J. C., & Leifer, L. J. (1988). *A framework for understanding the workspace activity of design teams*. Paper presented at the Proceedings of the 1988 ACM conference on Computer-supported cooperative work, Portland, Oregon, United States.
- Tang, J. C., & Leifer, L. J. (1991). An observational methodology for studying group design activity. *Research in Engineering Design*, 2(4), 209-219.

- Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social & behavioural research*. Thousand Oaks: Sage Publications.
- Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioural sciences. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioural research* (pp. 3-50). Thousand Oaks: Sage Publications.
- Tjosvold, D. (2002a). Managing anger for teamwork in Hong Kong: goal interdependence and open-mindedness. *Asian Journal Of Social Psychology*, 5(2), 107-123.
- Tjosvold, D. (2002b). Theory-oriented reviews for applied psychology. *Applied Psychology*, 51(3), 387-393.
- Tjosvold, D. (2004). Cooperative conflict management as a basis for training students in China. *Theory into practice*, 43(1), 80-86.
- Tjosvold, D., Andrews, R., & Jones, H. (1983). Cooperative and competitive relationships between leaders and subordinates. *Human Relations*, 36(12), 1111-1124.
- Tjosvold, D., Hui, C., Ding, D. Z., & Hu, J. (2003). Conflict values and team relationships: conflict's contribution to team effectiveness and citizenship in China. *Journal of Organizational Behavior*, 24(1), 69-88.
- Tjosvold, D., Hui, C., & Law, K. S. (2001). Constructive conflict in China: cooperative conflict as a bridge between East and West. *Journal of World Business*, 36(2), 166-183.
- Tjosvold, D., Law, K. S., & Sun, H. F. (2003). Collectivistic and individualistic values: their effects on group dynamics and productivity in China. *Group Decision and Negotiation*, 12(3), 243-263.
- Tjosvold, D., Tang, M. M. L., & West, M. (2004). Reflexivity for team innovation in China: the contribution of goal interdependence. *Group Organization Management*, 29(5), 540-559.

- Tjosvold, D., Yu, Z.-Y., & Hui, C. (2004). Team learning from mistakes: the contribution of cooperative goals and problem-solving. *Journal of Management Studies*, 41(7), 1223-1245.
- Tomes, A., Oates, C., & Armstrong, P. (1998). Talking design: negotiating the verbal-visual translation. *Design Studies*, 19(2), 127-142.
- Tovey, M., Porter, S., & Newman, R. (2003). Sketching, concept development and automotive design. *Design Studies*, 24(2), 135-153.
- Triandis, H. C. (1980). Values, attitudes, and interpersonal behavior. *Nebraska Symposium on Motivation*, 195-259.
- Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review*, 96(3), 506-520.
- Trousse, B., Christiaans, H. (1996). Design as a topos-based argumentative activity: a protocol analysis study. In N. Cross, H. Christiaans and K. Dorst (Ed.), *Analysing design activity*. Chichester, UK: John Wiley and Sons.
- Tseng, I., Moss, J., Cagan, J., & Kotovsky, K. (2008). The role of timing and analogical similarity in the stimulation of idea generation in design. *Design Studies*, 29(3), 203-221.
- Turner, M. (1993). *Ersatz design: interactions between Chinese and Western design in Hong Kong, 1950s-1960s*. Ph.D., Royal College of Art, London.
- Turner, M. (1995). Early modern design in Hong Kong. In D. Doordan (Ed.), *Design history an anthology: A design issues reader* (pp. 200-205). Cambridge, Mass and London: The MIT Press.
- Turner, M. (2002). Does Hong Kong need more design education? *Express*, 4, 13.
- Tversky, B., & Hard, B. M. (2009). Embodied and disembodied cognition: spatial perspective-taking. *Cognition*, 110(1), 124-129.

- Tversky, B., & Suwa, M. (2009). Thinking with sketches. In A. B. Markman & K. L. Wood (Eds.), *Tools for innovation* (Vol. 110, pp. 75-84): Oxford University Press.
- Valkenburg, R., & Dorst, K. (1998). The reflective practice of design teams. *Design Studies*, 19(3), 249-271.
- Valkenburg, R. C. (1998). Shared understanding as a condition for team design. *Automation in Construction*, 7(2-3), 111-121.
- Van Der Lugt, R. (2005). How sketching can affect the idea generation process in design group meetings. *Design Studies*, 26(2), 101-122.
- Verstijnen, I. M., van Leeuwen, C., Goldschmidt, G., Hamel, R., & Hennessey, J. M. (1998). Sketching and creative discovery. *Design Studies*, 19(4), 519-546.
- Visser, W. (1996). Two functions of analogical reasoning in design: a cognitive-psychology approach. *Design Studies*, 17(4), 417-434.
- Wallas, G. (1926). *The art of thought* London: Jonathan Cape.
- Warr, A., & O'Neill, E. (2005). *Understanding design as a social creative process*. Paper presented at the Creativity and Cognition Proceedings 2005.
- Weisberg, R. W. (1995). Prolegomena to theories of insight in problem solving: a taxonomy of problems. In R. J. Sternberg., and J. E. Davidson (Ed.), *The Nature of Insight* (pp. 157-196). Cambridge, Massachusetts: The MIT Press.
- Whyte, W. F. (1955). *Street corner society: the social structure of an Italian slum*. Chicago: The University of Chicago Press.
- Wilson, D. R. (1980). *An exploratory study of complexity in axiomatic design*. Massachusetts: Massachusetts Institute of Technology.
- Wilson, H. S., & Hutchinson, S. A. (2006). Triangulation of qualitative methods: Heideggerian hermeneutics and grounded theory. In A. bryman (Ed.), *Mixed methods* (Vol. II, pp. 243-254). London: Sage Publications Ltd.

- Yair, K., & Press, M. (2000). Look Who's Talking: Developing communication and negotiation skills through design education. In S. Stephen A. R, L. J. Ball & A. Woodstock (Eds.), *Collaborative design*. Coventry: Springer-Verlag London Limited.
- Yair, K., Tomes, A., & Press, M. (1999). Design through making: crafts knowledge as facilitator to collaborative new product development. *Design Studies*, 20(6), 495-515.
- Yuan, X. Y. (2003). *A research on the development of art and design education in China (in Chinese)*. Beijing: Beijing Institute of Technology Publishing.
- Zhang, F. C. (2001, 2001-02-14). A reflection on a unique Chinese design education (in Chinese). *China design online*, from http://www.dolcn.com/data/cns_1/article_31/paper_311/pgen_3119/2001-02/982165146-2.html.

APPENDICES

APPENDIX I: MY ETHNOGRAPHIC SELF

This is a thesis written for my parents. My parents are skilled artisans, or if they are still practising now, I like to think they would be called designers. My father is a jewellery maker and my mother a dressmaker, at a time when machines could not do what human hands do. Artisans were in great demand in the provincial town of Kota Bharu on the north-east coast of Peninsular Malaysia. Along the main road leading to the riverside were rows of jewellery shops, opposite rows of fabric shops. Things were largely made to measure, from bathtubs to floor mats. Plastic was a material yet to dominate Asia. Fake jewellery and ready-made clothing were rare, and loathed by the locals. Branding was either limited to imported goods, such as Lux soap, Eveready batteries or electrical appliances such as the Japanese made National rice cooker or cars such as Toyota; or a brand was a symbol of trust, the mark of a maker of a good product that lasted a long time.

My father had a workshop at home equipped with all necessary tools for his craft. My mother owned three Singer sewing machines at any one time; her huge cutting table dominated the hallway next to the kitchen. This was her work place and where she fed us meals and dressed us between her works. They both worked from home until my father eventually owned a jeweller's shop. A typical day at home started with sounds from their work: hammering, the pedalling of the burning equipment from my father's workshop and the tapping of stitches from my mother's sewing machines.

My father's workshop, approximately 30 square metres, was a heaven of tools, some bought from the hardware shop, but mostly made by my father. He would keep

any spare parts of broken appliances, vehicles or machineries, knowing that they would come in handy in future. For example, there was a box full of ball bearings of various sizes and wires of various lengths and thickness. My father's pastime, now mine too, was to browse the hardware shops or kitchen or bathroom stores to look at all sort of fixtures, thinking of the how it could be used for his work or to mend the broken tap in the house. I do not remember a plumber being called to our house. Everything was fixed by my father's clever use of spare parts.

My mother's workspace was less equipped, with only one triangular-shaped ruler, one tape measure, and a pair of scissors that my father sharpened every week, some old newspapers, drawing chinks and tracing paper ready for fabric cutting. Underneath the cutting table were bags of leftover fabrics. Only my mother knew the sorting system. Somehow, she managed to pull out a small piece of fabric accurately to give a small splash of colour to other garments in the making.

The artisans' life is never a lone one. During the day, their apprentices came to learn their skills and helped with some menial tasks. Later in the afternoons and evenings the clients would turn up. I grew up answering door to my parent's clients, who sometimes brought along some pictures of designs they called 'pattern books' (in English; they did not use a Chinese word for it) or sometimes just some imaginative ideas they had. My father's work process, when working for his "Taukes" (bosses) who owned the jeweller's shops in town, was different from my mother's. The design was given and he made it into jewellery. This type of practice is what we know as craft. His "Tauke" would tell him what kind of jewellery to make: it varied from gold Javanian bangles to gem pendants. They spoke with their own terminologies on sizes, patterns and the percentage of gold. The designs, if sketched, were very brief drawings on rice papers 宣纸 that also doubled up as wrapping for the piece of 95k gold raw metal. The

paper and the piece of gold would be thrown together in the melting bowl and burnt in seconds. On the other hand, his practice could also be a designerly one when individual customers turned up to commission something special. Then my father would show them examples from the jewellery pieces he had in the workshop or through sketches. With this kind of work, he would sketch the shapes in precision on paper as a record.

This commissioning process is one that my mother used too - every garment she made was unique. The patterns were taken from magazines at time, but the composition was not the same. They were the synthesis of patterns taking inspiration from anything my mother and her clients could lay their hands on. Essentially dressmaking is about making something fit to wear. Every customer came with a very different measurement to another. One cannot imagine how different one body is to another. Once a pattern was decided, my mother would take their measurement. There are several standard measurements to take depending on the garment to be made, whether or not it is a dress, a pair of trousers, or a top, etc. My mother kept a ledger of every client and garment. She recorded their measurements, sketches of the pattern, the date when it started and when it was to be finished, and attached one small piece of the fabric to the page.

What my parents did as a living, as I now reflect, despite my early education in science, eventually brought me to become a new media designer and later inspired my interest to study designers. My interpretation of the fieldwork I owe to my experience in seeing through the transition from the time of my parents, when things were custom-made, to now, when things are designed, manufactured, marketed and consumed. In the old days, anyone could be a designer, with their ideas and inspirations realised with the help of artisans. Nowadays, we are the consumers of what are available in the market.

I was lucky to wear dresses made by my mother from the time that I was little. The day when my mother finally told me to buy ready-made clothes from shops was the day I remember vividly as the end of her pride in her craft. Similarly, for my father, the day when a client turned up with a piece of necklace so uniformly manufactured in a factory was the day my father feared for his living. The future of craft disappeared when manufacturing began on a large scale, and artisans sought a way out of a life of limited return. Not only so, artisans' professional life was confined by age – good eyesight and the ability to use the hands for precision work.

My parents brought a stop to their practice when my brother and I left the town for higher education. They later settled in Singapore, while I moved to Kuala Lumpur and later to the UK. These moves are a leap from craft world to design world, as I reflected. For example, there is less possibility of getting a customised piece of furniture from the carpenter down the road; we make do with IKEA flat packs. Choices are limited to what is on sale and custom-made goods are now a luxury for the few. Manufactured products are available more cheaply than custom-made ones, with materials such as plastic and foam. Fake jewellery and fashion brands have become popular. We no longer seek for long lasting objects but new design.

This transition from making to design, long gone in Malaysia, is currently under way in China on a greater scale. My aim in this research was very simple to begin with: I was eager to understand my own root as a Malaysian Chinese who speaks Chinese as my first language. During my professional life as multimedia producer and new media designer, I experienced differences in the creative process and teamwork between Chinese-educated Malaysian designers like me and English-educated Malaysian designers. I was eager to explore in this research project whether there exists any cultural difference between Westerners and Chinese in designing. I certainly did not

expect to realise that the differences in creative process are not only cultural, but indeed invite a direct comparison between making and designing, the former recalling the time I had with my parents.

On the other hand, living in the UK was an eye-opener for me with regard to what I would call a post-industrialised, systematic world. The amount of red tape, bureaucracy and the need to assess every single work process was phenomenal. This relentless detailing is different from what I know has worked in Asia countries, even some other European countries. I was eager to know if this way of working has any influence on the creative process, the definition of design and the way designers collaborate. Interestingly, these understandings were made possible by studying cross-cultural teams of Western designers and Chinese designers at practice in China. Let us also not forget also that the world has become commercialised; it is remarkable when you walk down the high streets in the communist China to see every billboards are fighting for their space to shine. This is the current climate that the design profession is succumbing to. The design process is becoming the tool for selling – something that is pitch able; while ignoring the essentially situated, ambiguous and tacit act of designing. It needs not to be like this.

My understanding from doing this research is inclusive. There is a lot one can learn from how craft is made. Similarly, designers can think through using their hands, rather than the ideal of abstracting process and verbally articulating it in the professional context. Design, as I understand it, is essentially creative, as much as craft, as much as any action we as humans do everyday. Design is not just an activity a designer does, but something we all do. The creative process is not some activity mysteriously hidden in a black box. It can be understood, if we allow design to be seen as a space, rather than confine them in a controlled process. Creativity is essentially our

understood reality of a space full of possibilities that exists as long as we allow our imagination to flow; and that is where design lives.

APPENDIX II: EARLY STUDIES (E1, E2, E3)

A) EARLY STUDY 1 (E1) INTERVIEW QUESTIONS

1. Have you done design before you come here?
2. Have you done a lot of design before you started your education here?
3. How is the design process like (in Hong Kong)?
4. What are the differences? Is that has to be with workflow, thinking or communication?
5. Do you find that the differences are due to the size of the company, during your two jobs in Hong Kong?
6. Did you have a group project that involves many people before?
7. In the group project, did you find it hard to present your idea across brainstorming session? Especially when people sit down together, how did you get your idea across?
8. Let say you have a design project of brochure etc, how do you start the project?
9. How about design influence?
10. How do you translate yourself from your culture to this culture (in London)? Do you find a difference in society language here (in London)?
11. When you studied for three years, did you find a difference of design way?
12. Do you find education, or design education here much better?
13. When you have a project, I am not sure how your or your boss, how his way of doing things. Do you find him doing the research, starting from researching the people, the society, something you know the background before doing the design, or do you go straight to the design forms and functions?
14. You said that LCP is conceptual. Did you find this a good advantage?

