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Objects of Knowing:

Collaborative Craft Analyzed as a Platform for Knowledge Articulation

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Abstract

Previous research has thoroughly investigated knowledge creation from various perspectives and fields of expertise, although only a few studies have presented integrated discussions on the topic. This thesis situates knowledge creation at the intersection of two domains: organizational studies and craft and design research. While theories in organizational studies outline how tacit knowledge can be explicitly articulated through structured social practices, craft and design research inquires into knowledge creation through the process of materializing artifacts. In arguing for the integration of both perspectives, the present research examines collaborative craft as an organized activity and highlights the agency of objects in social practices where knowledge is articulated. Conceptually, this thesis draws on poststructuralist thinking and materialist approaches to organization in order to propose a material-discursive practice theory. Methodologically, it employs a multiple case study conducted in distinct geographies and cultural contexts, which allowed the designer-researcher to collaborate with craftspeople, collect rich empirical data, and confirm that social practices can yield knowledge via the production of artifacts. The research findings reveal the type of knowledge that can be articulated when craftspeople and designers collaborate, drawing attention to the relationship between the knowledge created and the artifacts produced. The study also emphasizes the significance of materiality in generating meaning and enacting discourse, especially in work settings where communication is hindered by sociocultural phenomena.

Keywords collaboration, craft and design, knowledge creation, materiality, organization, practice theory, tacit knowing.

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1

Introduction

1.1

The Materiality of Knowledge

Knowing allows us to negotiate a place in the world. As *knowers*, we devise cognitive frames, represent ideas, and create meanings. We hence resort to intangible devices, such as theory, language, and discourse, to articulate what we know (Adloff et al., 2015; Håkanson, 2007; Williams, 2001). However, it is the tangible dimension of these intangible devices what allows us to access them in the first place. It is through materiality that we can perceive, experience, and transform the world. The means by which we acquire, process, and transfer knowledge are bound to objects, spaces, environments, and material regimes in general (Orlikowski, 2002, 2006; Orlikowski & Scott, 2015). As *knowers*, we are framed within the physical boundaries of the *known* (cf. Wittgenstein, 1921/1961). We are thus embedded in an undeniably material reality and our knowledge is also situated therein.

But even in the realization that our knowledge is inherently material, articulating its materiality presupposes a fundamental dilemma: articulation implies resorting to ideas, meanings, and, ultimately, language. Referring to objects thereby requires transforming their

tangible aspects into elements of intangible representation. With the purpose of addressing this issue, the present work aims at analyzing materiality as a means of creating, explicating, and disseminating knowledge. Specifically, it sets out to investigate the process of knowledge articulation through material-intensive practices.

As a starting point, I shall stress that inquiring through materiality means assuming a disadvantaged position (Barad, 2003; Gherardi, 2017; Orlikowski, 2002; Schatzki, 2001). Whereas the aforementioned intangible devices have been afforded an instrumentality of their own, tangible objects still remain largely overlooked as agents in the formation of knowledge. In addition, knowledge articulation is normally perceived as the verbalization of ideas rather than the handling of matter.

Perhaps this is one of the consequences of modern thought, which has reduced our understanding of the world to binary oppositions. The problem with explaining phenomena based on such a view resides in the tendency to favor one pole of these opposites over the other. The dichotomy of discourse and materiality is no exception. Indeed, the dominance of the former over the latter demonstrates how modern theory has put knowledge forward as a primarily discursive construct.

In a similar manner, the habits of privileging mind over body, subject over object, agency over structure, and culture over nature typify the dominance of meaning over matter in the humanities and social sciences. In an attempt to overcome these dichotomies, this thesis posits knowledge as a multidimensional entity of which very essence is discursive and material at the same time. My intention in this work is thus not to disregard the proposition of using discursive devices to sustain knowledge. As a matter of fact, it is to acknowledge material objects as inextricable components of this sustainment.

In order to do so, the research at hand draws on poststructuralist thinking and subsequent orientations that contest the binary structures of the modern world (e.g. Barad, 2003; Bennet, 2010; Bourdieu, 1977; Gherardi, 2017; Hardy & Thomas, 2015; Knappett & Malafouris, 2008; Latour, 1987, 2005; Orlikowski, 2006; Orlikowski & Scott, 2015; Schatzki et al., 2001; Suchman, 1987). Although poststructuralism

has no consolidated definition and is often associated with a series of loose and ambiguous approaches, what characterizes all forms of poststructuralist thinking is a shared stance against hierarchically organized dichotomies. Succeeding philosophical undertakings have built upon such stance to adopt new readings of materiality in relation to discourse. Most of them are influenced by Foucault's *The Order of Things* (1966/1994) and *The Archaeology of Knowledge* (1969/1972), in which he resists hierarchical conceptualizations and asserts that "discourse does not preclude materiality" (Hardy & Thomas, 2015, p. 681; see also Barad, 2003; Miller, 2005; Orlikowski & Scott, 2015).

Taken together, these orientations support the treatment of knowledge as a situational notion rather than a foundational truth. All of them conceptualize knowledge as a contextual construct that cannot exist in isolation but rather emerges in relationships. From this point of view, relationships do not only involve individuals but also encompass the material arrangements in which they participate (Lehtonen, 2014, p. 16; Schatzki, 2001, p. 12). Subjects and objects can therefore be acknowledged as coacting agents in the constitution of the world (Barad, 2003; Bennet, 2010, Latour, 1987, 2005; Schatzki, 2001; Schatzki et al., 2001; Wacquant, 2015), where agency is a distributed property (Latour, 2005) rather than an fixed attribute determined by hierarchy. In short, subjects manipulate objects insofar as objects mediate the intentions of subjects, whether enhancing or disrupting them (Kimbell, 2011a, p. 300; Malafouris, 2008, p. 35; Pickering, 1995, p. 15). This relational perspective extricates power from anthropocentric paradigms and grants materiality an agency of its own (Knappett & Malafouris, 2008; Malafouris, 2008; Latour, 1987; 2005; Orlikowski, 2002, 2006; Orlikowski & Scott, 2015).

Following these lines of thought, the present work conceives of materiality as a relational constitution (Barad, 2003; Latour, 2005; Miller, 2005; Orlikowski, 2006) rather than a mere attribute of objects. Accordingly, materiality goes beyond physical things to encompass setups, embodiments, and practices, thus shaping experience and influencing the production of meaning (Brownell, 2014; Groth; 2017; Nimkulrat et al., 2016).

By introducing the notion of the materiality of knowledge, I am therefore exposing that knowledge is imbued with meaning to the same extent as it is imbued with matter. Further, I am accentuating that everything we know emerges in action, resides in relationships, and depends on context. Knowledge comprises a multidimensional entity which is built in discursive utterances but also in their material embodiments (Hardy & Thomas, 2015). Knowledge transcends the subject-object dualism and therefore must be investigated at the interface of the human and the non-human.

1.2

Matter and Meaning in Collaborative Craft

As explained in the previous section, the work at hand aims at examining knowledge articulation through material-intensive practices. To that end, the research design employs a multiple case study where three collaborative craft projects led the investigative process. All cases allowed for the collection of empirical data based on collaboration between craftspeople and the designer-researcher, shedding light on how craft and design practitioners create knowledge when they materialize things together. The main research question of the study, which will be further elaborated in Chapter 3, sets out to identify the type of knowledge that can be articulated through collaborative craft.

Besides being based on knowledge work, craft comprises a socially structured activity in which matter and meaning are held inextricably. Generally driven by the production of artifacts, craftsmanship entails the exercise of technical and cognitive abilities as well as the development of an aesthetic expression (Adamson, 2007; Malafouris, 2008; Sennett, 2008). Moreover, it serves as a means of interaction between subjects and objects, drawing attention to the roles they share in the materialization of the world (Cook & Brown, 1999; Knappett &

Malafouris, 2008). Craft practices thereby provide an appropriate way to study knowledge articulation as a process that is emergent in the relationship between the social and the material.

Recent research in craft and design has studied knowledge articulation from this perspective. In fact, the production of artifacts within this field has been influential in the advancement of new design theory (Biggs, 2002; Mäkelä, 2007; Nimkulrat, 2013). This is particularly the case for *practice-led research* in craft and design or *research through design* (Frayling, 1993; Friedman, 2008). Practice-led research constitutes a method of inquiry that “highlights the active role of the design practice in the research process” (Nimkulrat, 2013, p. 3), thus allowing designer-researchers to utilize their creative practice as the platform for investigation and to incorporate their material outcomes as part of the research output (Groth, 2017; Jarvis, 1999; Mäkelä, 2007; Mäkelä & Nimkulrat, 2011; Niedderer, 2007; Nimkulrat, 2013). One of the major benefits of the practice-led research approach is that it highlights the instrumentality of matter in the formation of knowledge. However, it has the disadvantage of focusing primarily on one’s own individual activity (see e.g. Pedgley, 2007), thus overlooking the potential of collaborative practices as a means of knowledge articulation.

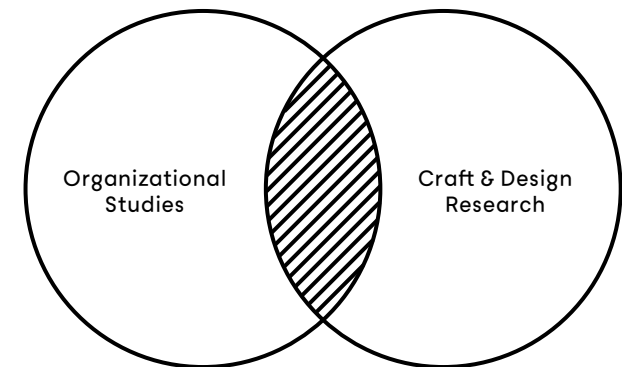
Conversely, other fields of inquiry focus on collaborative knowledge articulation but do not account for creative or material-based activity. Theories in *organizational studies*, for instance, outline how structured social practices contribute to the creation of knowledge (Nonaka, 1994; Nonaka & Takeuchi, 1995). Organizational studies is an academic field concerned with the study of human activity and the constitution of social processes, practices, and structures, focusing on the relations created among individuals and how these relations affect other individuals, groups, and institutions (see e.g. Argyris, 1999; Cook & Brown, 1999; Scharmer, 2000; Spender, 1996; Tsoukas & Vladimirou, 2001). A recent research orientation in this field is emerging to emphasize the influence of objects and material regimes in social practices and systems of power. Such orientation, known as the *material turn* (see e.g. Orlikowski, 2006), draws on poststructuralist thinking to oppose the *discursive turn* by questioning the privilege of meaning over matter in the explication of social phenomena.

In an attempt to grant a deeper understanding of knowledge articulation as a socially informed, material-based process, the scope of this thesis lies at the intersection of organizational studies and craft and design research (Fig. 1). Thus, the study conceives of collaborative craft as a material-discursive practice (Barad, 2003, p. 822; Orlikowski & Scott, 2015; see also Fry, 2007), entangling subjects and objects and thereby dismantling the paradigm of human-centeredness that has been predominant in design for at least the last three decades.

Before moving on to the next section, I consider it pertinent to provide precise definitions for the terms *knowledge articulation* and *collaborative craft*.

With *knowledge articulation* I refer to the “process through which tacit skills and knowledge are made explicit” (Håkanson, 2007, p. 51) and hence capable of systematic explanation. While theories in organizational studies refer to this tacit-to-explicit conversion as *externalization* (Nonaka, 1994; Nonaka & Takeuchi, 1995), I have preferred the word *articulation* due to its ubiquity in craft and design research (see e.g. Cross, 1982, 1999, 2001; Doloughan, 2002; de Freitas, 2002; Friedman, 2000, 2008; Groth, 2017; Jarvis, 1999; Mäkelä, 2007, 2016; Mäkelä & Nimkulrat, 2011; Margolin, 1989; Nimkulrat, 2007, 2013; Nimkulrat et al., 2016; Norman, 2006; Pedgley, 2007; Ravetz et al., 2013; Schön, 1983; Seitamaa-Hakkarainen & Hakkarainen, 2000; Sennett, 2008). The literature review contained in Sections 2.1 and 2.2 elaborates further on the tacit and explicit dimensions of knowledge. Moreover, it distills how both fields (i.e. organizational studies and craft and design research) treat these notions in relation to practice.

On the other hand, with *collaborative craft* I refer to the socially organized activity by which craft and design practitioners produce artifacts together, emphasizing that this practice does not only entail the handling of matter but also involves a shared meaning-making intention. Although I understand that craft embodies a whole category of its own and it does not necessarily constitute a design-like activity, the word *craft* is used throughout this work to describe *craft* and *design* interchangeably. By integrating both domains into this definition, I also infer that collaborative craft comprises a post-disciplinary practice in which different skills and knowledge need to be exchanged.




 Knowledge articulation theories

Figure 1. Scope of this thesis

1.3

Objective and Framework

Articulation plays a pivotal role in the development of theory as well as in the advancement of practice. It does not only underpin the creation of new knowledge but also facilitates its dissemination over time and across space (Håkanson, 2007). The main objective of this thesis is to analyze craft and design practices as a platform for knowledge articulation, thus aiming to contribute to the fields of practice-led research and knowledge creation theory. To that end, the overall structure of the study takes the form of eight chapters, which are organized as follows:

Chapter 1 consists of three sections. First, Section 1.1 establishes the context by introducing knowledge as a material-discursive construct. The notion of materiality is emphasized to shed light on the agency of objects in social practices where knowledge is created. Then, Section 1.2 determines the scope, which is the study of knowledge creation through the lenses of organizational theory and craft and design research. A multiple case study is briefly announced as the overarching methodology, explaining that the research setting comprises three projects involving organized collaboration between

craft and design practitioners. Lastly, Section 1.3, which is the present one, states the general objective of the thesis and provides a brief outline of its structure.

Chapter 2 is divided into four sections. Section 2.1 gives a detailed overview of knowledge and its dimensions. Section 2.2 distills the process of knowledge articulation as theorized in organizational studies and craft and design research. Taken together, these two sections enclose an exhaustive review of the literature which covers multiple perspectives from established conceptions to state-of-the-art approximations. Upon remarking some controversies and a generalized lack of consensus regarding the treatment of knowledge in the literature, an argument is presented to explain the epistemological stance adopted in this study. Later, Section 2.3 synthesizes the theory and organizes it visually. Special emphasis is given to the implications of analyzing knowledge articulation from a multi-paradigm perspective. Finally, Section 2.4 develops the conceptual foundation of the thesis by proposing a material-discursive practice theory.

Chapter 3 presents the research question, which aims at identifying the type of knowledge that can be articulated when craftspeople and designers collaborate. The research question is then reformulated into three sub-questions. Each sub-question relates to each case study, thus facilitating the analysis of the same phenomenon from three different perspectives.

Chapter 4 consists of three sections. Section 4.1 lays out the research setting and presents the methodological framework. A visual synopsis of the theoretical foundation is presented and integrated into the research design. Section 4.2 deals with the description of the cases and the data obtained from each of them. The cases report distinct ways in which collaborative craft served as a platform for articulation. Case I (Section 4.2.1) delves into the making process of traditional lacquerware in Japan, Case II (Section 4.2.2) studies a bamboo technique practiced in Hong Kong, and Case III (Section 4.2.3) covers a collaboration with a glassblower in Finland. Then, Section 4.3 revisits the data collected to specify the units of analysis. A summary of the data is provided, highlighting patterns and similarities observed among the cases.

Chapter 5 presents the findings of the study and reveals the type of knowledge that can be articulated through organized collaboration in craft and design. All findings are presented by following the same structure of the cases. Thereby, the main research question is answered first and then each sub-question is illustrated with case-specific examples.

Chapter 6 is organized into three sections. First, Section 6.1 opens up a general discussion about knowledge articulation through collaborative work, drawing attention to its implications in craft and design contexts as well as in organizational views of practice. Then, Section 6.2 pinpoints the limitations of the study and builds upon them to formulate a future research agenda. And finally, Section 6.3 presents the conclusion and wraps up with a reflection upon the research findings.

The remainder of this work comprises two additional chapters, 7 and 8, which cover the reference list and the appendices, respectively. Chapter 8 compiles the visual documentation of each case study and is therefore divided into three sections. The purpose of outlining the structure of this thesis is to give the reader a quick overview of its organization and contents. Although the present work is an in-depth study of very specific nuances about knowledge creation, I hope that it is still broad enough to make a contribution and serve as a reference for future research in the field.

2

Literature Review and Theoretical Foundation

2.1

Knowing and its Dimensions

The debate on what knowledge means is as old as philosophy itself. Perhaps one of the most endorsed conceptions of knowledge relates to Plato's tripartite theory, which conceives of knowledge as a "justified true belief" (Gettier, 1966). Plato argued that knowing arises when a proposition is (1) true, (2) believed to be true, and (3) justified as true. His theory influenced the development of a rationalist conception of knowledge that postulates reason and logic as the foundation of truth. Such conception is closely associated with the dualist tradition initiated by Descartes, who claimed that thinking precedes existing. Given the context of the present work, this view is questionable because it treats mind and body as separate entities, thus implying that knowledge emerges independently of action and experience.

Rationalism was criticized by more empirical accounts of existence such as pragmatism and phenomenology, both of which point out that thinking and existing are intertwined processes. Pragmatism (e.g. Dewey 1934/2005; Peirce, 1986), on one hand, conceives of knowledge as a situated construct, focusing on action and its practical consequences. Phenomenology (e.g. Heidegger, 1927/1996; Merleau-Ponty,

1945/1962), on the other hand, is concerned with experience and perception, thus accounting for the involvement in the world as one of the fundamental aspects of knowing. Although epistemologically different, both strands have undoubtedly enriched the study of knowledge by their critique of rationalist paradigms (Groth, 2017; Håkanson, 2007). Further, they have influenced the development of more contemporary theories of knowledge.

The present chapter encloses a review of some of these theories. This section focuses on knowledge and its dimensions, while the following ones build upon the dynamics of knowledge articulation. Rather than extending philosophical disputes around the epistemology of knowledge, I draw on what has been said to formulate the theoretical foundation of this work.

Knowledge Dimensions: Tacit and Explicit

Scientist and philosopher Michael Polanyi also contributed to the critique of rationalist assumptions. In arguing that "we know more than we can tell" (1966, p. 4; see also Polanyi, 1958), he distinguished two types, or *dimensions*, of knowledge: (1) the *tacit* and (2) the *explicit*. Polanyi argues that while explicit knowledge is declarative, factual, and explicable, tacit knowledge is not. Instead, tacit knowledge is personal, context-specific, and usually practical or procedural. It is active within the mind of the knower but not consciously accessible at the moment of knowing. Hence, tacit knowledge is difficult to articulate. Two terms related tacit knowledge are *knowing-how* (Ryle, 1945) and *embodied knowledge* (Merleau-Ponty, 1945/1962). The first is concerned with knowledge acquired through practice and expertise, whereas the second refers to a phenomenological proposition that accounts for the body as knowing entity.

