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# Construction of a conceptualization of personal knowledge within a knowledge management perspective using grounded theory methodology

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Construction of a Conceptualization of Personal Knowledge within a Knowledge  
Management Perspective using Grounded Theory Methodology

by

Eric M. Straw

A dissertation submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy  
in  
Information Systems

Graduate School of Computer and Information Sciences  
Nova Southeastern University

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An Abstract of a Dissertation Submitted to Nova Southeastern University  
in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

## Construction of a Conceptualization of Personal Knowledge within a Knowledge Management Perspective using Grounded Theory Methodology

by  
Eric M. Straw  
June 2013

The current research used grounded theory methodology (GTM) to construct a conceptualization of personal knowledge within a knowledge management (KM) perspective. The need for the current research was based on the use of just two categories of knowledge, explicit and tacit, within KM literature to explain diverse characteristics of personal knowledge. The construct of tacit knowledge has often been explicated and debated in KM literature. The debate over tacit knowledge arose from the complex epistemological roots of tacit knowing and the construct of tacit knowledge popularized by organizational knowledge creation theory. The ongoing debate over tacit knowledge in KM literature has shed little light on personal knowledge within a KM perspective. The current research set aside the debate over tacit knowledge and pursued the construct of personal knowledge from the perspective of the knower using GTM. Thirty-seven interviews were conducted with fourteen participants. Interviews were audio recorded and coding was accomplished with the qualitative data analysis software MAXQDA.

A total of eight categories were identified. These were organized into two groups. The core category *being overwhelmed* represented the absence of personal knowledge. The categories *questioning self*, *seeking help*, and *microthinking* fit under being overwhelmed. Together these categories were inverse indicators because they all decreased as knowledge acquisition progressed. The core category *being confident* represented the presence of personal knowledge. The categories *remembering*, *multitasking*, and *speed* fit under being overwhelmed. Together these categories were direct indicators because they all increased as knowledge acquisition progressed.

Three significant conclusions were drawn from the current research. These conclusions led to the conceptualization of personal knowledge from a KM perspective. The first significant conclusion was the conceptualization of a process of knowing as *Integrated Complexity: From Overwhelmed to Confident* (ICOC). The second significant conclusion was personal knowing as first-person epistemology is a universally lived experience that includes commitments to internal and external requirements as well as a bias toward integration. The third significant conclusion was personal knowledge can be viewed as a complex adaptive system. Finally, the current research concluded that personal knowledge within a KM perspective is a complex adaptive system maintained through acts of first-person epistemology.

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## Chapter 1

### Introduction

#### **Introduction**

The discipline of knowledge management (KM) has been mired in debate over the construct of personal knowledge (Oguz & Sengun, 2011). This debate has its origins in the construct of personal knowledge in organizational knowledge creation theory (Nonaka, 1994; Nonaka & Takeuchi, 1995) and Polanyi's (1958, 1966b) theory of personal knowing. Organizational knowledge creation theory is perhaps the most important literature in KM (Grant, 2011; Spender & Scherer, 2007). It consistently appears at the top of KM literature citation charts (Grant, 2007; Jennex & Croasdell, 2005; Ma & Yu, 2010). Polanyi produced a significant turn in epistemology (Gelwick, 2007-2008) and was claimed by Nonaka (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) as a primary foundation of his conceptualization of personal knowledge.

Nonaka (1991, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) claimed that his conceptualization of personal knowledge was inspired by Polanyi (1958, 1966b). Yet, many researchers have taken Nonaka and much of the rest of the KM literature to task for incorrectly applying Polanyi's work (Grant, 2007; Gueldenberg & Helting, 2007; McAdam, Mason, & McCrory, 2007; Neuweg & Fothe, 2011; Oguz &

Sengun, 2011; Tsoukas, 2003; Virtanen, 2010a). The early Nonaka (1991, 1994; Nonaka & Takeuchi, 1995) had a bifurcated conceptualization of personal knowledge: knowledge was either explicit or tacit. The later Nonaka (Nonaka & von Krogh, 2009) conceptualized a knowledge continuum with explicit knowledge on one end and tacit knowledge on the other end.

After a notable career as a world class chemist, Polanyi (1958, 1966b) spent many years of intellectual contemplation on personal knowing and then wrote more than 500 pages explaining his epistemology (Gelwick, 2007-2008). Polanyi focused on tacit knowing, which is a process of knowing rather than a category of knowledge (Gelwick, 1977; Oguz & Sengun, 2011). Many KM authors (Grant, 2007; McAdam, et al., 2007; Oguz & Sengun, 2011; Tsoukas, 2003; Virtanen, 2010b) have sought to explain and defend Polanyi's original intent and contrast it with the conceptualization of personal knowledge in organizational knowledge creation theory. These authors have done this while disagreeing with one another and universally decrying the conceptualization of personal knowledge in organizational knowledge creation theory.

