A Phenomenological Inquiry into the Experience of Having a

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A PHENOMENOLOGICAL INQUIRY INTO THE EXPERIENCE OF HAVING A DESIGN CONCEPT

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> Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole.
> John Dewey, *Logic: The Theory of Inquiry*, pp. 104-105.

Chapter 1. Introduction

1.1 A Personal Background

On an autumn afternoon, seven years ago, I accompanied a designer on his tour of the city of Shanghai watching him document many things on the street, including vehicles, people, traffic, shops, and buildings. When we finally sat down in a restaurant, he asked me, "How do you know a product is good?" I cannot recall what I said, but remember that I was not comfortable with my clumsy answer. I knew that this question was not merely about evaluation, nor was it about any particular product. This designer used to be my supervisor for a car design project, and he had taught me how to appreciate and design a car from scratch. At that time he was a senior car designer, and I was an industrial design student; but at the time of this conversation our roles were different. He had entered the research and development department of an outstanding automobile brand to work on strategic planning, and I had begun teaching product design. As if having seen through my hesitation, he smiled at me and said, "It isn't that simple any longer, is it? How can we tell other people that something is valuable in our designers' eyes?" The last question was addressed to himself as well as to me.

That afternoon's conversation often echoes in my mind when I am asked about my motivation for embarking on the journey to complete a PhD after having taught at a design school in Mainland China for five years. My role as a teacher has provided me with new opportunities to observe and understand design from a view that is different to the one I hold in my role as a designer. Learning to be a design researcher provides yet another view.

As design students, we are trained to be sensitive to people's needs, to chase down the problem, to fence in the scope of the task, to advance the skills both of hand and mind, to find solutions (often many solutions), to identify the most appropriate one that can be made within the given constraints, and finally to present a result. Then, one day, some of us become front-line design teachers, we cross the fine line between being capable of designing and being expected to guide the others to go through the path. This is often accompanied—as it was for myself—with a realization that any explicit description of all this doing, making, and thinking requires new knowledge.

When teaching, the long-accepted notions of "problem," "creativity," "innovation," and, "a concept" can begin to feel strange. The new teacher has to ponder on what they actually refer to when using the terms, and this requires looking at design with fresh eyes. This fresh view is a mixed blessing, as it brings a renewed appreciation of the activity of design, but also some confusion about its fluid nature.

As a teacher, I enjoyed discussing projects with the students, sharing ideas with them, and demonstrating model making to them in the workshops, which is very similar to the way I was educated nearly fifteen years ago. However, this approach is not enough. I remember clearly that a young colleague of mine once exclaimed, "Now I know how to learn better!" at the end of her four-month supervision of a group of students' who were working on their capstone projects. I share this appreciation that teachers are privileged to learn design from a new angle through the act of teaching. Design educators are, however, also faced with the changing social, economical, and technological contexts of design. The subject matter for design has changed substantially throughout the past decade in Chinese design schools: expanding from traditional tangible artifacts toward intangible, abstract, and more complex objects and systems. The excitement of seeing things turning from abstract thoughts into concrete embodiments has gradually been diluted by curiosity about some basic questions, such as: *What do we make in design? How and why it is made so?* and *What do we learn through designing?* In my role as a teacher, I am often led to assume that I passively witness the students' designing; yet I have an unexplained sense of co-creating something with them.

I find myself asking: *If these co-creations are not the final sketches, models, and reports, what are they?*

Such confusions about design may not impede designers from finishing their tasks. However, they are barriers to design students and practitioners who aim to acquire the ground to build convincing arguments for their processes and products, and to extend their capabilities. They also impact on the ability of design teachers to facilitate and participate in the learning path of their students and affect their own learning. If the confusion was solely theoretical, it could be resolved by seeking answers in books; unfortunately—or perhaps luckily—such passions and questions for design arise from both practice and theory, which mingle throughout the course of design. The confusion stems from an inability to grasp the art of describing this beautiful activity, as description is rooted in understanding. This understanding fits within the everyday practices of designers, and the vitality of this understanding of design can both influence and feed-on the evolving design practice. A question that is raised by a practitioner can run deep, if the confusion is true, if the inquiry is honest, and if the understanding accounts for the characteristics of the practice.

1.2 Context of the Study

If you go and sit in an ongoing design critique in a design studio, you will find the following dialogue very familiar and probably happening in any design school:

> Student : It [a digital device] can navigate and record paths. If you see a pretty view you can take a picture and attach it to the path, and later show them to your friends. To you, it's a record of achievements. When sharing with your fellows, you may find out a different path to the destiny. Then you can forward the path to your other friends. Likewise, paths can be uploaded and downloaded from the internet.
>
> Teacher: Okay, path planning and sharing… [Pauses] The other day I ran into a book talking about birds and fish: it instantly occurred to me that they have something to do with your design. Small fishes in the ocean move in shoals. If anything happens, the shoal instantly diverges and then converges. You know what's the interesting thing? Individual small fishes in the huge shoal basically never collide into one another. Birds are the same. A flock follows a leading bird. I'm not sure if your persona is a member of a group. Is she?
>
> Student: Yes.

> Teacher: Well, there'll be a lot of bikes in a club. As for the functions of your device, could it stimulate the moving pattern like fishes and birds? For instance, if suddenly a sharp turn appears, or someone suddenly put on the brakes, would it be dangerous for the other fellows?
>
> Student: Sure. But usually people ride bikes in a linear mode instead of side by side.
>
> Teacher: Okay. It's just my fuzzy concept. When I read the book, it reminded me of your design. The thing is, path-sharing is good, but not exciting. I was thinking, why, it would be interesting! Imagine a group of cyclists on the road in a long, long line. Assume, suddenly the leader sees a fallen tree blocking the road, or weather, or road condition changes. How could the information be shared (to the fellows way back behind) in a more intelligent and interesting way? Your design is about making them better enjoy the journey, right? This would be more exciting, helping the cyclists perceive the context and the upcoming changes of environment. (Field notes, TU250309HU)

This slice of data, recorded in field notes for the present research, is an extract from a one-on-one tutorial during the early stage of design. This stage is often termed *conceptual design* (see § 2.1.2). In conceptual design, designers synthesize their exploration of the situation and the opportunities that have been identified for the final product. They verbally and nonverbally describe what they have made, and discuss the product's functions, shape, parts, colors, materials, users, and scenarios of use, as well as the services they provide and the systems they function in. Designers make drawings and build prototypes. Designers use the word *concept* to refer to something that contains all those aspects, yet is greater than the sum of these parts. The outcomes of conceptual design are generally named *design concepts* (see § 2.1.1).

Designers seek out design concepts and develop them until the most appropriate are identified for further evaluation and realization. In this study, when asked to describe a concept in a finished design, designers often seem to have a natural ability to trace the process back to some particular moment that signifies a meaningful design episode. It is an episode of *having a design concept*, which includes the sudden awareness of an insight, the flow wherein the insight is fused into the design under question, and the outcome that develops into a concept (or a new concept that differs from earlier ones). In my experience as a teacher, when such an episode happens to designers, they are often aware, especially in retrospect. Common expressions of this awareness might include phrases such as, "I have a design concept," or simply, "Aha!" This phenomenon of having a design concept is not the totality of design, but it is a crucial part from

which the final product is derived. Fuzzy, and far from complete, the concept seems to have the power to initiate an exploration of the design in a new way. Conceptual design contains many such episodes: some develop in parallel, others in a single flow.

The extract above provides an example of this in the teacher's retrospective description of the emergence of her design concept. That episode became a fairly flexible and ongoing process, where the teacher conferred with the student about the details of the original concept and therefore modified her own concept. The episode appeared to seamlessly envelop concepts from different persons as well as the same person's concepts from different points in time.

The phenomenon of having a design concept sits at the heart of design. Designers live this phenomenon across a wide range of design domains, regardless of the subject matters of design, designers' specialties, or the complexity and contexts of projects. However, this phenomenon is not as clearly defined as it appears to be when used in both design research and practice; understanding of its structure is limited because the core notion, design concept, remains ambiguous. This notion of design concept is often taken for granted, implicitly interpreted, ambiguously delimited, and intuitively used by researchers and designers. My pilot study on the phenomenon of having a design concept (see § 2.1) indicates that there are overwhelmingly diverse understandings about the idea of a design concept. Deeply entangled with notions such as *conceptual design*, *idea generation*, *creativity*, *intuition*, and *conceptualization*, design concept exhibits many characteristics across definitions in the literature, designers' reflections, and its descriptions as practiced.

This problematic situation indicates that further thought is needed concerning the nature of a design concept. The scope is broad and blurred. The inability to specifically identify what design concept is results in a number of further questions: *How can the process by which the concept is obtained and developed be described? What does the phenomenon of having a design concept mean to designers? How can the insights of the active concepts be elaborated?* Within an educational context, the ambiguity of design concept impedes design students' integrative thinking and knowledge acquisition. Predicaments

in conceptual design, such as finding a way to embody a good idea, frequently bother students and their teachers.

More important than providing a univocal definition, is developing an understanding of why those features of design concept co-exist in design, which is a matter of perspectives. Different perspectives to approach the phenomenon of having a design concept can be discerned through the understandings of design concept and the descriptions of the phenomenon that they hold.

Findings from the pilot study indicate a common ground among the dominant perspectives: they all look at this phenomenon from an external standpoint. Having a design concept is described after the fact of the experience, and is analytically focused on elements of design through a viewer's view. The experience of design ends before description begins, so that the viewer is an objective onlooker of the phenomenon. A tension, however, exists in such general understandings: design concepts are deemed outcomes that are independent from the process where they are derived, and representing the things to be produced, however design concepts are reported to change in a way that is relational, generative, and evolutionary. This suggests that design concepts can grow on their own, as though they are entities that have become detached from designers and from the world. This approach results in a further question: *How are design concepts linked to people who have them, to the process where they develop, and to the things they represent?* Actually, the majority of design research associated with conceptual design is examining such questions.

Conceptions of the notion of design concept that occur from the external perspectives generally share the following characteristics:

- Either as independent representations of things to be produced or as mental constructions, design concepts provide few places to talk about designers themselves: their judgments, feelings, attitudes, influences and gains.
- Oscillation between lower levels and higher levels of abstraction and micro views and macro views is a feature of *generative abstractions* (abstraction that can develop on their own).
- Design concept tends to be used in a dual sense, as both general and unique.

As a result of these external perspectives, having a design concept is largely treated as a part of the design process that excludes other aspects of design (such as actors, objects, or contexts), or is reduced to a creative moment that links stimuli to the designer and the concept. The ambiguous understandings of design concepts and the phenomenon as rooted in external perspectives have become part of traditions in design and are seldom reflected on, to the extent that they cannot be revealed from within the same external standpoint. For this reason, an alternative perspective is needed: one that can more coherently approach this phenomenon and account for the relational and active features of design concept.

My observation in this study that designers usually have few difficulties describing the design concept of a real project or outlining how this occurred may serve as a way of identifying this perspective. Conceptions from external perspectives are not consistent with the term design concept or with the phenomenon as described in practice. Design practice moves in an implicit way, which is a more open phenomenon than it is represented as in the literature. Drawing on insights from my field study (discussed in § 2.1) and the emerging design research on experiential knowledge (see § 2.1.2.1), I suggest that the phenomenon of having a design concept should be examined from an internal perspective. First and foremost, having a design concept is a kind of experience that is lived by designers. The internal perspective approaches the designer's experience during construction, using the designer's own view. As a holistic view, this captures many aspects of the phenomenon of having a design concept that have been ignored by the external perspectives.

The internal perspective is usually hidden by dominant (but ambiguous) understandings of design concept. Experience arguably provides a vantage point to understand the phenomenon of having a design concept within a more coherent picture. The internal perspective on this is not given, however, and its relevance must be established through an examination of the phenomenon that occurs within. Therefore, examination of this internal perspective requires an exploration the underlying structure of the experience of having a design concept. If this perspective is relevant in the context

of this experience, it should be able to address the tensions created by understanding design concepts using external perspectives.

1.3 Overview

1.3.1 Problem

In terms of experience, it is generally acknowledged that people know more than they can tell (see Polanyi, [1958] 1998). The main challenge to any exploration of the underlying structure of the experience under question comes from this statement.

Aside from the tacit dimension of knowing (e.g. how to ride a bicycle or how to swim), which cannot be completely externalized (see Polanyi, [1958] 1998; Rust, 2004), people can (and do) describe their experiences to a certain degree. This is also the case with designers in practice. For example, designers talk about their design experiences, including that of having a concept, they make sense of their concepts and designing, and some significant moments are traced back by designers in retrospect to instantiate the sense of knowing ("Aha!" or "That's it!") that they achieved at that time. The knowledge that designers have about the experience of having a design concept is reflected in their discrete descriptions in or about practice, which are situated in their spontaneous internal perspectives. The way of articulation, however, usually confines what is known to little more than an acknowledgement that designers know how to practice. Experience therefore plays an important role in complementing what words cannot reach, or have not reached. The underlying structure of the experience of having a design concept remains obscured behind designers' first-hand accounts of the phenomenon as practiced.

Although this acknowledges that designers do know more than they can tell, it also implies some things that designers do not know. Based on my personal experience, the following situations are particularly relevant to novice designers: they do not know what a design concept means to them when they talk about the concept; they do not know why it is so difficult to delimit the boundary of design concept; they do not know

how to describe the implicitly recognized dynamic form of having a concept; they can describe little about the experience that they are dwelling in; they do not know why they appear to have achieved a sense of knowing when the concept first emerges and is rather fuzzy and why they establish a peculiar attachment to the moment of occurrence; they do not know how their ongoing experience affects the activities and concepts, let alone how to articulate these impacts; and they may have problems with linking their personal decisions and new understandings to the formation of a design concept. Design teachers also often find it difficult to articulate the phenomenon of having a design concept to clarify students' confusion. Therefore, situated in real world practice, the idea that designers know more than they can tell functions more like an excuse to hide a lack of knowledge about how to construct a way to enable designers to articulate more about the known and thus to know more.

At the design research front, emerging approaches to design experience from internal perspectives do not provide any basis to explore the underlying structure due to several reasons (see § 2.3.2):

- the main focus of current research on design experience is on providing rich and thick descriptions of individual cases;
- particular aspects of a design experience (such as designers' sensory experience) are more focused than the whole, so that the findings are yet to be integrated into the development of design;
- the findings of the body of design research tend to be idiosyncratic descriptions that reveal limited insights on the dimensions of a meaningful design experience that can be used to understand other experiences; and
- the identification of the structure of design experience has received little attention.

Therefore, a practical problem arises: that designers know more than they can tell, but they need to tell more. That is, while designers and design researchers are currently wrestling with the theme of experience that has been suppressed for long by external perspectives, there is an increasing need to articulate design experience. The articulation of a design experience is arguably not a designer's primary task, as the capability to create a meaningful experience by virtue of tangible or intangible products is the core of design expertise. However, this is a timely call for, at least, the following reasons:

- Considering the transition of design from crafts toward a discipline, explicating the design phenomena meets the demands for communication from within design as well as meeting the needs of cross-disciplinary collaboration.
- Understanding of the design experience makes the process more transparent, and articulating informed decision-making serves to advance understanding of this discipline.
- Due to the rapid explosion of the scope of the objects of design (from physical artifacts to services and systems) the designer's experience is playing an increasingly important role in practice in the changing context of design.
- For design education, the articulation of the experience-based process where a design is originated, developed, and becomes mature is indispensible for knowledge transmission.

The overall logic of the present study is straightforward: since an experience of having a design concept contains more than what has been articulated, and the articulation of it is helpful for advancing practice, it is valuable to explore how these kind of experiences can be more coherently described.

1.3.2. Premise I

This study is situated under the premise that any meaningful design experience is a dynamic and unified whole, which is based on Dewey's (1934/1980) conception of an experience. It teases out two questions that require further consideration:

(1) If an experience is a unified whole, what are the constituent parts of the whole, and what are the relations that hold the parts together?
(2) Can the identified underlying structure of the experience of having a design concept account for how dynamic this experience is?

The first question is concerned with the dimensions of the experiences that are being studied. In order to describe an experience that is a unified whole, it is necessary to make distinctions (that is, to identify dimensions). However, identifying the relations that unite the distinctions is equally important, because an experience as a whole is more than the sum of its parts. The basic dimensions include elements in relation, rather than elements as independent entities. The second question implies various relations that are rich in change (such as the temporal outcome and the ongoing experience).

These two fundamental characteristics give rise to criteria for a pertinent conception of the experience under examination, i.e. it should be able to provide new understanding regarding such an experience with features that are unified and dynamic.

1.3.3 Premise II

This study is grounded in the understanding that it is possible to understand another person's experience (to a certain extent), even though experience is highly individual. This stance is supported by the phenomenological perspective and by Dewey's (1934/1980) conception of experience (for detailed discussion see § 3.1).

Firstly, phenomenologially speaking, the conception of *intentionality* (denoting the relationship between a person's consciousness and the world) allows the public realm of experience to be examined. This conception rejects the egocentric predicament[1] that is rooted in the Cartesian doctrine, and embraces the mind that is intrinsically public rather than "a ghost in a machine" (See Langdridge, 2007). Furthermore, the concept of *intersubjectivity* (the relationship between people, so to speak) suggests a fundamentally shared relationship, in which people perceive the world they inhabit. These philosophical insights about the nature of experience lay down the foundation for this study, and have a significant impact on my choice of research methodology.

Secondly, to understand and to describe an experience of others, one has to undergo an experience that is the reconstruction of that experience. This approach is based on Dewey's (1934/1980) conception of experience:

> For to perceive, a beholder must create his own experience. And his creation must include relations comparable to those which the original producer underwent (p. 54).

In order to understand various designers' experiences of having a concept, I, as the researcher, have gone through their design episodes again and again, within my

[1] The doctrine from the Cartesian and Lockean traditions insists on the separation of subject and object and that of the mind and the body. In that instance, people are caught by an egocentric predicament, wherein they are unable to relate their consciousness to the world *outside*. (See Sokolowski, 2000, p.9.)

experience of having these design concepts. As a result of this resonance or of forming a different opinion, I am better able to understand participants' experiences (as I understand my own experiences). This approach serves as a means to enter into the others' experience, because the experiences share an underlying structure.

1.3.4 Hypothesis

The underlying structure of an experience of having a design concept that is derived from the internal perspective will coherently integrate design aspects in terms of rich relations that are overlooked by external perspectives. The structure will be able to account for the dynamic and unified features of such an experience in a way that is different to the conceptions of external perspectives. The structure will therefore provide a new understanding of the notion of design concept.

Dominant external perspectives approach design analytically, by focusing on conceptualizing elements and imposing additional relations on the elements, in order to build up various design models. However, design is immersed in experience, which is full of relations. These relations cannot be captured, unless from a perspective whose relevance is established through the experience that it looks into. Hence, the underlying structure of the examined experience is not only a conception of the experience; it also actively engages the inquirer in an internal perspective. It points out a distinct entrance to understanding the experience. From such an active perspective, the structure attends to relations and change of relations that are interrupted by external perspectives.

1.3.5 Subject Matter, Objective, and Methodology

The hypothesis that the underlying structure more coherently describes the experience is both situated in and examined during an educational context of design. I explore an internal designer perspective, in order to approach this evolutionary experience of having a design concept characterized by a dynamic and unified whole. In

this study, these kind of experiences are significant design episodes that begin in *wonder* and arrive at a coherent statement (a design concept or meaning) that absorbs the initial wonder into the newly formulated whole. Wonder presents surprisingly related things, in contrast with the insignificant rest, to the designer. Wonder also signals the beginning of the examined experience that can be traced back to it. The end of the experience is temporal and may evolve, depending on personal and temporal dimensions. Nevertheless, for each temporally recognized end, the derived design concept or meanings are relatively mature and coherent and not only account for the initial surprise and describe what has been formulated, but can also suggest further actions.

This study aims to identify the underlying structure of the experience of having a design concept, upon which a framework can be developed to facilitate the understanding of design experience and the articulation of meanings in a more coherent manner for the purpose of communication.

Drawing on phenomenological insights, I develop a research methodology that balances generalization and interpretation by attending to the experience hermeneutically; engaging the researcher in understanding and interpreting the examined design experiences. This approach is influenced by interpretative phenomenology and blends interpretation with description (identifying the basic structure) based on the fundamental spirit of phenomenology: *intentionality* and *intersubjectivity* (see § 3.1.1). The researcher's interpretation is instrumentally used in collecting and analyzing the experiences of having a design concept (see § 3.3.3). The interviews of 27 design teachers and 16 students from 12 industrial design programs, and observations of 12 projects from 7 design schools from Mainland China and Hong Kong are conducted with this approach.

Based on analysis of design teacher interviews, student interviews and observations of design projects in an education context, two correlated frameworks were identified: (1) the underlying structure of having a design concept, including the materials that the experience is made of, wonder, and facets of the dynamic and unified form; and (2) a flexible framework consisting of various themes, which can be used to describe the

meanings that are obtained through the experience. The underlying structure functions as a lens through which the framework of meanings is derived. The former assists with understanding the general characteristics of the phenomenon and embodies the internal perspective (which is enormously different from external perspectives). Meanwhile, the former allied with the latter facilitates the development of descriptions and meanings for individual cases in a productive manner. Use of these frameworks will open up communication possibilities, as designers begin to understand that they have to take the implicit into consideration and explicate this, as much as they can, to others.

1.3.6 Understanding Design Concept and Meaning

As the inquiry into the underlying structure of the examined experience develops, I argue that designers use the term design concept to make sense of their activities in a way that is distanced from their implicit experience (which they find is difficult to reveal). Thus, *meaning* is the alternative name for design concept from the internal perspective. Design concepts and meanings address the same thing—the achievements of design practice—but from external and internal perspectives (respectively) regarding experience. Both notions converge in the context of experience and merit new understandings. Meaning will be defined in § 5.1, and the new understanding about the notion of design concept will be summarized in § 5.5.4.

To pay respect to the generally adopted vocabulary, the term design concept will continue to be used to name the phenomenon under question in this research. However, readers may understand that design concept refers to meaning for the discussions are set in the landscape of experience.

1.3.7 Research Questions:

Primarily, four questions have guided this study:

(1) What makes general conceptions of the phenomenon of having a design concept and descriptions of the phenomenon as practiced result in ambiguous, different, and inconsistent understandings about the notion of design concept?
(2) What is a design concept in the context of an experience?
(3) What is the underlying structure of designers' experiences of having a concept?
(4) How can meanings made in an experience be more coherently articulated based on the underlying structure of the experience?

The first question steers the entire study through the current approaches to describe the phenomenon of having a design concept, and leads the focus on the internal perspective in terms of experience. The second question further clarifies the confusions and ambiguities of the key notion of a design concept that is rooted in the external perspective but permeates through any understanding of experience. This question draws attention to the convergence of a design concept and meaning as designers' means of making sense of the achievements in the design phenomenon, and it also directs attention to the features of design experience as dynamic and unified. The third question calls for the development a framework of having a design concept through an approach inspired by phenomenology. The fourth question addresses the implications of this framework and elicits a derived framework of meaning making. The two frameworks will be demonstrated by their application to two selected design cases. These research questions allow the research problem to be addressed in an evolving manner.

The above sections give an overview of this study. Since the field study was conducted in China, a brief account of the aspects of Chinese design education that have had an impact on the study are included below.

1.3.8 The Context of Design Education in China

Design education, including theory and practice, is relatively young in China, in comparison to developed countries. China's tradition of art and craft, with its distinct aesthetics and philosophies, is not immediately compatible with the appreciation of the values and methodologies of design that have been imported from the west, although the latter has received increasing attention during the last decade in China. Design in

China faces great opportunities to emerge as a discipline, with an emerging body of design research and needs of local industry to transform production approaches from those of original equipment manufacturer (OEM) to higher levels of economic form (see Li et al., 2000; Li, 2007; Zhou, 2002; He, 2002; Liu, 2006; He, 2007; Heskett & Liu, 2009). Professor He Ren Ke (Chair of China National Instructive Committee of Industrial Design Education) identified that Chinese design education has undergone dramatic changes, embracing both chances and challenges, especially within the past five years (personal communication, 2010).

The leading design schools in China (Hunan University, Tsinghua University, Jiangnan University, and Tongji University, to name a few) are gradually influencing the fellow schools in Mainland China in terms of design education and research[2]. In addition, the school of design from the Hong Kong Polytechnic University has become a distinct and active design hub that potentially bridges the east and the west, building connections between a wide number of design schools in Mainland China with its international resources. With the growth of a new generation of design teachers who have open-minded visions, quality practices, and substantial research backgrounds, design education in China is trying to merge into the international design communities and has begun to have a voice on a variety of profound theoretical and practical issues that are tackled by research communities worldwide.

This international collaboration cultivates the development of Chinese design education also. Some Chinese design schools are actively engaged in empirical practices, attempting to introduce to design education the cutting-edge theoretical perspectives including domains like sustainability, social innovation, interaction, and experience design. The appreciation of more holistic understandings of the nature and the evolving context of design has just begun to emerge. For example, the design for social innovation and sustainability (DESIS) China network[3], founded by six pioneering design schools in China, connects the local resources and needs with researchers and

[2] For example, the Redesign Design Education Conference was hosted by Jiangnan University (Wuxi, China) in May 2012, to focus on the themes of scope, methods, and principles in design education.
[3] See http://www.desis-network.org/?q=node/279

designers worldwide. Collaborations of this kind calls for the growth of rigorous design research . The present study is among the first group of studies undertaken by design researchers who are grounded in contextual practices in Chinese design schools.

Situated in such a context, industrial design education (when compared with architecture, visual communication design, and environment design) is actively transforming from a conventional object-centered and form-giving approach, toward an approach that is able to take into account of a much broader scope of subject matter of design. The supporting methodologies, process, and tools are expanding, and the changes to industrial design programs (from curricula to the conducting of individual projects), are significant. Division and integration are occurring simultaneously. Many design schools establish new programs that are detached from the conventional industrial design programs, to serve the needs of industries. For example, the School of Design in Hunan University adopts a modular curriculum layout that integrates interaction design, visual communication design, product design, and transportation design: these share a common foundation that is largely inherited from traditional industrial design education. Even within a typical industrial design program, projects of service design and system design have been introduced to students. Due to its cross-disciplinary nature, industrial design is one of the most active areas in Chinese design education and calls for advancing knowledge and approaches to cultivate competent designers. This cross-disciplinary feature characterizes the current industrial design education in terms of the objects of design and the forms of practice. The fusion and expansion that is occurring across different industrial design programs mirrors the changing scope in design as a discipline.

Although my previous focus stems from industrial design education, an understanding of the ongoing changes in this area has allowed me to move my gaze beyond (but also including) the conventional tangible product-based design. Although, for this study, I have collected data that is primarily associated with industrial design programs in China, the actual projects are diverse in terms of the scope of design and

the background of participants, and therefore are also diverse in terms of the content of experiences of having a design concept.

1.4 Outline of the Study

The research layout has emerged through this inquiry and is mirrored in the structure of the thesis, see Figure 1.1.

Chapter 2 begins the inquiry by laying out the context of this study: that internal perspectives to approach the phenomenon of having a design concept are hidden by inconsistent and ambiguous understandings of the term design concept, and that dominant external perspectives to the phenomenon fail to coherently accommodate the features of design concepts that are described in practice. I argue that exploration of the underlying structure of having a design concept from inside the designer's experience of this will provide a more coherent basis to describe this phenomenon and to understand a design concept. However, a problem exists at the heart of describing experience: that designers know more than they can tell but they need to tell more. I engage with this, exploring the potential criteria for the underlying structure in question that it should be able to account for the experience as a unified and dynamic whole in a way different from conceptions from external perspectives.

Chapter 3 explores a methodology that is inspired by the spirit of phenomenology, to approach, deal with, analyze, and interpret designers' experiences of having a design concept. Although experience is highly individual, there is a public realm of experience that can be understood. I adopt an approach that balances generalization and interpretation: this attends to the experience hermeneutically and engages the researcher in understanding and interpreting the examined design experiences.

Chapter 4 identifies the underlying structure of experience: including the ingredients from which the experience is made, the basic process, and relational facets of the experience as a dynamic and unified whole. This underlying structure is a conception of the experience from an internal perspective, and provides a framework for

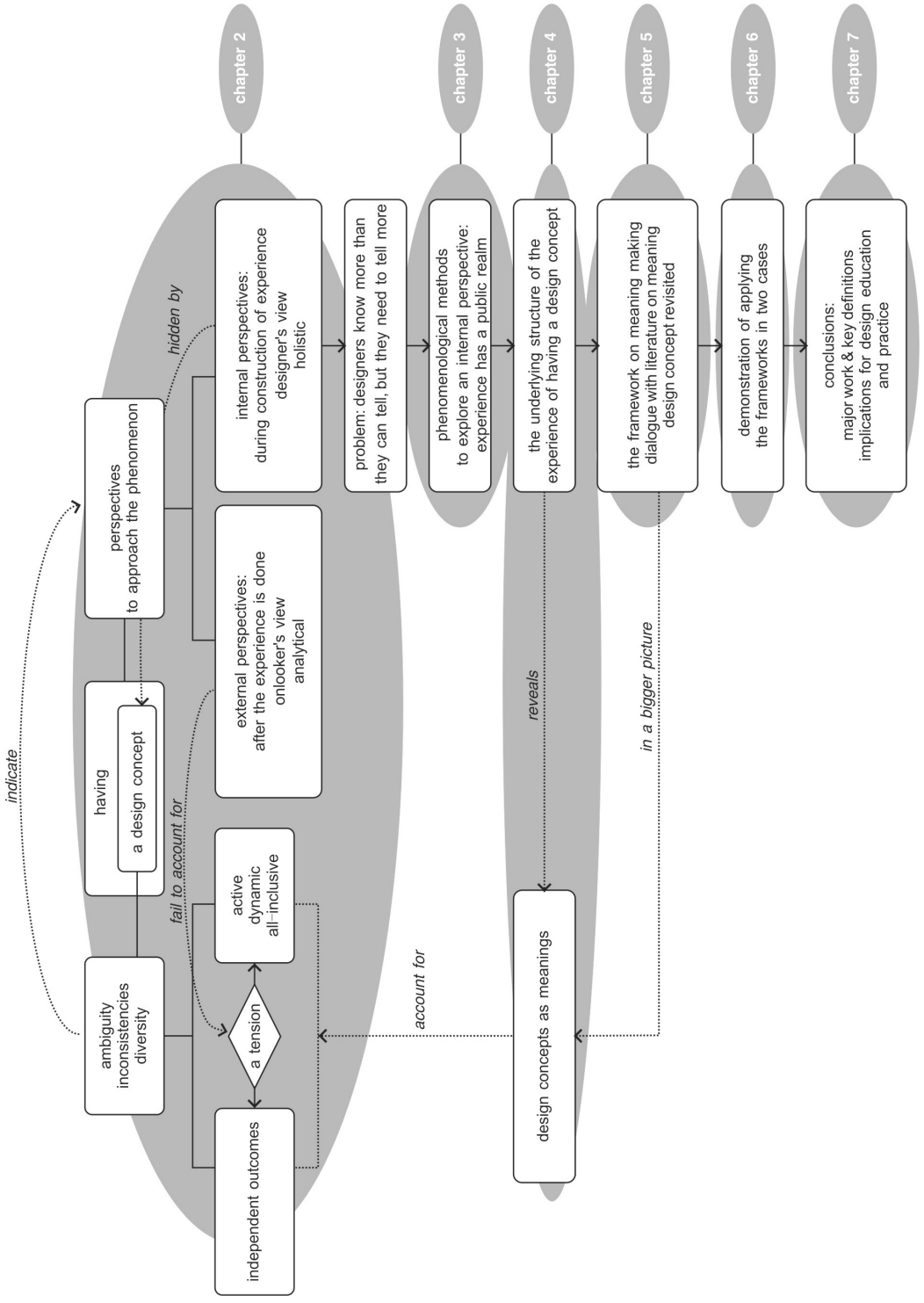


Figure 1.1. The outline of this study

approaching the experience. This framework indicates that such an experience begins in wonder, which presents surprisingly related things in juxtaposition to the designer. Juxtaposition reveals two possible relations: *and* and *but*, which respectively lead the concept to a solution or a problem through four phases: *connecting*, *extending*, *reformulating*, and *saturating*. *New wonder* may occur to the designer, and this will sensitize a new experience that affirms, modifies, or breaks through the achievements in the earlier experience, especially in the reformulating phase. New wonder signals the moving revelation where previously hidden things are presented and pre-understandings are recognized as indicating new understandings. The underlying structure is comprised of relations in and between several facets: uniting the *vertical conceptualization* with things revealed in the *horizontal experience*; a reflective dance between transcending the main experience and reformulating it using insights from new ideas; the interchangeable state of problem and solution and their mutual reformulation; and the designer's personal engagement in having a design concept that describes and interprets the experience.

These findings reveal that designers adopt the term design concept to make sense of their activities, distanced from their implicit experience that is difficult to reveal. Meaning is the alternative name of design concept from the internal perspective.

Chapter 5 proposes a definition of meaning for this study. I further introduce a flexible framework consisting of several themes (process, product, principles, experiential qualities, and natural attitudes) to describe meanings obtained through the experience. The relationship between the two frameworks is introduced: the underlying structure is identified as functioning as a lens through which the framework of meanings is derived. I conduct a dialogue between the conception of meaning in this study and meaning defined in various schools of thought in different contexts to consolidate the perspective toward the experience underlined in this study. Also, the tension in the notion of design concept is revisited and resolved in the context of the internal perspective that has been established in this inquiry. Several major natural attitudes in design that reside in the external perspectives are summarized in this chapter, in order to show why the

conception of having a design concept obtained from the internal perspective provides a more coherent basis to approach this phenomenon.

Chapter 6 uses the two frameworks to describe the experiences under examination in two selected cases, as a demonstration to show how the theoretical findings can be applied to understanding design practice.

Chapter 7 concludes the study by highlighting the theoretical findings and definitions on key notions, summarizing the overall inquiry, clarifying the implications of this inquiry for design education and design practice, and discussing the limitations of this study and possibilities for future research.

1.5 Reading Paths

This thesis presents an inquiry that is inspired by the spirit of phenomenology. Although phenomenology as a philosophy has been applied for some time in domains such as psychology, its use in the context of design is only recent. Many important concepts that have different meanings in everyday use (e.g. *intentionality*, *moment*, and *presentation*) permeate throughout the research methodology and main findings. They need to be sufficiently elucidated to support the understanding of the theoretical discussions on the frameworks established in this study. Therefore, this thesis will invite readers into intensive theoretical discussions from the very beginning. When the frameworks are completed, a dialogue with the relevant literature is conducted because this is an option of phenomenological research that can be used to better clarify the findings proposed in a particular study. The subsequent discussion on the key notion of meaning thus leads to a closing response to the notion of design concept from where the study originated. Demonstration of using the frameworks to describe designing in the context of two specific cases invites readers to digest the theoretical findings by returning to practice.

Different readers may find one of the following reading paths useful when going through this thesis, depending on their personal interest:

- For general readers I recommend Chapter 1and the conclusions;
- For design educators, § 1.1, § 1.2, § 1.3, Chapter 4, § 5.1, § 5.2, § 5.5, Chapter 6, and the conclusions might be of interest;
- For designers or researchers who are interested in understanding conceptual design, Chapter 1, Chapter 2, § 4.3.4, § 5.1, § 5.3, § 5.4, § 7.3 contain a complete context of this inquiry regarding the relationship of design concept and meaning;
- For people who are interested in understanding design from a phenomenological perspective, Chapter 3, Chapter 4, § 5.1, and § 5.2 will be useful;
- For people interested in examples about how much can be known from design experiences, Chapter 6 (the two cases) will provide a glimpse of this.

It is my hope that the entire thesis will be of interest to those who study design experience, and that it will invite further valuable contemplations and approaches to explicate implicit parts of design, for we share a common appreciation of the nature and the potential of design.

> It is we who do it: we act. The role of observer-as-participant, in making knowledge, abstracting it to theory, theorizing about theory; and in constructing the way we obtain this knowledge, then obtaining it accordingly, is central/essential/unavoidable/inevitable and completely desirable. Without the active participation of this actor, there would be nothing that we would know.
> Ranulph Glanville, *Researching Design and Designing Research*, p. 89.

Chapter 2. Design Concept and Experience

Designers live a variety of design phenomena, and having a design concept is central to these. Design research (covering areas such as design methodology, creativity, and design knowledge and expertise) examines *conceptual design*: an early stage of design that is rich in the fundamental phenomenon of having a design concept. However, the important questions of what a design concept is and what having a design concept means to designers are rarely asked; studies generally accept that having a design concept requires a process and arrives at something that can then be further realized in the form of concrete presentations of the to-be-produced.

Although design concepts are usually taken for granted, ambiguously delimited, and interpreted implicitly, the term design concept shows inconsistent characteristics across its various definitions in a number of areas: in literature, in designers' reflections, and in descriptions as practiced. The different ways that design concepts are used within these three areas are all deeply entangled with how the phenomenon of having a design concept is described. Thus grounded in shifting sand, descriptions of this phenomenon are diverse. Currently, investigations into design concept and its emergence lag behind the studies that are grounded in them. Although researchers and designers agree that design concepts do exist in designing (see § 2.1.1), there remains a need to establish the ground on which something can be delimited as a concept. Similarly, if all the characteristics—albeit inconsistent with each other—are faithful to the nature of design concept, the question remains as to how they can be coherently accounted for: in other words, *what do design concepts hide from researchers and designers?* Based on this question,

a pilot study on design concepts and the phenomenon of having a design concept sets up the context of this study.

2.1 What Do Design Concepts Hide from Us?

Designers often talk about their concepts when they discuss or present their works. Design concepts can therefore seem to be concrete objects that designers immediately deal with: by conceiving, presenting, developing, and refining them. Essentially, a designer's task is to generate innovative and valuable design concepts, such that the concepts can be implemented and realized in order to "change existing situations into preferred ones" (Simon, 1996, p.129). The term design concept seems to facilitate the ability of designers to synthesize, which is extremely important in the complex and fluid early stages. Cross (1997) reported that a design concept provides a pivotal point in the design process. Processes and methods are frequently examined based on evaluations of design concepts as outputs. Although design concept is one of the basic concepts in design, it is rarely reflected-on in practice or research. Rather, research focusing on the rich dimensions of the process where a concept is derived overrides research into understanding of the notion of design concept.

Close examination of the term design concept, however, may easily result in a chaotic map, as the term exhibits as much diversity in practice as it does in research. A design concept seems to dissolve into every possible form of presentation (ranging between verbal, visual, and physical) and contents (varying from processes to the substantial features of the potential product that capture the designer's attention at any particular moment).

2.1.1 The Ambiguous Notion of Design Concept

In this section, design concepts are examined in terms of how they are described, delimited, developed, and communicated, both in literature and by design teachers and students.

2.1.1.1 Design Concepts as Described in Literature

The term *concept* (Lawson, 1990) has a collection of alternative names in literature, such as "image" (Alexander, 1979), "solution principle" (Pahl & Beitz, 1988), "primary generator" (Darke, 1990), "organising principle" (Rowe, 1990), "an abstract form of ideation related to the design task" (Lai et al., 2006; Goldschmidt & Tatsa, 2005), or simply, "idea." Definitions of design concept vary, and can include: isometric or perspective sketches (in mechanical design; Liu et al., 2003), intellectual constructs and a form of ideational structure (Oxman, 2004), and designers' internal mental image (see, for example Kazmierczak, 2003; Dorta et al., 2008; Terzidis, 2007).

In object-oriented research, design concepts are characterized as having hierarchical structures (levels of abstraction; see Gero, 1990; Jones, 2001), whereas in process-oriented studies they are deemed to be nonhierarchical mind maps (e.g. Kokotovich, 2008). In classic creativity research, design concepts are regarded as static and mature outcomes that are creative in terms the network of links they create among themselves (e.g. Goldschmidt & Tatsa, 2005; Lai & Chang, 2006). In vivid contrast, they appear to possess a "restless nature" (Dong, 2007) when relations such as the human cognitive process are taken in consideration. A design concept is therefore identified either as an abstract order that organizes the different components of design into a coherent and meaningful whole (Heylighen et al., 1999), or as the basic element (the whole) that envelops the abstract and concrete components of relevant knowledge (Uluoğlu, 2000). In a general sense, design concept is loosely used as a collective name for the *components* or *notions* that are tackled in the process: including design problem, abstract concepts and concrete examples (Lai and Chang, 2006), or function, behavior, and structure (Gero, 1990).

Notwithstanding these heterogeneous terminologies, definitions, and features, many researchers have reported that design concepts contain relational networks (e.g. Heylighen et al., 1999; Oxman, 2004; Goldsmith, 2005). Besides this, a small group of researchers have suggested that design concept is also related to the subjective/ individual aspects of design as well as to the objective/universal aspects (see Uluoğlu, 2000; Ziv-Av & Reich, 2005).

Obviously, these definitions are "too broad, too narrow, inappropriate, ambiguous, multiple, inconsistent, and different in different areas of study or practice" (Love, 2002, pp. 354–355).

2.1.1.2 Design Concepts as Described by Designers

Asking designers "what is a design concept?" is like asking them to define what design is. In my field study they hesitated and contemplated. However, rich comments on its features (for example, expression of the difficulties in delimiting design concept due to its active role at different moments of practice) implicitly permeate designers' reflections on, and their retrospective accounts of, individual cases. In practice, a diverse and broad range of understandings, mixed with inconsistencies and ambiguity, can be identified.

Many of the design teachers and students who were interviewed for the present study tried to define a design concept as an idea, an identified problem, or a solution. Between problem and solution there is a fluid space: *opportunity*, which is also used to account for what a design concept is. Moreover, design concepts were referred to, in a broad sense, as boundary conditions, design directions, positioning, criteria, goals, needs, or design briefs. When asked about content, the teachers and students who were interviewed provided descriptions of design concepts that enveloped all possible subject matters of design. This mirrors another interesting phenomenon wherein design concepts are often talked about in the form of keywords. However, the generated conceptual keywords differ greatly in nature, ranging from nouns, verbs, to adjectives.

Among the all-inclusive definitions of design concepts that exist in practice, some understandings can be associated with specific major themes in design research:

(i) *Expanding scope.* The all-inclusive tendency in descriptions about design concepts indicates the expanding scope of design. Design has moved beyond artifact-centered practices toward the shaping of more complex and integral systems, including interacting people and environments. For example: "Design concepts aim at modifying people's relations through concrete objects created by design" (Field notes: 240308).

(ii) *Increasing attention to methodology.* Teachers who criticized intuition-based design emphasized that design concepts are abstract orders, and that they are "solutions of the solutions to the problems" (Field notes: IN230308). In this sense, the methodological dimension of design concepts is accentuated, and the subject matter of design extends beyond the product itself.

(iii) *Macro and micro views, or levels of abstraction.* For example: "The macro level focuses on people and utility; the micro level back to the artifacts themselves in terms of form, aesthetics, surfaces, features, technology, mechanism, materials. The macro level is more likely to be a job of designers, the micro engineers" (Field notes: IN240308).

(iv) *Creativity and innovation.* Unsurprisingly, emphasis on novelty repeatedly occurred during the interviews. For example: "A design concept is something new within a design. A design concept can stem from technology, from users. It can be anything. But it has to be new" (Field notes: IN160408).

(v) *Compartmentalization.* Differentiation between the levels of abstraction and macro/micro views reflects an implicit—but dominant—tradition in design, namely, compartmentalization in the form of conceptualization. In this study, teachers who paid close attention to design methodology tended to privilege the macro and the abstract ends to a greater extent than their counterparts. They pointed to the danger that focusing on the micro and concrete ends may lead to a form-giving or artifacts-centered approach, which restricts design thinking into a rather narrow sense. However, this approach is challenged by a familiar design impasse where the student finds: "The most

difficult thing is how to present a design concept with a proper language when you've got a good idea"(Field notes: 090409). Abstract design thinking is therefore separated from the concrete making in design.

(vi) *Evolutionary feature*. Some teachers claimed that "design concepts emerge when research is over and evolve in the rest of design process" (Field notes: IN200308). This viewpoint indicates a separation of design from research, which is a prevailing attitude in the rational technological paradigm. Other teachers, who also mentioned the temporal dimension, confidently acknowledged that design concepts are inseparable from the process, but hesitated to articulate the start and end points. In their view, design concepts are the current state of an ongoing knowing: some are ephemeral while others last for considerable durations. For example: "Design concepts are continuously developing. Therefore recognition of concepts is also developing. To articulate which is a design concept is difficult indeed… Every design concept is forced to a stop. If you don't stop it, it may continue forever" (Field notes: IN210308).

2.1.2 The Phenomenon of Having a Design Concept

Ways of using design concepts intertwine with notions such as conceptual design, idea generation, conceptualization, and abstraction. Therefore, ambiguity permeates throughout descriptions of the phenomenon of having a design concept. Conceptual design is an umbrella name for the initial stages of design that consist of generating ideas for a conceptual solution to the design problem (e.g. Chakrabarti & Bligh, 2001; Tseng, et al., 2008). Conceptual design, or the conceptual phase of design, is generally referred to as "the most vibrant, dynamic and creative stage of the overall design process" (Macmillan et al., 2001, p. 169). Having a design concept is often regarded as the heart of conceptual design, and is strongly associated with creativity and intuition.

To better understand the notion of design concept, the pilot study was extended to explore how the phenomenon of having a design concept was described. After reviewing the literature, a field study was conducted in the form of interviews with 26

experienced design teachers and 14 students from 10 design schools in Mainland China and the observation of two design tutorials. The majority of the literature related to this phenomenon is based on design methodology studies that are devoted to description and prescription of conceptual design. The review of this body of design research suggests that the process of describing design has inherited approaches and concepts from various disciplines and traditions, all of which have various agendas that have been adapted for use in the context of design.

A map of this area is outlined below. Descriptions of the phenomenon by designers are then instantiated to enrich the understanding and context of design as it is used in the present research.

2.1.2.1 Descriptions in Research

Theoretical Models

In addition to the ambiguity associated with the term design concept, there is also a lack of consistent agreement on the naming and delimiting of conceptual design[1] (see Ma et al., 2009; Ma & Xin, 2010). Within the extensive body of literature, having a design concept is frequently termed, interchangeably, as *ideation*, *concept generation/ development*, or, *generating 'whatever-name-for-a-concept'* in the context of conceptual design. It is often decomposed as one of the subordinate processes of conceptual design. For example, Macamillan et al.'s (2002) comparison of some conceptual design models indicates that the equivalent stages of concept generation can be respectively described as: establishing inputs and modes of action and establishing classes of function carriers (Hubka, 1982); searching for solution principles (Pahl & Beitz, 1988); generating alternatives (Cross, 1989); locating boundaries, describing sub-solutions, and identifying conflicts (Jones, 1992). Put in another way, having a design concept is seen as a segment

[1] For example, although the term conceptual design is generally referred to the early stage(s) of design, it can also denote a special category of design that is "not intended to be mass-produced but rather, to circulate through exhibitions or publications" (Erlhoff & Marshall, 2008, p. 72). In that case, conceptual design is the output of a process. The present study takes the former (more popular) interpretation of this term.

located somewhere at the "fuzzy front end" (Cagan & Vogel, 2002, p. 3) of the overall design process.

In order to lay down the knowledge foundation of the emerging discipline, many design studies attempt to overcome the lack of a common understanding of the progressing of the activity by developing generic process models for conceptual design. And yet, the design process has been keenly pursued for differing practical purposes. For instance, based on a study on product engineering design, Cross (1989) identified that the design process consists of steps: clarifying objectives, establishing functions, setting requirements, determining characteristics, generating alternatives, evaluating alternatives, and improving details. Cagan and Vogel (2002) were situated in a business context, and proposed the iNPD process, which outlined four phases: opportunity identification, understanding opportunity, conceptualizing opportunity, and realizing opportunity. For educational purposes, Lewis and Bonollo (2002) adapted Hales' (1991) five phases of the design process as: task clarification, concept generation, evaluation and refinement, detailed design of preferred concept, and communication of results.

In most of the process models that have been proposed, little is revealed about how a design concept emerges, and what a design concept is about. Abundant methods and tools are developed for conceptual design, but when conceptual design is decomposed into different activities most of the tools and methods are devoted to activities involving analysis and evaluation. This leaves the essential aspect of concept generation as supported through primarily intuitive means (Ziv-Av & Reich, 2005). Researchers have long observed that the initial design phase is the least understood (see Davies & Talbot, 1987; Shah & Wilson, 1989, p. 171), when compared with the subsequent developmental steps. Vermaas and Dorst (2007) criticized this, and argued that "there is a lack of interest in theories aimed at understanding and explaining the how and why of the observed design activities, and a rush from observation and description to prescriptive modeling and the construction of design tools" (p. 153).

In general, the first generation of design research aims to describe the essence of design across the variation of domains. The overwhelming majority of existing design

research is devoted to the process, and has built formal process models without paying specific attention to integrating other aspects of design (such as the actor, the object, and the context; see Dorst, 2008). This body of research shares the following three features:

- Concepts are seen as entities that are independent from the process that produces it.
- The slippery process of having a design concept is bypassed, as though it is a basic unit of the design process.
- A lack of elaboration on what a design concept means.

Practical Research

Descriptive models of designing have increasingly become sensitive to context, as research problems arise from specific contexts and call for understandings that are glossed over by the formal and context-free models. Therefore, in the pilot study I decided to move further to examine empirical studies within some specific contexts (e.g. education, business, artificial intelligence, and computer-aided design).

However, reflection upon the nature of design concept and frameworks on conceptual design is also largely overlooked in practical studies. If any definition is made, it is usually made to delimit factors to be examined in the particular study. Such definitions talk more about the context than about the content of conceptual design. For example, in order to analyze professional skills in design, Lewis and Bonollo (2002) described the nature of the process of concept generation as: "a set of creative tasks aimed at generating a wide range of concepts as potential solutions to the design problem specified in the brief," with the output from this process "a folio of concept sketches, supported by simple models or mock ups, providing a visual representation of design ideas" (p. 388). Situated in the business context, Ottosson (2001) compared the dynamic concept development conducted by the insiders (a c*oncept group*) with the integrated product development controlled by the outsiders (a *steering group*), to argue that the dynamic process is of significant economic advantage in the early phases of design.

In addition, the development of a predetermined conceptual framework from the literature, which is then used to examine design practices, is a popular approach in many practical studies. For example, Kokotovich (2008) compared the creative problem-solving framework of novice designers with that of expert designers and drew on concept-mapping research from cognitive psychology to develop mind mapping tools to improve novice designers' performance. These studies focus more on assessing and improving concept generation than on defining design concept or describing the phenomenon of having a design concept. A large number of contextualized practical studies have been built upon conceptions and process models that were developed in other more established disciplines and domains. Hence, a better understanding about the context for concepts and ideas can be obtained from taking a closer look at this phenomenon as it is described in several disciplines and domains that have influenced design.

An Engineering Point of View

Engineering is one of the domains where the rational problem-solving paradigm (see Dorst, 1997) is the most influential. Conceptual design is defined, from an engineering point of view, as a synthesis process where "functional requirements of a design problem are transformed into schematic descriptions of design solution concepts" (Chakrabarti & Bligh, 2001, p. 494). Gero (1990) proposed a *Function-Behavior-Structure* model of designing, which was both critically examined and further developed by Vermaas and Dorst (2007) through a redefinition of the notion of *function*. Liu et al. (2003) asserted that the greater the repetition of divergence/convergence (concept generation/evaluation) at different levels of abstraction, the more possible it becomes for the process to be an ideal approach for concept development. However, these ideal models (along with all approaches of conceptual design that aim to support designs of any nature and designing at—and through—any levels of abstraction) have been challenged by other approaches that examine the nature of design process and design problem from the practitioner's point of view. For example, Schön's (1983) paradigm of reflective practice and Rittel and Webber's (1973) discussions on *the wicked problems*

manifest the limitation of these formal process model developed in the context of engineering in describing design practice.

A substantial number of the models that have been used to describe the design process share fundamental relationships with aspects that are dominant in engineering. These include:

- the rational problem solving approach (Simon, 1996; see, also Dorst, 1997);
- the framework of hierarchical levels of abstraction and conceptualization (e.g. Chakrabarti & Bligh, 2001; Macmillan et al., 2001; Jones et al., 2001);
- focus on function without a stable definition of this term (see Vermaas and Dorst, 2007; also see Gero, 1990);
- analytical focus on elements rather than relations (e.g. Dorst, 2008);
- an innate intention to control the process to produce an ideal outcome (e.g. Liu et al., 2003; Ziv-Av & Reich, 2005) .

Creativity Studies

Concepts (or ideas) are closely associated with *creativity*. Research focus in creativity studies falls mainly into one of two directions: (1) concepts as outcomes, or (2) the cognitive process.

In the first category, creativity is defined "in terms of the capacity to produce new or original ideas" (Goldschmidt & Tatsa, 2005, p. 593). Having a design concept in this context is described as "a significant event – the so-called 'creative leap'" (Dorst & Cross, 2001, p. 425). This is often identified as the moment of illumination, intimation, the flash of insight, a bolt out of the blue, or the "Eureka!" moment. Many researchers, (such as Davies and Talbot, 1987) have observed that a promising idea may present itself through an associative process. However, investigation into association is limited, since it has been widely accepted that the process by which designers search for ideas/concepts is free and intuitive. It is, therefore, understandable that an extensive body of work in this area is concerned with developing tools and techniques to promote idea/concept generation: such as brainstorming (Osborn, 1963), lateral thinking (de Bono, 1970, 1992), and synectics (Gordon, 1961). This category of creative research emphasizes investigation into ideas/concepts as static entities, by examining their

structure as *links* and evaluating the quality of those links (e.g., Goldschmidt & Tatsa, 2005; Sarkar & Chacrabarti, 2011).

In the second category, which is supported by computer sciences and linguistics, designers' cognitive aspects have been included in the definition of creativity, in order to probe into the little understood phenomenon of concept generation (mainly in terms of the process of reasoning and decision-making). Instead of viewing creativity as a mystified moment of design, or a state of mind, researchers have attempted to describe the process of the *creative event*, by using various models. Cross (1997), for example, reported a synthesis of descriptive models (which consisted of combination, mutation, analogy, first principles, and emergence) that was established on the basis of Rosenman and Gero (1993). Lawson (1990) proposed a five-stage creative process: first insight, preparation, incubation, illumination, and verification. In parallel, researchers (see Goldschmidt, 1990; van der Lugt, 2005; Goldschmidt & Tatsa, 2005) developed methods such as linkography to capture and measure the links among design moves, or design ideas, or decisions. This latter approach aims at tracing the history of the emergence of the concept and using this to indicate whether it is a quality concept.

Attention to combination theories using similarity, analogy, and association in the creative process leads to a branch that examines the stimuli of idea generation in terms of various media and conditions, such as sketches (van der Logt, 2005), linguistic discourse (Dong, 2007), timing and analogy (Tseng et al., 2008), texts (Goldschmidt & Sever, 2011), and heuristic strategies to "make use of readily accessible information to guide problem-solving" (see Yilmaz & Seifert, 2011, p. 385). However, combination theories have been criticized to the extent that "creativity requires more than the mere automatic mixing of ideas" (Boden, 1990, p. 23).

Nevertheless, in the recent development of creativity research on concepts, researchers have reported that the relational network of the created concepts may not be solely within and among them as the outcomes. Lai and Chang (2006) have maintained that linking is "both the process and the result of idea association and is the key factor for understanding its issues" (p. 686). The awareness of the *out-directedness* of relations

of design concepts also emerges in research that has been influenced by linguistics and cognitive science. By acknowledging language as a part of both the doing and the thing that is done, researchers translate the semantics and grammatical structure of language into the structure of designing. Dong (2007), for example, argued that "language *does* design" (p. 6), through the following: aggregation (blending ideas and concepts), accumulation (scaffolding ideas and concepts), and appraisal (evaluating and assessing ideas and concepts).

In short, under the umbrella concept of creativity, understandings of having a design concept exhibit the following directions:

- The phenomenon is characterized with *association* (e.g. Rosenman & Gero, 1993; Dorst & Cross, 2001; Lai & Chang, 2006).
- A focus on either the stimuli (e.g. van der Logt, 2005; Dong, 2007; Tseng et al., 2008; Goldschmidt & Sever, 2011), or on ideas/concepts as independent outcomes (Goldschmidt & Tatsa, 2005).
- An emerging interest in relations within and between the concepts and process (e.g. van der Lugt, 2003; Goldschmidt & Tatsa, 2005; Lai & Chang, 2006; Dong, 2007).
- A primitive turn to creators' experience of creativity (e.g. Davies & Talbot,1987; Bindeman, 1998).

Knowledge-Based Frameworks

Conceptual design is also examined in terms of design knowledge and expertise. Various models of expertise (e.g. Popovic, 2004; Cross, 2004; Kruger & Cross, 2006; Dorst, 2008) have been developed based on the process of conceptual design, and these identify the levels of expertise at which novice to expert designers perform different ability in terms of problem solving and reflection. For instance, Popovic (2004) described the process of conceptual design in terms of the interaction between general strategic knowledge and domain-specific knowledge.