Polanyi's distinction between tacitness and explicitness comprises the foundation of numerous knowledge articulation theories (see e.g. Håkanson, 2007, Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka et al., 2008). Nonaka & Takeuchi (1995), for instance, use such distinction to propose a model for organizational knowledge creation (I will introduce the model itself in Section 2.2), in which they explain tacit

and explicit knowledge with the analogy of baking bread. From this point of view, propositional facts and direct information, such as the procedures and ingredients required to bake bread, are examples of explicit knowledge. The skills employed in baking bread, in turn, constitute examples of tacit knowledge.

Based on the work of Polanyi and Merleau-Ponty, Scharmer (2000) proposes a further distinction by introducing a diptychal reclassification of tacit knowledge, thus arguing that it can be either *embodied* or *not-yet-embodied*. While his definition of embodied tacit knowledge concerns the skills required to perform tasks, that of not-yet-embodied tacit knowledge relates to the “incipient sources” of enacting such skills (p. 36). Following this reasoning, he uses Nonaka & Takeuchi’s analogy to contextualize how tacit knowledge can be embodied or not yet embodied: “an example of embodied tacit knowledge is the act or process of baking bread (Nonaka & Takeuchi, 1995). An example of not-yet-embodied tacit knowledge is the invention of baking bread in the first place” (p. 38). He also stresses that both forms of knowing are epistemologically contrasting. Their phenomenological experience is different because embodied knowledge relies on action, whereas not-yet-embodied knowledge relies on reflection (cf. Schön, 1983).

Besides the authors mentioned above, many other scholars have recognized Polanyi’s oeuvre as the “most authoritative conceptualization of knowledge” (Lehtonen, 2014, p. 68). In fact, the notion of tacit knowledge has become widespread in various academic and scientific circles over the last three decades (Håkanson, 2007). A number of fields, ranging from pedagogy to science and technology studies, have adopted the concept to scrutinize a vast yet heterogeneous array of phenomena. Tacit knowledge has thus become a topical issue that no longer bears one unified meaning across such a wide spectrum of domains (Ardichvili, 2000, Håkanson, 2007). The lack of consensus upon one unique and exact definition, however, does not imply that the concept is problematic per se nor unable to transgress disciplinary frontiers (Adloff et al., 2015, p. 12). Instead, it might work as a ubiquitous device to facilitate the study of phenomena from multi-paradigm perspectives.

Throughout the present work, I take advantage of such ubiquity to examine the relationship between knowledge and practice from distinct perspectives, all of which integrate the theoretical foundation of the study. The list shown below synthesizes the key theoretical propositions that I use in this thesis to study knowledge articulation through collaborative craft. These ideas are further developed in the following sections of the present chapter.

- i Knowledge accounts for a contextual construct which is situated in practice, acquired through experience, and informed by relationships.
- ii The notions of practice and experience can be examined through empirical approaches such as pragmatism and phenomenology (e.g. Heidegger, 1927/1996, Merleau-Ponty, 1945/1962, Polanyi, 1958, 1966; Schön, 1983).
- iii The notion of relationality, in turn, demands the comprehension that knowledge does not emerge in individual practices but within a social structure (e.g. Bourdieu, 1977; Foucault, 1969/1972; Giddens, 1984).
- iv The concept of tacit knowledge thereby goes beyond skill and dexterity to incorporate culture-sensitive tacit knowledge, institutionalized forms of implicit knowing, and ways of knowing embedded in disciplinary cultures (e.g. Adloff et al., 2015; Julier, 2008; Knorr-Cetina, 1999; Reckwitz, 2002).
- v The above mentioned propositions claim for the examination of both individual and collective forms of tacit knowledge. This includes the study of knowledge through different theories of practice (i.e. *practice theory*) and the consideration of ways of *knowing-in-practice* (e.g. Gherardi, 2017; Orlikowski, 2002) and *knowing-in-the-world* (e.g. Maturana & Varela, 1992; Wacquant, 2015).
- vi Taken together, *knowing-in-practice* and *knowing-in-the-world* entail the recognition of knowing as a constitutive process in the materialization of the world, thus rendering the entanglement of materiality and discourse (e.g. Barad, 2003; Kimbell, 2011b; Orlikowski, 2006; Orlikowski & Scott, 2015; Østerlund & Carlile, 2005, p. 92; Schatzki, 2001).

Knowledge Articulation

An extensive body of literature has discussed knowledge beyond its theoretical implications to highlight its practical relevance. In fact, much emphasis has been given to the tacit aspects of knowing in recent studies of practice. This is perhaps because practices are understood as largely tacit endeavors in which know-how is central to the accomplishment of tasks (Ardichvili, 2000; Dormer, 1997; Duguid, 2005; Groth, 2017; Håkanson, 2007; Loenhoff, 2015; Mareis, 2012; Schön, 1983; Sennett, 2008; Tsoukas, 2003; Wacquant, 2015). Various approaches, including *knowing-in-action* (Schön, 1983) and *knowing-in-practice* (Gherardi, 2017; Orlikowski, 2002), have emerged to elucidate the role of tacit knowledge in the study of empirical phenomena, ranging from individual activities to interactions within and across entire social structures.

Even though these approaches have broadened our understanding of practice, their focus on tacit knowledge has diverted attention from the mechanisms by which it can become explicit. Says Håkanson, “[tacit knowledge] has been associated with a tendency to downplay the importance of explicit knowledge and with a near total neglect

of the significance of articulation” (2007, p. 52). To counter this, the following pages enclose a review of the literature on knowledge articulation, the general structure of which takes the form of three parts. First, I focus on organizational studies by introducing an articulation model developed in the field of organizational knowledge creation. Then, I move on to craft and design theory by presenting two articulation tools employed in the field of practice-led research. And finally, I underline the similarities between both perspectives and propose a theoretical framework to integrate them.

Knowledge Articulation in Organizational Studies

In the context of organizational studies, the concept of knowledge articulation relates to a much larger body of work extant in the fields of organizational learning, knowledge management, and information systems (Dubberly & Evenson, 2011). Arguably the most important contribution to the topic has been the *SECI model of knowledge conversion* (Nonaka & Takeuchi, 1995; see also Nonaka, 1994; Nonaka et al., 2008). Based on previous works by Nonaka, Nonaka & Takeuchi (1995) introduced the SECI model to propose four stages of knowledge conversion: (1) *socialization*, (2) *externalization*, (3) *combination*, and (4) *internalization*; hence the acronym. The model outlines how tacit knowledge can become explicit and how explicit knowledge can become tacit, relating these four stages of knowledge conversion to specific types of interaction between individuals. Also referred to as *knowledge creation model* or *knowledge creation spiral*, the SECI model has become the cornerstone of knowledge creation theory within the fields mentioned above (Adloff et al., 2015; Argyris, 1999; Lam, 2000; Lehtonen, 2014; Scharmer, 2000; Tsoukas, 2003; Tsoukas & Vladimirov, 2001).

The four stages of knowledge conversion, as theorized by Nonaka & Takeuchi (1995), can be defined as follows:

- 1 *Socialization* (tacit-to-tacit) is the process by which one individual acquires the tacit knowledge of another individual. This means that skills and abilities are transferred through social interaction. Transferring tacit knowledge, however, takes time

and demands the full involvement of individuals in their social environments (Nonaka et al., 2008). In the context of craft, socialization between practitioners typically occurs in activities such as observation, imitation, and repetition. Further, the transfer of craft-related knowledge is primarily mediated by the manipulation of matter, implying that socialization in craft plays an active role in the configuration of its material-discursive infrastructure.

- 2 *Externalization* (tacit-to-explicit) is the process by which tacit knowledge is articulated “through [different] modes of expression” (Nonaka et al., 2008, p. 22), thus allowing it to be converted, either verbally or nonverbally, into explicit and transferrable devices. This process underpins the creation of new knowledge by “rendering articulated knowledge in fixed, standardized, and easily replicable form” (Håkanson, 2007, p. 51). Images, codes, manuals, and documents typify forms or articulated knowledge. The importance of articulation relies on the fact that it allows knowledge to be accessed by others.
- 3 *Combination* (explicit-to-explicit) is the process by which different types of explicit knowledge are merged to create new explicit knowledge. This process permits the systematic transfer of already articulated knowledge between individuals, groups, and entire social structures.
- 4 *Internalization* (explicit-to-tacit) is the process by which explicit knowledge, regardless of its format, is acquired as new tacit knowledge by an individual or a group. In the context of organizational learning, the internalization phase supports the formation of a knowledge base, thus allowing social structures to create value (Nonaka, 1994; Nonaka et al., 2008; Scharmer, 2000).

The SECI model (Fig. 2) conceives of knowledge creation as a continuous and dynamic process (Nonaka & Takeuchi, 1995), thereby representing its “iterative nature” (Dubberly & Evenson, 2011, p. 4) with a spiral (see Fig. 2). Each loop of the spiral escalates gradually from the individual to the organizational level. As outlined in the model, knowledge articulation (i.e. the conversion of tacit knowledge

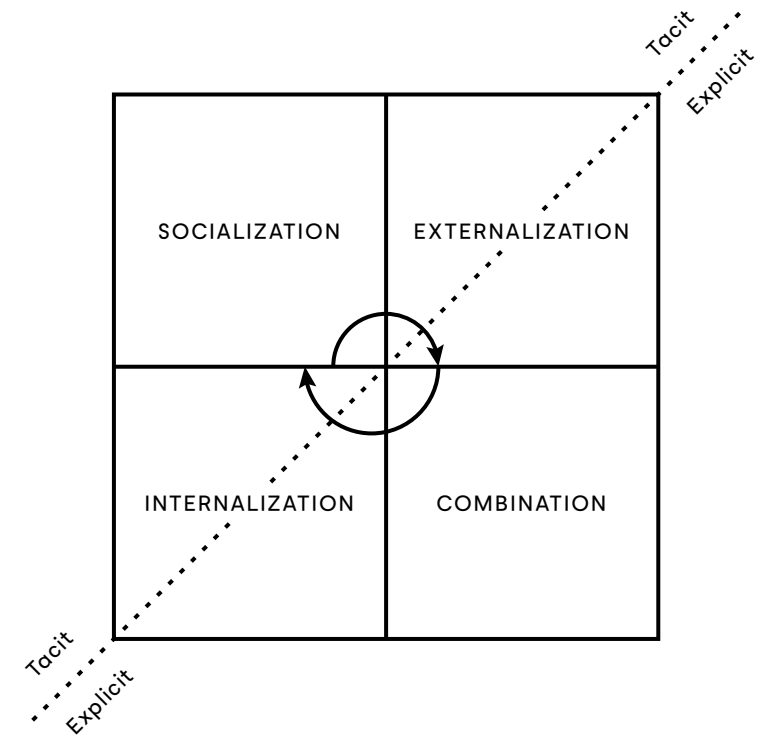


Figure 2. The SECI model (Nonaka & Takeuchi, 1995)

into explicit knowledge), takes place in the externalization phase. However, in order to attain articulation, some sort of socialization (i.e. tacit knowledge transfer) between individuals has to occur first. In light of this, I would like to remark that the processes of combination and externalization fall out of the scope of the present thesis. In any case, they have been included in the above description to help visualize the model contextually.

It is worth to note that Nonaka drew on Polanyi's work to develop his theory of knowledge conversion (Nonaka, 1994; Lehtonen, 2014). Several scholars in the field have criticized the SECI model, claiming that it oversimplifies Polanyi's distinction between tacit and explicit knowledge (see e.g. Bereiter, 2002; Gourlay, 2006; Li & Gao, 2003; Tsoukas, 2003; Tsoukas & Vladimirou, 2001). Besides this criticism, Nonaka's theory is questionable because it portrays an organizational narrative based on Japanese values, which might not be applicable across cultures. Nevertheless, the SECI model is only a framework and not a predictive protocol, so it might be helpful if used cautiously.

In spite of the criticism, other authors claim that the SECI model is general enough to be applicable to virtually any domain. In fact, the model has started gaining momentum in fields as diverse as education, social theory, and service design (Dubberly & Evenson, 2011; Hartley, 2007). However, there is still little, if not nonexistent, evidence of its application in more traditional design practices (i.e. craft and design, see e.g. Dubberly & Evenson, 2011, p.3; Friedman, 2000; p. 15; Niedderer, 2007, p.7).

Knowledge Articulation in Craft and Design Research

The notion of knowledge articulation has also gained recent attention in craft and design research. In fact, the term *articulation* has become rather ubiquitous in the field (see e.g. Cross, 1982, 1999, 2001; Doloughan, 2002; Dormer, 1997; de Freitas, 2002; Friedman, 2000, 2008; Groth, 2017; Jarvis, 1999; Mäkelä, 2007, 2016; Mäkelä & Nimkulrat, 2011; Margolin, 1989; Nimkulrat, 2007; Nimkulrat et al., 2016; Norman, 2006; Pedgley, 2007; Ravetz et al., 2013; Seitamaa-Hakkarainen & Hakkarainen, 2000; Sennett, 2008). One of the main

endeavors of craft and design research is to acknowledge the active role of practice in the production of theory (Biggs, 2002; Groth, 2017; Jarvis, 1999; Mäkelä, 2007; Niedderer, 2007; Nimkulrat, 2013). In the context of practice-led research, most studies on knowledge articulation are concerned with the methods that craft and design practitioners use to investigate their own practice. Designer-researchers ascribed to this strand deal with "the task of making tacit knowledge [...] researchable and explicable" (Groth, 2017, p. 7), and great part of this process happens through the materialization of artifacts.

Producing artifacts as a means of articulating knowledge "has brought a new dimension to design research" (Mäkelä & Nimkulrat, 2011, p. 1). It does not only interrogate the relationship between knowing and making but also considers the inclusion of professional practitioners into the academic arena. Two key contributions to this field of research have been Polanyi's concept of *tacit knowledge* (1966) and Schön's concept of *reflective practice* (1983). These concepts reveal a pragmatist effort to contest the positivist design attitude brought about by the Design Methods Movement of the 1960s (Dorst & Dijkhuis, 1995, p. 262; Bousbaci, 2008, p.38; Mareis, 2012, p. 63; Groth, 2017, p.15), thus rejecting rationalism and arguing that knowledge is always contextual.

Besides drawing on pragmatism, practice-led research in craft and design has largely resorted to phenomenology (Biggs, 2002; Groth, 2017; Mäkelä & Nimkulrat, 2011; Nimkulrat, 2013). Concepts such as *experiential knowledge*, *knowledge of the hands*, or *embodied knowledge* (Merleau-Ponty, 1945/1962) exemplify some of the terms that designer-practitioners have borrowed from phenomenology to discuss knowing in relation to making. Further, the integration of pragmatism and phenomenology into craft and design theory has influenced the emergence of other terms such as *knowing-in-action* (Schön, 1983), *knowing-through-making* (e.g. Mäkelä, 2007; Olsen & Heaton, 2010; Pasman & Boess, 2010), and *thinking-through-making* (e.g. Carter, 2005; Adamson, 2007; Ingold, 2013; Rajmakers & Arets, 2015), all of which stress the dynamics of material-intensive practices in the formation of knowledge (Biggs, 2002; Mäkelä, 2007; Nimkulrat, 2012, 2013).

Although contrasting and at times even contradictory, these ideas have come to constitute an important body of theory in craft and design, which emphasizes the significance of tacit knowledge and, by implication, of the tools that allow its articulation (Cross, 2001; Groth, 2017; Koskinen et al., 2011; Mäkelä, 2016; Mareis, 2012; Niedderer & Reilly, 2010; Nimkulrat, 2013; Nimkulrat et al., 2015). Drawing on the work of Cross (1982), Schön (1983), Scrivener, 2002), and Friedman (2008), Mäkelä & Nimkulrat (2011) have proposed two tools to help practitioners articulate their practices: (1) *documentation* and (2) *reflection*. Based on practices driven by the production of artifacts, they assert that documentation facilitates the process of reflection, hence rendering tacit knowledge capable of articulation. A more elaborated description of these tools is presented as follows:

- 1 *Documentation* is the process in which the creative practice can be transformed into data. This process “can assist in capturing the experiential knowledge during the creative practice” (Scrivener, 2002, p. 25) so that designer-researchers can access it later. Typical forms of documentation include annotations, working diaries, written text, photography, sketching, and video recording (Mäkelä & Nimkulrat, 2011). Hence, documentation implies transferring the tacit knowledge of the practitioner into textual, visual, or material devices.
- 2 *Reflection* is the process in which practitioners give serious and critical consideration to their actions in order to clarify their thoughts (Mäkelä & Nimkulrat, 2011). According to Schön (1983), this process occurs in two different modes: (1) *reflection-in-action* and (2) *reflection-on-action*. The first takes place within practice, whereas the second occurs after it. Reflection allows for the externalization of knowledge by accessing what has been documented.

With these ideas, Mäkelä & Nimkulrat (2011, p. 8) argue that “documentation can function as a research tool for capturing reflection *on* and *in* action. When artist-researchers document their practice-led research processes, they consciously reflect on the current experiences during the process (reflection-in-action) and on the documented experiences after the entire process (reflection-on-action)”.

Integrating Different Knowledge Articulation Theories

The literature review has covered knowledge articulation from the perspectives of organizational studies and craft and design research. Theories in organizational studies, based on the SECI model, online how tacit knowledge can be explicitly articulated through structured social practices (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka et al., 2008). Craft and design research, based on practice-led research tools, inquires into knowledge creation through the process of materializing artifacts (Mäkelä, 2007; Mäkelä & Nimkulrat, 2011; Nimkulrat, 2013). Although both perspectives may seem distant from one another, they share three fundamental similarities, which are listed as follows:

- i Both perspectives define the dynamics of articulation based on Polanyi’s distinction between tacit and explicit knowledge,
- ii both perspectives argue that articulation emerges in practice, and
- iii both perspectives suggest that articulation requires the completion of two successive knowledge creation phases: (1) the *tacit-to-tacit* phase and (2) the *tacit-to-explicit* phase. Phase 1 (i.e. socialization and documentation) involves enacting, capturing, and transferring tacit knowledge. Phase 2 (i.e. externalization and reflection) implies accessing previously registered tacit knowledge to articulate it in explicit forms.

Having underlined the similarities between both perspectives, I suggest their integration in a theoretical framework based on the SECI model, emphasizing that collaborative craft can yield explicit knowledge besides material artifacts. The proposed framework (see Fig. 3) conceives of phase 1 (tacit-to-tacit) as the interplay of socialization and documentation, thus devising phase 2 (tacit-to-explicit) as the reciprocity between externalization and reflection. Additionally, I propose the inclusion of an *articulation mechanism* to facilitate the explication of knowledge through the use of metaphors. As elaborated earlier, the research setting consists of three cases conducted in different cultural contexts. Due to issues with language barriers, each project employed a different metaphor to facilitate nonverbal

articulation. The articulation mechanisms employed in each project comprise processes themselves, and they relate to the titles of the projects analyzed in each case: ‘Translations’ (Case I), ‘Notations’ (Case II), and ‘Variations’ (Case III). Chapter 3 presents an overview of these articulation mechanisms in relation to the sub-questions derived from the main research question. Further, each articulation mechanism is explained in detail throughout Section 4.2.