B) EARLY STUDY 2 (E2) INTERVIEW QUESTIONS

1. Where and when did you start your design education before UK?
2. What makes your come to the UK for further study?
3. Why choose design as a profession?
4. How do you feel after one year or more in the UK?
5. How did you design before UK?
6. What is the most useful in designing that you learned from UK?
7. How about your relationship with lecturer, is there a difference between UK and China?
8. Given a project, how do you start in China? How about in the UK?
9. Have you worked with British students or designers before? If so, tell us about your experience that worth talking about?
10. Did you find a difference in how you see things in comparison to British? If so, tell us some of the significance ones.
11. What is next or future for you?
12. Do you see yourself different from before and after the study?

C) EARLY STUDY 3 (E3) INTERVIEW QUESTIONS

Part I: Background

A: Western-Chinese Academic Experience

1. Would you mind telling us about your educational background before Ivrea?
2. What are your reasons for further studying here?
3. Briefly, tell us about your study in the West.
4. Could you tell us about your view on being part of the big group of international students and lecturers in Ivrea?
5. Did you think there are differences in terms of everyday interaction between you and the Westerners? Give us a few examples if you can.
6. Tell us about your relationship with lecturers here in comparison to previous education.
7. Could you tell us briefly, what have you learned from the Ivrea experience?

B: Design Practices

1. Let us explore your motif to be a designer. What are the reasons influencing your decision to be a designer.
2. Would you mind telling us your design work experience?
3. Did you encountered differences between how you work on a project compared to the others? What are they?

Part II: Early Stage of Designing

1. Generally, given a design project, how do you start from fresh?
2. Let us explore briefly, your way of designing from one phase to another until a prototype is made.

C: Interpreting Design Problem

1. How do you identify design problem?
2. Did you find it difficult to understand a given brief?
3. What are your strategies to tackle that?
4. Comparing your previous design project experience, do you think there is a difference of the early stage of designing in comparison to the Westerners?

D. Conception of Idea

1. After scope is identified, how did you go about generating ideas?
2. Is there any sort of strategy in your mind when you are tackling a design problem?
3. Could you tell us what did you use to help you think of an idea?
4. Did you find that your approach to a design problem is different to the others?

E. Collaborative Design

1. Have you experienced collaborative design projects that involve you and Westerners?
2. How did you negotiate your idea with your team member?
3. Is there any conflicting experience between you and your group members during negotiation?
4. If so, what are they and how did you resolve that?
5. How did you feel about discussing in a group?

F. Cross-Cultural Collaborative Design

1. Could you tell us how you work in an all Chinese work environment?
2. Did you find any differences between your collaborative working here in the West in comparing to Chinese?
3. Any issues of working in an international team that you wish you could do better.

4. In your opinion, if you would have to compare your work in Chinese and in the West, what are the most prominent differences?
5. Finally, what are the issues we would have to consider as a Chinese designer to work in an international team?

APPENDIX III: STUDIES AT SANG DESIGN (P1, M1, F1)

A) INTERVIEWS AT SANG DESIGN

Name	Interview 1	Interview 2	ad hoc interviews
Yang	NIL	NIL	NIL
Tian	30/08/2005	20/01/2006	NIL
Gao	NIL	19/01/2006	10/01/2006, 11/01/2006
Mei	NIL	NIL	NIL
Tristan	09/09/2005	19/01/2006	NIL
Ma	12/09/2005	NIL	NIL
Ming	12/09/2005	NIL	NIL
Yu	09/09/2005	NIL	NIL
Siang	12/09/2005	NIL	NIL
Hai	NIL	NIL	NIL
Stephan	12/09/2005	NIL	NIL
Mikael	12/09/2005	NIL	30/8/05, 3/12/05, 9/12/05, 20/12/05
Svenja	09/09/2005	19/01/2006	NIL
Ying	30/08/2005	NIL	NIL
Wei	NIL	19/01/2006	NIL
Lee	30/08/2005	20/01/2006	NIL
Jie	30/08/2005	20/01/2006	10/01/2006, 11/1/06
Laura	09/09/2005	18/01/2006	9/12/05. 20/12/05, 29/12/05
Tao	12/09/2005	18/01/2006	NIL
Ong	NIL	NIL	NIL
Xuan	NIL	NIL	NIL
Lian	NIL	NIL	NIL
Keiko	NIL	20/01/2006	NIL
Tina	NIL	NIL	NIL
Lou	12/09/2005	NIL	NIL
Philip	NIL	NIL	NIL

Table 20: Designers interviewed at Sang Design

B) OBSERVATIONS AT SANG DESIGN, SUMMER 2005

	Date & time	Venue	Purpose	Team members	Data collected
1	23rd August 2005 15:11 – 17:05	Conference room, 1st floor	Franctex Branding: Brainstorming session, 2nd meeting	Mikael, Wei, Ong, Lian, Xuan, Tristan.	Field notes PC audio recording
2	23rd August 2005 17:29 – 18:15	Conference room, 1st floor	Daka measuring tool: first design meeting	Mikael, Wei, Lee, Jie, Tao	Field notes
3	29th August 2005 to 30th August	2nd floor	Interaction between Mikael and his staffs at third floor: Ying	Mikael, Ying	Field notes
4	29th August 2005 to 30th August	2nd floor	Interaction between Mikael and his staffs at third floor: Engineer A	Mikael, Engineer A	Field notes
5	29th August 2005 to 30th August	2nd floor	Interaction between Mikael and his staffs at third floor: Wei	Mikael, Wei	Field notes
6	29th August 2005, 17.10	Conference room, 1st floor	Portable electrical device: first design meeting	Mikael, Ying, Lee, Wei, Jie.	Field notes PC audio recording PC camera stills
7	30th August 2005, 11:45.	Si Chuan restaurant	Lunch with Sang designers at restaurant	Tristan, Lee, Lou, Tian, Ma, Ming, Yu, Hai, Wei, Tao, Ong.	Field notes
8	30th August 2005, 14:15.	Research area idea board,	Franctex Branding: Third meeting	Mikael, Wei, Ong, Xuan, Lian, Laura, Tristan.	Field notes
9	September 9th 4.15pm	Discussion area, 2nd floor	ABC Mobile Phone Brainstorming: First meeting	Mikael, Laura, Stephan, Team B, Team D	Field notes, Dictaphone recording

Table 21: Fieldwork Timetable at Sang Design, summer 2005

C) OBSERVATIONS AT SANG DESIGN, WINTER 2005

Session	Date	Start time	Place	Purpose	Event	Team	Participants/Interviewee	Note	Seat plan	Audio	Visual
1	04/12/2005	11:00:00	Sang Design	Re-entry to SP after a three months break				Yes			
2	04/12/2005	11:45:00	restaurant	Lunch at new Sichuan restaurant	Social Event		Tristan, Lee, Siang, Tian, Ma, Ming, Yu, Hai, Wei, Tao, Ong. Keiko, Svenja, Laura.	Yes			
3	07/12/2005	14:30:00	3rd floor	The lift research project: Chat with MING	Ad hoc interview		Ming	Yes			
4	05/12/2005		On the street to restaurant	Social Interaction between designers	Social Event		Laura, Tao, Keiko, Engineer A, Svenja, Tristan, Stephan, Ma, Yu, Siang	Yes			
5	06/12/2005	17:00:00	Conference room, 1st floor	Monthly company meeting	Formal meeting		Everyone (Presidents, Designers, Engineers, Admins)	Yes			
6	07/12/2005	12:30:00	3rd floor	Packed Lunch in office	Social Event		Laura, Svenja, Stephan	Yes			
7	07/12/2005	13:40:00	3rd floor	Laura & Svenja girly chat	Social Event		Laura & Svenja	Yes			
8	07/12/2005	14:00:00	3rd floor	Informal discussion on lift project	Informal discussion		Hai, Stephan	Yes			

9	07/12/2005	16:40:00	Discussion room, 1st floor	Chat with MIKAEL about monthly meeting	Ad hoc interview		Mikael	Yes			
10	18/12/2005	10:00:00	3rd floor	TAO is late to work (Chat with LAURA on taxi ride)	Ad hoc interview		Laura, Yang, Tao	Yes			
11	19/12/2005	08:45:00	Taxi	Chat with LAURA on her opinion about Chinese boss	Ad hoc interview		Laura	Yes			
12	19/12/2005	00:00:00	3rd floor Tao & Laura	Dynexx design project	Informal discussion		Laura, Tao	Yes			
13	19/12/2005	15:40:00	3rd floor	YANG and engineers	Informal discussion		Yang, Engineer A, Engineer B	Yes			
14	20/12/2005	14:05:00	Conference room, 1st floor	Roko multimedia phone first meeting	Formal meeting	A, B, C, D	Mikael, Team A, Team B, Team C. Team D	Yes		Yes	
15	03/01/2006		Third Floor	Exhibition design for Exhibito	Informal meeting	D	Laura, Stephan, Tao, Siang	Yes			
16	09/01/2006	11:45:00	3rd floor, discussion table	Olympic Torch	Formal meeting	B & D	Laura, Tao, Svenja, Tina, Hai, Siang, Yu, Stephan	Yes	Yes		
17	09/01/2006	13:45:00	Hai's PC, 3rd Floor	Discussion on set top box design	Informal meeting	B	Yu, Tina, Hai, Ming, Later Yang	Yes	Yes	Yes	

18	09/01/2006	15:30:00	3rd floor, discussion table	Exhibition design for Exhibito	Formal meeting	D	Laura, Tao, Ong, Svenja, Engineer B, Engineer C, Engineer D, Siang, Stephan	Yes	Yes	Yes	
19	09/01/2006	16:00:00	1st floor conference room	Company monthly meeting	Formal meeting		Everyone	Yes			
20	09/01/2006	16:30:00	3rd floor, discussion table	Exhibition design for Exhibito	Informal meeting	D	Laura, Tao, Ong, Svenja, Siang, Stephan	Yes			
21	10/01/2006	14:05:00	Second floor discussion room	Roko multimedia phone	Informal discussion		Tristan, Xuan	Yes			
22	10/01/2006	15:15:00	Second floor Jie's desk	on Roko phone	Ad hoc Interview		Jie	Yes		Yes	
23	10/01/2006	15:50:00	Second floor Gao's desk	on Roko phone	Ad hoc Interview		Gao	Yes		Yes	
24	11/01/2006	15:15:00	Second floor Gao's desk	on Roko phone	Ad hoc Interview		Gao	Yes		Yes	
25	11/01/2006	15:55:00	Modeling workshop	on Roko phone	Ad hoc Interview		Jie			Yes	Models
26	12/01/2006	13:30:00	2nd floor discussion room	Roko multimedia phone (small discussion)	Informal discussion		Gao, Wei, Tristan, Lee		Yes		
27	12/01/2006	14:15:00	2nd floor discussion room	Roko multimedia phone (2nd meeting)	Formal meeting	A, C	Mikael, Gao, Tian, Ong, Lee, Jie, Keiko, Lian, Mei, Tristan, Wei	Yes	Yes	Yes	Pictures
28	13/01/2006	14:45:00	2nd floor discussion room	Roko multimedia phone	Informal discussion	A, C	Tristan, Keiko, Wei, Mei, Tian, Jie	Yes	Yes	Yes	

				(informal discussion)							
29	13/01/2006	17:10:00	2nd floor discussion room	Roko multimedia phone (formal meeting)	Formal meeting	A, C	Lee, Gao, Jie, Xuan, Mei, Tian, Keiko, Tristan, Mikael, Ong	Yes	Yes	Yes	
30	16/01/2006	14:00:00	2nd floor discussion room	Roko multimedia phone (formal meeting)	Formal meeting	A, C	Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao	Yes	Yes		Sketches
31	17/01/2006	11:09:00	2nd floor discussion room	Roko multimedia phone (small discussion)	Informal discussion		Tristan, Keiko	Yes	Yes		no recording
32	17/01/2006	14:00:00	3rd floor team desks D	Olympic torch team D	Informal meeting	D	Tao, Siang, Laura, Svenja	Yes	Yes	Yes	
33	17/01/2006	16:11:00	2nd floor discussion room	Roko multimedia phone (formal meeting)	Formal meeting	A, C	Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao	Yes	Yes	Yes	Sketches, Photos
34	19/01/2006	10:38:00	2nd floor discussion room	Roko multimedia phone (formal meeting)	Formal meeting	A, C	Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao	Yes	Yes	Yes	

107 Session 29 was analysed for counting silence reported in section 5.1.1.

35	19/01/2006	13:31:00	2nd floor discussion room	Roko multimedia phone (formal meeting)	Formal meeting	A, C	Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao	Yes	Yes	Yes	
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Table 22: Fieldwork timetable at Sang Design, winter 2005

Ethnographic Episodes	Page	Study	Session	Date & time	Venue	Purpose	Designers	Data collected
Episode 1: My insider experience at Sang Design	71	Sang Design, Winter 2005	33	17/01/2006 16:11:00	2nd floor discussion room	Roko multimedia phone (formal meeting)	Lee, Wei, Mei, Keiko, Mikael, Ong, Tian, Gao	Audio recording, Field notes, Sketches, Photos
Episode 2: Team C Daka Design Meeting	163	Sang Design, Summer 2005	2	23/8/2005 17:29-18:15	Conference room, 1st floor	Daka measuring tool: first design meeting	Mikael, Wei, Lee, Jie, Tao	Field notes
Episode 3: Silences during Franctex branding meeting	165	Sang Design, Summer 2005	1	23/8/2005 15:11-17:05	Conference room, 1st floor	Franctex Branding: Brainstorming session, 2nd meeting	Mikael, Wei, Ong, Lian, Xuan, Tristan	Field notes PC audio recording
Episode 4: Mikael on fitting in	174	Sang Design, Winter 2005	From ad hoc observation					
Episode 5: Mikael in Franctex's brainstorming meeting	175	Sang Design, Summer 2005	1	23/8/2005 15:11-17:05	Conference room, 1st floor	Franctex Branding: Brainstorming session, 2nd meeting	Mikael, Wei, Ong, Lian, Xuan, Tristan	Field notes PC audio recording
Episode 6: Tao and Yang power distance	180	Sang Design, Winter 2005	10	18/12/2005 10:00:00	3rd floor	TAO is late to work (Chat with LAURA on taxi ride)	Laura, Yang, Tao	Field notes, Msn Chat
Episode 7: Tao's "making up story"	187	Sang Design, Winter 2005	32	17/01/2006 14:00:00	3rd floor team D desks	Olympic torch team D Informal meeting	Tao, Siang, Laura, Svenja	Field notes, Audio recording

Episode 8: Brainstorming by sketching on the post-its	207	Sang Design, Winter 2006	A session observed in October 2006 but there were no mementoes. I can remember it vividly.					
Episode 9: Jie on “feeling and shaping”	212	Sang Design, Winter 2005, Roko Project	22	10/01/2006 15:15	2nd floor Jie's desk	on Roko phone, Ad hoc interview	Jie	Field notes
Episode 10: Laura on Tao's “quick and dirty” creative process	216	Sang Design, Winter 2005	12	19/12/2005	3rd floor Tao & Laura	Dynexx design project, Informal discussion	Laura, Tao	Field notes
Episode 11: A swap of process for the Exhibito Project	224	Sang Design, Winter 2005	15	03/01/2006	Third Floor	Exhibition design for Exhibito Informal meeting	Laura, Stephan, Tao, Siang	Field notes