However, because of the elusive concept of knowledge in the field of design, many expertise models are little different to a description of the object-oriented design process. In these conceptual design models, *knowledge* is broadly used as a name for categories of the object of design (e.g. data, problems, solutions, concepts, and experiences) and

design concepts are limited in definition to—to name a few—one of the basic types of knowledge for problem solving (Mayer, 2010, p. 274); a sort of organizational knowledge that represents "abstract concepts and intuition through synthetic images, metaphors, and models that facilitates the communication of ideas" (Bertola & Teixeira, 2003, p. 184); or as the basic element for the categorization of declarative knowledge that envelopes naming and specifying things and is related to the object and the actor (Uluoğlu, 2007). Unfortunately, due to the even more diverse and ambiguous understandings of knowledge in the context of design, such definitions of design concept offer little clarification if the nature of design knowledge remains implicit (see Ma et al., 2009): using an ambiguous term to define another ambiguous term has been criticized, in design research, as hiding a lack of knowledge (See Frascara, 2007; Love, 2002.)

Also, many theoretical works on design knowledge are based on dichotomized categories (e.g. tacit and explicit; subjective and objective; abstract and concrete; universal and individual; this situation is elaborated further in § 2.3.1). The ontological and epistemological underpinnings of the derived knowledge elements are largely neglected, while the identified elements are used as building blocks for definitions of other notions. As a result, these polarized categories fail to fully describe the rich and dynamic activities involving the relations between the opposites. Actually, the approach of pushing categories into dichotomies overlooks the relational structure that categorization[2] originally emphasizes.

This area of research reveals some of the fundamentally ambiguous aspects of what is known as having a design concept:

- diverse understandings of fundamental notions; and
- dichotomies in categorization.

[2] According to Whitfield (2005), "categorization involves grouping objects together as similar, and distinguishing them from other objects. It further involves being able to identify new objects that we have not seen before, and assigning them to a category… Research into categorization … provided answers in the form of inter- and intra-category structure." He further claimed that "we do not respond to an object per se, but rather to its position within a category structure." (pp, 9-10)

The inconsistencies and ambiguity evidenced in knowledge-based research on the concept, again, disclose how little is known about the relations among the diversity; and yet, a growing area of research, named *experiential knowledge*, directs attention to one aspect that has been missing from other approaches.

An Experiential Turn

In the literature on having a design concept, the voice of the designer—who experiences this phenomenon—is a notable omission. The importance of turning such absence into presence has been noted by many researchers. Dorst and Reymen (2004), for example, stated:

> Learning design doesn't just involve skill acquisition, it also involves the learning of declarative knowledge, and the building up of a set of experiences that can be directly used in new projects. These experiences become a repertoire of earlier solution that can be applied by the design. (p. 4)

Design experiences have been interpreted as a store of *frames* (Schön, 1984), as *types* (e.g. functional types are types are holding environments for contextual knowledge that can be read off them (Schön, 1988)), as *design prototypes* (Gero, 1990), or as *design gambits* (Lawson, 2004). Reckwitz (2002) proposed practice theory as an alternative approach to knowledge that "embraces ways of understanding, knowing how, ways of wanting and of feeling that are linked to each other within a practice" (p. 253).

Design experience, however, did not attract much attention until human experience (more specifically, designers' experience) emerged during the past two decades as another way to understand design. Bindeman (1998) suggested that creativity should be studied as, "a significant and uniquely human experience, which is more than merely problem solving (Poincaré), more than mere self-reflection or verbal theory (Boden)" (p. 76).

There is an emerging body of design research that examines the experiences of designers and the role of this experience in designing and knowledge acquisition. This

new research area is named *experiential knowledge* [3] that denotes the knowledge derived from experience. This body of research dates back to the late 1980s, and is influenced by insights from areas such as the personal dimension of knowledge (Polanyi, 1958/1998, 1966), design as a reflective conversation with the materials of design situation (Schön, 1983), and phenomenology (this will be introduced in § 3.1.1). These conceptions direct attention to design as it is experienced, and they call for a suitable design methodology. However, in comparison with formal models in the rational problem-solving paradigm (especially in engineering), there are currently few formal process models that describe the phenomenon under question. Dorst (1997) observed the difficulty of generalizing design when using Schön's reflective practice paradigm. Such difficulty can be attributed to the limited number of relations of design experience that have been explored.

The focus on experience has led to a strand of research in a new form, which is termed *practice-led research*: the researcher acts as both the designer and researcher, and attempts to externalize implicit understandings achieved in individual design cases (e.g. Pedgley, 2007; Shumack, 2009; see also, Yee, 2009). Drawing on implications from cognitive psychology, philosophy, and social science, this approach reframes having a design concept in terms of: the role the body plays in designers' interaction and idea generation (Poulsen and Thøgersen, 2011); the sensory experiences that are present when "intuition" occurs to the designer (Mielonen et al., 2009); and aspects of designs' experience and knowledge that are transferred into the design process in relation to product usability in particular (Chamorro-Koc & Popovic, 2009).

Within experiential research on the phenomenon there are a few notable factors.

[3] The first group of rigorous studies on experiential knowledge has emerged in the recent decade. The first Experiential Knowledge Conference 2007 was held by the University of Hertfordshire and London Metropolitan University in June 2007. The Design Research Society (DRS) has set up the Special Interest Group on Experiential Knowledge (EKSIG) as the first Special Interest Group of the DRS in response to the request of its international membership. Special sessions on this theme have become a familiar unit at design research conferences, e.g., "Experiential Knowledge and Rigor in Research" in the third international conference of the IASDR 2009. Interest in experiential knowledge is growing in design society (see Niedderer and Reilly, 2007, 2010).

- A design concept is treated, from viewpoints of cognitive science or psychology, as a moment of association that is swallowed by either stimuli to the designer or the designer's resulting behaviors; or, when the voice of designers in practice dominates, a design concept dissolves into design activities and its content continuously changes;
- Methodologically speaking, the difficulty in generalizing formal models in paradigms such as reflection in action and tacit knowledge indirectly acknowledges the relations that would be cut loose by generalization.

This review of the literature on conceptual design has provided an overview of the descriptions of the complex and ambiguous phenomenon of having a design concept. The diverse understandings about design concept are sketched to provide the basis for a fuller picture. Particular disciplines and domains are not the only factors from which such diversity results. Instead, even in the same area of research (such as creativity or experience) descriptions of the phenomenon and definitions of design concept may significantly diverge, or may even form contradictions. This situation is also true of designers' descriptions of the phenomenon of having a design concept, as examined below.

2.1.2.2 Descriptions in Practice

Two examples are examined here to illustrate how the phenomenon of having a design concept is differently described by designers.

The first example comes from one of design teachers' interviews for the present research. Prof. C stated the following:

> I think the KAIST[4] has concluded a very effective way of using keywords to develop concepts. They [designers] also begin with observations, user studies, etc. Then they extract out the major content, based on which keywords are generalized. After such induction, the keywords are re-planted into the reality. Each is instantly associated with lots of things. It actually grows. Then they [designers] carry out the overall process again and again. There the concepts develop…With the value-laden conceptual ideas, corresponding language is further sought to materialize the concepts. (Field notes: IN101208).

[4] KAIST is the abbreviation of Korea Advanced Institute of Science and Technology, which is one of the leading graduate schools in Asia and has been influential in developing rigorous design research.

An iterative process is depicted above. Conceptualization plays a major role: a conceptual idea develops through oscillation between abstracted keywords and the concrete real world. Moreover, the intermediate concept functions like an organism that automatically grows on its own. The process of having a design concept is generalized by designers when they distance themselves from the phenomenon and reflect on it without being engaged in it. This is an understanding that is widely accepted by most designers, whether they are experts working on complex projects or they are novices who are trying to obtain something valuable out of their research.

The second example comes from the observation of a design critique from a collective project named *eTrans*. A group of students working on a TV advertisement to promote the use of electric cars were reporting their concept to the advisor, and this produced the following exchange:

Student 1: The concept is about how to communicate the values of electric vehicles in an abstract way.

Advisor: Where did that come from?

Student 1: From the findings of brainstorming. Most commercial and public advertisements are story-based. We want it to be abstract because less is more.

Advisor: What do you mean by abstract?

Student 2: You know, when you stand on top of a ladder trying to bend your upper body backwards, you would feel a sort of tension, physically and emotionally. Nervous, a bit scared, but somehow excited. You can feel it from toes to the back. We'd like to make the video arouse a tension with physical emotions to our audience.

Advisor: Well, you are talking about embodied experience. Very interesting.

Student 2: Yes. We are looking for something like costumes on the stage. Once the actor puts on the costume, it makes him genuinely feel like that character. We are seeking for something that can trigger the expected feelings.

Advisor: (turning to student 1) Did this idea come from brainstorming?

Student 1: Yeah… Well, we'd been working very hard with the research findings, discussions, and brainstorming, almost exhausted. She (student 2) got bored and couldn't help playing with the ladder over there (in the design factory). Then she came back and insisted that we should climb the ladder and feel it (simulating a bending pose). There it is.

Advisor: Okay. Let's see what we can do with this wild idea. Uncertain but exciting. (Field notes TU170910TJ)

The boundary of the concept was tight and clear when it was initially described as being "abstract" to differentiate from the prevailing story-based form of TV commercials. But that was before the experience (of the ladder) was in the description. When the moment the concept first emerged was traced back, the account was full of tangible or intangible things (the ladder, the embodied experience, and the example of costumes). In this example, the designers were working with a concrete and tangible range of things that they were trying to coalesce into something called *concept*. Within the continuous interaction between things, something special stood out against the rest (which appeared ordinary in comparison). Until then, they were still talking about the concept, but its scope was blurred and expanded. The designer's account of having a design concept was full of human feelings, judgments, and anticipation, as well as actions. By comparison with this, the process of conceptualization appeared less dominant. This kind of description of having a design concept is familiar to designers, as it frequently occurs in their practice.

These examples, similar to the review of the literature on conceptual design, indicate that the diversity of understandings of design concept is underlined when this notion is placed in the phenomenon of having a design concept in relation to specific contexts of domains, purposes, and conditions of description. The term design concept exhibits many characteristics across definitions in the literature, designers' reflections on it, and descriptions as practice. The features of design concept listed in § 2.1.2 overlap between different areas; they also present contradictions between different approaches and sometimes inconsistencies within the same area. These inconsistencies and contradictions are arguably useful for revealing what design concepts hide.

2.1.3 A Tension

Within the inconsistent, ambiguous, and diverse understandings of the notion of design concept, a tension can be identified. This tension arises from the contradictory nature of the following: design concepts are deemed outcomes that can subsist independently from the process, the designer, and the things to be produced; however

design concepts are reported to change in a way that is relational, generative, and evolutionary, which suggests that design concepts can grow on their own and all-inclusively contain everything that they have been detached from.

Design concepts are mainly regarded, like mechanical facts, as if they are entities independent from the process: either externalized as verbal or nonverbal descriptions, or enclosed in the designer's mind. In object-oriented process models, design concepts are described as being structured with levels of abstraction, and as resulting from conceptualization. If the design process (especially with its cognitive aspects) is included, it seems to exhibit a non-hierarchical structure, which makes the widely accepted idea of levels of abstraction insufficient. When viewed as a mental construction, the design concept does not imply a close relationship between a design concept and the person who has it, because a design concept reveals few factors of the designer who lives the phenomenon. Apart from this separation from the process and the actor, design concept is generally conceived as a model that represents things in the world, and which therefore operates at a higher level of abstraction than the things themselves.

Nevertheless, even if examined as outcomes, design concepts are widely reported to be relational: they are full of links that connect design moves (actions in the process), decisions (from the designer). They are *generative abstractions* (to borrow Rudolph Arnheim's term[5]), and they evolve over time. The restless and active nature that is observed from the linguistic perspective and the *out-directedness* of relations of design concepts in creativity studies make delimiting a design concept difficult. Similarly, the temporal factors and the changing content as described in practice are additional evidence of such a difficulty. The relationship between design concept and the process as a phenomenon lived by the designer remains elusive in current understandings of the notion and descriptions of the phenomenon.

Tension is created as the first statement results in structures and features of design concepts that do not support the active, dynamic, and all-inclusive tendencies implied

[5] The term generative abstraction was referred to by Donald Schön (1988) in his discussion about *types*. This term was originally proposed by Rudolph Arnheim (1969).

by the second statement. If, as entities detached from designers and from the world, design concepts can grow on their own, questions arise: *How are design concepts related to people who have them? How are they linked to the process where they emerge and develop? How are they connected with the things they represent?* At present, the majority of design research associated with conceptual design is examining these questions (see Table 2.1 for a summary of § 2.1.1 and § 2.1.2, where relevant findings of the pilot study present this tension.)

Table 2.1. The tension about the notion of design concept

Supporting Research Areas	Design Concepts Detached from the Process	Relational, Generative, and Evolutionary Design Concepts
Design methodology informed by different paradigms	• focus on the object-oriented process through the rational problem-solving approach • the framework of hierarchical levels of abstraction and conceptualization • focusing on *function*, without a stable definition of function • analytically focusing on elements rather than relations • an innate intention to control the process for an ideal outcome	• difficulty in generalizing formal models in paradigms, such as reflection-in-action and tacit knowledge indirectly acknowledges the relations that would be cut loose by generalization
Creativity research mainly based on cognitive science and linguistics	• the phenomenon is characterized with *association* • focus on either the stimuli • or on ideas/concepts as independent outcomes	• an emerging interest in relations within and between the concepts and process • a primitive turn to creators' experience of creativity
Knowledge-based research	• dichotomies in categorization	• diverse understandings of fundamental notions
The collection of emerging research on experiential knowledge	• a design concept is treated as a moment of association that is swallowed by either stimuli to the designer or the designer's behaviors, when experience is examined from viewpoints of cognitive science or psychology	• a design concept dissolves in design activities and its content continuously changes when the voice of designers in practice dominates
Field study	• increasing attention to methodology • levels of abstraction • conceptualization	• expanding scope • evolutionary nature • fusion of the concrete and the abstract

2.1.4 A Matter of Perspective

The examples from the pilot study have outlined the ubiquitous understanding that definitions of the notion of design concept and the phenomenon of having a design concept are overwhelmingly diverse within the practice and within academia. This agrees with the viewpoint of Buchanan (2001b) that the diversity of definitions in design actually is one of the great strengths of design, as these definitions are "all

fascinating and helpful, because they capture different perspectives on what is a very difficult subject" (p. 8). In this context, seeking a universal definition that will apply consistently and coherently across all areas of design practice is of less importance than exploring the perspective to approach the phenomenon. This is the approach taken in the present study.

Different perspectives can be discerned through the understandings of design concept and descriptions of the phenomenon that these understandings hold. Studies on experiential knowledge provide an example of this. In some such studies, the examined experience is understood as a cognitive mechanism: for example, imagination, which "allows us to entertain the notion of the shape of a face evident in the outline of clouds, just as one might see a pattern in the arrangement of bricks on the façade of a building" (Wylant, 2008, p. 7). The underpinning of cognitive science indicates that the experience would be largely treated as the process of mental construction that is irrelevant to the designer's other factors (like attitudes, motives, and feelings). However, this experience is also reported in a form that emphasizes these factors in studies that focus on designers' sensory experience. For example: "Every time I get a good idea, I feel as if my body is pricked with very thin needles all over" (Mielonen et al., 2009, p. 6). In this latter scenario, the designer's actions in design and the emerging design concept fade into the backdrop as general stimuli of such a sensory experience. Such a contrast signals that different kinds of descriptions serve the purposes of different inquiries, even if the subject of study seems to be the same. Moreover, these descriptions manifest the describers' positions toward the phenomenon of having a design concept. Two kinds of positions have been identified as playing an important role in the resulting descriptions and understandings: *external perspectives* and *internal perspectives*. However, these two positions are not well-matched in strength.

2.1.5 External Perspectives

Dominant perspectives for approaching the phenomenon of having a design concept share common ground in that they look at this phenomenon from an external standpoint. As a result, the phenomenon is described:

1. after the fact of the experience;
2. analytically, and focused on elements of design; and
3. through an objective viewer's view.

These aspects of the description are discussed below. Such external perspectives are dominant when describing the phenomenon, as they are prevalent in design research in general.

Firstly, most descriptions from an external perspective begin after the experience ends, such that having a design concept is approached as a finished event. The describer (either the researcher as the examiner of the phenomenon or the designer acting as the onlooker of the process) does not involve her/himself in this experience when describing it. This viewpoint was not questioned prior to the emergence of practice-led research. While the practice-led research still struggles with the theoretical justifications for its methodological foundation and criteria for inquiry outcomes, this post-experience stance still dominates.

Secondly, analytical thinking (which takes a thing apart into elements and models the elements by imposing relations upon them) is essentially rooted in design traditions. During design research's fifty-year history, the human activity of design has largely been described in terms of the basic elements of design: the object, the actor, the process, and the context (Dorst, 2008). Different areas of design research are characterized by their emphasis on various elements. Dorst (2008) claimed that the design process has been the "overwhelmingly" major focus of design research, "to the exclusion of everything else" (p. 5). As the process has been addressed primarily in terms of relation, however, these elements of design (object, context, and actor) are engaged in design research in a very limited way. The actors, in particular, as human beings who live the phenomena of design, have vanished from the mainstream studies, except for the body of research

where designers' cognitive aspects are considered as part of the process, or where their experience and knowledge are categorized as components of the object/context of design.

Thirdly, the stance of the observer as objective and staying distanced from the observed prevails in both academia and the practice of design. Design has, during its development into a wide collection of independent professions, accumulated a considerable body of knowledge within practicing communities. This knowledge about design as a coherent whole is implicitly applied by practitioners, and is expressed in, "designers' transactions with materials, artifacts made, conditions under which they are made, and manner of making" (Schön, 1988, p. 182). Throughout design research's short history, researchers have been attempting to turn the previously implicit applied knowledge into explicit knowledge through all kinds of academic inquiries (see Glanville, 1999; Bayazit, 2004). With the increasing body of explicitly encoded knowledge, design has begun to emerge as a discipline. However, the majority of design research, especially that of design methodology, has been influenced by the prevailing rational problem-solving paradigm. Although the conception of shaping design to fit with criteria of the conventional scientific inquiry has been criticized by many researchers (see Archer, 1981; Glanville, 1999), its impact on design remains extensive. Designers are encouraged to distance themselves from what is produced through practice by making themselves objective supervisors of the process (similar to design researchers in most domains).

As a result, conceptions of the notion of design concept from external perspectives generally accentuate the tension discussed in § 2.1.3 rather than providing a way to account for it. This occurs in two ways. Firstly, design concepts are believed to be able to develop on their own, either as independent representations of things to be produced or as mental constructions. This is a way of relating design concepts back to the process, to the actor, and to the thing in the world. Secondly, in order for design concepts to act as generative abstractions that develop across levels of abstractions or relate to both the micro and macro views, they tend to be used in a dual sense: as being both general and unique. This problematic dual sense leads to further tension in understandings of this

notion (this is further elaborated in § 5.5.2, after the term design concept is addressed in the context of experience in Chapter 4).

As a result, having a design concept is largely treated as the design process that excludes other aspects of design (actors, objects, and contexts), or is reduced to a creative moment that links stimuli to the designer and consequential actions. These ambiguous understandings of design concepts, along with understandings of the phenomenon as rooted in external perspectives, have become part of traditions in design that are seldom reflected upon. This is problematic, as in external perspectives the experiences of designers are either barely dealt with, or touched upon as an ingredient of one of the four basic elements of design. As noted above, experience in this context is at most a source of prior knowledge, a name for a part of the concept, or a description for what is retrieved by human cognition as memory.

Thus, the approach of external perspectives to the phenomenon in question fail to account for the tension that arises within the current ambiguous understandings of design concepts as these understandings cannot be revealed within the same external standpoint.

2.1.6 Internal Perspectives

In contrast, a review of the emerging body of research on experiential knowledge, supported by designers' descriptions in practicing, indicates another kind of perspective of an internal standpoint. This approach suggests that design practice moves in an implicit way, which is more open than the external perspectives that dominate the literature suggest. The phenomenon of having a design concept is a kind of experience that is lived by designers, and this fact is neglected by the dominant external perspectives. The internal perspective approaches the designer's experience during construction through the designer's view. As a holistic view, this kind of perspective shows the potential to embrace aspects of designing that have been overlooked from the external perspectives.

Situated in practice, most designers' descriptions of the phenomenon may reach into any aspect of design that is analyzed in research, yet they appear to hinge on something other than the individual elements. A design concept's scope is broad, and its content is dynamic and not limited to either things in the world or to an intellectual structure. Designers operate not only with factual information (e.g. findings collected from the outside) but also with intuition (the improvisational exploration of personal experience).

Often times when a designer first has a design concept, she or he cannot effectively articulate why it is worth pursuing or what is intrinsically good about the concept. Yet still, the designer appears to have established a certain attachment with the concept when it first emerges. It is a revelation of some remote thing(s) that surprisingly stands out from the rest of the things that the designer continuously interacts with. Conceptualization in this scenario, at this moment, no longer takes the leading role. Such descriptions of having a design concept cannot be achieved without seeing from the designer's eyes, and is enormously different from the report of step-by-step procedures and statements of the outcome (where the designer's voice disappears). Although the current descriptions of this phenomenon as a design experience (from internal perspectives) largely appear to be spontaneous and poorly-integrated, some discrete and unstructured contents are still frequently presented, especially in designers' accounts, because they are relevant to this phenomenon.

2.1.7 Summary

It is time to address the opening question of this chapter: *What do design concepts hide?* The usage of the notion of design concepts is loose, its scope is broad, and its content seems unstable. The ambiguity that is present in understandings of the notion of design concept suggests that there are various perspectives that correspond with the different positions that are used to approach the phenomenon of having a design concept. The ambiguity leads to a tension that cannot be accounted for by the dominant perspectives, which look at the phenomenon of having a design concept from

a position external to the phenomenon as experienced by the designer. The dominant approaches to this phenomenon adopt an external position, and implicit internal perspectives toward the phenomenon are hidden by ambiguous notions of design concept. However, designers' in vivo retrospect of what happened when they first had a concept, and what the concept is in real cases, reveals the potential of such a position bound to accommodate the active, dynamic, and all-inclusive features of design concepts that cannot be described in binary terms.

The discussion above suggests that experience provides an alternative position to understand the phenomenon of having a design concept within a more coherent picture. If the internal perspective is indeed useful, it should be able to address the tension by providing new understandings of design concepts, such that design concept will be clarified when its seemingly inconsistent features are better understood. Put in another way, the question—what is a design concept—needs to be reexamined in the context of experience.

This study investigates the phenomenon of having a design concept as a particular kind of design experience. With the move away from conceptualizing designing into elements with hierarchical structures, this discussion attempts to identify the relations of having a design concept on the landscape of experience. More specifically, I inquire into the underlying structure of the experience of having a design concept.

2.2 The Problem of Describing Experience

Polanyi (1958/1998) suggested the term *tacit knowledge*, which deals with a core conception of any kind of human experience: namely, people know more than they can tell. This is also the case in design. Designers implicitly know the experience of having a design concept; however, they do not explicitly know how to articulate such an experience.

2.2.1 Designers Know More Than They Can Tell

During its development from its origin in craft, design has accumulated a considerable body of pragmatic knowledge that is implicitly applied by designers. The idea that practice is a foundation for a form of knowledge has been widely embraced and has inspired lines of inquiry into the dimensions of knowledge. Gilbert Ryle (1949) first proposed the notions of *knowing how* and *knowing that* to address an ability that is distinct from knowing that something is the case (the encoded knowledge). Both knowing how and knowing that have relations as well as divergences, and their relationship resembles that of *tacit knowledge* and *explicit knowledge*. Polanyi (1958/1998) suggested that tacit knowledge enables people to accomplish an activity but it cannot be explained by explicit reasoning; whereas explicit knowledge refers to the codified knowledge that can be transmitted in a formal way. Jürgen Habermas (1998) took up Ryle's conception and maintained that *know-how* (in Habermas' vocabulary) is "the ability of a competent subject who understands how to produce or accomplish something"; and that *know-that* is "the explicit knowledge of how it is that he is able to do so" (p. 33). In parallel, Frascara (2007) pointed out that "it is possible that an experienced designer could work in a way that appears to be intuitive to an outsider. An experienced designer can develop a wonderful concept in a short time, but this is not intuition at work" (p. 63). In other words, know-how is a competent practitioner's capacity to understand how to produce or accomplish something with habituated skills. Know-that is the knowledge of how one is able to know-how, and it can be explicated for communication when making reasoning process transparent is needed (in design critiques, for example). Both know-how and know-that indicate an implicit realm of knowing incubated in experience. But know-that is the explicated know-how, which indicates that it is still possible for designers to articulate more about the tacit knowledge acquired in experience.

The distinction between know-how and know-that is not static. Apart from drawing a distinct line between the two kinds of knowledge, Polanyi and Prosch (1975) underlined the tacit knowledge as an act of "indwelling," not only to develop itself but to integrate the two: "Personal, tacit assessments and evaluations, we see, are required at every step in the acquisition of knowledge – even 'scientific' knowledge" (p. 31). For

example, a good swimmer may not be a good coach for a beginner, however, when the trainer fails to effectively explicate for the learner how to act, they may simply jump into the water and perceive the experience of swimming, and then tell the learner how to act. Therefore, practice in general, and experience in particular, provides the basis for and connection between the two forms of knowledge. Both forms of knowing grow as design evolves.

In practice, designers appear to prefer performing design to talking about how the work is done. Although the tacit dimension of knowing (e.g. how to ride a bicycle or how to swim), arguably, cannot be externalized and generalized (see Polanyi, 1958/1998, 1966; Rust, 2004), people do turn their experiences into descriptions in a certain degree. For example, significant moments are often traced back retrospectively by designers to illustrate the sense of knowing ("that's it!") that they achieved in the past. I observed in my interviews that once tuned into the practicing mode, designers often described how a design concept first occurred as though they were talking about the most beautiful part of the work that happened in an ineffably natural flow, which makes their hesitations to give out definition of the term design concept stand in a vivid contrast. Polanyi (1958/1998) used the term *indwelling* to describe the process whereby a person develops and employs tacit knowledge when engaged in a task. By dwelling in experience, designers know the specific moment when a concept arises, especially in retrospect. They know how to let the experience to carry them deep into the concept. They know how to make sense of their design (as product) and designing (as process) to make persuasive arguments. Also, they know how to let the others know, especially between designers' communication. For example, in order to communicate a design concept to other designers, a designer may simply demonstrate or present something (a gesture, sketch, or physical object) without relying on language. If an experience is shared, what has been apprehended by one is conveyed to another, silently and knowingly. This is why demonstration and observation have served as primary means for training practical skills in craft. Arguably, designers know more than what the existing conceptual models are able to accommodate, as experience plays an important role to complement what words may not reach.

Paradoxically, designers' knowledge in experiencing of design also implies a lack of knowledge in this very area. In many cases the term experiential knowledge has been used no more than as a token to acknowledge the fact that design practitioners do know something in relation to the fulfillment of the task, while the known appears impossible to articulate when it is divorced from individual situations. It is not unusual for designers to have difficulty in defining a design concept. In such instances, they do not know the relations between the scattered descriptions of having design concepts; they do not know how to describe the implicitly recognized evolutionary form of having a concept; they do not know how to describe more about the intuitive moment where certain things stand out against the rest all and indicate a concept; they do not know how to explain why they seem to have an attachment to that moment; they do not know how to explicate why they seem to already achieve a sense of knowing when the concept first emerges before it is fully expressed; they do not know how their ongoing experiences affect activities and concepts; they may have problems with linking their personal decisions and gains derived from the experience to the formation of a design concept as supporting argument of their work; and they do not know what is wrong with their practice when it goes awry (when, for example they fail to draw the scope of the design, or they feel it difficult to embody an abstract good concept). This is particularly evident with novice designers, and it is often difficult for design teachers to articulate the phenomenon of having a design concept, even though this articulation is necessary to clarify any confusion that the students may have.

2.2.2 The Need to Explicate Design Experience

This leads to a practical problem: that designers know more than they can tell, but they need to tell more. Although articulation of a design experience is, arguably, not the major job of designers, the ability to create meaningful experiences by virtue of tangible or intangible products is the core of design expertise. However, designers do need to tell more about what they know about design experience. This approach is timely for—at least—the following reasons.

2.2.2.1 The Call for Design Moving toward a Discipline

Considering the transition of design from crafts toward a discipline, explicating the design phenomena meets the demands for communication within design as well as for cross-disciplinary collaboration. Making the process of decision-making and judgment formulation more transparent and informed serves to improve communication and to advance understandings of this discipline.

Since the idea of design as a discipline was first voiced by design thinkers and educators (see Archer, 1979; Cross, 1999), there has been an increasing recognition of the importance of changing approaches to design from those founded in craft, as the latter fail to support the evolving context of contemporary design (see Owen, 1998; Buchanan, 2001b; Cross, 2006; Poggenpohl, 2009). Following Archer's (1979) proposition, Cross (2006) maintained that design research and design education are two paths that converge on a common concern of the discipline of design. Research, according to Archer's (1995) definition, "is systematic inquiry, the goal of which is knowledge" (p. 6). Hence, design research is concerned with the development, articulation, and communication of design knowledge (Cross, 1999). On the educational path, Poggenpohl (2009) argued that the transition of design from craft to discipline is grounded in a process wherein actions are no longer merely inherited by observation and trial and error, but rather are informed by a growing body of knowledge that can transcend the individual and implicit boundaries and that is able to be communicated and shared. Design as an emerging discipline thus grows in its evolving areas of research and education, both of which call for more articulation of experience to understand the nature of this human endeavor and to consolidate the foundation to support practice.

The attempts to explicate what was previously implicit, and to restore the relations between the two constitute the growth of know-that, are the bedrock of a discipline. Developments in other more established disciplines (such as medicine and chemistry,

for example) that have also emerged from implicit understanding and training, provide convincing examples to support such a growth (see Poggenpohl, 2009).

2.2.2.2 The Evolving Context of Practice and Cross-Disciplinary Communication

The rapid explosion of the scope of the object of design (which now ranges from physical artifacts to intangible services and systems) has resulted in an increasing awareness about the role of designers' own experiences in the design process.

The more complex and large-scale a design is, the more cross-disciplinary cooperation it involves, and it is difficult to imagine that a sustainable project like Design Harvests[6] could have been possible without a complex network: including design schools; researchers from agronomy, social sciences, humanities, and economy; the local government; committed farmers; entrepreneurs; and volunteers. As designers work more collaboratively with people from other disciplines (who have solid research underpinnings to support their decision making) they are at a disadvantage, because there is no vast repository of knowledge to help them to articulate their actions. The ability to coherently understand the nature of design concepts and to articulate the experience of having a design concept will enable designers to function at a high level with collaborators from other disciplines. Explication of the design phenomena meets the demands from communication in cross-disciplinary collaboration as well as within design.

2.2.2.3 Design Education

[6] The Design Harvests project is a research-based design intervention in rural China (Chongming, Shanghai) that aimed at promoting a social and economic balance between the city and the countryside. See http://designharvests.com/.

In the context of conceptual design, knowledge transmission is indispensible to the articulation of the experience-based process where a design is originated, developed, and becomes mature. This transmission is therefore essential for design education.

As mentioned above, a significant amount of the support for the development of design as a discipline comes from design education, which has, in turn, grown out of training (its conventional origin in craft). Within the design critiques that were observed for this study, tacit understanding was ongoing, without explanation of why one design concept was better than another. Sharon Poggenpohl mentioned that there is a famous saying among designers and design teachers: "the work will speak for itself" (personal communication, Dec 20, 2011). Pointing out how the current design could be better is fundamental in a critique. If such communication is mainly conducted through implicit demonstration and observation, without ways to articulate and reflect on the experience where judgments are made, this is communication serves the purposes of training rather than education.

The divergences and relationship between the tacit and explicit knowledge draw attention to training and education. Peters (1965) stated the following:

> We often say of a man that he is highly trained, but not educated. What lies behind this condemnation?… It is … that he has a very limited conception of what he is doing. He does not see its connection with anything else, its place in a coherent pattern of life. (Cited in Cross, 2006, p. 3.)

The growing understanding of knowledge about experience, and of how the transmission of knowledge as such can better facilitate practice in the evolving context of design, makes design education different from training. Within the craft tradition, demonstration and observation were the most important means for instructors and learners to transmit the knowledge of know-how. In the emerging context of design as a discipline, however, "the aim of design education should be to foster the development of thinking, judging, collecting information, organizing it, managing resources, and producing visual communications that are effective and sensitive to users, contents, and contexts" (Frascara, 2007, p. 67).

This changing context of design introduces a need of translating from the tacit knowing (which also includes the intuitive movements that the designer makes) to make it explicit, so that it can be explained to someone else. Designers may find difficulty with making the transition from the implicit to explicit, but this is enormously important to their practice and design education in particular. Designers are cultivated to be adept at handling having a design concept, but they cannot coherently and holistically articulate this to advance design knowledge in this respect. The teacher hopes that students are learning how to practice more explicitly for the educational purpose; whereas the teacher should be equipped with the knowledge to articulate a variety of experiences of having a concept in the first place.

Situated in the position of looking at the phenomenon of having a design concept from an internal perspective, the task of this study thus becomes straightforward, and can be summarized in the following question: *Since an experience of having a design concept contains more than what has been articulated and the articulation of it is needed to advance practice, how can this kind of experience be more coherently described?* This requires a conception of the experience in question through an internal perspective. Such a conception is the underlying structure of the experience.

2.3 A Lack of Basis to Articulate Experience

The factors examined above suggest that in actual practice, the statement that *designers know more than they can tell* may be used like an excuse to hide a lack of understanding about how to construct a way to articulate more about the known in design experience and thus to know more. Although the exploration of this has suggested that the phenomenon of having a design concept should be approached from an internal perspective, this perspective has not been directly examined in existing literature. Therefore, the relevance of my study must be established through an examination of the phenomenon that it looks into.

2.3.1 Concerns in Describing Design Experience

The tacit, unique, personal, and dynamic dimensions of experience cast doubts on whether experience can be explicitly described. Schön (1988) has directed attention to four pairs of opposite characteristics inherent to any theory of designing: tacit and explicit knowledge, uniqueness and generality, plurality and commonality, and generativity and cumulativeness. Schön did not point out that these oppositions result from diverse perspectives to approach designing, nor did he make explicit suggestions how the opposites could be coherently accounted for. However, the preceding discussion suggests that these dichotomized characteristics may indicate that there is a lack of basis to restore the relations between each of the poles. These dichotomies have resulted from prevailing external perspectives toward designing, which aim at generalization and prediction. Shifting into the realm of experience, the research purpose of this study should also be tuned into understanding and revealing more relations that may resolve some of these dichotomies, as these relations are determined by the nature of the experience.

The contrast of plurality and commonality has been illustrated in the diversity in definitions of design concept and descriptions of the phenomenon of having a design concept in § 2.1, and will be addressed when the notion of design concept is elaborated in the context of the experience in § 5.4. Generativity and cumulativeness will be discussed in § 2.4.2. Here, two more closely-related pairs will be discussed, as these are particularly relevant to the plan of this study at this moment.

Concerns about tacit and explicit dimensions are always intertwined with uniqueness and generality. Polanyi's (1958/1998, 1966) conception of tacit knowledge underlined the personal dimension of knowledge, which has been overlooked in mainstream frameworks of knowledge (as these approaches are lacking in its human facets). Following this line, Rust (2004) refuted the idea that an individual's tacit knowledge somehow can be externalized and made explicit in the form of rules for the others to apply. Rust argued that "the original tacit knowledge held by individuals is unique to them, a product of their whole experience, and not a direct source of

generalizable knowledge" (p. 79). The distinction between tacit and explicit knowledge is viewed as identical to the distinction between subjective and objective aspects in some studies (e.g. Uluoğlu, 2000), while it is seen as the similarity with that between uniqueness and generality in other studies (e.g. Heylighen et al., 1999).

However, the pursuit of a common basis to describe design experience inevitably involves generalization. Basically, the more abstract a generalization becomes, the more uniqueness that is filtered out in individual cases. Generalization sacrifices the uncommonly shared details in each individual case in order to allow the commonly shared aspects to apply in a collective scale. However, although the shared things are often reduced to elements of content within various external perspectives, they can also be relations in the view of experience. A basis consisting of generalized relations makes the unique content of individual experience absent but accessible: this is how a generalized basis may be able to facilitate articulation of the unique. One should not shrug off the basis of describing design experience just because every design experience is a unique experience. An important area of research is identifying how to disclose those things that could be described but which now remain implicit due to a lack of access to immediate and tacit dimensions in experience.

Theoretical justifications to support the assertion that an experience can be understood and articulated to a certain extent will be discussed in details in Chapter 3, with the introduction of the public realm of experience.

2.3.2 Current Research on Design Experience

Research on experiential knowledge in design society is rapidly growing (see Niedderer & Reilly, 2007, 2010). The reviving focal point of experience has developed into several research interests, as outlined below.

Firstly, *user experience* is a growing research area in the context of human-centered design, and designers act as observers to study these experiences (e.g. Candy et al., 2006;

Poldma, 2009, 2010). The absence of the voice of the designer (who experiences this type of phenomenon) is barely acknowledged in this strand of research.

Secondly, embodied experience is an important theme in a broad research society that explores the experiential knowledge associated with aesthetics, art, and craft. Aesthetics studies on experiential knowledge (particularly those based in embodied experience) often examine domains like music (Johnson, 2007), literature and visual arts (Bindeman, 1998; Johnson, 2007), interactive art (Candy, et al., 2006), and dance and performance (e.g. Healey & Light, 2007; Wallis, et al., 2010, see also Barrett, 2007), since art is regarded as a form of experiential inquiry which presents and enacts experience. Besides this, there is evidence of a growing awareness of the possibility of exploring the creators' experience to complement the foundation of practices in traditional craft (e.g. Pedgley's guitar project, 2007).

Thirdly, interest in embodied experience also emerges in design. For instance, Poulsen and Thøgersen (2011) explored the role that the body plays in designers' interaction and idea generation. Niedderer and Reilly (2007) similarly noted that the interest in embodied experience is the middle ground between research that aims at generalizable and transferrable knowledge and practice of creating, designing, inventing, and making (in which bodily experiences play an important role). A naturalistic approach to research on experiential knowledge also exists: this aims to objectify the implicit experiential knowledge by following the rules and methods that are developed in cognitive science, behavioral science, and neuroscience (see Storkerson, 2009). Experience is regarded as the stimuli that cause changes in the brain (by changing the neural connections and the neurochemistry) and which are therefore bound to influence human actions (e.g. Onians, 2010).

Fourthly, experiential knowledge underpins the growing body of practice-led research that looks into the designer's own experience in designing (e.g. Pedgley, 2007; Shumack, 2009; see, also Yee, 2009). In spite of the debates about tacit and explicit knowledge, practice-led researchers contend that experience contains and produces an integral part of design knowledge, which cannot be externalized without positioning the

designer at the center of the inquiry to her/his own practice (see Niedderer and Reilly, 2007, 2010; Yee, 2009).

Hence, not all studies on experience are situated in internal perspectives. However, among the approaches that currently employ internal perspectives, some features can be identified.

Practice-led research is regarded as a recent methodological innovation (Yee, 2009) and many of its fundamental debates have been revisited and remain unresolved. Increasing awareness of experience's role in knowledge-building naturally invites designers to step into the arena of research, to elicit and report forms of knowledge that are central to their practices. At this infant stage, practice is merely a general medium for the designer or researcher to conduct research. Research concerns are heavily tilted toward planning an organized process and rigorous documentation of the individual practice. Understandings about experience seem to be confined to discussions about tacit knowledge, which reveal little regarding the common basis of articulating experience.

In addition to practice-led research, discursive inquiry on designer's experience (which is conducted by researchers outside of the immediate practice) also grows. In this context, having a design concept is mainly regarded as an experience of intuition. Davies and Talbot (1987), for instance, interviewed experienced designers to explore the antecedents and contingencies of "the most significant mental events associated with the experience of the idea," (p. 24) but did not relate the actual design to these experiences. Focused on the same moment, Mielonen et al. (2009) used embodied experience to report designers' sensory/somatic experiences. A problem with this strand of research is that the rich design experience is not examined in relation to the contents of designing (design concept/meaning), or the changes to them. There is little insight to relational dimensions and the basic structure of such an experience, because intuition is seen as a basic unit that is bestowed on the designer.

Experiential knowledge research, for the main, has invested many efforts to distinguish knowledge, thinking, and knowing (see Storkerson, 2009), but few explore

how these are fabricated in the structure of an experience that is more than an intellectual process. The current research does not provide any relational clues or frameworks to indicate how design concepts emerge and how they are developed and unified in human experience. Their findings cannot, therefore, be used to understand and to articulate other experiences.

To conclude this section, the current design research on experiential knowledge from internal perspectives also restricts the articulation of the experience under question in several ways. It has focused on rich and thick descriptions of individual cases rather than a common basis to articulate designers' experiences. Particular aspects of a design experience (such as designers' sensory experience) are focused on to a greater extent than the whole, so that the findings are yet to be integrated into the development of design. The findings of research on experiential knowledge tend to be idiosyncratic descriptions that reveal limited insights into the dimensions of a significant design experience (which could be used to understand other experiences). The identification of the structure of design experience has received little attention.

Set in this context, the underlying structure of the experience of having a design concept is now to be explored, to establish an internal perspective.

2.4 Two Key Characteristics of an Experience

With the shift from external perspective to internal perspective, it is necessary to understand what an experience means before probing into the underlying structure of the experience of having a design concept. This involves an inquiry into the features of this kind of experience, given that the designer's experience fosters, nurtures, disturbs, and fuels the development of a design concept.

For designers, having a design concept is a kind of experience that is distinct from the ephemeral and insignificant experiences in which designers are also immersed but fail to notice. Designers experience all sorts of activities in the early stages of design, and these are used to identify valuable design opportunities. Designers live the experience of

studying the design brief, communicating with the client and collaborators, conducting user research, analyzing the problems and identifying opportunities. All these activities are conducted and experienced, but do not necessarily impress the designer as the experience in which the emergence of something meaningful is witnessed. The significance of this emergence has earned it a specific name as a concept.

Compared with the unmemorable, discursive, and ordinary experience (lacking in traceable beginning and end) such experiential episodes are significant. For this reason, having a design concept is, to borrow John Dewey's term (1934/1980), *an* experience. This conception of *an* experience inspires my study in terms of two characteristics of a significant experience: it is a unified whole and evidences dynamic growth. Both call for pertinent conceptions of the underlying structure of the experience in question, and have become criteria that the proposed structure is anticipated to live up to.

2.4.1 A Unified Whole

In Dewey's groundbreaking treatise *Art as Experience* (1934/1980), he investigated into the features that qualify a piece of significant experience as a complete one (*an* experience).

> An experience is a whole and carries with it its own individualizing quality and self-sufficiency…An experience has a unity that gives it its name, that meal, that storm, that rupture of friendship. The existence of this unity is constituted by a single quality that pervades the entire experience in spite of the variation of its constituent parts. This unity is neither emotional, practical, nor intellectual, for these terms name distinctions that reflection can make within it… Yet the experience was not a sum of theses different characters; they were lost in it as distinctive traits. (Dewey, 1934/1980, pp. 35–37)

During the design process, the designer encounters significant experiences that arise from the ordinary and routine experience. She or he may perceive delightful astonishment, enlightenment, and sense of epiphany as much as painful frustration, doubt, and uncertainty through a significant experience. Such an experience can be recognized, for it has a beginning and an end that marks it out of the ordinary that is consumed in the continuous activities without leaving a trace.

Moreover, according to Dewey (1934/1980), an experience has a unity that is constituted by a single underlying quality permeating various parts of the entire experience. Whereas such a unity is composed of the interrelated emotional, practical, and intellectual phases, it is impossible to separate one from another. He identified the distinctions but emphasizes their interrelations. Therefore, the central features of Dewey's aesthetic, according to Shusterman (2000), are the holistic themes of internal relations and organic unity: "No element or concept had an independent identity or essence but rather is entirely a function of its interrelations with all the other elements and concepts of the whole to which it belongs" (p. 5).

If, as Dewey (1934/1980) alleged, an experience is a unified whole, a question arises: Is an experience (e.g. having a design concept investigated in this study) an inseparable unit without any structure? Dewey himself suggested the following in relation to this question:

> An experience has pattern and structure, because it is not just doing and undergoing in alternation, but consists of them in relationship… The action and its consequence must be joined in perception. This relationship is what gives meaning; to grasp it is the objective of all intelligence. The scope and content of the relations measure the significant content of an experience. (p. 44)

Dewey's conception of an experience not only acknowledges that experience fabricates actions, intellectual endeavors, and emotions, but also suggests the active place for meaning within a significant experience. Dewey's insight on an experience's structure provides an important clue to the present study, and is further discussed and developed in Chapter 4.

Thus, although an experience is a unified whole, this does not mean that it is not composed of distinct parts; rather, distinctions are identified within relations. Dewey (1934/1980) maintained that an experience denotes a process of doing and undergoing, which occurs in a one-in-another relationship rather than in alternation. He insisted that an experience is a whole, in which:

> Thinking goes on in trains of ideas, but the ideas form a train only because they are much more than what an analytic psychology calls ideas. They are phases, emotionally and practically distinguished, of a developing underlying quality;

> they are its moving variations, not separate and independent like Locke's and Hume's so-called ideas and impressions, but are subtle shadings of a pervading and developing hue. (p. 37)

The underlying thought for "phases" instead of "stages" is to view the examined elements in their inseparable relations. Their properties overlap, and they dissolve in the relations connecting with one another.

This poses the following questions: *If having a design concept is a relationally unified whole, what are the constituent parts of the whole? What are the relations that hold the parts together? Besides, what is the relationship between the designed and the designer?* These are questions to the underlying structure of the experience. In order to describe an experience that is a unified whole, making distinctions (identifying dimensions) is necessary. However, identifying the relations that unite the distinctions is of equal importance, because these determine how relevant the distinctions are to accounting for the characteristics of a design experience.

2.4.2 Dynamic Growth

Dewey (1934/1980) further suggested that the interrelations within an experience are dynamic:

> In every integral experience there is form because there is dynamic organization. I call the organization dynamic because it takes time to complete it, because it is a growth. (p. 55)

Although the dynamic growth is here depicted in a general sense, it is a valuable reminder to my inquiry into the structure of the discussed experience. Dewey privileged dynamic aesthetic experience over the fixed material object that conventional thinking identifies as the work of art, that is, he privileged aesthetic process over product. Shusterman (2000) described "for Dewey, the essence and value of art are not in the mere artifacts we typically regard as art, but in the dynamic and developing experiential activity through which they are created and perceived" (p. 25). This viewpoint is taken up in this study, since a design experience cannot be fully captured by the product

(design concept) when it is extracted from the process as the static outcome; instead, it is within the experience that design concept becomes generative or active.

The dynamic feature of having a design concept is also reflected in the fact that design concepts dynamically grow. A design concept that arises from the experience is dynamic because it changes over time and generates something new while absorbing the new things into the changed whole in a cumulative way. Design concepts, in this sense, are no longer static products of the experience, but part of the significant course of having a design concept.

This dynamic characteristic of an experience also opens up an opportunity to understand one pair of opposites in design practice, namely generativity and cumulativeness:

> Designers appear to build up their knowledge in a cumulative fashion, developing knowledge in one design episode and carrying it over to the next. But how shall we conceive of this cumulative process? If designers frame situations and shape practice through general rules or principles carried over from past experience, how do they ever make anything new? (Schön, 1988, p. 182)

In view of Dewey's insights, generativity and cumulativeness are literally mirrored in the dynamic growth of the experience. To understand and describe the examined experience, the present inquiry should be able to distinguish the substance and form of such a growth, and, more importantly, to present these in relations. The relationship between design concepts and process therefore needs to be reestablished.

The experience of having a design concept unifies different parts, within a certain structure, that pertain to a dynamic growth, and this implies that the structure can be identified using something other than static factual elements. The tension that conventional external perspectives fail to reconcile suggests the change of emphasis in identifying the structure in question. Imagine a multiple-faceted organism that dynamically grows over time. In order to describe its structure, it is necessary for the facets to be identified, for they are basic materials of the organism. However, the structure would not do justice to the feature of dynamic growth without accounting for relations between these facets and the change of relations. The basic elements in the

structure are relations. As a result, the factual elements no longer have stable positions in the proposed structure (as they do in most of object-oriented process models). The relational structure reveals what comes to the foreground and what fades into the darkness at a certain point of time of the experience, based on the way that the experience flows.

To sum up, the underlying structure of the experience of having a design concept under scrutiny in this study should be able to act as a basis to describe such experiences by taking care of the two features discussed above. The structure will serve as a means not only to describe the identified parts/aspects of the design experience but also to bring them into productive relations. Rather than focusing on the factual elements (like the conventional approaches to design phenomena do) this study has developed a more subtle concern for relations. I attempt to identify the structure by combining the theoretical sensitivity cultivated in the literature and the insights from the field study. I attempt to explore a vocabulary pertinent to the internal perspective to describe having a design concept, instead of using the conventional design categories that were developed from external perspectives.

2.5 Summary

This chapter began the inquiry with the pilot study that sketched out how the notion of design concept and the phenomenon of having a design concept are described in the literature and in practice. The context of this study was set up: namely, that internal perspectives that could be used to approach the phenomenon of having a design concept are hidden by inconsistent and ambiguous understandings of the term design concept; and the dominant external perspectives to the phenomenon fail to coherently accommodate the features of design concepts as described in practice. A tension exists in current understandings of the term design concept, wherein design concepts are seen as outcomes detached from the process and thus separated from the designer and the things that they represent, yet they are also acknowledged to be relational, generative, and evolutionary.

I argue that exploration of the underlying structure of having a design concept, from inside the designer's experience of it, will provide a more coherent basis to describe this phenomenon and to understand design concept. However, there is a problem at the heart of describing experience that designers know more than they can tell, but they need to tell more. Limitations of the growing body of design research (which employ internal perspectives) are discussed to lay out concerns in describing design experience. I engage with this problem, exploring the potential criteria for the underlying structure. The resulting structure should be able to account for the experience as a unified and dynamic whole in a way that is different from extant conceptions derived from external perspectives.

> [Phenomenological reflection] must suspend the faith in the world only so as to *see it*, only so as to read in it the route it has followed in becoming a world for us; it must seek in the world itself the secret of our perceptual bond with it… It must question the world, it must enter into the forest of references that our interrogation arouses us, it must make it say, finally, in its silence *it means to say*.
> Maurice Merleau-Ponty, *Phenomenology of perception*, pp. 38-39.

Chapter 3. Research Methodology

3.1 The Public Realm of Experience

Experience is highly individual, unique, and often ineffable. Nevertheless, we can understand the other's experience to a certain degree. This is possible because experience is not locked in an enclosed personal sphere; instead, there is a public realm of experience that can be explored. This feature of experience is the underpinning of the methodology of this study, and will be addressed using insights from the field of phenomenology and John Dewey's (1934/1980) conception of *experience* first.

3.1.1 Phenomenological Point of View

The philosophical movement of phenomenology[1] was founded by the German philosopher Edmund Husserl (Husserl, 2001; see also Langdridge, 2007). The core argument in phenomenology is that consciousness is outwardly directed to the world, rather than inwardly directed to ideas locked in the mind. Thus, there is a public realm of human experience. Sokolowski (2000) provided the following description: "Phenomenology is the study of human experience and of the ways things present themselves to us in and through such experience" (p. 2). This expression captures the subject matter of phenomenological inquiry of any kind, and indicates why

[1] Husserl raised the problem concerning the adequacy of the foundation upon which scientific inquiry rested. Husserl's overall project was concerned with providing an adequate epistemological foundation for scientific or any other kind of inquiry. He argued that scientists usually take the world to be their axioms, because the things and the world itself are never questioned but accepted as the ground. In other words, he argued that the world is contaminated by either the varied scientific inquiries or the psychological assumptions of the scientists (See Cogan, 2006).

phenomenological philosophy has been applied to a range of domains that are interested in human experience (such as psychology, nursing and health care, and social science). Appreciation of insights from this point-of-view have only recently been expressed in relation to design (See Verbeek and KockelKoren,1998; Poulsen and Thøgersen, 2011).

3.1.1.1 Intentionality and the Publicness of the Mind

Phenomenology notes the fact that all consciousness is consciousness "of" something, no matter if the object of consciousness is the chair that you grab, a football game that you anticipate or remember, or a statement /a fact when you are engaged in judging. This insight establishes the inseparable relationship between what is experienced and how it is experienced. The correlation of the two is *intentionality*, which is a key feature of consciousness. Every experience is intentional, and thus is an "experience of" something.

This outside-directedness of consciousness may sound like a trivial statement. However, it has been overridden by the Cartesian and Lockean traditions, which have dominated culture (especially western culture) for centuries. Following Cartesian and Lockean traditions, researchers tend to believe that when we are conscious, our awareness is primarily directed inwards (as awareness of self or personal ideas) rather than directed outwards (to the things that sensitize such ideas). Cognitive science, neuroscience, and mainstream psychology were established based on this doctrine, which also has profound impact on design, when the broad notion of human is of interest to this young discipline. A design concept is often viewed as a designer's internal mental image (Terzidis, 2007; Dorta, 2008). Consciousness is taken to be an enclosed box, with the mind lodged within this box like "ghost in the machine" (Ryle, 1949). Philosophers have identified an *egocentric predicament* (see Sokolowski, 2000). This approach forces the separation of the body from the mind, and subject from object, in which case there cannot be a world in common for every individual. A life of perception, reasoning, and knowing cannot share a common basis if each individual's mind is locked in an individual body and is directing individual actions.

Instead, the phenomenological conception of intentionality provides a foundation for study of the public realm of experience, where the separation of subject and object is united. Intentionality is the correlation between what is experienced and how it is experienced, which essentially turns consciousness out onto the world. This correlation leads to "a focus on the experience of things in their appearing and the way in which they appear to us as we focus our attention on them in consciousness" (Langdridge, 2007, p. 13). For instance, when a friend in wheelchair talks about how hard it is for him to find a comfortable cushion, I can vividly picture his situation, for I understand how torturous a seemingly comfortable pillow can be at the times when I am suffering from insomnia. Apparently, my friend and I are not experiencing the same thing, as we are in very different circumstances. However, we share something fundamental in the way we are aware of the things appearing to us: the quality of a cushion and that of a pillow are revealed to my friend and to me within the very personal experiences that we are respectively having, and such a quality directs our attention to further aspects of the experiences we have undergone. We thus not only know more about the objects but also have a better idea about ourselves. Such correlation is intentionality. Intentionality makes it possible to understand others' lived experiences by allowing these experiences to have possible resonance for the other. Consciousness, and, as a consequence, the mind are thus recognized as intrinsically public.

With the move away from the dichotomy of subject and object, there is no such thing as an independent "I" being a subject; instead, I see the world through the relationship between the world and I. Thus, I can only understand the world that the I intends toward, and by seeing the world, I see myself in turn. This intertwining relationship is the foundation for an understanding of the world (See Ma et al., 2010.). Sokolowski (2000) has stated that "the world as a whole and the I as the center are the two singularities between which all other things can be placed" (p. 44). This suggests that the world is not merely the sum of the things that are experienced, but the context: a setting for selves and for all the things we experience. Subject ("I") and object (something in or about the world) are therefore joined together in mutual co-

constitution. This relationship of the world and "I" is embedded in any experience, and is therefore public.

3.1.1.2 Intersubjectivity

The public realm of experience is enriched by considering the relationship between people: *intersubjectivity*, which is also grounded in the above discussed notion of intentionality. Intersubjectivity includes two layers: the direct relation between people and the indirect relation between people based on the relation that all people have to the world (intentionality). The experiences of the other people can be described directly, however it is also possible for each person to connect to others in an indirect way, by describing "how we experience the world and things in it as also being experienced by other minds and other selves" (Sokolowski, 2000, p. 152). Both the direct and indirect relations of intersubjectivity address the public realm of experience in two aspects: (i) the commonality wherein self is directed to the world by any individual human being in the world and (ii) the world that is held in common. This results in the public realm of experience and opens up opportunities to understand the others' experience.

Intersubjectivity plays an important role in the designer's understanding of the user and the user's experience, which have become prominent themes in the evolving context of design. Human-centered approaches embrace users' participation in various stages of the design process for different goals and in different forms, with universal acknowledgement that an understanding of the user is important. Designers' understanding of the users will shape the form, the extent, and the nature of the practice: namely, how they design. Nevertheless, the importance of the designer's self-experience has largely been overlooked when the designer is approaching the user's experience. Researchers (for example, Ma et al., 2010) have reported that users' experiences tend to be viewed as objective entities that can be discovered, while the designer attempts to oversee design processes from a distanced stance. There is, as a result, a gulf between subject and object in the designer's actual designing. Nonetheless, since the designer is a human being, she/he is inevitably engaged in a reciprocal process of understanding of

her/himself and the other. Being-in-the-world means that the designer is acting toward another person (a part of the world) in the way of understanding the other by understanding the self-experience. Attending to intersubjectivity may, surprisingly, broaden the horizon of designers' experiences and free them from pre-understandings when designing. Intersubjectivity is a form of relationship that is not invented, but inherently exists in experience of any kind, including design. Only it takes extra efforts to enter this public realm of experience.