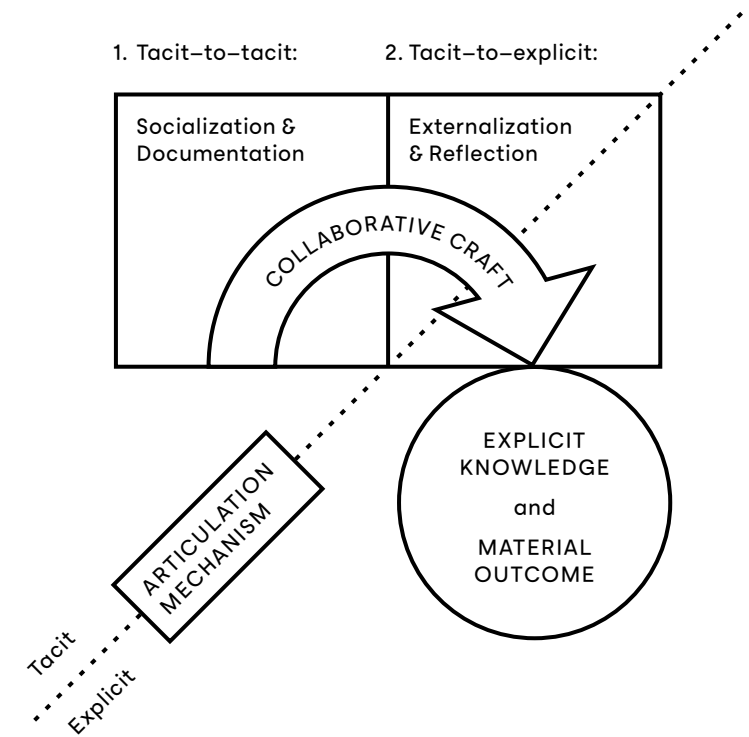
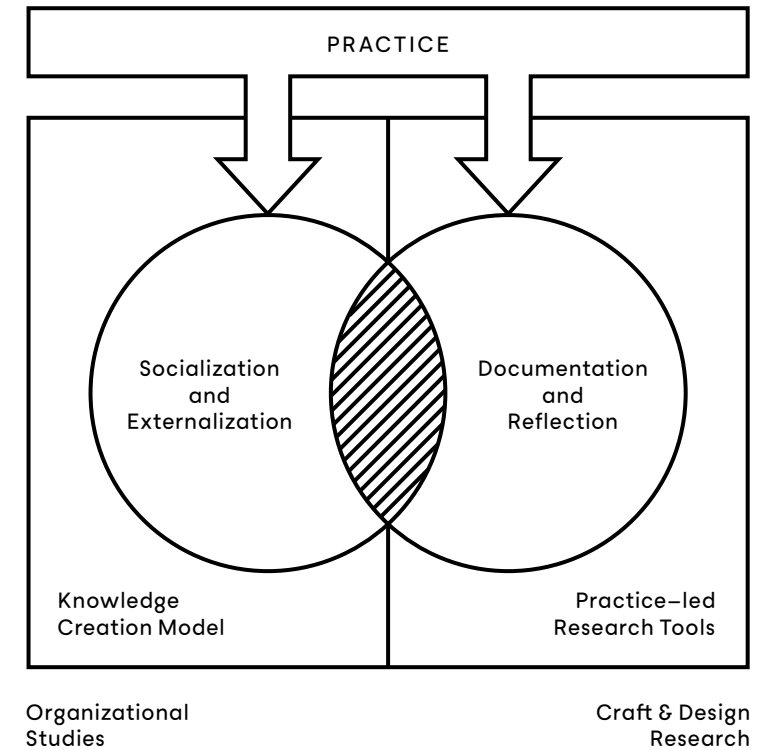


Figure 3. The SECI model revisited to integrate craft & design theory

2.3

Researching from a Multi-paradigm Perspective

In the previous sections, I have reviewed the literature on knowledge articulation from the perspectives of organizational studies and craft and design research. Each field has devised its own tools to scrutinize the same phenomenon. The former, based on knowledge creation models, outlines that socialization between individuals enables the externalization of tacit knowledge into explicit, transferable devices. The latter, based on practice-led research methods, stresses that documentation facilitates reflection, allowing tacit knowledge to be captured, explicated, and disseminated. Upon underlining some similarities and pinpointing an evident gap between both research paradigms, the present work entwines them to propose an integrated approach. Fig. 4 condenses the theory contained in sections 2.1 and 2.2, portraying knowledge articulation as emergent in practice and visualizing it as a *boundary object* (see Bowker & Star 1999, p. 297) between the fields of organizational studies and craft an design research.



 Knowledge Articulation

Figure 4. Theory synthesis

2.4

Ecologies of Practice: Towards a Material–discursive Practice Theory

The present thesis has proposed collaborative craft as a material-discursive practice in which matter and meaning are held inextricably. This proposition implies two things. First, the study needs the inclusion of social theory because the research setting is based on social practices. And second, the inclusion of this social theory must allow for the study of matter and meaning simultaneously. To that end, *practice theory* (e.g. Bourdieu, 1977; Giddens, 1984; Schatzki, 2001) offers a way to understand collaborative craft as a relational constitution of materialities and discourses. It also opens up issues of the role of objects with respect to subjects and vice-versa (Reckwitz; 2002; Schatzki, 2001). However, practice theory alone does not grant equal ontological status to subjects and objects, thus not accounting for the agency of materiality in the formation of knowledge.

Drawing on Bourdieu (1977), Schatzki (2001), and Orlikowski & Scott (2015), I suggest a *material-discursive practice theory* instead, emphasizing that the theoretical foundation of this study posits two fundamental considerations: (1) the empirical aspects of knowledge, and (2) the sociomaterial aspects of practice. Further, in reformulating

the ontological relationship between subjects and objects, I revisit Wenger's work on practice theory (1998) and his notion of *communities of practice* to develop the concept of *ecologies of practice*. This concept is central to the work at hand because it moves the unit of analysis beyond the social world to encompass material regimes and natural environments.

As the research setting comprises distinct geographies and cultural contexts (i.e. collaborative craft projects carried out in Japan, Hong Kong, and Finland), the concept of ecology of practice provides a suitable methodological device to analyze collaborative craft at the interface of objects and subjects, matter and meaning, nature and culture, and structure and agency. To clarify, with ecology of practice, I refer to the spatiotemporal setting of a given practice in which social and material agents are entwined, stressing the material-discursive nature of this very infrastructure and thus claiming for a monist account of constituting phenomena. By capturing the essence of organized activity, the concept of ecology of practice illustrates the different ecosystems in which collaborative craft practices take place. These encompass the natural and artificial environments, instruments, infrastructures, interfaces, and mediums of transaction that enable relationships between practitioners and the world.

The summary shown below concentrates on my decision to suggest a material-discursive practice theory based on different theories of practice. Further, it explains the logic behind devising the concept of ecology of practice for methodological purposes. With this, I aim to illuminate the connections between the theoretical foundation of the study and the practice-led research setting. A comprehensive description of the methodology employed in this thesis is included in Chapter 4.

Theoretically:

- i The literature suggests that a unified, clear definition of practice theory does not exist (Kimbell, 2011b; Reckwitz; 2002; Schatzki, 2001). Instead, the concept refers to a body of work concerned with the study of social practices beyond the social, thus encompassing material arrangements and their influence on human activity. Although different theories of

practice may vary in focus, all of them conceive of practice as a relational constitution, which means that none of its elements can be studied in isolation (Kimbell 2011b, p. 132). Practice theory is generally perceived as a loose approach, but it might work well when used in conjunction with other theoretical orientations (Reckwitz, 2002).

- ii This thesis analyzes practice with a theoretical framework that integrates organizational studies and craft and design research. Both fields situate knowledge articulation within an epistemological stance based on pragmatism and phenomenology (Groth, 2017; Lehtonen, 2014). The notions of practice and experience are central to this stance. However, pragmatism and phenomenology are heavily subject-oriented and none of them accounts for the role of objects in the configuration of practices.
- iii I have emphasized the instrumentality of material objects in social activities, arguing that matter has agency in the formation of knowledge. In the context of craft and design research, this idea has its roots in the pragmatist-phenomenological approach spearheaded by Schön (Groth, 2017, p. 15). Although Schön's approach does not recognize non-human agency, his concept of knowing-in-action (1983) already portrays non-human objects, such as materials, processes, and technologies, as potential co-agents of practice.
- iv Other scholars have built upon similar ideas to discuss the notion of practice as an interaction of subjects and objects (see e.g. Barad, 2003; Bennett, 2010; Lehtonen, 2014; Kimbell, 2011b; Orlikowski, 2006; Scharmer, 2000; Sennett, 2008), stressing that knowledge does not emerge from social or material entities but from the relationship between them.
- v An array of theories spanning the fields of sociology (see e.g. Bourdieu, 1977; Giddens, 1984; Reckwitz, 2002; Gherardi, 2017), cultural studies (e.g. Foucault, 1966/1994, 1969/1972), philosophy (Wittgenstein, 1921/1961), and science and technology studies (e.g. Latour, 1987, 2005; Orlikowski, 2002, 2006; Orlikowski & Scott, 2015; Suchman, 1987) have devel-

oped similar understandings of knowledge based on the idea of relationality. Some of them already grant a new ontological status to objects, thus conceding materiality an agency of its own. This is the case for *Actor-network theory* (Latour, 2005), *Sociomateriality* (see e.g. Gherardi, 2017; Orlikowski & Scott, 2015) and *New Materialism* (see e.g. DeLanda, 2006).

- vi These theories could have offered appropriate lenses to understand how materiality and discourse are entangled. However, they would have provided only a general insight because not all of their conceptual propositions are applicable to practices as specific as collaborative craft.

Methodologically:

- i The research setting comprises three projects involving organized collaboration between craft and design practitioners. Although various methodological frameworks have been developed to analyze craft and design activity, this particular research setting demands the connection of theory with practice from a multi-paradigm perspective.
- ii This implies that practice-led research tools, although instrumental in the process, may not be sufficient to analyze all agents involved in the formation of knowledge.
- iii I could have connected theory and practice with *action research*, meaning that the analysis of individual activity could have been extrapolated to collaborative scenarios. However, the three projects to be studied have already been conducted, and "action research is research in which the process of making or designing an artifact constitutes the methodology" (Seago & Dunne, 1999, p. 11).
- iv I could have used *grounded theory* (Glaser & Strauss, 1967) as well, but the literature review already delivered some preconceived assumptions, and the research question is built upon one of them (see Chapter 3). Further, this approach might have fallen short in analyzing multiple cases cohesively and simultaneously.
- v Different theories of practice have developed their own tools to study knowledge creation between individuals and their

ways of knowing-in-practice (see e.g. Duguid, 2005; Koliba & Gajda, 2009). Most of these theories draw on the notion of *communities of practice* introduced by Lave & Wenger (1991; see also Wenger, 1998; Ostermann, 2008). The term refers to groups of people who engage in processes of collective learning and shared knowing, and it has gained recent attention in the field of organizational studies (Lehtonen, 2014; p. 22).

- vi This orientation could have offered a proper analytical tool to study collaborative craft as a platform for knowledge articulation. However, it faces important limitations in explaining how agency and power are distributed among practitioners (Roberts, 2006). This also means that the concept of communities of practice is rather subject-oriented and ignores the ontological significance of objects.

In short, the proposition of moving towards a *material-discursive practice theory* goes hand in hand with the notion of *ecology of practice*. While the former concept has been introduced as the theoretical foundation of the study, the latter comprises a methodological tool devised to suit the research setting.

3

Research Question

What type of knowledge can be articulated through collaborative craft?

The general research question of this thesis, stated above, is based on the assumption that collaborative practices can yield knowledge via the production of artifacts. Therefore, instead of interrogating whether knowledge is articulable through materiality, the study focuses on identifying the nature of this knowledge and the relationship it has with the artifacts produced.

As mentioned earlier, the research design employs a multiple case study based on three collaborative craft projects. This approach facilitated the study of knowledge articulation in three different, practical settings. Further, it allowed to divide the main research question into the following sub-questions: (1) How can knowledge be articulated through materiality? (2) How much materiality is needed to articulate knowledge? and (3) How can materially articulated knowledge be reproduced? Each sub-question relates to the articulation mechanism used in its respective case: (1) *translation*, (2) *notation*, and (3) *variation* (see Table 1). To remind, the term ‘articulation mechanism’ refers to any process that can facilitate the conversion of tacit knowledge into explicit manifestations.

CASE	ARTICULATION MECHANISM	APPROACH	SUB-QUESTION
I	Translation	Expressing the same idea in a different modality	How can knowledge be articulated through materiality?
II	Notation	Representing principles and processes through a standardized symbol system	How much materiality is needed to articulate knowledge?
III	Variation	Iterating a concept by repeating a series of operations	How can materially articulated knowledge be reproduced?

Table 1. The three sub-questions and their relation to each case study

4

Methods and Data

4.1

Research Setting: Collaborative Craft in Practice

Designers and craftspeople are trained in a predominantly material tradition. Besides granting confidence in creative problem solving and ability to formulate alternative types of logic, this training allows design and craft practitioners to produce, reproduce, and understand non-linguistic systems of representation (cf. Goel, 1995). Design and craft practices thereby enable the exercise of technical and cognitive abilities through the manipulation of objects. In collaborative contexts, such abilities are socialized in various modalities, suggesting that verbal language may not constitute the main agent in the formation and dissemination of knowledge.

In line with the notion of the materiality of knowledge introduced in Chapter 1, the present chapter describes three cases exemplifying distinct ways in which collaborative craft served as a platform for articulation. More specifically, Case I delves into the making process of traditional lacquerware in Japan, Case II studies a bamboo technique practiced in Hong Kong, and Case III covers a collaboration with a glassblower in Finland. All three cases saw the production of material artifacts along with knowledge yielded in explicit forms.

An overview of the research setting is presented in Table 2, which includes a brief description of the projects developed in each case, their ecologies of practice, and the type of data captured from them. The cases are described in detail in section 4.2.

As explained earlier, this thesis employs a multiple case study (Yin, 1984; Eisenhardt, 1989) as its overarching methodology. This decision was made primarily because the research setting allowed the study of similar practices undertaken in different environments. Besides facilitating various perspectives of analysis of the same phenomenon, this methodological choice coheres with the proposition of utilizing a material-discursive practice theory as the foundation of the research.

In presenting the case study methodology as the backbone of the research design, I assert the qualitative nature of the present study. While qualitative research does not aim at unveiling the ultimate truth, it suggests multiple lenses to scrutinize certain phenomena. To that end, the present thesis devises different methods of data collection and analysis, some of which have been developed to suit specific criteria demanded by each case study. Fig. 5 visualizes the model of this methodological framework, revisiting the theoretical foundation, recalling the proposition of moving towards a material-discursive practice theory, and establishing a connection between the theoretical foundation and the practice-led research setting.

CASE	I	II	III
Time and Place	05–11, 2014 Ishikawa, Japan	09–12, 2017 Kowloon Peninsula & Southern District, Hong Kong	03–05, 2018 Helsinki, Finland
Ecology of practice	11 participants 6 institutions 4 production units 2 materials 5 processes > 10 tools 1 geographical setting	4 participants 1 institution 1 production unit 1 materials 5 processes < 5 tools 2 geographical settings	3 participants 1 institution 1 production unit 1 material 5 processes > 15 tools 1 geographical setting
Type of practice	Woodturning and lacquer coating	Bamboo handicraft	Free-hand glass blowing
Articulation mechanism	Translation: Expressing the same idea in a different modality	Notation: Representing principles and processes through a standardized symbol system	Variation: Iterating a concept by repeating a series of operations
Data collected	Photography video material samples templates drawings prototypes final artifacts	Photography video material samples templates drawings notation system final artifacts	Photography video material samples drawings prototypes scores final artifacts

Table 2. Research setting

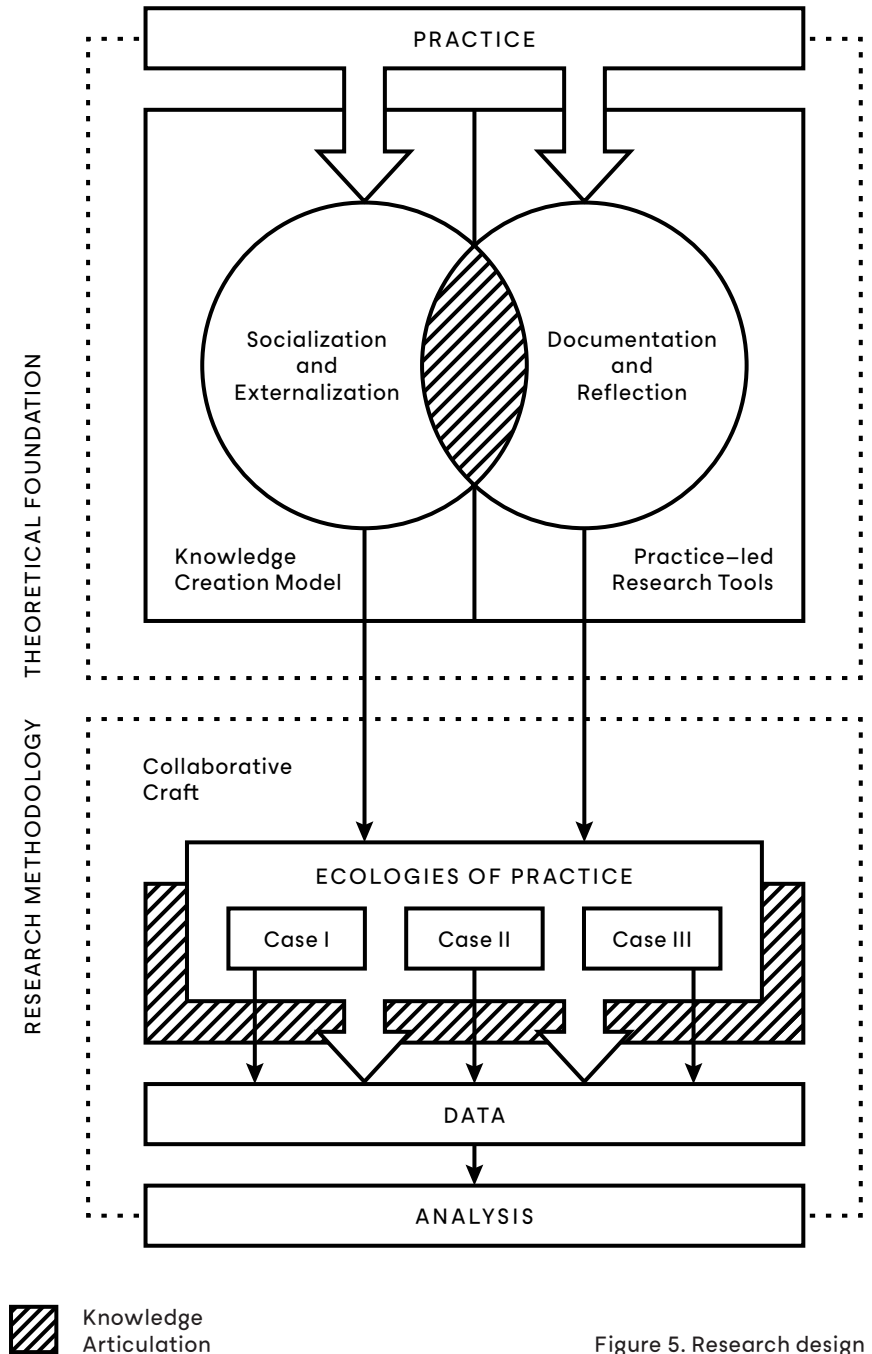


Figure 5. Research design

4.2

Case Description and Data Collection

Cases I and II include proper names, word compounds, and technical terminology in Japanese and Cantonese. All proper names and word compounds have been romanized with the Hepburn and the Jyutping systems, respectively. Where official English names of institutions and agencies do not exist, personal translations have been provided. All three cases use the Western proper name order, meaning that family name follows first name. Technical terms and craft jargon reported throughout the cases have been italicized when introduced for the first time.