Table 23 Index of Episodes reported

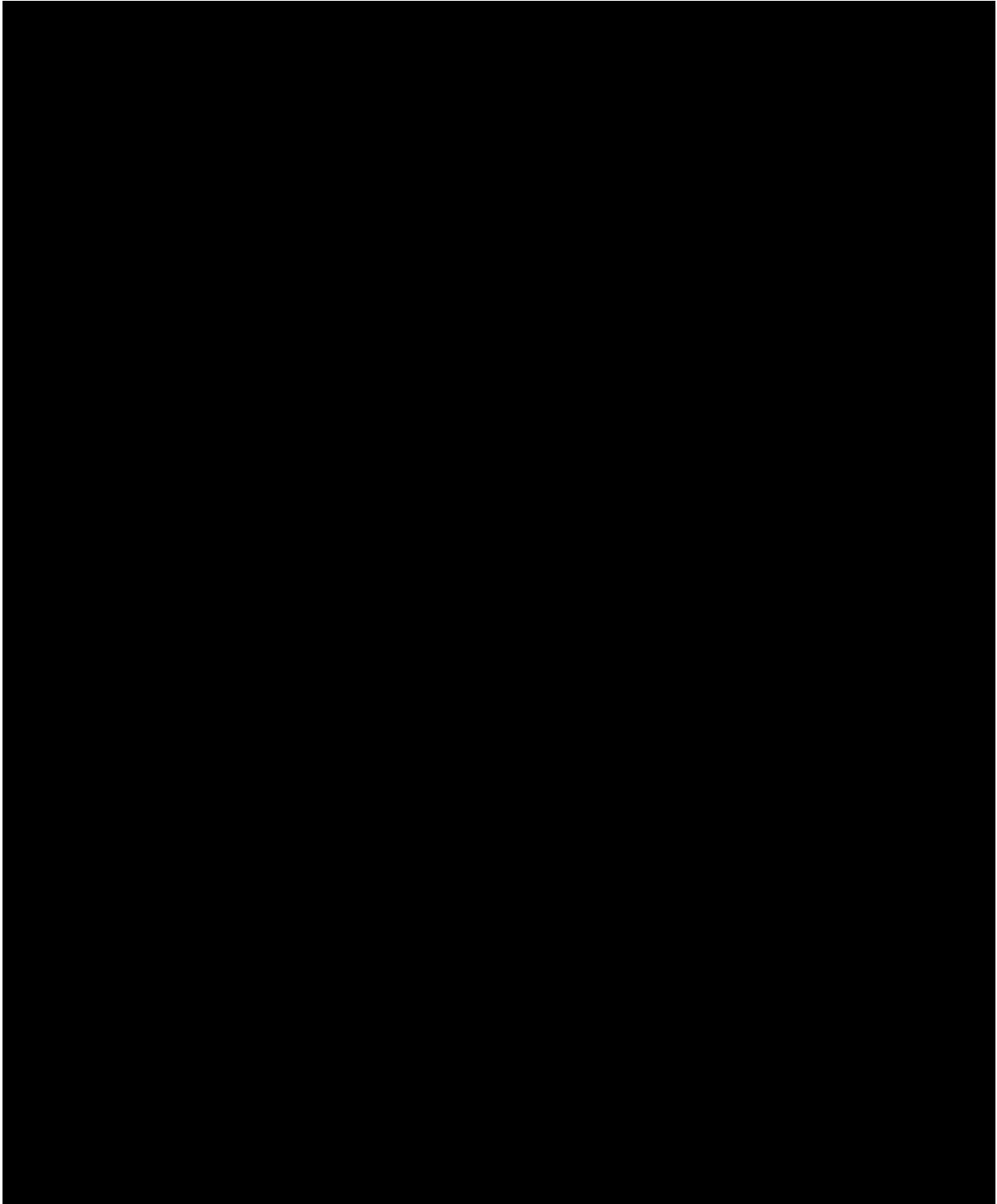
Interview Account	Page	Study
Account 1: San on graphic language shared between designers	151	E1
Account 2: Garrett on the lack of briefing	152	E1
Account 3: San's expectations of a design agency	152	E1
Account 4: San on creative work structure	153	E1
Account 5: San on Western-Chinese difference in design teaching	154	E1
Account 6: San on WDs' freedom	155	E1
Account 7: San on WDs' being more conceptual	156	E1
Account 8: Mikael, German Design Manager on CDs' Silences	160	P2
Account 9: Laura, American Team Leader on CDs' Silences	160	M2
Account 10: Laura on viewpoint and argumentation	161	M2
Account 11: Ying on language difficulty	171	P2
Account 12: Laura on design language	172	M2
Account 13: Tian on CDs' subgroup discussion	173	P2
Account 14: Tristan on fitting in with CDs' subgroup	176	P2
Account 15: Laura on CDs' silences	177	M2
Account 16: Tian on power distance	178	P2
Account 17: Laura on Yang's authoritarian management	179	M2
Account 18: Kathy on instructional teaching	181	E2
Account 19: Kity and PanPan on freedom in Britain	182	E2
Account 20: Laura on brainstorming and expressing viewpoint	183	M2
Account 21: Tristan on CDs' visual oriented design	193	P2
Account 22: Martin from WUZU2006 on CDs ideation process	194	WUZU
Account 23: Mikael on teamwork	199	M2
Account 24: Tristan on CDs' shaping and the importance design reason	211	M2
Account 25: Mikael on CD's creative process	219	M2
Account 26: Tristan on Breadth versus Depth	219	M2
Account 27: Jimmy on result oriented CDs	225	E2
Account 28: Tian on CDs' use of computer graphics	229	M2
Account 29: Tristan on CDs' use of computer graphics	229	M2
Account 30: Laura on design as problem-solving	250	FL

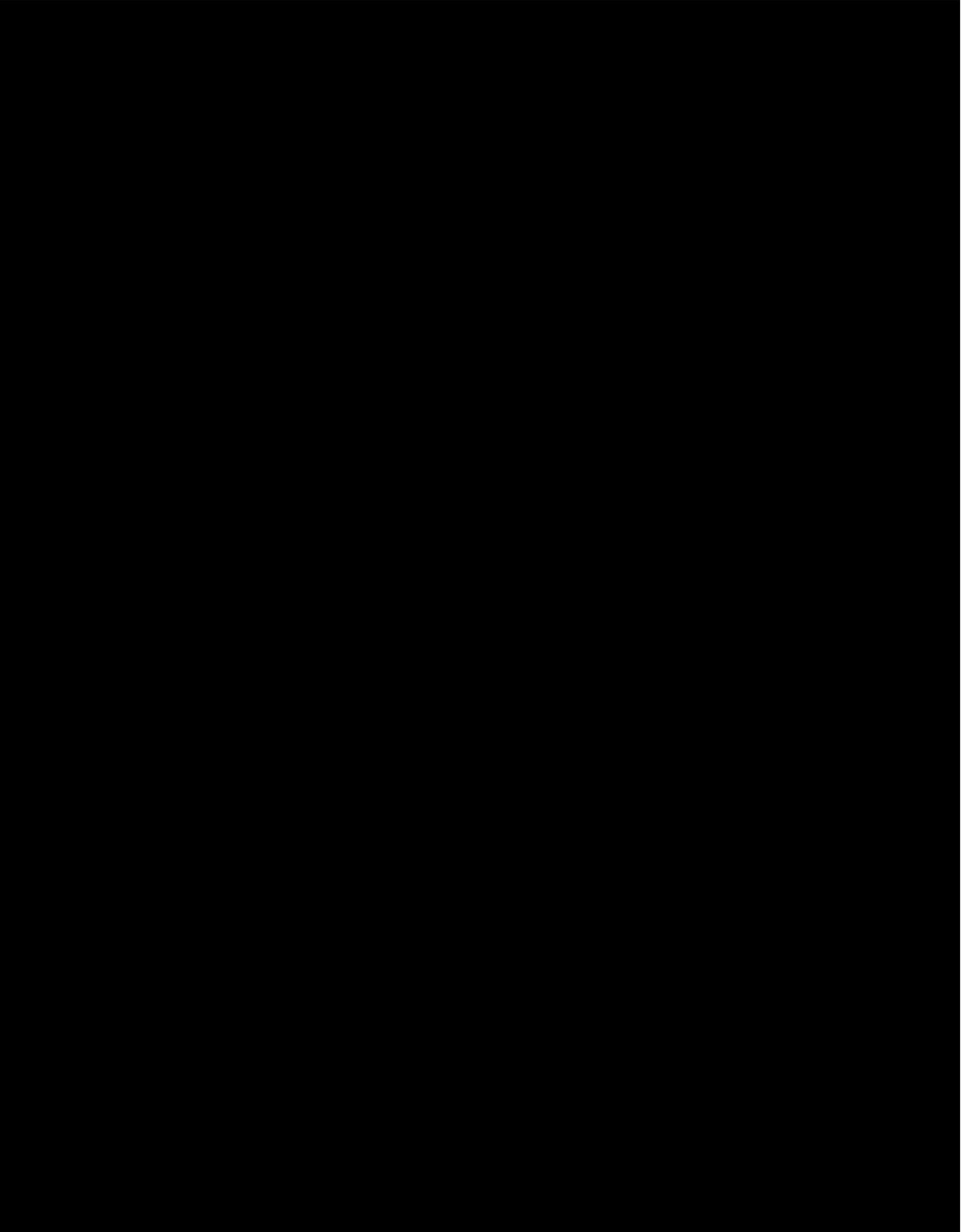
Table 24 Index of reported interview accounts