The following example illustrates the notion of intersubjectivity, and demonstrates that it is reasonable to anticipate that the dimension of intersubjectivity will be included into consideration when inquiring into design experience. I participated as an observer in an inclusive design workshop, in which a group of student designers and their active-design-partner, Betty, attended to intersubjectivity in the experiences of each other and proposed an impressive game named *Music Without Sound*. Within this design project, the students described that Betty was a young girl who could not hear, but possessed a keen sense of color and has a passion for art (drawing and photography). They abandoned their initial agenda to explore Betty's "disabled" identity, and were, instead, inspired by the strengths of their partner, for they were amazed by her ways of appreciating life. Having Betty as one of them, these students had a pleasant time together creating something. They probed into their own experiences of the colorful world that Betty loved also. They explored the imaginations of the silent world that Betty lived in. They also immersed themselves into the world full of color and sounds in fresh eyes by imagining how Betty experiences it. In short, the students began to understand their partner's experience by understanding their own. Finally, the group arrived at a metaphor that "Betty loves photo-shooting because, for her, colorful world is equivalent to music rhythm" (Field notes: DDL0709GB). They found that colors and rhythm were two clues that allowed Betty to imagine the music that was intriguing but unreachable to her. The collective effort led to an imaginative proposition of their game of music without sound (later performed by the group, see Figure 3.1), which involved translating music into actions. Betty's unique experience had been presented and

reformed, intersubjectively, through the student designers' entering into Betty's experience of music.

Figure 3.1. The development of the game Music Without Sound

3.1.2 Dewey's Conception of an Experience

Husserl's American contemporary, John Dewey,[2] had a conception of experience that followed the pragmatist philosophy, but that also resonated with certain aspects of phenomenology. In his discussion on art as experience, Dewey (1934/1980) dealt with the publicness of experience, by maintaining that any audience's experience is the reconstruction of the artist's experience:

> For to perceive, a beholder must *create* his own experience. And his creation must include relations comparable to those which the original producer underwent. They are not the same in any literal sense. But with the perceiver, as with the artist, there must be an ordering of the elements of the whole that is in form, although not in details, the same as the process of organization of the creator of the work consciously experienced. (p. 56)

[2] In recent years John Dewey's work has been revisited, with an increasing interest in the overlap between his theory of experience and phenomenology. Shusterman (2000) observed that Dewey captured "the aesthetically essential theme of the body which was lacking in analytic aesthetics but increasingly important and alluring in continental theory" (p. 10). Dewey (1934/1980) insisted that "every experience is the result of interaction between a live creature and some aspect of the world in which he lives" (p. 45). This line of inquiry brings Dewey closely in tune with the conception of the lived body, as held by phenomenological philosopher Merleau-Ponty: wherein intellectual pursuit is situated in our being-in as something that occurs through our experiencing the world (Merleau-Ponty, 1962; see also Finlay, 2005, or Poulsen & Thøgersen, 2011). This is also a main argument in Dewey's work. Merleau-Ponty's work is well known for the reunion of the Cartesian separation of the body and the mind: he insisted that people are engaged in the world not from the center of the inner mental faculty (according to thinking), but from through being-in-the-world, an embodied engagement that our meanings of the perceived world inhabit. The shared interest in the theme of body also positions Dewey as opposed to "the dichotomies of body and mind, material and ideal, thought and feeling, form and substance, man and nature, self and world, subject and object, and means and ends" (Shusterman, 2000, pp. 13–14).

This suggests, therefore, that although the artist's original doing, making, conceiving and arranging of every detail of the work cannot be duplicated in an audience's experience of the art product, the underlying form of the two experiences makes it possible for the audience to perceive, and thus to understand, the artist's experience of creation. Matters in the world and the way that an individual human being acts to and undergoes these matters form the foundation of comparable relations for individual experiences of these unique yet understandable matters:

> A new poem is created by every one who reads poetically – not that its raw material is original for, after all, we live in the same old world, but that every individual brings with him, when he exercises his individuality, a way of seeing and feeling that in its interaction with old material creates something new, something previously not existing in experience. (Dewey, 1934/1980, p. 108)

Although Dewey's inquiry into experience is more concerned with reform than with clarification (and with theory that will change practice rather than with ways to explain, ground, or justify this practice), his conception stakes out the public aspects of experience also. An experience is by no means confined to an enclosed cabinet and therefore is accessible by the others, not in terms of the exact materials experienced but in the sense of a comparable relational structure.

Conceptions from phenomenology and Dewey's insights on experience both shed light on the methodological foundation of this study; before moving onto the introduction of research methodology, however, several concerns about a phenomenological approach deserve further clarification.

3.2 Discussions on Methodological Considerations

During the course of his endeavor to establish an adequate epistemological foundation for science, Husserl (1913/1983) insisted on the necessity of a return to the "things themselves," instead of taking the unquestioned world for granted. Building upon the foundations laid by Husserl, phenomenology has undertaken an existential turn, which was initiated by Heidegger, then developed by Jean-Paul Sartre, Simone de Beauvoir and Merleau-Pont (who all focused on understanding existence), and then a

hermeneutic turn has been developed by Gadamer and Ricoeur whose projects were concerned with interpretation. [3] This general historical picture indicates that phenomenology is an umbrella name for a collection of heterogeneous lines of inquiry (see Langdridge, 2007) whose interests varying from descriptions of the general structure of experience that follow Husserl's transcendental position (e.g. Giorgi, 2008) to a need for greater interpretation of meanings immanent in human experience with a more existential position (e.g. Smith & Osborn, 2008).

The objective of the present study is to understand design experience as it stems from the need to articulate design phenomena. However, this objective cannot be immediately fulfilled by using any existing phenomenological approaches. Further discussion on the distinct descriptive and interpretative positions in this family will demonstrate ways to understand the shared phenomenological underpinning and to fabricate this into an approach that is appropriate for my inquiry. The rationale behind the synthesized approach in this study stems from several aspects: (1) appreciation of the commonly-held spirit of phenomenology; (2) discussion on the as-yet unresolved methodological dilemma in existing phenomenological studies (which sheds light on the choice of interpretation that is used in this study); and (3) the nature of design research. These are discussed below.

3.2.1 The Spirit of Phenomenology

In spite of the differences among phenomenological approaches, there are some important commonalities held across this field of inquiry: the core concept intentionality (see § 3.1.1.1), the natural attitude, and the necessity of bracketing of the natural attitude to describe things as they appear to us. These commonalities bring in the phenomenological attitude in an understanding of human experience and shed light on possible methods for studying human experience. Applying this attitude to design research is valuable for the present research (for both the methodological considerations

[3] Langdridge (2007) made an introduction to phenomenology by introducing various influential fundamentals of this philosophical movement of phenomenology.

and the emerging findings) as it allows both means and ends to be well integrated in this study.

Since all groups of inquiry in phenomenological studies emphasize the importance of achieving the phenomenological attitude, it is useful to first understand what the phenomenological attitude aims to reveal: namely, the *natural attitude* in lived experience. We accomplish our daily life, perceive and act according to our experience within an unquestioned acceptance. When we locate a preferred spot on the subway, while we make a public presentation, or converse with close friends, when we are wobbling on the slippery footwalk on a rainy day, or as we work on a design project, we are dealing with the world using different knowledge in hand. A natural attitude is the perspective that we begin with, and is the default, taken-for-grantedness that can accompany our experience of other people, objects, and things in the world. The natural attitude thus comprises our preconceptions about the world (Husserl, 1960; Sokolowski, 2000; Langdridge, 2007). When we are conscious of something we are related to it and we are aware of this. While the natural attitude colors our experience, it is the prior knowledge that we carry with us, but nevertheless usually escapes from our consciousness and contemplation. The natural attitude comes from personal life experience as well as social and cultural conventions. The world is experienced and new knowledge is achieved through experiences that are immersed in the natural attitude. Expressed in another way, the natural attitude contains a wide range of understandings and shapes our ways of directing ourselves to the world; it is immanent in our experience.

However, the natural attitude cannot be aware of within the natural attitude itself. The phenomenological attitude involves the process of retaining astonishment and openness to the world by questioning back, while reflexively restraining pre-understandings in the natural attitude. Phenomenologists have to go beyond the natural attitude paradoxically to discover it (Husserl, 1970; Finlay, 2008), that is, to achieve the phenomenological attitude. The phenomenological attitude "disengages completely from the natural attitude and focuses, in a reflective way, on everything in the natural

attitude, including the underlying world belief" (Sokolowski, 2000, p. 47). This does not mean that seeing from within the phenomenological attitude will change the ways that the world is experienced, rather, the experiences are contemplated using a variety of efforts, termed by Husserl (1931/1967) as *epoché*. These efforts are used to escape the captivity of the unquestioned acceptance of the everyday world. The practice that discloses acceptance as an acceptance (i.e., the revelation of the natural attitude) is *phenomenological reduction* (see Cogan, 2006).

The importance of bracketing off pre-understandings is acknowledged throughout the various of positions in phenomenology. However, the effort to achieve this is approached in two opposite directions in existing phenomenological research: either by bracketing the natural attitude, so that a purportedly uncontaminated or essential structure of the experience can be generalized; or by bracketing and utilizing layers of the natural attitude, through interpretation, to obtain a rich understanding of a particular experience. The former is the task of the classic descriptive approach, and the latter is that of the collection of interpretative approaches. The difficulty in positioning the present study within the current landscape of these two phenomenological approaches gives rise to the following discussion.

3.2.2 Dilemma between Description and Interpretation

The present study aims to identify the *underlying structure*[4] of a kind of experience. The term was introduced by Amedeo Giorgi (2008) as "a way of understanding the lived experience in an essential way" (p. 47). The research plan of this study is inspired by the spirit of hermeneutic (interpretative) phenomenology,[5] which engages the

[4] Giorgi (2008) maintained that "I used the word 'structure' rather than essence because lived experiences are complicated and often require multiple constituents" (p. 46).

[5] The interpretative phenomenological methods recognize the role of the researcher through the way the analyst interprets a participant's understanding, that is, through the researcher trying to make sense of the sense-making activities of the participant (see Langdridge, 2007, p. 107; Smith and Osborn, 2003). However, interpretative phenomenological approaches aim to explore the detailed meanings of the experience to people who inhabit such an experience: that is, every experience is treated as unique, and therefore the idea of underlying structure of an experience is not of interest to this line inquiry.

researcher's involvement as a means of understanding designers' experiences. According to Finlay (2003):

> Existential-phenomenologists argue that as researchers we cannot help but bring out own involvement into the research… The intrinsic role played by us as interpreters when formulating findings must be acknowledged given the way our perceptions are necessarily entangled when accessing experience. (p. 108)

The objective of my study diverges from the collection of interpretative phenomenological approaches that privilege interpretation and explanation over and above description and understanding. The aim to identify the underlying structure of experience seems to bring the study in line with *descriptive phenomenology*,[6] which emerged in 1970s and adheres quite rigidly to a set of methods inspired by Husserl's work that values description. This classic descriptive approach is "a hermeneutics of meaning-recollection, with the researcher remaining close to the participant, attempting to give voice to the participant's experience with as little of the researcher as possible" (Langdridge, 2007, p. 158). Therefore, the goal and means of my study cannot fit entirely into either kind of the established phenomenological approaches, and the choice between description or interpretation is problematic.

With the emergence of the existential and hermeneutic turns of phenomenology, which diverge from Husserl's transcendental position, there has been a corresponding move away in emphasis from generalizing the underlying structure of experience to interpreting meanings of a particular experience. This divergence is grounded on a more fundamental choice of position: whether it is possible for the inquirer to stand outside of her/his own lived experience to describe things as they really are (as Husserl's transcendental position holds); or if the phenomenological reduction is accepted as an imperfect (but valuable) method to reveal at least some of the ways the natural attitude hides our understanding of human experience (an approach that is supported by existential phenomenologists, e.g. Dahlberg et al., 2001). The two positions tend to be reduced to fixed approaches of either description (which excludes the researcher's

[6] Descriptive phenomenology seeks to discern the underlying structure of an experience (see Langdridge, 2007, p. 86.) Arguably, the focus of descriptive phenomenology on "the things themselves" neglects the relationship between the researcher and the researched. This situation can be improved by being aware of, and making use of, the researcher's involvement in the examined experience.

involvement) or interpretation (which denies the shared structure of experiences). The descriptive study generalizes the underlying structure as a kind of experience that is *purely* lived by participants; the interpretive study only adopts hermeneutic methods, emphasizing the uniqueness of each experience and denying the latent structure of a kind of experiences.

This is, arguably, an arbitrary categorization that overlooks the phenomenological underpinnings held in common: intentionality and the intersubjectivity that is grounded in intentionality. Such neglect widens the gulf between the two major groups of phenomenological approaches, rather than providing possibilities of methodological development. Examination of the family of phenomenological approaches shows that the line between the two groups of approaches is far from determinate due to the following reasons.

(1) Description and interpretation are united in order to apply the phenomenological attitude, even if the study purpose is generalization or description. Although researchers who follow descriptive phenomenology believe that the transcendental reduction is achievable by epoché or bracketing (by ruling out the researcher's interpretation and contamination of the investigated experience),[7] they still rely on doctrines such as *imaginative variation* (which involves the researcher's interpretation [imagined perspectives] to paradoxically bracket the natural attitude and reveal the essence). Likewise, an assumption in classic descriptive phenomenology is that the research participant's experience is out there in her/his concrete descriptions, which already contain the underlying structure. However, this approach encourages the researcher to elicit the research participant's voice by staying close to the participant through hermeneutic interview questions.

(2) Heidegger also maintained that "all description is interpretative and there is, therefore, no way of arriving at something that is pure description, untainted by the interpretative frame of the human being producing the description." (cited in

[7] Giorgi (2008), who is well known for his influential endeavors in descriptive phenomenology, claims that by bracketing it means that the researcher "does not engage her [or his] own understanding of the phenomenon and remains open to what the participants tell her [or him]" (p. 40).

Langdridge, 2007, p. 159). The following reasons are concerned with intentionality and intersubjectivity in particular: the shared phenomenological underpinning across variations in approaches. They offer a ground to support the synthesis of the descriptive goal with the interpretative means.

(3) Denying interpretation, as an inescapable and potentially powerful means that may serve the descriptive purpose, seems inconsistent and incoherent in the context of the spirit of phenomenology. If descriptive phenomenologists see their work as loyally following Husserl's transcendental phenomenology, which calls for a focus on the things themselves, it seems inappropriate for them to ignore Husserl's considerations on intersubjectivity. Both the direct and indirect relations of intersubjectivity (see 3.1.1.2) are grounded on the conception of intentionality, which supports the commonalities between individual experience: that we direct our selves to the world as anybody like our own being in the world does and that the world is held in common. If this is the case, there is no evidence showing that intersubjectivity cannot instrumentally serve to bracket the natural attitude and to allow the things to disclose themselves to us. This does not suggest that all experiences of a certain kind are identical, nor is it the case that the shared underlying structure captures the totality of any experience. Nevertheless, the structure is a basis for understanding and articulating experiences.

(4) There is no reason to reject the entire project of identifying the basic structure of experience merely because the existing descriptive approach has not fully attended to the public realm in human experience. Concurrently, the collection of interpretative phenomenological approaches have successfully demonstrated the importance of attending to both the phenomenon and the interconnection between the researcher and the researched (e.g. Finlay, 2009.) Although the dominant focus in this branch is on unique meaning, it does not provide any basis to reject the conception that interpretative experience of the inquirer who is engaged in the collection of hermeneutic approaches may share certain structure with the experience under investigation. As noted above, intersubjectivity underlines the shared fundamental relation that the researcher and the researched have to the world.

The above discussion indicates that both description and interpretation may coexist when the researcher approaches human experience, rather than being radically incommensurable (as the current categorization of phenomenological methods is inclined to assume). The researcher can be involved when identifying the underlying structure of experience: It would be a hasty decision to reject the existence of the underlying structure of a kind of experience simply because of misgivings about possibility that a pure description is achievable. Acknowledging the researcher's involvement helps to reveal and bracket the natural attitude in light of the spirit of phenomenology.

3.2.3 Concerns of Design Research

When situated in the context of design research, the methodological synthesis of description and interpretation, and the inclusion of the researcher's involvement are further supported as a means to accomplish the objective of understanding designers' experiences.

Design is a young discipline and for this reason design research has borrowed methodologies from other established disciplines. None of these methodologies are ready-made for design, nor have they been developed in responses to the nature of the subject matters of design research. The family of phenomenological approaches has been primarily developed in the discipline of psychology. Psychology has its own subject matters and goals, and these may be satisfied with either description or interpretation approaches (e.g. describing the process of an experience of having a chronic disease; or interpreting how a victim of domestic violence makes sense of her marriage). Nonetheless, the following reflection on the nature of design indicates that design research has its own agenda.

Design is not alien to any form of inquiry that consists of making and invention within the context of communication and application. According to Buchanan's (1995, 2001a, 2004) persistent work on design and new rhetoric, design is an architectonic

productive art of all kinds of making in this era of technology. Similarly Glanville (1999) insisted that scientific research is a subset of design; rather than the other way round. Apart from the making of tangible or intangible things, Buchanan (2004) also recognized design as an inquiry:[8]

> Design has become a form of inquiry: a way of interacting with the world to investigate the environment in which human beings are directly involved and the surroundings in which they are indirectly involved. Indeed, it is a way of investigating what it means to be human at a time when technology, the complexity of organizations, and expanding knowledge of natural phenomena threaten to overwhelm us. (p. 5)

The nature of design is embodied in all forms of practice and research that concern making. The experiences that design research investigates are experiences of practice and production, which is the point where arts and sciences converge.

Therefore, it is inappropriate to restrict design research within the specific characteristics of a particular strand of scientific approach. The methodology of design research, when it is borrowed from other lines of scientific inquiry, deserves appropriate modification, if necessary, as long as the modification pays respect to the fundamental spirit of the borrowed original inquiry.

Naturally, the conception of design as inquiry applies not only to design practice but also to design research. In practice, the teacher is actively involved in the student's experience of having a design concept, and this relationship can be interpreted different from merely that of an observer (this also applies to peers who offer reviews, and users who give comments). Practicing designers combine interpretation with description to understand, develop, and articulate the experience. If this is a feasible way of turning know-how aspects into know-that aspects in practical design inquiry, it merits consideration for inclusion in the approach of any design research whose major goal is to turn the implicit to the explicit. A relevant description of design is not merely an account of something, but also a description including the aspect of how this developed.

[8] Buchanan, when he translated Dewey's (1938) definition of inquiry into design, maintained that: "The concept of inquiry is more than the vague and benign idea of questioning. Inquiry is a mode of conduct. It has a beginning, middle, and end, and it involves a pattern with distinctive elements that are explored in design practice as well as design research" (Buchanan, 2004, pp. 6–7).

There is an opportunity and a tacit need for the seemingly incommensurable goals and means of descriptive and interpretative phenomenological approaches to converge in design research. As McDonnell (1997) pointed out, ways of studying and building descriptive models of design "are consistent with the view that the process by which we come to understand design as a social activity is, in essence, a work of interpretation" (p. 457).

Besides this, instrumental use of the researcher as a means to disclose experience is also an approach supported by the emerging practice-led design research. Whereas current practice-led research still has many unresolved fundamental issues to address, its focus on designers' own experience deserves re-animation in design research. The growing field of practice-led research indicates that experiential knowledge research explores the phenomena in a way that includes not only tacit knowledge but also provides insight and emergence of new artifacts and practices, which are recognized as being central to understanding of design activity by designers and researchers (McLaughlin, 2009; Yee, 2009). According to Niedderer and Reilly (2010), Practice-led researchers have maintained that "the inclusion of practice in the research process or as a research outcome helps to integrate and communicate those kinds or parts of knowledge that cannot easily be made explicit" (p. 6). They noted that the controversial practice-led research emerged to address two prominent requirements. One is the political-philosophical position of seeking to restore the relationship between theory and practice. The other is based on the idea that since practice relies on tacit knowledge, while research requires explicit communication, grounding practice within research gives rise to the necessity to articulation.

Hence, the nature of design calls for an adaptation of methodology for the present study. This approach has been taken in preference to a rigid adherence to the procedures and doctrines of the existing approaches in phenomenological psychology.

3.2.4 Summary of the Methodological Position

The above discussion has provided several reasons to support the research methodology employed in my study. Firstly, description involves interpretation, and both are united in human experience. There is no reason to assume that meanings are interpreted without any kind of underlying structure of experience. Also, there is no reason to allege that the identification of an underlying structure of experience cannot contribute to an interpretation of meanings by enriching understandings of the experience under investigation. Whether the objective of a study is to describe the underlying structure or to interpret more about an experience is a matter of the choice. The desired end should not be the yardstick to determine the employed means of the study. The expected consistency, either in description purely through generation or in interpretation purely through hermeneutic methods, results from the arbitrary separation of description from interpretation, and means from ends.

Secondly, the union of description and interpretation goes in concert with the nature of design as inquiry. If the underlying structure is relevant to the experience of having a design concept, this structure will somehow be able to address the issue of how having a design concept occurs, because understanding of this is part of this experience per se. Hence, a descriptive structure can allow the researcher to interpret more about the experience, for it offers "a way of understanding the live experience in an essential way" (Giorgi, 2008, p. 47).

Thirdly, the researcher's interpretative involvement is inevitably included in the development of a descriptive underlying structure of the study. This is determined by the subject matter of this study and is supported by the interconnected phenomenological conceptions of intentionality and intersubjectivity. The public realm of experience supports the exploration in research methodology for myself, as the researcher, to enter into designers' experiences. By doing so, I create my experiences of having a design concept, which not only extends the variation of the limited data, but also increases chances that more pre-understandings may be revealed through enriched discourse.

Considering the spirit of phenomenology and characteristics of design research, this study adopts an approach that attempts to integrate description (generalization) and interpretation by attending to the experience hermeneutically; and by engaging the researcher in understanding and interpreting the examined design experiences. Such integration suits the subject matter and the goal of this study. This stance is embodied in the process of data analysis that is illustrated in § 3.3.3.

3.3 Research Design

This study starts with a pilot study, upon which the main inquiry is developed. Data collection and analysis are integrated as an interrelated whole, in which interpretation occurs in the service of further generalization. Various methods are selected for different purposes at different phases of the study.

3.3.1 Data Collection

3.3.1.1 The Pilot Study

To understand how the phenomenon of having a design concept is described by design teachers and students, 26 experienced design teachers and 14 students from 12 industrial design programs from Mainland China were interviewed using semi-structured questions. Students were encouraged to give accounts of their conceptual design practices in different types of projects. Teachers were asked to describe some specific projects and processes, and the critical situations in which they were involved to tune into students' development of concepts. Besides, tutorials of two undergraduate projects were observed at a university. All the interviews and observations were tape-recorded and transcribed immediately. My reflections about what was going on were written down in field notes. The interview questions and observation focus underwent temporal modifications, which were directed by the preceding rounds of ongoing comparative data analysis and theoretical memos.

As a result of this process, the scope of the cases was narrowed down to experiences within contextual design projects, as these provided integrative practicing cases as opposed to the particular skill-oriented training in conventional foundation courses. Different from the initial pre-supposition for sampling, this preliminary study indicates that contextual design projects are conducted across every level of design education. Whether the student participants are undergraduates or postgraduates is an irrelevant criterion for this study.

The pilot study also indicated that the researcher should be aware of and seek to diminish the restrictive impacts of research activities on research participants' performance. Chinese students were quiet and shy, and hesitant to voice their opinions in public unless they were quite sure of them. Setting up a camera during a discussion session at a studio seemed to put the students on alert, and held back their communication, in comparison to other observed sessions without intervening in their daily working environment. Video recording was thus abandoned, and the use of group interviews was found to be an effective way to encourage more open discourse. Interview questions that asked for definitions or general opinions about the key terms in design were replaced with requests for descriptions of specific experiences and situations, once the difficulty in making definitions about design was apprehended. Email correspondence was adopted to develop research participants' reflections, or to make up the aspects overlooked in earlier communications but implied by the ongoing data analysis. These implications from the pilot study were followed up in the main study.

3.3.1.2 The Main Study

To encompass the developing context of industrial design education (see § 1.3), the twelve cases selected in this study covered a collection of student participants, ranging from master and undergraduate students to senior high school graduates, and these students were studying a variety of majors (such as industrial design, visual communication design, and interaction design). The participating teachers were also from a variety of backgrounds (for example, industrial design, art, environmental design,

multi-media, engineering, and social science). They all had working experiences either in design consultancies or in research institutions. The inclusion of experienced supervisors was important, because novice designers' experiences are incubated and co-created by the professionals, which enriches the width and depth of the contextual design projects that are conducted by students. This variation in sampling allowed me to locate participants who had common experiences of having a concept, but whose characteristics differed widely; such variation was hypothesized to reveal those aspects of the experience that are commonly shared across individual perception.

However, the quality of design and education was not subject to the variation sampling. This is because the experience under investigation needed to contain a meaningful process and product: this is better cultivated in leading design schools. Considering the unbalanced development of Chinese design education and the rapidly increasing number of design schools that have resulted from the policies of enrolment expansion launched in 1997, I chose seven design schools (six from Mainland China and one from Hong Kong) that had leading positions nationwide. Among the six Mainland Chinese schools, four have the longest history (as they were founded within the first ten years of the history of Chinese industrial design education) and these schools set up high benchmarks for design education of different modes in China. The other two design schools in China have demonstrated visions and active collaborations in quality design, despite their relatively short history. The only design school from Hong Kong is included, due to its unique influence in Chinese design education (see the introduction of the context of Chinese design education in § 1.3) and its close integration of cutting edge theories and practices.

Usually the sample size of research employing phenomenological analysis is very small (about five or six for interpretative phenomenological analysis). For interpretative phenomenology, the sample size is not a problem, since a generalized claim is not the purpose. But even for descriptive phenomenology, which aims to generalize the underlying structure of a kind of experience, the sample size is generally three (Giorgi, 2008) to five or six, because of the time-consuming nature of the analysis process.

As far as the selection of design projects is concerned, all the experiences are relatively recent and were impressive to the participants. Retrospective descriptions of experience, semi-structured interviews, and participatory observations were employed to collect data. All projects and interviews were conducted in Chinese, although English was used when the project involved collaboration with foreign participants. All the interviewees were informed about the research topic, and conversations were audio-recorded for transcription and translated into English when cited. Pseudonyms are adopted throughout.

For those short-term cases (such as tutorials) where I had little chance to truly enter into the community, observation was supplemented with field notes. These include accounts of the participants' activities and their self-reflections, as well as reflections on my own experiences of the particular case. For long-term projects (varying from fully compacted 2–3 days to several weeks), I familiarized myself with the project background by attending the studio-based tutorials, teachers' lectures, or students' presentations. I also made use of the actual working environment, by staying close to the participants when they were having discussions or conducting design research in the field (in and outside of the studio). The tutorials and discussions were audio-recorded, because much of them contained important information about the original experiences under examination. Video-recording was rarely used due to the intimidating sense of intrusion noted above, as well as copyright issues in the sponsored and internationally collaborative projects. Conversations or reflections, although often discursive and fragmented, are chronologically documented (this reflects how the phenomenon of having a design concept was lived).

I also interviewed the students and teachers, inviting them to describe their experiences. Interviews with the students were flexibly conducted either with individuals or in small groups depending on the form of the arrangement of project. The choice of interview was not only as a method to capture the retrospective accounts of experience, but also to create new experiences of having a design concept: for design concepts develop when reviews are stimulated. Group interviews in small sizes (two or three

participants) were also applied when the students joined the same class but developed designs individually: this was because they were familiar with each other as well as the design context, a context that encourages participants to freely offer their reviews. Each set of interview questions was different and was modified based on the particular happenings in the project. For instance, initially teachers and students were asked to define design concept based on their personal understandings, which caused much hesitation, meditation, reflections and confusions due to the complex nature of the term. When this request was perceived as too intimidating, I reframed the questions as invitations to describe some design concepts in relation to their recent projects. An example of the interview outline can be found in Figure 3.2. A sample of an extract of transcription from a group interview is provided in Figure 3.3.

Figure 3.2. An example of the interview outline

Interview Outline to S. (May 30, 2010)

A brief introduction about my study:
During the past two and a half years I have been studying design students' experiences of having a design concept in contextual design, exploring how they make sense of their design concepts. I am interested in not only what have been proposed as design concepts, but also the way how they are determined so and what they appear to the designer. This is not an issue merely about object-oriented design process. Instead, I want to explore designers' feelings, attitudes, judgments made in the experience and their influences on and gains from the experience.

Therefore, I look forward to your descriptions of such experiences when you were conducting the electric tool project. Concrete examples will be of great help to my study.

Thank you very much for your support and collaboration!

About the interview:
This semi-structured interview will be audio-recorded and transcribed. The interview data will be used anonymously.

Objectives of the interview (Omitted in the version distributed to the interviewee):
- To identify the key relational dimensions of a "design concept" as it is understood by the designer acting towards it.
- To explore the experience space in conceptual design, including perceived user experience, designer's own experience, user's experience of user study (if any), and the anticipated experience as interaction design product.
- To explore the underlying structure of design experience that integrates both the objective and subjective correlations of a "design concept."

→

Figure 3.2 Continued

Interview questions:

1. Please could you tell me what your design concept is in your electronic tool design project?
2. What was very impressive to you when you realized that this design concept first emerged?
3. Can you tell me what aspects your concept is about? Have they ever changed over time?
4. Did any impressive things happen when you and your team were doing user research in the field?
5. What does user mean to you? Prof. T, for example, claimed that he is a target user of your design. What have you learned from his experiences of using tools?
6. How did you and your teammates approach the potential users or stakeholders in hardware stores or furniture workshops?
7. How did you determine whether some captured experiences were relevant to your design or not? Or, have you noticed any peculiar findings, but did not include them into your design? If yes, Why?
8. In your reflection notes you said, "The most difficult part is when I got the concept of double purpose, I couldn't find a proper vehicle to materialize it." What does a vehicle mean to you?
9. Can you describe how an emerging concept affects your searching for the materialized vehicle?
10. I noticed that in the earlier design critiques you mentioned an alternative concept of yours, "a one-shot concept," which you felt very appealing. But it was seriously challenged by your classmates and tutors. Can you tell me more about why you thought it was a good concept?
11. When you talked about future trends, you said that you paid attention to looking for those things that are irrelevant to electronic tools but might be of help. Can you give me some examples?
12. Did you encounter any problems when you were developing your ideas? If any, how did you cope with them?

Figure 3.3. An extract from an interview transcript

Researcher: You mentioned that you had two independent ideas at the outset: a scanner and an e-book. Why were you trying to merge the idea of e-book with the scanner? Simply because you like that Sony e-book?

Student: No. Considering the procedure of scanning, I just got the feeling that people need some shape other than that of current mini scanners to steadily lay their hand on. Actually, my inspiration first came from a cigarette box designed during the Cold War. Once opened, it could scan immediately. Therefore, I always have this shape of a sheet on my mind. It suddenly occurred to me that I scan in order to read. But it happens that you feel satisfied once scan is done and the following reading probably never happens. For one thing, the content could be very disordered. But if it's also an e-book, you can read it right on your way home.

Researcher: As for the concept of the ring shaped e-book, what is the most impressive aspect of it in your eyes?

Student: In fact, my roommate came back with several books the other day. I was playing with the paper ring that wrapped around the books when this idea occurred to me all of a sudden. What if I can read continuously, like turning a ring? It would be a genuinely smooth reading experience, I guess. There it is. You know, turning the page is quite a disturbing process. At first you gaze at this line, but when you turn the page or scroll through the text on the screen you have to relocate the line where you've been. There's a jump.

Figure 3.3 Continued

Peer 1:	I think there is an issue about portability. When on earth would people like to read using such a small device instead of a real book? It would be when you have just a little time to kill, while on the bus, or taking a break. You would feel like reading several pages. For such a short period of time, maybe ten minutes a day, I have to wear this on my wrist for a whole day, which is silly. Not to mention the sticky summer.
Peer 2:	Oh, another thing about ways of using, about the scenario of using it. Sometimes I read on bus, browsing magazines on my mobile phone. In comparison with a general mobile phone, one disadvantage of this e-book is, you have to operate it with both of your hands. If I'm on a bus, I probably have to hold a handle. Then it would be quite inconvenient. Beside, this (simulating turning an imagined ring) posture [is annoying]. People probably would find it indecent (chuckling). It looks like as if as if I'm cheating in an exam. In addition, it'll get you crazy focusing on that small area for a long time. After all, reading a proper book is the most comfortable.
Student:	I've thought about that earlier. I tried to operate it single-handedly. It feels quite natural to me.
Researcher:	As you two talked about the potential problems, how do you feel about this design? What's the first impression that it strikes you?
Peer 1:	I mentioned the ring-shape, which is not a deficiency. D said [in earlier talk] he's not sure which shape is better, the ring or the plastic shape. I mean, the flexible plastic shape might be better. As for the reading posture, someone might fell it a bit strange. But it's fun. People such as student would probably like it. The moment he told me about his idea, I thought it very interesting.

Data collection and analysis went hand-in-hand. Data from each time of field study was immediately analyzed through ongoing memo-writing. Arrangements and modification for next fieldwork depended on analysis of the preceding work. As the researcher, my initial understandings guided the next research actions in the field, which is one of the ways that a researcher's involvement influences interpretation. However, staying close to design students and teachers, and trying to elicit more voice to their accounts of their experiences is a major task in data collection. I described my own experiences (anchored in the design concepts that were discussed) in my field notes, as preparation for more profound involvement.

Examining an experience while it is ongoing is problematic. I did not employ the often-used *think-aloud technique* (Aanstoos, 1985) or *protocol analysis* (Dorst, 1997) for there is a significant difference between the experimental tradition and experiential research. The experimental tradition was first developed in research on *things* (phenomena in the natural world that are independent from human beings). Think-aloud methods to collect designers' verbal accounts arise from the experimental idea to examine, "what is going on inside people's heads by asking them to verbalize what they

are thinking." (Dorst, 1997, p. 83); however, "one can abstractly isolate experiential variables or factors, but one cannot do that actually without simultaneously modifying the structure of the experience" (Giorgi & Giorgi, 2008, p. 35). That is to say, devising a laboratory setting to invite participants to articulate the real-time thinking while fulfilling a designated task will result in design experiences that have a different structure to those experiences that occur in designers' natural settings, for the experiences of the former are directed by the attention to verbalizing the intellectual process. An experience encompasses dimensions beyond thinking. The simultaneous verbalization discloses certain parts of the experience; on the other hand it may suppress other parts, such as emotional and bodily dimensions: thinking, doing, and perceiving all happen together. In order to articulate what we are thinking, what we are doing and how we feel about the consequences, our ability to take action may have to be compromised. Therefore alternative methods, such as observation of design tutorials, peer reviews, and group interview were adopted to collect designers' accounts of memorable and meaningful experiences in designing. Neither think-aloud methods nor observations with retrospective interviews are perfect ways to collect experiential data; however the latter is more suitable for the goal of my study, to explore relational dimensions of an experience.

The raw data about design experiences were further enriched with the sensitized interpretation from participants as well as from the researcher.

3.3.2 Choice of Cases

Twelve cases were selected based on the variation principle and under the direction of the implications arising from the continuously unfolding data analysis. They are chronologically summarized in Figure 3. 4.

Figure 3.4. A brief summary of the selected cases

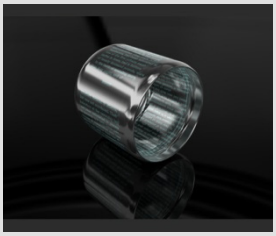
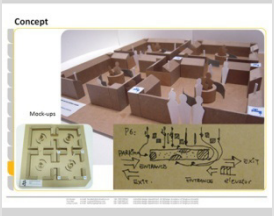
	Project Title & Brief Introduction	Data Collection
1 	"Easy home" – portable furniture design (Mar 27, 2008, Tongji University.) An undergraduate student's capstone project, which just began 4 weeks ago and had months to go. In a thirty-minute tutorial the student reported findings from his field study and initial design concepts, which were designed for young people living in rented flats. The tutor appreciated the student's inspirations from luggage case and storage box, and helped him steer through a dilemma.	• Observe a design presentation & critique • Interview the tutor • Interview the student
2 	Information booth design (Feb-Mar, 2009, Tongji University.) A Year 4 undergraduate student's one-month project for the Info-box design competition for Expo Shanghai 2010. The students reported at the very beginning that he had conceived the idea to embody all sorts of meanings that an information booth and its sponsor would want to convey to the Expo visitors by means of material, texture pattern, shape, etc.	• Observe the tutorials & critiques • Two rounds of interview with the student to follow up his reflection
3 	"Play with the sun" – a system design for urban children (Mar 25, 2009, Hunan University.) A student described his concept and discussed it with a classmate. He reported that his concept would improve urban children's current cold entertainment experiences by including a system of objects and activities centered on solar energy.	• Group interview
4 	"Loop Book" – E-book design (Feb 23 - Apr 9, 2009, Tongji University.) The project was assigned by the tutors as "a future product design." The student was inspired by a paper ring that wrapped around books, and thus attempted to create a "genuinely continuous" reading experience using the movement of turning a ring. However, his concept was challenged by other two peers who questioned what a pleasant reading experience could be.	• Observe tutorials and presentations • Observe students' discussions • Group Interview
5 	Intelligent food label Design (Apr 9, 2009, Tongji University.) This was from the same "future product" project as above. The student identified a blind spot in people's current way of consuming a certain kind of foods, whose expiry date changes when the package is opened. However, her proposition was confronted with acute questioning from her peers, as to whether the product failed to function in various imagined scenarios.	• Observe tutorials and presentations • Observe students' discussions • Group Interview
6 	"井"- System and service design for supermarket (Apr 15-24, 2009, Tsinghua University.) A project sponsored by a Japanese company, which lasted seven weeks. A team (three undergraduates) was working on identifying opportunities to create a more efficient service system for a supermarket. Through intensive field research in supermarkets of different kinds, students reported a new environment plan to reshape shopping paths based on different shopping purposes.	• Observe tutorials • Participate in students' field studies • Observe group discussions • Group interview • Follow up students' reflections by emails

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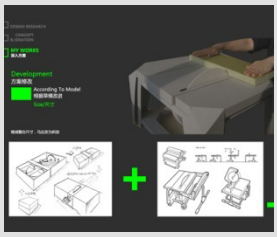
Figure 3.4 Continued

	Project Title & Brief Introduction	Data Collection
7 	Electric tool design (Feb-Apr, 2009, Tongji University.) An undergraduate student's capstone project sponsored by a Germany company, supervised by one in-house designer and two teachers. The conceptual phase lasted less than one month. By the end of the first two weeks, the student already achieved a relatively stable concept, which was about combining a table-saw and a cut-off saw in one.	• Observe tutorials and presentations • Interview the student • Interview the tutor • Follow up the student's reflections via emails • A new in-depth interview after the project was done
8 	"Ever Green" – service design for the local elderly in HK (Jul 27-30, 2009, Hong Kong.) Fifteen students from HK local high schools and Shantou University as one group participated in Design.Lives Lab 2009 (an inclusive design workshop organized by RCA, UK, HK PolyU, and HK InnoCentre). Students finally proposed an event for the local elderly in HK to share their lived history of HK with young generations after an unexpected huge "setback" happened.	• Participate as an observer of the whole event • Observe students' field study, discussions, and presentations • Discuss with facilitators & a organizer
9 	"eTrans" – TV ad design for promotion of electric cars use (Sep 15 – Oct 21, 2010, Tongji University.) Among seven groups working on a system design project for electric cars, 3 Year Four students from Tongji CN and 2 Year Three students from Kolding DK developed a TV advertising inspired by an unexpected exploration of bodily experience. They decided to make the video arouse a tension with physical emotions to the audience, which was not immediately embraced with positive feedbacks however.	• Participate as an observer & facilitator of the whole event • Observe design critiques • Observe students' discussions & presentations • Group interview with students
10 	Innovative product development for wearing high heels (Jan, 2011, Hong Kong Polytechnic University.) A two-week project. Four MDes students in a group proposed a set of products to reduce the chances of women getting injured by wearing high heels. They identified this design opportunity by formulating a problem that wearing high heels is bad for women's health, but most women still love to or have to wear them.	• Observe tutorials & presentations • Participate in tutorials
11 	Enunciation training program designed for autistic children (Jun 28, 2011, Shenzhen.) Two MDes students (from Beihang University & Jiangnan University) collaborated on a project sponsored by Changhong Co.. They were inspired by their personal experiences of looking after autistic children at a welfare house and proposed an interactive educational program based on the conception of *sensory integration therapy*.	• Participate students' field study • Group interview with the students • Participate in a tutorial • Follow up students' reflections via emails
12 	"Recho" – experience design on memory (Jul 15-16, 2011, Hong Kong Polytechnic University.) This MDes student's individual capstone project introduced a concept of an experience design by "replaying" the cherished memories through a course of human-objects interactions. However, his description in the final presentation made me feel "awkward." This feeling surprised me. In order to understanding my perception and to articulate my critiques, I had to question back to that moment introspectively.	• Observe the tutorials & presentation • Informal and written discussions with the tutor

3.3.3 Data Analysis

As summarized in § 3.2.4, description is engaged with interpretation. Hence, the term *description* is used in a neutral way in this study hereafter to refer to turning the implicit to the explicit. Two threads of movements are interrelated in description: generalization (which points to the conceptualizing end) and interpretation (which points to the hermeneutic end). Actually, designers are continuously interpreting and generalizing their experiences, when they literally undergo the experiences and when they are asked to describe them. They do so in a spontaneous and discursive way. If the collected accounts of the design experience inherently involve the two threads in relation, the researcher should give voice to both, and then allow the generalization and interpretation in the experience to be generalized as the underlying structure.

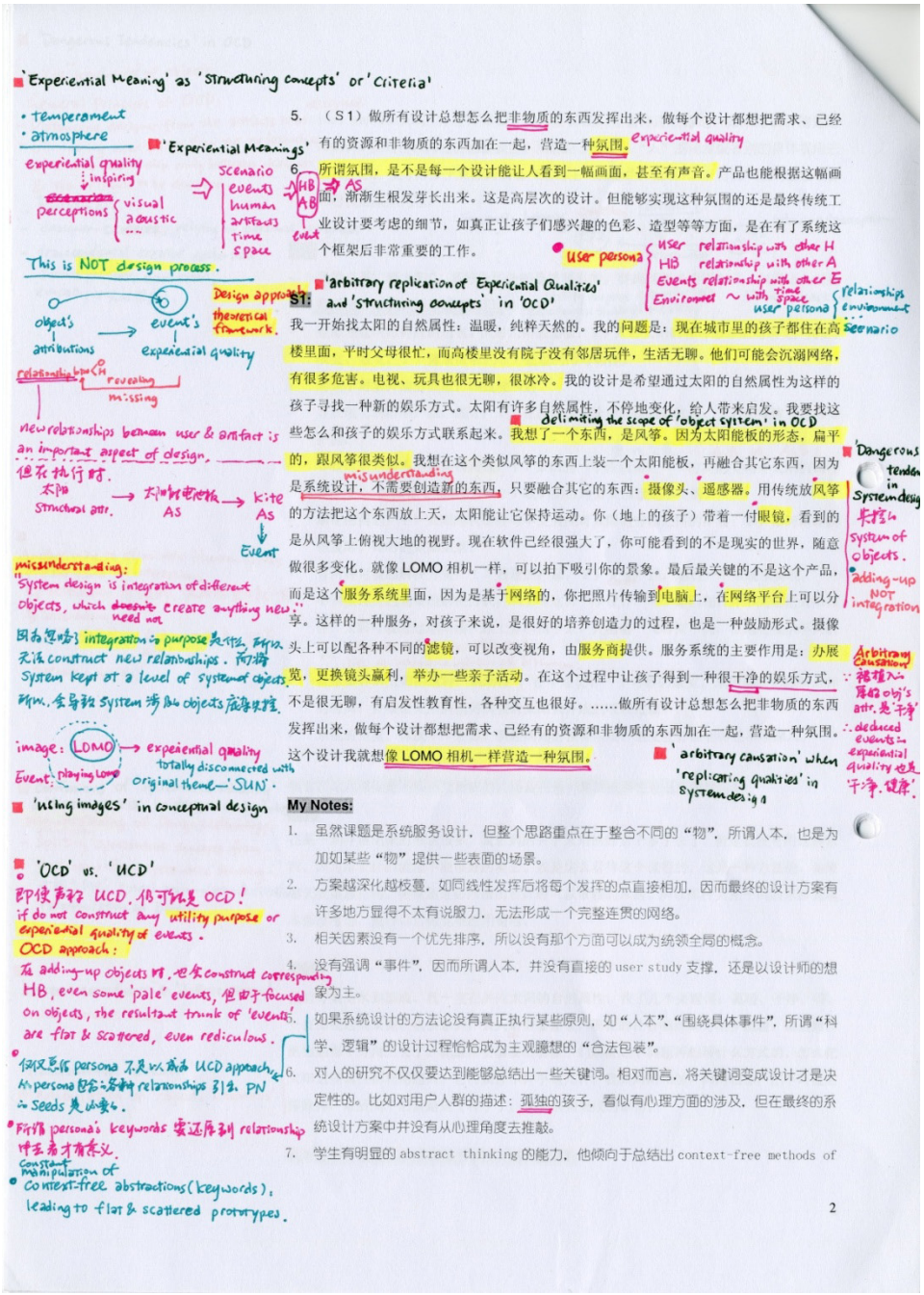
The integration of interpretation and generalization is embodied in the researcher's twofold involvement in data analysis. Through interviews, observations, and descriptions of designers' experiences of having a design concept, I had many experiences of the same kind. While documenting my experiences, I was acting like a designer describing her practice. On the other hand, I reflected on designers' experiences of having a design concept as well as my own, making decisions on the ongoing data collection, and trying to conceptualize the underlying structure of these experiences. By doing so, I acted as a researcher. Interpretation thus acted as the nexus of the two roles. Data analysis was enabled and documented through: (i) initial reflection on transcripts of interviews/field notes; (ii) writing theoretical memos; and (iii) writing mixed memos. I worked like a double agent in each phase of analysis: making practice and understanding practice through theory, and vice versa. I reflected on data and on theoretical constructions, and discussed the revealed pre-understandings of both. For this reason the documented interpretations of experiences appear very close to the designer's practice: although they are guided by a course of systematic reflection, they are further informed by the emerging structure, and they support this structure.

This approach was not pre-determined, but instead emerged as the research unfolded and my understanding of experience developed. As the data analysis unfolded I realized that it was rarely the case that I could understand designers' experiences without

personally reflecting on their concepts, their experiences, and my own experiences; nor did the data collected from the field (designers' accounts of their experiences) already contain the totality of what an experience had reached. Thus, although firsthand data from the designers is fundamental, it is not sufficient on its own to present the structure.

3.3.3.1 Transcription and Initial Reflection

Figure 3.5. An example of transcripts in analysis



In each round of data collection and data analysis, the phase of transcription and initial reflection occurred first. Transcripts of interviews and field notes of observations were printed out on A4 paper with wide margin, and emergent categories were written down alongside the substantive data that they referred to. Transcripts were examined in a line-by-line mode. This phase, however, is not solely concerned with generalizing designers' descriptions of their experiences. My interpretations of the examined experiences were mainly recorded in the mixed memos in detail (aside from a few that were immediately documented in field notes). Topics of my comments, reflections, and interpretations were also generalized and marked out for the reference of future memo writing. Figure 3.5 is an example of a transcript in initial analysis. From the beginning of data analysis, generalization and interpretation were simultaneously worked on.

Generalization does not aim to fracture the experience into factual categories, as in that case the identified structure would simply involve the retelling of an individual experience. The objective of generalization is to reveal categories of factual contents that are shared within various descriptions of experiences, and to identify the relations among the categories. The underlying structure should be able to account for the change of the relations.

3.3.3.2 Theoretical Memos

The generalized categories and topics were further discussed in theoretical memos, with the current date and the code of data marked out to make sure that corresponding data that support theoretical categories could be traced. The connected categories/topics were highlighted in the memos, to encourage new discussions to include the relations among the categories. Dialogues between the categories and concepts from relevant theories or philosophical perspective were also conducted in memos. Both were subject to modification: ruling out the old (if appearing remote), or including the new (if emerging as relevant). For example, I acknowledged the importance and relevance of the phenomenological formal relations and have identified extended relations between them

supported by data. Through this process, research findings resulted from the influence from both extant theories and the field.

New relevant topics would arise from such discussions, as would reflections on the same topic, which were also discussed in new memos. With the date marked, discussions following the same topic at different points of analysis could then be compared. This assisted me with exploring my pre-understandings, either of the substantive experience or of theoretical constructions. Insights on the underlying structure arose from such comparison and were documented as hypotheses (to be further examined to determine if they were relevant and fit with the data or not). These discussions also directed fieldwork and sampling in the next step. For instance, when the five areas of design concept emerged, I moved away from traditional object-centered projects toward interaction and system design projects.

Figure 3.6 illustrates a thread of preliminary, yet evolving, discussion on the notion of design concept. For the convenience of presentation, this is just a short clip of a long-term discussion on a key concept in the examined phenomenon. The presented discussion on design concepts was heavily shaped by conceptions such as levels of abstraction and conceptualization, which were later revealed to be crucial pre-understanding of design.

Figure 3.6. An extract from evolving memos on related topics

On "Design Concept" (related to field notes 08TR05-p1, Feb 08, 2009)
When design concept is discussed in different contexts, it means differently. It can be:

- An abstract structure that illustrates a certain relation;
- A hierarchical plan for components in macro and micro views;
- A manifestation of an implicit problem (in designer's language), which is particularly the case in a concept design. It seems to be a development from an abstraction (the concept) to another more contextualized abstraction (the problem).

Implication on design concept for further filed work (Feb 08, 2009)
Design concept is a fuzzy notion. It has been flexibly used with boundary varying from a very brief abstraction of an idea to almost overlapping the most domains of the notion of design itself. However, design concept is frequently used in design practice and education. It has been named as an important category for design evaluation. To identify the boundary of design concept in a certain context is helpful to identify the fundamental design experience.

New field questions:

- Ask students and teachers to describe the design concepts of some given and famous products;
- Ask students and teachers to describe the concepts in their ongoing project;
- Ask students and teachers: *what is a design concept in the context of final evaluation?*

Figure 3.6 Continued

On design concept" (related to field notes 08TR17-p2, Feb 25, 2009)
When referring to an existing design, a design concept seems to be a multi-perspective interpretation of a static output of design inquiry, and its structure is relatively stabilized, especially in terms of each pair of contrasting ends: transcending and contextualized; and differentiated and continued. The degree of the contextualizing and that of the transcending ends have reached equilibrium, i.e., every component of the design has been assigned to an appropriate level of abstraction (micro or macro view). So do what is differentiated and what is continued. Equilibrium seems to be the point when a design concept becomes relatively stable and mature.

However, before this point, the developing concept accommodates many unsettled conflicts that arise from the paired poles, which makes "the concept" very slippery and continuously evolving. Understanding of the design concept has much to do with pre-conception and early convergence, but it can also be naturally constructed through the process, acting as the "direction," especially in the early stage, to guide designing (where, what, and how by delimiting the scope). In the latter case, understanding of the potential concept grows from the abstract level (the main structure of the concept) to the concrete level (explicit planning for components), i.e. it emerges through the process.

On comparison of two modes of conceptualization in relation to macro & micro views (Feb 25, 2009)
In practice there are two modes of conceptualization regarding the shift of macro and micro views (or, levels of abstraction): (1) flattened way of conceptualization constantly on the micro/concrete level; (2) hierarchical way of conceptualization between macro and micro (abstract/concrete) levels.

Mode (1): transplanting details from existing things; the process seems intuition-based and control of the quality of design concept appears lacking. This mode is driven by the purpose to be different, not necessarily directed by any form of problem. This mode takes place constantly in a micro view, and tends to result in a sum of concrete parts.

Mode (2): more dimensions can be found and developed by abstracting from the concrete level; the final outcome will be grounded on concrete materials; each time of view shifting generates something new to the design concept. This mode is very similar to prevailing conceptual design models in design methodology.

On relating macro and micro views to the literature (Feb 28, 2009)
The two incommensurable modes of conceptualization do exist in design practice. Is it matter of conceptual design of poor or good quality? Or, is it possible that the two modes indicate different moments of one design process? Regarding the second hypothesis, Dorst's (1997) work on describing design may be a relevant theoretical justification.

In Kees Dorst's dissertation, he concluded that different paradigms apply in different levels of design activity. He proposes a dual-mode model of design. By positioning different goals at different stages, an inquirer can choose the appropriate paradigm to inquire into the specific design activities. For example, adopting the rational problem solving paradigm in when explicit communication is needed.

However, Dorst (1997) also insists that "both categories of design activity always be present simultaneously in design episodes" (p. 168). This "integrated conclusion" draws on insights from Habermas' conception of 2 levels of experience (p. 160): sensoric experiences and communicative experience.

My observation of macro and micro views somehow echoes this dual-mode conception. Macro view contains abstract thinking (formal theories) and micro view contains concrete thinking (reflective practice). Both happen in design episodes simultaneously. When dealing with specific task, designers tend to use macro view to give judgments on concepts, and to use micro view to present a concept.

Hypothesis:
The mechanism of view shifting between the macro and the micro may lead to patterns of conceptual design.

The theoretical memos varied in length from one paragraph to many pages. They were devoted to the development of generalized aspects of the examined experience. The theoretical memos were used to analyze data collected from designers and documentations of my own interpretations and understandings (of their experiences as well as mine; see section § 3.3.3.3). My interpretation also permeated through theoretical memos (for example, I identified implications on the discussed concepts/topics to further study; I adjusted interview questions and focal points in observations, and adjusted sampling according to these implications; I made hypotheses to be examined; and I compared the emerging conception with relevant theories in the literature to see if this facilitated new conceptualization or called for re-examination of the tentative conception itself).

The process of writing theoretical memos lasted throughout the complete data analysis. Based on these memos, the descriptions of the underlying structure and the derived framework were written up.

3.3.3.3 Mixed Memos: Documenting Interpretation and Generalization in Relation to Each Other

Given that the researcher was instrumentally used to understand the investigated experience, a special kind of memo, which I have termed *mixed memos*, were used. These document my interpretations of the experiences, in conjunction with generalizing theoretical categories/topics from these interpretations. Unlike theoretical memos, mixed memos elaborate substantive data. The integration of the two types of memo fosters the emergent structure of the experience and opens up opportunities to evaluate and modify this structure while applying new interpretations. This is a process of reciprocal growth.

A three-stage process occurred through writing mixed memos and theoretical memos, as a result of ongoing reflection on each case:

(1) My interpretation covers three layers of reflection on: (i) the design product, (ii)

the participant's experience, and (iii) my own experience of having a design concept. While documenting these interpretations I simultaneously recorded the relevant or emerging categories and topics in memos.

(2) The generalized categories and topics were elaborated in the theoretical memos, which aimed to identify the underlying structure.

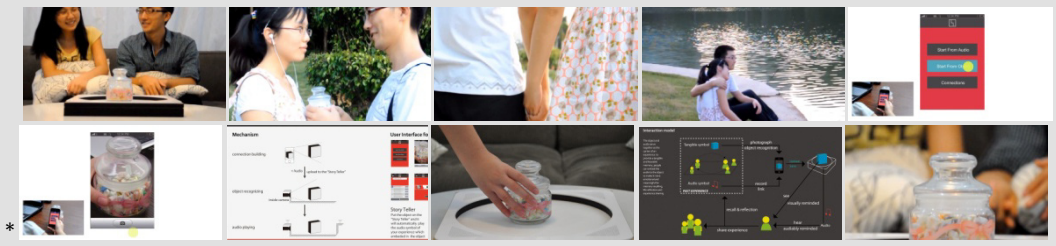
(3) The emergent structure and framework were then used to interpret the examined experience (to see if they worked effectively). Meanwhile, any new understandings about the experience that arose through new interpretations were included in theoretical construction.

The second step involves writing theoretical memos, as illustrated above. The first and third steps depend on mixed memos. If required, the second and the third steps take place iteratively.

Data Box 3.1
***Recho:* Experience design on memory**

This MDes student's individual capstone project introduced a concept of an experience design by "replaying" the cherished memories through a course of human-objects interactions.

> This bottle of stars is a present from my boyfriend. It was on my birthday. He phoned me and asked me out for a date that evening. While I was waiting for him by the lake on campus, I saw him approaching me wearing headphone as usual, but trying hard to hide a smile. I had no idea what was on his mind. Then he stopped in front of me, took off the headphone and put it on me. It was this song, "Take me to your heart." He asked me to close my eyes. When I opened my eyes I was surprised to see that he had this bottle of stars in his hand. I recalled I'd mentioned before that I like sitting on the lawn in summer evening and looking above into the skies. So peaceful and comfortable. I couldn't believe that he remember it and made stars for me. Honestly, I was deeply touched. Yeah, I still clearly remember the beautiful view by the lake that day. We sat there listening to the music for a long time. Everything was perfect. Next day I combined this bottle of stars and the song, and upload it to "Teller." [Demonstrating procedures of interacting with the interface and digital device "Teller." The song was automatically played when the bottle was placed on top of "Teller."] Even now, we often do this, cuddling and listening to this song with stars on Teller. Looking back on the sweet old days, we really cherish our college time together. (Field notes: DS160711PU)



* **Figure 3.7. Frames extracted from the presentation video of Recho (copyright by MAO L. C.)**

The following is a comparison of mixed memos from one case, which illustrates the first and the third step (see Data Analysis Box 3.1). These memos are based on my review on a graduate student M's interaction design while observing his presentation. M concluded the introduction of his design concept with a video clip, in which the user as the first-person narrator described a using scenario of the product (see Data Box 3.1).