The following cases report the development of three projects from which empirical data were captured in a variety of formats. To unify the study and facilitate its analysis, all case descriptions observe the same unvarying structure: First, the case is introduced; next, the study is contextualized; later, an overview of the craft technique in question is presented; and finally, an explanation of the collaborative project is detailed. A table organizing the ecology of practice is included at the end of each case.

Notes on research ethics and orthotypography

All participants gave informed consent to take part in the projects described in the case studies and their respective documentation. The participants' real names are used except when they have asked to be kept anonymous. Although the majority of the images presented throughout this thesis (including the appendices) depict objects rather than subjects, images depicting individuals are rather focused on the manipulation of matter.

4.2.1

Case I: Translations

How can knowledge be articulated through materiality?

The present case covers a work setting situated in a Japanese environment. Specifically, it describes a collaborative project developed with a group of artisans in a small town famous for its lacquerware. Technical sophistication and proximity to cultural values are two key characteristics of Japanese workmanship that cannot be overlooked. In other words, Japanese craft embodies an amalgam of the traditional and the technological, which results in the materialization of profound forms of situated tacit knowing.

In light of this, one could presume that Japan would provide an ideal scenario for studying the implicit dimensions of making. However, putting these ideas into practice was not as easy. Communication, for instance, was a complex issue. During the early stages of the study, the whole collaborative process was somewhat inhibited due to language barriers and other cultural factors which will be explained later. Even though these relatively problematic circumstances were not unexpected, they seemed potentially surmountable.

As a result, the main task of the study became to examine materiality as a mediating language in the context of cross-cultural work.

Context of the study

‘Translations’ is the title of a broader project undertaken in this context. Made possible with the support of the Kyoto Institute of Technology (KIT, Japan), the Japan International Cooperation Agency (JICA, Japan), and the National Council of Science and Technology (CONACYT, Mexico), the project was developed in the frame of JICA’s fellowship program ‘Modern Design and Traditional Craftsmanship’, an initiative incorporated into the Strategic Global Partnership between Mexico and Japan. Through its cooperation programs, JICA addresses “various needs that developing countries have by covering a wide variety of subject areas” (Japan International Cooperation Agency, 2017, Section 2), spanning traditional know-hows, cutting-edge technologies, and recurring innovations in the government-industry-academia framework. The main goal is to facilitate technical training, foster cross-cultural dialogue, and provide financial aid to promote social and economic development. The Mexico-Japan Strategic Global Partnership celebrated its first program in 1971, but it was until 2006 that ‘Modern Design and Traditional Craftsmanship’ was incorporated into its annual cooperation agenda. From this year onwards, the program has been handled by the Graduate School of Science and Technology at the KIT. Its purpose is the exploration of traditional Japanese craft techniques through self-arranged study and hands-on learning.

Besides the funding received from the mentioned institutions, the practical implementation of the project was enabled through the deliberate participation of about forty-five craftspeople distributed in more than thirty production units across Japan. With a duration of eight months, ‘Translations’ comprehended the study of five techniques: lacquerware, pewterware, stoneware, wood joinery, and bamboo latticework. For the scope of the research at hand, however, Case I focuses only on the first on this list. More specifically, it delves into the practice of *Yamanaka shikki* (‘shikki’ stands for ‘lacquer-

ware' in Japanese) through a sub-project involving eleven people, six institutions, and four manufacturing facilities. The rest of the constituents of this ecology of practice will be distilled in the following pages, but before giving further details, some key facts about the politics of craft in Japan will be provided along with a brief history of the technique.

Traditional Japanese craft

Already since ancient times, the purpose of craft in Japan has been utilitarian to the same extent as it has been social. Traditionally, the transfer of craft-related knowledge was strict, vertical, and generally practiced on a familial lineage basis. The access to wisdom, especially that of craftsmanship, was a social privilege yet a highly specialized activity. Handmade artifacts were not only acknowledged as carriers of strong social value, but also resulted praiseworthy for the time, care, and knowledge invested in their manufacture. Industrialization brought turbulence to these perceptions and challenged the dynamics involved in craft production. However, it could not completely revamp the paradigm of verticality. This led craft to a foreseeable evolution: many techniques began to disappear, whereas others became more precious and seized novel opportunities for trade and economic growth.

During the post-war economic expansion, a series of initiatives were impelled to overcome yet another crisis in which, as many other guilds, craft struggled for years. Among these, arguably the most fruitful was run by the Association for the Promotion of Traditional Craft Industries (Densan Association) in cooperation with the Ministry of Economy, Trade and Industry (METI). A law, commonly known as the 'Densan Act' ('Promotion of Officially Designated Traditional Craft Products Industry' by its official name), was promulgated in 1974 to promote traditional crafts nation-wide and grant them official recognition as such. Five criteria were established by the METI in order to concede official designation to craft products (Densan Association, 2000, pp. 6-7). According to these criteria, an artifact is eligible for official designation if it:

- i serves an utilitarian purpose in everyday life,
- ii is primarily manufactured by hand,
- iii has an established provenance of a hundred years or more,
- iv is made of materials that have remained unchanged for a hundred years or more, and
- v is regionally produced to a certain scale by a certain number of craftspeople.

Since the enactment of this law, the METI has resolved official designation for 230 types of products (Densan Association, 2017), and the list continues to grow. In parallel, the Densan Association has run a number of programs to encourage the advancement of traditional technologies, increase the global demand of local handmade products, and incorporate craft culture into the public agenda. As a result, traditional crafts in Japan are nowadays favored with a comprehensive political apparatus which allows their classification, legislation, protection, and promotion to be efficient and transparent processes.

Additionally, while some specific items have been classified as 'tangible cultural properties', the tacit knowledge required for the production of any traditional artifact constitutes an object of classification as well, but it rather comprises an 'intangible cultural property' (see Yagihashi, 1985, p. 79). This term alludes to "the human skills themselves, which are embodied by individuals" (Japanese Agency for Cultural Affairs, 2007, p. 2) and result absolutely necessary for the creation or preservation of cultural products. Thus and so, master artisans who possess the most refined skills and demonstrate excellence in their trajectories receive the designation of 'Living National Treasures' (for an overview, see Japanese Agency for Cultural Affairs, 2017, pp. 38-53). This aspect has entailed the emergence of social personae in relation to certain types of material practices and their practicing communities, thus reinforcing the rigor of knowledge dissemination through a politics of craft exercised in training schools, apprenticeship models, and other kinds of socially institutionalized schemata.

Both the tangible and intangible domains of cultural products in Japan appear relevant to the thesis at hand, especially because they entwine subjects and objects (cf. Orlikowski & Scott, 2015) and

underpin the material-discursive nature of craft in twofold ways. On one hand, the tangible domain determines the material significance of an artifact and the meanings it carries: in the Japanese context, this domain resolves whether the criteria for its designation as a traditional craft product is fulfilled, arranges the practicalities needed to systematize its methods of production, and establishes the mechanisms for its acquisition by cultural repositories. In this thesis, it informs the codes involved in the production and representation of knowledge; pinpointing how this knowledge is materially rendered to a large extent. The intangible aspect, on the other hand, highlights the significance of craftsmanship in terms of human abilities, values, and systems of beliefs: in the Japanese context, it honors master craftspeople for what they implicitly know, legitimizes the channels of knowledge transfer, and situates craft and craft-related activities as a discursive, social construct. In this thesis, it refers to the networks that enable the socialization of knowledge, suggesting that collaborative practices may dominate the bureaucracies of traditional craft.

All elements included in the previous overview have been described because Yamanaka shikki will be analyzed contextually. As stated before, the intention is to scrutinize its ecology through a material-discursive practice theory rather than solely analyzing its social artifacts. Therefore, the dynamics of objects and subjects, matter and meaning, and structure and agency embedded in it result instrumental for the comprehension of the research setting presented in this case and the type of data captured from it. The same criterion applies to the next two cases.

Yamanaka shikki

Yamanaka shikki has its origins in the latter decades of the 1500s (for a historical overview of Japanese lacquerware, see Inumaru & Yoshida, 1992). Even so, its practice was formally established until the 18th century, when a group of woodturners settled in the former town of Yamanaka, now part of the city of Kaga, in the Ishikawa Prefecture. The area was best known for its hot springs and traditional lodges. A growing resort culture allowed the craft to develop, leading to the

production and trade of lifestyle household goods such as bowls, trays, tea utensils, and tableware in general. Woodturners continued to produce the same kind of items, and in 1975, Yamanaka shikki was awarded official designation by the METI (Densan Association, 1975/2017), becoming one of the first traditional techniques to be recognized as such.

In accordance to the 5th criterion established by the METI, the technique receives its name after the Japanese toponym ‘Yamanaka’, which literally means ‘in the middle of the mountains’. Located in a mountainous region covered with rich woodlands, this bygone town afforded the ideal environment for woodworking. Turnery and carving were preferred due to the technical properties of the wood obtained from the area, and also because the humid climate allowed the timber to be uniformly seasoned. Nowadays, Kaga is a merger of ancient history and modernization. In addition to the economic benefits brought by its hot spring resorts, the city enjoys a well-developed infrastructure and has managed to maintain a sustainable path for the traditional lacquerware industry.

The approach to sustainability is multiple-edged. Besides the preoccupation to ensure environmentally and economically safe futures, the activities surrounding this practice are also socially and culturally oriented towards self-sufficiency. The wood used for turning and carving is harvested from municipal forests, managed by regional authorities, and processed in local production facilities. Craftspeople are organized in cooperatives and the technique is taught in a specialized institute. The local government impulses Yamanaka shikki as a productive activity and ensures its visibility in the cultural sphere. Museums and craft centers play as well an important role in the quest of sustainability: they contribute to the exploitation of a cultural asset by exercising a healthy ecology of knowledge about this practice and its impact in society. At the same time, they mobilize local talent and educate the public on the technique and its products. All of these aspects have made this craft highly appreciated and actively demanded. As a result, lacquerware from Yamanaka is ubiquitous throughout Japan, and its consumers seem to be well informed about its origin and characteristics.

One feature that distinguishes Yamanaka shikki from other types of Japanese lacquerware is the solidity of its wood. By trimming the logs vertically instead of horizontally, artisans produce more durable yet very thin-walled wares. Vertical trimming, commonly referred to as *tategi*, implies orienting the artifact along the log with the grain visible lengthwise. Although *tategi* makes a wood piece more difficult to carve and produces considerably more waste, it prevents warping and deformation during and after the process. This allows the resulting artifact to be more utilitarian and less decorative, guaranteeing long-lasting endurance, impeccable quality, and an appealing look that matches the popular taste.

Yamanaka lacquerware is crafted in a slow and steady pace. Besides technical precision and qualified human capital, time and patience are very much required. In some cases, it can take up to twenty craftspeople and over a year to complete a single piece. The process can be synthesized into “four major stages: [1] *substrate*, [2] *priming*, [3] *intermediate coating*, and [4] *top coating*” (Ohba, 1985, p. 91). Stage one consists of wood work, while stages two to four consist of lacquer work. Each stage is performed by a different craftsman, implying that the production chain requires a minimum of four specialists, or even four production units, working in timely coordination. The following list summarizes the most significant steps in each stage of the process (for reference, see Mertz, 2011, pp. 58-63; Ohba, 1985, pp. 91-94):

- 1 Substrate: shaping the *kiji* (wood piece).
 - Hardwoods such as *keyaki* (Japanese zelkova), *mizume* (cherry birch), and *hinoki* (cypress) are extracted from local forests and cut into logs. The stems are peeled and the logs are either selected or discarded by a specialist.
 - The selected logs are classified and cut into shorter pieces. The length of these pieces depends on the height of the desired artifact.
 - The artifact is visualized and oriented in the stem *tategi*-wise. Its general diameter is marked with a pencil on the top side of the log. As the final object will be turned on a lathe, this mark is always a circle. The log is cut with a saw

following the mark and leaving enough space for subsequent maneuvering.

- The resulting chunk is turned on a lathe producing a cylindrical wood core. The wood core is boiled and set aside for drying and seasoning. Drying takes place in a special chamber and lasts from one to two weeks. Seasoning can take as long as two years depending on the characteristics of the material and the conditions of the weather.
 - Once seasoned, the wood core is carved with hand-forged metal tools and turned on the lathe until it roughly resembles the shape of the desired artifact.
 - After a drying period of two months, the wood core is turned on the lathe again until a detailed, final shape is achieved. No standardized measuring units are employed in shaping the final object. Instead, lathe masters trust their intuition and seldom use templates.
- 2 Priming: preparing the *kiji* for *kyushitsu* (lacquer coating).
 - The piece is sanded and cleaned thoroughly before priming. If knots or cracks appear, the wood is repaired until its surface becomes uniform and smooth. Two finishes are possible: clear wood and lacquer. If the design demands the piece to highlight the grain of the wood, several layers of clear polyurethane coating are applied. Then, the piece is polished and completed with these processes alone. If the piece requires lacquer coating, the process continues as indicated in the next steps.
 - A mixture of *urushi* (a cured greyish resin exuded from the sap of lacquer trees) and petroleum benzine are applied with a brush to the wooden piece. As *urushi* is toxic in its liquid state, special care is needed from this process on.
 - Two layers of pulverized sawdust mixed with *urushi* are applied with a spatula to thicken the base and make it more resistant.
 - A thin layer of *urushi*, ceramic powders, and water is applied with a brush. Then, grinding powder is used to burnish it.

- Another layer of raw urushi is applied with a spatula, rubbed down with charcoal, and polished with sandpaper. After repeating this process several times, any blunt edges caused by continuous layering are sharpened and polished.
 - The piece is heated for about ten hours. Heating occurs in a humid chamber at an increasing temperature that rises up to 70 °C. Once heating is completed, the urushi becomes fully polymerized and the piece needs to be cooled down for several hours.
- 3 Intermediate Coating: Applying several layers of kyushitsu.
- Raw urushi is the main material used for intermediate coating, but cooked rice paste and grinding powder are also employed. Water is added to knead the mixture, and the resulting pastry is applied with a spatula.
 - A repeated sequence of coating and burnishing is performed. Paper is used to remove excess material.
 - Sequential layering continues until the surface becomes uniform and meets the thickness required by the design. If the design demands precise thicknesses, special considerations need to be taken because too much layering may lead to undesired thickening. Tea boxes, which often require an airtight seal, are submerged in hot water until the temperature expands the piece so that the lid is released from the box.
- 4 Top Coating: *uwanuri* (final layer).
- Once the undercoating work has been completed, the final layers of lacquer are applied with a brush.
 - During this stage, color is added to the urushi. Although a rich chromatic variety is possible today, the colors employed traditionally were limited to the natural pigments available in the past. Yamanaka shikki, in any case, is characterized by its crimson-hued vermilion and deep black tones, both of which are still produced traditionally. Using either of those, the uwanuri master gives the final hands of pigmented urushi until the desired

depth of the chosen color is achieved.

- This process follows the same logic described in the two previous stages, comprising a slow sequence of continuous coating and polishing. The final hand gives the finish, which can be matte or glossy.
- Upon completion, the piece is set aside to dry and harden. Drying times vary according to moisture and humidity conditions, and special care is needed to prevent any dust from sticking to the lacquered surface.

After the top coat is applied, some additional processes may occur. These include sprinkling and burnishing golden powder for decorative or artistic purposes. However, this will not be described because the present case deals with the design of utilitarian rather than decorative artifacts.

Project description, ecology of practice, and data set

The information detailed before was captured through a combination of observing, practicing, and reading about Japanese woodwork and lacquerware (see e.g. Brommelle & Smith, 1985; Mertz, 2011). Although the literature on the topic has become more extensive over the last decades, craft skills are still preferred to be passed down on a look-and-learn basis. In Japanese, this practice is called *minarai*, which literally means ‘look and learn’ and contextually translates as ‘apprenticeship’. Apprenticeship involves knowing in practice (cf. Maturana & Varela, 1992; Orlikowski, 2002; Wacquant, 2015) and stays in line with the process of socialization theorized by knowledge creation scholars (e.g. Nonaka & Takeuchi, 1995) in the field of organizational studies.

‘Translations’ comprehended a project in which non-linguistic, material-intensive modalities, such as *minarai*, steered the socialization of knowledge. The following paragraphs describe the course of the project, detail the constituents of its ecology of practice, and set the bases for the case analysis. This case study, as expressed before, aims at explaining how collaborative craft yielded knowledge in material forms. Findings from the case, detailed in Chapter 5, provide some

concrete insights to the sub-question at issue: How can knowledge be articulated through materiality?

Over the course of ‘Modern Design and Traditional Craftsmanship’, some general knowledge on Japanese craft was gained. For instance, a visit to the Fureaikan Museum of Traditional Crafts in Kyoto granted deeper understanding of certain techniques and their distribution across Japan. Lacquerware in particular was observed to be prevalent in the prefectures of Kyoto and Ishikawa. During a field trip to the latter, I managed to arrange a studio visit to Japan Crafts Oshima Co. Ltd., a company producing Yamanaka shikki since 1909. With an illustrative tour to their facilities followed by a fruitful discussion on the potential of collaborative practices, Mr. Toyoki Oshima, president of the company, invited me to design a small collection of products in cooperation with the craftspeople working for him. His son, Taro, who is the fourth generation of a family of shikki artisans and now runs the company, was appointed to coordinate the production and arrange all the practicalities.

The project started in June of 2014 and took six months to be completed. Nothing was particularly briefed, but some requirements were made. First, the proposed designs had to serve utilitarian purposes and be pursuant to the company’s product portfolio. Second, due to time restrictions, the size of the products should match that of already seasoned substrates. And third, some kind of novelty was expected.