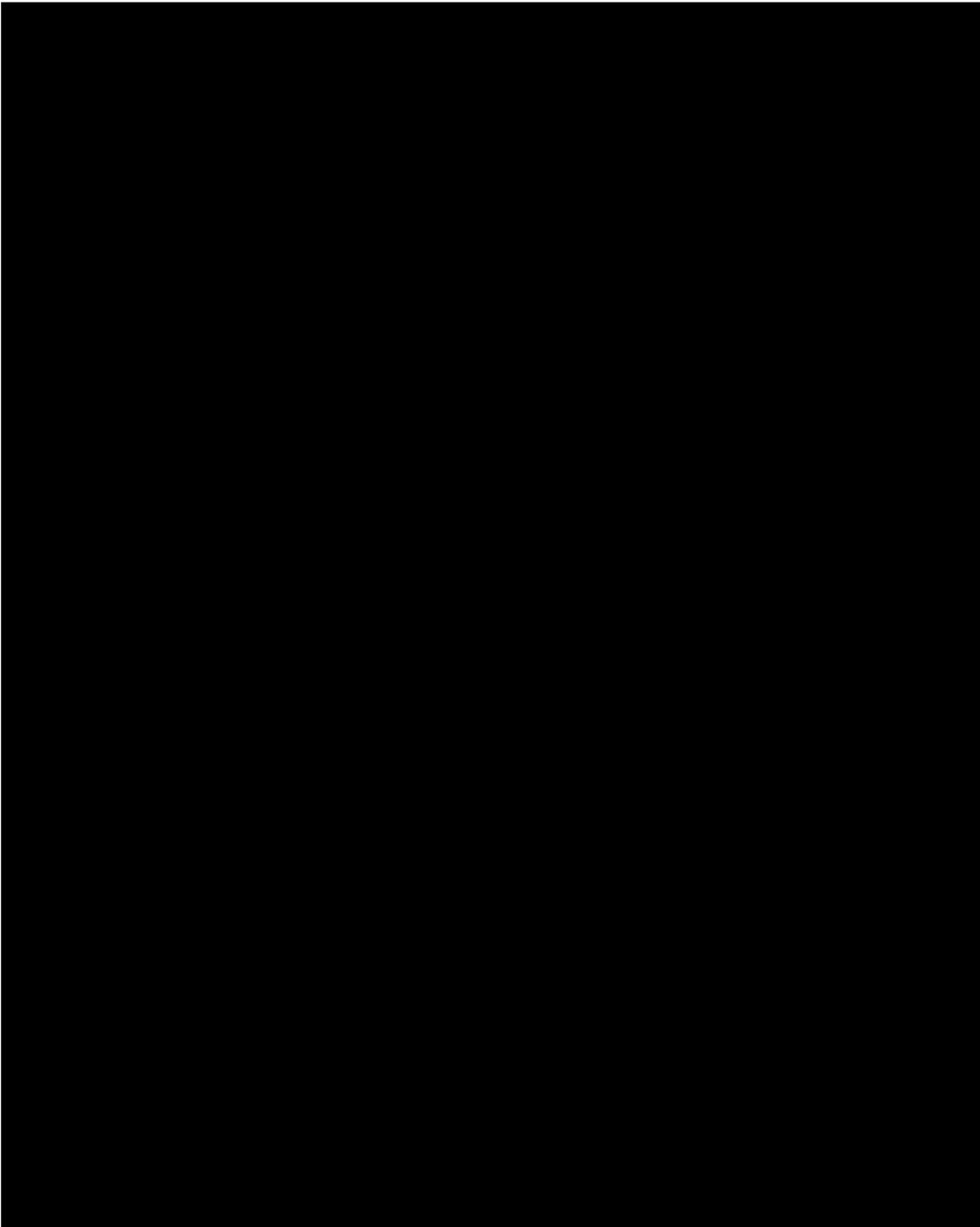
APPENDIX IV: PUBLISHED PAPERS

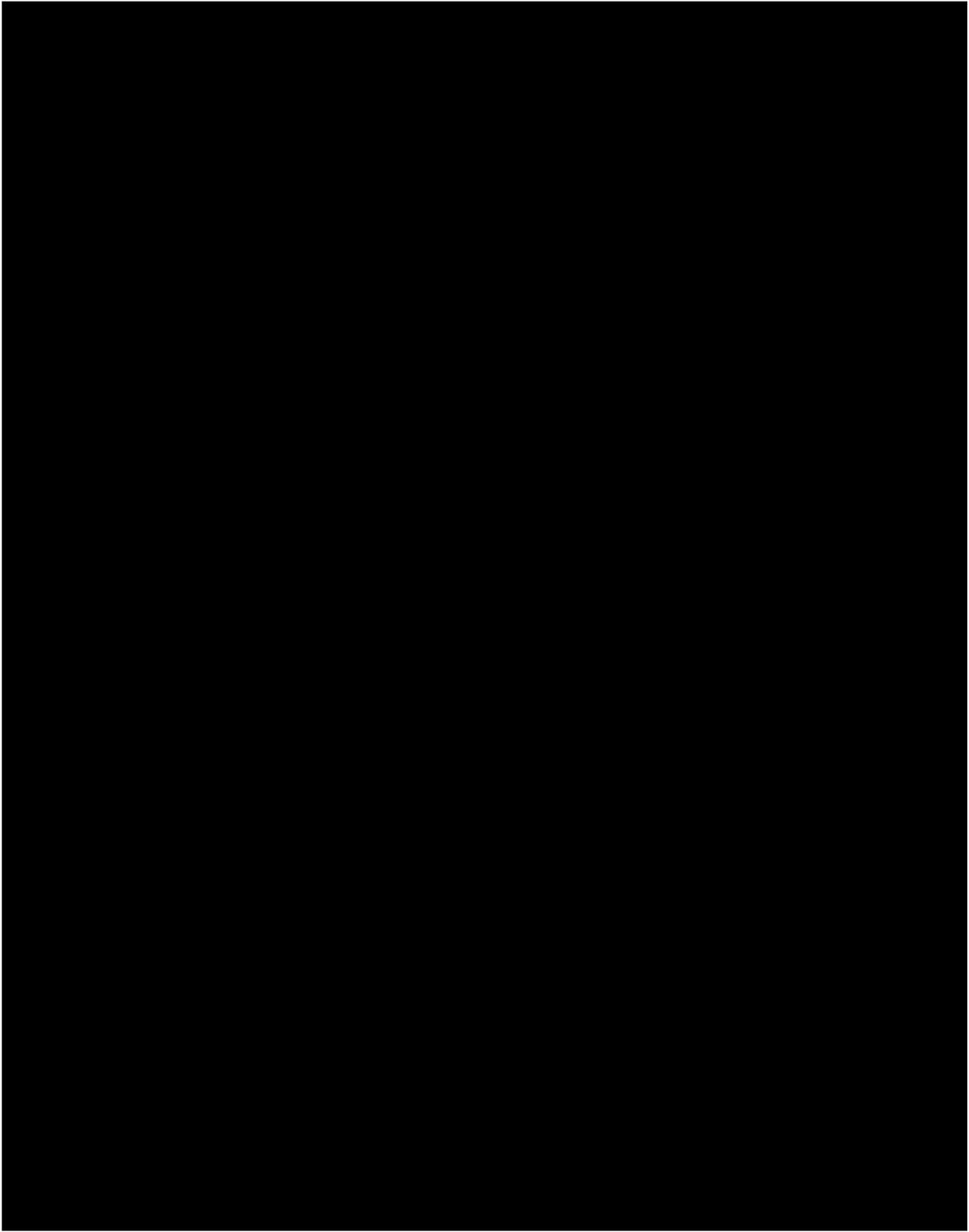
- A) Nainby, P. (2005). West meets east: negotiating ambiguities at the early stage of designing. EP&DE, Edinburgh.
- B) Nainby, P., S. Jie, et al. (2005). Design education in China from intuitive viewpoint: A cross-cultural comparison. IDEC 2005, GuangZhou, China.
- C) Nainby, P., M. S. Gong, et al. (2006). Talking design: A Swiss/China cross-cultural collaboration. Engineering and Product Design conference, Salzburg University of Applied Sciences, Salzburg, Austria.
- D) Chueng-Nainby, P. (2010). Where is the conceptual design stage? Describing concept negotiation in early design collaboration between Western-trained and China-trained designers. Cumulus Shanghai, Shanghai, China.

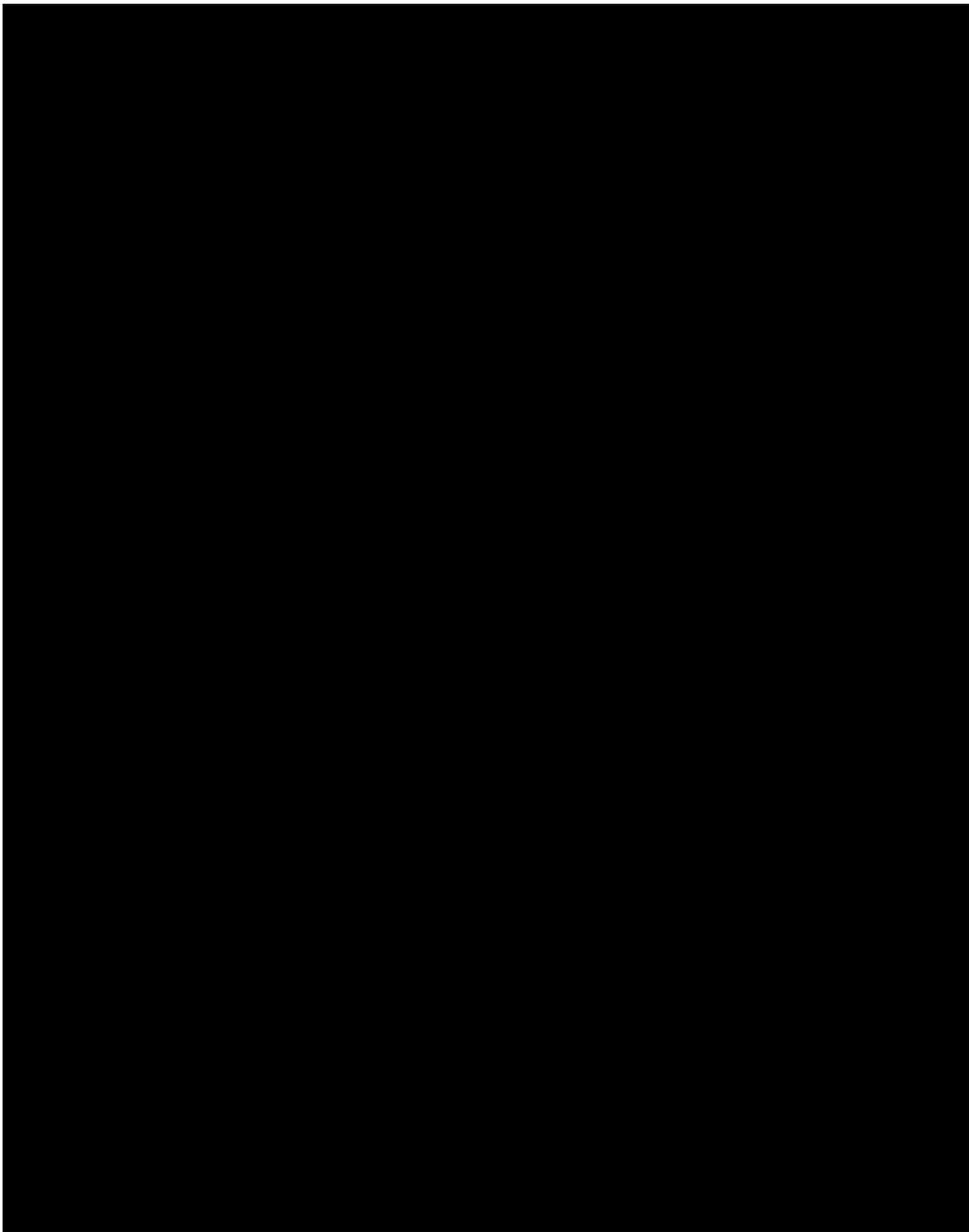
A) Nainby, P. (2005). West meets east: negotiating ambiguities at the early stage of designing. EP&DE, Edinburgh.