This presentation of the design concept instantly sensitized a significant experience to me, which—surprisingly—started with a feeling of awkwardness. My understanding of my own experience evolved through continuous interrogation of the original wonder and the new wonder arising in the ongoing understanding by virtue of the integration of interpretation and generalization.

Data Analysis Box 3.1
An example of mixed memos

Interpretation 17/07/2011	**Categories & topics**	**Further interpretation** 27/08/2011	**Categories & topics**
On the Product		***On the Product***	
It was proposed that, in addition to visual elements (*tangible symbols*), music (*audio symbol*) is also a meaningful tag to an experience, and that people can combine symbols to represent that experience and would enjoy reviving that experience whenever they want to.	• Product - The area of experience	To the student, the meaningful quality of the original experience and that of the proposed experience was wonder; to me, the ordinarily experienced subject matters in their re-formed presentations and the overlooked ordinary experience as a part in the new experience are connected in an and-relation of wonder. By developing my design proposition I had deviated from the student's original wonder.	• Wonder • Wonder • Revealed understanding
There could be another option: instead of reviving the original experience by simulating, re-experiencing the neglected ordinary could occur in a meaningful new way. One can attach music to ordinary everyday activities with aspects yet to be "seen" at that time. The ordinary activities may accumulate to an extent that they might strike one as a wonder, once the overlooked aspects are revealed by means of the changed temporal, visual or acoustic factors. For instance, one blogs, takes photos, and listens to music every day. Each activity per day might be ordinary in individual. When viewed in months or years, however, the particular music with particular periods of life, for example, might formulate an interesting pattern that turns the ordinary into meaningful all of a sudden.	• Reformulating the expected product • Merging • Form - Ordinary-wonder • Form - Subject matter – qualities • Product - Subject matters - Elements, parts • Principle - Change of temporal presentation - Ordinary – meaningful	The real problem with the student's design is that the proposed experience failed to bring a surprise to the user through interaction with the objects. I was trapped in the preconceptions of confusing the subject matter of the original experience with that of the proposed experience. I had failed to tell an important difference in the form of the student's design and that of mine. In the student's case, the subject matters of the two experiences are largely overlapping (the same objects, same music, etc.), while the subject matters of the produced experience in my proposition are differently formed materials from the original experience, not from their copies.	• Revealed understanding about M's new wonder • Two different products • Forms • Subject matters
On My Experience		***On My Experience***	
I felt a little awkward with the idea of deliberately going over a shared memory with the sharing person(s) but could not tell why. Suddenly I knew what was wrong. The beauty of a cherished experience lies in the unexpected recurrence. It just needs a right opener, and memory will do the rest magic. Even if what is revived is only part of the experience, it is enough. To exert an effort to prepare actual objects from the exact experience in order to revive	• Wonder – a "but" relation • Reformulating • Form of the expected - Cherished - Sensitizing wonder - Unexpected occurrence • Prin. expected - Parts present - Whole absent • Current Prin.	This experience of design inquiry was triggered by a wonder that astonished me with an awkward feeling for the presented experience design. The wonder drove me to probe into my experience of the design. It occurred to me that I felt awkward because "to exert an effort to prepare actual objects from the experience in order to revive memory of the whole experience" is against the natural form of a pleasant recalling of the original	• Wonder • Connecting • Extending

memory of the whole experience is somehow an opposite approach. The represented objects and music are in fact merely parts in the original experience. The completeness of the objects and music paradoxically manifest the incompleteness of the original experience under revival. Subtleties are lost.	- Whole(objects) – present - Whole (experience) – absent • Form of the current product • Wonder – a reformulated "but"	experience, which "just needs a right opener… Memory will do the rest magic."	
		I reformulated the understood subject matter and form of the original and the student's proposed experiences, trying to merge the intended original experience into my anticipated experience for the users without realizing I was doing so.	• Pre-understanding: Seeing the old experience and the experience of recalling the old one as having the same subject matters.
Besides, as for many precious experiences, their existence is probably perceived the most obvious when they are absent, e.g., an experience in romantic love. Probably they are not proper experiences to be revived. Maybe the students could select other kinds of experience when demonstrating a using scenario.	• Prin. expected - Precious – absent • Product	I assumed that it was because of the nature of the original experience (being precious due to absence) that it is not the proper type of experience to be revived, and suggested: "maybe the students could select other kinds of experience when demonstrating a using scenario." In effect, I did propose a new experience design based on a different type of original experience.	• Pre-understanding about form and subject matter • Revealed understanding
The original experiences are precious because they happened once. Duplicating the same parts from the original experience seems unbearably artificial to me since the design is supposed to be about a new experience, not a copy of the old one. Now it is merely an attempt to present a whole with a sum of pieces. Making some independent parts continue while ignoring the changed course of actions, context, purposes etc. in the new experience, the form of the student's merged proposition lost its subtleties.	• Wonder – a reformulated "but" • Form of the current product - Subtleties lost • Current principle - Actual pieces – continued - New whole – changed	The "awkward" wonder presented a but-relation to me, i.e., the original experience is meaningful to the users but the revived one grounded on it is not. An implicit understanding about my hidden hypothesis of the experience was teased out: that the designed experience should consist of things and activities that surprise the users. It is a pre-understanding that I secretly believed in without spelling it out.	• Revealed understanding • Reformulating the problem • Principle
		Then what could be a bigger contrast if the original experience is perceived to be ordinary and the designed experience sets off wonder? As recorded in the field notes: "instead of reviving the original experience by simulating, it could be re-experiencing the neglected ordinary in a meaningful new way." This understanding was reinforced in the principle of my design proposition: to deliberately select ordinary activities that often escape from our attention as the potential subject matters, and to change the form of these matters in new relations to impress the user. Moreover, the subject matters of the original experience and the revived one should be situated in a relation with tension, e.g. the relation of absence and presence, or with elaborate preparations and with a simple move. The intended wonder was composed as the juxtaposed same subject matter that used to be ordinary and is now significantly meaningful.	• My expected product • Wonder – and relation • Principle • Principle
		This indicates that I had been captivated in a preconception that a	• Pre-understanding of principle →

Data Analysis Box 3.1 Continued

Interpretation 17/07/2011	**Categories & topics**	**Further interpretation** 27/08/2011	**Categories & topics**
(On My Experience)		***(On My Experience)*** satisfactory experience should be perceived to be of a quality that is dramatically different from that of the original experience. I did not probe into the relationship between myself and others, but simply trusted my own immediate experience of the design. It was a natural attitude of neglecting the reflective dance between the self and the others. My understandings, arising from the immediate experience, were utilized as a goal to determine the form of the proposed alternative design before they were reflected on as a means. The obtained principles aimed at shaping the intended product instead of understanding, continuing and developing the other's experience of the product.	• Principle about design experience • Natural attitude
On the Designer's Experience None.		***On the Designer's Experience*** Actually the designer is talking about two different experiences: the to-be-revived one and the reviving one. The former is meaningful but exists independent of the proposed design; the latter is supposedly made meaningful by using some objects in the light of the proposed activities. However, the latter could not automatically be meaningful because it contains parts of the former. Besides this, the original experience is meaningful because it triggered wonder to the perceiver. Wonder lies not only in the matters but also in how they are formed.	• Subject matter • Wonder: an "and"

This method was employed for three reasons. Firstly, considering the two layers of intersubjectivity (see § 3.1.1.2), my reflection on the design concept and on my own experience was associated with the indirect relationship between myself and the designer. In the present research, the designer and I were indirectly related due to the same phenomenon that we lived; both sides had experiences of having a design concept. My involvement was developed as an important complementary source of data and as a means to study the experience under question, apart from directly describing the

designer's experience. This approach was inspired by the fundamental spirit of phenomenology, which involves intentionality and intersubjectivity.

Secondly, in order to identify the underlying structure, it is necessary to bracket people's natural attitude in terms of their understanding of the experience under scrutiny. My reflection on my own experience as such catalyzed dialogues between various interpretations, which increased the chances of seeing the to-be-bracketed.

Thirdly, although reflection on the design concept is an innate aspect of reflection on the experience when the experience is ongoing, this was proposed as one of heuristic areas because many of the collected experiences for the present study were described in retrospect (after the preliminary design concepts had emerged). These experiences were sensitized by the design concept, which was presented as a tentative product, but may have grown out of the original experiences of having the concept through interpretation. The act of reflecting on the previously-presented design concept therefore facilitated reflection on the overall experience.

This interpretative method is unlikely to apply to many of the experiences that are examined in psychology and social science (for example, a researcher studying an experience of being a victim of crime does not have to be personally involved in such an experience). However, for a design researcher (if she or he has a background of design and participates in the investigated phenomenon) acting as a double agent is both feasible and reasonable. This approach of writing mixed memos in conjunction with theoretical memos embodies the use of the researcher as a vehicle to explore design experience, and allows integration of different methods at different phases of the study for the purposes of exploring interconnected generalizations and interpretations.

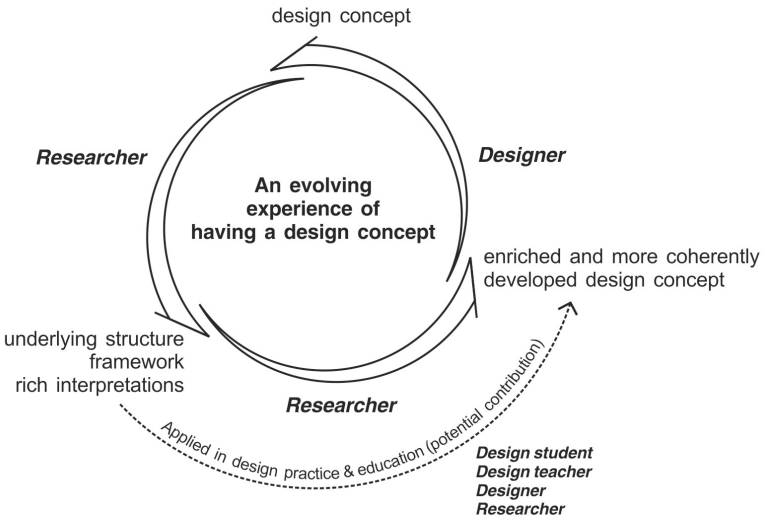
3.3.3.4 Summary

As my active involvement and interpretation was included in the service of generalization, data analysis occurred throughout and guided the data collection process. The underlying structure of having a design concept and the derived framework are

emergent products, resulting from an approach that underwent modifications based on insights obtained during the inquiry. The theoretical constructions have absorbed and developed relevant conceptions in the literature through continuous dialogues with the phenomenological perspective. Moreover, they were continuously tested and modified in practice. Theoretical memos and mixed memos enabled this process. Figure 3.9 illustrates the research flow.

In addition, even if a designer is invited to describe an experience with a concept that has already been realized, he or she may be inclined to develop the concept in that account. In this case, each attempt to articulate the experience ends up an interpretation that works at that specific point of the process. Given the evolutionary nature of having a design concept, the researcher's interpretation is utilized as a complementary means to understand the examined experience. The roles of the research participant (the designer) and the researcher in the research cycle are illustrated in Figure 3.8. The researcher's constant application of the theoretical constructions in understanding and articulating more of the experience demonstrates how a person may benefit from the research findings. This person could be the practicing novice designer (or design teacher, or professional designer), who is reflecting on and trying to develop her or his earlier emergent concept; or it could be a new observer (a researcher or a design collaborator, for example), who has experienced the presented design concept and has had an experience that is relevant to the designer's original experience.

Figure 3.8. The involving roles in this study



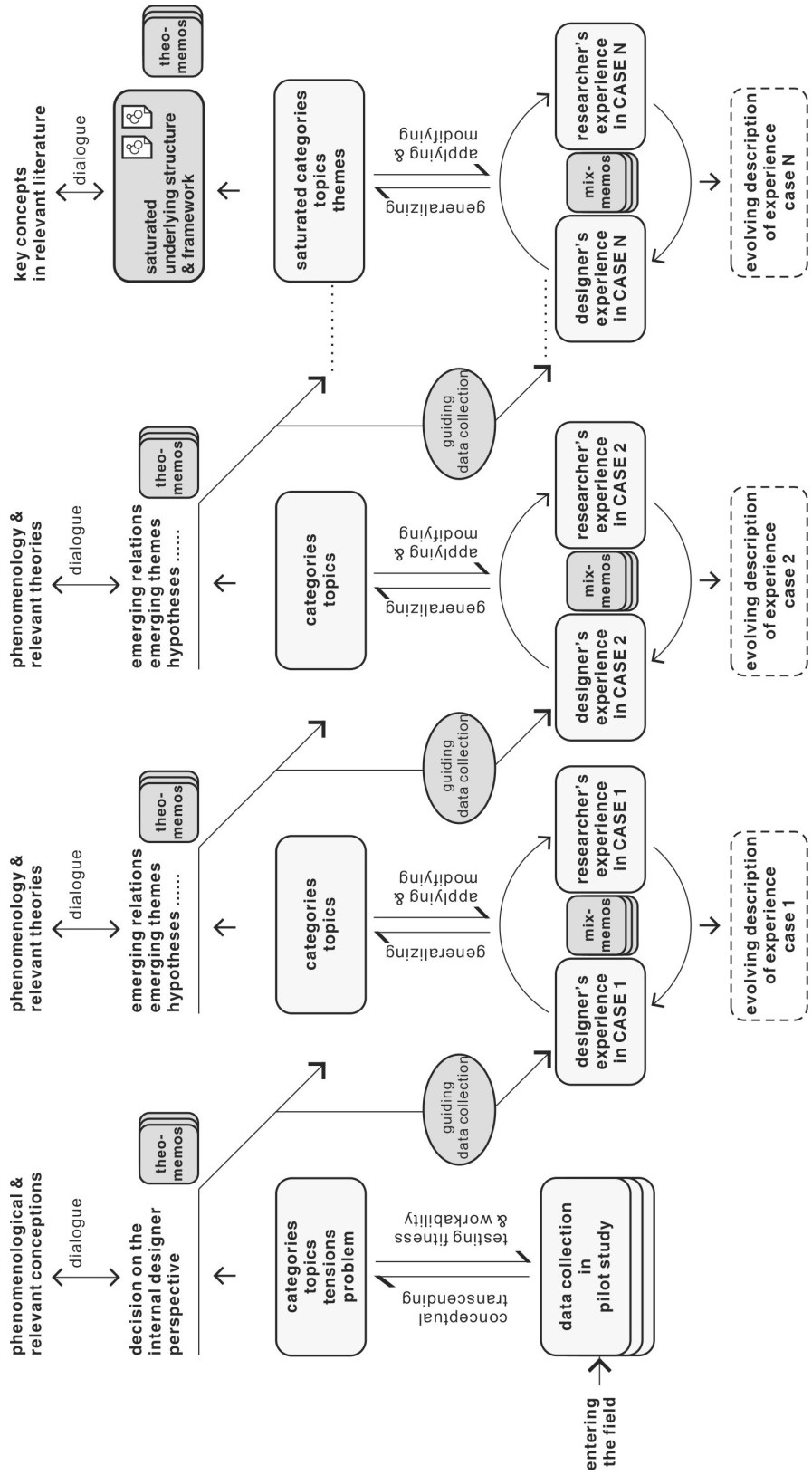


Figure 3.9. The research flow

3.3.4 Evaluation

The appropriate way of evaluating these research findings is to apply them to a real-time practice, in which the structure that has been identified and the derived framework are grounded. Many research projects use a pre-determined plan, where analysis begins after data collection is done; however, the evaluation of the emergent structure and framework of having a design concept is not an additional step for the present empirical study, but rather this is an innate aspect of the analysis. The concepts, dimensions, aspects, and relations within an experience of having a design concept were continuously checked against descriptions of substantive design experiences from the participant designers and from my own accounts in understanding the experiences of these designers. Dialogues between the theoretical work and the actual experiences permeate the entire study, and the combination of mixed memos with theoretical memos plays an important role. The identified structure fits with the investigated experiences and becomes the underpinning of a framework that is used to interpret design concepts. These theoretical constructions facilitate us to describe the experiences in many aspects yet in a coherent way.

Such an innate evaluation suits design as inquiry. Dewey (1938) outlined the following definition of inquiry:

> Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole. (pp. 104-105)

The present inquiry into the experience of having a design concept is no exception to this definition, in terms of the movement of the process from the indeterminate to a more determinate situation: that which emerged through the process of research was used to further guide the research. The emerging *product* (that is, the underlying structure and the derived framework on meanings) can be utilized to revisit and to interpret different experiences of having a design concept: to see (i) if they capture important aspects of the experience; (ii) if they are relevant to a variety of this kind of experiences; (iii) if they help understand a new experience; and (iv) if any new

dimensions and aspects emerge and indicate potential modifications of the structure and framework.

The approach of continuously comparing the emerging conceptual constructions against actual descriptions of experiences to see if they fit with the experiences and to obtain insights of modification compensates the absence of additional workshops to validate the findings. Fitness, relevance, and workability are criteria of this phenomenologically-inspired inquiry, just as validity, reliability, and objectivity are important to positivist research. This process intrinsically involves the researcher's introspective interpretation of (and therefore, application of the structure and framework to) the experiences and the identification of the underlying structure of the experience. In essence, this elaboration echoes inquiry conducted by design practitioners when they try to understand, develop, and evaluation their creations.

3.4 Summary

In this chapter the public realm of experience, supported by the phenomenological perspective and Dewey's (1934/1980) conception of experience, lays down the foundation of the research plan. The spirit of phenomenology was explored, to synthesize a way to approach, analyze, and interpret experiences of having a design concept. Examination of the debates on description and interpretation in current phenomenological methods, as well as on the nature of design research, led the study to its methodological stance: to attend to the experience hermeneutically and engage the researcher in understanding and interpreting the examined design experiences.

The overall research plan is thus characterized by the following features:

- Interpretation is not the result of this study, but is an important phenomenological turn that can be used to understand design experience (by including the intersubjective dimension in the research). The inquirer is used instrumentally to articulate and restructure the experience of having a design concept;

- The phenomenological attitude has a profound impact on this study, not only in the research plan but also in the resulting findings;

- The reflective journey follows the nature of inquiry, that is, the formation of the problem emerges through the inquiry rather than being predetermined, and as a result, it shapes the formation of research methodology of this study.

> Historically… the science of the rainbow has turned out to be just this hinge where wonder holds together aesthetic perception, with its pleasure, and thought, with its distinct process and pleasure.
> Philip Fisher, *Wonder, The Rainbow, and the Aesthetics of Rare Experiences*, p. 85.

Chapter 4. The Underlying Structure

This chapter introduces the main finding of this study, the underlying structure of the examined experience, which is outlined through three sections. Firstly, its ingredients are introduced: the categories and relations that emerged from data and from the literature on experience. The categories and relations that are discussed were considered relevant in ongoing dialogues and data analysis. The structure under scrutiny is a conception of the experience of having a design concept, from the internal perspective of the designer. This consists of relations that are fundamentally concerned with the form of the experience. Given that form and subject matter intertwine in the process of having an experience, I introduce the basic formal relations developed from phenomenological analysis and the subject matters of design in a related manner, instead of separating the organizing relations from the organized contents. Secondly, with these materials at hand, two modes of process of the examined experience (each associated with a solution or a problem) are introduced. Each consists of four equivalent phases: connecting, extending, reformulating, and saturating. The concept of wonder is further elaborated, as it forms the beginning of the process of the experience. Thirdly, the underlying structure is identified as comprising relations in and between several aspects: the uniting of the vertical conceptualization with things revealed in the horizontal experience; a reflective dance between transcending the main experience and reformulating it using insights from new ideas; the interchangeable state of problem and solution and their mutual reformulation; and the designer's personal engagement in describing having a design concept within and after the experience.

Situated in the context of experience, design concept is understood as *meaning made in experience*. A brief definition of meaning, informed by phenomenology, is outlined. Some of the natural attitudes in design that result from the tension of current understandings about design concepts (raised in the beginning of this inquiry) are reported at the end of this chapter. In alliance with several emerging themes, the structure supports a flexible framework of meanings, in order to understand and articulate an experience of having a design concept, which is introduced in Chapter 5. Also, a dialogue between meaning in this study and in the literature is conducted in Chapter 5 to enable understanding of design concepts as meanings in a larger picture.

4.1 Ingredients of the Underlying Structure

4.1.1 Form and Subject Matter

First of all, I examine an important relation: form and subject matter. These give rise to a basic vocabulary and provide the materials to build up the structure of having a design concept. Although it is tempting to ascribe form to the structure and subject matter to the content or material of an experience, the intertwining relation makes such distinction blurred. Relation denotes a state between some things at a particular point of an experience. Form and subject matter are temporal properties of the related things. As Dewey (1934/1980) identified:

> "Relation" in its idiomatic usage denotes something direct and active, something dynamic and energetic. It fixes attention upon the way things bear upon one another, their clashes and unitings, the way they fulfill and frustrate, promote and retard, excite and inhibit one another. (p. 134)

Awareness of relations as characterized by a dynamic feature that blends verbally independent concepts or elements together is important for the understanding of the proposed underlying structure of having a design concept. Here I take the opportunity of discussing form and subject matter, as these provide a basis for the journey into the investigated structure.

The relation between form and subject matter (also termed *substance*) does not infer that the related things coexist side-by-side. But rather, a form could not be presented on its own without the aid of its counterpart, and vice versa. For example, imagine looking at a piece of cake, we see that it is made of layers of fruits inside and coated with a satisfyingly thick fresh cream outside. The cake is presented by the *form* that organizes the subject matters so, which makes them *the* cake. However, we cannot describe or present this form without mentioning the organized matters: fruits, cream, and so on. The cake can still be referred to using "three layers," "inside," and "outside," but these are not sufficient to describe the form of the cake to other people. So, static as a piece of cake is, the relationship of form and subject matter is already very subtle. This relation can become much more complex when describing an experience in designing, as in this context the subject matters, alone, continuously changes.[1]

The relation of subject matter and form is the hallmark of an experience, and has been extensively discussed by philosophers and theorists (e.g. Burke, 1931; Dewey, 1934; Worth & Gross, 1978) in various lines of inquiry associated with experience. This relation resembles the correlation of "what is experienced" and "how it is experienced" (leading to the phenomenological conception of intentionality, see § 3.1.1.1) in the latter's daily sense. Dewey (1934/1980) insisted that:

> Form is a character of every experience that is an experience… Form may then be defined as the operation of forces that carry the experience of an event, object, scene, and situation to its own integral fulfillment. The connection of form with substance is thus inherent, not imposed from without. (p. 137)

Neither form nor subject matter act as a permanent label that can be attached to any kind of things contained in an experience. Dewey stated that "what is form in one context is matter in another and vice versa. Moreover, they change places in the same work of art with a shift in our interest and attention" (p.131).

[1] Following McKeon's strategy of combining philosophy and rhetoric to create an art of philosophical inquiry directed toward all communication, Buchanan (2001a) pointed out the connection between design and the new rhetoric lies in the changing conceptions of subject matter and distinct purposes for communication and application.

Nevertheless, form is a concept that allows us to "move from a consideration of form to consideration of subject-matter" (Burke, 1931, p. 195), which enables us to reflectively articulate the otherwise united whole of an ongoing experience. Language and concepts (not design concepts, but concepts in the underlying structure) allow us to talk about an experience. Vocabularies of the components of both subject matter and form of the examined experience are needed, as we use substantive as well as abstract terms (in the example above, "fruit," "cream," "layers," and "inside and outside," to describe a piece of cake).

4.1.2 Form: Basic Formal Relations

No matter how metaphorically a form is defined (as force, energy, or rhythm, for instance; see Dewey 1934), it is nevertheless defined in terms of relations that organize materials into subject matter of an experience. To better understand form, four basic formal relations, along with several extended others, are identified as components of the form examined experience. Most of these formal relations have a phenomenological underpinning.

Sokolowski (2000) suggested that phenomenological studies frequently analyze three formal relations (also termed *structural forms*): parts and wholes, identity in manifolds of presentation, and presence and absence. Concerning the relation of parts and wholes, parts are divided into moments (*non-independent parts*) and pieces (*independent parts*). The juxtaposed and- and but-relations that are related to wonder also emerge as major formal relations in the collected data, for these are the starting points for two modes of different (but equivalent) basic processes of the examined experience. Data analysis in this study engages the interplay between the old and the new, which has been identified as another basic formal relation in the examined experience. While probing into the dynamic experience, I found that the fundamental relationship intentionality (between what is experienced and how it is experienced) plays an increasingly important role in understanding this experience. These relations

correlatively elicit the structure of the experience as a whole, which takes a process to ripen.

In the following section, the four basic formal relations are introduced first. The and- and but-relations are clarified (in § 4.2), since they belong to the basic process of the examined experience. The relation of the old and new are then elaborated (in § 4.3) to support presenting the experience as a unified and dynamic whole. The notion of intentionality (explained in § 3.1.1.1 while the spirit of phenomenology was introduced) is again taken up when the underlying structure deals with the designer's involvement (in § 4.3.4). This order suits the tight connection between form and subject matter, for form can only be elucidated along with the material that it organizes. The following four basic formal relations can be discussed when the outcome of the examined experience can be separately described in reflection (where the dynamic experience is temporally suspended). The other formal relations have to stay close to the unfolding dynamics of the experience, and thus are addressed at the point where they enter the pertinent parts of the underlying structure.

Parts and Wholes

A whole is "something that can exist and present itself and be experienced as a concrete individual" (Sokolowski, 2000, p. 24.) Parts are the components of a whole. Parts and wholes form a very straightforward relation; however, it is also slippery, as designers often focus on parts without realizing these different parts may imply wholes of different scopes. In other words, wholes are not definitive containers with constant parts, and the wholes can be parts of new wholes. This relation depends on the changes of the observer's attention to the subject matter.

Mobile phones provide an example of this. Before the iPhone appeared, when designers talked about a mobile phone they talked about materials, shape, mechanical structure, keyboard, screen, and so on. All these physical parts implied a mobile phone—a physical object—as a whole. Now, when designers talk about an iPhone, their gaze has been torn away from the physical parts and is directed to the intangible parts, such as gesture-based operations (through the touchscreen), the platform of iTunes, and

apps. The mobile phone itself has therefore become a part of a larger whole, which includes a new way of interactive social communication and a new business model. Human interaction via the mobile phone existed long before iPhone appeared, but has earned attention as a new whole, supported by new parts, through this groundbreaking product. The relation of conventional parts works well for a conventional mobile phone, however with the iPhone designers overcame the inclination to see the physical product as a routine whole, and allowed the relation of parts and whole to bring them to another whole of a broader scope. This is the how iPhone has created a breakthrough in the conventional artifact-centered industry of mobile phone.

Moments and Pieces

The formal relation of parts and wholes is grounded in—and made even richer by—an important distinction between two kinds of parts: *pieces* and *moments*.[2] A piece can exist as a whole, whereas a *moment* cannot.[3]

For example, a leaf is a piece of a tree. Plucked from the branch, a leaf still exists independently; carrying all the necessary parts on its own without having to borrow anything from the mother whole (the tree) in order to be recognized as a leaf. The loosened original part and whole relation of a leaf and the tree is still there, however this does not prevent the leaf from becoming as a new whole.

In contrast, *moments* depend on the existence of other things. Color for a tangible object, for instance, is a *moment* of the surface of certain material. Human perception of a color depends on factors such as the texture and the size of the colored material (the substrate), the environmental lighting, and motion. A designer rarely decides on a color for a product simply based on a set of parameters. Color samples in different professions present colors with consideration of suitable materials (for example, car paint color samples are coated with a clear paint on top of the metallic color sheet to stimulate the

[2] To avoid the confusion of the phenomenological term *moment* with this term that refers to a very short period of time in common sense, the former will be written in italic throughout this thesis.

[3] Sokolowski (2000) explained that "*Pieces* are parts that can subsist and be presented even apart from the whole; they can be detached from their wholes. Pieces can also be called independent parts… *Moments* are parts that cannot subsist or be presented apart from the whole to which they belong; they cannot be detached. Moments are nonindependent parts" (pp. 22–23).

potential color on a car body). Therefore, color is not recognized on its own, as objectively as a series of RGB or CMYK numbers. In short, a *moment* exists by blending into other complementary parts (either *moments* or pieces).

The relation of *moments* and pieces is another basic formal relation in the proposed structure for two reasons. Turning *moments* into pieces realizes conceptualization (see § 5.4.1.1): the bedrock of the conventional conception of designers' practice in having a design concept. A change in the reversed direction fulfills the revelation in an experience (which is further introduced in § 4.3.1). In alliance with other formal relations, the relation of moments and pieces brings in rich interactions in that of parts and wholes.

Identity in Manifolds of Presentations

Every thing existing in the world has an identity, no matter if this thing is tangible or intangible, material or nonmaterial: a tree, a man, a chair, a football game, a delightful lunch, reading a poem, or having a trip in India. A thing is presented to the observer as *what it is* by showing its part(s), facet(s), profile, state, or qualities at a time. These parts, facets, profile, state, and qualities are presentations of the thing. The identity is "within and yet behind all of its expressions" (Sokolowski, 2000, p. 28). The identity makes a thing instantly the particularly intended object by governing all kinds of ways the thing is able to appear to the observer. In this sense, an identity is conceptual and abstract belonging to a dimension that transcends any actual presentation.

The identity of a thing is revealed and enriched through continuously experiencing the manifolds of its presentations (see Sokolowski, 2000). Mention of a book, for example, involves calling this thing by its identity. This identity sounds quite abstract, as it applies to a huge collection of things that are a medium for authors to describe, document, analyze, debate, summarize, and express their thoughts to readers; and function as important educational instruments intended to enlighten knowledge and to enhance imagination mainly through the sense of vision. These are some of the presentations to that abstract identity of a book. However, when I literally take a book

from the shelf in a bookstore, a halo of presentations instantly wraps around this book: I see that it is a biography of a writer's wife; paperback edition; non-illustrated; with an introduction by the Pulitzer Prize-winning author herself; the text printed in a pleasant layout; and the size of the book is ideal to carry. Presentations with more vivid details could go on when I begin to read it: it is a portrait of a woman's legendary life carefully hidden in her mysterious mask; the narration is witty, penetrating, and deliberately sophisticated. In this way, it becomes *the* book, intriguing and inspiring to me. More levels of the identity of the book are revealed when manifolds of presentations cumulate as the temporal and spatial relations between the perceiver and the object change in experience.

An identity is never separated from the manifolds of its presentations. Also, it can never be totally revealed in one go, since it takes time for the perceiver to experience various presentations of the intended thing. It can be revealed at different levels, supported by different presentations, as the experience of the thing unfolds.

Presence and Absence

The formal relation of presence and absence is originally raised and systematically worked out in phenomenology.[4] Strictly speaking, the terms *presence* or *absence* denote the embodied state of an intention: whether the targeted thing is in its bodily presence to the one who intends, or not. For example, when anticipating an event that we are going to participate in, the event is intended in its absence. When we are recalling an event that we have participated in, the event is emptily intended in its absence too. Only when we are in that event, we experience it with the event presenting it to us.

At first sight, it seems that designers generally deal with things that are absent, no matter how much user research is conducted or how many sketches and working models explored in design process. Designers are planning the future. They are experts of making things that are absent from them, due to the separation of conceiving/planning

[4] Presence and absence in phenomenology are connected to "filled" and "empty intentions": "An empty intention is an intention that targets something that is not there, something absent, something not present to the one who intends. A filled intention is one that targets something that is there, in its bodily presence, before the one who intends" (Sokolowski, 2000, p. 33).

and production. Actually, the interplay between absence and presence in design is much richer than this, because a thing intended by designers varies from tangible to intangible, material to nonmaterial. A description/statement/judgment made by a designer is present to her/him when it is targeted (to borrow some quotes from my field notes): "The furniture lent by the landlord is unpractical and old-fashioned;" "When you stand on top of a ladder trying to bend your upper body backwards, you would feel a sort of tension, physically and emotionally. Nervous, a bit scared, but somehow excited;" Or, "The location of the promotion venue on campus is great. You can't imagine how much the dawn redwoods means to the alumni because they are the landmarks where the living zone begins." In these examples, it is not the objects (like furniture, the ladder, and the woods and the events) that were presented to designers when they were recalled or anticipated. Rather, the states and expressions of these objects were present to designers as part of design concepts that had been achieved so far and were undergoing examination. Discussion about design concepts involves intending kinds of objects[5] in the world that belong to a dimension different from the being of a tree, a person, or an event. When design concepts are aware of and described, they are revealed from their absence.

Each of the formal relations alone cannot capture the form of the experience of having a design concept. However, they are fundamental *relational elements* that correlatively build up the form and describe the underlying structure.

4.1.3 Subject Matters: Five Areas of Design Concepts

Five areas of subject matters of design concepts have been identified. The main ingredients within each area are generated from the data and summarized in Table 4.1. They are also supported by insights from the literature. These are the vocabularies that designers use to describe a design concept.

[5] Sokolowski (2000, pp. 95–96) indicated that judgments and statements are "categorial objects," which are higher-level objects, and are "out there" as more complex modes of presentation, more intricate ways of being manifested. Nevertheless, they are also parts of the world. They are how a tree, a football game, or a behavior can be articulated.

Table 4.1. Five areas of design concepts

Signs & Symbols	Objects	Actions & activities[6]	Experiences	Systems
Properties/Qualities	Materials	Purposes	Esthetic quality	Purposes
Shapes	Shape	Actions	Doing	Organization
Colors	Parts	People (agent)	Undergoing	People
Texture	Configuration	Objects (agency)	Meanings	Environment
Parts	Mechanism	Context	Self and others	Interactions
	Functions		Body and the world	Qualities
	Qualities			
	Colors			
	Volume			
	Mass			

The field research indicates that design projects are usually divided into visual communication (or graphic) design, product design, interaction and service design, system and environmental design. This categorization appears to echo Buchanan's (1995, 2001a, 2001b) conception of four orders/areas of design, symbols and images; physical artifacts; actions and activities; and environments and systems. Connecting each order to distinct design profession signifies the changing meaning of product in design and the shifting concerns in respect to different problems designers encounter. However, Buchanan's conception is more than categorization of professions. The four orders of design provide *places* to look at distinct subject matters of design. It has been observed, in the present study, that designers may have to deal with subject matters belonging to different *orders* in one project. One minute they study physical artifacts, the next minute they elaborate on how the service system can work by means of the artifacts. Therefore, I see an order as a temporal angle to look at distinct subject matters of design. I call them *areas* of design concepts in this study, denoting different organizational relations under scrutiny, each of which holds together peculiar elements.

Moreover, I propose to extend Buchanan's four areas of design by adding another significant area: experience. This is an emerging area of subject matters where designers explore the problem of creating and supporting meaningful human experiences. The new professional expression of user experience design calls for approaches to shape experience as intended products, with pertinent *elements* that matter to an experience

[6] This set of elements is based on the interview with Dr. Xin Xiangyang (2010) on interaction design education.

like material, shape, mechanical structure to an object. Designers act toward the subject matters in any area of the aforementioned four within experience, whereas none of the four areas address the relations that constitute significant experiences. Experiences merit a place among subject matters of design concept. Seeing experience as a distinct area resembles the extension from the area of tangible objects to that of actions and activities. Human actions do not emerge as the third area of design until they are rigorously reflected on and treated as the final product in terms of interaction design.

The relation of subject matter and form is reflected in the areas of subject matters of design concepts. Two formal relations permeate in the five areas: parts relating to wholes; and identity relating to presentations. The identified elements in each area are parts and presentations of that area and support the identity of being, say, an object or a system.

We talk about certain elements under an unvoiced premise that the discussed elements are interrelated and referring to a whole in a distinct area. Within—and only within—such relatedness, we have the freedom to temporally focus on particular elements. Sometimes, in designing, we concentrate on a certain part(s) so intensively that we forget its basic bearing to the whole. In the meantime, different wholes exist, waiting for us to zoom out from the micro view and see pertinent wholes to be saturated with the scrutinized parts. The ebb and flow of the relation of parts and wholes implies a way how a concept is shaped as it is at a particular point of the process. For example, when our attention shifts from the shape of a lamp to the gesture that interactively turns the lamp on, a part of a physical object is implicitly replaced by a part of an activity.

Furthermore, the relation between identity and its manifolds of presentations is entangled with parts and wholes, insofar as identity makes areas distinct from one another. Sometimes it is difficult to say which is a part of a whole, and which is the presentation of the identity of the whole. The configuration or function of an object, for example, can hardly be described as a part of the object, yet it employs parts to present the object. For example, without discussing the parts of a camera (such as, lens, body, shutter, and control wheels) it is impossible to describe its mechanism. Yet a camera

needs all of these physical parts to present its identity. Therefore, the elements identified in each area form a collection of correlated parts and presentations to make a whole with a distinct identity.

Special kinds of elements are discussed here: these are qualities and properties. These elements are frequently used to refer to the subject matter, regardless of which area is currently under the designer's consideration. Qualities often take the form of adjectives to describe nouns (identities of things). Examples of qualities are Chinese symbols, luxury cars, high-tech digital devices, effective services, etc. In categorization theory, researchers have been working on qualities by dividing them into *attributes* based on different *sources* (e.g. Athavankar, 1989;[7] Krippendorff, 1995[8]). The conventional semantic categorizations of vastly different qualities are centered on artificial objects. The conception of five areas proposed above is distinct from those conceptions since a quality, in this study, denotes a facet of the identity of the thing in question and calls for proper presentations to support it to be manifested in experience. Qualities in different areas engage different parts and presentations.

The awareness of change between presence and absence allows a better understanding of the formal relations of parts and wholes, and identity in manifolds in the subject matters of design concepts. The identity and the whole of a design concept are never captured at one blow. They are gradually brought to the light from the absence and cumulate. To quote from a teacher's interview:

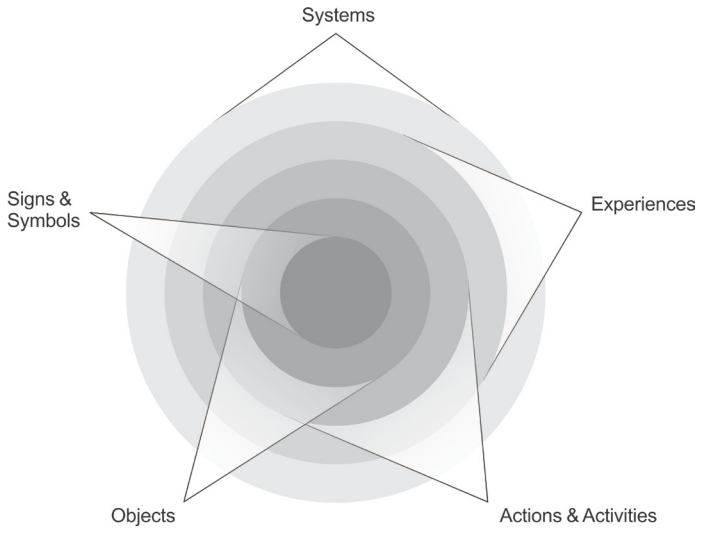
> What a design concept is depends on from which perspective it is examined. Speaking of aesthetics, much of the concept can be talked about in terms of form, material, fashion, or expression of symbols or values; from the user experience or utility perspective, the concept exhibits innovation in ways of using or interaction, or security, or efficiency... An expression of a design concept can hardly be exhaustive. It can be described from multiple perspectives. (Field notes: IN240309)

[7] Athavankar follows Rosch's research on prototypes. Sources such as user, attitude, occasions, social class/price, region and craft, style, technology, source of energy, speed dimension, and shape indicate distances or differences between any member of a category and its most central exemplar: the prototype.
[8] Krippendorff (1995) differentiated qualities/attributes in a way that "dimensions, characters, and features are distinguished and the latter is subdivided into parts, properties, and configurations" (p. 164).

A thing, by being in the world, always exhibits a blend of presence and absence. Therefore the five areas (see Figure 4.1) provide materials to allow different relations to be brought to the focus in an ongoing experience and to leave the rest to fade to the back, temporally.

As shown in Figure 4.1, the area of experiences is placed between actions/activities and systems because it focuses on individual's stories. The actions area provides means and embodiments to fulfill individuals' experiences. The area of systems diverges from that of experiences and facilitates the happening of the individuals' stories by organizing individuals and their environments (which is another set of relations). However, the rings represent competing areas of design subject matters; they do not imply the increasing importance of the areas. Each ring stands for an angle governing a distinct set of elements to frame a design concept.

Figure 4.1. Five areas of design concepts



4.2 The Basic Process

The underlying structure integrates the aforementioned formal relations and subject matters into two modes of process, based on four phases. The two modes are not mutually exclusive. Instead, they are tied to one another in the development of the experience. The starting point of an experience of having a design concept and the nexus between the two modes is wonder. One experience can be turned into a part of a new

experience through a new wonder, which is how the experience evolves. As a conception of the experience of having a design concept, the underlying structure helps us understand and develop the experience by addressing the changes and accumulation in this evolution.

4.2.1 Wonder

An experience of having a design concept is more than a sequence of activities. It begins with an epiphany that is either known immediately or can be traced back and understood if the outcome is significant. Wonder, in an experience of having a design concept, is the beginning of a design episode that presents surprisingly related things to the designer. Two distinct modes of wonder, experienced with four equivalent phases, are identified below and illustrated with several design cases.

Wonder is an ancient theme in philosophical discussions, and it signifies the beginning of inquiry to obtain knowledge.[9] Wonder is the famous Socratic moment of knowing one's ignorance, knowing that one does not know. Two schools of thought have further elaborated this. Descartes (1972) identified wonder as the primary human passion, which marks the beginning of creation of meaning and indicates that an object deserves attention and further exploration because it may be important. Spinoza identified astonishment, an equivalent of wonder, in the way "we are astonished when our mind focuses on an object precisely because it has no connection with anything else that we can imagine. The object is truly new to us, though we may discover connections with other things through prolonged engagement" (cited in Buchanan, 2007, p. 44). Fisher (1998) extended this ancient theme based on aesthetics of experience, by interpreting wonder and the poetics of thought as two sides of the same coin. In this sense, experience of wonder has an aesthetic-intellectual form. This point of view fits with the conception of Dewey (1934/1980) that "esthetic cannot be sharply marked off

[9] Socrates said: "Philosophy begins in wonder" (Plato, 1952, p. 55).

from intellectual experience since the latter must bear an esthetic stamp to be itself complete" (p. 38).

As discussed in Chapter 2, in conventional research on conceptual design the occurrence of a design concept tends to be boxed to the term association, and is often concealed by the notions such as intuition or creativity. The close connection of the meaningful beginning with the ensuing experience of inquiry is largely overlooked. Due to this neglect, it is worth examining whether anything can be articulated in an experience that impresses us as wonderful or creative: *What happens in wonder of an experience of having a design concept? How wonder is fabricated into the design concept?* Based on an analysis of the moment of wonder and the ensuing investigation to obtain a design concept (within designers' experiences), these questions are explored in the following section (§ 4.2.2).

4.2.2 Four Phases

There are four phases in an experience of having a design concept: (1) connecting of two seemingly irrelevant things with a surprising juxtaposition; (2) shifting the area of subject matter to accommodate this relation; (3) reformulating to modify and absorb the related things into a whole; and (4) saturating the whole. These phases indicate different attention during an experience. An experience does not neatly comprise these interrelated phases in a linear way, because experience makes them a unified whole.

Wonder unveils the connecting phase and presents to the designer either an and-relation or a but-relation. The former directs the ensuing design to a solution and the latter to a problem. A coherently expressed solution or a problem brings the experience of having a design concept to an end for the time being, which satisfies the designer's curiosity sensitized by wonder and allows the designer a sense fulfillment at that particular point of the process. Hence, wonder and the achieved solution or problem as a design concept mark a meaningful design episode out of the continuum of design activities that otherwise escape consideration as relevant to having a design concept.

Here I introduce the four phases that begins with an and-relation, then provide a contrast by depicting another mode of four phases that has a but-relation as the starting point. I explain the problem and solution as different *moments* of a design concept. What unites them and realizes the mutual reformulation of both will be worked on.

4.2.2.1 Having a Solution Concept

The first mode of four phases is illustrated with a piece of data extracted from one of my interviews, which concisely describes the occurrence of a solution. This is related to a washing machine design (see Data Box 4.1and Figure 4.2) made by an industrial design student.

Data Box 4.1
A washing machine design

This is an extract from a teacher's interview. Prof. F introduced an MDes student's recent project supervised by himself:

It was before the deadline of a washing machine design competition. Liang [the student] had been thinking about how people use a washing machine in many ways, but hadn't come up with any satisfactory concepts yet. His mind was stuffed with details about a washing machine. When he went back home, he threw his coat into a laundry basket that was already full. It suddenly occurred to him, why not store the to-wash clothes directly in the washing machine? From then on, the concept became clearer and clearer. One can put the clothes into the washing machine every day. When the appropriate quantity is reached, the machine is ready to work. The washing machine will, in the first place, be a "laundry basket." Then, shape, control panels, texture, structure, and things like gravity sensor emerged naturally. There he arrived at the solution. (Field notes, IN231008)

*

* **Figure 4.2. Washing machine design (copyright by LIANG G. P.)**

Connecting by Wonder

When the laundry basket and the washing machine were juxtaposed in the designer's perception and recollection of the event of washing clothes, wonder occurred.

The two were paired up in an and-relation. This is not merely a relation in a scenario of doing the laundry, in which a laundry basket and a washing machine are temporally and spatially related. Instead, the two objects were now related as one new object. For a conventional washing machine design, all product parts (such as the tank, body, control panel, and door) and the corresponding actions are connected together to fulfill the purpose of clothes washing, which is a very basic form of a design covering the areas of objects and actions. Wonder surprised the designer by bringing two previously irrelevant things into a juxtaposed relation, which implied a chance to change many parts and presentations of the washing machine and the event of doing the laundry. This and-relation reached beyond the designer's previous conceptions of a washing machine design. Absent, though, a hidden proposition of a potential solution dawned on the designer. This revelation was achieved through presenting the remote independent wholes as connected parts of a potentially new whole that remains obscured at that moment.

Extending of the Whole

Immediately, in the designer's eyes, the idea of a container for clothes exhibited the potential to become a presentation of the identity of a new way of using a washing machine. This presentation had been taken for granted and thus swallowed by the earlier dominant identity of a washing machine (as only used to wash clothes). The two things related by *and* suggested an inner similarity in the prospect of the hidden new whole, which fell into the area of activities and even of experiences. The new whole called for a distinct identity. This idea of inner similarity emphasizes that the previously independent wholes were turned into potential parts of a new whole in the and-relation, and suggests that the way they are related to the absent new whole is similar. The juxtaposed things, both inside a big picture that is yet to present, contribute their parts and presentations to support the emerging identity.

To understand wonder, the designer has to transcend from the excitement of it by suspending the previous conception (the old whole), making it open to embrace new parts, presentations, and new identity. This is an extension of the whole. The approaches

of staying open and conceptualizing identities and wholes with the experienced presentations and parts also encourage the changes of areas of subject matters.

Reformulating

The extending of the whole is not about adding something new on top of the original things. Rather, this gives rise to an in-depth reformulation of the relations, as well as the related elements, to satisfy the extended boundary of the design subject matters. By absorbing the and-related things into a new thing, previously determined relations (such as parts and whole and identity in presentations) are destabilized.

The designer tried to merge presentations of storing to-wash-clothes (an activity) and presentations of washing clothes (another activity) to well fit the intended identity of a new experience of using a washing machine that can be realized by one physical object. He had sufficient freedom to suspend or to change the presentations of a traditional washing machine (the shape, the structure, electronic sensors, and so on) to tune them into the aimed experience that would absorb the parts and presentations of a laundry basket. This freedom came from the highly unsaturated new design at the contextualized end. However, it did not compromise the determinacy of the new whole at the conceptualized end. The inner similarities and the state of containing clothes revealing a new identity of an experience of doing the laundry without the basket were determined, but needed to be enriched.

The attachment between the designer and the eclipsed solution is established in the initial wonder, which makes the designer feel empowered to utilize the freedom to (re)formulate the currently understood and determined aspects and to bring them into presence. In the meantime, the designer is undergoing the experience of (re)formulating the subject matters, and is trying to make judgments about whether the reformulated parts and presentations confirm and complete the anticipated experience. This phase is iterative. It leaves the door open to new wonder and thus new experience that will turn the current experience as a part of a new whole. This is discussed in § 4.2.3 to show what the experience of having a design concept is a dynamic whole means.

Saturating

As the individual parts within the whole and manifolds of presentation grow determinate, the whole becomes saturated and the anticipated identity emerges. The hidden proposition is, at this stage, brought into the presence and rounded out as a concrete solution by the duly changed appearances (such as a basket-shaped body, simplified structure, new sensors, or procedures of doing the laundry) along with the continued appearances (the necessary parts of the washing machine as a washing machine). Besides these, the new experience of using the washing machine brings out some pleasant presentations to the new identities. For example, young people find doing the laundry becomes simpler and more straightforward because "when the appropriate quantity is reached, the machine is ready to work." This simplifies the course of washing clothes by unifying individual events and objects into one. The experientially formed design concept has therefore reached *oneness*. That is, an experience of having a design concept was saturated. Also, when the design concept is embodied by a tangible product, this easily sensitizes an experience to a new perceiver as long as wonder occurs to her/him. For example, the student's supervisor mentioned, "I was impressed, for the whole thing looks so natural" (Field notes, IN231008).

4.2.2.2 Having a Problem Concept

The other mode of four phases starts with a wonder, but this is presented with a but-relation. The example used in this section comes from the documentation of a group of MDes students working on a project for women in high heels (see Data Box 4.2).

Data Box 4.2
Innovative product development for wearing high heels

This is a two-week project. Four MDes students in a group proposed a set of products to reduce the chances of women getting injured by wearing high heels. They identified this design opportunity by formulating a problem that wearing high heels is bad for women's health, but most women still love to or have to wear them.

Documented below are several relevant facts that had been explored in second-hand research. They stand in a contrast to findings from the interviews. Both were concluded in the students' report (Field notes: TU080111PU).

→

(Continued)

Economic Facts:
- Female's financial independency
- Increasing markets
- Demands for product lines
- Branding

Social Facts:
- Health problems
- Better appearance
- Sexuality
- Fashion trends
- Considerations on Health
- Changing social status of the female

Technological Facts:
- Ergonomics, comfy high heels
- Demands in side products such as compression socks and medical cream to fit the condition of wearing high heels
- Balancing technology
- New materials like recycling plastic
- Folding mechanism in high heels

Findings from 29 Interviews:
- Nearly half of the interviewees own more than 20 pairs, one of them owns 55 pairs of high heels.
- All interviewees remember their first pair of high heels; one owned her first pair at age four.
- 4" to 5" heel are very popular, some interviewees even owned a pair of 6.5".
- 9 out of 21 interviewees wear high heels 1–3 days a week; 6 out of them rarely wear them, however, they buy them when they like.
- Interviewees do not consider occasions.
- The price of the high heels owned by the interviewees ranged from $500 to $4000.
- Most interviewees throw out high heels mainly because the shoes scratch their feet.
- Only one person looks after her high heels by putting them in the anti-humidity boxes.
- 75% of the interviewees got injured.
- Most of the interviewees do not have specific treatment taking care of their feet after wearing high heels.
- Embarrassing incidents do not stop interviewees from wearing high heels.
- While wearing high heels, all of interviewees were more confident, felt more attractive, felt more beautiful and were taller.
- Most interviewees wear the most comfortable high heels more often.
- The younger and more creative interviewees like to customize their high heels more that the others.
- The interviewees with management positions would not spend time to customize shoes.
- A lot of interviewees do not know how to walk while wearing high heel, but most of them do not realize that they need advice.
- Most interviewees are 5'–5'3" tall.

Connecting

The students' experience of having the design concept began with a "but": wearing high heels is bad for health, but many women still have to, or love to, wear them. This paradoxical relation made two phenomena suddenly stand out from other discursive social, economical, and ergonomic facts that had been explored. Before this connecting moment, the students had collected a large amount of information that indicated the undesirable impacts that high heels have to the wearers. To their surprise, the reasons that most women stick to their choice also varied: from a sense of fashion, to identity issues, to dressing code requirement by work.

When a wonder occurred, it caught the designers' attention as a problem: two things that existed in the current situation did not impress on them until the things were connected. One thing was *undesirable but difficult to change* (wearing high heels impairs health) due to the existence of its counterpart that *is determined to continue* (women still have to, or love to wear high heels). The undesirable thing may be identified in the form of a need (for the unhealthy impacts to improve), since designers are devoted to changing the current situation to more preferred ones. Whether the designer expresses this with an eye to the present or to the future, each refers to the same side in the but-relation.

Two things suddenly become so related that contradiction arises from them, which surprised the designers. The two things are then two inconsistent parts in an obscure whole. The undesirable thing will not be improved if other parts in the whole remain absent. The but-relation signals an acceptance that is not reflected on until wonder turns some things in relation into questionable existences.

Extending of the Whole

Subsequently, an anticipation of an argument to change was energized by wonder. Although this argument was an obscure whole for the time being, the students looked into the but-related two things in the hope of finding something changeable to destabilize the undesirable thing. By studying the interviews and second-hand research, they gave up the idea of working solely on high heels (e.g. tailor-made or air-padded high heels) to improve bad impacts on health, and extended their attention to the various occasions, activities, and interactions associated with wearing high heels. There was a subtle shifting of areas of subject matters resulted from the extending whole.

The but-relation alone indicates inconsistency in a whole that needs to be resolved by identifying more parts that alleviate the tension between the but-related two. This is an extension from a simple and fuzzy "but" toward an argument for change. A problem not only indicates something needs to be changed (because of the existence and continuation of something else that is problematic) but also that the change is feasible.

Therefore, a design problem points to the entrance toward a coherent whole, which contains potential design solutions within it. The but-related things are often implicitly referred to as a gap, precisely because something hidden makes one part of the but-relation a need that is difficult to satisfy. The opportunity is the gap in the absence, the missing piece in the whole, which links now and future. To simply state an undesirable fact that needs to be changed is not enough to be an argument. The focus on the initial but-relation extends to a more sophisticated relational whole.

Reformulating

The extending phase gave rise to the reformulating phase, which allowed more things to enter designers' vision (such as health care and adaptation to different occasions). The students finally understood that the interaction between human body and high heels stresses the human body; but also that this interaction can be changed, by adding, for example, other objects that correct or alleviate the bad effects. A fuzzy and hidden opportunity for design was on the edge of emergence.

Of course, the reformulating phase of an experience of having a design problem can be more complex, because the initial but-relation could be more spontaneous and fuzzy than had been stated in the high heel design case. The designer takes rounds of reformulation to identify the parts (the undesirable/needed thing, the determined condition, and the potential opportunities) and the whole (a design problem as an argument to change). An example of my experience of a digital device design illustrates such a situation (see § 4.3.4).

In this phase, the potential problem is not determined yet. Even the but-related things undergo reformulation. When different hidden opportunities tentatively emerge, different combinations of other parts in the problem realm have to be modified accordingly. The hidden opportunity reshapes the whole problem and suggests distinct area of solutions. The revealed and reformulated parts increase the cohesion of a design problem being a persuasive argument. Hence, the reformulating phase of the experience of a problem concept starts from turning the determinate parts indeterminate: revealing

the hidden part (opportunity) to be changed and reformulating the other parts in response.

This phase is a growth from parts to a whole and turns the absence to presence. The but-coupling, containing or pointing to hidden things, is revealed as competing parts for an eclipsed whole. This is a design problem. The revealed hidden-but-related thing suggests a ground to draw the scope to change. Without recognizing the identified parts as being related in a whole, contradiction and inconsistency do not exist, nor does the ground of a problem concept.

Saturating

In the next phase, the but-relation was finally replaced by a more sophisticated argument of a design problem: "wearing high heels has an undesirable impact on women's health, but most women still have to or love to wear high heels. It is nevertheless possible to design some products that help women reduce chances of injuring their bodies without compromising a stylish way of wearing high heels" (Field notes: TU080111PU). For example, the interactions between the auxiliary products and human could alleviate the stresses on the waist and back resulting from wearing high heels. Thus, a design problem, indicating solutions through new interactions, became saturated. The solution is not the only one, however; it depends on which is understood as the hidden opportunity and the relations of this to the other parts in the argument.

The argument to change, as a mature problem concept, includes the following: something to continue (determined conditions/criteria); something to be changed (the opportunity); and the undesirable fact that may improve, or a need that may be satisfied.

4.2.2.3 A Brief Comparison between Two Modes of Four Phases

The four phases of the two modes of experience of having a design concept are compared and in Tables 4.2 and 4.3. They are further summarized as follows.