During the course of the project, Mr. Oshima and his son showed me around Kaga. The project covered visits to a total of four institutions, four production units, and four master craftspeople. Kaga hosts the Ishikawa Prefectural Technical Training Center for Yamanaka Lacquerware, a craft institute devoted to teaching lathework, turnery, and lacquer coating. Founded and directed by Living National Treasure Ryozo Kawakita, the center trains lacquerware artisans, technologists, and researchers, and it is the only institution of its kind in Japan. Mr. Kawakita welcomed me in his school and taught me the basics of kiji work on a Yamanaka-styled lathe. The other three institutions visited were the Yamanaka Lacquerware Traditional Industry Exhibition Hall, the Yamanaka Lacquerware Cooperative Association, and the Yamanaka Society for the Preservation of Woodturning

Technologies, all of which allowed for the collection of extensive visual data.

The rest of the production units incorporated in the project included the Yamanaka Wood and Timber Resources Management Facility, the woodturning workshop *Rokuro no Sato* (literally ‘lathe village’), and one additional workshop specializing in coating. On the first visit to the woodturning unit, master craftsman Kazuo Satake, also a member of the Yamanaka Society for the Preservation of Woodturning Technologies, showed interest in sharing his knowledge and joining the collaboration. During subsequent visits, he focused on demonstrating his skills through a combination of gesture and woodturning. Special emphasis was made on the tools employed, yet every single demonstration happened in absolute silence. Later in the project, Mr. Satake and his apprentices stepped into the production of the wood cores. On a similar basis, the master craftsmen at the coating facility strived to provide sufficient information on their workshop dynamics prior to their involvement in the project.

All information provided was systematic and indeed sufficient. However, personal approaches to the process resulted hard to explain. Embodied thinking and experience-based decision making could be observed but not verbalized. This happened partly due to language barriers and partly due to the quiet style of their workmanship, but primarily because such notions belong to the tacit dimension (Polanyi, 1966). After realizing so, I decided to proceed with the design phase relying only on non-linguistic systems of representation, namely images, drawings, templates, mock-ups, models, material samples, and other codes alike, all of which comprised the visual and material *translations* (see e.g. Fig. 6) of concepts that would have remained inexplicable otherwise. Only after this coding process could a design intention be resolved and agreed upon.

The project saw the production of a series of four items: a bowl, a cup, a flat box, and a lidded caddy with a circular handle (*Yamanaka Series*, Fig. 7), all made of local mizume and crafted by means of the original technique. The designs were based on archetypal references of traditional lacquerware, and the series was produced in batches of three colors: black, vermilion, and clear wood. Both finishes, matte

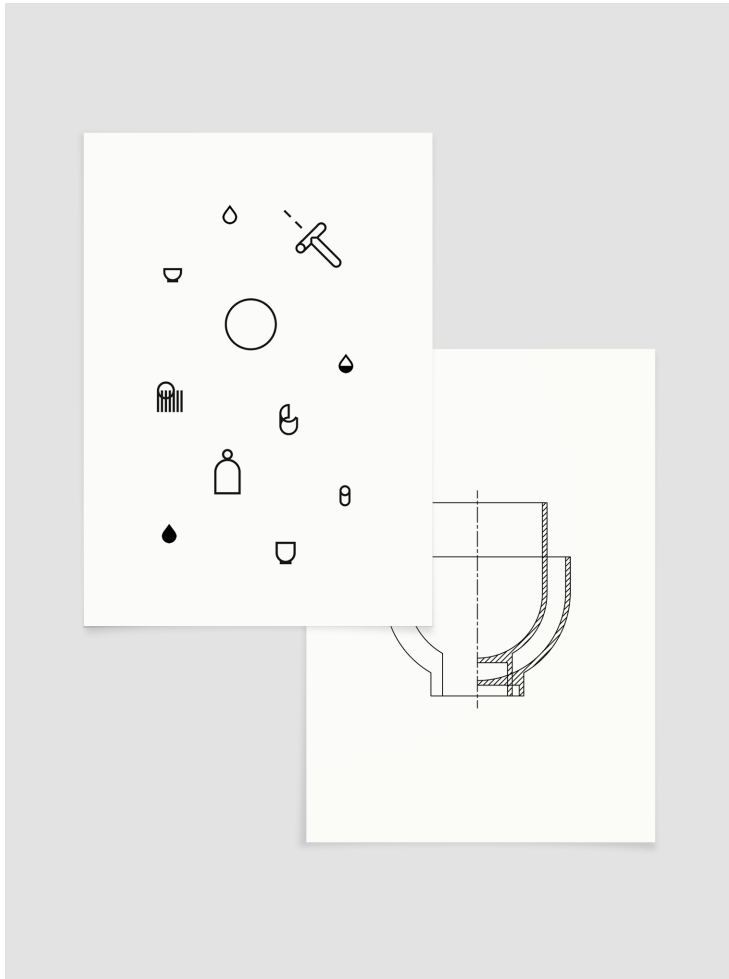


Figure 6. Translations



Figure 7. Black versions <matte and glossy> of the Yamanaka Series

and glossy, were applied to all items in order to produce six stylistic versions for each of them. The difficulty level of the designs ranged from very simple to moderately complicated: the clear wood, matte version of the bowl constituted the simplest piece, while the glossy black version of the caddie implied the greatest effort production wise.

The process was conscientiously documented, shedding light on the interaction of objects and subjects in different processes and through different modalities. All individuals, institutions, and production units involved in the project are enumerated in Lists 1-3. Successively, Table 3 details the ecology of practice described throughout the case. Note that rather than schematizing a division of labor, the table intends to visualize relationships for further analysis. As this study focuses on collaboration, specifying the limits of individual activity serves only to identify the locus of distinct stages within the whole process. For a more comprehensive visual documentation of the project, refer to Appendix 1 at the end of this book.

LIST 1. INDIVIDUALS AND THEIR ROLES IN THE PRACTICE

1	Toyoki Oshima 大島豊樹	Yamanaka Shikki master, decision maker
2	Taro Oshima 大島太郎	Production coordinator
3	Ryozo Kawakita 川北良造	Kiji master, Living National Treasure
4	Kazuo Satake 佐竹一夫	Kiji master
5	Kiji apprentice 1	Wood turners
6	Kiji apprentice 2	
7	Kyushitsu master	Priming/intermediate coating artisans
8	Kyushitsu apprentice 1	
9	Kyushitsu apprentice 2	
10	Uwanuri master	Top coating artisan
●	Me	Participant and observer

LIST 2. INSTITUTIONS REPRESENTED IN THE PRACTICE

A	Ishikawa Prefectural Technical Training Center for Yamanaka Lacquerware 石川県立山中漆器産業技術センター
B	Yamanaka Lacquerware Cooperative Association 山中漆器連合協同組合
C	Yamanaka Lacquerware Traditional Industry Exhibition Hall 山中漆器伝統産業会館
D	Yamanaka Society for the Preservation of Woodworking Technologies 山中木地挽物技術保存会
E	Kyoto Institute of Technology 京都工芸繊維大学
F	Japan International Cooperation Agency 独立行政法人国際協力機構

LIST 3. PRODUCTION UNITS INVOLVED IN THE PRACTICE

»	Japan Crafts Oshima 株式会社大島東太郎商店
»	Yamanaka Wood and Timber Resources Management Facility 山中木材協同組合連合会
»	Rokuro No Sato Lathe Workshop ろくろの里工芸の館
»	Coating Workshop 株式会社塗工房

4.2.2

Case II: Notations

INDIVIDUALS- INSTITUTIONS	PRODUCTION UNIT / PLACE	PROCESS	STAGE	MATERIAL	TOOLS & EQUIPMENT	MODALITY	
1 – B, C ● – E, F	Japan Crafts Oshima / Ishikawa	Planning	Initial discussion	None	None	Linguistic	
			Invitation				
1 – B, C 2 ● – E, F		Organizing	Observing			Linguistic and non-linguistic	
1 – B, C 3 – A ● – E, F	Technical Training Center / Ishikawa		Observing and practicing	Mizume	Lathe, carving tools	Non-linguistic	
1 – B, C 4 – D ● – E, F	Rokuro no Sato / Ishikawa						
● – E, F	Studio / Kyoto	Designing	Analyzing	Mizume and urushi	Annotations		
2 ● – E, F	Japan Crafts Oshima / Ishikawa		Coding		Sketching tools, digital drawing		
● – E, F			Blueprinting				
1 – B, C 2 ● – E, F	Wood Resources Management Facility / Ishikawa	Woodworking	Substrate	Mizume	No data	Linguistic	
2 4 – D 5 6 ● – E, F	Rokuro no Sato / Ishikawa				Codes, pencil, saw, lathe, carving tools, boiler, drying unit	Non-linguistic	
2 7 ● – E, F	Coating Workshop & Japan Crafts Oshima / Ishikawa	Lacquer coating	Priming	Urushi	Sandpaper, brushes and spatulas, heating unit		
2 8 9 ● – E, F					Intermediate coating	Grinding powder, rice paper, brushes and spatulas	
2 10 ● – E, F					Top coating	Codes, pigments, brushes and spatulas	

How much materiality is needed to articulate knowledge?

The following case covers a project conducted in a fairly distinct scenario. Besides the territory, the culture, and the conditions of the craft industry in which it took place, the design intention was what made this project different from the previous one. Case I reported some practices in which material and non-linguistic symbol systems facilitated knowledge sharing. Case II also examines materiality and its potential in that regard, but instead of delving into the representation of already given principles and processes, it describes a project which focused on localizing them first.

Informed by ‘Translations’, ‘Notations’ continued to explore the relation between objects and subjects, as well as the processes by which their interactions are enabled. The project originated from the study of *Zi zaat*, a bamboo craft technique practiced in Hong Kong. Being overpopulated, mega-centralized, and heterogeneous, the city and its dynamics influenced the approach to collaboration in various ways. From the multiplicity of ideologies to the confluence of different

Table 3. Ecology of Practice, Case I: ‘Translations’

urban rhythms, the culture in which this project was inscribed allowed us to establish a more plural practice, but also one that resulted more hectic and chaotic.

Context of the study

‘Notations’ was undertaken during a five-month mobility program in Hong Kong. This program was organized in the context of a bilateral agreement between the Aalto University School of Arts, Design and Architecture (Finland) and the Hong Kong Design Institute (HKDI, Hong Kong), the purpose of which is to promote institutional cooperation, academic interchange, and cross-cultural understanding. Through this scheme, the HKDI invites overseas scholars to enroll in educational activities and conduct independent studies advised by senior academics.

The project was supported by the Vocational Training Council of Hong Kong and developed within the ‘Visual Arts and Culture’ program at the HKDI’s Department of Design Foundation Studies. Its practical implementation was made possible through the deliberate participation of one production unit, two craftspeople, and one external advisor. Before describing the rest of the case and detailing its ecology of practice, a general outlook of the craft industry in Hong Kong will be provided along with an explanation of the Zi zaat technique.

Craft situation in Hong Kong

Hong Kong struggles quite significantly with the preservation of traditional craft. It also has a rather short history in practicing proper measures to do so. The following paragraphs recount how, besides the politics of its national institutions, the reason for this relies on cultural factors.

In 2004, the Chinese government ratified the Convention for the Safeguarding of the Intangible Cultural Heritage, a treaty adopted by the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO). Later in the same year, the Hong

Kong Special Administrative Region (HKSAR) gave formal consent to extend the treaty to its territory. The Convention entered into effect in 2006, after which the HKSAR government instituted the Intangible Cultural Heritage Office (ICHO, formerly Intangible Cultural Heritage Unit) to work in compliance with the standards stipulated by the UNESCO.

The ICHO undertakes all kind of efforts related to the “identification, documentation, research, preservation, promotion, and transmission of intangible cultural heritage” (Intangible Cultural Heritage Office of Hong Kong, 2017, Section 1), where ‘intangible cultural heritage’ is defined as a body of “practices, representations, expressions, knowledge, [and] skills [...] that communities, groups and, in some cases, individuals recognize as part of their [culture]” (United Nations Educational, Scientific and Cultural Organization, 2003, Art. 2.1). In conformity with the Convention, certain social practices such as traditional craftsmanship are also encompassed in the definition.

Following these criteria, the ICHO published the first Intangible Cultural Heritage Inventory of Hong Kong in 2014 (Hong Kong Intangible Cultural Heritage Database, 2014). The publication gathers a total of four hundred and eighty items illustrative of this asset, from which more than one hundred are cataloged as ‘traditional crafts’. Zi zaat products were included in this classification and later incorporated into the ‘Representative List’ of the inventory. The representative list comprises twenty items selected on the basis of their need for urgent safeguarding measures.

As noted above, all efforts to promote and uphold the so-called intangible heritage may be well ascribed to political agents and robust institutional apparatuses. However, for the particular case of traditional crafts, the prognosis does not seem as promising as it should. The problem appears to be related to ideology more than politics, partly because the local craft culture is not as vivid, but mainly because most techniques are still practiced with extreme jealousy: traditionally, master artisans overprotected their working methods and did not transfer any knowledge to their employees in order to avoid brain drain (Cheung, 2016), so most apprentices acquired their skills in secrecy. This impeded the development of proper mechanisms to

register and archive data, information, and knowledge related not to the products, but to the techniques involved in the manufacturing of these products; it also blocked the permeation of local craft knowledge into the public domain.

On the other hand, when the mainland opened its markets, the manufacturing costs in Hong Kong increased tremendously. The made-in-China phenomenon impacted the Hong Kong economy and brought manifold consequences to its craft industry. This aspect also influenced the belief that opting for a career in the field was not the brightest decision (Chan & Bok, 2013).

To summarize, while some institutional and political endeavors are undertaken to uphold Hong Kong's cultural heritage, it is an ideological stance what maintains craftsmanship in turbulence. As a result, traditional craft practices are not only suffering from cultural impoverishment, but they are also swiftly fading into obscurity.

Zi zaat

Zi zaat is the Cantonese equivalent of the Mandarin word *zhǐzhá* (roughly translated as 'paper craft'). The term refers to the Taoist tradition of building paper figures with supporting structures made of bamboo. Such figures, namely floral tributes, lanterns, dragons, lion heads, and effigies in general, play an essential role in religious rituals and festivities. *Zi zaat* objects are burnt as offerings to the deities or the deceased in temples, graveyards, and other places of Taoist worship. The practice dates back to the 11th century in China, and it is believed to have replaced the living offerings used in ancient sacrifice ceremonies. The social purpose of modern *Zi zaat* is therefore metaphorical rather than practical, thus carrying a complex body of cultural, historical, and religious implications.

Its building process resembles a miniature version of traditional scaffolding, perhaps because both practices share a common structural logic and employ the same main raw material. In Hong Kong, bamboo ranks as the most widely used scaffolding product (Hong Kong Construction Industry Council, 2017). Its supply is therefore constant and involves the participation of numerous industries. From

harvesting to construction, bamboo represents a profitable commodity due to its fast growing pace and outstanding mechanical properties. The material is hence widespread throughout the Chinese territory; it is not only found in groves or farmlands but also routinely observed in the urban context.

It is of no surprise that bamboo is largely used in craft products as well. Since its origin, the practice of *Zi zaat* took great advantage of its properties, developing a materially affordable technique that mainly relied on manual labor and did not necessitate the intervention of any sophisticated technology. The production of *Zi zaat* artifacts, however, is nowadays a fading tradition which seems neither economically rewarding nor environmentally sustainable (Chan & Bok, 2013). Nonetheless, the craft has managed to survive and maintain its original production process practically intact.

The process, as learned through first-hand experience, consists of three major stages: (1) *cutting*, (2) *shaping* and *assembling* the structure, and (3) *covering* the structure with paper. The following list describes each of the steps involved in them. Note that the third stage is not described because the present case focuses only on the production of the bamboo structures.

- 1 Cutting: preparing the bamboo strips.
 - The bamboo is extracted and set aside to dry. No special treatment is required because the artifacts are not intended to be long-lasting.
 - A blade is used to cut the culms into flat strips. Regardless of the scale of the desired object, the strips are invariably about five millimeters wide and one millimeter thick; these features are predetermined by the cutting tools.
 - Once cut, the edges are sanded to prevent splintering.
 - The strips are trimmed according to the length, or rectified length in the case of arcs, of each part specified in the design. Although designing *Zi zaat* items does not entail a systematic process, bamboo masters use drawings and similar media to visualize all parts within the whole and define an assembly sequence. Due to the lack of further systematization, this step takes a long time and is often

- performed on a trial and error basis.
- 2 Shaping and assembling: joining the strips together to build the supporting structure of the effigy.
 - Once all parts have been trimmed, each one is numbered according to the assembly sequence. Usually, every part is different from the next one, so this sequence is determined intuitively and does not follow any predetermined rules, patterns, or standardized conventions.
 - All parts are pre-shaped before assembly. Pre-shaping is achieved by carefully bending the strips by hand. Common shapes include straight lines, arcs, and open curves; but circles, ellipses, and other types of closed loops are preferred. Unlike open parts, closed loops make the assembly easier because they already form two-dimensional figures. When they are intersected, a three-dimensional geometry is produced, giving structural support to the object and making it gradually steadier.
 - To form a closed loop, the strip is bent so that both of its ends overlap in an area of about two to three centimeters. The contact area is bound with glue and fastened with rice paper thread. To strengthen the joint, the same thread is used to tie a knot around it. This procedure is made by hand and occasionally assisted with a plier.
 - Before assembling different parts together, a pencil mark is traced on the strips where the joints will be located. Each joint follows the same principle: gluing the contact area, fastening the pieces together, and tying a knot. Two main types of joints are employed: (a) binding the edge of one strip to any point within the length of the other, and (b) binding two strips by intersecting them at any point but their edges. The orientation of the strips in a joint follows no particular logic; however, perpendicular arrangements are prevalent.
 - The construction of the piece continues with the sequence described earlier, yet each part needs test-fitting before gluing. As this step is also performed on a trial and error

basis, it is not uncommon to improvise. Completion time varies according to the size and difficulty of the design. Once the structure is finished, paper coverings can be immediately applied to it.

Project description, ecology of practice, and data set

As reported previously, Zi zaat relies primarily on manual skills and often resorts to improvisation. The technique itself favors intuition over rationality (cf. Schön, 1983), resulting in a generally loose practice which hardly allows systematic thinking. Establishing a collaboration with Zi zaat artisans was thus expectedly tricky. As in the previous case, language barriers and the absence of verbal language worsened the situation. The lack of a systematized practice, however, brought greater difficulties: organizing work became the most serious challenge faced throughout the project.

Cases I and II describe similar projects dealing with the development of non-linguistic symbol systems. Still, the difference between them needs to be clarified: in the previous project, a series of pre-identified concepts were translated into codes to communicate principles and processes related to the practice in question, whereas in the present one, no concepts could be abstracted because no convention existed about the practice in the first place. The project led to a thorough study of the technique, followed by a conceptualization phase in which this aspect was countered. The focus, then, was not *representing* but *localizing* entities to later assign them meanings by convention. As the name suggests, 'Notations' resulted in the development of a codification system intended to express, classify, and quantify the components and procedures involved in the making of specific Zi zaat objects.