The ongoing KM debate over personal knowledge can be understood as valid attempts to draw out different characteristics of knowledge. However, the debate has been impaired because researchers have chosen to appropriate the phrase *tacit knowledge* to explain diverse characteristics of knowledge. In addition, researchers have been extraordinarily concerned with getting Polanyi (1958, 1966b) right, which has led to a neglect of the construct of personal knowledge within a KM perspective. It is possible that researchers who have debated the meaning of tacit knowledge, for example, one set claiming that it is about effableness of knowledge (Nonaka & von Krogh, 2009) and

another claiming that it is about focal awareness (Tsoukas, 2003), are both correct. The current research explored the phenomena of personal knowledge within a KM perspective from the experience of participants in the process of acquiring personal knowledge. The current research used grounded theory methodology (GTM).

### **Problem Statement**

The problem investigated in the current research was the conceptualization of personal knowledge within a KM perspective. The construct of personal knowledge plays a critical role in KM research as well as in the practice of KM in organizations (Heisig, 2009). Yet the conceptualization of personal knowledge has been inhibited by reliance on just two categories, explicit and tacit, to explain diverse characteristics of knowledge (Heisig, 2009; Oguz & Sengun, 2011; Virtanen, 2010b). In addition, the phrase tacit knowledge has reached the level of a buzzword in KM and is even used to represent opposing conceptualizations of personal knowledge (Oguz & Sengun, 2011). The deficient conceptualization of personal knowledge caused by reliance on the explicit-tacit categorization is an obstacle to the advancement of KM research and practice (Oguz & Sengun, 2011; Virtanen, 2010b).

The dominant conceptualization of personal knowledge in 160 KM frameworks analyzed by Heisig (2009) divided knowledge into the two categories of explicit knowledge and tacit knowledge. Explicit knowledge is generally viewed as a relatively simple construct and has not generated significant controversy in KM literature. Explicit knowledge is characterized as knowledge that is effable (Virtanen, 2010b). It can be articulated and codified. However, Collins' (2010), writing from a sociology perspective,

introduced four meanings of explicable and eight definitions of cannot. Tacit knowledge on the other hand is a complex construct that has generated much controversy in KM literature. This controversy is far from being resolved (Oguz & Sengun, 2011). Tacit knowledge has served as a warehouse construct for holding all knowledge that is not explicit knowledge (Oguz & Sengun, 2011; Virtanen, 2010b). Competing conceptualizations of tacit knowledge have led to many attempts to clarify the meaning of tacit knowledge (Gourlay, 2006; Grant, 2007; McAdam, et al., 2007; Mooradian, 2005; Nonaka & von Krogh, 2009; Oguz, 2010; Oguz & Sengun, 2011; Ray, 2009; Takaki, 2009-2010; Tsoukas, 2003; Virtanen, 2010a, 2010b). Yet, consensus on the meaning of tacit knowledge has not been reached (Oguz & Sengun, 2011).

The controversy surrounding tacit knowledge may be due to a conceptualization of personal knowledge that relies on just two categories to explain diverse characteristics of knowledge. An example of this problem can be seen in the interaction about tacit knowledge between Nonaka (1994; Nonaka & von Krogh, 2009) and Tsoukas (2003) who both appeal to Polanyi (1958, 1966b) for a significant part of their foundation. Nonaka addressed the effableness of knowledge on a continuum from effable to ineffable. In Nonaka's view if an individual cannot articulate certain knowledge then that knowledge is tacit: for example, an accomplished baker who is unable to fully explain an advanced kneading process. Tsoukas addressed an individual's focal awareness of knowledge. In Tsoukas' view if an individual is not focally aware of certain knowledge then that knowledge has become automatic and is therefore tacit: for example, an accomplished pianist who is aware of the music as a whole rather than the individual keys being played. It is possible that both Nonaka and Tsoukas are correct in their

observations about personal knowledge but were forced into a disagreement because of the reliance on just two categories to explain diverse characteristics of knowledge. Heisig (2009) concluded that there was not a standardized understanding of personal knowledge in the 160 KM frameworks he evaluated and that the frameworks emphasized different dimensions of knowledge. Are effableness and focal awareness unique characteristics of knowledge rather than competing definitions of tacit knowledge? This question was at the heart of the problem investigated in the current research.