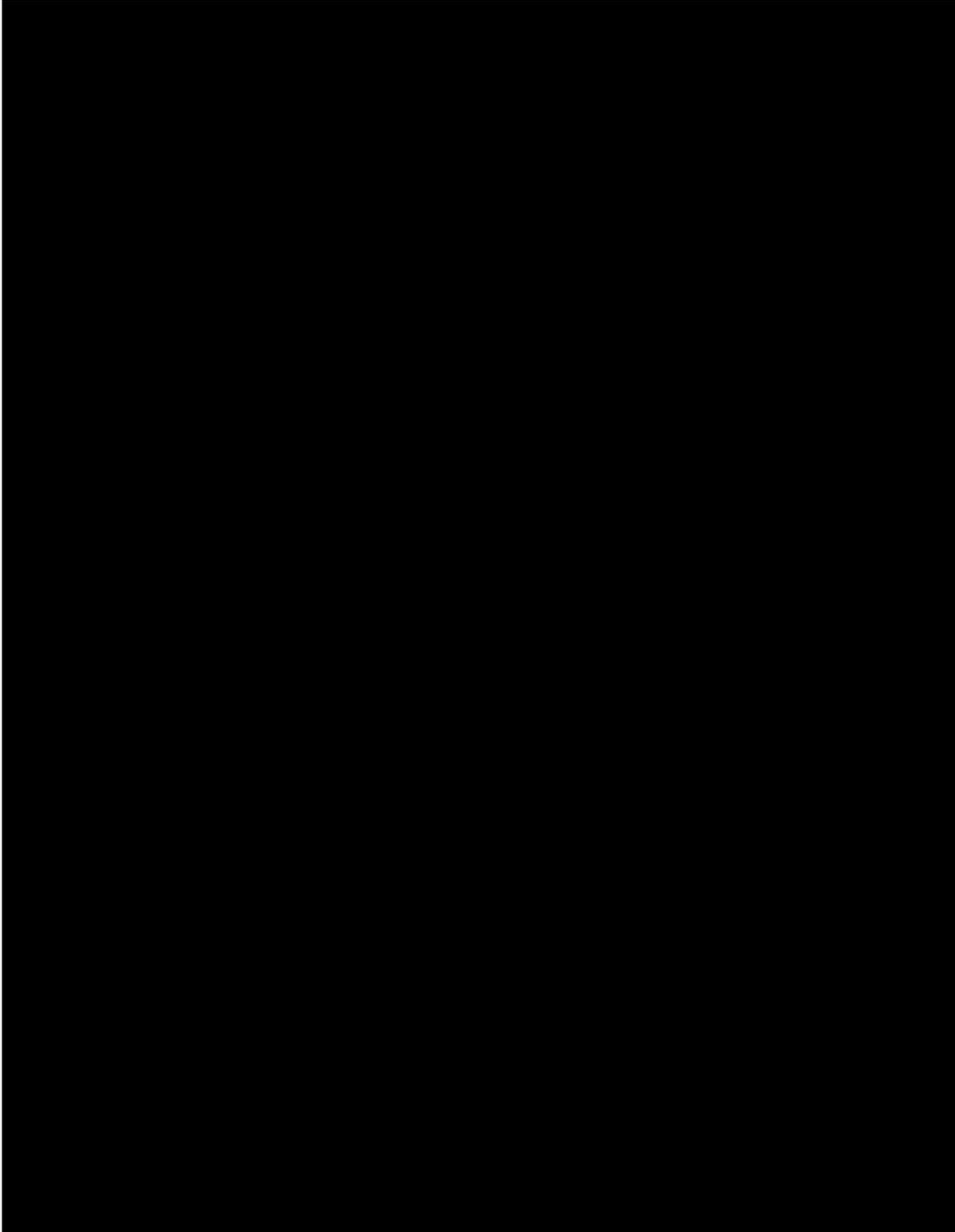




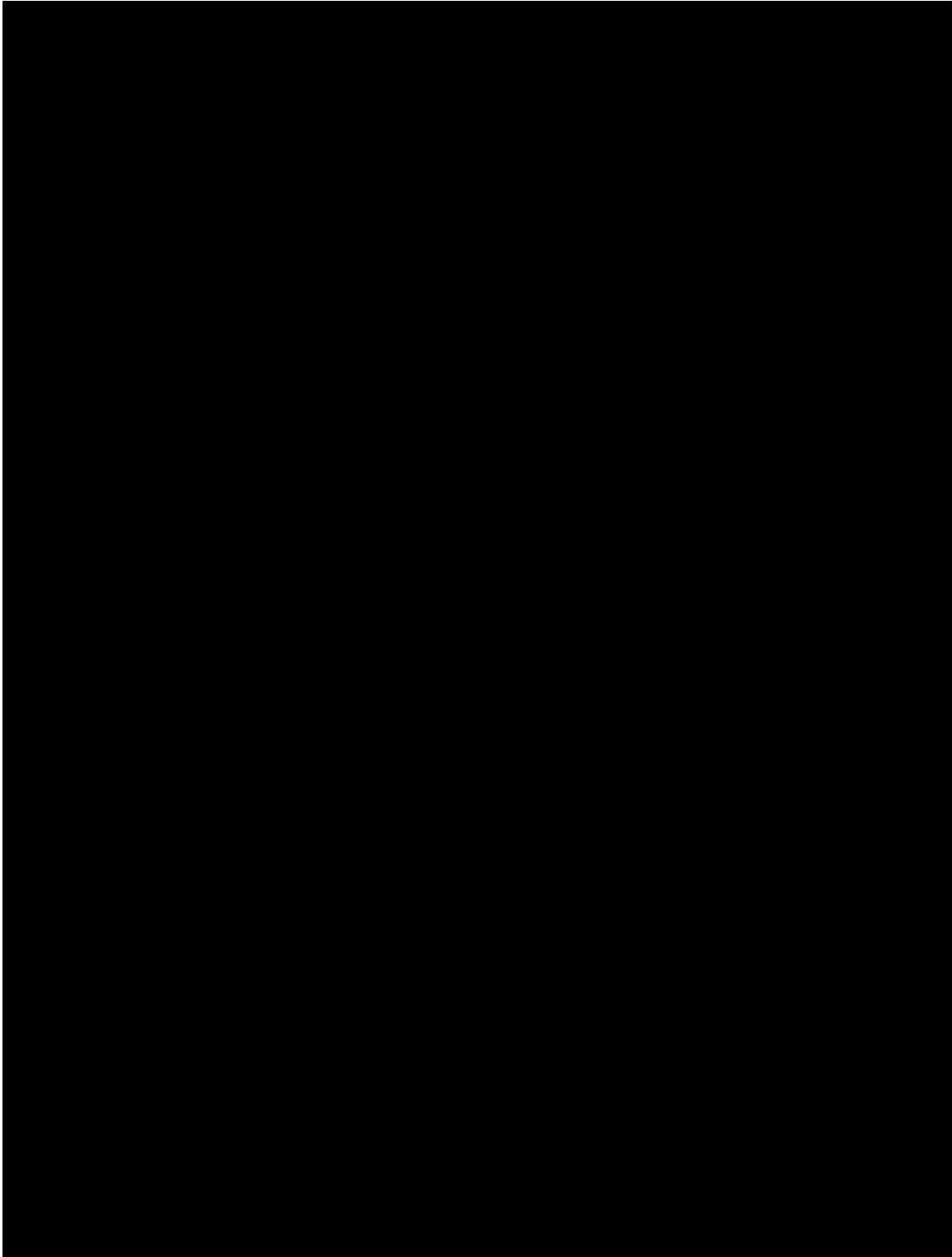


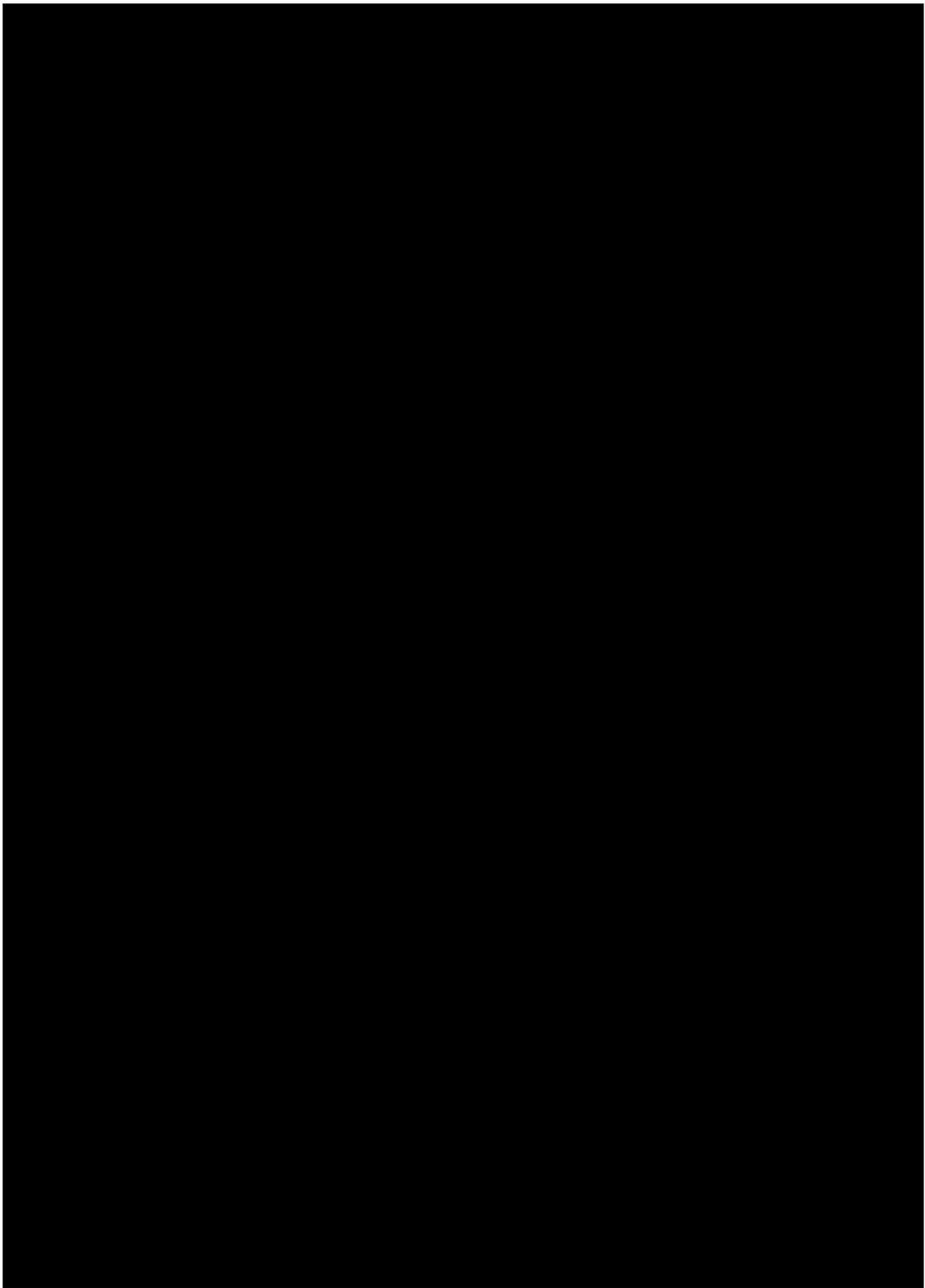


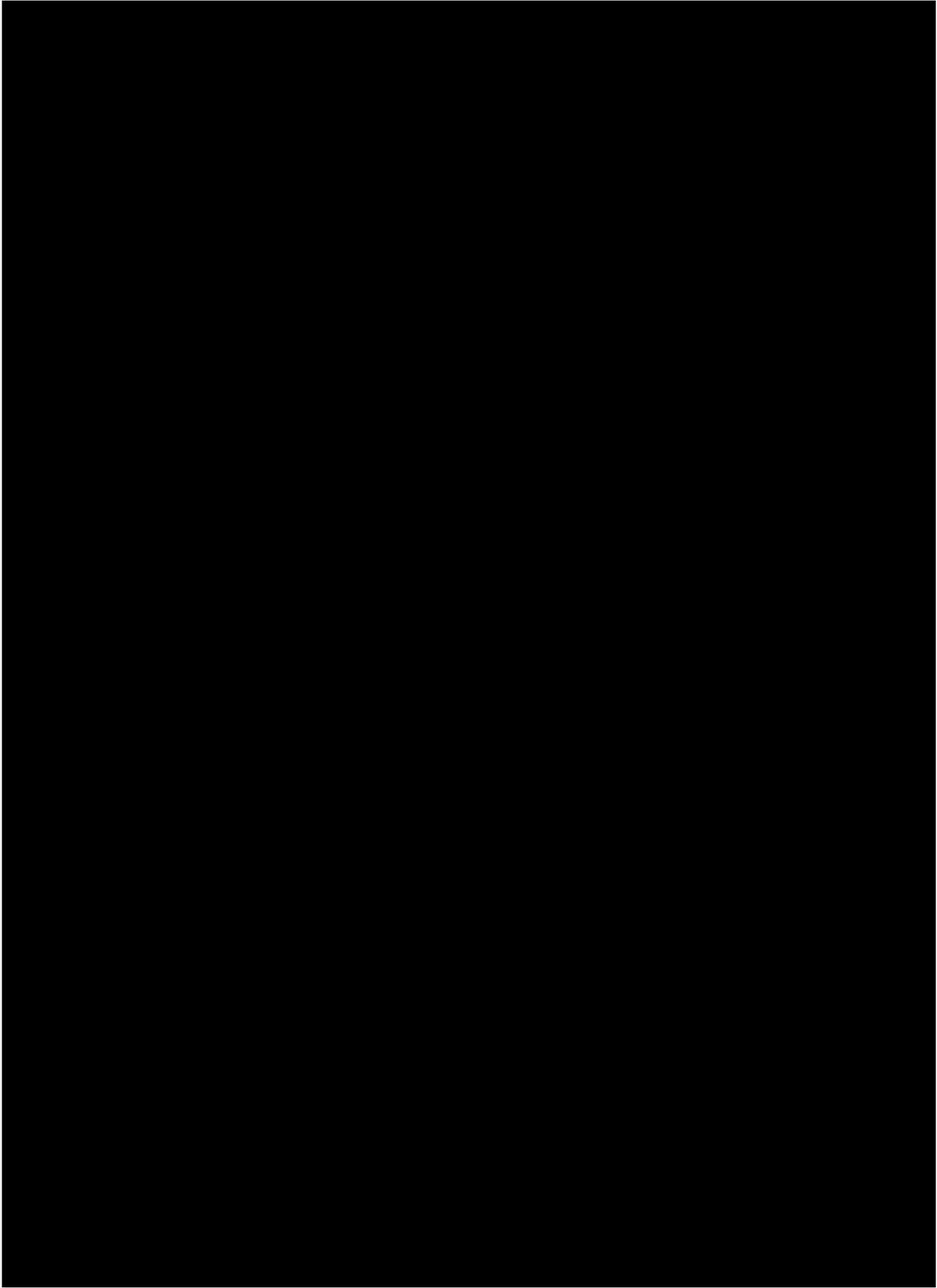


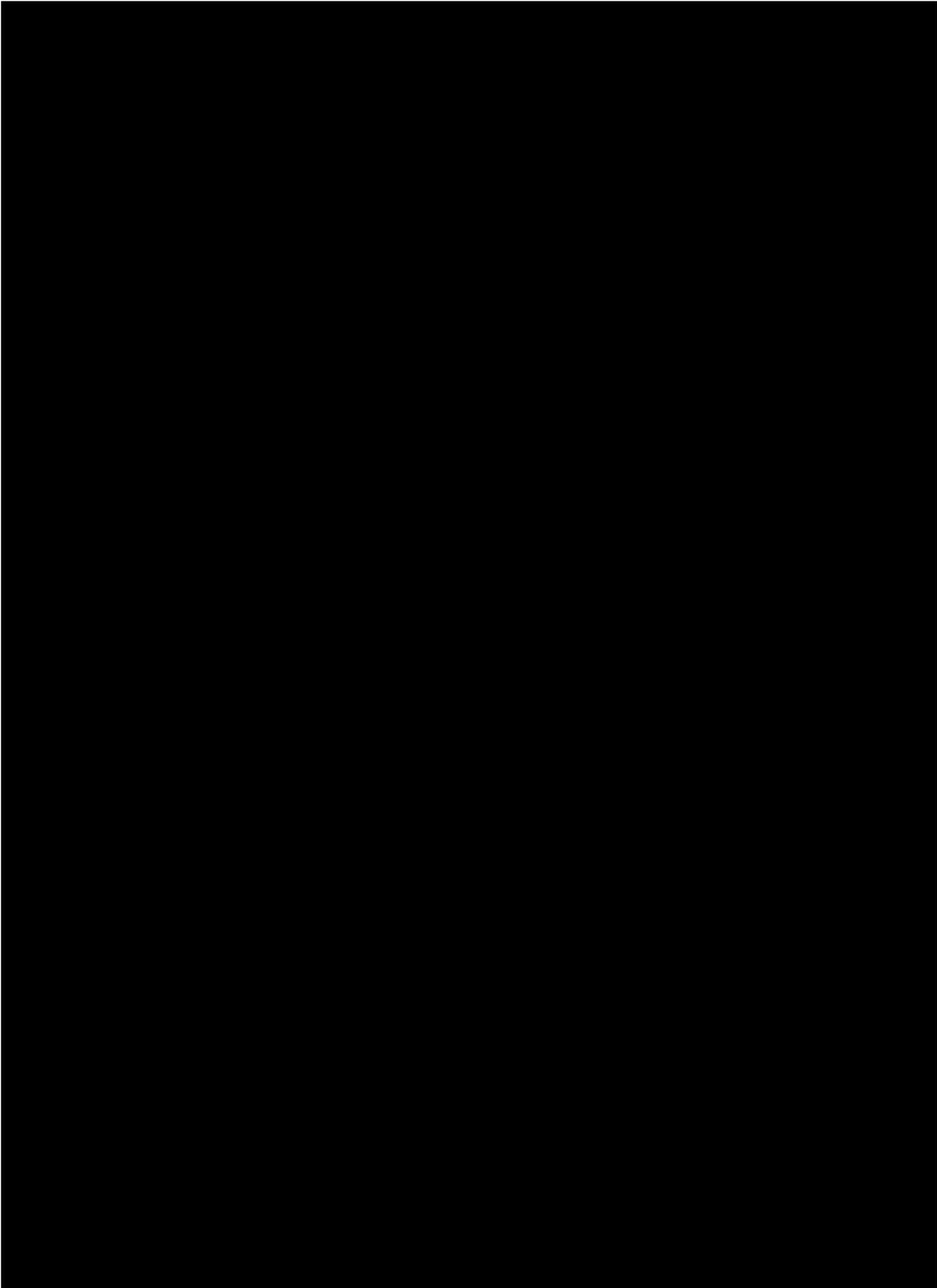


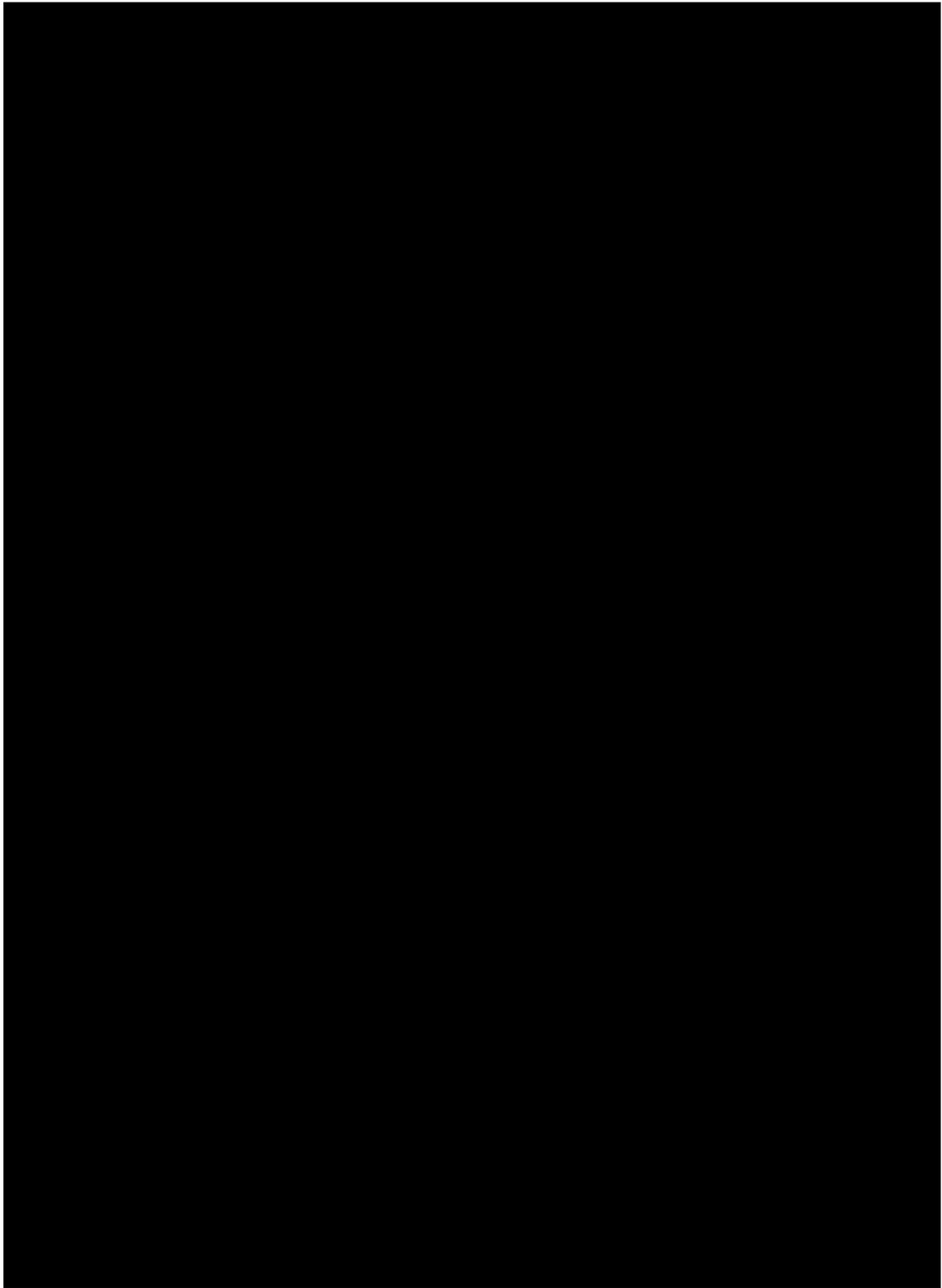
B) Nainby, P., S. Jie, et al. (2005). Design education in China from intuitive viewpoint: A cross-cultural comparison. IDEC 2005, GuangZhou, China.