Using the same structure as in the previous case, the following paragraphs describe the course of the project, detail its ecology of practice, and set the bases for a subsequent analysis. Further, Chapter 5 distills the findings and provides relevant insights related to the sub-question raised in the present case: how much materiality is needed to articulate knowledge?

The project did not run as smoothly as I would have hoped. Given the current outlook of craft in Hong Kong, not many facts about the industry could be gathered during my visiting period at the HKDI. Finding opportunities to organize workshop visits and on-site explorations constituted a difficult task as well. After several failed attempts, I eventually managed to spot some workshops and plan a few field trips. Among all places visited, the one that drew my interest was Bo Wah Paper Craft, a Zi zaat production unit located deep in the district of Sham Shui Po, an area predominantly inhabited by working-class citizens and immigrants from mainland China.

Bo Wah began operations in 1963, when master craftsman Wai-Kin Au-Yeung founded an effigy shop to seize the booming business of Zi zaat. Nowadays, the establishment is run by his son Ping-Chi, and it is one of the last standing businesses of its kind. Even though Zi zaat has slowly become an obscure industry, Ping-Chi has managed to maintain a well-reputed Bo Wah, recognizing that innovation is much needed in order to keep its heritage alive. Ping-Chi obtained a degree in design, but opted to take up his father's craft. In acknowledging innovation as the key to survival, he has gained recognition for being open to work on unconventional projects, as well as for using his design abilities to amaze his customers.

During my first visit to the workshop, I approached Ping-Chi to learn more about the technique. However, an immovable language barrier impeded communication. I soon realized that my intention was not even being understood, and the only thing I could think of at that moment was the need for translation. As my knowledge of the politics of craft in Hong Kong was limited, I was aware that even a change of modality would not allow me to understand certain cultural aspects embedded in it. So, instead of recurring to the method employed in Japan, I decided to look for an interpreter. This process was also complicated; fortunately, I could find a timely solution. Phoebe Hui, an HKDI scholar and interdisciplinary artist working in the intersection of language and technology, offered a helping hand. After she became fully acquainted with the objectives of the project, we planned a workshop visit to communicate them to the craftsman.

By the time communication was established, I had already stud-

ied the technique via other sources, e.g. visits to other workshops and intensive online searches (for reference, see Multimedia Information System of Hong Kong Public Libraries, 2017). Practically speaking, the project started during the conceptualization phase. The collaboration began in October of 2017 and lasted for three months. 'Notations' involved the participation of two artisans, Wai-Kin and Ping-Chi, and the interpreter, Phoebe, who also performed as an external advisor. The practice took place in two separate settings: the workshop in Sham Shui Po, located in the Kowloon Peninsula at the southern end of the mainland, and a studio, located in the Southern District of the Hong Kong Island.

The project saw the development of method for notating basic Zi zaat objects. Originally started as a alphabet, the project evolved into a visual system for representing the components required to build standardized shapes. To make this system possible, a set of parameters was used to define object properties such as width, height, radius, arc length, and space between components. Two values, minimum and maximum, were assigned to each property, producing bi-dimensional parts formed of straight lines, arcs, and a combination of the two (Fig. 8). All possible assemblages between parts were visualized in tables organized by type of part and type of joint, resulting in an assembly matrix for three-dimensional objects. Numerous figures were blueprinted following these criteria and Ping-Chi prototyped five of them in bamboo: a wheel, a column, a frustum, a dome, and a bullet (*Kowloon Series*, Fig. 9).

By doing so, it became possible to methodize the assembly sequence, classify similar parts and processes, and quantify the components and procedures required to build each figure. In other words, apart from delivering tangible outcomes, the collaboration yielded technical knowledge in the form of codified data (Fig. 10). Coding allowed to express basic figures in a systematized manner, whereas producing them in tangible form afforded a simple yet varied palette to speculate on objects of greater complexity. Altogether, the results could sample the constructive potential of the technique and synthesize the material lexicon of Zi zaat into an archetypal craft language.

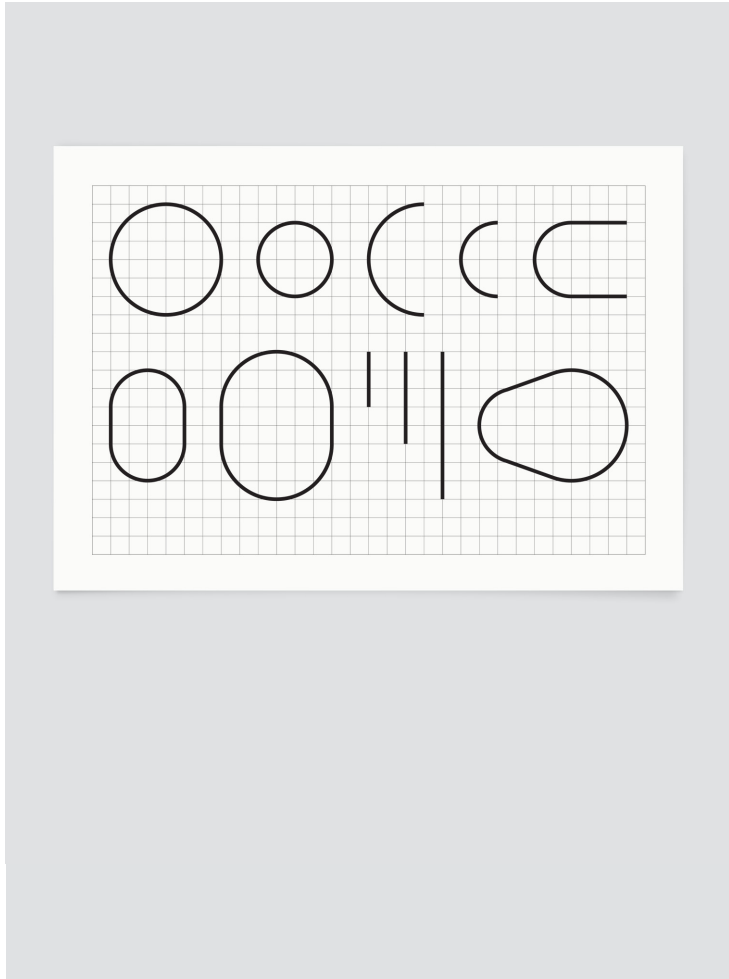
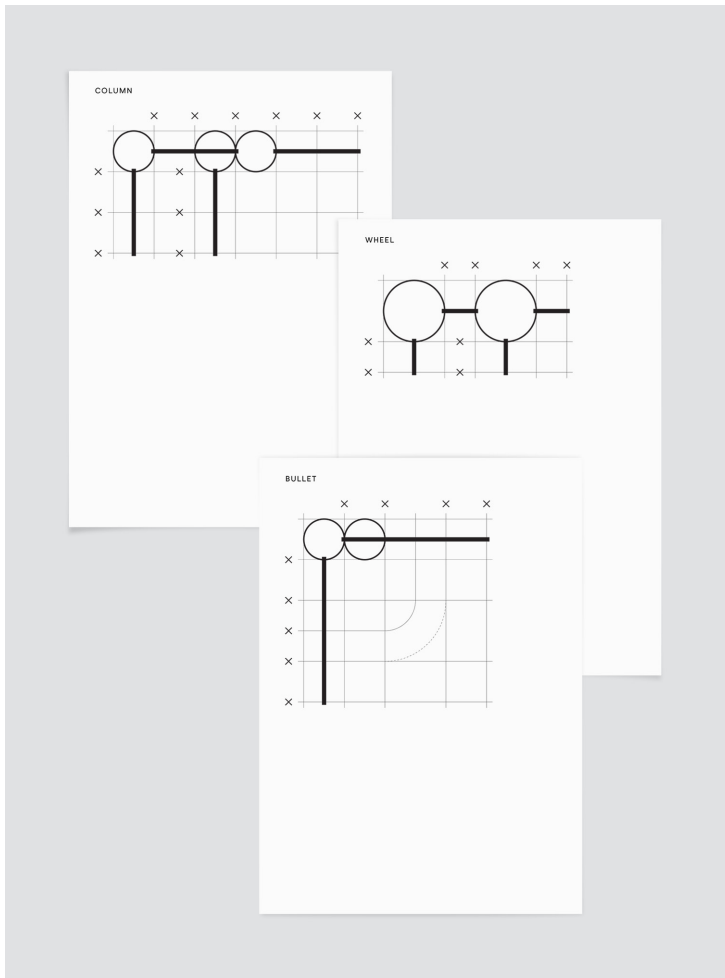


Figure 8. Two-dimensional parts formed of lines and arcs



Figure 9. Kowloon Series. Photography by Nils Håkon



The process was thoroughly documented. An extensive photographic record and over eighty minutes of video were captured from this project. Lists 4-6 enumerate the individuals, institutions, and production units involved in the project. Further, Table 4 details the ecology of practice described throughout the case. For a more comprehensive visual documentation of the project, refer to Appendix 2 at the end of this book.

Figure 10. Notations for some of the objects presented in Fig. 9

4.2.3

Case III: Variations

LIST 4. INDIVIDUALS AND THEIR ROLES IN THE PRACTICE		
1	Phoebe Hui	Interpreter
2	Wai-Kin Au-Yeung 歐陽偉乾	Bamboo master, decision maker
3	Ping-Chi Au-Yeung 歐陽秉志	Bamboo master
●	Me	Participant and observer

LIST 5. INSTITUTIONS REPRESENTED	LIST 6. PRODUCTION UNITS INVOLVED
A Hong Kong Design Institute 香港知專設計學院	» Bo Wah Paper Craft 寶華扎作

INDIVIDUALS- INSTITUTIONS	PRODUCTION UNIT / PLACE	PROCESS	STAGE	MATERIAL	TOOLS & EQUIPMENT	MODALITY		
1 - A ● - A	Bo Wah Paper Craft / Kowloon Peninsula	Planning	Initial discussion	None	None	Linguistic		
1 - A 3 ● - A			Interpretation					
2 3		Authorizing	Decision- making				No data	No data
3 ● - A	Studio / Southern District	Organizing	Observing and practicing	Bamboo	Writing and sketching tools	Non-linguistic		
● - A			Designing				Analyzing	Annotations
3 ● - A			Bo Wah Paper Craft / Kowloon Peninsula					Coding
● - A	Blueprinting							
3 ● - A	Studio / Southern District	Prototyping	Cutting	Codes, blades and knives, pliers, paper string, glue				
	Bo Wah Paper Craft / Kowloon Peninsula		Shaping and assembling					

How can materially articulated knowledge be reproduced?

Case III describes a project developed with a glassblower in Finland. At first glance, this case may appear homologous to its precedent one. However, the projects covered in each case differ in their approach towards articulation. The previous project aimed at codifying technical knowledge to facilitate the production of artifacts. This one, in contrast, concentrated on the skills needed to reproduce such technical knowledge through the production of artifacts. In other words, the focus escalated from organizing technical facts to capturing embodied knowledge.

Although this study was as challenging as the former two, its work setting was much more favorable. In the first place, all communication was held in English. The absence of language barriers enabled dialogue beyond mere verbalization. Additionally, the practice was conducted in a university context, which did not only provide state-of-the-art facilities but also a proper milieu for experimentation.

Lists 4–6. Individuals, institutions, and production units involved in Case II
Table 4. Ecology of Practice, Case II: ‘Notations’

Context of the study

‘Variations’ originated as an independent project during the course of my master’s degree studies at the Aalto University in Finland. The project was advised by lecturer Heikki Määttä and made possible with the cooperation of lecturer and glass artist Kazushi Nakada. All tasks performed throughout the study took place at the *Lasistudio* (literally ‘Glass Studio’) of the School of Arts, Design and Architecture in Helsinki. As in the previous cases, a general overview of the practice will be provided before giving any details about the project.

Glass working in Finland

Unlike the two techniques described earlier, glass working is not indigenous to any particular region or cultural territory. Nonetheless, the style of the practice varies from place to place, resulting in technical features and artistic manifestations which are either a consequence of the technologies available or a mirror of cultural phenomena. As the present case covers a glass project developed in Finland, the style in focus is that of *Scandinavian glass blowing*. Although Finland does not geographically belong to Scandinavia, such is the technical name of the style taught and practiced in the country.

Glass design played an important role in shaping Finnish culture (for a historical overview of Finnish design, see Korvenmaa, 2009). With its origins heavily rooted in craft, design in Finland emerged from the professionalization of applied arts. The history of Finnish design narrates the gradual achievement of one national identity championed by the cooperation of institutions and industries, in which education and formal training in the field constituted the essential pillars. The key moment in this narration is perhaps the establishment of the Craft School in 1871, which was later known as the University of Art and Design Helsinki and incorporated into the Aalto University as the School of Arts, Design and Architecture in 2010.

The professionalization of applied arts and crafts did not only bring new industries, markets, and labor forces; it also propelled the concept of ‘Finland’ within the continental Europe scene. In

reinforcing its presence at international fairs and world exhibitions, the country attained the legitimacy of its design as both a disciplinary practice and a disciplinary culture. The latter aspect led to the consecration of national heroes such as Alvar Aalto, Kaj Franck, Tapio Wirkkala, and Timo Sarpaneva, all of whose work supported the strengthening of nationalistic values and eventually became part of the repertoire of classic Finnish design, including that of glass.

Even though arts and crafts left an important legacy for designers, glass practices in Finland operated in a strict industrial design context. It was the designers who blueprinted the products and the factory workers who executed them, not really allowing the glass scene to mature as a craft. Despite the emergence of various cultural movements which could have been influential in changing this paradigm (e.g. the North-american Studio Glass Movement of the 60s), the industry continued to operate under the same industrial design tradition.

Finnish design schools kept graduating professional designers, and the major glass production centers in Finland continued to train highly skilled glassblowers. However, the fragmentation of design into multiple subdisciplines (Korvenmaa, 2009), added to the poor integration of designing and making, got the glass industry into trouble. With “factories closing down and schools being uncertain about their future” (van der Lei & Mavrostomos, 2014, p. 7), both the industry and the academia have now acknowledged that the future of glass may rely on collaboration.

Freehand glass blowing

Glass working can be classified into two general categories: *cold* and *hot work*. The first involves handling glass at room temperature, including techniques such as cutting, grinding, engraving, and polishing. Hot work, in turn, consists in manipulating the material at its plastic temperature. Depending on its composition, glass liquifies at approximately 1500°C and can be manipulated as the heat slowly decreases (Aoyagi, 2002). Blowing, which means inflating molten glass through a blowpipe, constitutes the most common hot work method. *Freehand*

glass blowing, or *free-blowing*, in contrast to *mold-blowing*, consists in the transformation of the material by using hand tools instead of casting methods. Freehand techniques are also more in line with the craft philosophy than with the industrial design tradition.

Blowing red-hot glass freehand demands advanced skills and the use of specialized instruments. As mentioned earlier, working styles vary from place to place. What distinguishes Scandinavian glassblowing from other techniques is the way of using certain tools, which also depends on how the work setting is organized. To facilitate the comprehension of the freehand blowing process, a representative list of the equipment and tools employed in this project will be presented first (for a detailed overview of these and other glassblowing tools, see Aoyagi, 2002; Corning Museum of Glass, 1980). The list encompasses the following:

1 Equipment:

- *Furnace*: an enclosed structure where previously prepared batches of glass are *charged* and heated. Furnaces are equipped with large pots, called *crucibles*, from which the molten glass is *gathered*.
- *Glory hole*: another furnace for reheating the glass when needed.
- *Annealer*: an oven-like structure for cooling down finished pieces and preventing cracks or breaks caused by thermal stress. The process of cooling down a finished piece is referred to as *annealing*.

2 Tools:

- Gathering *irons* and blowing *pipes*: iron rods for gathering glass and blowing it through. Both tools are about one meter and twenty centimeters long, with the only difference that blowing pipes are hollow. When the glass is gathered from the crucible, the piece to be blown is held from the end of the pipe. A special type of iron, called *pontil*, is used to *transfer* the glass from the pipe when the opposite side of the piece needs to be worked.
- *Marver*: a table-like surface made of steel or brass. Marvers are flat areas for rolling and smoothening gathered glass

before blowing it.

- *bench*: the main workstation. Here, the glassblower sits and organizes the rest of the hand tools. Benches are about one meter wide and have two parallel rails in which the blowing iron can roll back and forth.
- *block*: a solid, water-soaked piece of wood with a round concave section and a handle. This ladle-like tool is used to smoothen the glass, make its shape even, and help pre-forming the object.
- *jack*: a large tweezer-like tool with two parallel blades. Jacks are used for shaping the object by pressing, stretching, and widening the glass piece.
- *puffer*: a thin blowing conduit with a conical spout. Puffers are used to blow glass pieces which are already transferred into pontils.
- *caliper*: a metal instrument with two hinged, adjustable legs. Calipers are used for measuring the object and verifying its size and proportion.
- *shears* and *blades*: cutting instruments mainly used for trimming the glass piece but also employed to make stress marks on it.
- other tools and safety wear include heat-resistant gloves, eyeglasses, and protective sleeves.

Free-blowing relies on a combination of dexterity and creativity. The process is highly performative and therefore enables reflection-in-action (Schön, 1983). The possibilities of the technique are thus practically endless. The following list describes the basic steps for blowing a sphere and transforming it into a predetermined design (Fig. 11). As the title of this project suggests, the rest of the artifacts produced through the collaboration constitute *variations* of this predetermined design. Therefore, their fabrication employs the same tools and follows a similar process.

1 Blowing a sphere:

- The blowing pipe is introduced into the furnace to gather a lump of molten glass from the crucible. The glass is gathered by rotating the pipe until enough material



Figure 11. A drawing of the predetermined design

- accumulates and sticks to the end of the rod. The pipe needs continuous and uniform rotation at all times to prevent the red-hot glass from dripping off.
- The gathered lump is evened and smoothed by rolling the end of the rod over the marver.
 - Once the lump becomes a uniform mass, the blower moves to the bench and continues rolling the pipe on its rails with the left hand. The right hand is used to manipulate the rest of the tools.
 - The glass is blown through the pipe, producing a small bubble to be evened with the lower end of the jack. This process is repeated several times until more glass is needed.
 - A second layer of glass is gathered from the furnace. The blower moves back to the bench and shapes the resulting lump with the block. A piece of wet newspaper can be used to smoothen the glass as well. Rotation continues at all times by rolling the rod back and forth; the blower's body moves accordingly. The process of gathering additional layers of glass can be repeated as many times as necessary.
 - The glass is blown through the pipe producing a much larger bubble. Its diameter depends on the amount of glass gathered and the pressure applied while blowing. Its length, in turn, depends on the inclination of the pipe. The bubble can be elongated by gravity and deformed by centrifugal motion; therefore, consistent rotation, full control of one's bodily movements, and attention to external forces are very much required to achieve a uniform sphere. The resulting piece consists of three main sections: (1) the *mouth*, which covers the area attached to the rod; (2) the *body*, which includes the hollow part of the bubble; and (3) the *bottom*, which comprises the round end of the glass and generally becomes the base of the final object.
 - Once the bubble is formed, the piece is smoothed with the block and tightened with the jack at its mouth end.