### **Dissertation Goal**

The goal of the current research was to develop a conceptualization of personal knowledge within a KM perspective using GTM. The purpose of GTM is to build rather than test theory. In GTM the theory is derived from the experience of participants in the phenomenon being investigated. Thus, the goal of the current research was to discover a conceptualization of personal knowledge. This discovery occurred through the analysis of data collected from participants who were in the process of acquiring personal knowledge within a KM perspective.

GTM has become quite diverse since it was first introduced by Glaser and Strauss (1967). Glaser and Strauss separately took GTM in different directions (Morse et al., 2008). In addition, other researchers have introduced variations into GTM that have become substantial GTM approaches (Morse, et al., 2008). Therefore, it was necessary to identify the GTM approach that was followed in the current research. Corbin and Strauss (2008) provided the GTM approach used in the current research. Corbin and Strauss was selected because: (a) it was originally written as a textbook (Morse, et al., 2008) and

contains a thorough description of the GTM process with significant examples; (b) it is directly connected to one of the original authors of GTM; (c) it has been updated regularly and recently due to its popularity; and (d) it is compatible with dissertation requirements such as research questions and literature review. References to GTM in the current research refer to the Corbin and Strauss approach to GTM unless otherwise noted.

GTM is ideally suited for theory building (Urquhart, Lehmann, & Myers, 2010). The primary strength of GTM is that it emphasizes discovery of theory from data rather than the fitting of data into an existing theory. GTM is rooted in data collection and coding. Data is commonly collected through interviews. Coding is used to extract analytical categories and their relationships from the data. Data collection and coding occur simultaneously and recursively until theoretical saturation occurs and a theory emerges from the data.

GTM has recently been used in information systems (IS) research to develop the web-images signifiers (WIS) theory (Zahedi & Gaurav, 2011). Zahedi and Gaurav (2011) identified 48 cultural signifiers across five categories. These items led to the nine propositions in WIS theory. There are two important similarities between the research of Zahedi and Gaurav and the current research that supported the likely success of using GTM to solve the problem identified in the current research. First, Zahedi and Gaurav identified a limited yet somewhat controversial set of cultural dimensions in literature. The current research identified a limited yet somewhat controversial set of categories (explicit and tacit) in literature that forms the dominant conceptualization of personal knowledge in KM. Second, Zahedi and Gaurav had to extract embedded perceptions from participants to identify cultural signifiers of images. The current research required

extracting embedded perceptions of knowledge acquisition to identify a conceptualization of personal knowledge. The application of GTM by Zahedi and Guarav, as well as the recent application of GTM by other IS researchers (Day, Junglas, & Silva, 2009; Levina & Vaast, 2008; Matsuo, Wong, & Lai, 2008; Petrini & Pozzebon, 2009; Walsh, Kefi, & Baskerville, 2010), demonstrated the value of using GTM in theory development and the likely achievement of the goal of the current research.

### **Research Questions**

The current research answered the following research questions.

1. What are the perceptions of novices regarding their acquisition of knowledge?
2. What categories, sub-categories, and relationships can be constructed from RQ1?
3. What core categories and relationships can be constructed from RQ1 and RQ2?
4. What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3?

### **Relevance and Significance**

The problem identified in the current research was both relevant and significant because the conceptualization of personal knowledge is fundamental to the goals and outcomes of KM (Heisig, 2009; Hislop, 2009; Oguz & Sengun, 2011; Virtanen, 2010a). The effective handling of knowledge comprises the core practices of KM (Heisig, 2009). If the conceptualization of personal knowledge changes then the practices of KM change (Hislop, 2009; Oguz & Sengun, 2011; Virtanen, 2010a). Thus, an accurate

conceptualization of personal knowledge is essential for effective KM in organizations. KM, in turn, is a vital discipline in research and practice (Hislop, 2009).

The problem identified in the current research persisted because the ongoing discourse about knowledge in KM literature has focused almost exclusively on the conflict between the conceptualization of personal knowledge in organizational knowledge creation theory (Nonaka, 1994) and Polanyi's (1958, 1966b) theory of personal knowing. KM is dominated by a conceptualization of knowledge that has only two categories, explicit and tacit, to explain diverse characteristics of knowledge (Heisig, 2009; Oguz & Sengun, 2011; Virtanen, 2010b). This bifurcated view of knowledge is rooted in the conceptualization of personal knowledge in organizational knowledge creation theory. At the same time, this bifurcated view of knowledge is often attributed to Polanyi in KM literature in spite of the fact that Polanyi did not argue for a bifurcated conceptualization of knowledge. The phrase tacit knowledge has become a buzzword in KM literature with little attention paid to the underlying epistemology (Oguz & Sengun, 2011).