Table 4.2. Comparison between two modes of four phases

	An experience of having a solution	**An experience of having a problem**
Connecting	Irrelevant things presented in an and-relation	Discursive phenomena/facts presented in a but-relation
Extending	Extending the inner similarity to a new whole (usually involving the area of experiences)	Anticipating an argument to change as the whole that is yet to be present
Reformulating	Turning the previous wholes into indeterminate parts of a new whole: exploring the inner similarity that indicates both preliminary presentation and identity of the new whole	Turning the determinate parts indeterminate: identifying the hidden part (opportunity) to be changed and reformulating the other parts accordingly
Saturating	Presenting the new whole with identity in supporting manifolds of presentation	Presenting the identified relevant parts as a coherent argument to change
Major change of relations	*Absorbing the juxtaposed "and" by reformulating the new identity and presentations.*	*Revealing the argument to change by reformulating competing parts including the juxtaposed "but."*

Table 4.3. Comparison between the evolutionary solution and problem

	A solution	**A problem**
Beginning (The revealed hidden thing)	The shared presentation(s) (in the *and-juxtaposition*)	Something undesirable Something that will not change (in the *but- juxtaposition*)
End (The revealed hidden thing)	A new design as a whole: • with saturated identity in new presentations • with new parts to the new whole	The argument to change as a saturated whole: • something to continue (condition/criteria) • something to be changed (the opportunity) • undesirable fact that may improve, or need that may be satisfied

Having a Solution Concept

In an experience of having a solution concept, wonder is the sudden awareness that something is out of its place while juxtaposed with the current design. This instantly makes the design situation an indeterminate one. Actually, it is not the remote thing as presented by wonder, but the implied *inner similarity*, that indicates a preliminarily determined relation of presentations and identity. This relation requires a new whole to reside in. It takes the designer time to see the inner similarity, and reformulation of the design comprises the prolonged engagement of merging the juxtaposed things into a new whole through conceptualization and revelation. Different from putting together a missing jigsaw puzzle to complete the whole picture, by way of analogy, it involves reorganizing and reshaping the existing pieces to have the missing piece well fit into a

new picture. By doing so, more of the hidden aspects of the new picture are brought to the presence. The finally achieved whole, when all in place, is different from the previous whole, since locating the previously remote thing (presented by wonder) in its place is achieved by redefining the whole as well as dislocating and changing the earlier focused subject matters. In this process, conceptualization (the interplay between *moments* and pieces) is important for the construction of parts, wholes, and identities, although it is not the dominant relation. First and foremost, wonder that presents an irrelevant thing and the currently focused thing side-by-side is not conceptualized. The revelation, instead, integrates most of the formal relations, including conceptualization, that carry the designer to the end of the experience.

Having a Problem Concept

A design problem rests upon something people cannot (or will not) change. This part becomes a determinate condition that urges the designer to find out the changeable things. More competing things emerge as constituent parts when the problem becomes more specific and matures into a coherent argument. Being brought into its presence, the previously hidden changeable thing becomes an opportunity for solutions within a saturating design problem. This also implies the area of subject matter that will be dealt with.

An experience of a design problem extends a spontaneously perceived contradiction or inconsistency (a but-relation) toward a coherent whole (an argument to change). Articulating an evolving problem brings to light the neglected things that would otherwise remain obscure (and by doing so continue to result in the unfavorable consequences) to illuminate the starting point of change. This process is also grounded in the revelation.

Compared to an experience of having a solution concept, this experience appears to require greater intellectual effort. The coherent meanings that qualify as a design problem contain a logical form. However, this form is not initiated by conceptualization. Instead, it is driven by the curiosity to understand the surprisingly presented but-

relation that has arisen from the discursive ordinary. The intellectual process that begins from, and constantly feeds, on the designer's experiencing of revelation is an experience that brings satisfaction with its completion.

For the two kinds of experiences of having a design concept, the four phases provide a vocabulary to describe the kinds of experiences that are often bypassed by the notions like intuition, creativity, and association. Each mode of four phases deals with only one side of design in a relatively idealized way. In actual practice, the two modes of experiences often iteratively occur and form an evolutionary experience of having a design concept. Something that sensitizes wonder toward a solution to one designer might invite another designer to probe into a problem. This may also happen to the same designer at different points of time. There is a fluid line between the interchangeable solution and problem. With the solution of a washing machine, for example, the problem could be phrased as: *Doing laundry is part of our everyday life, but it is generally a burden to many young people; how can the event be turned into a simple and light experience?* The subtle relationship between solution and problem is further clarified in § 4.3.3.

It is worthy of noting that the solution and problem elaborated here can be extended into a broader sense. The two modes of four phases apply to both the solution and the problem concerned with the principles and understandings (see the framework of meanings in Chapter 5) in actions apart from the product that is going to be realized.

4.3 A Dynamic and Unified Whole

In real world practice, having a design concept rarely takes place neatly adhering to one mode of four phases, let alone in a way that follows the phases in a linear way. In the above sections, the whole picture of the underlying structure has not been completed yet. As outlined at the beginning of this dissertation, the examined experience is characterized by a dynamic and unified whole, and the underlying structure should be able to account for these features.

To refer to the basic formal relations in an experience (as discussed in § 4.1.2), the first three sections in this chapter (§ 4.1, § 4.2, and § 4.3) express different parts and presentations of the underlying structure, as our attention to the structure changes between the different facets of it: the ingredients, the process, and the characteristics. Let us see the experience under scrutiny as a thing with a unique identity. This identity is revealed layer by layer, as the parts and presentations at each facet are explicitly expressed as our understanding about it goes deeper. In this section, it is time to unveil another level of the experience's identity: by describing parts and presentations that support the qualities of a dynamic and unified whole. Since the identity is enriched with the accumulation of manifolds of presentations and parts, this third level of identity is established based on the contents introduced in the two sections above. More specifically, the relations that integrate the relevant materials of the structure into new presentations, at the new level of identity, are described. They form distinct but interrelated facets of presentations of the level of identity under discussion.

In addition, in presenting this level of identity within the examined experience, the relation of *old and new* has earned its place in this structure as another basic formal relation that has emerged from the data. Correlated with the relation of absence and presence, the relation of old and new is more than temporal: it presents all the things revealed so far, which are subject to be either suspended or utilized. Constant reflection on the experience leads to the disclosure of the designer's natural attitudes, as well as preconceptions on the particular design task, and then to potential alternative options.

For instance, when I first saw a five-year-old child's drawing (see Figure 4.3) I could not help noticing that the flag on the left hand side was flipped in the finished work. This amused me, so I began to imagine what had made the little artist changed his mind. My assumptions included several options. Obviously at the very beginning the child had realized that flags should fly in the same direction as the pencil draft indicated. But symmetry was considered the most important quality of a grand castle, so it was privileged over the natural law. Or—wait a second—could it be that the child already knew one-point perspective drawing, which satisfies both principles at once? Later I

asked this child himself why the direction of the flag was changed. To my surprise, he answered, "I started from the left side. But the paper was not big enough when I reached the right side" (personal communication, 2011). Through reflection on my experience of this drawing, my natural attitude was revealed: to me, the natural law takes priority. Meanwhile, a new understanding was also present: to the five-year-old, esthetic quality was the most important and science may not yet been considered in his art creation.

Figure 4.3. A 5-year old child's drawing (copyright by Xin Qingzhu)

The old and the new are relative to one observer (me, in this case) who experienced observing, interpreting, and understanding a child's artwork. The old has been unknowingly involved in the earlier course of experience until that revelation; the new becomes a part of current understanding, or part of a potential design concept in the case of design. Both old and new understandings are brought from absence to presence. They show conditions under which each way of interpretation makes sense, but the collision between the two catalyzes (or even creates) an experience of having a design concept.

4.3.1 Vertical Conceptualization and Horizontal Revelation

In an experience of having a design concept, revelation engages two correlated formal relations. From absence to presence, the width of the design concept expands,

and the interaction between old and new understandings advances the depth of the design concept. A design concept grows from empty and implicit to saturated and explicit in the experience that is grounded on the revelation. Revelation in the examined experience results in fluid change of parts and whole: for example, the previously independent wholes become *moments* or pieces of a new whole. Conceptualization is realized by a change between *moments* and pieces as well as parts and wholes, and this allows the identity to be articulated. Revelation forms the substrate of an experience of having a design concept, where the designer is continuously interacting with all sorts of things before these things' conceptual identity and whole along with contextualized presentations and parts are recognized. Conceptualization, on the contrary, deals with things across the conceptual and contextualized ends by turning *moments* into pieces and breaking a whole into parts.

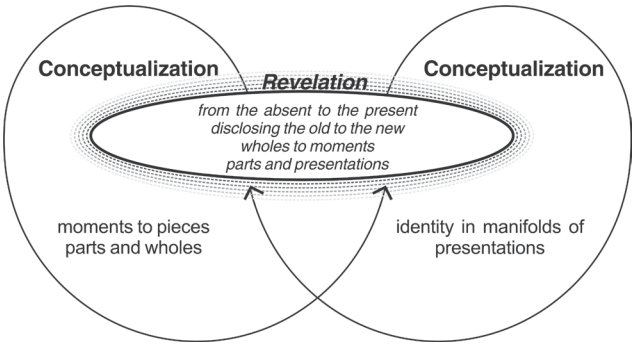
Aspects at the various levels of abstraction that result from vertical conceptualization are always tied together, because of the horizontal revelation. Conceptualization allows the designer to suspend the holistic relations and to focus on particular aspects; revelation, however, restores awareness of the relations of parts and wholes and identity in presentations and presents them as integral things to the designer. Only revelation in experience allows pieces (or, wholes) to be *re*-turned into *moments* of a new whole: that is, revelation restores relations cut loose by conceptualization that turns *moments* into pieces. Revelation moves in an opposite direction to conceptualization by melting down all the extracted elements into one entity. Such wholeness reaches its culmination at the end of the experience, where all the understood things dissolve into inseparable parts to one another in the whole.

Separation of conceptualization from revelation makes the examined experience fall apart. The reality can be blindly fractured by conceptualization when the designer does not immerse herself or himself in revelation; conversely, revelation in experience would be a myth without the designer's ability to articulate contents at both conceptual and contextualized ends. In the latter case, wonder would be beyond the understandable and the process of an experience of having a design concept would not occur.

Conceptualization and revelation employs all the basic formal relations in the experience. The two in conjunction realizes identity of a design concept arising from manifolds of presentations.

In a metaphorical sense, conceptualization grasps the vertical relations, and revelation is anchored in a horizontal direction (see Figure 4.4). Because of wonder, the vertical conceptualization is recruited into the service of understanding and developing the revealed things, in order to feed the ongoing experience. In this sense, conceptualization is grounded in the experience of having a design concept, rather than in the overarching form of this experience. The vertical conceptualization and the horizontal revelation mutually nurture each other. Without conceptualization, we can barely speak out what is made, not to mention how it is made so. Revelation, on the other hand, unifies conceptualization in the main course of bringing the absent to the presence and disclosing the old next to the new.

Figure 4.4. Conceptualization and revelation



4.3.2 A Reflective Dance

An earlier (or another designer's) experience of having a design concept might be turned into part of a new experience of the same nature. The fusion of this experience makes the old and the new experience a cumulative and evolutionary growth. The fusion often happens during the designer's prolonged reformulating phase. This can be described as a reflective dance:[10] it involves transcending an ongoing experience by

[10] Finlay (2008) introduced the conception of "a dance between the reduction and reflexivity," which means "the researcher slides between striving for the reductive focus and reflexive self-awareness; between

virtue of a new wonder, and utilizing the new experience to reformulate the earlier experience. The insights from the new experience may function as evaluation, affirmation, modification, or breakthrough in relation to the earlier experience. The arising new wonder makes the designer temporally tear her or his gaze away from the current phase to the beginning of a new experience (a new wonder) that has been stimulated by the subject matters made thus far. This is the emancipation from ongoing experience and perspective, allowing the designer to perceive and to reflect on them with fresh eyes, as though observing another person's work. Absorbing the subject matters that were made in the new experience, the earlier experience revives in the larger whole and is modified directed by the insights from the new whole.

The reflective dance is fundamentally established on the revelation in the experience. Bringing the absent to the present starts the dance, and the relation of the old and the new guide it through. This facet of the underlying structure steers the new experience out of the original experience toward a coherent way. This is achieved by understanding the following: what was understood, conceived, and unreflectively believed before; how the old understandings are relevant to the current subject matters in question; and how the old could be exploited to formulate the new. In short, an experience of having a design concept often engages the reflective dance between old and new experiences through the nexus of wonder toward a more consolidated experience.

Four situations of the reflective dance have been identified from the studied cases. They describe different interactions between the formal relation of the old and the new and that of absence and presence. The last instance, however, is an extreme situation where the reflective dance is hindered, due to a disconnection between the two formal relations. The four situations are outlined as follows:

(1) A reflective dance can lead to affirmation the ongoing experience. If new

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bracketing pre-understandings and exploiting them as a source of insight" (p. 1). This is a phenomenological discussion; whereas the fundamental form rests upon the researcher's/inquirer's ability to slide between the immediate experience and to step outside of it and reflect on it. This is similar to a design experience: the designer may not reach as far as a phenomenologist does, but does inquire in a way that is compatible with phenomenological thinking.

wonder presents a juxtaposition that echoes things that have been presented by the initial wonder, then it affirms the insights about the design concept formulated in the original experience. The designer may re-enter the subsequent phases in the original experience inhabiting a familiar track and reformulate more to saturate the end product;

(2) A reflective dance can result in modification. Even if the new wonder presents the same juxtaposed things, it is possible that the designer will see a different way of extending: for example, where previously the connected things were deemed to indicate a physical object, they can instead form a new event. In this example, the new wonder summons important modifications to the previously aimed-at concept;

(3) A reflective dance can sometimes create a breakthrough. As the formed subject matters of design concept grow in the reformulating phase, the designer has more-and-more materials to experience. It is possible a radically different juxtaposed coupling arises from the ongoing reformulating phase, in which case the earlier starting point is in face of the possibility of being suspended. A very different design concept is incubated in a brand new experience, which is a breakthrough from the old one. Moreover, if the designer probes further, the rejected earlier concept and the newly emerging concept will evoke a new wonder by forming a vivid contrast while side-by-side. This kind of wonder may lead to the formulation of something that is not immediately part of the to-be-produced product, but something very relevant to the environment where this product is shaped. I use the word *environment* to indicate levels of identity and presentations of the design concept that are different from its substantive level. This is why designers often include the process, their personal understandings and feelings, or generalized principles in their description of a design concept (the notion of principle will be explained further in § 5.2.1.2); and

(4) An extreme situation occurs when the design concept seems to either be stagnant or to be continuously accumulating without any guidance to draw the boundaries and to direct the reformulation in a consistent way. In this case, the reflective dance is stopped, because there is no reflexive reasoning[11] between the old and the new

[11] Husserl (Roberts, 1992, p. 164; cited in Swindal, 1999, p. 65) suggested that reflexive reasoning is not inferential, in that "it does not thrust abruptly into the dark secretes of causations, but simply looks at itself. Reflection is the self-showing of reason." Also, the self-showing is inseparable from what is shown.

experience of having a design concept.

In the first three situations, newly triggered experiences function as an important source of evaluation (intrinsic to design experience). These experiences may coexist in an evolving experience (see an example in Data Analysis Box 4.1). The reflective dance is central to the reformulating phase of the experience of having a design concept, which makes it the most prolonged one among the four, connected to and feeding on surges of new understandings obtained in the new experience.

Data Analysis Box 4.1
***Loop Book*: E-book design**

The project was assigned by the tutors as "a future product design." Student David was inspired by a paper ring that wrapped around books, and thus attempted to create a "genuinely continuous" reading experience using the movement of turning a ring. However, his concept was challenged by other two peers who questioned what a pleasant reading experience could be (Field notes: GI090409TJ).

In the group interview, student David introduced his conception of an e-book design, which began with:

> My roommate came back with several books the other day. I was playing with the paper ring that wrapped around the books when this idea occurred to me all of a sudden. What if I can read continuously, like turning a ring. It would be a genuinely smooth reading experience, I guess. There it is.

After David presented his design embodied with shape, material, interactions, and so on, his peers raised their wonder: their imagined experiences of reading and this e-book. For Vivian, this small device might be nice to kill a short period of time ("one feels like to kill the time by reading several pages while on the bus or having a rest"), but after that it was supposed to be worn on the wrist a whole day. For Jen, the device needed two-handed operation, but reading in urban transportation could not afford use of both hands; besides, the posture while reading "looked as if I'm cheating in an exam," which might appear indecent to the others.

These "buts" are new wonders questioning what a comfortable and pleasant reading experience could be based on what was already had. New wonders make the designer question the original wonder by transcending out of the earlier experience. They may affirm the original wonder with consistent juxtaposition (Jen also said, "Yes, someone might fell the reading posture a bit strange. But the ring idea is fun. Young students probably would like it"); they may inject complementary considerations in extending and reformulating the original wonder; and, if powerful enough, they may reject the earlier starting point when, e.g., the design solution is viewed resulting in more problems than it solves.

The reformulation pushes on synthesis by fine-tuning the whole with its identities, by means of articulating multiple understandings and interpretations through new ands and buts (wonders). This is fundamentally concerned with turning pieces into moments, in line with the tentatively anticipated whole that is subject to modification and evaluation.

This kind of reflective dance may occur to a designer at different point of having a design concept. Being the output of one's prior experience, pre-understanding is an accretion without a beginning and an end. It escapes the attention in the ongoing experience. It is boundless since it is a *moment* of our prior experiences. Wonder draws the boundary of our understanding at the moment that merits attention now. It is turned into the pre-understanding (the old) when juxtaposed to a currently experiencing thing in the form of wonder. Thus the relevant pre-understanding becomes a matter in the current experience that is leading to new understanding that requires reformulating the current materials.

Reflection on new wonders produces generative and cumulative design concept at the same time. New wonder helps to bring the absent (the neglected or taken for granted pre-understandings and the new possibilities) to the presence. The old and the new are brought in the presence in a pair. The ensuing extending and reformulating phases in that particular new experience absorb previously independent wholes into parts of a new whole. New-understandings include judgments on the appropriateness or inappropriateness of the previous design. The relation of the old and new carry on the process of designing by directing the designer whether to use, or how to modify, the old understandings in the intended design.

In the fourth situation, however, the first possibility of stagnation easily draws designers' attention, as a design impasse for the revelation is reached (see an extract of a design project in Data Analysis Box 4.2). The second possibility is more deceptive, since the experience still appears to be productive.

Data Analysis Box 4.2
***eTrans*: A TV ad design for promotion of the use of electric cars**

Among seven groups working on a system design project for electric cars, three year-four students from Tongji CN and two year-three students from Kolding DK developed a TV advertisement inspired by an unexpected exploration of bodily experience. They decided to make the video arouse tension in the audience by triggering physically manifested emotions. This was not immediately embraced with positive feedback, however (Field notes: SD270910ET).

Having a design concept requires the designer to immerse him/herself in the experience, that is, pouring oneself into it. The original wonder emerges in an ongoing experience and convinces the designer that the product could be meaningful. To deliver the design as a finished product and to invite the audience to an equivalently meaningful experience is a different matter, however.

In the tutorial I observed, this group of students were stuck in an impasse: they had developed a strong attachment to their idea of reminding the audience of the intimate human-nature relation by showing an abstract video to arouse the audience's bodily experiences; however, their peers reported that they were perplexed by the video and felt uncomfortable for it appeared too "sexual." The group of students felt "sad" but refused to change the video.

Tutor Tom tried to use a pianist's story to instantiate the students' impasse:

> When roaming in a park in a foreign city a pianist was suddenly grabbed by a piercing emotion. He found a piano in a small open theatre on a little square and couldn't wait to express that feeling into music. He forgot about everything, skills, structure, except for poring himself into each note struck on the keys. On finishing the piece of music, to his surprise, half of the audience had gone, and the rest might not have been listening at all.
>
> Then he decided to play it again the next day. He thought about the details to convey the perceived emotion to his audience, summoning all his techniques of composing and performing. At the end of his impromptu this time, he found almost all the audience stayed. Some of them were moved into tears. Strangely, he himself didn't feel the emotion that hit him yesterday… Design is similar. You have to shift between feeling your own experience and communicating it to the audience.

This is a typical example of the blocked reflective dance between one's immediately experiencing something and composing the experience by taking in it as part of the final product for the others. New wonder had not occurred to the designer yet. The students were dwelling in their own wondrous embodied experience, and failed to slide outside of the original experience to shape it as a subject matter of design. Perception of the proposed video solicited a new experience from the audience, which was denied by the student designers clinging to the old one where the glamorous identity of the aimed experience was formulated but poorly-supported. Without the dialogue between the old and new, the experience of having a design concept could be in danger of coming to a standstill.

As to the continuously accumulating instance that impedes a reflective dance, I use an example to help us to understand this special situation (see Data Analysis Box 4.3 and Figure 4.5). Each loop can be traced back to the same wonder, the same *and* or *but*; whereas the wonder leads to distinct extension and reformulation, which makes the design concept catchall but keep none. A very clear indicator of this situation is that the designer seems to be proposing accumulating presentations, with the purpose of the

design increasingly diluted in each. Designers in this context seem to be tackling different problems, but attempting to use one solution. The absent is continuously brought to the present, while the relation of the old and new is bracketed. The designer has not been aware of her or his old understanding and thus the new is not about to dawn. I term this extreme situation *sticking to the original wonder*.

Data Analysis Box 4.3
***Fresh Label*: Intelligent food label design**

This was also from the "future product" project. Student Vivian identified a blind spot in people's current way of consuming a certain kind of foods, whose expiry date changes when the package is opened. However, her proposition was confronted with questions from the peers regarding whether the product would effectively work in various anticipated scenarios (Field notes: GI090409TJ).

During the peer review in a group interview, student Vivian introduced her design by expressing the identified problem:

> For certain kinds of food, the quality guarantee period printed on the package is, say, one month, but it'll reduce to one week when the package is opened. Oftentimes users can't remember when it was opened. So, my concept is about healthy life.

She was very excited about finding a blind spot in current way of consuming foods. After describing a winding journey of reformulation, Vivian reported her concept as follows:

> I've arrived at the concept of intelligent alarm label design. Each label is in the shape of a dial plate that can stick to food's package. For instance, a box of milk stays edible for five days after it's opened. I press the label on the sign of five, then a red arc appears. With the arc gradually disappearing, the expiry date is approaching. The guarantee period is expired when the red arc completely vanishes. This is a signal to the user, preventing them from eating overdue food by mistake.

She concluded that "I want to design something that doesn't urge people to consume the food, but can remind people in a low-profile way when the food is no longer proper to eat." Clearly, this was about the identity of using the electronic label anticipated by Vivian, "low-profiled" and "healthy."

However, debates raised by her peers were centered on the question: *Does such a "low-profile" way of reminding really work?* David and Jen, Vivian's classmates, questioned: "Without sound message, how can this label remind people of the expiry date when a refrigerator is filled with all sorts of stuff?" And, "Wouldn't a label that flashes or beeps be a better option?" Vivian insisted that "I don't want to demand people to eat up everything before the due day as if they have to. I just want to make sure that the user can use food under a well-informed safe condition." Jen pointed out that the procedure of using the label largely made people's current way of consuming foods more complicated, which was not low profile at all.

For Vivian's peers, their experiences of Vivian's proposition were full of new "buts." Confronted with the challenges, Vivian continuously defended herself by looking back at the beginning of the "concept" – the original "but." For example, Vivian shrugged off the question about "If dozens of kinds of stuff in a kitchen are labeled with this 'low-profile' reminder and you can't discern whether something is expired until you pick it up and check, isn't it the same with or without this label?" This present a new wonder in a but-relation, which would have otherwise started a new experience to a more coherent design concept.

However, Vivian maintained that her design was for a particular kind of food. There was some doubt regarding who would be the user. Jen responded that, "if one could go through such complicated procedures to sort and mark each item before storage, she probably is careful and sensitive enough not to leave foods going overdue." Vivian reformulated her concept, by stating that "housewives are sensitive to foods like fruits and vegetables but they need reminder for those that would not be instantly used up when package is opened; for young bachelors, they need it anyway."

In Vivian's initially identified problem, people's current way of consuming packed foods was deemed a hidden opportunity to change. Accordingly, the but-coupling was reformulated by David and Jen into: *Two pieces of guaranteed period information exist under different conditions, but people easily overlook the change of conditions*; while Vivian focused on: *The expiry date changes, but there is no real time information presentation*. For David and Jen, a solution should be an effective reminder. For Vivian, conceiving a way of real →

Data Analysis Box 4.3
Continued

time information presentation is enough.

Vivian appeared to be addicted to her "label concept" as she firmly adhered to her initial wonder, which included little about how the information should be expressed. Each time she revisited the initially connected and extended problem with the subject matters made so far, she saw nothing go against the wonder and would therefore enrich the concept a step further, e.g. claiming that "it works for home-made wine and pickle making too," and, "Not only foods but also products such as contact lenses also have this problem." When we put Vivian's accounts of her experiences of having the design concept together, we can find that her "concept" grew into more and more complicated parts and presentations claimed to be supporting the "low-profile" way of consuming foods. The solution grew all-inclusive while focus on the problem remained drifting.

When subtly different understandings about the fuzzy problem were reformulated in rounds of reformulation by the designer and new observers, it became clear that the "low-profile" lifestyle was personally valued and conceived as the identity of presenting information by Vivian, but it was remote to her initial wonder (the first identified problem). Also, this identity somehow held back other ways of appearing of an effective reminding of the change of use condition, which was deemed the hidden solution in the design problem by David and Jen. For them, a healthy and economical way of consuming food was a valued identity.

Sticking to the original wonder does not prevent the expansion of the width of the design concept. But the derived concept may be thin and lack of consistency if reflection on the old and new is not made to allow the designer to become aware of preconceptions.

* **Figure 4.5. Intelligent food label design (copyright by LIU W.)**

I will now take a closer look at the changing formal relations in the reflective dance. Bringing the absent to presence is the major relation in an experience of having a design concept. Wonder, the ensuing permeating conceptualization, and the reflective dance under discussion are all rooted in this relation. The relation makes the experience as well as the design concept accretions. On the other hand, the dialogue between the old and the new guide the experience through to an end.

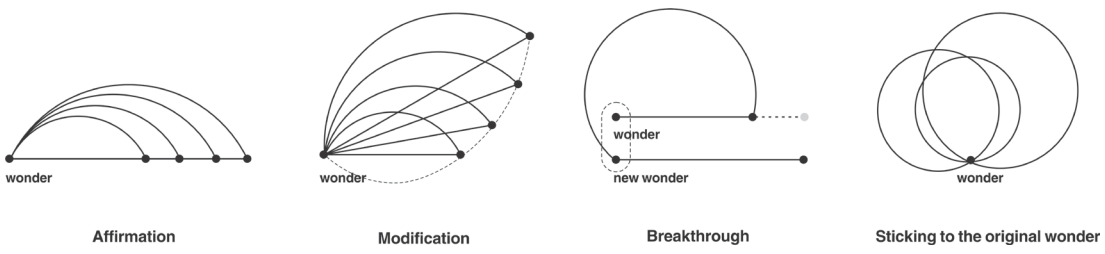
There are two options in designers' actual dealing with the revealed things. Either they blindly accumulate the things that have been brought to the scope of subject matters of a design concept, without reflection on their old-understandings and preconceptions (which have shaped the design concept since the revelation occurred), or, they have a reflective dialogue between the old and the current situations to make the new in a better informed direction.

As noted above, the old and new relationship is correlated with that of absence and presence. These enable the revelation to occur in the experience. The old and new is more than a temporal relation. It contains all the materials that have been presented, suggests that these materials be either suspended or utilized. Although the relation of the old and new might not be always engaged (e.g. in sticking to the original wonder), when it is engaged the experience that re-delimits the whole will occur. Without the old and new, the presented previous hidden things result in accumulation. The old and new turns the free accumulation into a guided growth, for a *generative direction* arises from the discourse of the old and new, because they manifest conditions under which each way of interpretation makes sense. This is how the first three situations of the reflective dance facilitate the evolution of the experience. This is also in concert with the suggestion of Buchanan (2001c), that experience and environment are *places* where continuous reconstruction happens, which integrates the pluralism of past life and future possibilities in the moving present.

Seeing new wonders from a design concept that is under formulation seems natural for a fresh observer (such as a peer designer, a teacher, or a user). However, it takes great effort for designers to transcend their ongoing experience and start the reflective dance. This is like fighting against gravity, because the powerful attachment between the designer and the original wonder is yet to be fully satisfied, and the natural attitude in design dominates. Experienced designers and design teachers exhibit the expertise of smoothly engaging in a reflective dance during the experience.

The four situations of the reflective dance are illustrated in Figure 4.6.

Figure 4.6. Four situations of a reflective dance in an evolving experience



4.3.3 Solution and Problem as Moments to Each Other

Due to the way an experience of having a design concept evolves, solution and problem become interchangeable parts of a whole. The solution and problem indicate which subject matters have successfully attracted the attention of designers in an ongoing experience, and this makes the experience a significant design episode. A solution or a problem is confirmed or rejected by its counterpart that is sensitized by the new wonder arising in the very experience, especially during the reformulating phase. The more that is experienced and understood, the more explicit the problem and the better solutions can be formulated. Articulating the hidden opportunity in a problem itself immediately points to solutions. Seeing problems in a solution is an opportunity to improve the design concept. Experiences of wonder energize having a design concept and facilitate the transition between problem and solution. This is the power of the continuously growing design concept arising in design experience, it is evolutionary and generative.

While a specific thing is a solution for one designer, it might present a problem to another: this depends on what is connected to it and what constitutes wonder to the perceiver. Solution and problem are *moments* to one another in a design concept. No matter whether the design process is described as *problem-driven* or *solution-driven* (see Kruger & Cross, 2006), the focused design concept always implies its counterpart on the far side of the moon. Such a bond can be illustrated by a personal experience of mine, which is about a design project named *communication grill chang-tei* (exhibited in the Media Art Festival, Japan, 2004).

My experience of this design unfolded when I observed it at the exhibition as an audience member. As shown in Figure 4.7, I saw that several young people were absorbed in chatting online on their own laptops in a small room. The more active the virtual conversation became, the hotter the pot on the stove became. While these young people sat close to each other, none of them actually spoke one word to another. Having hot pot is a popular event in Eastern Asia for face-to-face reunion and conversation, but it was weirdly quiet at that time. This struck me as a wonder. The spontaneous “but”

juxtaposition gradually developed into the following: it is so easy to talk in real life but the younger generation seems obsessed with virtual communication. This was dramatically staged in such a special event and space. To me, this wonder implied a problem that was extending to the area of human interaction.

When I looked deeper into this but-relation, different parts of the problem emerged. The younger generation tended to be addicted to communication in virtual communities, which increased the chance of individuals experiencing solitude in real life. I saw it as an undesirable fact. *But where was the hidden opportunity to change? And what was supposed to continue?* I, as a new designer in face of the design, first attempted to formulate the problem by seeing that the experience of face-to-face communication was too ordinary to evoke young generation's appreciation of traditional values in real communities. During continuously questioning back to the initial wonder, however, I found myself trying to reformulate the problem concept in a different way.

I saw that the current virtual communication via face-to-interface interaction ignores the valuable experience in traditional communication. After rounds of reformulation, I arrived at an understanding of a design problem that appeared to have tentatively satisfied my curiosity about the original wonder. The argument for change was that both real and virtual social interactions should be respected as part of people's life, and they would continue (these were the conditions), since they are both inevitable ways of living in this age of technology. However, individual isolation resulting from obsession with virtual social networking might improve if the experience of virtual social interactions could be changed (this was the hidden opportunity).

In my first attempt, the final design solution might be a new experience about face-to-face human interactions that appear less ordinary. Eventually, a potential design could become a new experience of communication in virtual communities, fused with strengths and aspects of face-to-face human interaction.

However, when I looked at the project description that had been provided by the designers, it occurred to me that this project was presented as a solution "for the new century" in the designers' eyes. They reported:

> In order to eat, you have to continue chatting to get the electric stove to work. To eat yakiniku, heat up the electric stove. If you want it to stay hot, you have to keep chatting with the other people sitting around the table. If the chatting stops, the heat turns off. It's a networked home appliance for the new century.

Figure 4.7. Communication Grill Chang-tei in the Media Art Festival (Japan, 2004)[12]

I imagined that for these designers, with materials such as hot pot and online chatting at hand, wonder occurred within the experience of a powerful and-juxtaposition: traditional communication and virtual online communication. As a typical event of friend or family gathering, the act of having hot pot was used here to imply the identity of the intended design event, which was a favorable way of communication. Clearly, online chatting was previously irrelevant to the event of having a hot pot. Nevertheless, they were presented as two comparable parts in an and-relation that implied a solution in a new experience. If a solution is presented, the problem that it aims to solve is also implicitly manifested. In this case, a vague problem could be

[12] Copyright owned by SUEDA Koh and ISHII Koji. Also see http://www.ching-dong.com/cgc/contents/conceptEN.html (accessed on Feb 13, 2012)

presented as the traditional face-to-face communication is *ordinary*, but the young generations aspire to exciting communicative experiences.

If we see the Communication Grill Chang-Tei project as a presentation of a phenomenon, the strengths of this project lie in that the designer sharply caught a subtle juxtaposition (an *and* to them; a *but* to me) and integrated it in the event of having hot pot. The dramatic contrast easily sensitizes an experience of wonder to the audience, and this either resembles the designers' wonder, as a solution, or suggests a problem. Whatever the case may be, these are experiences of having a design concept that share a structure that is similar to that experienced by designers. The new experience guides the fresh observer to access and to reconstruct the designer' original experience in the new one. The same subject matters suggest a solution now; whereas they may manifest a problem too, as far as the historical and individual dimensions of the investigated experience are concerned. Wonder unites solution and problem as two sides of a coin in the growing experience. This is an alternative understanding to the description of creativity suggested by Dorst & Cross (2001), which in turn is based on the co-evolution model of problem-solution from the external perspective (Maher et al. 1996).

4.3.4 Designer's Active Involvement in the Design Concept

Another relation that illustrates the underlying structure as a dynamic and unified whole is the designer's active engagement in making the design concept. This may sound like a trivial statement. This relation is nevertheless a highly relevant presentation of this structure's identity at such a level. The relationship between the designer and the design concept enables an understanding of the internal designer perspective that was first introduced in § 2.1.6 and has been carried throughout this inquiry. The designer's factors are so entangled with the derived design concept that the designer becomes part of the concept that she or he makes. The relationship between the designer and the design concept also sheds light on a new understanding of the term design concept, whose characteristics cannot be accommodated by a definition that is derived from

conventional external perspectives, as these definitions treat design concept as an independent product of design process. This new understanding is further clarified in § 5.5.

4.3.4.1 An Internal Perspective

I will now resume the discussion on external and internal perspectives (in Chapter 2) to describe a design phenomenon and to identify how the presented underlying structure accounts for an internal perspective. The term structure, on its own, reveals little about the interactions between the particulars of the observed and the observer.

Let me use an analogy of photo taking that helps to elaborate this further. For any photo taken with a digital camera, a kind of hidden information, called exchangeable image file format (EXIF), can be read. The EXIF information includes the camera model, exposure time, the lens' focal length, aperture size, etc. These form a basis to describe how a particular photo was obtained. This is remote to how the photo appears to the audience. It tells little about what and how the particular photographer wanted to present in the photo, or how the elements could be useful for other photographers if they were to create a photo of the same subject under the same circumstances. Thus, EXIF is a kind of structure about a creative process developed from a perspective external to the process where that photographer inhabits.

With this in mind, imagine a beautiful landscape is unfolding in front of you, and you are trying to take a photo of it. You manipulate the camera to select various combinations of the parameters (e.g. focal length, white balance, film sensitivity, manual or aperture priority mode) in search of a nice effect. You zoom in and out, swing right and left, and tilt the camera in various angels. More than this, you yourself move about to step up to or to back from the intended parts (say, a red-roofed cottage on the meadow) in the landscape. Your gaze shifts between the continuous real landscape around you and the image in the camera's viewfinder. You press the shutter when a satisfactory photo is previewed through the viewfinder. Such a description is not limited

to the resulting photo: all these endeavors have a relation to what is presented to you through the camera, and constitute the underlying structure of having the photo. The structure is soaked in relations between you and the landscape, and those in your ways of presenting it aided by the camera. This concerns the integration of the process, tentative presentations of the product, and the producer.

Obviously, the underlying structure of an experience of having a design concept is enormously different from the structure such as the EXIF that is identified from an external perspective. However, having a design concept resembles the internal perspective of taking a photo, in that the creator is living in that creative phenomenon.

Situated in the bond between what is experienced and how it is experienced, the underlying structure of the examined experience is not a structure that is out there in the world, irrelevant to particular processes, designers, and derived concepts. The structure is imbued with various relations that bring an experience into a whole because of the involving human dimensions. Hence this underlying structure is not static. The dynamic characteristic can only be revealed through the process of creation rather than after the process ends; and it can be described by the designer who is in that process instead of summarized based on the end product. The difference lies in that this structure is derived from an internal perspective to the examined design phenomenon.

4.3.4.2 A Design Concept Contains the Designer intending the World

This leads to a second issue*: What does it mean that the designer becomes part of the design concept made by her/him?* To answer this, I continue to draw on the analogy of photography. Once captured, the landscape is presented uniquely. The experience of capturing such a photo provides clues to disclose such uniqueness, and thus provides a kind of basis to support the formation of a photo. It becomes the lens, metaphorically, that connects the viewer to the view. This experience cannot be reduced to either the steps of taking a photo or to the facts and figures about the resulting photo. Being part of the experience, the photographer is naturally involving the photo as part of the lens.

Moreover, the photo is the photographer's description of the world, as much as it is an interpretation of it. Although it is presented, the photo is but one moment of the photographer's exploration of the landscape through the experience. In this way, it embodies and implies the relationship of the photographer intending the landscape. Even the frame of the photo—like other more eye-catching factual presentations regarding the contents of the photo—results from, and mirrors the way the photographer wanted the view to be.

By the same token, from a presented design concept, it is possible to read off some aspects and intentions of its designer or presenter. Whether we agree or disagree with those intentions and understandings, we accept the design concept as material for us to further experience, reconstruct, develop, or reject. In that process, we have our own experience of having the design concept, and the derived design concept reflects our intentions and understandings. The identity of the design concept is now supported by presentations (with our new contribution included). This identity of the design concept is what appears to us, and may be different from the earlier presentations to the original designer. Also, it may be seen or overlooked by the new observer of the design concept. A design concept could be deemed creative by one person, and unnecessary and overdone by another. Thus the identity of the concept is not an objective entity. Instead, it is revealed through the relationship between the subject matters and the designer/observer. The quality level of the identity of a design concept and its embodied appearances are connected to particular designer/observer's understanding and judgment.

In short, a design concept contains the particular intentionality of the designer and the world. Like a photo reflecting the photographer's view of the world, a design concept has the designer's perspective in it.

4.3.4.3 Design Concept as Meaning

Through the internal perspective, I have demonstrated how design concepts are related to the people who have them, to the process where they emerge and develop, and

to the things in the world they represent. These questions (raised in § 2.1.3) are difficult to be coherently addressed from external perspectives, but human experience provides an effective vantage point for this. The answer to the question *What is a design concept in the context of an experience?* ripens in this inquiry into the underlying structure. By referring to a design concept as elaborated in the experience of having it, the designer indicates that meanings have been achieved.

The tradition of conceptualization hides the recognition that the so-called design concepts are what designers adopt to make sense of their activities of creation as well as the creations, just as meanings are employed within the experience. Within this study, design concepts and meanings converge at the point where the internal perspective to approach designing from the designer' eyes emerges. Design concept is the alternative name for meaning, denoting a designer's achievements made in designing. The ambiguous term design concept is a collective name for all kinds of meanings that are stable enough to be stated in the ongoing design experience. The definition of meaning in this study is made in the next chapter, and a framework to describe meanings obtained through the experience that is derived from this underlying structure is elucidated. A dialogue on meaning with the literature will be conducted to further clarify how meaning is differently understood from an internal perspective in this study compared with various schools of thought on this notion that are currently influential in design.

Notions such as design concept and conceptual design have often been taken for granted when describing designing, without the realization that these notions inherit particular perspectives and characteristics from certain traditions. The situation is made further problematic when designers and researchers implicitly try to apply these notions as a foundation to describe designing in the context where these notions no longer hold. This approach reduces opportunities to communicate the phenomena of having a design concept on a more coherent basis, and limits the designer's ability to understand and appreciate the diversity that the current understandings exhibit. The expression of the

phenomenon of having a design concept means having a set of coherent meanings about either a design solution or a problem, or both.

To pay respect to the general practiced vocabulary, the term design concept continues to be used in calling the phenomenon under question. But readers may understand that design concept suitably means meaning when the discussions are set out in the landscape of experience: this requires a shift in perspective.

To conclude this exploration of the underlying structure of having a design concept as a unified and dynamic whole, different relational facets are presented in this section. The unity of the vertical conceptualization and the horizontal revelation in experience integrates all the basic formal relations into an inseparable whole. The designer's reflective dance between transcending the ongoing experience and reformulating it using insights from new wonders further elaborates on the change of relations that occur in the revelation (the relations of absence and presence and old and new). The fusion of solution and problem as moments to each other not only emphasizes the unified whole in a different way, but also, in alliance with the reflective dance, illustrates an experience of having a design concept as a dynamic and evolutionary growth. Furthermore, identifying the designer as being personally engaged in the experience helps to explain that the achieved design concept contains the relation between the product, the process, the designer, and the intended world, and gives rise to the notion of meaning as an alternative name for design concept in the context of experience.

4.4 Summary

The underlying structure of the experience of having a design concept is divided into three sections: its ingredients, the basic process, and its existence as a unified and dynamic whole. A basic formal relation in human experience is required to understand a thing (i.e., identity arising in manifolds of presentations). Different sections in this chapter have dealt with various parts and presentations of the identity of the structure at

a particular level. Presentations, in these sections, grew from less integrated and less dynamic (a sum of components) to highly integrated and dynamic (describing the quality of a unified and dynamic). Basic formal relations permeate throughout these presentations in this underlying structure. The combinations and changes of these formal relations allow a more complex level of identity of this structure to be presented.

The end of an experience of having a design concept is personal and temporal, as long as the achieved design concept at that moment can account for the wonder that kindles the process and unites the old and the new in a whole. Therefore, the end of having a design concept is not definitive. Instead, it can be prolonged and renewed, for new wonder may occur and recruit previously hidden, but now relevant, things into new juxtaposition. The new wonder calls for a new experience of having a design concept by reconstructing and integrating the earlier experience. The evolving experience of having a design concept, which embraces new wonders (especially during the reformulating phase), offers an introspective way of evaluation, confirmation, modification, or even breakthrough in relation to the old design concept and the pre-understandings associated with the natural attitude.

> Man lives in the meanings he is able to discern. He extends himself into that which he finds coherent and is at home there.
> Michael Polanyi & Harry Prosch, *Meaning*, p. 66.

Chapter 5. The Framework of Meanings and Discussions

5.1 Definition of Meaning

Meaning (referred to as design concept in this study) belongs to a dimension of the presentation of the experience of having a design concept. Meaning is derived through the underlying structure of the examined experience. Therefore, it embodies the features of the experience that it presents.

The contents of meaning encompass the subject matters, processes, and qualities of the experience, and the designer, (whose perspective is central to this discussion). These materials will not be expressed as meaning until their appearances to the designer are recognized and regarded as relevant to any currently achieved meanings. The experience of having a design concept seamlessly envelops meanings from different persons and meanings from the same person at different points of time, and evolves based on changes indicated by the identified underlying structure.

Meaning is organized by the variety of relations that are identified in the underlying structure. In this way, meaning maintains a fundamental relation between the expressed world and the expressing designer. Hence, unified by an experience, meaning not only presents the current (or the imagined preferred) situation, but also manifests the particular designer's judgments, feelings, attitudes, actions in, and gains from the very experience. Meaning is therefore not a representation of the world that is located between the world and the designer. It is not a concept in the conventional sense.

Moreover, meanings are temporal achievements in an ongoing experience. When meanings are modified, absorbed, and rounded out into a whole as a design concept (about either a solution or a problem, or both), the experience comes to a relative end. Meanings are our understandings about the world, and they suggest how we should act next. Coherency of meanings is an implicit criterion for the intrinsic evolution of a design concept in the experience. As a *moment* of the experience of having a design concept, meaning is a unity of means and ends, process and product, the known and the yet-to-be-known.

This definition of meaning is deeply rooted in phenomenology. Phenomenologist Sokolowski (2000) explained the following:

> It [meaning] is not there already, waiting for us to turn to it or to infer its presence. Rather, it is a dimension of presentation, a change in the mode of presentation, that arises when we enter into the propositional attitude by means of a propositional reflection. It arises when we change our focus. The proposition is not a subsistent entity; it is part of the world being articulated, but being taken as just someone's presentation: in this case, it is being taken as your presentation. It is your judgment (p. 99).

Therefore, the state of a thing (e.g. "the sofa is soft," or "this e-book can create a pleasant learning and reading experience for children") is presented as a meaning by a person, based on her or his experience. But this meaning can be intended, by another observer, as a judgment made by that person. The new observer may go from intending the thing naively and straightforwardly, to reflectively intending it as proposed by the meaning maker. As a result, a new state of the previous judgment may be disclosed, and this will become a new meaning to the new observer. Meanings form our judgments, propositions, and design concepts, when the world appears to us and is expressed by us in our personal interactions with it.

However, not all meanings are—or can be—articulated in the process of designing. Aspects of an experience can be presented and apprehended in ways other than words. Firstly, the pre-linguistic and embodied dimensions of meaning faithfully manifest the ineffable aspects of experience to designers. Also, presentations of the experience can be non-verbal presentations, such as sketches and prototypes. Secondly, that aspects of an

experience are not verbally presented under certain circumstances does not mean that they cannot be verbally described. For example, Poulsen and Thøgersen (2011) demonstrated that tacit knowing can be communicated and shared through bodily engagement among several participating designers in the same event. Nevertheless, to communicate *embodied design thinking* with people outside the event (or outside the discipline of design), the ability to describe at least part of the tacit meanings is still needed. My study seeks to identify more of the examined experience that is articulable, however it does not claim that meanings explored in this particular context capture the totality of meanings made in the experiences.

This conception of meaning is compared against other conceptions in the literature that have been influential to design in § 5.3, to further clarify the value of seeing meaning from this particular point-of-view in resolving the tension that exists in current understandings of the notion of design concept.

5.2 The Framework of Meanings Made in the Experience

Being the presentation of an experience, meaning can be implicit. Designers have their ways of communicating meanings: verbally through description and nonverbally through sketches, prototypes, or bodily engagement (such as demonstration). Since this study aims to more coherently articulate design experience for the purpose of explicit communication, the focus here is on the transformation of implicit meanings to explicit meanings.

5.2.1 Themes

5.2.1.1 The Process and Product

Several interrelated themes have emerged through my investigation into the underlying structure of an experience of having a design concept: process, product, principle, experiential qualities, and natural attitude. The elaboration on the two modes

of the basic process consisting of four phases, and the united solution and problem based on five areas of subject matter already addresses the first two themes: process, and product. Here I introduce the remaining three. All these themes provide unique *places* to describe and interpret an experience of having a design concept through the underlying structure. The themes correlatively constitute a framework of meanings made in the examined experience.

5.2.1.2 Principle

A reported meaning (to borrow quotes from my field study) may vary from the following: "portable furniture, like a luggage case," to "designing pop-up ads for an e-banking system needs to balance a tricky problem: customers' perception of online ads might be anything but safety; but safety is exactly what the bank desires to convince its customers," or, "the width of the seam between the button and the body-shell should be fine, otherwise the user's hair will be stuck in it." Aside from descriptions about product and process, meaning achieved in the experience of having a design concept includes other aspects that shape the product and process. One of these is the principle that is made in design experience (one interviewee in this study described this as the "solution of the solution").

This kind of principle is strongly related to designers' action in experience. This can be likened to a wheel rolled by the interaction between actions and materials acted on. The track left by this rolling wheel is the resulting form (not merely shape) that organizes the product as it is. These are *generative principles* (Buchanan 2001c), or principles in action, and are intensively ascribed to the reformulating phase.

Dewey (1891) suggested that principles are hypotheses about how one might proceed in conduct. Buchanan (2001c) stated that the generative principles of design thinking are "places of reflection where immediate impressions and the elements of nascent experience may be temporarily located for exploration, speculation, and innovative insight" (p. 75). Jafarinaimi (2011, p. 17) explored various philosophical

origins of principles and their relationship to action, and argued that principles are hypotheses that engender diverse perspectives, interpretations, and relationships.

Drawing on these theoretical insights, and given that the present inquiry focuses on relations that occur in a dynamic and unified experience, principles are approached as kinds of meaning that generate the unity of action and the consequence of action. These principles are hypotheses, based on the temporally old to envision the new in an ongoing experience wherein they emerge. Such a principle can be extracted as a description of a set of form relations that may apply to new designs. Principles can be hypotheses of the formation of the experience of having a design concept, as well as those of the formation of the end product, if we embrace the idea that the two are inseparable and that an experience belongs to an area of design subject matters. The two examples below show principles in action that were formulated in such experiences.

Data Box 5.1
About a lamp design

This is an extract from a teacher's interview. Prof. F introduced his interpretation of an existing lamp design (Field notes, IN231008TJ).

From the cognitive point of view, I used a simple example to illustrate the idea of an innovative design to my students. It's a lamp design. The designer turns everything into flat, only leaving a metal tube to outline a profile of a lampshade embracing the bulb. Why? Now it's an innovative design, different from what I imagined a lamp usually looks like. Why then does the designer still keep the shape of a lampshade, so traditional and conservative? Why use the 2D element, a line, to represent the lampshade? In fact, you've got the freedom to reconstruct the shape. You've broken the overall relationship of the shape of a traditional lamp. If you continue to break through the profile of a lamp, people would have difficulty in accepting it as a lamp due to the cognitive confusions. Be free to change, but keep at least something to continue. Even if the continued element is traditional, still the overall design is innovative.

* **Figure 5.1. Filament: Lamp designed by Damian O'Sullivan**[1]

[1] Online image, http://www.monsterdesign.co.kr/product_content_2003_sang.htm (accessed on 22 Aug 2011).

The first example comes from my interview with Prof. F (see Data Box 5.1 and Figure 5.1). His reflection on an existing lamp design captures the formulation of a principle in his personal experience of reconstructing the design concept. That lamp design impressed him as "innovative." He interpreted the designer's experience of having a design concept. The principle of obtaining an innovative appearance can be understood in this example as follows: when the major presentations (as well as parts of a whole) are about to be changed, a presentation is needed that supports the traditional identity of the object. Making this presentation forms a contrast between the traditional identity and the novel presentations, which can present a pleasant wonder to the observer (as anticipated by the designer). All these are hypotheses, which give rise to actions and result in change of relations. In this case, wonder presents a three-dimensional object flattened into a two-dimensional profile, and only a very small proportion of presentation—the symbolic profile of a traditional lamp—still reminds people of its identity. This principle is concerned with balancing between the old and new identities and between old and new presentations in order to ensure that a desirable identity is well supported.

The second example is from the project of music without sound[2] that was introduced in § 3.1.1.2. The student designers from Betty's group exercised an empathetic process to co-create their experience of having a design concept with Betty. In order to approach Betty's genuine experiences, the student designers realized that they had to appreciate Betty's strengths in coping with the silent but colorful world. Betty's energetic life and her vivid imagination surprised the students in its contrast with their sympathetic preconception of deaf people's life. Empathy did not become their principle until this wonder made them see "how stupid their earlier questions were" (Field notes: DDL0709GB). Pre-understandings were revealed and suspended. Based on an intersubjective process of empathy (see Finlay, 2005), the student designers reshaped their experience of having a co-created design concept through connecting of, acting to, and emerging with Betty's experience. The three layers of action became the principle of

[2] This case was discussed in detail in a paper by Ma et al. (2010), presented at the Design Emotion Conference 2010.

Betty's group's practice for experiencing co-creation. This activity of connecting the self and others located subject matters of design in the area of experiences. This approach urges the designer to see the necessity of reformulating her or his own pre-understanding and to reflect on and understand her or his own experience in order to understand those of another person. The principle of empathy re-directed the designer's actions and subject matters and the form that they acted toward.

Regarding the generative nature, principle is often deemed to have a delimiting power to determine the concrete in light of the abstract. In the present study, however, principle is a theme of meanings, arising from experience, that unites form and subject matters of design in what to do next. The generative power of principle is rooted in more sophisticated and integrated relations than in merely conceptualization. Principle of this nature is generative because it is meaning. Principle reserves a reflective place for designers to temporally hold back the preoccupation with the subject matter under construction, and to express form to reason, to argue, and to plan, which will be further embodied by the end product and the completed experience.

Principle is intensively expressed in the reformulating phase. Also, it is often formulated by the designer (implicitly or explicitly), who adopts theories, perspectives, and approaches (e.g. affordance, empathy, or product semantics) depending on their personal capability and inclination to tackle the subject matter.

5.2.1.3 Experiential Qualities

In an experience of having a design concept, many emotions are evoked. No matter delightful or painful, these emotions are the inevitable variations of the hues of the overarching esthetic quality. They make an experience a complete one,[3] and are as important as the practical and the intellectual phases. Emotions permeate through the ebb and flow of an experience from the moment when the experience is initiated,

[3] Dewey (1934/1980, p. 37) insisted that what makes a process of thinking and actions an experience lies in a single quality which integrates the practical, intellectual, and emotional phases of the experience into a unified whole. This quality, according to Dewey, is esthetic quality: the quality of an experience.

detained and energized, until it is completed. Different emotions stimulated in the examined experience are named here as experiential qualities: among these wonder, curiosity, care, freedom, loyalty, certainty/uncertainty, empowerment, fulfillment, and satisfaction generally outline a journey of emotional variation of the examined experience.

The first and foremost experiential quality in having a design concept is wonder (a feeling of surprise or astonishment), which sets off the phase of connecting and is followed by curiosity and care in the extending phase. Wonder would not be wondrous if the designer was simply surprised and not curious about why this feeling occurred or bothered to imagine where it may reach. Wonder places the designer in a perplexing but exciting situation. It sensitizes the designer's aspiration toward making a design concept that stays loyal to the initial wonder, and pulls her or him through the painstaking phase of reformulation that is full of unresolved presentations and suspended parts. Sometimes the designer's loyalty to wonder could be extraordinarily strong. In such instances, the designer will appear to have established a tight bond to wonder, like having an attachment to the things presented by wonder. The bond of loyalty, care, and curiosity makes the designer feel empowered to undertake the inquiry. No matter how much uncertainty she or he feels when working on contextualized parts and presentations, an overall sense of certainty remains about the unknown whole of a particular identity. Wonder cannot be conceptualized, as it only occurs in experience because of its esthetic substrate.

During the reformulating phase, the designer undergoes conflicting experiential qualities, such as certainty and uncertainty, openness and fixation. This occurs when the designer is reflecting on otherwise inseparable relations (such as form and subject matter, conceptualization and revelation, solution and problem, and pre- and new-understandings). Curiosity and aspiration toward the end result, and anticipation of fulfillment that answer to wonder, keep the intensive reflective dance from falling into independent practical and intellectual pieces. The bond between the designer and wonder can be difficult to break, unless the previously made meanings lose their ground

and become understood to be irrelevant as a result of a newly arising wonder that presents more powerful juxtaposition and indicates a more promising option. In this case, a productive reflective dance happens. The designer will not stop until a sense of fulfillment of balance and oneness is achieved and satisfies the curiosity.

The aforementioned experiential qualities are not the totality of the emotions that designers experience in having a design concept. The key experiential qualities that emerge in a basic process of such an experience actually may involve a wide collection of emotions, including happiness, sympathy, playfulness, enjoyment, boredom, disappointment, awkwardness, frustration, anxiety, and so on. Emotions (and their intensity) cannot be generalized, because they make each experience unique. However, they can be talked about in each case. An uncertainty could develop into a deep doubt or even despair, with the unresolved matters accumulating over time without any direction. Although the original wonder may fire ecstasy when it dawns on the designer, new wonder may lead to frustration or regret when the natural attitude and preconceptions are manifested.

While motions may open up opportunities for a new experience (which absorbs and incorporates the earlier experience), sometimes emotions can be so strong that they overwhelm the designer, suspend the unfolding experience of having a design concept, and fixate the designer's attention on their emotions. The designer, in this case, is detained in the emotional phase (for example, mesmerized by ecstasy or stuck in frustration), which becomes alienated from the experience of design. I call this situation *emotional occupation*.

The state of emotional occupation often occurs when the designer is actively involved in experiencing the world. It is a pre-reflective state in designing. Dwelling in emotional occupation holds back the experience of having a design concept, bringing it to a standstill. That is to say, what is experienced in the state of dwelling in emotional occupation fails to be related to the subject matter of design.