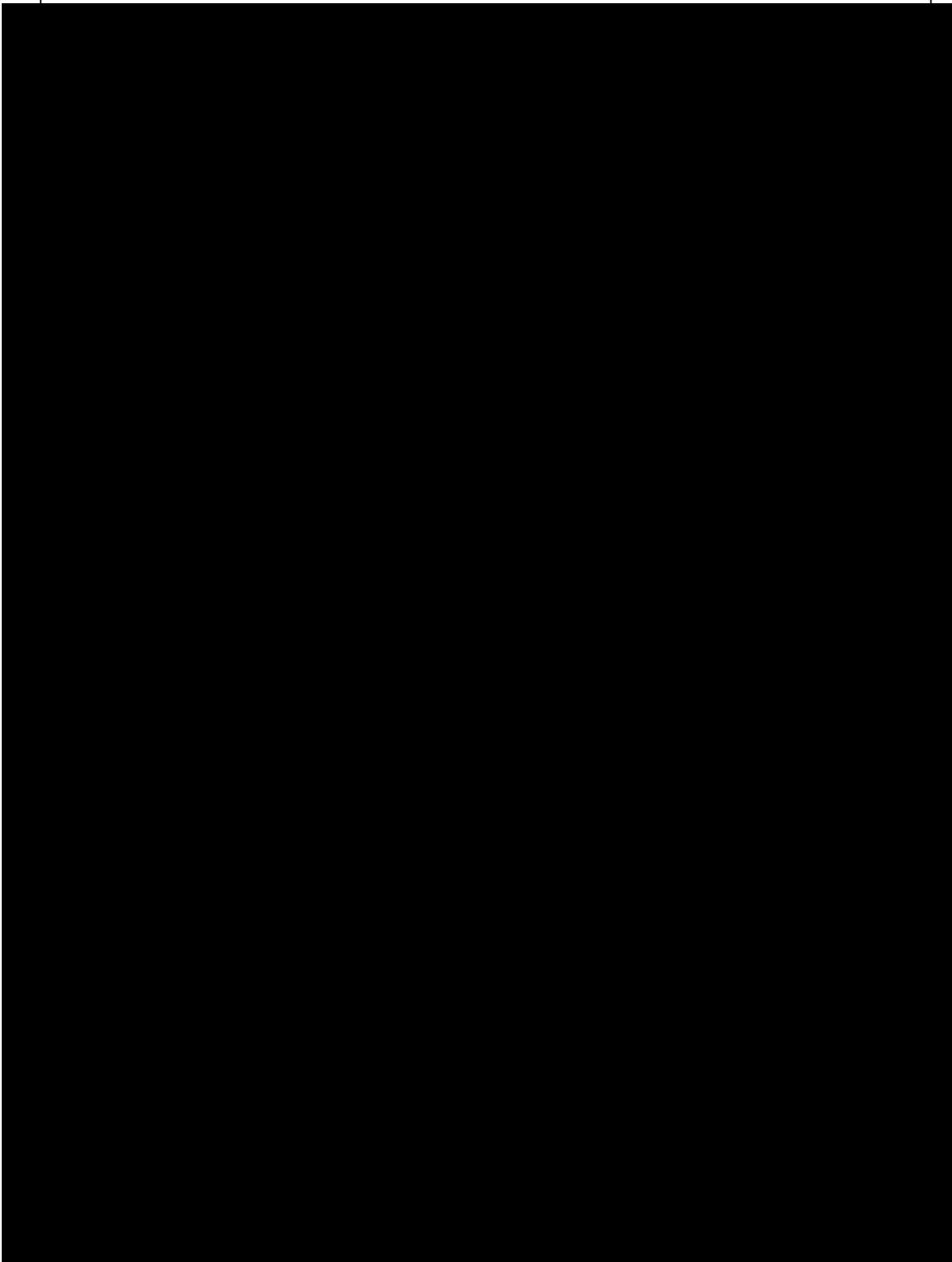


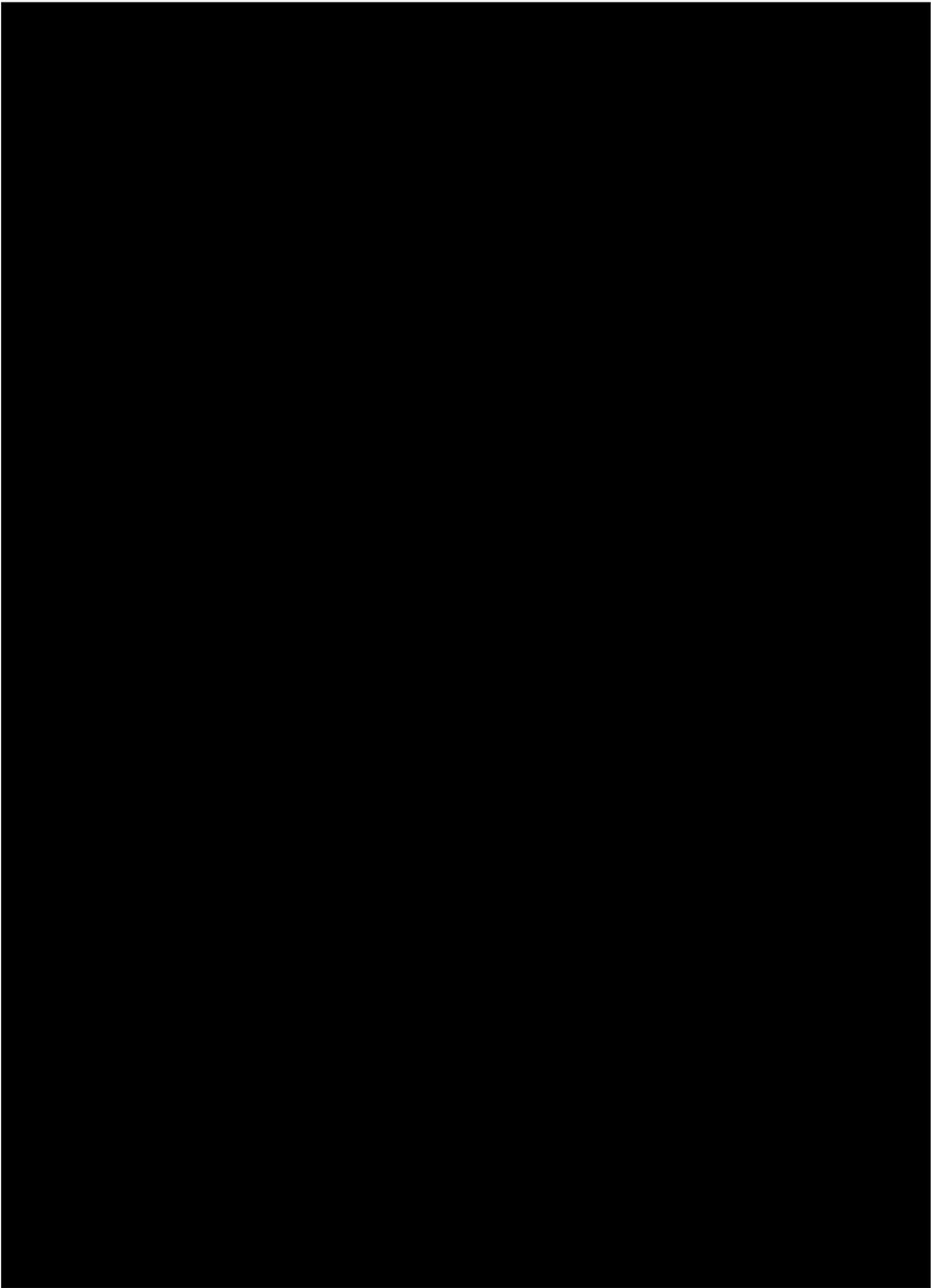


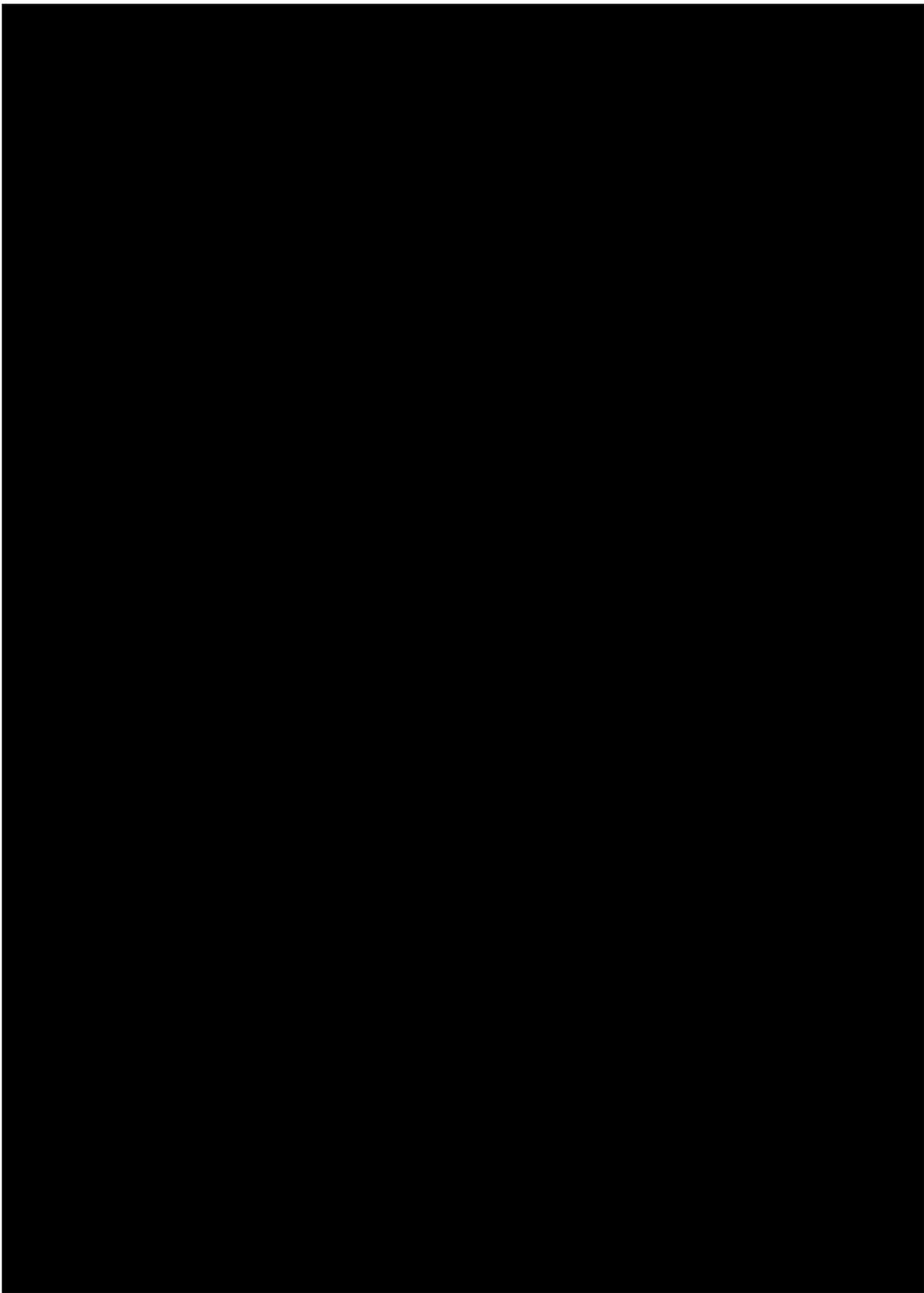


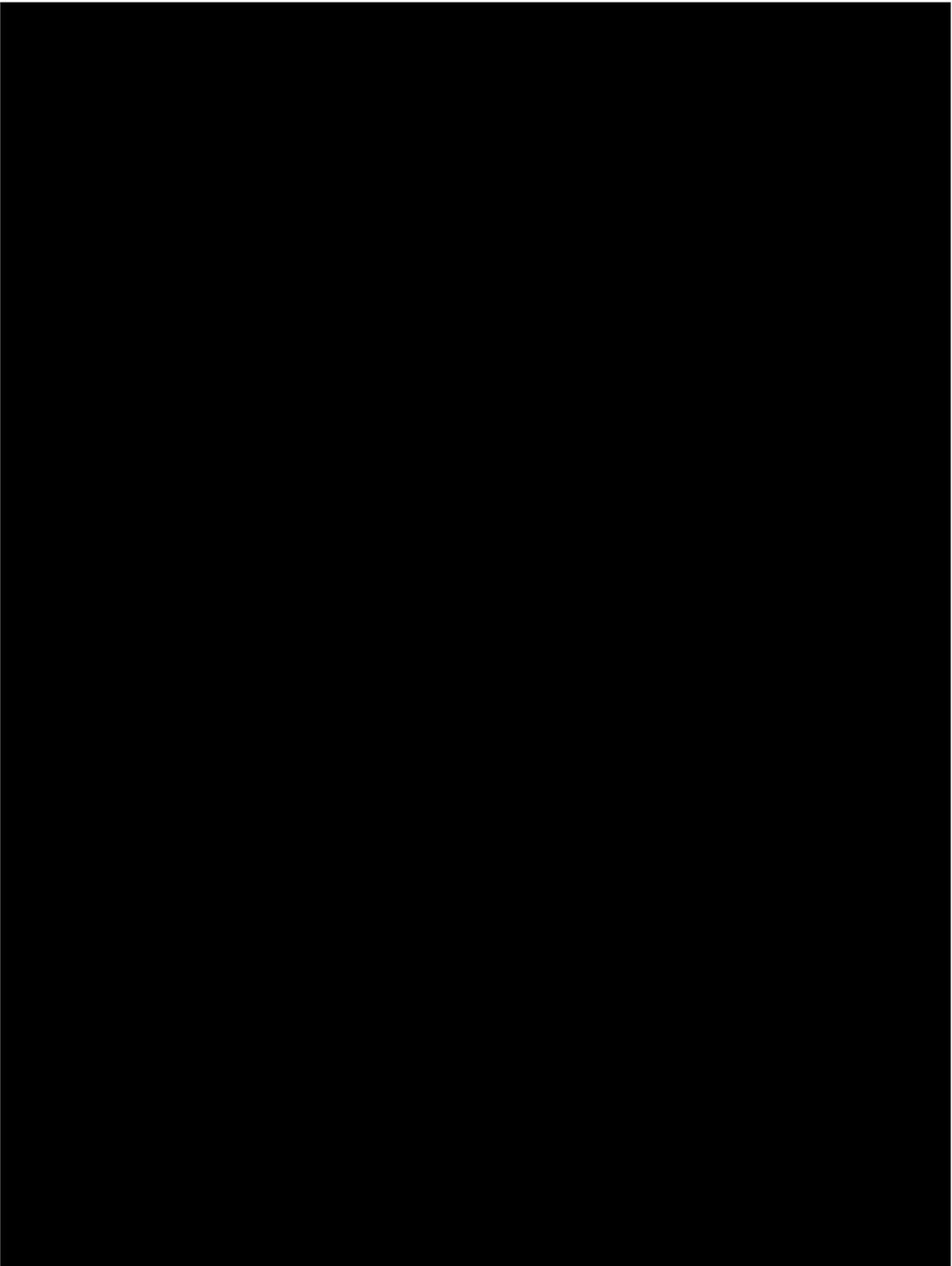


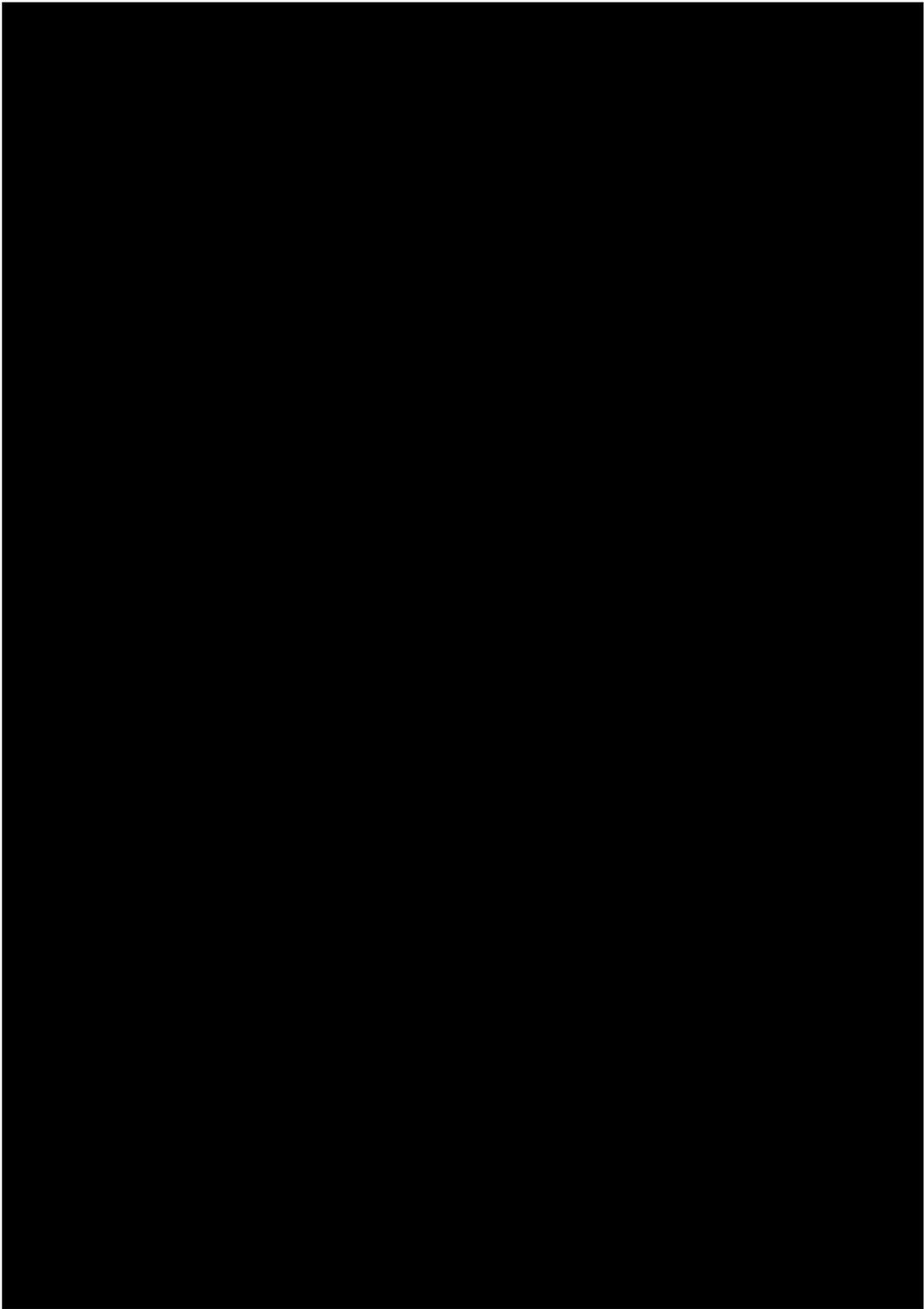
C) Nainby, P., M. S. Gong, et al. (2006). Talking design: A Swiss/China cross-cultural collaboration. Engineering and Product Design conference, Salzburg University of Applied Sciences, Salzburg, Austria.