Literature attempting to clarify and defend the original meaning of Polanyi's (1958, 1966b) epistemology abounds (Gourlay, 2004; Grant, 2007; Hedesstrom & Whitley, 2000; McAdam, et al., 2007; Oguz, 2010; Oguz & Sengun, 2011; Ray, 2008, 2009; Takaki, 2009-2010; Tsoukas, 2003; Virtanen, 2010a, 2010b; Willcocks & Whitley, 2009). A major theme in this literature is that organizational knowledge creation theory (Nonaka, 1994) did not accurately represent Polanyi's theory of personal knowing (Oguz & Sengun, 2011). Nonaka and von Krogh (2009) recognized Polanyi as the inspiration for the conceptualization of personal knowledge in organizational knowledge creation

theory. However, they also claimed that Nonaka (1994) expanded on Polanyi's ideas in order to adapt them to KM. Thus, the KM literature is left with two distinct conceptualizations of personal knowledge fighting over the use of the single phrase tacit knowledge: Nonaka on one side and the KM defenders of Polanyi on the other. This debate has continued despite the fact that Polanyi focused on tacit knowing, which is a process of knowing rather than a category of knowledge.

The current research offers a possible resolution to the problem because GTM facilitated the discovery of a conceptualization of personal knowledge that emerged from participants who were in the process of acquiring knowledge. Both Polanyi (1958, 1966b) and Nonaka (1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) as well as the larger part of KM literature (Oguz & Sengun, 2011) acknowledge that knowing is wrapped up in the knower. The current research set aside the ongoing debate over tacit knowledge and pursued the construct of knowledge from the perspective of the knower. The conceptualization of personal knowledge that emerged from the current research could have supported an existing view of personal knowledge or it could have offered a brand new view of personal knowledge. Either way, it certainly contributed significantly and broadly to the research and practice of KM by offering a conceptualization of personal knowledge from the perspective of the knower.

### **Barriers and Issues**

The barriers and issues that make the current research dissertation worthy included the inherent complexities of knowledge and the GTM approach. First, there is an ongoing philosophical debate about the nature of knowledge (Binmore, 2011;

Chappell, 2009; Steup, 2008) that adds significant complexity to the problem identified in the current research. Second, GTM is a complex and challenging methodology that is critically dependent on the analytical efforts of the researcher (Corbin & Strauss, 2008).

Full-time professional philosophers cannot agree on a definition of knowledge (Spender & Scherer, 2007). The philosophical debates about knowledge are often traced back to Plato (Binmore, 2011; Steup, 2011). Unfortunately, the traditional philosophical definition of knowledge, justified true belief, is one of three that Plato proposed and rejected (Chappell, 2009). Alternatives exist, but none have gained universal acceptance (Steup, 2008). On top of this unstable philosophical sand is built KM's understanding of personal knowledge. It is not surprising that KM literature is full of diverse constructions of personal knowledge. This diversity occurs even when the same terminology, such as the phrase tacit knowledge, is being used by different researchers (Heisig, 2009; Oguz & Sengun, 2011). Within this tangled milieu resides the problem identified in the current research: the conceptualization of personal knowledge within a KM perspective. This problem is not only difficult to solve, it may well be impossible to solve if solve is defined as producing a conceptualization of personal knowledge that will be easily, quickly, and widely accepted. However, if solve is defined as adding to the discussion about personal knowledge in such a way as to offer a step forward for KM then the current research holds much hope for KM research and practice.

GTM is critically dependent on the creative analytical efforts of the researcher (Corbin & Strauss, 2008; Glaser, 2001; Morse, et al., 2008). Writing memos and coding concepts requires that the researcher separate himself intellectually and emotionally from the specifics of the data in order to view the data at a macro level. The data represent

bricks in multiple pathways while the memos and coding represent an aerial view of the pattern and direction of the paths. This is pure qualitative data analysis that requires much from the researcher. Glaser (2001) emphasized the significant role of the conceptual work of the researcher. He concluded that good theory only comes from researchers who conceptualize well. Corbin and Strauss (2008) discussed the sensitivity of researchers to the data. They explained sensitivity as the intellectual ability to understand the message contained in the data. The authors characterized GTM results as a kind of mathematical sum of the data plus the researcher. Morse, et al. (2008) emphasized the importance of the researcher's thinking processes and instincts. They went as far as to claim that "the self is the instrument of the research" (p. 51). Thus, GTM is a challenging research methodology requiring significant creative analytical effort on the part of the researcher.