A design teacher's account of her personal experience (which occurred when she was a design student) illustrates this type of situation (see Data Box 5.2). Acute feelings

were agitated during her field studies (including sympathy for the blind children and anger from knowing that blind people were living among hostility and inequity). Such emotions shocked the designers and made them feel disempowered. Their attention was fixated on these facts, and they were unable to treat these facts as potential design subject matters. They did not have knowledge of the possibility of design of something beyond tangible products. They dismissed the idea of including mass media in their design, as they had no idea of how complex that system could be or where it would lead. Dwelling in emotional occupation hinders designers from seeing what is currently and poignantly experienced juxtaposed next to what is to be designed. This also accounts for the often-discussed gap between research and practice in design in a certain degree. However, the teacher's reflection on that experience also sheds light on a way out of this stagnant and unproductive state, in terms of making quality design. Once the experience is properly reflected on and exploited, the act of breaking through the emotional occupation summons new wonder to the designer. Thus, in the experience of having a design concept, strong emotions are a mixed blessing.

Data Box 5.2

During a design tutorial, a teacher described, to her students, a personal experience about doing user research in a universal design project when she was a sophomore in industrial design (Field notes, LC280611CH):

> On the outset of a design for visually handicapped children, our team visited Shanghai Blind Children's School. It was a Friday afternoon. [Paused as if to pull herself together.] I can't believe I still remember everything happened on that day so clearly… It was fifteen years ago… A few boys were playing football on the playground, waiting for their parents to pick them up. Can you image how these blind boys played football? They were super smart. They put the football into a rustling plastic bag and ran after the sound where the ball was hit. We were bewildered by the scene, attacked by a sudden surge of sadness. Oh, gee, what can *we* do for them? We know *so little* about them.

She recalled another surprising fact that she learned the same day. After they interviewed a blind couple who came to pick up their child, a parent asked whether the students could do a favor for them:

> One of the most difficult things is going out to take a bus. Sometimes conductors refuse to have us on board because, you know, it's inconvenient. Can you write a letter to Xinmin Evening News [a local newspaper] and help us appeal for attention?

But, the teacher admitted: "It *pains* me to say, we felt like defeatists, beaten up by the reality. We knew the gadgets we were going to make were far from what these kind people truly needed. It made us feel guilty." They had found a hostile world that they had never imagined. It shocked them and scared them.

The teacher further introduced their final product designs and admitted that the whole team felt ashamed of their ignorance about the blind people. It took them quite a long time to digest what they had seen and heard. The tutor stated:

> If we'd have one more chance to redesign the product, I think we could make use of insights from the children's ingenious ways of living their everyday life, rather than providing another bunch of products that reinforces their identity of being blind. And we should never shrug off the users' articulated needs, wishes, and desires so easily, even if they sound remote to our original design agenda. On the contrary, the more "irrelevant" their needs are to our designers' conceptions, the more likely a new design that breaks through our preconceptions could be on the way.

Experiential qualities are valuable to an experience, and not merely because they fuel it to the completion. Emotions flow as if they are the commentary of the observable story, but are experientially encoded in the designer's memorable experience. They are the opener to trace an experience of having a design concept, they enrich the description, and they are what personally matters to the designer.

5.2.1.4 The Natural Attitude

The natural attitude is an important theme in the experience of having a design concept. I outline it here according to the following aspects: definition of the natural attitude, the way to reveal it, and the design impasses associated with it.

As introduced in § 3.2.1, in phenomenology the notion natural attitude denotes the default perspective that people inhabit while they interact with the world. Thus, it contains knowledge shaped by individual experiences, social norms and cultures, education and living. It is immanent in human experience. The natural attitude is usually taken for granted: we live our daily life, perceiving and acting to the world in an unquestioned acceptance. Personal natural attitudes result from an individual's prior life experience, and they are cultivated by education and practice. Designers are no exception to this.

Given the unknown acceptance of a natural attitude, it cannot be revealed within itself. Rather, effort is needed to elevate oneself from the ongoing experience and to see what has been hidden. Researchers practice phenomenological reduction to reveal and bracket the natural attitude, in order to get closer to the uncontaminated essence of experience. However, it seems unlikely that designers are adopting an identical approach to deal with experiences in design. Nor is it the purpose of design to describe the *essential* experience, for design has its own pragmatic agenda (which is about making and change). Nevertheless, the natural attitude is a part of the knowledge foundation for design practice; although natural attitude also erodes away this very foundation while it

remains absent from a designer's knowing. Designers' natural attitudes can be unveiled and are possible to be used to develop a design concept, because of the underlying structure of an experience of having a design concept.

The natural attitude shapes the boundless pre-understandings that are inherent in the experience before the designer knows it. Wonder, however, points to a way for the designer to realize, to reflect on, and to suspend (or make use of) the pre-understandings and preconceptions. When a designer can see how their world was understood and conceived previously, the natural attitude that brews these meanings is unveiled. In this sense, a reflective dance, enabled by wonder, may reveal the designer's natural attitude. When this occurs, either a completely different experience of having a design concept is initiated, or the current experience in the reformulating phase is shaped by referring to the natural attitude as the basis for evaluation, confirmation, modification, and breakthrough. Meanings that are about the disclosed natural attitude are derived through an exacting intellectual process. They become a source of knowledge about design experience. Hence, the natural attitude, as a theme in having a design concept, provides a place to look at the knowledge basis of meaning making.

Pervasive in design experience, the natural attitude can lead to design impasses that vary case-by-case. Designers' individual natural attitudes in practice are demonstrated through two cases that are explored in Chapter 6. A discussion on natural attitudes in having a design concept is summarized at the end of this present chapter. Here, I introduce one typical design impasse that resulted from a prevailing natural attitude in design. This has been identified as a recurrent situation in many design cases. Apart from experiencing emotional occupation, designers (especially novice designers) may be trapped in conceptual elaboration without being able to draw the boundary of design. This is often associated with the natural attitude of divorcing conceptualization from experience.

In a group interview I invited an undergraduate, Chris, to describe the design concept he had developed in a recent system design project that started with a given topic on "energy" (see Data Box 5.3). With a bulky collection of discrete objects

expanding and cumulating, Chris was unknowingly facing a design impasse. He had been dwelling in a conceptual elaboration that was separated from actual experience.

Data Box 5.3
***Play with the Sun*: A system design for urban children**

Student Chris described his concept and discussed it with one of his classmates. He reported that his concept would improve urban children's current cold entertainment experiences by including a system of objects and activities centered on solar energy (Field notes: GI250309B).

> At first I found some natural attributes of the sun, such as warmness, genuinely natural. The problem I found is, kids living in cities have a lonely childhood. They live in high-rise condos without companions. Neither their parents nor neighbors are available. TV and toys are boring and cold. These kids are inclined to get addicted to the internet.
>
> My proposal is to find a new entertainment for these kids by utilizing the attributes of the sun. I have to find a connection between the sun's attributes and kids' entertainment. Then the kite came across my mind. I am thinking about mounting a solar panel onto the kite. They are similar, flat, aren't they? System design does not require creating new objects, so the integration of existing objects is enough. Then I tried to integrate other things in it, for example, a camera or a remote sensor. You fly a kite in a traditional way. The solar energy will keep it working. You can get a bird's-eye view through a pair of special glasses in connection with the camera on the kite. Recent technology gives you more freedom. What you see is not the ordinary world. It's like lomography. You can take a very special picture. The point is not the product any more, but the system. You can upload the pictures onto the SNS websites. This service can promote children's creativity. Besides, the camera can be equipped with different filters, which will be provided by various suppliers. The main functions of this service system are to have exhibitions, to gain profit by offering accessories, and to host family activities. In this way the children could have access to a new way of entertainment. Like I said, I'm always thinking about how to present the nonmaterial things. I want to add up all the needs, the existing objects and the nonmaterial things in order to create an atmosphere. I'd like to have a special atmosphere in this design.

Breaking the relation between the properties and the things to which they belong is the conceptualization tradition that is indispensible to design. This tradition of design justifies the designers' manipulation of *moments* as wholes. Attributes of the sun (such as *warm* or *natural*) are aspects of the sun's identity. They are abstracted from the sun as independent concepts and attached to other things: a "system of objects" in Chris' case. It seemed as if Chris saw an and-coupling from the very beginning: the sun and an entertainment game: two incomparable and remote things that might have served as a good starting point as wonder. However, the anticipated inner similarity (e.g. how the components of a system, claimed to be warm, were related to the Sun) was detached from real experience of such matters and was further diluted due to the designer's fixed intention toward the area of objects. As he suspended his experience of the proposed system, the various objects (the kite, the camera, the way of play, and the community)

failed to appear as a whole. Pure conceptualization distanced the designer from real matters in design, which impeded the innate evaluation and modification of the design in the ongoing experience. This impasse was the difficulty in respect of drawing the boundary of the design scope, along with a lack of criteria to evaluate the conceptualized identity of the system and the system's contents. As a result, the sun was loosely included as an eclipsed token of warmth and nature.

Let us take a closer look at Chris' natural attitude. Intensive study and participation in all sorts of design competitions has become an influential context in current Chinese design education. Such practice promotes the natural attitude under discussion. As Chris reflected:

> Competition is in fact simple. So many prize-winning designs are based on simple combinations of functions. Two totally irrelevant objects are bound together in order to express some common attribute. Or, if an event involves two products, this event's attribute instantly integrates the two objects. Manipulating attributes such as overlying or arraying them results in a satisfactory product (Field notes: GI090325B).

Apparently, such principles, drawn from experiencing prize-winning works, have become part of the student's knowledge repertoire. Effective design principles in this context tend to be adopted as routine templates to generate design concepts regardless of subject matters and context. For Chris, one design principle is turning *moments* (e.g. attributes, functions, or presentations) of a thing into pieces (e.g. keywords, the concept, or a conceptualized identity) and further combining these pieces with other things to make a new design. This is a process: from breaking the originally perceived relation of identity in presentations in a thing, to attaching the independent identity to other presentations of a remote thing in order to conceptualize a new whole with experience suspended.

The challenge for design concepts that are derived through this approach is how to make the abstract relations concrete, embodied, and materialized. Many students are concerned about how a design concept can be linked to the things that it represents. During my field studies I heard many questions in that respect: "The most difficult part in my designing is, once the idea of function is determined how to give it a form.

Should I adopt an organic shape simulating the nature, or, shall I use a most simple geometric shape and translate the function into it?" (Field notes, GI009409TJ), and, "To what extent should a system design be objectified?" or "Why I'm always drifting between abstract ideas and feeling difficult to contextualize any of them?" (Field notes, DS090326HU). In actual practice, if the relation between conceptualization and experience cannot be restored, the expected natural shift between divergence and convergence across different levels of abstraction will not automatically happen. Captivated in the act of manipulating abstract concepts, the designer has few options, aside from using trial and error to select concrete matters.

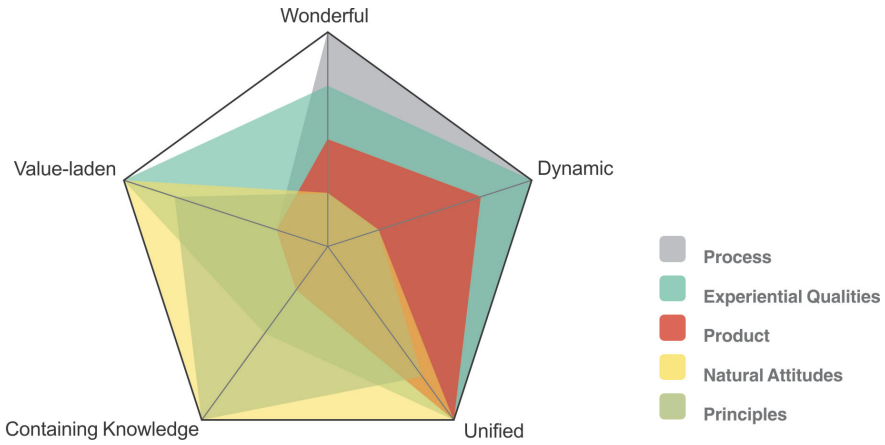
Notably, an attempt to suspend the natural attitude is different from an attempt to eliminate it. Designers' awareness of the potential impacts of their natural attitudes on their experiences of design provides them with more opportunities to understand the objects they act toward (user experience, for example, is central to many areas of design and cannot be merely dealt with the artifact-centered approach). Revealing the natural attitude affords the designer opportunities to disclose users' real needs. This is also useful for establishing the foundation of a design process that engages people at different levels (in terms of form, extent, and nature) in a changing social context.

5.2.2 Meanings and the Identity of the Experience

The process, product, principles, experiential qualities, and the natural attitude are five themes of a framework that facilitates us to describe meanings made in an experience of having a design concept. To refer to meaning's definition in this study, these themes are approached as presentations of the examined experience. Grounded in the identified underlying structure, these themes are distinct but correlated places to understand, to interpret, and thus to describe the experience. They indicate that such an experience has a meaningful identity, in the sense that it is wonderful, value-laden, and contains knowledge (as well as dynamic and unified). Figure 5.2 is a rough diagram of the themes that contribute to each facet of the examined experience. Their overlaps, again, manifest that such an experience is a unified whole. This *map* is open to new

themes, which further studies may find relevant to the examined experience in different contexts. These themes are outlined below:

Figure 5.2. Various themes of meanings in relation to various aspects of the identity of the experience



1. *Wonderful*. A surprisingly and- or but-relation revealed by wonder starts the journey into having a design concept. Moreover, in a historical view, a previously-had experience is turned into part of a new experience of having a design concept by means of new wonder. In this way the experience grows as a dynamic whole.
2. *Value-laden*. The initial revelation by wonder is valuable for the designer since it is intuitive inspiration that was previously beyond words. Wonder may present differently related matters to different designers, which makes the derived experiences highly value-laden: that is, the product (either a solution or a problem) and principles made and revealed in such an experience reflect that particular designer's values in her or his social context. Awareness of (and explicating) the natural attitude sheds light on the often intuitively practiced design by turning judgment-making and principles more transparent and subject to further modification. Also, the experiential qualities are engraved with values that can be traced to things or situations that matter to the designer.
3. *Containing knowledge*. Both principles forged in the experience and the

natural attitude that has shaped and is revealed in the experience build up the designer's personal knowledge repertoire. This is difficult to grasp in terms of conventional knowledge frameworks that have been derived from external perspectives. Apart from these two, the beginning of an experience of having a design concept—wonder—signals that certain meanings are hidden yet knowable. The sense of knowing achieved from the very beginning sensitizes designers' curiosity as well as their trust to know, to understand, and to make more meanings to fill the previously eclipsed whole.

4. *Unified*. A satisfactory design solution or a problem embedded with a convincing argument to change, and the interplay between the two, characterize the unity of meanings as product of the experience. The unified whole is not merely reflected in the product, but also in the dynamic process: the vertical conceptualization integrated in the moving revelation and the fusion of new experiences, the reflective dance in the evolutionary experience, and the designer's involvement in meanings. In addition, experiential qualities make the experience a unified one, for they compose a unique rhythm of each experience of this kind.
5. *Dynamic***.** The basic process and the four relational facets in the underlying structure all support the experience as a dynamic growth. More specifically, the reflective dance between transcending the ongoing experience and reformulating it using insights from new wonders presents how dynamic the basic process of such experiences can be. Fundamentally, all the basic formal relations contained in the product, process, and principles interweave the experienced matters into a dynamic form.

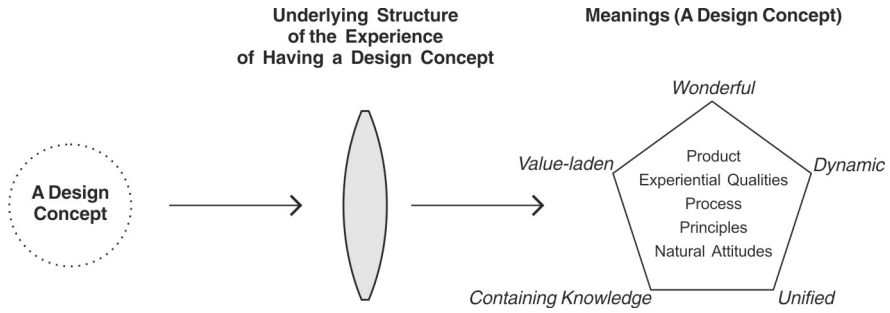
5.2.3 Relationship between the Framework of Meanings and the Underlying Structure

The framework of identified underlying structure and the framework of meanings are interconnected and can facilitate description of an experience of having a design

concept in a more coherent way. A framework, by definition, means "a structure made of parts joined to form a frame; esp. one designed to enclose or support; an essential or underlying structure and a conceptual scheme in extended use." [4]

Popper (1994) noted that a framework can also be regarded as "a set of basic assumptions, or fundamental principles" (p. 35). As noted previously, this underlying structure functions as "a lens" through which fuzzy design concepts in various design practices become meanings made in the experience per se that can be understood and described. The structure supports the framework of meanings. The framework of describing meanings provides various themes for understanding and interpreting (that is, to describe what a design concept means to the designer in different ways). These conceptual themes provide ways to present reasons why having a design concept is a meaningful experience. Each theme in an experience can be described based on the underlying structure that captures the fundamental parts, relations, and characteristics inherent in the experience. The framework of meanings allows an implicit design concept be more explicitly presented through the underlying structure, which provides a coherent basis. Describing meanings makes the implicit experience more explicit, because meanings are its presentations.

Figure 5.3. The relationship between the two frameworks



The described meanings and how they are described inherit the contents, relations, and characteristics of the underlying structure. To conclude this section, the relationship between the underlying structure and this framework is illustrated in Figure 5.3. The understanding of the experience and the description of meanings that can occur by

[4] See the Oxford English Dictionary Online (accessed on Apr 15, 2012) [http://www.oed.com/view/Entry/74161?redirectedFrom=framework#eid]

means of the two frameworks are demonstrated in two cases that are presented in Chapter 6.

5.3 Discussions on Meaning

In Chapter 4 I argued that design concept is an alternative name for meaning. The term design concept has commonly been adopted to make sense of design practice from the external perspective. Since meaning is a key notion in this study, it is useful to examine it in a larger context: positioning the meaning understood within this study among several conceptions that stem from the various origins that are influential to design. Having a dialogue with the literature will consolidate the understanding of meaning in an experience of having a design concept elaborated so far.

Meaning is a word that has many meanings. To quote a few general categories from the Oxford English Dictionary Online:[5] meaning can be understood as the significance, purpose, or underlying truth of something; the sense or signification of a word, sentence; a person's motive, intention, or purpose; or, knowledge, understanding, opinion, and belief.

Meaning has been explored in a wide range of areas, varying from cognitive science and linguistics to philosophy of language. There is an increasing awareness in the domain of design that design should be regarded as meaning making (Krippendorff, 1995; Kazmierczak, 2003; Diller et al. 2006), and the notion of meaning is often associated with the concept of *affordance* (e.g. Boess &Kanis, 2008; Almquist & Lupton). Design researchers hold different conceptions of meaning, but their endeavors suggest how understandings of meaning could potentially shape design research and practice in various contexts. Although it is beyond my intention in this study to provide an exhaustive summary about meaning research, it will be helpful to identify the underpinnings and contexts of some conceptions of meaning that are influential to

[5] See the Oxford English Dictionary Online (accessed on Apr 15, 2012) [http://www.oed.com/view/Entry/115465?rskey=myMpaD&result=2&isAdvanced=false#eid]

design. This will allow me to compare them with the way meaning is defined in the present study. Areas such as cognitive science and conventional semiotics, traditional psychology and sociology, symbolic interactionism, product semantics, affordance, and experiential knowledge are discussed, to identify the importance of the internal perspective underpinning meaning and experience in this study.

5.3.1 The Current Landscape of Studies on Meaning Influential in Design

Four Conventional Origins of Studies on Meaning

Meaning has been extensively studied in four conventional and influential areas: semiotics, cognitive science, psychology, and sociology. These four each have distinct subjects of their own.

A major strand of discussion on meaning in design can be traced back to conventional semiotics, which studies meanings *in* objects. Meaning is used "as if it were independent entity that could be attached to objects or contained in containers" (Krippendorff & Butter, 2008, p. 355). Thus, it is not a coincidence that designers and design researchers tend to turn meanings into attached properties, qualities, or attributes of things when they are influenced by the semiotic tradition. Many things adopted as parts or presentations of the subject matter of design are not themselves in their own right but rather *mean* different things. They have been deprived of their original existences and extracted as symbols or signs. The symbolic relation between a thing and its meaning emerges from, and is stabilized by, the culture in a particular community or society. In China, for example, a circle means the heaven, and a square means the earth; the number nine denotes the infinity; and bamboo signifies intellectuals' integrity. Based on my observations, this tradition of symbolization has a strong impact on the Chinese contemporary design and design education. Such expressions frequently appeared in designers' accounts of their designs within the present study, for example, "The façade adopts elements from the circuit board to express that it is an information

center building," and, "This furniture is made of wood, which means tradition and nature" (Field notes, 090302TJ).

Cognitive science studies human cognition as a mental process in terms of knowing, learning, and understanding. Meaning, as the product of such a process, is defined as "a thought induced in the receiver, which is originated by the contact with a design [product]" (Kazmierczak, 2003, p. 47). Borrowing insights from cognitive semiotics,[6] Kazmierczak (2003) urged a shift of design paradigm, and asserted that design should be regarded as cognitive interface that enables reconstruction of meanings. Design, according to Kazmierczak, is concerned with the intellectual process: namely, meaning making is "the design of thinking" (p. 45). As opposed to one extreme that design is seen as artifact-centered, this view tends to ascribe the foundation of design to the faculty of the mind. In this approach, the mental process is often taken to be the entirety of a design experience.

Psychology studies the human mind and identifies reasons for people's behavior, traditionally on an individual basis. Sociology examines the organization of society (as a community made up of individuals). However, the integration of psychology and sociology prevails in existing research. The exploration of meaning in these two areas exhibits a certain similarity. Blumer (1979, p. 103) noted that meaning in its conventional psychological and sociological sense is either: (1) bypassed by merely focusing on the initiating factors (e.g. stimuli, attitudes, motives, cognition in psychology; social position, status demands, social roles, and values in sociology) and on resulting human behaviors; or (2) is regarded as an unimportant link between the two ends and is swallowed by the initiating factors. Blumer criticized that meaning in traditional psychology and sociology is either deemed as an inherent part of the thing and therefore denied any process involved in its formation; or is regarded as an expression of the elements of a person's mind (e.g. sensations, feelings, ideas, memories, motives, and attitudes), which are thus lodged in the psychological processes of coalescence of these elements in a person. This viewpoint is clearly reflected by

[6] Peter Storkerson's series of work on design from the perspective of cognitive sciences is influential to this strand of design research (see Storkerson, 1996; Information and Concept Formation, 2002).

aforementioned definitions—in conventional semiotics and cognitive science—of meaning as either attributes *in* objects or as mental constructions.

The conceptions of meaning in these four conventional areas have been challenged by the theory of symbolic interaction and the theory of product semantics. Both open up new horizons for understanding of meaning in communication, and have received growing attention in design research and practice.

Meaning in Symbolic Interactionism

Blumer (1979) clarified the characteristics of meanings that are examined in symbolic interactionism as follows: (1) meanings are neither intrinsic to, nor objective parts of, the thing that possesses meaning, but are the basis on which human beings act toward these things; (2) the source of meanings is the process of interaction between people; and hence (3) meanings are engaged in an interpretive process by the person who is interacting with the encountered things. Meanings, in the context of symbolic interactionism, are seen as social products that arise in the process of interaction between people. Furthermore, Blumer suggested "the use of meanings by a person in his action involves an interpretive process" (p. 105).

The theory of symbolic interactionism has received increasing appreciation in the developing area of interaction design practice. It provides a framework for design that aims to tackle the complex systems that support human activities and service.

Meaning in Product Semantics

To differentiate from generic meanings as introduced by traditional semiotics, Krippendorff (1995) invented the term *product semantics*. This term describes a framework about object's *form* (defined as "the designer's objectified meaning") and meaning (as "that objects have to different users"). Krippendorff (1995) stated that:

> Meaning is a cognitively constructed relationship. It selectively connects features of an object and features of its (real environment or imagined) context into a coherent unity. (p. 159)

More concisely, meaning is "what user expects the object to do" (p. 166).

The strengths of product semantics lie in the acknowledgement that meaning is context-dependent, which indicates meaning consists of relations beyond the product itself. This position was further clarified in Krippendorff and Butter's (2008) recent work. They rejected the conventional semiotic conceptions that: (1) meaning is an entity that can be attached to or lodged in objects; (2) meaning is located outside the human species as the cause of experience; and (3) meaning is represented by the object and turns the object as a symbol of or a sign for it. Also, Krippendorff (1995) suggested that making sense goes around a hermeneutic circle where "meanings are constructed until this process has converged to a sufficiently coherent understanding" (p. 160). This echoed Blumer's (1979) assertion, in the context of symbolic interactionism, that the use of meaning engages an interpretive process. The product semantics approach dismisses the conception of meaning as the internal representations of an external world that is rooted in cognitive science, and asserts that meaning is not fixed.

However, the theory of product semantics tends to be only superficially used in design practice, primarily as a justification to map meanings of all kinds onto individual parts of a design (especially designs in the area of objects). This tendency results from the fact that product semantics embraces several conceptions that are implicitly contradictory to its claimed standpoints. This is discussed below.

Firstly, Krippendorff and Butter (2008) claimed that they "prefer the term 'meaning' to 'experience'" (p. 355), because experiences, in their opinions, cannot be shared. For them, meaning connects the design of artifacts to other people's use of the artifacts. Meaning is therefore separated from both objects and human beings, as an autonomous mediating entity, termed as *relationship* though. This resembles the first two conventional semiotic standpoints that Krippendorff and Butter supposedly rejected.

Secondly, set in the context of human-centered approach, product semantics attempts to build the relationship between objects and people (termed *users* in the earlier work). However, the people that have been studied in this research do not include designers. As a result, meaning is distanced from design practice, and instead focuses on

the various contexts[7] of people interacting with the design product. The project of product semantics is intent on contrasting the ways a product can be interpreted by people other than designers, with how interpretation is intended by designers. The absence of designers and their experiences of making sense of the anticipated product leads to conclusions that are far from those that have been observed in design practices. For example, Krippendorff (2006) assumed that "our [designers'] own understanding of our world usually is perfectly clear" (p. 66). By interpreting human-centered design as a one-way traffic of design for others, this framework impedes design experiences from being understood.

Thirdly, meaning, in product semantics, rests upon an additional activity of understanding outside of design. Dewey (1938) identified a historical distortion of the relationship between perceptions and conceptions, because "perceptual and conceptual contents were supposed to originate from different sources and thus required a third activity, that of synthetic understanding, to bring them together"(p. 111). Therefore, Folkmann (2010) criticized that Krippendorff's (1995) semantic theory as not exploring actual expression of meaning in depth. Folkmann (2010) argued that it does not account for how the object points to meaning that it "simultaneously contains and conceals" (p. 47).

Meaning and Affordance

Affordance is another influential theory in design research and practice, and is often associated with meaning. It has been adapted from the original ecological approach in psychology and has evolved in design (see Krippendorff, 1995; Norman, 2002; Almquist & Lupton, 2010). Affordance is frequently discussed in conjunction with semantic theory (e.g. Krippendorff, 1995; Boess & Kanis, 2008; Maier et al., 2009).

[7] Product semantics discusses valuable contexts of artifacts where meaning is contained: artifacts in use, artifacts in language, life cycle of artifacts, and ecologies of artifacts.

Psychologist James J. Gibson (1977) first invented the term affordance[8] to describe the physical facts of the objects in the world that "exist completely independently of interpretation or the relational interaction" (Almquist & Lupton, 2010, p. 7). For instance, a flat ground surface affords walking, and water affords flowing. Gibson's conception of affordance is neither subject nor object. Also, it has nothing to do with human experience and intentionality, and thus precedes interpretation and meaning. However, further relations between subject and object have been inspired during the evolution of this concept, and these are outlined below.

When Norman (1988/2002) introduced affordance into design, he redefined this concept as the "perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used" (p. 9). In fact, the popularized notion of affordance in design is the *perceived affordance* (Almquist & Lupton, 2010, p 7). Norman's adaptation of affordance involves human dimensions, and offers a new perspective for designers to shape the object in terms of functionality, perceived properties, and the meanings made by people.

There is a growing body of design research that explores affordance and meaning. Gibson's (1977) approach to affordance is frequently used to restore the relationship between the human sphere and the objective sphere. However, few studies explicate the notion of meaning per se, and instead leave it loosely referring to subjective ideas. In Fisher's (2004) study on the relations between plastics and people, for example, meaning is used as users' reported perceptions of the material such as "tacky," "sticky," or "fleshy." The *factors* that lead users to any of these meanings/ideas about the material are allegedly derived from either the culture or the material's objective properties. The opposite origins of meaning are thus claimed to be united by adopting the concept of affordance. Also, meaning, tends to be categorized into "a separate affordance," in certain disciplines, such as architecture, that are heavily influenced by conventional semiotics. In this case,

[8] According to Gibson (1977, p. 78): "The affordance of something does not change as the need of the observer changes. Whether or not the affordance is perceived or attended to will change as the need of the observer changes but, being invariant, it is always there to be perceived. An affordance is not bestowed upon an object by the need of an observer and by his act of perceiving it. The object offers what it does because of what it is" (cited in Almquist & Lupton, 2010, p. 7).

meaning is no different to a symbolized independent component that links people to places, or users to artifacts (see Maier et al., 2009) as instructed by semiotics. Instead, Almquist and Luption (2010) proposed a more sophisticated approach, which involved identifying a common region in design between affordance meaning, by blurring the division between objects and subjects. This was based on the idea of affordance from Gibson (1977) and the conception of objects from Latour (1996).[9] This approach involved underlining the social and collective dimensions of meaning to push meaning beyond the subjective sphere.

All of the above ideas on the relation between affordance and meaning suggest a myriad of relations between the world out there and people's inexhaustible ways of perceiving the world. However, few of them build their arguments by attending to the relation between meaning and experience.

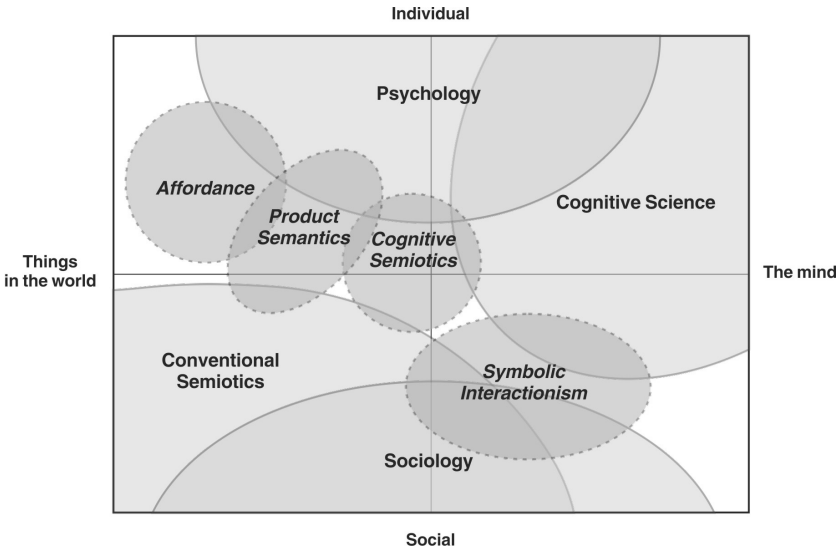
5.3.2 The Missing Piece

Unlike the general point-of-view of seeing design concept as the static and objective product from the external perspective, meanings present the experience of this phenomenon and coherently relate different parts of the experience for the designer to achieve a sense of a whole. As a presentation of an experience, meaning is situation (context)-dependent, nonhierarchical, and local, but can potentially be shared due to the basis of experience. Above all, meaning is essentially relational, for it is grounded on the relationships between object and subject (intentionality) and between individual and public (intersubjectivity). Due to this relational nature, it is difficult to locate the conception of meaning in the present study within the current landscape of established and influential areas of meaning research (see Figure 5.4), which is mapped based on the distinct subjects of each study. This problematic situation resembles challenges to another notion that is often entangled with meaning: experiential knowledge. A brief

[9] The authors draw on Bruno Latour's (1996) conception of *objects*, which consists of both human beings and things as players in social networks.

discussion on experiential knowledge research here will open up an opportunity of positioning this conception of meaning by reframing the landscape.

Figure 5.4. The current landscape of established research areas on meanings that are influential in design research and practice



Different lines of inquiry into human experience have indicated that meaning is entangled with the notion of knowledge, especially knowing in practice.

Dewey's (1934/1980) theory of experience attributes meaning to the intellectual phase of an experience. The term *intellectual* "simply names the fact that the experience has meaning" (p. 55). Meaning arises from the relationship of action and its consequence. To understand this relationship "is to think, and is one of the most exacting modes of thought" (p. 45). Hence, meaning is related to thinking, reflecting, understanding, and knowing.

In parallel, Polanyi and Prosch (1975) named their book on intellectual freedom *Meaning*, as they insisted that meaning cannot be divorced from knowing. They stressed that "all knowing is personal knowing" (pp. 44–45) and argued that tacit knowing is personal knowledge. Based on this, we exercise our personal knowledge when we are making sense of our experiences, ranging from driving a nail with a hammer to understanding another person's action by entering into his situation and judging from within his point of view.

Recently, there is a reviving appreciation in academia of the theories of Dewey and Polanyi on experience, meaning, and knowledge (e.g. Shusterman, 2000; Barrett, 2007). This resonates with the growing interest in the value of practical or experiential knowledge that "is in being 'instrumental to the enrichment of immediate experience through the control over action that it exercises'" (Shusterman, 2000, p. 18; also see Dewey, 1934/1980, p. 294). The conventional conception of science as value-neutral truth in analytic philosophies does not accommodate such fluid-relational and all-encompassing nature of knowledge in practice. The separation of supposedly true knowledge from perception can be traced back to Plato's time (see Plato 2001). Various lines of inquiry into experiential knowledge, however, have attempted to restore the relationship between practice/experience and knowledge, for it is recognized that experience should be considered as part of the epistemic foundation of the value-laden unity of knowing and knowledge in design practice.

It is not a coincidence that meaning and knowledge intertwine in the context of experience, and are sometimes used interchangeably. Meaning, in many ways, shares the features of practical knowledge, because it is rooted in experience. Reckwitz (2002) insisted on *practice theory*, which integrates the body, the mind, things, knowledge, discourse, structure/process, the agent, and the shifting status of these:

> A specific social practice contains specific forms of knowledge. For practice theory, this knowledge is more complex than 'knowing that.' It embraces ways of understanding, knowing how, ways of wanting and of feeling that are linked to each other within a practice. (p. 253)

While researchers often have difficulty ensuring that experiential knowledge lives up to the research criteria required by scientific knowledge (e.g. transferable[10] and measurable[11]), experiential knowledge (intertwining with meaning, though,) cannot be located in the current landscape of studies on meaning. The current landscape is

[10] Experiential knowledge studies, and practice-led research in particular, have been challenged in terms of the difficulty of realizing "a mode of generating knowledge that has application beyond immediate points of production and consumption of the artistic [and design] product" (Barrett, 2007, p. 116).

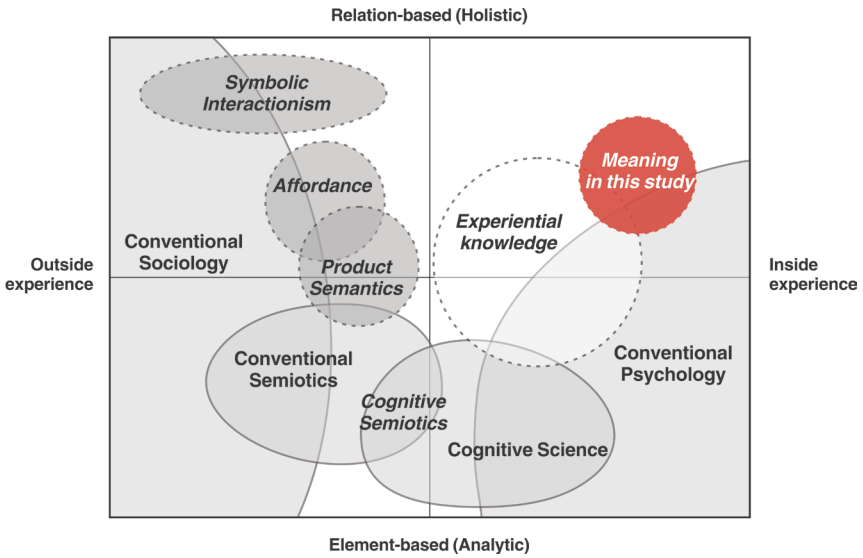
[11] For example, Storkerson (2009) claimed that naturalistic cognition (including tacit knowledge, experience-based expertise, judgment, and embodied cognition) and formal knowledge can by analyzed and measured together in real-life situation, following the rules and methods that are developed in formal scientific studies.

dominated by established research areas, which are based on categorizations that overlook the structure of experience. Nevertheless, the subjects of the existing research are inherently related within an experience. The dynamic and unified nature of experience requires meaning in the present study to deal with changing subject matters. To position my conception of meaning within the landscape of studies on meaning, a new way of understanding of this landscape (freed from fixed subjects of study) is required. This is proposed by including the consideration of perspectives regarding human experience.

5.3.3 Remapping the Landscape

Figure 5.5 indicates a remapped landscape of studies on meaning with a different way of categorization. It is demarcated in terms stances of inquiring into meaning from inside or from outside experience, and approaches that focus on relations (holistic) or elements (analytic). Based on this new road map, relations and distinctions between these research areas on meaning and meaning as defined in the present study can be clarified. In addition, this also shows that in areas that share similar subjects of study, the employed stances and approaches may significantly differ.

Figure 5.5. The remapped landscape of research areas on meaning



Based on this new map, a dialogue between the conception of meaning in the experience of having a design concept and other areas on meaning can be conducted. The relations in this figure are discussed below.

With Conventional Origins

Cognitive science and traditional semiotics have cultivated a culture in design that sees meaning as qualities attached to things. A major flaw of this analytic approach in design practice is that it keeps all different subject matters (which otherwise sit in different areas) solely in the area of symbols and signs. Regardless of whether the actual design is concerned with an object or an event, it becomes a collage of things that signify its meanings. Each thing that exists in the proposed design, if seen as a meaning, is reduced to a hollow token. Substantive things, such as a circuit board or wood, become symbols like words in language, and stand for something else as its meaning. Freezing meanings as routine qualities, features, or attributes of things downplays the significance of meanings in the dynamic experience. This approach neglects the fact that that qualities, as *moments* of the identity, need to be revealed in the manifolds of presentations. This is therefore a superficial method of interpretation. The way meaning is defined in the present study moves beyond this traditional object-centered focus and the fixation to the area of symbols and signs.

With Symbolic Interactionism and Affordance

My study is in concert with some basic stances about meaning that are held in symbolic interactionism and some affordance studies; which are opposed to the conventional conceptions of meaning (that have an analytic basis). These stances disagree with approaches to meaning as intrinsic in objects: meaning is neither objective nor enclosed in people's mind, and has no independent existence. And, meaning carries more features than the stimuli-consequence or causal relationship can encompass. Symbolic interactionism, in particular, strikes a chord with my study, in that it treats meanings as engaged in an interpretive process. In this approach, meanings are not established but are handled in a process (that is, meanings are dynamic). The meaning

maker should use herself or himself as a vehicle to engage in a new experience to tease out, use, and modify meanings.

Meaning in this study diverges from symbolic interactionism at the point where the former explores the possibilities of publicness of meanings and experience in the personal dimensions while the latter examines meaning sticking to a society-wide scale. In the symbolic interactionist point of view, an individual human does not directly interact with a particular object. Instead, the interaction rests upon the meaning of the object that is defined by others. It is with the society that the particular actor interacts. The emphases on symbols and negotiated meaning resulting from social interaction seek collective patterns. This conception of meaning at the social level does not provide any access to individual experiences or to the specific objects experienced; it is thus derived from a perspective that is external to individual experience.

During the evolution of the theory of affordance, this concept has moved from a thoroughly objective relationship between an object in the world and the object's potential behaviors to an inevitable connection with human experience. Phenomenologically speaking, I see the relationship between affordance and meaning is intrinsic. Affordance in design, or *perceived affordance* (Norman，1988/2002)， already sits at the heart of intentionality of human experience. This presents a basic relation in experience: the object's properties disclose to the perceiver in her or his intention of this very object. The perceiver is aware of whether these properties support or fail her or his purpose. These properties may enable other unexpected behaviors because the perceiver is experiencing that object. Making explicit specific affordances is actually a process of explicating meanings. Affordance is the interpreted meaning from the experience, a way of presenting the experience. There is an implicit change of perspective—from external to internal—in studies on affordance, especially in design studies.

With Product Semantics

Although my study shares a standpoint with product semantics in rejecting the proposition that meaning is an empty symbol or a sign of an object that it represents,

there are also significant distinctions between the two approaches. My study finds that the process of describing having a design concept sensitizes new experience and fosters new meanings. For either the designer who is situated in designing, or a new observer who is examining a finished design, with any attempts to understand how and why a thing is designed so, she or he may contribute to the final product. This new observer can be the same designer at various stages of the design, another designer, or another person such as a user.

The achieved meanings bring more hidden things to light through new experiences. In this sense, a design concept is enriched by use, resulting in satisfactory or less satisfactory experiences that are presented by more meanings than what the designer anticipated to make while intending the absent final product. This study insists that meaning is not a relationship additionally imposed on objects and people. Krippendorff and his colleague, however, merely studied meanings made by users, leaving meanings made by designers as "form" (substance that stimulates people to make sense of the product), as if the two are fundamentally different. The reason form and meaning fall apart in product semantics is because this area of research has not yet explored the relationship between meaning and experiences. Product semantics theory reduces experience to a process of psychological construction and adopts a conventional human-centered approach that overlooks the designer's own experience in meaning creation.

With Experiential Knowledge

As far as the personal dimension of knowledge is concerned, the stance of meaning as a presentation of experience shows the potential to account for the intertwining relationship between meaning and knowledge. Knowing is part of the experience of having a design concept. Hence, it is reasonable to consider that meaning presents both knowing and the outcome of knowing. A meaningful experience contains knowledge, as meaning is formulated and grasped with the goal of understanding, and it thus intertwines knowing and experience. Concepts as varied as Dewey's (1938) operational facts-meanings, Schön's (1988) types as *generative abstractions* (borrowing Arnheim's term,1969), and Latour's (1996) objects with agency—to name only a few—

all attempt to explain why the derived knowledge in practice seems embedded with actions to generate something new. Given the vantage point provided by meaning as a presentation of the experience, this dynamic nature of design knowledge becomes self-evident. Polanyi and Prosch (1975, p. 36) noted this: that when we make contact with things outside of us, we "pour ourselves" into them and make them as part of ourselves. We therefore extend ourselves into the meaning that we can discern and find it coherent. This supports my finding that the growth of coherent meanings as a design concept is made by experience with the designer intending toward the world. Meaning presents the action, and the subject matter that is consequentially formulated in relation. As apprehended expression of the experience, meaning guides the designer's further action.

Reflecting the findings of this dialogue with the literature concerning meaning, the upper right corner of the landscape in Figure 5.5 is much less explored than the other three quadrants, which are densely occupied by well-established research domains. My study indicates an emerging interest in the project of restoring relations by means of an internal perspective to experience and design practice.

Imagine the term meaning in the above discussion (in § 5.3) is replaced with the term design concept. Resemblances between the landscape of studies on meaning and that of studies on design concept (introduced in Chapter 2) are then apparent in terms of the diversity, ambiguity, overlaps, and contradictions. The way to understanding therefore lies in identifying each conception's underpinning stance and approach, rather than focusing on differences of terminology.

5.4 The Tension in Design Concept Revisited

This study originated from a perplexing ambiguity in the term design concept and overwhelmingly diverse understandings of the phenomenon of having a design concept. A tension in dominant understandings of design concept was identified in § 2.1.3: namely, on one hand design concepts are generally deemed to be outcomes of the process where they were derived, objectively independent of designers who made them,

and they represent things to be produced; and on the other, they are reported as actively relational, evolutionary, and generative (by virtue of a dual sense).

Given that the design concepts discussed here are in fact meanings (which have been explored in this inquiry) it becomes evident that the conception of meaning in this study can coherently resolve this tension. Meanings are temporal outcomes of the experience, and they reflect the moving variation of an experience. Meanings are perceived presentations of experience, and therefore naturally express the process from which they arise. Thus, meanings are never independent outcomes of the design process. Everything, including people (designers and people they approach) engaged in the process constitutes the experience of having a design concept, and therefore each has a chance to be presented in the meanings. Based on the underlying structure of the experience that restores fundamental relations of human experience, the characteristics of design concepts can be understood as follows:

- *All-inclusive*. A design concept includes the process, product, principles and natural attitudes full of designers' judgments, feelings, knowledge and values. It is all-inclusively relational because all these parts are unified in a whole.
- *Actively generative*. A design concept envelops the generative principles made in the experience. It presents the designer's involvements, intentions, and actions. It is actively generative due to the inclusion of human dimension.
- *Evolutionary*. A design concept is a dynamic growth that unifies solution and problem. It becomes coherent as the experience unfolds and it develops or radically changes when the experience is turned into part of a new experience through new wonder.

A design concept is a set of coherent meanings made by the designer in the context of experience. Within the present study, design concepts and meanings converge in the internal perspective, in order to approach designing from designers' eyes. The tension

regarding the term design concept that has resulted from external perspectives is resolved in this internal perspective.

In contrast, the prevailing external perspectives for approaching the phenomenon of having a design concept accentuate, rather than account for, such a tension. This is because they cultivate a tradition of design that is immersed in natural attitudes about compartmentalization. Furthermore, the natural attitude cannot be unveiled within itself without changing the perspective. As a result, the majority of design research seeks to model this phenomenon by imposing various relations on the elements of design that have been derived from external perspectives. Researchers extensively explore how design concepts, as independent entities, are connected to the designers, the process, and the things out in the world that they represent. Designers, who operate their expertise to accomplish tasks, are also often situated in these natural attitudes.

This tension was first raised in Chapter 2 to indicate the opportunity of changing perspectives toward the phenomenon of having a design concept. Hypothetically, the underlying structure of an experience of having a design concept derived from the internal perspective will more coherently integrate design aspects in rich relations that are overlooked by external perspectives; and the resultant structure will shed light on new understanding about the notion of design concept.

The first part of this hypothesis has been, I suggest, sufficiently supported in my study through an identification of the underlying structure and the framework on meanings in the examined experience, as well as in the discussion on the conception of meaning. Now, to demonstrate the second part, I explain why design concepts (i.e. meanings) are dealt with in external perspectives and analytic approaches in such an inconsistent manner. The internal perspective developed in this study enables me to disclose and understand the natural attitudes in design fostered by perspectives outside design experience. The following discussion aims to elicit a deeper understanding of the notion design concept.

5.5 Prevailing Natural Attitudes in Having a Design Concept Revealed

Here I explore some major natural attitudes that are incubated in external perspectives toward the design phenomenon. These are: conceptualization, dualisms, and the gap between concepts and things. All of these involve compartmentalization. I clarify these natural attitudes below, by discussing the relationships that have been interrupted by various forms of compartmentalization. To do this, I use the formal relations in the identified underlying structure of such an experience.

5.5.1 Conceptualization

Conceptualization is an analytic approach that takes apart a thing into elements and structures the relations between these elements, in order to build an abstract model that explains the thing. Conceptualization, as the most powerful natural attitude in design, acknowledges elements and relations in a whole, but in a way that is different from holistic approaches. When the designer is dwelling in conceptualization, her or his attention to elements is inclined to override that to relations. McGarry (1981) identified a similar inclination:

> Man is a pattern-forming creature. He tends to classify experiences, to find relationships and to generalize and abstract from these experiences. People can store concepts (indeed they must do so if they are to communicate) but the items of their mental furniture are distinct and unique to each of them. (p. 25)

Here I refer to an example to illustrate the relationship between elements and a relational continuum. A columnist named BTR from Shanghai once said the following:

> Imagine the meaning that is to be expressed as a continuous road. Then, words are like a string of bus-stops along the road. Of course it happens that the words exactly match with what you want to express. More likely, however, what you want to say stubbornly locates between two bus-stops. It is up to you to decide at which stop you get off, or, to consider constructing *the* stop just right with different combinations of words.[12]

[12] This was published by BTR in his blog: "假如把要表达的意思想象成一条连贯的路，那么文字就像一个个公车站，恰好的情形固然有，但更多的时候，你要表达的东西会偏偏在两站路之间，于是你得决定究竟在哪一站下车，或者如何用不同的文字组合来构建那样一个恰到好处的车站。" (Retrieved from http://btr.blogbus.com/logs/70591586.html)

Concepts, like the bus-stops, are what we construct in order to get closer to our experience of the world. The abstraction of symbols and signs such as language gives us the freedom to talk about the world. But as Glanville (1999) concisely stated: "We also understand that the description is not the experience; the explanation is not the actuality; predication is not mechanism" (p. 84) Conceptualization interrupts certain relations. Concepts are the digitalized analog world: cutting the continuous world and life into fine pieces so that we can become closer to what we experience.

Conceptualization results in a hierarchical structure that represents the real world as existing within a spectrum between the abstract (transcendental) and the concrete (embodied). Claims such as, "human designers form their individual design experiences into generalized concepts or groups of concepts at many different levels of abstraction" (Gero, 1990, p. 30) are generally accepted in design. Two kinds of hierarchical structures are involved in conceptualization: levels of abstraction and macro/micro view.

The conception of levels of abstraction is underlined by the emphasis on the general sense of design concept: that is, when a concept is generalized from some thing(s) it is more abstract than the thing(s) where it has arisen from. For example, a container, a bottle, and a coke bottle illustrate three levels of abstraction. The "bottleness" is generalized from a coke bottle and many others particular bottles. So, a bottle is more abstract than a coke bottle. By the same token a container is the most abstract among the three. In light of the conception of abstracting, design concepts are described hierarchical.

However, design concept fabricates more things than those that can or should be compared in terms of degree of abstraction. This introduces a different mode of conceptualization (using the macro/micro views) that decomposes things into components. A common misconception is that the model of levels of abstraction still applies to the relationship between the whole and its components. Thus, we may tend to see an integrated thing as abstract, with the particular components as concrete. The contextualized and concrete components are focused when we zoom into the micro views of the whole; while the fact that it is a particular thing of such and such features

becomes clear when we zoom out to have a macro view. The concept here is no-longer comprised of the shared characteristics of the components. Instead, it is a unique model that represents the to-be-produced product, such that abstractness and concreteness are simply less relevant to the presented design concept. The general sense of design concept leads our attention to extracted elements, and the unique sense of design concept implicitly signifies that we are talking about all these in relations as a whole. Hence, a design concept is often used in a dual sense (this is discussed further in § 5.5.2).

The more abstract a concept is, the more embodiments it drags into the structure of levels of abstraction. Meanwhile, the larger the view becomes, the greater number of contextualized elements that are recruited in the micro view. Therefore the two hierarchical structures of conceptualization are either viewed as identical or used as intertwining.

This conception of hierarchical structure can lead to the assumption that different elements of a whole can be compared in terms of their abstractness, and so does the sub-elements of the elements. For example, Jones et al. (2001) proposed the method of a hierarchical *Product Idea Tree* (PIT) to facilitate conceptual design. While they identified that "ideas closest to the inner ring should be more general" and "ideas on outer ring should be more concrete" (p. 529), a simple question seems to have been shrugged off: namely *On what ground are different parts of different branches of the "idea tree" with distinct starting points supposed to be positioned on the same ring?* For instance, it is very difficult to tell which is more abstract from a piece of furniture or a scenario of using the furniture. Both of these could be concrete, in that they are made up with rich components; while they could also be abstract such that "a tangible artifact" and "an intangible event" are enough to label each. These two examples do not share the generalized relationship, as they are two things of different nature. Yet, they are related within a design concept, since the furniture could be a part in an event (such as moving-house). Apparently, the hierarchical structures imposed onto conceptual elements are not always necessary, or relevant, to the real world that the elements try to represent.

As briefly mentioned in § 4.1.2 (on the basic form in experience) conceptualization relies on turning pieces into *moments*. A famous example of turning moments into pieces is the Cartesian dichotomy of mind and body: the mind is believed to be a self-enclosed sphere and ideas as mental images. Many research areas are established on this foundation, including cognitive and behavioral sciences. However, from the human experience point-of-view, the mind and the body are inseparable from one another in constituting a human being to which they belong.

Conceptualization is indispensable to having a design concept. However, it is often reinforced into a natural attitude, as if it were the totality or the overarching relation of this phenomenon. Conceptualizing design from outside the design experience is an example of our understanding of the world that we may override certain parts on top of the rest in a whole, and name the accentuated parts as wholes leaving the rest hidden. When designers design a product, for example, the product is often regarded as if it were the only thing that matters. As a result, conventional design was traditionally artifact-centered, and did not see the human interactions as part of a larger picture. By the same token, the sum of qualities or components of the product may be abstracted as *the* design concept in light of the hierarchical structures, while the designer's engagement is excluded from the whole.

However, the underlying structure of having a design concept indicates that conceptualization and revelation are seamlessly unified in such an experience, as they are enabled by all of the basic formal relations (see § 4.3.1). Thus, conceptualization and revelation are glued together by the following: the interplay between turning *moments* into pieces (wholes) and the relation in a reverse direction, the joining of absence and presence with the old and new, and the conceptualizing of identity and the whole while seeing their supporting presentations and parts. Revelation both starts and drives an experience. Conceptualization facilitates and enables the understanding and description of experience and meanings.

5.5.2 Dualisms

Another kind of compartmentalization in design is dualisms. Many analytic theories and models about conceptual design rest upon dichotomized categories. The paired poles (e.g. tacit and explicit, body and mind, subjective and objective, declarative and procedural, descriptive and prescriptive, and abstract and concrete) do stake out the vast territory of design, but they reveal less about the rich and dynamic relational middle part. The influential rational problem solving paradigm of design itself is grounded in the positivist dichotomies that separate means from ends, research from practice, and knowing from doing (see Schön, 1983; Dorst, 1997). The premises and criteria behind the dichotomized categories are not derived from an equivalent basis, hence definitions (and the ensuing application) are often incommensurable and nontransferable. They can barely serve as complementation or extension to one another. The conventional understandings of conceptual design seem to be caught in the trap that "fragmentation of design process, such as rational and irrational aspects, and logical and creative aspects, impedes the understanding of holistic design thinking" (Narváez, 2000, p. 49).

The compartmentalizing of design into dualisms can be better understood if the formation of design in history is considered. Buchanan (1995) pointed out that a separation of designing from making, dating back to the Renaissance, fractured the otherwise unifying design into specified types of production. The lack of an intellectual foundation of design resulted from the separations of designing from production further led to "a loss of the essentially humanistic dimension of production" (p. 34). In the absence of the humanistic dimension of making, it is difficult to absorb designer's experience into design conceptualization, because it is the former that contains the latter, not the other way round.

Among the dualisms that result from design compartmentalization, one pair is implicitly employed to restore the generative and dynamic relations of design concept. Design concepts tend to be utilized in a dual sense in design: being both general and unique. For example, one may call the quality of eco-friendly as the concept of a car, which is fairly general and can be linked to all sorts of things varying from physical objects to complex systems. A concept car staged at an international motor show,

however, is a real thing that has been produced by following a concrete design concept that was meant to model nothing else but this unique car.

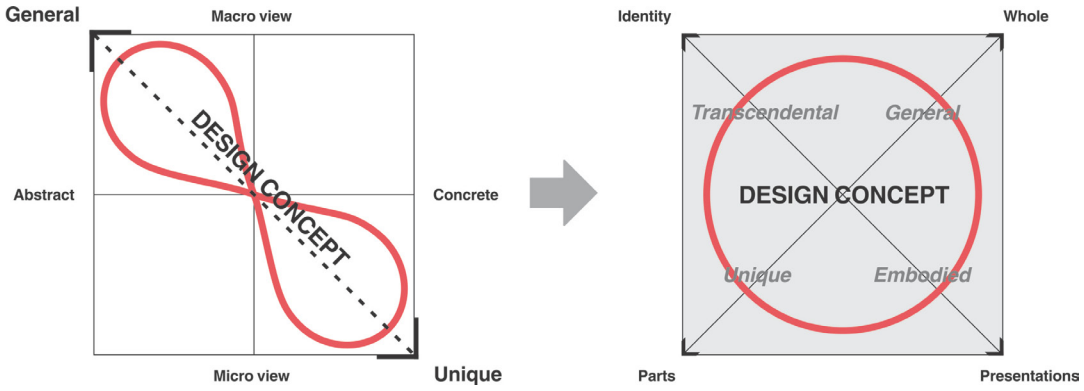
Concepts are generally viewed as shared characteristics across sets of objects. The generalizing process is conceptualization. McGarry (1981) argued that a concept is the "common element" of experience and "concepts tend to form a hierarchical system"(p. 24). Concepts, however, are also defined as models outside the concrete things that they represent. Barsalou et al. (1993) suggested that "concepts are contextualized and local in scope to situation" (p. 1). However, such a dual sense leads to a paradox: the former implies that a concept is general among the things that share the same feature, while the latter depicts a concept as having a unique relation to the thing that it represents and sharing the same structure with the thing. The notion of the user in design is a typical example of this case. To quote from a student's reflection: "Do we have to narrow down the target [users] group? What about understanding the individual user? Each person is unique. Using the target group kills lots, lots of things" (Field notes, TU170910TJ).