- Finally, a constriction is made to close the sphere and help the blower knock it off the pipe.
- 2 Transforming the sphere into the predetermined design:
 - The design is usually presented to the glassblower in the form of drawings or sketches. The object is measured with the caliper directly from the drawing.
 - Before shaping the object, the sphere needs to be transferred to a pontil. This task is assisted by a second blower or a workshop apprentice.
 - The piece is turned around by attaching it to the pontil and releasing it from the pipe. At this point, the glass has started to cool down and needs to be reheated in the glory hole.
 - As the glass recovers its plasticity, the blower moves back to the bench and uses the jack to open the constriction. With continuous rotation, the sphere is slowly widened until it becomes the desired object. This process is called flaring and also consists in smoothening the edges of the piece.
 - Depending on the complexity of the design, different combinations of re-gathering, reheating, reshaping, and flaring may be needed. If the design demands additional blowing, the puffer is used for this purpose. Throughout the process, the caliper is used to verify the proportions of the piece as specified in the design. Shears and blades are used for trimming excess material.
 - Once the final piece is achieved, a new constriction is made so that the glass can be knocked off the pontil.
 - The piece is released from the iron rod directly into the annealer. Depending on the size of the piece and the type of glass used, annealing time may vary from a few hours to a few days.
 - After annealing, the piece is ready for cold work, which may include grinding any pontil mark, sanding the edges, and polishing the piece.

Project description, ecology of practice, and data set

As reported earlier, free-blowing is a complex activity that requires the integration of technical and embodied knowledge. The act of blowing glass emulates an intricate choreography in which the correct interplay of time and motion is essential to deliver successful outcomes. With the objective of capturing such embodied knowledge, this project examined the production process of a series of artifacts blown by glass artist Kazushi Nakada. The following paragraphs describe the course of the project, detail its ecology of practice, and set the bases for a subsequent analysis. Findings from this case, reported in Chapter 5, provide a response to the sub-question at issue: How can materially articulated knowledge be reproduced?

The project was planned in January of 2017 and carried out from March to May of the next year. Even though all the hot work was completed in less than ninety minutes, other processes such as taking an introductory glass course, familiarizing with the tools, discussing preliminary ideas, conceptualizing the design, conducting the post-production phase (i.e. the cold work), assessing the outcomes, and reflecting upon the practice made the project much longer. The first stages focused on establishing communication and defining the objectives, after which several glassblowing sessions were organized.

During the hot work, the starting point, as expressed in Fig. 11 (page 90), consisted in shaping a cylindrical body with a hemispherical bottom. The shape of this object was determined by two parameters: (1) a radius value, applicable to both the spherical and cylindrical sections; and (2) the length of the cylinder, which equaled its radius. In practice, the first condition would be achieved with the correct blowing pressure, and the second would result from the interplay of gravity and the shaping skills of the blower. Although arbitrary, the restriction of such parameters allowed a systematic study of the blowing process.

Several iterations of the initial object were blueprinted, all of them composed of different arrangements of the same cylinder and the same sphere (Fig. 12). Seven of these objects were blown by Kazushi, from which five resulted in successful outcomes (*Helsinki Series*, Fig. 13). The blowing process was captured on video, facilitating a visual

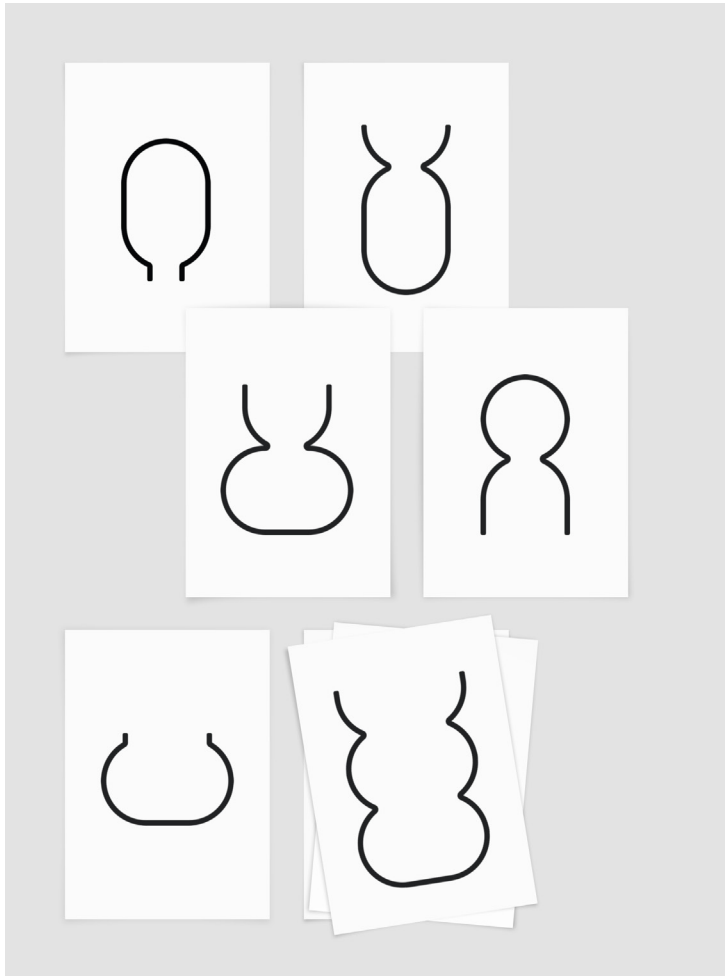


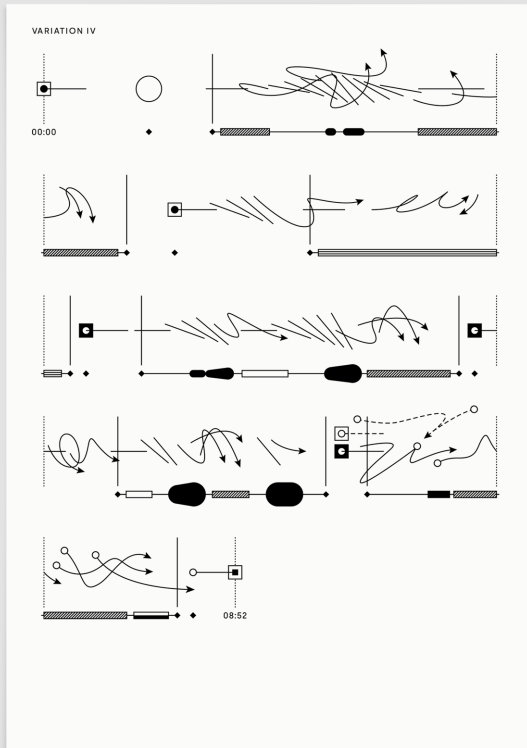
Figure 12. Variations of the predetermined design shown in Fig. 11

record of the bodily movements required to achieve each piece. The tools utilized and their relationship with motion were also registered. This led to the development of a notated representation of the whole blowing process, in which tools and embodiments could be visualized as a continuous workflow in time. As a result, the project saw the production of artifacts along with a visual score indicating how to execute the initial glass piece and its variations (Fig. 14).

Lists 7-9 report the individuals, institutions, and production units involved in the project. Further, Table 5 organizes the ecology of practice described throughout the case. For a more comprehensive visual documentation of the project, refer to Appendix 3 at the end of this book.



Figure 13. Helsinki Series. Photography by Ayaka Inoue



LIST 7. INDIVIDUALS AND THEIR ROLES IN THE PRACTICE

- | | | |
|---|----------------|--|
| 1 | Kazushi Nakada | Glass artist, workshop master |
| 2 | Apprentice 1 | Blowing apprentice, workshop assistant |
| ● | Me | Participant and observer |

LIST 8. INSTITUTIONS REPRESENTED

- | | |
|---|------------------|
| A | Aalto University |
|---|------------------|

LIST 9. PRODUCTION UNITS INVOLVED

- | | |
|---|------------|
| » | Lasistudio |
|---|------------|

INDIVIDUALS- INSTITUTIONS	PRODUCTION UNIT / PLACE	PROCESS	STAGE	MATERIAL	TOOLS & EQUIPMENT	MODALITY
1 - A ● - A	Lasistudio / Helsinki	Planning	Initial discussion	None	None	Linguistic
● - A		Organizing	Introduction to the workshop	Glass	Furnace, marver, irons, pipes, bench, blocks, jacks, glory hole, annealer, puffer, caliper, shears, safety wear	Non-linguistic
			Taking glassblowing lessons			
			Blowing			
1 - A ● - A ● - A		Designing	Analyzing	Annotations		
			Coding	Sketching tools, digital drawing		
			Blueprinting			
1 - A ● - A		Executing 'Hot work'	Blowing	Codes, furnace, irons, pipes, pontils, bench, blocks, jacks, glory hole, annealer, puffer, caliper, shears, safety wear		
			Shaping			
● - A		Studio / Helsinki	Visualizing	Analyzing	None	Codes, video recordings, annotations, sketches
1 - A ● - A	Re-coding					
● - A	Rendering the score			Digital drawing		

Figure 14. Score for one variation of the predetermined design

Lists 7-9. Individuals, institutions, and production units involved in Case III
Table 5. Ecology of Practice, Case III: 'Variations'

4.3

Units of Analysis and Data Synthesis

Cases I-III yielded a vast amount of data. One of the major challenges of this study consisted in defining the direction of the analysis and prioritizing certain types of data over others. As explained in Chapter 2, the research design draws on Practice Theory (Bourdieu, 1977; Giddens, 1984; Schatzki, 2001), Actor-Network Theory (Latour, 2005), and Knowledge Creation Theory (Håkanson, 2007; Nonaka & Takeuchi, 1995) to propose conceptual devices such as *ecologies of practice* and *articulation mechanisms*. All of these were indeed useful in delimiting the research and seemed promising for analyzing the cases. The next paragraphs explain how I utilized one of these conceptual devices to define the units of analysis and proceed with the interpretation of data.

Units of analysis

As the subtitle of this thesis suggests, what the present research intends to analyze is the practice of collaborative craft. To that end, a potential unit of analysis could have been what I had defined as an

ecology of practice. Worth to remind, an ecology of practice concerns the ecosystems in which practice is embedded. These include the natural and human-made environments, infrastructures, interfaces, networks, and mediums of transaction that enable the entanglement of objects and subjects in collaborative craft processes.

Utilizing this conceptual device seemed appropriate because it would have allowed the organization of multiple types of data in a unified manner. However, the data evidenced that the ecologies of practice reported in the study entailed collaborative as well as non-collaborative activity. To clarify, non-collaborative activity comprises either individual processes or group processes where labor was divided instead of integrated. To provide a coherent study and facilitate its interpretation, I decided to narrow down the units of analysis from whole ecologies of practice to specific collaborative moments occurring within such ecologies. As Yin advises, “the more a study contains specific propositions, the more it will stay within feasible limits” (1984, p. 22).

The ecologies of practice reported throughout Cases I-III (as illustrated in Tables 3, 4 and 5, in pages 70, 84, and 99, respectively) consisted of the following elements: individuals, institutions represented by individuals, production units, physical environments, geographical settings, processes, stages within processes, materials handled, tools and equipment used, and modalities employed. To procure a more consistent analysis, I re-specified the units of analysis as those moments of practice which fulfilled all of the following criteria:

- i A material was handled during a process or a stage within a process,
- ii this material was handled by two or more individuals including myself,
- iii the handling of this material entailed collaborative activity beyond a mere division of labor, and
- iv this collaborative activity occurred only in non-linguistic modalities.

Any other moment not complying with these standards was automatically excluded from the scope of the analysis. Although all

stages in each project contributed to the formation of knowledge and allowed other processes to emerge, the core of this thesis resides in the moments where articulation resulted from collaborative practice. Additional elements such as institutions, geographies, or tools were not completely discarded because, in any case, they remained embedded in individuals, materials, and the outcomes produced.

Data Synthesis

The aforementioned criteria permitted me to extract the collaborative moments of each project and identify the processes of socialization, externalization (Nonaka, 1994; Nonaka & Takeuchi, 1995), documentation, and reflection (Mäkelä & Nimkulrat, 2011) occurring between individuals. Table 6 synthesizes the data collected from the study and highlights some patterns encountered throughout the cases. It is worth to note that the formation of codes (externalization) took place during these collaborative moments and occurred after other shared activities such as observing, practicing, recording evidence and making annotations (socialization and documentation). In all cases, the resulting artifacts were materialized based on their preceding codes, which confirms that collaborative craft practices can yield codified knowledge besides material outcomes (see Fig. 3 on page 35). Even though codification does not equal articulation, it is the formation of codes what allows knowledge to be articulated (Håkanson, 2007). To this end, common codes stem from previously acquired and recorded knowledge, and they enable articulation through conscientious, shared thinking (reflection).

CASE I: TRANSLATIONS

INDIVIDUALS	STAGE OF THE PROCESS	MATERIAL	MODALITY
Toyoki Oshima, Ryozo Kawakita, and me	Observing and practicing T→T	Mizume	Non-linguistic
Toyoki and Taro Oshima, Ryozo Kawakita, and me			
Taro Oshima and me	Coding T→E	Mizume and urushi	
Taro Oshima, Kazuo Satake, the Kiji apprentices, and me	Substrate POA		
Taro Oshima, the Kyushitsu master, and me	Priming POA		
Taro Oshima, the Kyushitsu apprentices, and me	Intermediate coating POA		
Taro Oshima, the Uwanuri master, and me	Top coating POA		

CASE II: NOTATIONS

INDIVIDUALS	STAGE OF THE PROCESS	MATERIAL	MODALITY
Ping-Chi Au-Yeung and me	Observing and practicing T→T	Bamboo	Non-linguistic
	Coding T→E		
	Shaping and assembling POA		

CASE III: VARIATIONS

INDIVIDUALS	STAGE OF THE PROCESS	MATERIAL	MODALITY
Kazushi Nakada and me	Glassblowing lessons T→T	Glass	Non-linguistic
	Practicing T→T		
	Coding T→E		
Kazushi Nakada, the blowing apprentice, and me	Blowing POA		
Kazushi Nakada and me	Shaping POA		

T→T Tacit-to-tacit conversion
i.e. Socialization and Documentation

T→E Tacit-to-explicit conversion
i.e. Externalization and Reflection

POA Production of Artifacts
i.e. Yamanaka Series, Kowloon Series, and Helsinki Series

5

Findings

This thesis aimed at identifying the type of knowledge that can be articulated through collaborative craft. The study covered three projects undertaken in different settings where collaborative and non-collaborative stages took place. The research findings suggest that the type of knowledge articulated through collaboration differs greatly from that articulated in non-collaborative contexts. Additionally, the study proved the significance of materiality as a vehicle for non-verbal expression, especially when communication was obstructed by cultural or linguistic dissimilarities.

Rather than presenting craft and design as two separate realms, the approach towards collaboration strives to integrate them into a single ecology of practice. Nevertheless, a distinction between the dominant skills of a craftsperson and those of a designer needs to be pinpointed for two reasons. First, this thesis refers to 'collaborative craft' as a practice involving the participation of individuals with different, perhaps complementary, skills. Only after distinguishing the differences between such skills could I answer the research question. Second, my role in the study favored analysis over creation. Although I did participate in the study as a maker, I primarily performed as a designer-researcher. Therefore, this thesis illustrates the interpretation of data from a situated perspective and does not necessarily reflect the views of a craftsperson.

The following paragraphs highlight the main finding of the study and respond to the general research question. Successively, the next pages summarize additional findings and provide complementary insights by answering the sub-questions formulated in each case.

What type of knowledge can be articulated through collaborative craft?

Articulation between two or more individuals can only occur if they share a common tacit knowledge. In the context of craft alone, knowledge sharing happens through the socialization of skills. The act of making constitutes the primary means by which craftspeople share their abilities. Therefore, observation, imitation, and repetition, all of them constitutive of apprenticeship processes, represent quintessential forms of socialization in craft. When these processes take place,

tacit knowledge remains tacit while being transferred from one individual to another, yet it may become explicit through the materialization of artifacts. In the context of collaborative craft, tacit knowledge is also shared through socialization, and it also remains tacit when transferred from one individual to another. However, collaborative craft necessitates explication before materialization, so tacit knowledge does not become explicit through artifacts but through codes that facilitate their materialization.

The difference between codes and artifacts is that coding implies the representation of objects, whereas producing an artifact entails the manipulation of objects already represented by codes, even if such codes are not explicit. As asserted by Goel (2005, p. 127), designers deal with representations of the world, while craftspeople and makers manipulate the world itself (see also Dormer, 1997, p. 18). Integrating both ways of knowing presupposes a work approach that opposes hierarchical organization. Hence, socialization between craftspeople and designers allows richer transfer processes than socialization between craftspeople and their apprentices. In other words, since craftspeople and designers handle objects differently, their exchange of tacit knowledge happens dialectically.

To exemplify these ideas and relate them to the notions of non-collaborative and collaborative activity, I will refer to two events extracted from Case I:

- 1 During my visit to the technical training center in Yamanaka, Mr. Kawakita taught me how to turn a wooden bowl on the lathe. I first observed how he did it and then tried to turn the bowl myself. Even though I did not absorb his skills by imitating him, I understood the type of dexterity required to fashion that specific artifact. By looking-and-learning, I could internalize new knowledge. However, I could not externalize anything since my role was that of an apprentice. A vertical hierarchy was very much evident, partly due to the institutional context, but also because I was only reproducing a series of implicit codes pre-established by him. Further, the exact shape to be achieved was not represented anywhere; I just had a mental image informed by the piece he had made earlier.

- 2 Before the design stage, most of the activities took place at the woodturning workshop in the lathe village. By then, Mr. Satake had already agreed to join the project, and instead of seeing me as an apprentice, he thought of me as a collaborator. This allowed us to share our tacit knowledge in a two-sided way. He used his tools to manipulate the material and I used drawings to suggest alternative methods of manipulation. I did not gain his embodied skills and he did not acquire my representation abilities either, but we were able to create shared mental images before manifesting them materially. In that sense, our common tacit knowledge did not capture knowledge about making artifacts. Instead, it revealed knowledge about the conceivability of making such artifacts.

The first example narrates how tacit knowledge was transferred vertically, whereas the second recounts a process in which socialization occurred transversely. Most of the practices in this and the other two projects procured the same transversal dynamics. The three cases evidenced that transversality does not merely permit horizontal exchanges, but it recognizes knowledge as a multi-dimensional entity. In other words, while apprenticeship focuses on the vertical transmission of skills within a fixed disciplinary setting, collaborative practices allow the socialization of ideas, mindsets, and attitudes beyond hierarchies and across disciplinary cultures.