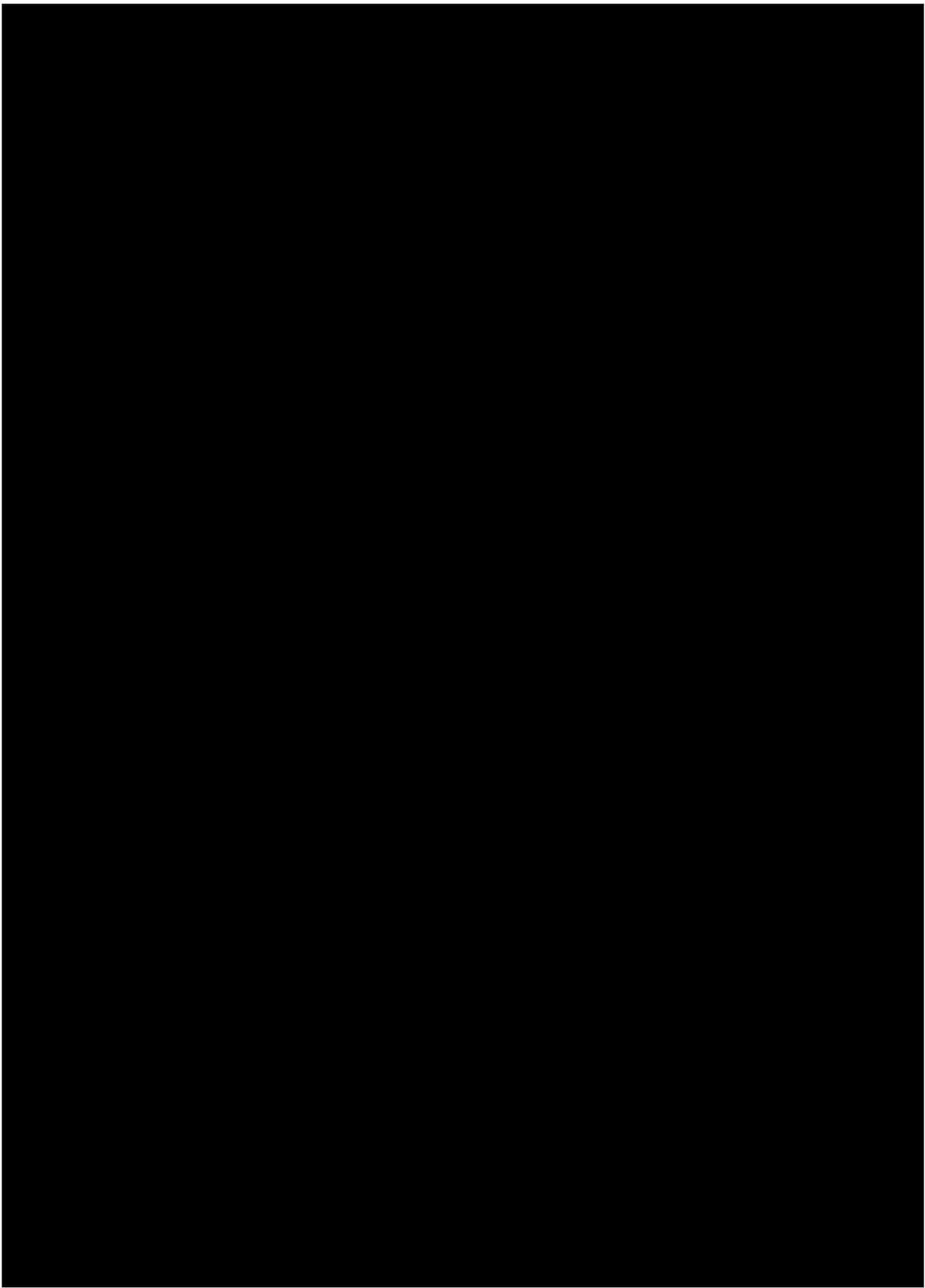




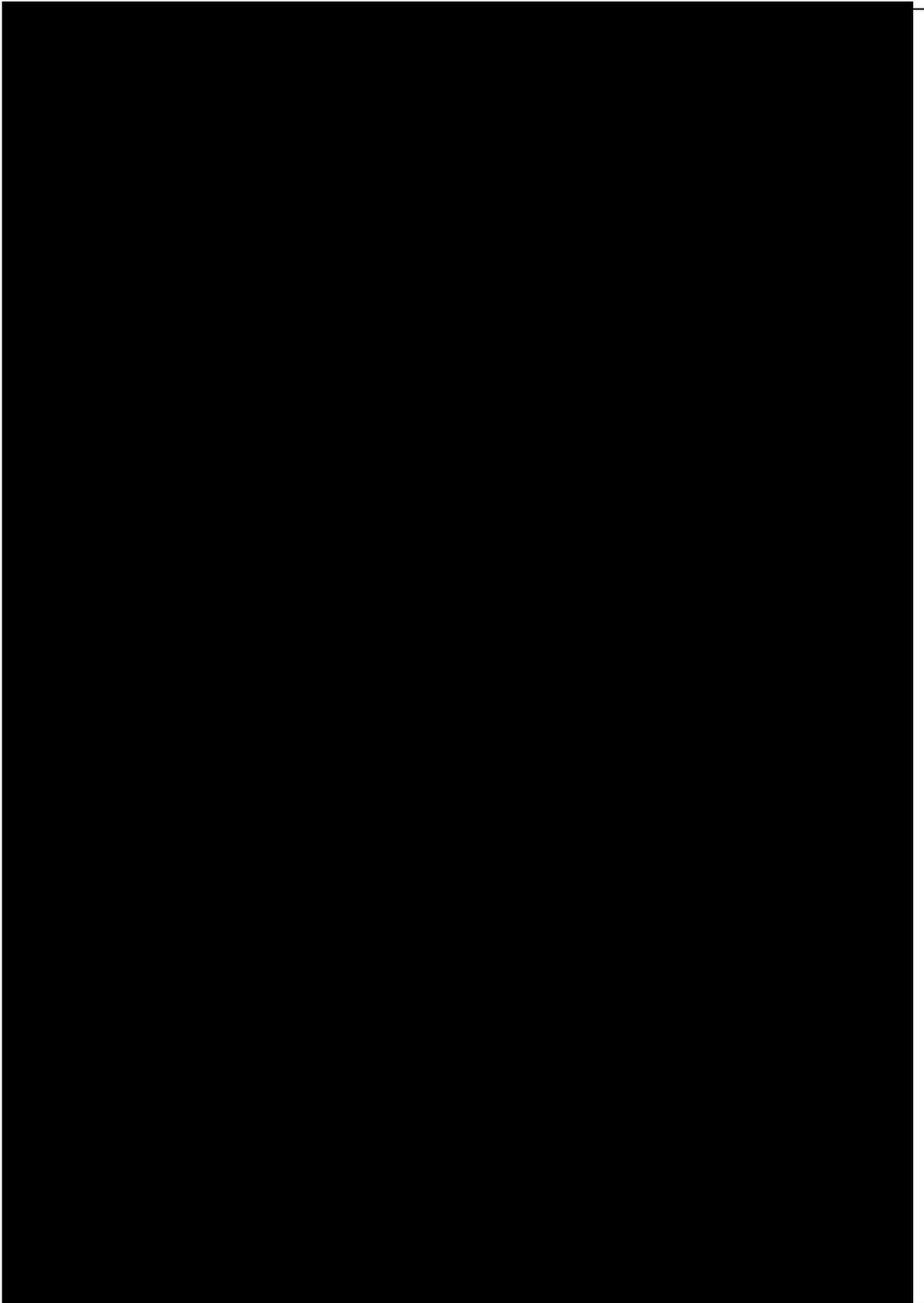


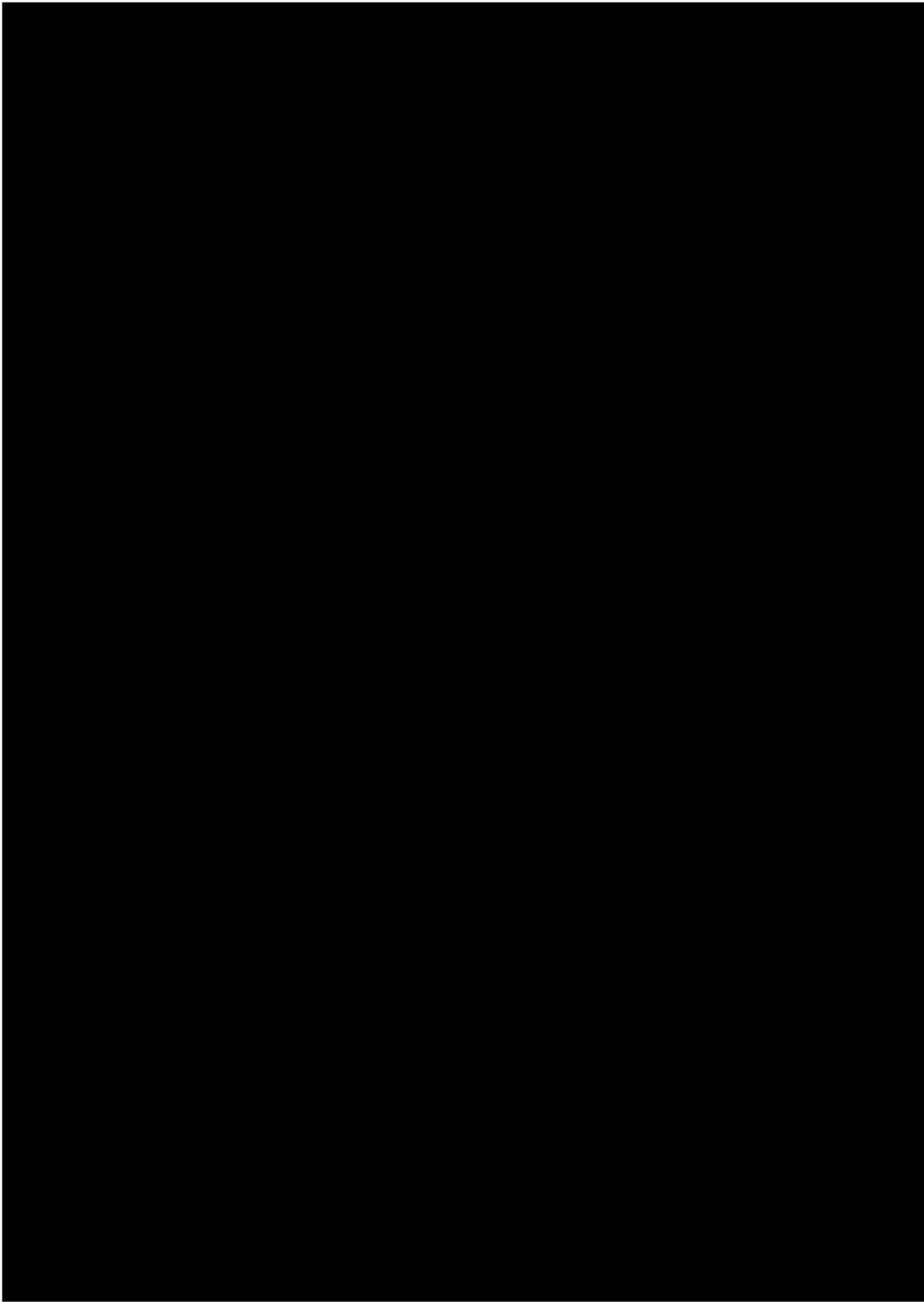


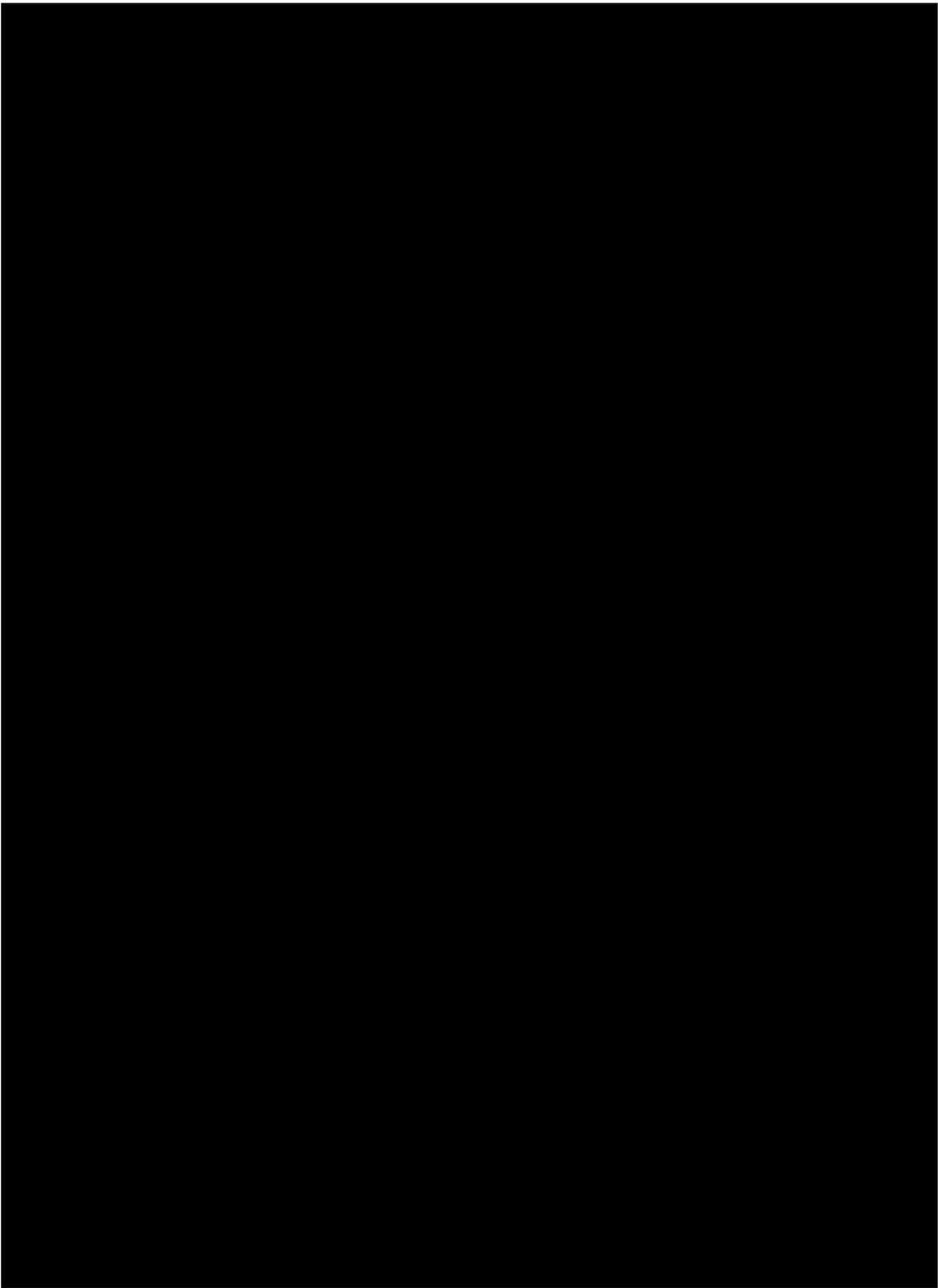