This dual sense is strongly associated with the two hierarchical structures in design conceptualization. The general and transcendental sense of a design concept seems to unify the abstract end and the macro view; the unique and embodied sense of a design concept appears to integrate the concrete end and the micro view. This dual sense is utilized to make up for the relations broken by the hierarchical structure in conceptualization.

In addition, this dual sense is also implicitly employed to account for the generative aspect of design concepts. Design concepts appear to automatically grow by oscillating between the abstract and the concrete, the transcendental and the embodied ends. They are regarded as generative abstractions because their abstractness somehow is always pointing to concrete things. Uniqueness makes it possible to describe a design concept as the specific product at a certain point of the process; whereas generality identifies conceptualization as the whole pattern of the process. Design research and practice seem to be making use of the ambiguity in the philosophy of concept to integrate the design outcome into the process.

Figure 5.6 shows that the generative aspects of design concepts need not to be understood in a mysterious way, because the dual sense of design concepts intrinsically adhere to each other based on the relation of identity in manifolds of presentations and that of parts and wholes. These two relations supplement the relations that have been overlooked by the structure of levels of abstraction and macro/micro views. The dual sense of design concepts appears inconsistent when design concepts are conceptualized from outside of the experience. However, when design concepts are relocated in experience as meanings that present the interaction between the designer and the world, such a dual sense properly manifests the reasons why things intended by the design always seem to simultaneously possess both abstractness and concreteness. They are related in this way because of the underlying structure of human experience.

Figure 5.6. The resolved inconsistent dual sense of design concepts



5.5.3 The Gap between Concepts and Things

Another major compartmentalization in design lies in the gap between design concepts and things, which is also an immediate consequence of conceptualization. Verbeek and KockelKoren[13] (1998, p. 31) asserted that reduction of matter to concepts, following a tradition that can be dated back to Plato,[14] has been a characteristic of the discipline of industrial design since its very beginnings. Scholars who have been aware of

[13] Verbeek and KockelKoren (1998) maintained, "Designers seem to be Platonists, considering objects to be only derivative 'copies' of primordial ideas" (p. 29).

[14] McGarry (1981) stated, "Logicians who follow the philosophy of Plato use the term [concept] as an abstraction of the common elements shared by an array of objects – the 'horseness' of horses, the 'treeness' of trees, the 'humanity' of human beings or the redness of red-colored object" (pp. 21–22).

such a compartmentalization criticize that designers are concerned primarily with the concepts and then with things in the second place. Designers are trained to focus on the nonmaterial, which distances designers from the objects (including things and people) in the world. For example, the user is often conceptualized primarily in terms of routine categories (such as their age, gender, occupation, taste, competence, motives, or aspirations), rather than being seen as a whole human being.

This natural attitude gives rise to a perplexing question that always nudges designers and researchers: *How are design concepts and things possibly related?* This question introduces a predicament in achieving a coherent conception of the experience of creation. The activeness of design concepts fails to be explained in external perspectives, as it is positioned between human beings and the world.

One example may help us understand the relation and difference between concepts and things. Imagine you, as a painter, are trying to present a sleek curved object purely with lines. The surface beautifully blends all the convex and concave parts into a continuous whole, extends and, at last, converges as the profile of the object under your gaze. We all know that the profile is not an independent line in its own right, but rather a presentation that expresses the features of the surface where it locates. Drawing out the profile of the object as it appears to the painter is therefore an interruption of the continuous surface, and this extracts a dependent part into an independent entity. Lines that present the surface are just like concepts that are abstracted from the continuum of the world to describe the world. However, the line never departs from the surface.

The natural attitude of seeing design concepts as existences between the designer and the world involves the relationship of absent and present. Sokolowski (2000) noted that we tend to take concepts, ideas, or meanings that we make and possess "as some sort of mental or conceptual things, something closer to us, some sort of things that are never absent" (pp. 97–98). He further suggested that conceptualization could result in a danger of "misplaced concreteness."

In addition, the relation between parts and wholes also intertwines with presence and absence, leading to the natural attitude of seeing design concepts as mediating entities between us and the world. Design concepts are referred to as if they were always present to us to cover up for the absence. This tendency makes designers continuously identify parts and to assume that the sum of all the discovered parts make a whole. The relations within that whole are distorted by such an approach for any object and identity engages the relation of absence and presence. Hence, the gap between concepts and things is frequently associated with the design impasse of failing to draw the scope of design, which turns the subject matters of design into a flattened panorama that excludes the temporal and personal dimensions in an experience of having a design concept.

In summary for this section, the conceptions of design concept that are derived from external perspectives, as characterized by the natural attitudes discussed above, cannot resolve the identified tension. The tension leads to problematic situations in both design practice and research, such as a segmented design process, disconnection between problem and solution, and difficulties in understanding experience. Attempts are made by researchers and designers to link design concepts to the process based on an ambiguous dual relation in order to fit them into the hierarchical structures of designing. Design concepts are distanced from the designer and disconnected with the things for they are deemed independent entities between people and the world. This situation is shaped by the dominant external perspectives and analytic approaches. All these can be revealed and understood by virtue of a change of perspective: from outside design experience to inside design experience.

5.5.4 Summary on the Notion of Design Concept

The conventional understanding of the design concept can be stated as follows: a design concept is an abstract, objective, and hierarchical entity made of conceptual components, which represents real things to be produced after design. Use of "representation," indicates that a design concept is an entity outside of the world. A

design concept is also independent from the temporal dimension and from relationship with people who make it.

The term design concept is a legacy from the external perspective of describing designing. On one hand, design concepts are helpful for describing designing, as they allow designers to talk about distinct aspects of a unity that takes analytic thinking to discern. On the other hand, the conventional understanding of design concept may further distort the way designers have, and understand, experiences. The term design concept allures designers to reside in the external perspective, and thus impedes them from finding appropriate places to talk about themselves, which is a necessary part of an experience.

Nevertheless, design concept is also used as a title for many things that are obviously relevant to designing and to the final design, but that are not easily related when one stands outside of the experience where these things emerge. A design concept implies a whole and gives a name to all its elements: the known and the yet-to-be-known. This holistic sense benefits from the implicit experience where a design concept arises, but has been taken for granted by the external perspective.

Therefore, when one says, "I have a design concept," it means that she or he can present certain aspects of the designed matter as a whole: both relative and temporal. There is no such a thing as a distinct moment at which the concept is completed, because no concept is so determinate and saturated that it cannot be destabilized. Instead, a design concept (or meaning, as defined in this study) grows, emerges, and becomes stable when a coherent whole is obtained. The design concept lives in our experiences.

> Expression does not clothe design thinking; it is design thinking in its most immediate manifestation, providing the integrative aesthetic experience which incorporates the array of technical decisions contained in any product.
> Richard Buchanan, *Rhetoric, Humanism, and Design*, p. 46.

Chapter 6. Demonstration of Applying the Frameworks

As briefly outlined in Chapter 3 (see Figure 3.4), twelve cases have been investigated. They were collected from twelve design projects, which were conducted by students and facilitated by their teachers from six design schools in Mainland China, one university and several local high schools in Hong Kong, and one university from Denmark (in a collaborative project). These projects included one three-day intensive workshop, eight studio projects that lasted from two to seven weeks, and three capstone projects that each lasted at least three months. The majors of the students varied, and included industrial design, interaction design, visual communication, and environmental design. Most participants were undergraduate students. My research approach was determined at one stage to embrace greater variation of scope and depth of design concepts. This was done in order to check the relevance of the emerging frameworks to more complex experiences and to further modify them. At that point, a greater number of the MDes students' projects and collaborative projects were examined.

I undertook intensive research activities in the field. For the short-term projects, I observed the entire process, documenting students' discussions and their field studies (if any). For most of the long-term projects, I spent at least ten days on each (one month for some). This allowed me to stay close to the designing students, to dive into the context of the projects, and to be within the communities to enable more of the designer students' and teachers' voices in the research. When each project was completed, I conducted interviews with students and teachers, and I used email and personal conversations to follow up on the students' reflections on their experiences.

Since my field studies were directed by the insights and hypotheses derived from previous data analysis, my personal involvement in the field increased over time. I participated in tutorials by making comments and discussing my experiences with some students and teachers. For data analysis, I began to use myself instrumentally to disclose an experience of having a design concept, knowing that my understanding and interpretation were part of the new experience. During the intensive memo writing, I described, reflected on, interpreted, and articulated the examined experiences iteratively for each case. Aside from this, dialogues between the emerging frameworks with the existing theories, and comparison of the theoretical constructions with the data have lasted throughout the entire inquiry (please refer to Figure 3.9 for the general research flow). Data analysis turned out to be very time-consuming. The analysis of some earlier collected data lasted, for example, over six months for each case. Also, the analysis could become iterative when the preliminary frameworks emerged and contrasted with those earlier cases. The purpose of the frameworks was to understand and describe these experiences more consistently.

In the previous two chapters I reported the two frameworks established in this study, which aim to help articulate more of the experience of having a design concept. In this chapter I demonstrate how to apply these in describing such experiences, using two cases. All the collected cases support the reported theoretical findings. These two cases were selected because they respectively stand for conventional product design and participatory design as an important design movement in a changing social context.

In the first case, the growth of the experience is facilitated by the interaction between a novice designer' and his tutor (an experienced product designer). In this case, distinct trajectories can be traced that finally converged at an enriched proposition and understanding. The second case is located in the expanding terrain of design. This terrain increasingly includes design participation, and designers' experiences are playing an increasingly important role in the socially inclusive design of events and experiences. In this example, the young design students' experiences of critical moments in design collaboration present a potentially productive beginning of having a design concept.

For each case, I first outline the report of the experience: either as a synopsis that refers to the original transcript of the designers' conversation or as a spontaneous retrospective description in the field immediately after the project was done. Then, I demonstrate how to understand and interpret these data to describe the experiences. The contrast between the original accounts of these experiences and my articulation of them when following the framework on meanings and the underlying structure will show that the experience of having a design concept can be described in a coherent and enriched way by using these frameworks.

6.1 *Easy Home*: Portable Furniture Design

6.1.1 Synopsis

Easy Home is an undergraduate student's capstone project. When I first observed this project, it had been running for four weeks and would last for three months. The project began with a theme that featured two keywords: "apartment-renting" and "furniture." In a 30-minute tutorial (see Data Box 6.1 for the transcript), student Mike reported findings from his field study (in collaboration with teammates) and described his own emerging design concepts, whose potential users are young people living in rented apartments. The tutor, Lena, appreciated Mike's inspiration from a luggage case and a storage box, and steered him through an impasse by having her own experience stimulated by a wonder that occurred to her.

Data Box 6.1
The Transcript of a tutorial on the project Easy Home

Date: Mar 23, 2008
Duration: 30 minutes

Mike: [Mike first spent around ten minutes showing findings from his user research with a presentation file attached with video clips.] We've analyzed the relationship between furniture and apartment renting from at the outset. Firstly, the furniture is provided by the landlord. In general, the majority of furniture items provided by the landlord are worn-out and old-fashioned. Secondly, they [the interviewees] may buy some items. In the first case there is a problem, that is, the landlord usually only provides them with limited basic items: a wardrobe, a table, but no TV stand or any things of that kind. This is another video we took that day [at an interviewee's place]. The bed and the bed stand are from the landlord. He [the interviewee] lives alone in a small one bedroom apartment. He bought that chair and told me he still needed a bookshelf; now he mingles books with his clothes in the wardrobe. →

Data Box 6.1
Continued

He's a young guy who doesn't spend much on clothes, you know. The second problem is, if they have roommates, they have to purchase some new furniture. This scene is from another flat. The landlord only left one bed and a computer desk. Now two guys are living there. They need one more computer desk. So they decided to get one. Actually, their wardrobe and cabinet are not big enough. A lot of stuff is piled like hills all over in the room.

So, I've made some conclusions. The tenants still have to buy some items. Not necessarily the whole set, but some particular pieces. Therefore, they have a problem: if they buy second-hand furniture, there is no delivery service at all. These young people seldom buy new furniture for several reasons. Generally, they can only afford secondhand furniture, which is much cheaper but will not be delivered [by the seller]. How to move and install the furniture, especially the big ones, is a problem. Even if they buy new furniture, they have it delivered at home, which is good. But they cannot carry it away when they have to move. At the most, they negotiate with the landlord about leaving the new furniture at the old place. If they're lucky, they can sell it to the landlord. However, normally the landlord wouldn't agree. They have to throw away the furniture. What a waste! Something like this cabinet. The tenant definitely has no way to take it along.

So, my concept is to provide a kind of portable furniture. It is about putting a furniture piece in a box. The box is around 700 mm long. I've checked up on it. It's approximately the size of a luggage case. Besides, tenants always use storage boxes. I'd like to integrate the whole furniture piece into something like a luggage case, or a storage box. You can pull it away. In that size it can be put inside a taxi trunk. Because, if it's too big, they'll have to hire a house-moving van, which would be way too expensive. It doesn't make any sense.

I imagine, at the end of the day, I will propose a plan: when someone moves, he can take these furniture items with him to the new place in one go or two, without hiring the moving van. Too expensive, too much trouble. Then, it [the furniture] probably will appear like a luggage case, or a storage box. If each single piece of furniture is like a box, several of them can be stacked and pushed on wheels: bed, table, wardrobe, for instance, as the sketch shows here. When the furniture pieces in the box are taken out, the box is empty for storage. I think the lid might be drawn in this way, folded behind, and then the three boxes can be nested into one another to function as a storage box for random stuff such as books or quilts.

Lena: So, you have decided?

Mike: Ah, I have another reason [for this decision]. As you know, I have visited several people in their apartments, not many. I've found that the furniture there is generally of the similar style. These are the most common ones [pointing to the pictures]. Boxes like these, made of thin wooden boards… Many storage boxes here and there. This is a small storage box, and random stuff piled in a mess. They keep many boxes on top of the cabinets just in case. My peers warned me that making additional boxes would be a waste, and it increases the cost too. In fact this would not happen. An additional box is bonus space for storage.

I have a second concept, which is designed for people sharing a one-bedroom apartment. For instance, this is the case I've shown. Two guys, two desks, but only one bed (chuckling with embarrassment), offered by the landlord. I'm thinking about… if they change it into two single beds, I can put the furniture in between. It'll work as a screen; at the meantime each item has its original function. This is the plan of the room. For example, if one guy faces in this direction, he reads and writes on this side in this way (showing the sketches). The desk could be folded down like this. This is the bookshelf. Clothes can be put here. I can put a curtain here. Say, if one person has to stay up late working, he can fold that down and draw something out lest his roommate should be disturbed.

Data Box 6.1
Continued

Lena: Well done. I'm happy while going through your presentation. The way you introduced your finding by making the video clips is way better than you previously did. It's clearly cut and straightforward. And I can tell you were confident in your presentation, slowly, step-by-step, but well structured. Especially the sketches. When you were talking about a box, you put a person next to it as a reference for size, which makes it very clear. This is big progress. I'm feeling good about that, indeed.

As for your concepts, I am very interested in them. Honest to say, I'm excited today. I think it very exciting. I believe many young people would love it because of the idea of house-moving. You've also been considering the size of the box and other details. Of course, I think there is a problem: when you stick to this idea and are going to develop it further, you'll have to decide which kinds of furniture to make. The bed, the table, or something else? Actually, you may easily locate the niche, because you are working on the situation in which whatever is provided by the landlord cannot meet with the needs of the tenants. Maybe those kinds of things are exactly your opportunity: the furniture items that landlords usually won't provide but in general young people would love to have.

Mike: Yes, this is what I plan to do. I don't have to design an entire set. But if time and energy permit, I want to make a reasonable collection.

Lena: Good. I'm *attracted* by this concept. It could be a piece of furniture with wheels and a handle on it. In its daily use, something might fold down and the wheels disappear. Usually you won't even notice them. Once transformed, you can easily grab a handle and pull it away. The other option is also nice, the one as a storage box after moving is done. Well, you were trying to work out how to fold it [studying the sketches]. Both are nice. Do your teammates have different opinions?

But something like this [pointing to a sketch] might be difficult to fit into the concept, because it's … [hesitating] To give it a handle or something? I don't think so. Anyway, there are many issues you should consider when it comes to deciding which furniture item is appropriate for this concept, and which is not just because you simply cannot squeeze it in.

Mike: I just happened to draw this sketch. The biggest problem might be the wardrobe. It is way too big. I've thought it over. If it has to be squeezed into a box 700 times 400mm big, probably it has to be segmented.

Lena: My suggestion is, don't challenge cabinets or wardrobe first. Pick those more appropriate ones… This concept could be so fun, I mean, a furniture item with wheels and a handle ready to go? If you choose cabinet, however, I'm afraid when everything is put together you'll get another IKEA drawer-chest, merely a box that can be pulled away. So, I mean, you could pick something simple at first, say, a computer desk or something else, change it into a box and pull it away. Solve this first. If you can make it, then consider [cabinets]… If it works, you may come up with many alternative solutions. Then you can determine which kinds of furniture also go with the idea. Start with the simple things.

Mike: I don't get it. Why would a computer desk be a simpler one? Isn't folding more difficult?

Lena: No. I think it should be more interesting. Squeezing something… into a box, it'll be a variation of an IKEA product. At the end of the day, it is very much likely to be something from IKEA, a box on wheels with an extra handle. That's it. You said that you want it to be used for storage. Storing stuff is definitely a state different from that relevant to travel. If you can sort out these two different issues, the next step would be smoother. It [the portable furniture for storage] seems like a very beautiful solution now. But I believe that you'll have to encounter many difficulties as it unfolds. As for the other concept [flexible interior plan], I think you've made a very good point too. I suggest… I don't know. Which one do you prefer? →

Data Box 6.1
Continued

Mike: [Hesitating] … I have no idea either.

Lena: Well, from the viewpoint of a capstone project, you need a plan that is appropriate to be nicely presented, embodied by model, I mean. But I do believe it is a very nice concept. Before the interim presentation, I need you to visualize it properly. Just this single image [with a luggage case and a stack of boxes] won't do. People cannot understand. You need to highlight the image. Yet still, I personally prefer the first option, which could be so much fun. It would be an ideal option for the capstone. Do you have any problem?

Mike: Nothing in particular. I just feel [hesitating]… it would be more difficult.

Lena: Next time I'll show you some pictures. You've got a very valuable breakthrough point. It will be fine.

Mike: Well, it could be a box, I suppose. But, if the inside stuff [the computer desk] is taken out, the box is still there. How to dispose the outer surface? Fold it down or… ?

Lena: You don't have to fold it [the box] down. There are many ways to make the handle disappear, for example, folding it back and making it connect to the other side with a click. The whole piece might appear like paper folding… Look, the point is, it might not be a storage box any more in its working state. It could be like, for example, if the two facing parts can be flipped inward. When they are pulled out and folded back, they become the surface of the desk. This is what I'm imagining. I think it's doable. Whether the furniture could be an empty box, it is a different concept.

Mike: So, the outer surface *is* part of this furniture!

Lena: *Yes, exactly!* I don't know what you think about it. This is my understanding. Don't you think the same way? Now, I know that you've got two plans. One is that it [the box] is part of the furniture. It becomes furniture once unfolded. The other plan is, it contains the furniture in moving and will be used as a cabinet or storage box later on.

Mike: Yes. I had thought of that option at the very beginning. But I haven't got any concrete idea how to continue.

Lena: [Going through Mike's sketches again] I have a hunch that it's going to be a very interesting concept: [mimicking a user] Why! How come my desk has wheels and a handle? Hey, it looks like I can move it about right away. I don't need any package at all, since it'll be thrown away once the furniture is there. The apartment is tiny. I won't keep that.

Of course, this [the box concept] is also a good one. You just have to decide which way to go. In my opinion, you'd better choose the one that inspires you more.

I feel the box concept could be more difficult as you dig into it. Many practical problems. It won't be easy to put these items [the wardrobe, cabinets, etc.] into a box. Apparently, they are too bulky. Maybe, a bookshelf that is already something on wheels. That's enough.

Mike: I imagine that box will be 400 mm tall.

Lena: This box? No way. It absolutely won't contain such a big thing… I'm recalling the cabinet I got from IKEA, which was that huge, so much taller… Anyway, this is just a preliminary framework. You don't have to worry about those details now. Calculate the volume in totality and see if it [for example, a bookshelf] can be put into a box in that size. If it'll do, then work on how each part is connected. I think connection is an easier problem.

Data Box 6.1
Continued

Mike: Yep. I've been thinking about that too. Do I have to put one thing into another? What if the wardrobe is 800 mm long, but the case is 700 mm long. What shall I do with the extra 100 mm? Leave it outside?

Lena: Worry about those matters later. Let's leave all the options open for the time being. The furniture surely will have to be able to be taken apart. There are many ways to do it. Now I find it an urgent problem, that is, whether the volume of a piece of furniture like that can *really* be carried away by the tenant or not. In addition, I feel that this concept of yours might be more suitable with small items. For instance, a computer desk. I grab it, pull it outside and put it in a taxi. There we go. If you have to carry massive pieces, I'm afraid that you have to hire a moving van. Plus, workers from the house-moving company can carry them for you. Then, this concept is less meaningful. Try them both. One is to focus on small items; the other is to turn the big pieces into small ones. I need more details next time: how you fold them; how the handle looks like; how it appears when it is completed folded up, etc.

Mike: Yes. I'll do it. Many thanks.

- The End -

Data Box 6.1 provides a general idea about what had happened to the designer student and teacher. The recorded conversation partly captures their experiences of having the furniture design concept; at least, it is a verbal presentation of the experience that designers could and did articulate when they were literally in the ongoing experience. To understand and describe more of their experiences, I will exercise my frameworks to retell the story, following the proposed main themes of meanings.

6.1.2 The Process

The occurrence of wonder is a highly individual phenomenon. Wonder in one's eyes may remain ordinary to the other if the surprising juxtaposition has yet to be witnessed. At first glance novice designer Mike and experienced designer Lena reached highly similar understanding of Mike's portable furniture concept from the beginning. However, when examined carefully, the trajectories of the two in having their own experience are very different. They finally converged when the distinctions were realized and arrived at a more explicit and consistent design concept.

6.1.2.1 Ordinary Before Wonder Occurs

During the presentation Mike introduced the idea that target users are single young college graduates, who are in their early stage of career and live in rented apartments, alone or with roommate(s). He and his teammates had visited several potential users at their apartments, observing their living environments and asking for their opinions about the furniture they were using or anticipated to use.

When Mike began describing his concepts by saying "we've analyzed the relations between furniture and apartment-renting at the outset," he focused primarily on the areas of objects and actions. For instance: "The furniture provided by the landlord is worn-out and old-fashioned"; "He [the interviewee] lives alone in a small one bedroom apartment. He bought that chair and told me he still needed a bookshelf"; and "Now he mingles books with his clothes in the wardrobe."

While going through the pictures and videos taken from their observations and interviews, some infant problems were implicitly implied: landlords usually provide basic pieces of furniture but that is not enough; contradictions exist between what users get and what they want in terms of furniture's style and functions; and a lack of storage space. I see these as *infant problems* because they were spontaneous "buts" but were not further pursued, although they did have the potential to become central if any arguments to change as a whole had been further developed and the hidden opportunity to change had been suggested. At the early stage, they were no more than factual descriptions that remained remote to the anticipated design. They appeared ordinary to Mike for they were part of the expected living conditions of these young tenants. None of them became the "but" that made the designer pause, surprised, and question back seriously. At this moment, the established relation between furniture as objects and apparent-renting as a set of events revealed neither a significant but- nor an and-relation to Mike to start the connecting phase. No wonder had occurred yet.

6.1.2.2 The Student's Trajectory

The student's initial experience followed a linear path through the four phases of having a design concept. When encouraged to reformulate his design concept during the critique, he expressed some difficulty with narrowing down the project to certain furniture categories. Implicitly, the boundary of the design was ambiguous and drifting. There was a lack of principle to determine the furniture at both conceptual and contextualized ends. Mike's preconception—of including a box for storage—had been entangled with the proposed design concept. This was so implicit that it took time for both the tutor and the student to identify such a preconception. Not until they had identified this did both designers realize the distinctions between the concepts that they each had.

An Episode Where the Initial Wonder Emerged

Mike concluded his field study asserting that, "The tenants still have to buy some items. Not necessarily the whole set, but some particular pieces." Unknowingly, Mike's attention had drifted from the furniture in the daily use toward house-moving. Mike's first attempt to frame a problem also reflected such a change of attention:

> Generally they can only afford secondhand furniture, which is much cheaper but will not be delivered (by the seller). How to move and install the furniture, especially the big ones, is a problem. Even if they buy new furniture, they have it delivered at home, which is good. But they cannot carry it away when they have to move.

Subsequently, Mike articulated that his concept was "to provide a kind of portable furniture." It was since then the "image" of a luggage case and storage boxes frequently appeared in his descriptions, presented in sketches. This is a significant moment of wonder, which presented an and-relation.

A Linear Mode of Four Phases

As shown in the underlying structure of the experience of having a design concept, a problem and a solution do not flow like two separate creeks in designing: a solution or a problem is confirmed or rejected by its counterpart through new wonder that arises in the very experience, especially in the reformulating phase. The penetration of the two is also embodied by Mike's retrospective accounts, where it is difficult to determine which

exactly came to Mike first: the "and" or the "but." According to the transcript, the significant inquiry began with several connected problems. However, the expressed problem at that moment was too fuzzy and there was a lack of curiosity in the designer to formulate a proper problem.

In contrast, Mike expressed eagerness to elaborate on the substantial idea of "portable furniture." Rapidly, the opening of stating a problem faded to the background. By examining the activity of moving and the involved objects, he immediately went about formulating the furniture of an unknown category:

> The concept of is about to put a furniture piece in a box. The box is around 700 mm long… approximately the size of a luggage case that can be put inside a taxi trunk. If it's too big, they'll have to hire a house-moving van, which would be too expensive… If each single piece of furniture is like a box, several of them can be stacked and pushed on wheels: bed, table, wardrobe, for instance, as the sketch shows here. When the furniture pieces in the box are taken out, the box is empty for storage. I think the lid might be drawn in this way, folded behind, and then the three boxes can be nested into one another to function as a storage box for random stuff such as books or quilts.

He was occupied by contextualizing purposes, appearance, product parts, actions, and preliminary mechanical constructions.

Mike's solution concept began with an "and" juxtaposition: the furniture, a luggage case, and a wheeled storage box are presented together. When it first occurred to him that the luggage case and the wheeled storage box were equivalents of the potential furniture, this was a significant moment. Immediately after the previously remote objects were juxtaposed to the furniture, the potential design was extended to an unknown whole, which included presentations of these connected objects. Therefore, he attempted to (re)formulate the furniture with all sorts of presentations that were borrowed from the luggage case and the wheeled storage box. The four phases of having a design solution concept were undergone in a very smooth and short episode, in a linear way.

However, Mike was unaware of three issues. They were hidden at that moment but were actually shaping Mike's experience of this concept.

Firstly, although the furniture was vividly anticipated in details such as the appropriate dimension for transportation by taxi or other extended functions (storage for miscellaneous items) with supporting structure and parts, Mike was trapped in an impasse. As tutor Lena questioned, "You'll have to decide which kinds of furniture to make. The bed, the table, or something else?" In other words, the portable furniture had not been saturate or stable enough when Mike first reported it. Although portability is an important facet of the potential furniture's identity, the identity was still largely ambiguous in terms of what furniture it is. Besides, the hidden thing to be changed (the scope of the design subject matter instead of individual parts like shapes, dimensions, or structures) remained obscure. In his preliminary experience, meanings about drawing the boundary of the design were thin. This is why Mike hesitated when showing his sketches and said, "The biggest problem might be the wardrobe. It is way too big. I've thought it over. If it has to be squeezed into a box 700 times 400 mm big, probably it has to be segmented."

Secondly, he was unable to break away from the powerful preconception about storage. Perhaps he had been bearing this need in the mind since user research in the field. For example, when showing the video taken at the user's apartment Mike pointed out:

> Many storage boxes here and there. This is a small storage box, and random stuff piled in a mess. They keep many boxes on top of the cabinets just in case. My peers warned me that making additional boxes would be a waste, and it increases the cost too. In fact this would not happen. An additional box is bonus space for storage.

Thirdly, although Mike began his description of design concept with a problem, it was an underdeveloped problem, and thus helped little to draw the boundary of the hidden design opportunities. Referring to the four phases of an experience of having a problem concept, the problem can be formulated in a more explicit way. The problem that first mattered to Mike was a broad but-relation: that is, many young tenants need to move frequently, but moving furniture is difficult for them. The former is the event that is supposed to continue, and the latter is an undesirable fact if nothing involved in the event of moving is going to change. The "but" juxtaposition marked out a wonder,

since the designer was drawn into anticipation of making a convincing argument that was yet to known. When exploring the established connection, the hidden reason of the inconvenient situation was attributed to the general dimensions, constructions, and shape of current furniture in relation to mobility. To probe a bit further, the hidden thing could be the interactions between people and furniture in the event of house moving. The revealed previously hidden aspects of furniture in moving provided opportunities to change. In return, house-moving, as a predetermined event that the tenants have to cope with, becomes the argument to support such a change. All these together make the "but" a design problem. With each part reformulated in an interrelated manner, the concept of a problem grew clearer and more stable. If the initial problem had been sufficiently explored, it might have been easier for Mike to see that the idea of storage and the shape of a box are remote to the most crucial problem. The emancipation from preconception takes serious reflection and the occurrence of new wonder, which did not occur until Lena's reconstructing the experience joined in.

6.1.2.3 The Tutor's Trajectory

Tutor Lena's comments and elaborations on the concept provide an interesting contrast between the experienced and novice designers' competing experiences, as based on the same starting point.

Clearly, connecting the "luggage case" and "wheeled storage box" with the idea of furniture sensitized a wonder for Lena also. She said that she was "excited" and "attracted" by the concept. As Lena commented, "I believe many young people would love it because of the idea of house-moving." The instant comments from Lena were more like verbalization of herself her own experience:

> I'm attracted by this concept. It could be a piece of furniture with wheels and a handle on it. In its daily use, something might fold down and the wheels disappear. Usually you won't even notice them. Once transformed, you can easily grab a handle and pull it away. The other option is also nice, the one as a storage box after moving is done. Well, you were trying how to fold it. Both are nice.

This primary formulation sounded like a concise expression of the same thing that Mike had proposed on the basis of physical objects and actions. However, it became different, as she carried on reformulating the concept and responding to Mike's clarifications. A more dynamic facet of the structure of having a design concept was embodied in Lena's descriptions: a reflective dance enabled by new wonder.

Lena exhibited a subtle reflective dance between introducing the design as it was and, meanwhile, allowing herself to step into the shoes of a fresh observer to experience the imagined furniture with all the revealed parts and presentations (to feel if it was wondrous or not). For example, Lena exclaimed: "This concept could be so fun"; "Why! How comes my desk has wheels and a handle?"; or "Hey, it looks like I can move it about right away." The initial and-relation was somehow extended into a broader whole when the designer was imagining experiencing the potential product. In daily use experience the furniture is supposed to be static, while wheels and handles imply mobility, which is a remote state to the pre-understanding. Lena understood that unexpected parts (like wheels and handles) that were disguised in the furniture's daily use would strike the user as a pleasant wonder when transformed for transportation. This is genuinely a new wonder: daily use and house-moving. All Lena was doing now, as a designer, was suspending her previous understandings that had inherited Mike's concept and to allow herself to experience the imagined product as a whole in a new picture.

A new wonder can become an affirmation or an argument to modify the currently proposed design. Lena was composing a new design concept by extending the one proposed by Mike into the area of experiences: as an experience of wonder for the user. The new wonder emerged in the wake of the old one. The new wonder, from experiencing the formulated design, also became an important criterion to evaluate the design under development. For example, Lena suggested Mike not to

> Challenge cabinets or wardrobe first. Pick those more appropriate ones… This concept could be so fun, I mean, a furniture item with wheels and a handle ready to go? If you choose cabinet, however, I'm afraid when everything is put together you'll get another IKEA drawer-chest, merely a box that can be pulled away.

If the proposed design fails to stimulate a meaningful wonder to the user, the extending and reformulating phases are subject to modification, as long as the initial connection is still supported by new experiences.

Lena's concept became more consolidated and explicit when she began to explore her new design concept that was under reformulation. She was trying to integrate two different use contexts into an interesting using experience, by allowing the potential furniture to be adaptive for the two contexts. It dawned on Lena that Mike had taken it for granted that the furniture could be later transformed into a box for storage. Hence, she argued that "storing stuff is definitely a state different from that relevant to travel." Mike, however, had been implicitly targeting furniture that was basically a box. This is why he was continuously talking about wardrobe or cabinet, and became frustrated by the challenges about the determined dimension: "What if the wardrobe is 800 mm long, but the case is 700 mm long. What shall I do with the extra 100 mm? Leave it outside?" Mike had hoped to pick furniture items that could be naturally competent for the two using contexts with as little change as possible. This distinction between the tutor's and the student's anticipation was not immediately noticed. For a while, the two of them were formulating their distinct concepts but assuming that they were discussing the same thing.

The major discrepancy was not exposed until each had a relatively saturate design concept. When Lena suggested, "You could pick something simple at first, say, a computer desk or something else, change it into a box and pull it away." Mike concerned himself with questions like: "Why would a computer desk be a simpler one? Isn't folding more difficult?"; "Well, it could be a box, I suppose. But, if the inside stuff (the computer desk) is taken out, the box is still there. How to dispose the outer surface? Fold it down or... ?" At that moment, Lena realized that they were on different tracks of meaning making about the portable furniture, which presented a new wonder to the tutor. This made her better understand that Mike's concept was very different from her imagination. Apparently, she also had good reasons to suggest modification of his

concept, due to a principle made in her experience of the concept. She clarified her proposition:

> You don't have to fold it [the box] down… The point is, it might not be a storage box any more in its working state. It could be like, for example, if the two facing parts can be flipped inward. When they are pulled out and folded back, they become the surface of the desk. This is what I'm imagining. I think it's doable. Whether the furniture could be an empty box, it is a different concept.

Mike captured the point and exclaimed, "So the outer surface *is* part of this furniture!"

"Yes, exactly," Lena answered.

Finally the student's and tutor's experiences of this furniture concept converged, and were ready to move toward a more coherent concept.

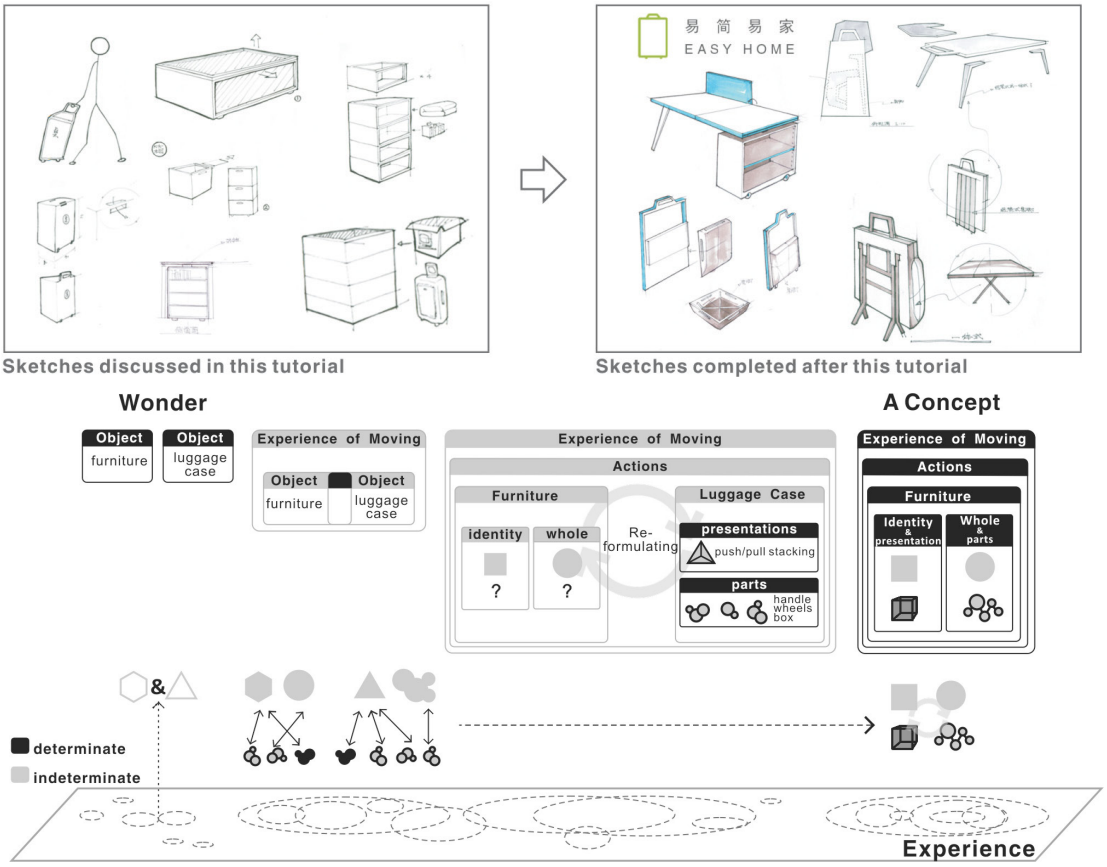
6.1.3 The Product that Grew out of the Old One

Compared with what he had already made, Mike appeared much more excited about the prospect of the reformulated portable furniture. It became obvious to both the tutor and the student now that there had been two competing propositions: (1) a whole piece of furniture can be transformed into a box to move, which is about portability and installation, but not necessarily relevant to storage; and (2) a piece of furniture for storage that is movable, which does not have to involve transformation/flexibility.

The revelation of preconceptions of the both presented a new wonder which made Lena question her own experience and reconstruct Mike's to explicate the hidden difference. By virtue of this new understanding, the student's earlier impasse (of failing to choose furniture categories) and his preconception (of having to include storage) were broken through. Thus, Mike could elicit new insights from his initial "and" wonder, by seeing the connected objects in a big picture of an experience of having certain furniture pieces adapted for different occasions of use. The subject matters of design were extended to house-moving and daily use rather than the former alone. Having gone

through the growth of the experience of having a portable furniture concept, both the tutor and student reached a shared understanding where the initial wonder of and-relation was more sophisticated satisfied and reformulated. The growth from objects to events and experiences is also reflected by the project name: later termed *Easy Home*, instead of portable furniture.

Figure 6.1. The growth of the portable furniture



As well as affirming Mike's idea of merging the luggage case or a storage box into the furniture that he had formulated at the very beginning, new possibilities of structure, product categories, parts, even the feature of flexibility were identified. For example, the transformation of the desk surface mentioned above, and "There are many ways to make the handle disappear, for example folding it back and making it connect to the other side with a click. The whole piece might appear like paper folding." With the previously limited identity of portable furniture enriched with these presentations, the pre-conceived theme of storage became less relevant, while flexibility appeared more and

more relevant. The revelation of the identity as well as the manifolds of presentations of the potential design made Lena confident to articulate a different proposition in order to bypass Mike's impasse (where his proposition had been contextualized in factual aspects yet ambiguous in conceptual identity. Figure 6.1 shows the evolution of this portable furniture design concept.

6.1.4 Principle

In Lena's reformulation of her concept, a simple principle arose: "It should be more interesting." By "interesting," she meant that the greater the contrast between the furniture in normal working state and in transporting state, the more significant the user's experience could be. This is a wonder: designed for the user to perceive when going through the transitions between activities of daily use and those of house-moving. This wonder is meant to occur as a surprise when the user sees how flexibly the furniture can be adapted for the two previously irrelevant situations. This wonder presents the and-relation of presentations from regular furniture (affording basic functions) and a luggage case or a wheeled storage box (serving in house-moving). Starting with the same wondrous juxtaposition, the tutor extended the unknown whole into the area of experience based on activities, rather than on the objects themselves.

Sticking to this principle implicitly, Lena suggested that Mike suspend the bulky and box-like furniture items for the time being, for the following reason: "It'll be a variation of an IKEA product. At the end of the day, it is very much likely to be something from IKEA, a box on wheels with an extra handle." In proposing an item like a computer desk, she intended to dramatize the anticipated wonder, as the furniture in the two activities presents a strong contrast. This shows how differently the same thing can be formulated, yet how much its parts, presentations, and identity can be unified. This is the unvoiced commentary to the judgments of why an IKEA product would be less interesting and why a computer desk, rather than a wardrobe, could be a more simple choice for this furniture design.

Another principle was made after the above point had been determined. Lena advised Mike to pick a "simple" piece to try out the portable and foldable idea: "If it works, probably you may come up with many alternative solutions. Then you can determine which kinds of furniture also go with the idea." Building a prototype by selecting an item with the most potential to present the intended identity makes it "simple" for the design to develop a collection. The workable way of transforming the selected item would be reformulated as a future design principle for new items (see Figure 6.2). This would enable the designer to secure consistent ways of presentation for the portable and flexible furniture items, and to make them a collection of the same identity.

Figure 6.2. The prototype and the completed collection of portable furniture (copyright by SU C.)

A. Prototype (exploring the opportunities of a portable computer desk)

B. The completed collection of portable furniture

6.1.5 Experiential Qualities

In this slice of data, the student and the tutor showed different emotional rhythms of having the concept. For Mike, the initial wonder of seeing furniture and the luggage case/storage box was, of course, significant. However, challenges to transform the connected objects into one quickly wore out the energy of wonder. He was trapped in the impasse discussed above, and did not appear to have a strong belief that this concept could be very impressive to the others. Actually, he himself had lost the pleasant astonishment while undergoing the preliminarily emerging concept of "wardrobe on wheels." Lacking the capability to have a reflective dance and being confined to his natural attitudes, he gradually talked about this idea as if it was ordinary. He was in face of great uncertainty and ambiguity about the identity of the design compared to what had been determined in details. He doubted whether it was a competitive concept at all, so that the major introduction to the portable furniture was followed by a second (and totally different) concept, which was about a flexible interior layout of a tiny apartment shared by two tenants. That concept almost disappeared from the rest of the conversation between Mike and Lena because Lena was intensively drawn into the wonder about the potential of the initial "and" and was excited about the prospect of experiencing an interesting portable furniture collection. Her persistent reformulation and her ability to reveal the design from her point-of-view finally made Mike break away from his preconceptions and experience a new energetic wonder before the initial one was swallowed by the mundane and uncertainties; he experienced the ecstasy of breaking through the impasse.

Lena's prospect of the design concept was unveiled layer by layer, which was continuously reenergized by the new wonders arising from her own unfolding experience. Her experience included understanding the discrepancies between hers and Mike's visions. She exhibited loyalty to the initial and-juxtaposition and persisted throughout the iterative reformulating phase (which was full uncertainties and unexpected opinions from Mike). She never doubted the value of the concept of

portable furniture. Lena did not (and could not) clarify her concept straightforwardly from the very beginning. As a tutor, she needed to know if she had apprehended Mike's concept. As a designer, she waited patiently for her own concept to become more consolidated. When she identified the distinctions between their concepts, she actively attempted to make sense of it. By doing so, preconceptions from both parties were revealed and new concept—including principles—were articulated. She had a keen sense of making use of new wonder (whether it was an and- or a but-relation) to affirm, modify, or break through the earlier understood things, if necessary. Through an experience that took a more dynamic process with expanded width and depth, Lena finally became confident. Her positive comments became critical suggestions: "In my opinion, you'd better choose the one that inspires you more. I feel the box concept could be more difficult as you dig into it." Lena's confidence came from her belief in the values of the potential design and the better understood student's predicament. The surge of new wonders arising from the interactions between the two designers' experience made the experience a co-created evolution. It is not strange that Lena appeared to share the ownership and feel empowered to join in the duet.

6.1.6 Natural Attitudes

Object-Centered Approach

Mike's impasse rested on an implicit drift between the contexts of house-moving and daily storage. He did not see, at first, that both are parts of the activities that would be reshaped by the potential furniture. This impasse fundamentally resulted from his initially object-centered approach.

When the luggage case and a wheeled storage box were presented together with the furniture in question, Mike extended the wondrous connection into a whole that sat in the area of objects. He focused on the whole as a new object and attempted to reformulate it in terms the elements belonging to the area of objects (in terms of shape, dimension, parts, and structure). The inner similarity he identified between the luggage

case or storage box and the furniture were parts and presentations of objects, such as the wheels, the handles, and the size. Had Mike loosened his focus on objects, it would be more evident to him that the portability identity arose from the activity and experience of the furniture in moving; but he attributed portability as a quality of the furniture as an object, instead of an event or experience. Hence, Mike's way of absorbing the initial and-relation was to include the case and box into the new whole by transplanting their parts and presentations onto the unknown furniture. Basically, this is an approach of adding up discursive pieces to make a whole, as if such transplants guaranteed the aimed identity. When the transplant had been rapidly carried out, there seemed to be little energy left to guide Mike where to look into and what to do next. When the old wonder subsides, and no new ones emerge, the once exciting design tends to be downplayed and become ordinary.

In vivid contrast, Lena, an experienced practicing designer as well as tutor, extended the initial "and" into the area of activities. In her eyes, furniture (in routine use at home) and cases and boxes (in house-moving) were connected from the very beginning. The potential whole included the transition of events that was anticipated as being supported by the new furniture. This could be more meaningful, natural, and thus "interesting"— in her words—and "simpler." Divergent from the student's swaying focus diluted by the watered-down wonder, the tutor adopted a clearer, yet more dynamic trajectory, by sticking to inquiry into the initial and-relation and making use of all sorts of new wonders to enrich, confirm, and support the design concept.

We could make good use of an experience if we can better understand the similarity suggested in wonder and the whole that the similarity indicates. With an object-centered point of view, however, the extending phase is limited; the dynamic (re)formulation of a solution concept is impeded; and the wonder might be easily consumed and lost. Effort is needed to be aware of a previous focus of the area of design in order to delimit the boundary of the whole in the extending phase. Reformulation of design cannot solely rely on transplant and substitution of parts and presentations at the

contextualizing end. Without bearing the connections to the aimed identity, any wonderful concept would just be an abstract keyword, remote to things that carry it.

Preconception that Dilutes the Intended Identity

Mike had, for a long time, been struggling with the preconception that the final furniture included an independent box, or, that it would be best if it was a box per se. For this reason, he instantiated his concept with references to wardrobe, bookshelves, or cabinets. These options appeared to affirm the initial wonder, but they agitated him as hardly any of them fit well with the dimension requirement that he deemed first and the foremost. Such a preconception had probably existed since Mike was impressed by users' current living space as full of all sorts of boxes (see Data Box 6.1).

Although Mike unknowingly adopted an object-centered approach, this does not necessarily mean that events, activities, and human-object interactions had been excluded in his experience of having the concept. After all, he was inspired by the interviewees' narratives of their ways of living. It is difficult to think of "portable" without associating this with an event of moving. House-moving scenarios were as vividly pictured as those real, tiny, messed-up apartments that were witnessed by Mike. All these things did not become the intended subject matters of design, because of the powerful preconception. The area of actions was briefly touched upon as a consequence of the objects' reach. Such a loose connection between furniture and the relevant events/activities impeded Mike from seeing that he had proposed some portable furniture items for house-moving while considering them to function for storage in daily use in the first place. For him, the two functions/events were naturally intertwined in the image of a luggage case or a wheeled box. This was too natural and too ordinary to draw his attention to the transition of the events. As a result, the identity of portability of the unknown furniture was far less saturated and was secretly overridden by the identity of storage on the one hand; and Mike missed the chance to experience the wonder of the two remote furniture using events and of shaping them into a new whole on the other hand.

This preconception was so powerful that we may find that it persisted in Mike's reformulation of his idea almost until the end of the critique. At the moment of realizing "the outer surface" of the furniture in transportation could be genuinely an inseparable part of the furniture (rather than merely a container) Mike felt new wonder. Suddenly he apprehended what Lena meant by saying that a computer desk could be simpler and more interesting. Breaking through the preconception suddenly broadened and reenergized the experience of having the furniture concept. Only new wonder gives us freedom to see our hidden but powerful pre-understandings, and to make better informed decisions whether to stick to or to bracket them.

What Counts as a Design Problem?

Often, the "problems" in the designer's accounts are not associated with the wonder that triggers persistent inquiry. For example, Mike, at the very beginning of his accounts about his observation, reported that the user's placement of books inside the wardrobe next to clothes was a problem. If Mike perceived something unusual and sees the co-existence of books and clothes in a wardrobe as a peculiar but-relation, he might have wanted to further understand the presented contradiction. The connecting phase would have been triggered, extended as an argument to change and formulated as, for example: users need more storage space but their general living conditions would not permit, whereas the interior organization for mixed categories of stuff in a relatively big piece of storage furniture might be improved. The "but" would have become a good argument to support this opportunity of mixed storage, which in its current situation is "a problem." Actually, this "problem" was more-or-less taken up in Mike's under-developed alternative concept about the flexible interior plan.

Taken from a different angle, the wonder might have presented a surprising "and" also. The irrelevant items, such as books and clothes, become so related that their co-existence in one furniture item indicates a presentation of a potential furniture item of a new identity. They might be able to find their place in a new whole, wherein both deserve appropriate and modified ways of storage (like the clothes being stored in a wardrobe). The furniture is destabilized from a determinate category—a wardrobe—to a

new storage item (as-yet unknown) that may resolve the mixed storage situation in the target users' extremely compact living space. This imagined design episode might have happened to another designer. In that case, the designer would have undertaken the project by following a very different direction, and developed a different experience of wonder as well as its product. A myriad of possibilities exist in designing, depending on what attracts the particular observer's attention and is acknowledged as a thing relevant to the design in the form of wonder.

Teachers often attribute design students' impasses to the concern that identified problems are not appropriate "design problems." For example, one professor said:

> Problems always exist. What really matters is whether you can find a way to solve the problem, rather than name it a problem. Every Chinese citizen knows that railway transportation during Chinese New Year is a problem. It's so crowded and difficult to secure a ticket. Then how can you solve it? It's not a design problem. (Field notes: IN160408TS)

Unlike the definitive claim from this professor, in this study I suggest that this is not a design problem until the hidden opportunity is suggested. Furthermore, there has to be a "but" of the inquirer's interest that can sustain the curiosity through the tough journey of design. Otherwise, the causally verbalized "but" will remain no more than an infant design problem, which does not engage wonder with the designer's open exploration and cannot turn the exploration into an experience of having a design concept.

6.2 *Ever Green*: A Service Design Project from the Design.Lives Lab 2009

6.2.1 Introduction

This case comes from a group of young student designers who took part in learning participatory design[1] for social inclusion in a workshop named the Design.Lives

[1] The big family of participatory design (or co-design) advocated design practices through the inclusion of people who may eventually be influenced by such practices. Inclusive design is a strand of this movement that prevails in UK. This approach mainly deals with open-ended projects with designers acting as social activists to support design by people (See Ma et al., 2010).

Lab (DLL) 2009.[2] The workshop was developed based on the workshop of 48-Hour Inclusive Design Challenge advocated by Cassim (2007), and more specifically informed by the Design Participation Tactics workshops by Lee (2008). The 3-day program began with a half-day of presentations on design in general and on inclusive design in particular. These were given by designers who worked in Hong Kong and by the workshop organizers. This was followed by two days of intensive teamwork, during which each group of students and their active-design-partner were required to propose a design concept that had been inspired by their open-ended exploration. After the completion of the proposal, a final presentation was held in front of all the participants and a jury made up of the workshop organizers, invited designers, and researchers. Three best designs were awarded. Also, in the midst of the 2-day teamwork, each group was requested to make a progress report to the rest of the participants.

I took part in the DLL as an observer, and stayed with one of the groups through the 3-day workshop, documenting how the student designers' went through the whole program, my experiences in observing all the participants and in the ongoing events, and my immediate reflections on the happenings (Field notes: DDL0709GD). My analysis of these materials, as well as interpretations evoked by understanding the designers' experience explored the active roles that bodily experience and intersubjectivity play in an experience of having a design concept. I attempted to make sense of the student designers' experience of the emerging final concept, which survived a crisis in the middle of the process. I tried to understand why a seemingly negative experience could be a valuable one and what may be learned from it.

[2] This workshop was initiated by Dr. Yanki Lee from the Helen Hamlyn Centre of Royal College of Art (UK); collaboratively planned and managed by Dr. Kwok Leung Denny Ho and Dr. Sui Yin Albert Tsang from the Hong Kong Polytechnic University; and supported by Hong Kong InnoCentre. The participants included students from some local senior schools in Hong Kong and year one design students from Shangtou University, China; a group of active-design-partners comprising disabled and elderly people from Hong Kong; and a group of volunteers with either design or social science background from Hong Kong Polytechnic University serving as facilitators. Eight design teams in total were set up, each consisting of one disabled/elderly active-design-partner and approximately 10–15 student designers, and one facilitator.

6.2.2 An Immediate Retrospective Description of the Project

As well as taking field notes during the workshop, I also reported the process that our group had gone through as follows. The following report was made immediately after the workshop had been completed.

Before teamwork began, Kevin, the facilitator, and I had a brief encounter with Granny T, the active-design-partner assigned to our group, during the lunch break. I was under the impression that she was an old lady in her seventies, quiet with dignity, very polite, and slightly reserved. I learned to my surprise that Granny T was actually eighty-four years old. She lived alone in a nursing home far away from the downtown. We were informed that Granny T had a medical appointment in that afternoon, which meant that the teamwork time would have to be reduced.

The entire group was first built on that afternoon of Day 1, when Granny T was officially invited into our group. The students already met each other and were sitting in a circle. Kevin took the lead with a brief self-introduction and introduced Granny T as the active-design-partner to the students. The students were then requested to introduce themselves to Granny T one-by-one. Although the big circle did not make it easy for the group to clearly hear what each other was saying, Granny T appeared interested in meeting them all and asked the students to repeat their words if she missed them. One of the students moved a chair into the center of the circle and ushered Granny T there to sit down. Spontaneously, the formal big circle transformed into a tight cluster with Granny T sitting and telling her personal stories, surrounded by the students in a huddle. She told them about her age, her family, and her life experience. For example, she said that she had suffered a lot and had witnessed numerous changes of Hong Kong. A memorable example was that she used to be an acrobat and sold medical oil in Temple Street in her early days. She looked happy, her eyes sparking with excitement. When an organizer approached her to remind her of the upcoming appointment, Granny T said that she wanted to cancel the appointment and stay with the group for “all these children are so lovely.” I was impressed that such a tiny change of the spatial arrangement could act as a successful icebreaker. From a retrospective point of view, this

was the most harmonious moment of the project that was experienced by the entire group. Figure 6.3 shows the contrast before and after that icebreaking moment.

Figure 6.3. The beginning of teamwork in the DDL

On the periphery of the cluster, however, Kevin became increasingly worried about the tight schedule and the one-way communication. He found that once Granny T took the lead, it seemed as if her stories would never end. The most problematic aspect for him was that the students seemed to be enjoying her narrative and were too absorbed to raise any questions. At the center of the group, Granny T made no effort to conceal her fondness for these students, and especially for Kevin. She said that one of her granddaughters was an adorable girl and implied that Kevin should meet her granddaughter. This idea amused the students into laughter. But Kevin felt extremely embarrassed and murmured to himself: "This has strayed too far from the subject." Instantly, he divided the group into halves. Half of the students continued to listen to Granny T, while Kevin himself talked to the remaining students about the project briefing and encouraged them to identify problems that Granny T might have in everyday life. Then the two halves shifted, with the briefed half acting into problem identification and the other half to be briefed by Kevin.

Subsequently, the students dominated the communication. They asked various questions, whereas Granny T's answers gradually became "simpler and shorter." But the students told Kevin that they were frustrated because Granny T did not give them any "direct" or "valuable" answers. "She's not a true user! She doesn't have any problems at

all!" a student designer complained. Disappointed by the fruitless problem identification, the students began to ask desperate questions: "What is the most inconvenient thing in your everyday life?"; "At your age do you have any regrets about things that you haven't done yet?" But Granny T's responses remained brief and calm: "Everything is just fine."

In order to know more about Granny T, the students asked if they could accompany her home and visit where she lived. She agreed. It was a 1-hour journey from the workshop venue to the nursing home. The students appeared more relaxed as soon as they left the classroom-like meeting room at the InnoCentre. They clustered in small groups, excitedly chatting about irrelevant topics in the street. Only two students stayed with Granny T and got on the subway train together. They had to wait on the platform for the rest of the members to arrive. When the group managed to gather at the subway station, Granny T guided them to a bus stop. On the bus, the students chose to sit beside their fellows. Some (including me) stood near to the door. The seat next to Granny T remained empty all the way. I resisted an impulse to sit beside her. A strange feeling came over me, as I recorded in the field:

> I was totally uncomfortable with the scene on the bus. This feeling kept growing like a rolling snowball. At the same time, I felt I was trapped in a weird situation. In front of the students and Granny T, I felt myself to be "invisible." Or, was I trying to be invisible? I did not explain to the whole group at the outset that I cannot speak Cantonese although I could understand most part of their conversation. They knew that I was just an observer. Kevin translated for me when I requested. I felt like I had a strange existence in this group, not sure if I should make myself more invisible or not. And still, I could not help feeling that I should do something to be more actively engaged in the project. What a pity that I had missed the good timing to be part of them. This weird state might be uncomfortable to them as much as it was to me.