Case III, for instance, covered a project aiming to capture the embodied knowledge and skills of a master glassblower. That could have happened if I had spent years of practice to absorb the skills of the master, and if the master had allowed me to access his knowledge in the first place. What happened instead exemplifies the propositions made earlier in this chapter and clarifies the answer to the research question.

Kazushi kindly organized an introductory course for me. I could grasp the basic notions of glassblowing by taking the course and experiencing the process myself. I did not acquire enough embodied skills to materialize my own design intentions, but I gained another type of knowledge by trying to do so. Observing Kazushi allowed me to understand the relationship between motion and shape in glassblowing,

and practicing led me to reckon the tremendous difficulty of enacting such relationship with my own body. Only after comprehending the latter aspect could I externalize my design intentions. However, this externalization did not occur through practice. As a matter of fact, it happened through codes representing embodied actions elucidated by practice. Such codes were tacitly shared between us and later articulated in the form of a score.

The score produced in Case III does not really serve as a guide to execute a glass piece, and it may be incomprehensible to people who did not participate in the project. However, its utility resides in the fact that it comprises a designerly way (see e.g. Cross, 1982, 2001) of understanding a process and externalizing the tacit knowledge that surrounds it. During the practice, the very idea of producing a score allowed us to create a common code to articulate the glassblowing process without having to perform it at the same time (cf. Schön, 1983). We thus could use our imagination and create shared mental images of how to execute new pieces. As Scharmer insists, “imagination holds images of not-yet-fully embodied realities” (2000, p. 37), so their explication shall not be attained through shared praxis but through shared reflection (cf. Mäkelä and Nimkulrat, 2011, p. 8).

The analyses from this case, along with those of the previous ones, suggest that the type of knowledge that can be articulated through collaborative craft is that of not-yet-embodied tacit knowledge. As elaborated before, such type of knowing does not capture skills about making artifacts but rather reveals knowledge about the conceivability of using such skills to make artifacts. While embodied knowledge deals with the ability to do things, not-yet-embodied knowledge deals with the originating sources of doing them (Scharmer, 2000), meaning that, in collaborative practices, the production of artifacts is not the primary means by which articulation is attained.

Craft and design scholars have largely discussed the impact of artifacts in knowledge creation, especially in the context of practice-led research. For instance, Nimkulrat stresses that “artifacts can serve as inputs into knowledge production and as outputs for knowledge communication” (2013, p. 14). I would argue, however, that such a claim may only apply to artifacts created in non-collaborative contexts. In

practice-led research, practitioner-researchers produce artifacts individually and externalize their tacit knowledge through verbal reflection upon their individual practice. Consequently, no socialization occurs because no codes need to be interpreted by someone else in order to have the artifacts materialized. Collaborative practices, in contrast, necessitate the formation of codes before the production of artifacts, and such codes demand the comprehension of all practitioners. In other words, codes provide a common language between individuals and thus constitute the backbone of successful articulation in collaborative work.

While the main finding of this study does not disregard the proposition that artifacts contribute to the formation of knowledge in craft and design, it sheds light on why articulation in collaborative practices is primarily enabled by other material entities. In that sense, the conception of materiality expressed in the present thesis goes beyond artifacts to encompass all objects handled by the practitioners of an ecology of practice. These objects, in fact, precede artifacts and consist of the materials, tools, settings, systems, and environments that provide affordances (Gibson, 1979) to human subjects. Following these lines of thought, the next paragraphs provide answers to the sub-questions presented in each of the cases.

How can knowledge be articulated through materiality?

Case I illustrates the transfer of knowledge via non-linguistic modalities. Besides using drawings, sketches, and models as alternative means of communication, I encountered other objects through which knowledge could be transmitted.

During my visit to the Yamanaka Lacquerware Exhibition Hall, I found samples, collections, and catalogs displaying technical facts about the materials and processes employed in this type of craft (see Appendix 1 at the end of this book). One object which drew my attention was a wooden bowl split into halves to show its cross-section. Besides emphasizing the physical properties of the artifact, the cross-sectional cut clarified the concept of *tategi*: the direction of the grain allowed me to visualize how the log had been trimmed

and oriented on the lathe. This object did not only deliver technical knowledge but also triggered a not-yet-embodied notion of a specific embodied action.

The example cited above confirms the capacity of objects to spark articulation. Even though objects do not carry knowledge themselves, they allow knowing to arise (Lehtonen, 2014). In fact, a significant amount of knowledge in craft and design is produced and reproduced in material form, partly acquired through making and partly transferred through codes. Articulation, however, necessitates the transfer of codes “in relationship to previously acquired knowledge” (Håkanson, 2007, p. 65). Even when these codes are explicit, transferring them alone may fail to enable articulation.

How much materiality is needed to articulate knowledge?

Case II demonstrates that the amount of materiality does not matter as long as the practitioners can classify, quantify, and represent all objects involved in their practice. This does not necessarily mean that the fewer the objects the easier the articulation. Besides handling materials, tools, and physical settings, practitioners deal with mental images, ideas, beliefs, and other abstract concepts. All of these elements, along with tacit knowledge, integrate the communal resources (Wenger, 1998, p. 73-84) shared by the individuals of an ecology of practice. The way of utilizing this repertoire is what facilitates or obstructs articulation.

On the other hand, no material would allow the articulation of knowledge in the absence of a process. The relationship between materials and processes condenses the tension between knowing-what (representing) and knowing-how (manipulating). The research findings reveal that technology, conceived of as the utilization of knowledge in practical settings, mediates such tension by bridging the reality perceived through representation and the reality enacted through manipulation. This permits the integration of different skills and thereby the emergence of not-yet-embodied tacit knowledge. Thus and so, the question now would be: How much technology is needed to uncover not-yet-embodied tacit knowledge?

How can materially articulated knowledge be reproduced?

Case III aimed at answering this sub-question by reproducing a series of operations but revealed that knowledge needs its own reproduction mechanisms. To detail this point, I must remind that articulation follows the formation of codes, which in turn have to emerge in relation to previously shared tacit knowledge. In such a way, newly articulated knowledge could be reproduced as long as its codes remained explicit and the tacit knowledge underpinning them was still shared by all practitioners. However, the research findings demonstrated that the articulation process entails the formation of new tacit knowledge (see also Boisot, 1995; Håkanson, 2007; Resnick et al., 1991), which inevitably requires new articulation mechanisms.

As elaborated before, codes comprise a commonality of language which facilitates the explication of knowledge. Although codes and other symbol systems carry some degree of ambiguity and imprecision (Goel, 1995), no form of communication is completely unequivocal. The arbitrariness of language (Saussure, 1966), whichever modality it comes in, is what affords semiosis and poiesis. To that end, the formation of mental images, meanings, and codes implies endless re-signification processes which are inherently tacit. The only way to attain new explicit knowledge from previous articulations would be through what Nonaka & Takeuchi (1995) have referred to as the process of *combination*, which does not necessarily relate to the practice of materializing artifacts and is thus out of the scope of this thesis.

6

Discussion

6.1

Limitations of the Study and Recommendations for Future Research

Limitations of the Study

Based on the research design, two key limitations could be identified throughout this thesis. The first is concerned with the use of practice-led research as a method of inquiry, whereas the second relates to the drawbacks of employing a multiple case study.

On the one hand, practice-led research allowed me to conduct a methodologically sound process and analyze the data with scrutiny. However, it led me to explicate collaboration from an individualized point of view. Because practice-led study implies analyzing one's own activity, this type of research often limits the treatment of data to subjective, personal metrics. In an attempt to counter this, I opted to examine knowledge articulation beyond the constraints of individual practice. But even when the results were obtained from analyzing collaborative activity, their interpretation remained situated in my individual perspective as a designer, which neither includes the views of a craftsperson nor a collective understanding of the phenomenon at issue.

On the other hand, since the study was limited to three projects conducted in different places and at different times, it was impossible to assess how cross-cultural dynamics affect knowledge articulation over time. Employing a single longitudinal study could have been more appropriate in addressing this concern as well as in providing more specificity to the results. While I recognize that the value of my methodological choice resides in approaching knowledge articulation as a translocal phenomenon, I must also underline that the present thesis offers only a general view of knowledge articulation in regard to cross-cultural practices.

In addition to the two points listed above, an important limitation in framing the study was the existing gap between organizational knowledge creation and knowledge creation in craft and design. An exhaustive review of the literature evidenced that even when their objects of study seem distant from one another, both fields use the same sources, draw on the same authors, and inquire into the same phenomenon. Notwithstanding that, I found no evidence of prior research integrating them. Although this circumstance did not constitute a methodological problem per se, it was a major disadvantage during the development of the theoretical foundation.

The absence of prior research also led the study to become exploratory rather than explanatory, meaning that the results are not generalizable and their validation requires further inquiry. In acknowledging so, the next section pinpoints some opportunities for a future research agenda.

Recommendations for a Research Agenda

This thesis has discussed how craftspeople and designers articulate their tacit knowledge when they work together. Three topical issues concerning this phenomenon have persisted throughout the study: (1) the need to understand work settings as ecosystems constituted by subjects and objects, (2) the influence of objects in mediating the reality perceived through representation and the reality embodied through manipulation, and (3) the role of symbol systems in attaining articulation. In surfacing these issues, I suggest three avenues

of research that could provide a more complete understanding of knowledge articulation in collaborative craft contexts:

1 *Craft as Ecology:*

Besides capturing the essence of organized activity, the concept of ecology aims at transcending the mind-body dualism and dismantling the privilege of humans over non-humans. Although some schools of thought such as new materialism and object-oriented ontology are emerging to address these concerns, they still need time to mature as a field of inquiry. The present study would have benefited from a more established discussion on the topic. Research in this area is therefore pivotal in developing a coherent perspective on how objects matter in a context where materiality is already at the heart of the investigative process.

2 *Craft as Technology:*

We shall consider technology as the utilization of knowledge in practical settings. To that end, this avenue invites to analyze collaborative making from a production-oriented perspective. Whether scrutinizing traditional technologies or exploring experimental methods of fabrication, research in this area should delve deeper into processes, materialities, and the tensions between knowing-how and knowing-what beyond the constraints of individual practice. Although these topics have already been addressed by researchers in the field of arts and design, collaborative making still remains largely overlooked as a means of knowledge articulation.

3 *Craft as Semiology:*

This is perhaps the least explored of the three avenues proposed here. The concept of semiology tackles the relationship between the material reality and the devices we use to communicate it. Therefore, it entwines the knower and the known in the process of meaning-making. I have explained how collaborative craft necessitates the formation of codes prior to the materialization of artifacts. To that extent, researching craft as semiology aims at considering how symbol systems are not only produced as the consequence of an existing material reality, but also as the cause of bringing this reality forth into existence.

These avenues of research should facilitate a more contemporary comprehension of collaborative material practices, their disciplinary pertinence as a field of inquiry, and thus the scope of their objects of study. In addition to these recommendations, I encourage cautious and critical research at the intersection of fields. Even though some degree of disciplinary bias is always inevitable, cutting across domains sparks alternative ways of thinking, allows new relations to be formed, and offers a better-informed perspective.

6.2

Conclusions

This study set out to identify the type of knowledge that can be articulated through organized collaboration between craftspeople and designers. Empirical evidence demonstrated that craft and design practitioners are able to articulate their not-yet-embodied knowledge when they collaborate. The research findings also showed that even though not-yet-embodied knowledge emerges in shared praxis, it is shared reflection that permits its explicit articulation.

Besides giving the possibility to articulate knowledge, collaboration has the potential to trigger a positive exchange between craftspeople and designers. One key aspect about this positive exchange is the affordance of building a common language. As noted throughout Chapter 4, design and craft practitioners are able to communicate through making and materiality. Although one may assume that the sole act of materializing artifacts does not have enough leverage to solve major issues, it is the commonality of this language what allows such issues to be uncovered and channeled.

In a broader sense, collaborative craft constitutes a shared thinking-through-making process that seems crucial for two reasons. First,

making things collaboratively implies externalizing ideas, desires, and anxieties through materials, tools, and technologies. This process entails the emergence of non-linguistic modalities, thus transcending verbalization and facilitating a deeper dive into the tacit aspects of things. Second, combining thinking and making in a collaborative manner ignites the formulation of new types of logic, which inherently necessitate novel ways of externalization. While the latter aspect appears essential in problem solving, the former seems much more impactful in problem finding. Thereby, collaboration validates the act of making as a means rather than an end.

Materializing things collaboratively also offers us a way to participate in the world. Collaborative making is the means by which we interact with other subjects and establish relationships with objects. Moreover, it is the means by which we contribute to the transformation of the reality while having a chance to express ourselves. Throughout the research at hand, I have referred to collaborative craft as a socially organized practice concerned with the production of meanings via the materialization of artifacts. From this perspective, knowledge comprises a socio-material construct that emerges from collective experiences, representations, and transformations of the reality.

Accordingly, I have inquired into knowledge articulation by adopting an epistemological stance rooted partly in pragmatism and partly in phenomenology. I have then proposed a material-discursive practice theory to rethink the locus of subjects in relation to objects, putting knowledge forward as an empirical notion situated in practice, acquired through experience, and informed by relationships. This view echoes the ideas championed by Schön (1983), thus opposing the positivist school of thought and rejecting the rationalist paradigm of knowledge. The proposition of a material-discursive practice theory therefore aims at dissolving the dualism of body and mind, matter and meaning, and object and subject to claim for a monist account of existence.

In this view, the epistemological subject who knows through reason is first replaced by a phenomenological subject who rather acquires knowledge by participating in the world. The phenomeno-

logical subject is then de-centered and reinserted as a co-constituent of a much larger entanglement, which I have called ecology of practice, where other subjects and objects coexist, co-act, and contribute to the formation of knowledge simultaneously. This speaks much of the same language as Latour's (2005) Actor-network theory and DeLanda's (2006) new materialism, which neither privilege matter over meaning nor vice-versa. In other words, the 'I think and therefore I exist' shifts towards a 'things exist and we think through our interaction with them', legitimizing the notion of knowing-in-the-world and thus arguing for an ontological reconsideration of objects.

With *Objects of Knowing* I thus refer to two things. On one hand, I refer to those elements constitutive of the material reality which allow subjects to attain articulation. On the other hand, I refer to the fundamental purposes of conducting this investigative process: as discussed earlier in this chapter, the present study appears relevant for several reasons. First, it has implications in craft and design contexts as well as in organizational views of practice. Second, it interrogates the relationship between the representational and the embodied in settings where meaning and matter are entangled. Third, it explains the limits of knowledge creation and outlines the effects of articulation. And fourth, it gives us some ideas to speculate on the future of collaboration.

As a closing remark, I would like to briefly reassert the significance of discussing not-yet-embodied knowledge in the context of collaborative craft. Drawing on Scharmer (2000), I have previously explained how not-yet-embodied knowledge reveals the power of imagination upon not-yet-existing realities. Bringing imagination forth into existence is one of the purest manifestations of thought. As such, the act of articulating our not-yet-embodied knowledge with the purpose of materializing things presupposes a fundamental shift in how we perceive ourselves in the world. Consequently, collaborative craft does not only serve us as a tool to transform the reality, but also as a means to transform the way in which we comprehend it.

7

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8

Appendices

8.1

Appendix 1: Translations



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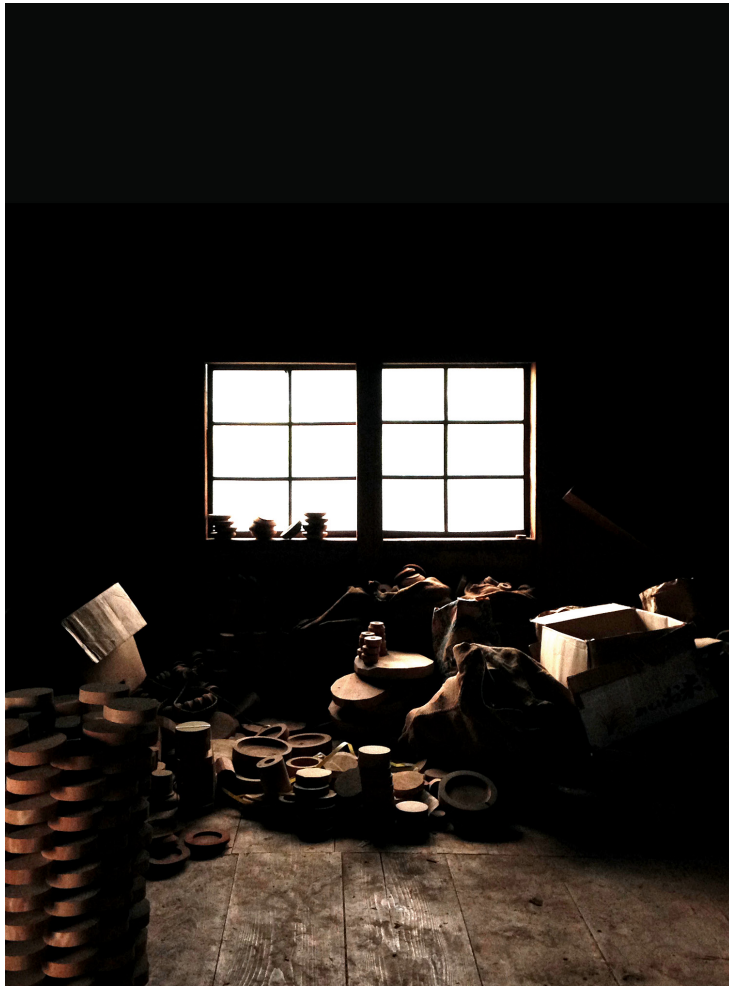
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8.2

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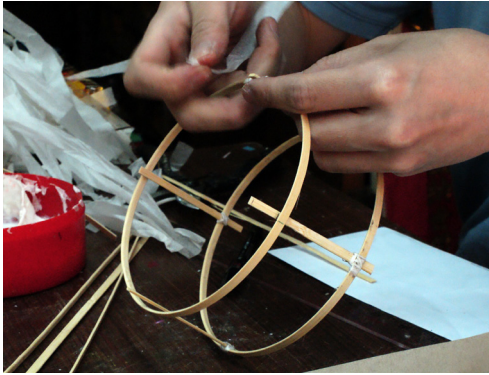
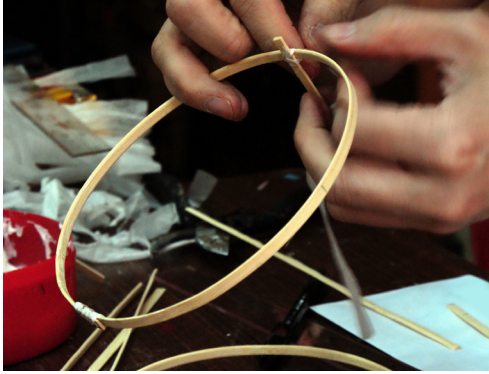
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