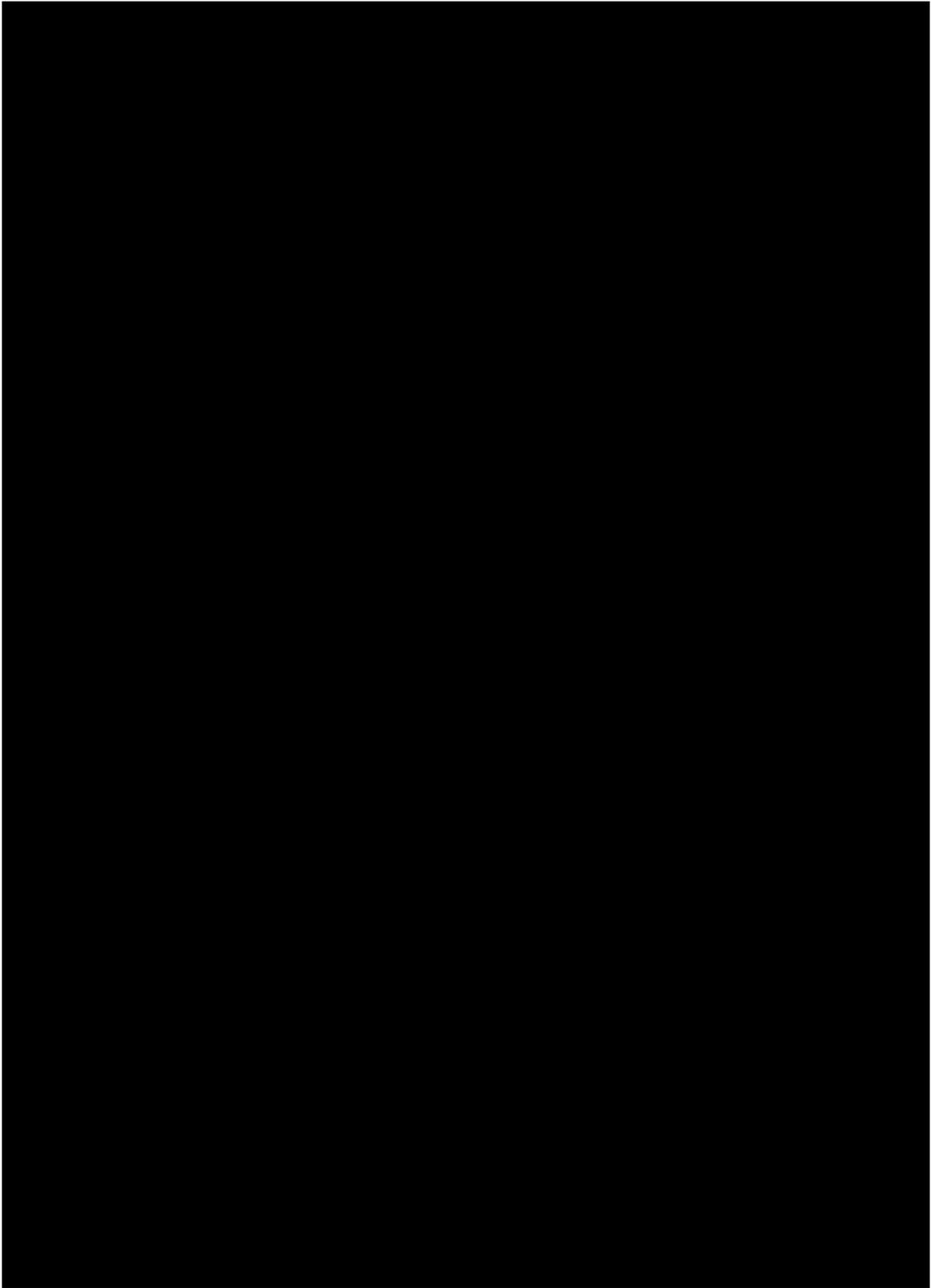


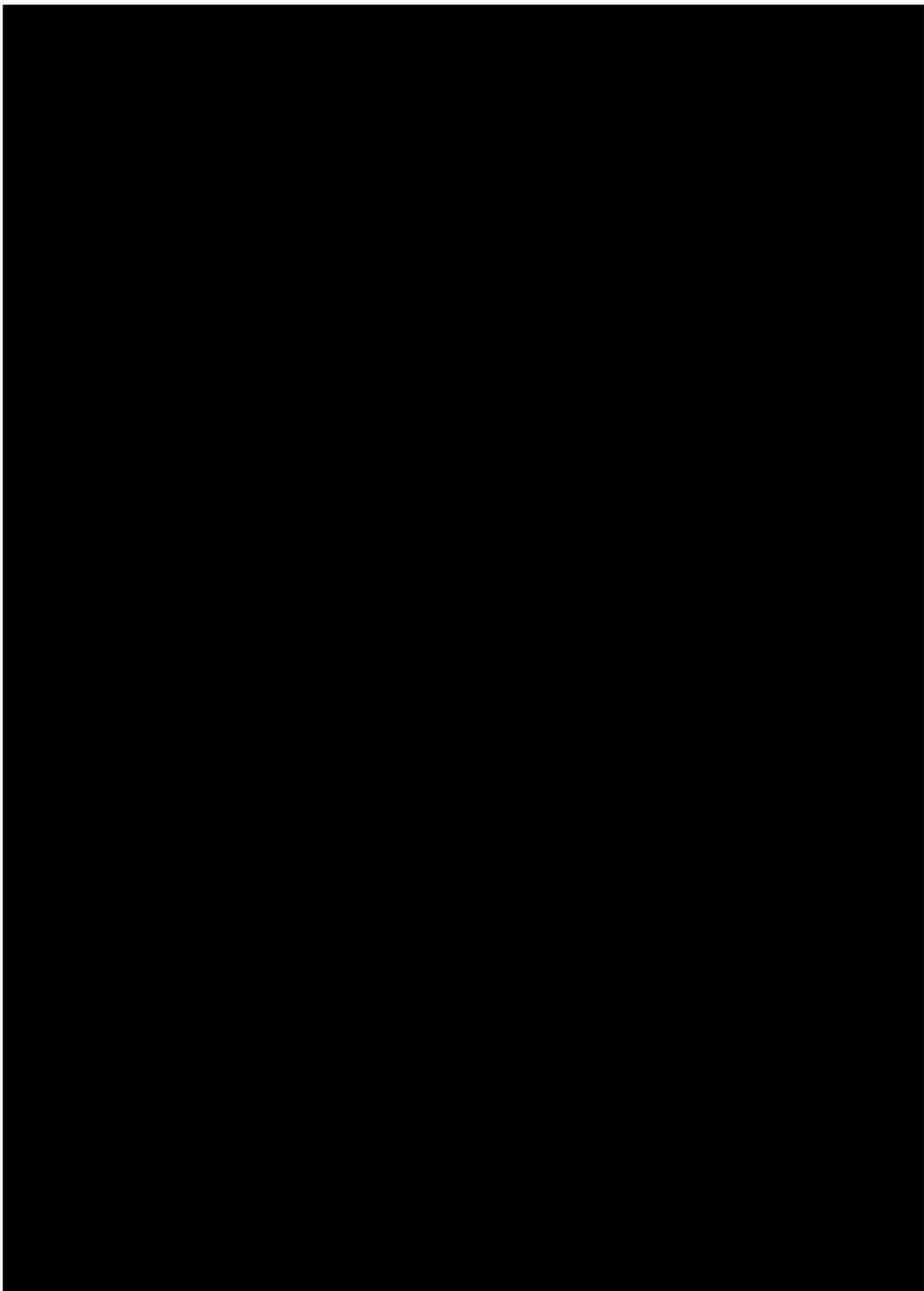
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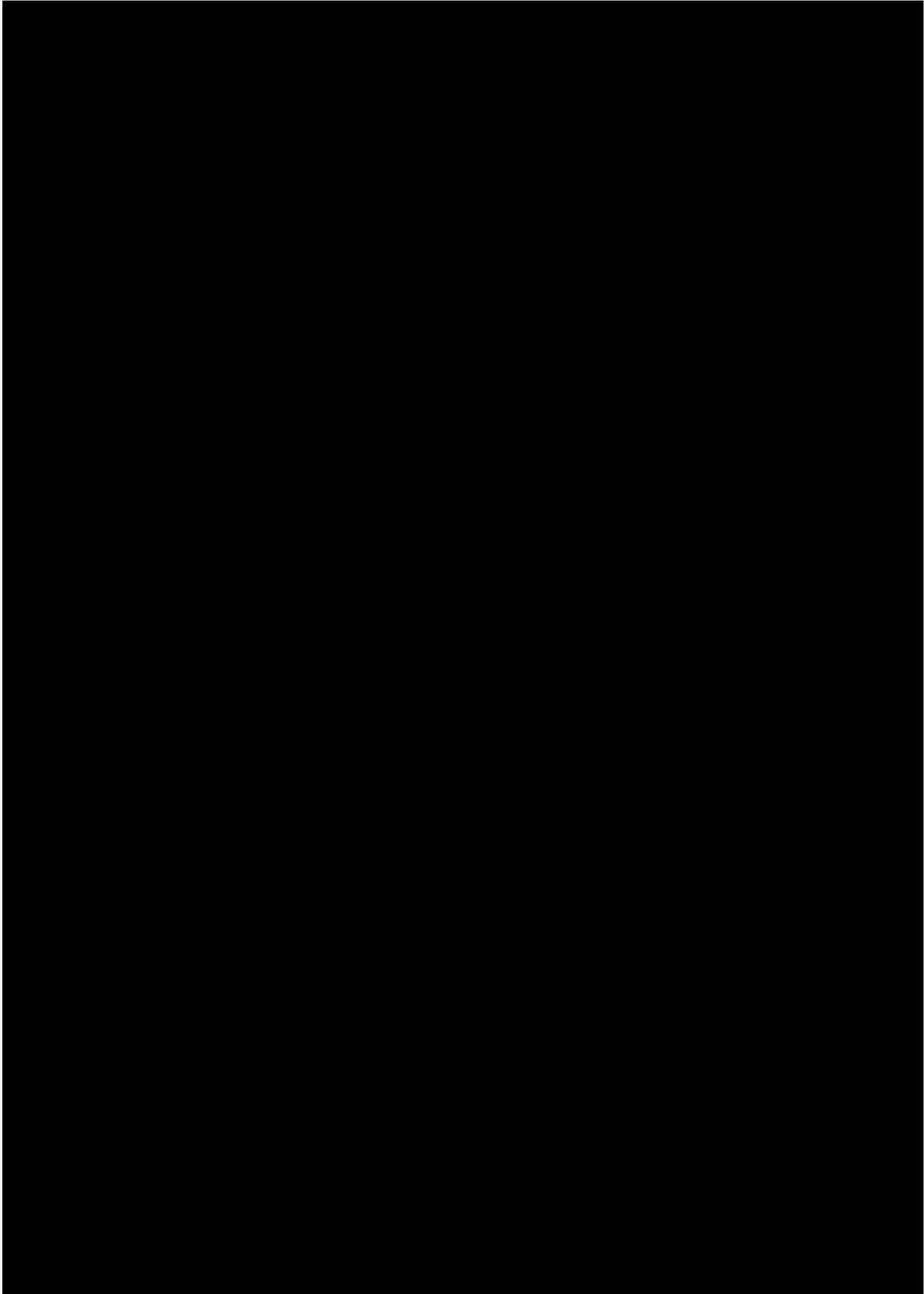












THE END