On entering the nursing home, the student designers quickly shifted back into working mode and started taking pictures everywhere, as if they were reminded of their task by the particular interior space and facilities installed in the nursing home. Like excited children on excursion, they talked loudly about this unfamiliar place when marching along the narrow corridor. They exclaimed at how small the shared kitchens and washrooms were. The noisy parade was so unusual to the elderly who lived there that some of them sat at their bedroom doors, staring at the invaders silently. Granny T

introduced the students to her neighbors, emphasizing several times that they were her granddaughter's friends. She did not mention a word about the workshop. Still, she kindly allowed the students to flood into her tiny bedroom and take pictures. With great patience, she answered their questions about her daily life at the home. Kevin commented with embarrassment that "they've made too much noise."

Having finished their 15-minute tour, the students decided to conduct an onsite discussion about design opportunities. Granny T borrowed the common room of the nursing home for them. When she finally entered the room, the students had already split into two teams and were working on constructing a persona based on Granny T and generating key words based on her daily activities. While Granny T silently sitting alone by the window in the same room, no one seemed to feel any inappropriateness, since the designers were working now. Only when the students found something missing, one or two messengers would be sent off to have a brief communication with Granny T. I watched the messengers shuttling between "the designers" and "the user" carrying information piece by piece. This small space where every member was present accentuated the real alienation that was going on. So far, it had reached the peak of user-exclusion, which is completely against the ethos of participatory design.[3] Almost three hours after we set off from the Innocentre, we were on our way out of the nursing home. Granny T insisted walking us to the bus stop. Kevin asked if she had prepared supper that evening. As a token of gratitude, he invited her to have tea some other day.

The next day morning, our group was told that Granny T had quit, because "she was tired." It was a shocking moment for all our group members, especially for the student designers. A student cried out, "It's such a terrible blow to me!"

Others joined in protesting and said, "It's unfair! How we're supposed to compete with the other groups now?"

Someone grumbled, "Then we shall quit too!"

[3] Brereton & Buur (2008) forged this term to maintain the idea that participatory design, in some sense, must become ubiquitous.

After overcoming the emotional crisis, however, they began to reflect on the way they had been with Granny the previous day. Finally, they accepted Granny's absence and decided that they should finish the project.

Our group's interim presentation on that day was bombarded by questions from the organizers and other participants. For example, "In face of an old lady who's sixty years older than you, whom did you imagine you were talking to?"; "Didn't her experience of being an acrobat impress you a little bit? Why didn't you even ask her a word about that?" Kevin appeared to be very self-condemning and later confessed he had been overwhelmed by "the most challenging comments in my life." He thought that since the moment he encouraged the students to interrupt Granny T's storytelling they had lost the design opportunity that otherwise might be of interest to both Granny T and the student designers. He had thought that he should direct the students' attention to problems that would be more valuable to designers, but concluded "apparently, I was wrong."

When the teamwork continued, Kevin asked the students to sit around the table and to identify design opportunities based on two key words: sympathy and empathy. The students realized that the conclusions drawn yesterday were "largely subjective." It took them a great deal of time to break the heavy silence mingled with the feeling of being sorry. But both the students and the facilitator were puzzled about how to turn empathy into "productive design opportunities." Discussions emerged gradually when some students mentioned that they were inspired by a party example given by an organizer. For the first time it occurred to these novice designers that their design task might not have to focus on their partner's "problems." And by problems, they implicitly meant troubles instead of opportunities.

Drawing on the short experience of the previous day, when they intimately clustered around Granny T enjoying her storytelling, the students abandoned the problem solving agenda and looked into what Granny might appreciate in this event. They found to their surprise that this short period of time chatting might have been the only thing that Granny T had truly enjoyed. They knew that she enjoyed talking about

her life and family. Clearly she loved her grandchildren and even wanted to be a matchmaker. The preliminary design concepts identified yesterday (e.g. a digital photo frame or calendar expressing the elderly people's memories) had become less attractive.

Instead, the concept of communication and sharing emerged. One of the comments received from earlier critiques now rang a bell: "Maybe the final design is not a tangible object, but could be an event that people like Granny T would love to take part in." A primitive service design was formulated that aimed to provide the elderly to communicate and share their life experience with the others. For the contents to be talked about and shared, the students explored different directions: including how the elderly are coping with chronic diseases and matchmaking for young people. The students tried to use each piece of information they had received from yesterday's field study to propose a kind of service that might be of interest to people like Granny T. The further they carried on, the more they realized what they had missed. They wished that they had known more about Granny T's canceled medical appointment, because "diabetes" was the only relevant point they had from yesterday's persona construction. They did not know if the matchmaking offer was something she was enthusiastic about or if it was just a kind joke. During the intensive half-day group discussion, a proposition named *Ever Green* was finally made. This involved organizing a series of events for elderly local people to share their lived history of Hong Kong with younger generations.

However, their project was severely challenged by the jury in the final presentation, for a plain fact that the entire group had not thought of approaching Granny T to understand the reason for her decision to quit. The "incompleteness" of co-creation stood in stark contrast to the game of *Music Without Sound* that had just been presented by another group [see § 3.1.1.2]. This was another critical moment to reflect on our experience in this participatory design project. Also, one of the jurors criticized how little about how such a platform would function had been explored; although the juror acknowledged that the opportunity to "tell my story and know our city" was nice.

Had the student designers gone back to Granny T and won her back as a co-creator, the final deliverables might have been more than a bunch of objects (such as posters, T-shirts, and a leaflet; see Figure 6.4). However, in my opinion, if Granny T remained present and was treated the same way she was "included" in the first day, the students would never have reflected on their relationship with their partner as well as their problem solving approach. The absence of the partner evoked serious interrogations to the nature of participatory design,[4] and signaled a meaningful starting point for the student designers to develop their design. This extreme situation led to opportunities for better inclusion in terms of the final product, although both the design process and the product could be greatly improved.

Figure 6.4. Ever Green: the presented "elements" of the event of sharing

Immediately after the presentation, Kevin and I gathered our group members together and shared with them our reflections on this workshop. Some girls were still in tears for the criticisms from the jury. We admitted to the group that the project of our group could be significantly improved, if we had better understood the essence of co-creation. But we also suggested that all of us should think over what we had learned. Obviously, the students' recent design concept was much more valuable compared with the earlier options. We had witnessed that they became more devoted to the project after the great setback, as they had learned to respect, care, and were inspired by Granny T's limited participation. We even had a small discussion on how the project could have

[4] This topic was elaborated in two papers coauthored by my colleagues and myself from the DDL (see Ma et al., 2010; Ho et al., 2010).

improved to stimulate more reflections on the project. The closing remarks provided me with rich data for my later analysis.

The above account covers many details related to the design students' experiences as well as mine (based on the timeline). It provides a general picture of the happenings in the workshop. I will now probe into this group's experience of having the design concept, to show that more can be learned in light of the five themes of meanings.

6.2.3 The Process and Product

Strictly speaking, the students' experience of having the final concept did not start until the first critical moment occurred: when Granny T quit. The scene with Granny T and the students enjoying their chatting in a tight cluster stood out from the rest of the identified problems in the students' exploration on the first day. This scene was juxtaposed with the unknown concept in an and-relation. The students were quite astonished that the short period of pleasant togetherness within the half-day journey with Granny T turned out to be the most favorable happening to both parties. This cast other things into shadow: the bulletin points that they abstracted to describe potential users, problems, and design opportunities. This was a wonder to the student designers because it connected a particular scene next to an unknown concept and implied a kind of people-inclusion with all the warmness, pleasantness, and willingness that the students and Granny T had personally experienced. This indicated a kind of design participation that is valued and appreciated. The and-juxtaposition was immediately extended into a service for events, which might be of different purposes and actions, such as: sharing experiences of dealing with chronic diseases for health purposes; performing matchmaking for fun and care; or the finally selected event organization of the lived history sharing for bridging the old and young generations and for culture sustainability. Actually, in this case the reformulating phase of the experience was quite linear. Given the limited amount of time and knowledge, the whole group chose to trust the vague meanings signaled by this wonder and rushed to their preparation for the final presentation.

As a result, the product (a service for events of people-inclusion) was sorely in need of improvement, which resulted from three factors, outlined here. Firstly, the idea that design product is not limited to tangible objects was new to these high school students and college-age novice designers. The collection of the logo, T-shirt, poster, and leaflets proposed in their presentation failed to embody their proposition of an event of sharing, let alone the structure whereby the event could be organized. The proposed whole, as either a service system or a certain event, had parts and relations more than a sum of tangible objects; it therefore required pertinent parts and presentations that would allow an identity of a system/event to be perceived. Although the subjects for a series of sharing events or workshops were proposed (these included family history during the World War Two, home-made medical oil, and traditional pastry-making), they were not supported by any specific information about stakeholders, business or organizational models, or resources (such as funding and venue). All these were beyond these students' knowledge repertoire. It had never occurred to them who should organize such an event. Nor did the process of the event seem in need of clarification. This is why a juror claimed in the final presentation, "I didn't see any design." Of course, the audience did see the designed logo, T-shirt, and posters; but they did not see the anticipated events that were supposed to integrate the purpose, actions, people, objects, and context as a whole. Likewise, a service system that enables the series of events to function deserved more pertinent presentations as well as parts.

Secondly, the students did not make full use of their own experiences to formulate the anticipated event. They did not reflect on, for example, why they wanted to take part in this workshop in the first place, how they felt about the way Granny T was first introduced to them, and why the unknowing maneuver of moving Granny T's chair to the center served as an opener to pleasant chatting. The group's experience of missing the opportunity to truly include their partner is also an example that implies how important a process toward co-creation is and, at the same time, how difficult it is. The student designers did not interweave such details into planning each event. The design needed to encompass everything from the initiation of the event to the process of

engaging all participants to contribute to an activity in which they felt empowered and appreciated to do something.

Thirdly, the proposed design concept failed to sensitize a wonder to the audience that was comparable to their own of seeing the significance of a pleasant togetherness between the old and the young. Instead, the jury saw many "buts" out of the objects that implicitly led to all sorts of problems and required breakthroughs to the final product.

6.2.4 Principle

In design that emphasizes social inclusion and collaboration, the intersubjective aspect of experience from all participants lays down the foundation of the process and arrangement of design as a co-creation process. There was an embryonic principle made in this group's experience of having a design concept: namely, *empathy*. But this empathy was neither developed nor immediately applied, until new wonders occurred to me when I later studied and reflected on the overall event.

Empathy is the English translation of the German term *Einfühlung*, which means "'feeling into', or gently sensing another person or an object in the process of trying to appreciate it" (Finlay, 2005, p. 273). Drawing on the conception of empathy explored by phenomenologists Stein and Husserl, Finlay (2005, p. 289) developed an intersubjective process with three interrelated layers to achieve empathy: connecting-of, acting-into, and merging-with. Kevin briefly introduced the idea of empathy to the students, but he did not explain how to apply this process. In hindsight, I see some missed opportunities for our group to have embarked on an empathetic journey.

On our journey to Granny T's nursing home, I recorded how I felt when witnessing Granny T become more-and-more alienated, first on the bus and then in the common room. I recalled that I felt awkward about my own existence in this group feeling reduced to *invisible* but *not invisible enough*; at the same time I nevertheless hesitated in my decision to remain as an onlooker or to act as a participant. I later realized that I was connected to Granny T's experience of this project at that point of

the process. This was a wonder moment, where two persons' experiences were connected and this indicated hidden facts and understandings. When Granny T facilitated the students' to enter the field, but was excluded from the onsite discussion, she probably had a similar feeling of becoming invisible. I do not know whether it was the pleasantness that she briefly enjoyed at the very beginning or her warm nature that kept her kind attitude through the first day with us, in spite of all the abominable questions and displays of ignorance from us. I imagine that her assistance was the expression of her willingness to be one of the creators instead of merely as a passive recourse of creation. If I had shared my experiences in the journey with the students, we could have better understood what being excluded means to a person who was supposed to be an active partner. This could be achieved by first connecting ourselves to her: tapping into our own hope and fear in a collective activity may have provided a way toward acting into true inclusion.

However, an empathetic process toward co-creation cannot be achieved without all participants' striving to act into the other's experience, seeing what the other sees, and feeling what the other feels. This requires participants to exercise their bodily experience and imagination. For example, if I had encouraged the students to probe into the unexpected change of the initial ice-breaking, which only took a change of the spatial form from a big, standard circle into a tight and voluntary cluster, we might have considered more about the spatial arrangements in the proposed event. If we had discussed different ways of entering the group, exercising our imagination, we might be able to formulate some particular arrangements and procedures for the proposed series of events through which participants would achieve a sense of being part of the creation. Also, exploring our own experiences would have provided opportunities to formulate the subject matter of design in the area of experiences, in terms of esthetic quality, meanings, self and the other, and the body and the world. In that case, we could have claimed that our product was not only a kind of event but also a particular experience. More importantly, all participants needed to interact together. When we were imagining the other's experience, we needed feedback from that person, in order to know whether our imagined contexts were relevant. Otherwise, vivid imagination would remain

remote to the subject matter in design. In this sense, our group's way of handling the project in the absence of Granny T made it impossible for an empathetic process to be fully applied.

In the final presentation, when the jury questioned our group as to why we ignored Granny T's absence, this was a very painful but wondrous "but" moment, in my eyes. I felt wonder in seeing how little the principle of empathy had been applied and how different the project might otherwise be. If we saw the whole 3-day workshop as the product of each group's practice, it would become clear that the entire co-creation process needs to be designed by all participants. A design problem that our group needed to address was revealed by an obvious "but:" on the student designers' side there was a growing awareness of user exclusion practiced on the first day, but a genuine user inclusion was still hindered in our reflection on our practice without attending to the intersubjective dimension of an experience of co-creation. This wonder was acutely presented by the absence of our active-design-partner.

Hence, I see the opportunities for practicing empathy in design that involves people's participation. Empathy, as a generative principle, provides the condition for designers to advance their knowledge and practice through a reciprocal process of understanding people and their experiences by looking into designers' own experiences. This principle guides designers in shaping the intersubjective dimension of experience by drawing insights from bodily experience, spatial factors, and imagination.

6.2.5 Experiential Qualities

The students could not have transferred to the concept of an event from those of digital devices if they were not attracted by the wonder that presented the harmonious initial gathering to their design project. They underwent astonishment, care, empoweredness, curiosity, certainty against uncertainty, and a sense of achievement, as anyone may have done when in an experience of having a design concept. Nevertheless, in this project the group's rudimentary experience of having a design concept involved at

least two major emotions, which held back the flow of the experience to more open options. The first was the frustration that arose when the students were informed of Granny T's decision to quit. The second was sympathy mingled with a sense of guilt as the students finished the project without her. Neither helped the novice designers to suspend their intensive attention to the self and to reach out to the other. The energy of the experience of having a design concept was largely consumed at a stagnant emotional occupation state.

The frustration provoked by Granny T's choice to quit initially made the students almost blindly complain about everything except themselves. They could not think or see, except for feeling humiliation, defeat, and abandonment. The sudden change was so unbearable that they declared that they preferred to give up. Emotional occupation made them fall behind the schedule for a while, because this was a significant setback to their previous progress in problem solving. Time and effort were required for them to see their pre-understandings, and for them to face what had been done demanded courage. The breakthrough later arose from stepping out of the "disastrous" situation and thus seeing their hidden natural attitudes rebuilt their confidence "to return to the game." Getting over that difficult situation signifies a change of attitude.

Although the students were encouraged to explore the idea of empathy, they mistook it with another emotion: namely, *sympathy*. Feeling sorry about the way Granny T was treated the first day stimulated a deep sympathy for her, which easily gave rise to an overflow of design problems. Compared with the conclusions they had drawn from the first day's problem identification, their descriptions about Granny T had changed. Previously she was described as "an ordinary old lady in perfect health because she walks very fast and refused any help in public transportation." Some of the students were even confused as to whether she had any problem at all. During the discussion the next day, however, touch points of problems in Granny T's life seemed to be rediscovered: her health conditions, her choice to live in a nursing home despite her affections for her family; her ways of interacting with the other elderly—who were not always friendly—under the same roof; and her favorite social activities. The students felt sorry for her

when they went over their field notes, documenting information such as "going to have dim sum for family reunion only on holidays," and "converted to Christianity since her husband passed away five years ago, for she feels that he is looking at her from above." The image of Granny T as an ordinary and healthy old lady was reframed as a poor and lonely old lady with many potential problems and needs.

If the students could ask themselves why they had not identified any problems in Granny T's presence, but were nearly overwhelmed, in her absence, by the emerging problems about how she coped with her life, they probably would have admired this old lady's strengths (in living with all those problems in a dignified manner). Fortunately—perhaps purely by chance—the wonder moment occurred to the students before they dwelt too much in sympathy and regret, which had tended to lead to certain solutions to assist Granny T to accomplish certain task more easily. The warm scene of the old and the young being together was an epiphany to the students: that the aim of design might not be a professionally designed product (which would paradoxically accentuate the limitations or disabilities as their design partner's core identity). A product of that nature would present a controversial outcome, as it would be driven by sympathy in the context of inclusive design. Unlike one of our peer groups (see § 3.1.1.2 for their interaction with Betty), our group did not explore much about their partner desires and dreams, as we lacked Granny T's personal input.

Participatory design places the experiences of all sorts of participants under the spotlight. Once entering the lives of the others, designers would frequently be shocked by their ignorance and the obtained new understandings. Intertwining emotions, such as frustration to oneself and sympathy for the others, may keep the designer dwelling in the emotional occupation and impede them from working as a doer. During emotional occupation, the process of design is suspended by strong emotions. The designer needs to transcend it to move on. Otherwise, they can become overwhelmed by the emotions, (especially negative emotions) and feel less empowered to change anything. For the designer to understand such immediately aroused emotions requires more exacting efforts than simply bracketing them and rigorously reflecting on the experience wherein

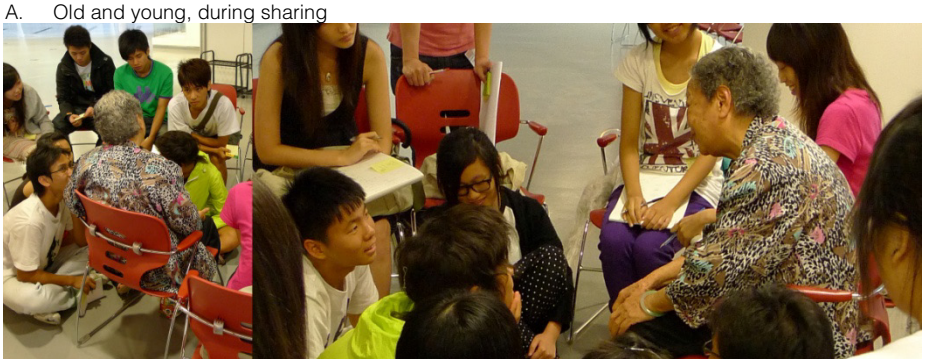
they arose. Rather, it is the designer's reflective dance that spurs the experience of designing, by providing new material to perceive and by directing new actions.

6.2.6 Natural Attitudes

Suppose the photos taken at the InnoCenter and at the nursing home are put side-by-side in front of us (see Figure 6.5): an evident "but" is clearly manifested. From the enjoyed inclusive *non-design* to the people-exclusive *professional design*, the student designers' natural attitudes about design played a crucial role. This is a design problem that is related to the way design participation should be designed. Subject matters of design practices, such as in the DDL itself, generally cover all the five areas, and underline the participants' co-created experience as both the process and the product of their experience of achieving the design concept.

Figure 6.5. Two approaches to participation in the DDL 2009

A. Old and young, during sharing



B. Designers and user, during designing

In the DDL case, designers' natural attitudes shaped the form, process, and outcome of the participatory design, which included people who are not generally

regarded as co-creators by designers. Conventional conceptualization and the problem solving approach are two prominent natural attitudes that underpinned the students' design performance in this Ever Green project. These natural attitudes blocked the path toward understanding human experience—including the designers' own—and furthermore blocked the goal of drawing inspiration from these experiences. If designers' could become aware of and change their hidden natural attitudes, the undesirable exclusion may improve. Whereas designers' natural attitude is not to be aware of within the very attitude, their natural attitude is possible to be revealed through wonder.

Conceptualization and the Identity of the User

My study has found that if conceptualization is divorced from designers' own experience, the user[5] experience that designers aim to understand will be contaminated, and will become less relevant to real users. Dwelling in the conceptualization of empty identities by taking *moments* as pieces is a natural attitude in design (see § 5.5.1). Suppose we are thinking of the concept of the user, and in reality we see a user in front of us. A very easy way of conceiving is to see the *real* user in front of us as the representative of the collective group (*the user*), which is an abstract identity. . It seems that through design research we reconstruct the concept of the user with a general identity, which is irrelevant to the experience of the particular user involved in design. The identity, manifolds of presentation, and all parts of a thing as a whole are moments to one another. However, we are inclined to separate the identity of a thing from its presentations, and to extract parts from the whole: as if meaning could be separated from individual experience, or needs could be segmented from a real person. Although conceptualization makes it possible for us to make distinctions, it also introduces a gap between concepts and actual things in the world.

The identity of anything cannot be assigned separately from the way the thing is experienced from its presentations. Therefore, an active-design-partner can be perceived

[5] Although participatory design calls for a redefinition of the roles of different parties of participants, and asserts that users are not expected to be involved in design merely as conventional "end users," the term user is adopted in a more general sense here. Strictly speaking, Granny T's role in this group was practiced in a way that was closer to a general user than to a co-creator.

as a co-creator only when she or he is functioning as one of the creators. For example, the identity of Granny T as a design partner was not perceived in the way she was treated as a passive user. When facing an actual person, the designers remained obsessed with collecting and sorting out the major characteristics of the imagined user. They segmented Granny T's life into conceptual categories (such as age, living conditions, health state, family members, and hobbies), and tried to integrate these into a conceptual user persona that was no longer relevant to this particular design partner in terms of her identity and what she needed and valued. Granny T's personal motivation for taking part in the event of the DDL was neglected by the students, and she was dehumanized in the students' treatment of her as an objectified information provider. She was extracted into an empty concept of the user, which was deemed an abstract representation of a group of people who share the same characteristics. Unfortunately, pure conceptualization did not help the novice designers to understand the following: what being old meant to a lady in her eighties and to these 18-year-old designers; what she had that they did not have; where both parties' interest and passions might overlap and initiate a genuine co-created experience.

The briefly shared harmonious relationship between the old and the young and the pragmatic exploitation of Granny T staged a wonder for me: I was able to see the natural attitude of the student designers when they were dealing with the empty concept of user rather than being together with her in person. This natural attitude was evidenced by the following: they did not enquire and observe Granny T's health conditions but were satisfied with bullet points of the user persona such as "diabetes" and "vegetarian"; they asked many rude questions; they did not notice Granny T's experiences on her way home and her eagerness to take care of the group rather than being taken care of; and they paid little attention to her ways of living (ranging from the arrangement in her bedroom, coping with the illness, to entertainment). The students' design experience had been reduced to a dehumanized process that was full of empty identities and symbolic meanings.

Problem Solving Approach and the Identity of the Designer

While the user experience was suppressed in the process of an intended co-created design, the designers' self experience was also largely neglected. The students' problem solving approach, connected with their perception of the identity of a designer, indicated another natural attitude in design. This distanced the designers from their own experience and led them into a stance of being objective supervisors of the design process.

The students did not explore how they felt about Granny T at any stage: not in her presence or absence, during the pleasant chatting, or at the nursing home. Also, they failed to examine their responses to changes of space: such as the ice-breaking movement from a big circle to a tight cluster, and the change from the classroom-like workshop to the journey on street. Some questions never occurred to them: such as why they felt empowered to dominate in the design process and why they were frustrated when Granny T quit (if she was supposed to be just a user). They literally experienced laughter, tears, despair, and hope throughout the project, but they never discussed these. Nor did they mention their own experiences (physically and psychologically) of the nursing home, although the interior design in the home was utterly novel to them. According to Merleau-Ponty (1945/1962, p. 82), "the body is the vehicle of being in the world." Designers' own experience, especially embodied experience, could function as a vehicle and context to disclose and understand user experience. This is the arena where the process of empathy could otherwise have entered. A designer equipped with knowledge, who neglects her or his own experience, is less capable of truly understanding the other's needs.

Design as problem solving had become a dominating approach once the students set about to take over the active role in the project instead of enjoying casual chatting with Granny T. Problem was regarded by these novice designers more as a pragmatic trouble instead of a convincing argument to make a change with an indication of hidden opportunities. This is why they were keen to identify the inconveniencies that Granny T had, and were disappointed to claim that Granny T's identity was "ordinary" since she

"did not have any problems." They talked about many problems without much interest in asking why, because there was no sign of wonder.

In addition, I found that the openness of the student designers to listen to the voices of active-design-partners depended on the students' perception of their designer identity. By conventional design education, designers become accustomed to roles as creators, helpers, and experts, when design is mainly understood as a problem solving process. The identity of *problem-solvers* emerged when our student designers carried out the design process that routinely began with problem identification. Correspondingly, the design partner's identity as *problem-carrier* was established and reinforced in the same process where she was merely consulted as the end user. The common room at the nursing home staged a typical passive inclusion, where Granny T was excluded from the dialogues and decision-making process of design exploration. The old-and-young relationship had been suspended and replaced by a designer-versus-user relationship. Only when Granny T dropped the program did the rest of group members start to become aware of their previous problem solving approach. The major setback became the wonder for the students, allowing them to break through their old concepts and to begin a new one. Bracketing such an attitude also enhanced students' understanding of participatory design.

Dwelling in conceptualization and the approach of problem solving are two intertwining strands of natural attitudes in designing that prevent the suppression of user experience from being revealed. As a result of these natural attitudes, access to understanding experience was heavily blocked.

6.3 Concluding Remarks

I have demonstrated my descriptions of designers' experiences of having a design concept in two cases of different natures. This was based on the two frameworks established in this study. They are meanings of such experiences that appeared to me when I was actively trying to interpret and articulate designers' experiences by

understanding my own experience of the design concept proposed by them. As a result, the elaborated meanings present their experiences as well as mine. Experiences that originate from the same starting point grow into a consolidated whole, with an expanding width and depth.

As design projects conducted by student designers, both cases above could be improved in many ways. However, as experiences of having a design concept, they are rich in wonders, embryonic principles, values, and knowledge, as long as they can be articulated effectively. They are meaningful to the students, and also to whoever attempts to understand these experiences (such as teachers, design collaborators, and researchers). By understanding the experience, the latter group exercises their faculty of design to enrich and develop the design concept with arising meanings. They have an experience of having a design concept that is as meaningful as the experience of the student designer.

The impasse in the furniture project and the crisis in the inclusive design project indicate that sometimes wonder occurs under difficult circumstances: when the flow of the experience is interrupted and the energy to continue seems to drain. Such predicaments often result from the designer's natural attitudes, and tend to be accompanied with the opposite of a reflective dance: dwelling in either emotional occupation or pure conceptualization. However, the predicament itself may strike the designer with a sense of astonishment, if the designer is stimulated to transcend from the currently focused subject matters and to bring the relevant pre-understandings into re-examination. Wonder energizes the experience, leading toward a better design concept and making the experience an evolutionary growth.

> We need a way of talking about the objects of designing—what we design *with*—that allow us both to take cognizance of multiple ways of seeing things, each a reality for those who hold it, and to make sense of strivings for commonality.
> Donald Schön, *Designing: Rules, types and worlds*, p. 182.

Chapter 7. Conclusions

In this dissertation I have mapped out two interconnected frameworks for understanding and describing an experience of having a design concept: the underlying structure of an experience of having a design concept and the framework of meanings made in such an experience. They are identified based on 12 design cases in the educational context and have derived insights arising from a continuous dialogue between the emerging theoretical constructions in data analysis and the relevant theories in the literature.

In this chapter, I highlight the findings of this dissertation in relation to three topics: the underlying structure, a comparison of perspectives, and meaning and design concept. I then summarize evaluation of the frameworks, implications of this inquiry for design education, design practice and knowledge foundation of design, clarify the limitations, and suggest future research.

7.1 The Underlying Structure of an Experience of Having a Design Concept

The underlying structure is a theoretical conception of the experience of having a design concept. It comprises three parts of the experience: the ingredients, the basic process, and a unified and dynamic whole (see Table 7.1). Each part addresses distinct presentations and has supporting parts that reveal a pertinent level of the identity of such an experience. The three parts progressively manifest an experience of having a design concept: from a sum of components to a highly integrated whole, and from less

dynamic subject matters to an evolutionary growth. These manifestations allow the experience to be articulated with different materials, as the things that are intended change during the course of the experience.

Table 7.1. Three parts of the underlying structure and the involving basic formal relations

Levels of Identity	Parts and Presentations		Basic Formal Relations Permeating the Structure							
			pats & wholes	moments & pieces	identity & presentations	absence & presence	and-relation	but-relation	old & new	intentionality
A sum of components	Basic formal relations	• *parts and wholes* • *moments and pieces* • *identity in manifolds of presentations* • *absence and presence* • *and-relation* • *but-relation* • *old and new* • *intentionality*								
	5 areas of subject matters	• *signs and symbols* • *physical objects* • *actions and activities* • *experiences* • *systems*	+ + + + +	+ + + + +	+ + + + +	+ + + + +				
The basic Process		Wonder				+	+	+		+
	2 modes of 4 phases	• *connecting* • *extending* • *reformulating* • *saturating*	+ + + +	+ + + +	+ + + +	+ + + + +	+	+	+ +	+ + + + +
As a Unified and Dynamic Whole	Relational facets	• *unity of conceptualization and revelation* • *a reflective dance* • *solution and problem as moments to each other* • *the designer's active personal involvement in the experience*	+ +	+ +	+ +	+ + + + +	+ +	+ +	+ + + +	+ + + + +

The ingredients part enables the description of a design concept, as the outcome of the examined experience in reflection on the experience. This introduces five areas of subject matters of design concept: signs and symbols, objects, actions and activities, experiences, and systems. Apart from these substantive components of the experience, eight basic formal relations are identified. They include parts and wholes, *moments* and pieces, identity in manifolds of presentations, presence and absence, and- and but-relations, the old and new, and intentionality.

The basic process of an experience of having a design concept helps designers and researchers describe the examined experience based on the timeline. This process begins with wonder. Wonder presents, to the designer, the previously irrelevant things in a

surprising and- or but-relation that implies an unknown whole (as either a solution or a problem). Based on the two different relations revealed by wonder, the basic process can be further analyzed into two modes of four phases: connecting, extending, reformulating, and saturating. For a design solution concept, the experience is primarily concerned with absorbing the juxtaposed things in the and-relation by turning them into *moments* and reformulating the new identity and presentations of a new whole. For a design problem concept, the experience is devoted to revealing an argument to change, by reformulating competing parts (including the originally juxtaposed "but").

The unified and dynamic whole emancipates designers and researchers from relying on the timeline as the only clue to describe the examined experience as a growth. This part provides further relational facets to address this identity: (i) the vertical conceptualization and the horizontal revelation are integrated as the weft and warp of an experience of having a design concept; (ii) the experience engages the designer in a reflective dance between transcending the ongoing experience and reformulating it using insights from new wonders; (iii) solution and problem become unified as *moments* to each other in an unfolding experience; (iv) the derived design concept contains the designer intending the world (as the designer's active personal involvement is part of the experience).

The identification of an underlying structure of the experience of having a design concept (as based on the identified basic formal relations as well as their changes) is arguably one of the major contributions of this study. This structure is not a process that merely consists of linear steps, nor is it based on factual elements segmented and abstracted from experiences. Instead, it is an original phenomenological attempt to understand the experience by focusing on the relations and the change of the relations. As Table 7.1 indicates, these basic formal relations permeate throughout each part of this underlying structure, each with certain relations playing a more significant role than others. Capturing the combinations and changes of these formal relations allows a more complex level of identity of such an experience to be presented.

This underlying structure restores many relations cut loose by conceptions of the phenomenon of having a design concept that are derived from perspectives remote to human experience. Firstly, a design concept is understood to be the to-be-produced things in articulation. Things can be described by virtue of the areas of subject matter situated in basic formal relations. Secondly, a design concept is linked to the design process, for it demarcates different phases of the experience during its dynamic growth. Thirdly, a design concept is connected to the designer since it contains the designer's intentions toward the world in the shape of the designer's judgments, feelings, attitudes, actions, and understandings made in the very experience.

Moreover, the underlying structure acknowledges the temporal and individual dimensions of such an experience. Concurrently, it accounts for the way that the experience is able to seamlessly envelop concepts from different persons and the same person's concepts at different points of time. Merging the old design concept into a new one and connecting the individual experience with the intersubjective realm are fostered by new wonder that stimulates a new experience grounded on the same underlying structure. The dynamic and unified experience can be more explicitly and coherently described on this basis.

Emphasizing that the experience of having a design concept is characterized by a unified whole is not a way of avoiding to approach the subject by wrapping it up with an inexplicable nature. Instead, such an underlying structure comprises sufficient distinctions to facilitate us to talk about the experience. This underlying structure is devoted to building connections. The identified distinctions are further put into relations to allow more of these kind of experiences to be described. As a result, the identified underlying structure is not a sum of the three parts outlined above. The unified relations of the underlying structure are presented in a cumulative manner in this dissertation: the more unified the experience is as presented, the more sophisticatedly it is grounded on distinctions. This unity essentially brings the humanistic dimension of making back to design.

In short, the underlying structure provides a productive way of understanding and thus articulating the experience of having a design concept.

7.2 A Comparison of Perspectives

The entire inquiry originates from the curiosity about the ambiguous notion design concept and the diverse descriptions of the phenomenon where a design concept emerges: namely, having a design concept. A literature review of design studies on the notion of design concept and this specific phenomenon was conducted. In parallel, I also examined design concept and the phenomenon of having a design concept as described, delimited, developed, and communicated by design teachers and students in their practices and reflections.

A tension was found at the heart of the ambiguity in the term design concept: on the one hand design concepts tend to be regarded as outcomes that are independent from the process where they emerge and designers who make them, and separately representing the things to be produced; on the other hand design concepts are described as all-inclusively relational, actively generative, and evolutionarily dynamic.

This tension indicates that distinct understandings are derived from distinct perspectives through which the phenomenon of having a design concept is approached. The dominant perspectives that are adopted to describe this phenomenon in design research and practice have largely overlooked that having a design concept is, in the first place, a kind of experience lived by designers. These external perspectives (that is, from outside design experience) tend to reduce this phenomenon into either an object-oriented process or an intuitive moment. They can barely account for the tension inherent in the notion of design concept. In contrast, the growing body of research on design experience and designers' descriptions in practice exhibit the potential to more coherently understand the phenomenon of having a design concept. They imply that there is a kind of internal perspective to describe this phenomenon, namely from inside the designer's experience of it.

In the preliminary part of this inquiry I set up the context of the study by addressing the first research question: *What makes general conceptions of the phenomenon of having a design concept and descriptions of the phenomenon as practiced result in ambiguous, different, and inconsistent understandings about the notion of design concept?* I further noted two emerging questions: *What is "a design concept" in the context of an experience?* and *What is the underlying structure of designers' experience of having a concept?* The former can be addressed after the latter finds its answer: that is, when an explicit conception of the experience of having a design concept is achieved.

Given the emergence of the underlying structure of the experience of having a design concept, an internal perspective held in this study has been embodied. This forms a vivid contrast to the dominant external perspectives that are held extensively throughout design research and practice. These two kinds of perspectives to look at the specific phenomenon have been introduced in the dissertation in a progressive manner. A comparison between the two is outlined in Table 7.2.

Table 7.2. A comparison of internal and external perspectives

	Internal Perspective	**External Perspective**
The phenomenon of having a design concept (DC)	• a kind of human experience • a way of understanding is achievable	• an object-oriented process • a formal model is generalizable
Approach	holistic approach focusing on relations and the change of relations	analytical approach focusing on substantive elements
Timeline	during the construction of the experience	after the experience as an enclosed fact
Described by	subjective and actively engaged designer	objective and detached observer
Tension in DC	resolved	ignored or failed to be accounted for
Relations between DC and things, process, and designer	• DC as presentations of things to be produced; • DC expresses the ongoing process; • DC contains the designer's intention	• DC as a representation/model of things to be produced; • DC as a generative abstraction used in a dual sense; • DC distanced from the designer
Strengths	• restores the relations that external perspectives do not address, provides a more coherent basis to understand experience; • Invites the describer into the experience and secure places for designers' voice	• established methodologies; • contributes to encoded knowledge and greatly facilitates communication of design
Limits	• difficult to articulate; • methodological foundation of research in & through an internal perspective needs to be further consolidated	• may distort the way designers understand and experience having a design concept; • may allure the designer/researcher to remain in the same perspective so that the revelation of the natural attitude is limited

The comparison of the growing understandings about the two kinds of perspectives has formed a latent clue, which further elicits and supports the exploration of the underlying structure. Introducing the previously implicit internal perspective into the study and turning it explicit eventually sheds light on the hypothesis that a unified and dynamic experience of having a design concept can be more coherently described. The overall endeavor has made my study a genuine inquiry.[1] The identified tension inherent in the notion of design concept has turned the current understandings of the phenomenon of having a design concept into an indeterminate situation. To transform the situation into a more determinate one, this particular phenomenon has been explored, in terms of its "constituent distinctions and relations," to establish the underlying structure of the phenomenon as lived by designers. In return, this underlying structure explicitly embodies a previously hidden internal perspective to approach the specific phenomenon, which is able to resolve the tension in design concept. Therefore, the ambiguity around the term design concept and the phenomenon of having a design concept as described in design research and practice becomes understandable and is clarified in the achieved broader picture.

The comparison in Table 7.2 shows that the conventional understanding of the notion of design concept can be significantly complemented by the internal perspective. The underlying structure of having a design concept, as derived from an internal perspective, has destabilized the conventional notion of design concept, making it converge with meaning in the context of experience (this is summarized in § 7.3).

7.3 Meaning and Design Concept

7.3.1 Definitions

Based on the insights from the underlying structure of having a design concept, I argue that meaning is the alternative name of design concept when the phenomenon of

[1] Inquiry, by definition, is "the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole" (Dewey, 1938, pp. 104–105).

having a design concept is described as an experience from the internal perspective. Situated in external perspectives, designers adopt the term design concept to make sense of their activities as distanced from their implicit experience (which is difficult to reveal).

Meaning

Meaning is a dimension of presentation of the experience of having a design concept. Meaning is not an additional product ascribed to things in the world, nor is it independent from the individual who acts toward the things. Rather, it holds a fundamental relation between the expressed world and the expressing designer. Therefore, meanings permeate the examined experience revealing both particular aspects of the world and the designer's judgments, feelings, attitudes, actions, and understandings from the very experience. They are the temporal achievements by which something yet hidden is able to be brought to the light. And, they are used for the evaluation, guidance and formation of action. Meanings are manifested, further modified, absorbed, and interwoven into a coherent whole when the experience comes to a satisfactory end (temporarily).

The end of an experience of having a design concept denotes a personal and temporal moment at which the achieved meanings could account for the wonder that initiates the process and are saturate and unified enough to support the identity of the designed matters. Meanings are subject to affirmation, modification, and even rejection and breakthrough, as a result of a new experience of having a design concept, with all due meanings to consolidate the old ones.

Designers have their ways of communicating meanings: verbally (through articulation) and nonverbally (through sketches, prototypes, or bodily engagement such as demonstration). Since this study aims to facilitate designers to articulate more of their experiences, meanings elaborated here are the verbalized presentations of the examined experience.

Design Concept

In the expression of having a design concept as practiced by designers, a design concept refers to meanings that are sufficiently unified to be stated in the ongoing design experience. A shift of perspective is required to see this convergence. Design concept is used as a collective title for many things that are obviously relevant to designing and to the final designed matters, but are not easily related when the observer stands outside of the experience wherein these things emerge. A design concept implies a whole and gives a name to all its elements (the known and the yet-to-be-known) when it is described in an ongoing experience. This holistic sense benefits from the implicit experience wherein a design concept arises, but has resulted in the discussed tension within external perspectives that analytically look at the phenomenon under scrutiny. When someone states that they have a design concept, this means that she or he can present certain aspects of the designed matter as a whole: a relative, personal, and temporal whole. A design concept lives and grows in our experiences to achieve it.

Therefore, in this study I maintain that design concepts should be examined as meanings. In the context of experience, they are no longer abstract, objective, and hierarchical entities made of conceptual components which represent real things to be produced after design; rather, they are part of the world, including the to-be-produced things and the designer.

7.3.2 The Framework of Meanings

For designers, the experience of having a design concept is full of meanings. However, the meanings spark and swiftly fade away and are scattered in designers' accounts. They are rarely rigorously approached, articulated, or studied from the designer's perspective. This is also problematic as it indicates a lack of an understanding about the structure of the experience where meanings arise. Experience is a hermeneutic holding environment of meanings made in design. Describing meanings is, in fact,

turning an implicit experience into explicit presentations: because meanings are its presentations.

In this study, I have proposed a framework of meanings derived from the underlying structure of an experience of having a design concept, as this underlying structure provides a way of approaching and understanding such an experience. This framework of meanings consists of several emergent themes (the process, the product, principles, experiential qualities, and natural attitudes), which are distinct but correlated places for interpreting and articulating the experience through exercising the underlying structure. With these interrelated themes presenting the experience as wonderful, value-laden, and containing knowledge apart from being dynamic and unified, a meaningful identity of the experience is rounded out.

The underlying structure of the experience of having a design concept has an essential bearing on the framework on meanings. Applying the framework invites the investigator to enter the internal perspective to describe the designer's experience of having a design concept that is revealed in her or his own experience of the same underlying structure. The framework of meanings brings the designer or researcher back to idiosyncratic design experiences. The underlying structure helps the designer or researcher to approach the diverse and individual experiences, allowing them to dive into the uniqueness without losing the pertinent perspective.

7.3.3 Design as Meaning Making

There is an increasing awareness in the domain of design that design should be regarded as meaning making (e.g. Krippendorff, 1995; Kazmierczak, 2003; Diller et al. 2006; Boess & Kanis, 2008; Almquist & Lupton, 2010). Authors in this domain have grounded their works on various conceptions of meaning, whose distinctions and relationships have been discussed in § 5.3. This emerging body of design research suggests that understandings of meaning could potentially shape design research and

practice in various contexts. Accordingly, based on the definition of meaning in this study, a competing understanding of design as meaning making is achieved.

When meaning is understood as a presentation of the experience where it arises, design as meaning making involves presenting the experience that the designer has been through. This supports the viewpoint that design is a generic human capacity to make things and give meaning to life (see Heskett, 2001). People make sense of their lived experience all the time. As Diller et al. (2006) stated: "Meaning helps us understand the world and ourselves, learn, and make sense of what's around us. It provides a framework for assessing what we value, believe, condone, and desire" (p. 23). In the context of an internal perspective—particularly concerned with the phenomenon of having a design concept—design as meaning making aims to bring out meanings as a unity which is wonderful, value-laden, knowledge-containing, and evolves over time and between people. And, meaning making is organized by an underlying structure that has been identified in this study.

Findings in this study indicate that the experience of having a design concept is not exclusive to professional designers and is not confined to the design process that precedes the product. Although such design experiences occur to designers intensively in the conceptual phase of design, they also happen to other people. For example, when a design project is completed and the product is launched in a press-event, the audience may have a discourse with the product (as part of meanings made by designers) that supports or rejects the presented design. When attempting to understand and describe a designer's experience that has already been had, the new inquirer steps into the shoes of the designer and personally has an experience that takes in meanings made by the designer. The new inquirer could be the same designer at a later point of time, a project collaborator, a user, or a researcher. Design as meaning making renders the role of a designer to include a broader sense, as anybody could contribute to a design concept (meanings).

7.4 Evaluation

This study adopted a reflexive[2] evaluation of the identified two frameworks throughout the process of data analysis. All the conceptual constructions (from the primarily discursive categories and topics to the two frameworks that emerged over time) were tested by applying them in describing experiences in the 12 design cases. Evaluation occurred in each round of analysis for each case. Theoretical memos documented these conceptual constructions (identified from the data) and compared them with relevant theories and conceptions in the literature. The arising relations, themes and hypothesis were integrated with the conceptual categories and topics. I used these to understand, interpret, and articulate the designer's experience as well as to conduct data collection in the next case. Whether the emerging conceptual categories, relations, topics, themes, and (later) the frameworks are relevant to the examined experience, and whether they work to facilitate description of the experience or not, depended on examination grounded on data. This examination was made to identify: (i) if these conceptual constructions capture important aspects of the experience; (ii) if they are relevant to a variety of these kinds of experiences; (iii) if they help understand a new experience; and (iv) if any new dimensions and aspects emerge and indicate potential modifications of the frameworks. The examination is documented in theoretical memos and mixed memos. Through this iterative process the two frameworks are integrated and evaluated (refer to Figure 3.9 for the research flow).

Therefore, evaluation of the theoretical frameworks proposed in this dissertation is not an additional step that happens when they are done. Instead, evaluation is an innate part of in the analysis during the frameworks under construction and guides the very construction. In chapter 6, I demonstrated applications of the two frameworks to describe experiences of having a design concept in two cases in comparison with the original documentation of these experiences. If the descriptions make sense to readers, this also supports that the frameworks are effectively helping people understand and articulate more about the experience.

[2] Finlay (2008) suggested "applied to research, reflexivity can be understood as thoughtful, self-aware evaluation of the intersubjective dynamics between the researcher and the researched" (p. 3).

7.5 Contributions

The two frameworks constructed in this study will facilitate design educators, students, and designers to conduct more informed and rigorous reflection on their personal experiences of design. The strengths of the two frameworks are in their ability to approach the immediate and implicit experience. They have to be used in practice, as without a particular design experience the frameworks are empty. Without the frameworks, rich and dynamic experiences that a design inquirer (in a broad sense) is engaging with are difficult to present and to communicate. Exercising the frameworks results in retold stories of the designer's own experience, intertwined with the inquirer's ensuing experiences. These are not thick descriptions, but restructured meanings arising from design experiences, with previously hidden matters brought to the light.

7.5.1 Implications for Design Education

In an educational context, the frameworks will help teachers and students to more explicitly communicate significant design experiences. The frameworks will help them to reveal the unvoiced understandings and actions by virtue of wonder occurring in design, and to yield meanings to support informed judgments and decisions. The teacher could elaborate more of her or his insights on the students' design, instead of being immersed in her or his own excitement of the implicit new vision without being able to explain why. The teacher and student could more consciously and collaboratively create an experience of having a design concept, work on it, and develop it.

Design case study is frequently employed in design education. Using oneself as the agent to understand and interpret the experiences of having a design concept from the existing design cases will encourage the revelation of more hidden aspects of the existing designs. New wonders may bring more inconsistent meanings to the light, and thus open up opportunities to develop into a more coherent unity. The frameworks help students learn the strengths and defects from the existing designs.

One of the major tasks in teacher's design critique or tutorial in the early stage of design is to understand and clarify the design impasses that the student encounters but is not yet aware of. Enlightening the student by means of wonder enables this student to see the current process and product as shaped by her or his natural attitudes and preconceptions. This serves as a natural way to break through impasse, because this process is fundamentally grounded on the underlying structure of having a design concept.

Meaning, as conceived in this study, offers an alternative way to embrace design theories that novice designers are exposed to in education. Given the relation-focused internal perspective, there is no reason to assume that theories are forced away from experience. Instead, theories may be actively employed in an experience of having a design concept, especially in the reformulating phase, and are described as meanings in the name of principles.

Besides, the understanding about a solution and a problem that is identified in this study encourages students to move beyond the problem-solving approach in the narrow sense. The vision of problem as a coherent argument to change, supported by the revealed hidden opportunity, will help novice designers to better understand design situations rather than superficially collecting matters that appear troublesome and merely focusing on the others. Any design problem that emerges from an experience of having a design concept should be a set of coherent meanings that support the as-yet unknown but resolvable changes. Otherwise, the proposed solution is easily detached from the identified problem. Based on my observation, for example, it is not unusual that a design that has been initiated by a claimed social problem results in a lifestyle product. If a social problem is identified in the area of systems, it may be approached as a problem that explores the elements and relations in that particular area, instead of being transplanted to a design that focuses on, say, the relationship of symbols or artifacts. Seeing solution and problem as interchangeable moments of the design product improves upon the conventional problem solving approach.

7.5.2 Implications for Design Practice

For practicing designers, the frameworks may help them develop the ongoing design process by more reflectively and knowledgeably attending to their own experiences. If designers adopt the two frameworks to describe experiences and meanings, this could facilitate a more coherent argument to be more transparently formulated: one that not only accounts for why or how the product is so but that also suggests the development. Communication based on a deep understanding of the form and the outcome of design experiences is important for design collaboration, especially for inter-disciplinary projects.

User experience has undoubtedly become an important subject matter of design. The relationship between meaning and the meaning maker tends to be cut loose without a careful investigation of the structure of experience. In contrast, seeing design as meaning making and the intersubjective dimension of the underlying structure of having a design concept make a designer's design experience and how users make sense of a design profoundly compatible with each other. This approach provides an access to understand user experience that is different from merely conceptualizing the user's world.

Moreover, the natural attitudes in design, such as conceptualization, dualisms, and the gap between concepts and things in the world, are not exclusive to design students. The natural attitude is cultivated by education and reinforced by practice. Applying the frameworks to reveal those natural attitudes that have impacted the form, the process, and the product of design will enhance designers' understanding of design in its rapidly changing context and help them adjust their practice accordingly.

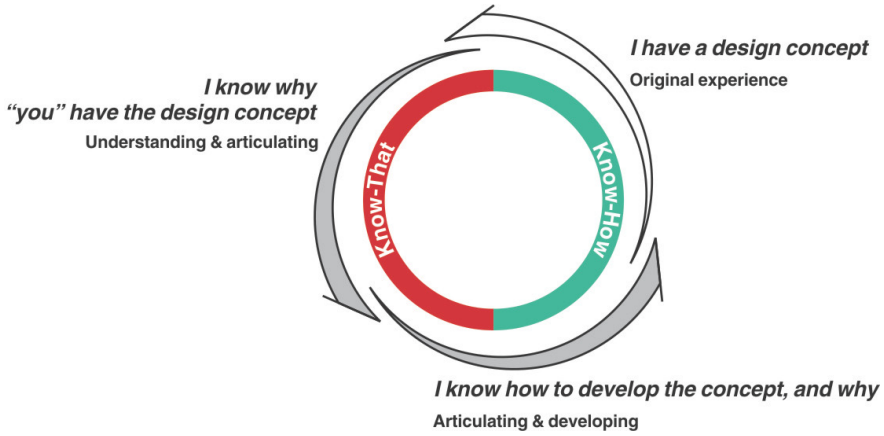
7.5.3 Implications for the Knowledge Foundation of Design

The exploration of the underlying structure of an experience of having a design concept is driven by the motivation to facilitate designers to tell more about what they experience in this phenomenon and what a design concept means to them. Articulating

more of design experience contributes to the knowledge foundation of design in several aspects.

This study advances the knowledge about an important kind of design phenomenon that has long been either regarded as ineffable intuition and a creative moment, or reduced to a design process in which the designer's factors are largely missing. The change from the perspective external to the designer's own experience to that which places the designer—or any new design inquirer—at the center of the phenomenon provide a more coherent way to account for the ambitious notion of design concept and to describe the phenomenon of having a design concept. The underlying structure reveals more knowledge about design experience.

Figure 7.1. The integration of know-how and know-that



Application of the two frameworks to describe the experience also bridges the two forms of knowledge related to practice: know-how and know-that. Meanings present design actions and consequences of the actions. The coherence of achieved meanings is an important criterion for the evaluation of each. Therefore, meaning supports know-how in practice and know-that in reflection on practice. Describing meanings expresses an explicit understanding about the world that people are interacting with, including the acting selves, by turning implicit know-how into know-that. Figure 7.1 shows a simple process wherein the two forms of knowledge are bridged by describing experience in different scenarios of the evolving experience of having a design concept. For each phase of the experience, "I" denotes the person who is describing the experience: "I have

a design concept" could be a spontaneous description by a designer. The two frameworks contribute to the understanding and developing phases. The term "you" indicates that the describer is a new inquirer or the same inquirer who is distancing herself or himself from the earlier experience, and trying to understand and articulate it.

Also, meanings achieved in other experiences can be revisited, revised, and rebuilt into new meanings in a new experience. This is why experience is often regarded as a part of personal knowledge repertoire. The framework of meanings also keeps a place for examination of the designer's old knowledge, by virtue of the experience under scrutiny. The natural attitude contains knowledge and skills that designers exercise in practice. The revelation of the natural attitude captures a way the old knowledge is aware of, which is in collision with the emerging new understandings, and thus makes it possible to achieve more coherent meanings, even in the presence of a problem.

Hence, I suggest that design experience should be fully utilized as a hermeneutic means to consolidate the knowledge foundation of design, just as phenomenology was first conceived by Husserl to complete the epistemological foundation of science by looking into human experience. The two frameworks provide a coherent basis for designers to articulate more about the known and thus to know more in a unified way.

7.6 Limitations

This study has been conducted in a design education context, as I mainly studied novice designers' and teachers' design experiences. The sample was relatively small, although to achieve sufficient variations, I investigated 12 design projects. These projects ranged from traditional product design to participatory design, and from individual-based design to team work. The underlying structure of the investigated experiences and the framework of meanings may be enriched and advanced if more experienced design experts' experiences in real practicing contexts are examined.

The design cases examined in this study are relatively simple and small-scale, and were conducted without a deep engagement with business contexts. The majority of

system and service design projects carried out in Chinese design schools are still at the infant stage of understanding this new terrain of design. The elements and relations identified in the area of system need to be polished in more quality projects. Although many of the participating teachers are experienced design practitioners or researchers, their involvement was for educational purposes, which restrained their performances in co-creating the experience of having a design concept.

This study examined a kind of phenomenon in design that is primarily individual-based. An internal perspective has been developed to examine individual design experiences using a relation-based approach that suits the structure of the investigated phenomenon. Experiences of other kinds of design phenomena, however (e.g. systematic evaluation, decision making, implementation, and business or social innovation) deserve specific pertinent approaches. The individual-basis internal perspective may not be the most appropriate for different research subjects, or should be better included in approaches that are fit for more complex collaborations.

This study was situated in the design educational context in China, and the findings are primarily focused on Chinese designers' experience of having a design concept (despite one internationally collaborative project with European students and teachers). Further studies could be conducted to determine whether the basic structure of having a design concept and the framework of meanings can be transferred to understand experiences in other cultures.

7.7 Suggestions for Future Research

This study examines individual designers' experiences, instead of focusing on the experience of design collaboration. Cross-disciplinary is an inescapable feature of contemporary design. In addition, the evolving social context requires the inclusion of more people into the design process, which makes the development of an understanding of people's experiences and voices a timely project. The experience of having a design concept in the highly intersubjective dynamics created by people who possess different

knowledge and powers merits a closer examination in future studies. With attention directed to design communication, it would be of significant practical implication to develop the framework of having a design concept within the context of social-based co-creation as well as that of professional-based collaboration.

The flexible framework of meanings proposed in this study is open for development. Future studies may identify new themes that are relevant to the examined experience in different contexts.

The applicability of these theoretical findings should be further tested and developed in practice. Besides, the insights obtained in this study in relation to the foundation of design knowledge call for a development of design methodology. Concrete tools, processes, and methods can be used to inspire, understand, and develop a designer's experience of having a design concept, and the development of these can be informed by the underlying structure and the framework on meanings. For example, the following may give rise to a design process that is different from conventionally object-oriented design processes: allowing oneself to stay open (at least in a certain degree) and striving to understand, in a new way, how the phenomenon reveals itself; exploring the intersubjective dimension by instrumentally using oneself as a medium to disclose the other's experience; or understanding the embodied dimension and including it into the subject matter of design. Guidelines can be explored to facilitate systematic reflection and communication for either individual work or teamwork.

This study is among the first to use the phenomenological point-of-view to understand design phenomena and to describe design. Throughout the research I have had a deep appreciation of phenomenology, which serves as a vantage point for understanding experience in various ways of restoring relations that have been interrupted or neglected by many other scientific inquiries influential to design while this field was developing into a discipline. The perspective of phenomenology is the wonder that has occurred to me during my inquiry into the fuzzy phenomenon of having a design concept. What are juxtaposed next to each other are: designers bring the unquestioned hidden matters into the light and absorb them into a new whole (this is

the main form of having a design concept); and the activity of researchers, who are engaged in bracketing pre-understandings and exploiting them as a source of insight between phenomenological reduction (see § 3.2) and reflexivity. I hope that this study has demonstrated the possibility of developing the two together into a new understanding and an approach toward the investigated design phenomenon. Exploration of the relationship between design and phenomenology can be a long-term and sophisticated project.

Finally, I should say that this study does not aim to control or to predict designers' practice. Instead, it is devoted to understanding a highly dynamic and unified design phenomenon that external perspectives fail to coherently describe. This study provides a way to understand, through interpretation and articulation, the experience of having a design concept, by putting us into productive relations. By doing so, the growth of experience and meanings is stimulated.

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