### **Assumptions, Limitations, and Delimitations**

The current research was a qualitative theory development study based on GTM. As such, the research was dependent on data collection from participants in the process of acquiring personal knowledge. Thus, the primary assumptions centered on the willingness and ability of participants to share their knowledge acquisition experiences. Willingness refers to intent, and ability refers to skill. The assumption that participants will be willing to share their experience includes personal, social, and occupation factors that can contribute to or detract from a participant's intent to share. These factors range from personal and managerial perceptions of job performance to attitudes about self as well as experiences related to trust and emotional well being. The assumption that participants will be able to share their knowledge acquisition experience is dependent on

previously acquired intrapersonal and interpersonal skills. These include factors ranging from the participants ability to perceive their own internal processes to the participant's communication ability. A secondary assumption is that participants will sufficiently represent the normal population of working adults in which KM is concerned so as to make the results of the current research generalizable.

The limitations of the current research were primarily related to the freedom of participation. Participants had to have been recently hired into a new job requiring knowledge acquisition, and personally volunteer to participate. Data collection from participants ceased if either of these two participation requirements changed. While previously collected data was valid, new data was unavailable in such a situation. New participants needed to be located depending on the timing and number of participants who withdrew from participation.

The major delimitation of the current research was the limitation of participants to the occupation of barista. A barista is an employee at a mobile cart, coffee shop, café, or restaurant who prepares drinks using an espresso machine. Baristas use other equipment and can make non-coffee bean based drinks. However, the defining characteristic of a barista is the use of an espresso machine. Good quality espresso drinks are based, in part, on the barista's ability to effectively use the espresso machine, which is complicated (Barron et al., 2012; Caprioli et al., 2012; Dold et al., 2011; Illy & Navarini, 2011). The complicated nature of preparing drinks using an espresso machine is one reason for this delimitation. In addition, this delimitation was placed on the current research in order to maximize the creative analytical effort of the author of the current research. As noted above, the creative analytical effort of the researcher is critical for the success of GTM.

However, generalizability of the current research to other KM settings may be questioned based on this delimitation.

### **Definition of Terms**

**Affordance of Interpretation:** The opportunity for meaning through the interpretive capabilities of humans based on social and cultural influences (Collins, 2010).

Affordance is an indicator of effort required to interpret. Affordance and effort are inversely related.

**Appraisal:** A personal act of evaluation within an interpretive framework (Polanyi, 1958).

This personal act results in rejection of or commitment to something outside the interpretive framework.

**Collins String:** “Stuff inscribed with patterns...that [are] neither random nor featureless”

(Collins, 2010, p. 16). Collins Strings are both physical and patterns. They are like the computer science idea of a string yet more general. Collins Strings are not limited by digital transmission, include the medium used to transmit the string, and include everything that is not featureless or random (Collins, 2011).

**Epistemology:** The study of knowledge (Moser, 2002; Steup, 2011). Epistemology seeks to answer questions about the nature of knowledge and knowing. Philosophical epistemology emphasizes conditions for knowing. Educational epistemology emphasizes acquisition of knowledge. Psychological epistemology emphasizes mental states of knowing. Biological epistemology emphasizes physical states of knowing.

**Explicit Knowledge:** Knowledge that is effable (Virtanen, 2010b). Explicit knowledge can be expressed in language (Nonaka, 1994) or has the potential of being transferred by the use of Collins Strings (Collins, 2010).

**Indwelling:** The central action of all personal knowing (Polanyi, 1958). Indwelling consists of a from-to relationship between subsidiary and focal awareness. Meaning emerges out of the functional and phenomenal structure as well as a semantic and ontological aspects of this from-to relationship (Polanyi, 1969a).

**Interpretive Framework:** Consists of presuppositions formed within the life and language of a specific context (Polanyi, 1958, 1966b). The acceptance of a set of presuppositions is an indwelling in them. Through indwelling people focus their attention on the application of the presuppositions rather than the presuppositions themselves. These presuppositions may or may not be convincing when analyzed, but analysis can only occur when indwelling ceases.

**Knowledge Management:** The leveraging of knowledge for competitive advantage (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995). It includes activities associated with creation, storage, sharing, and application of knowledge within the enterprise (Heisig, 2009).

**Tacit Knowing:** Is the process of indwelling (Polanyi, 1966b). “All understanding is tacit knowing, all understanding is achieved by indwelling” (Polanyi, 1962, p. 606).

**Tacit Knowledge:** A warehouse construct for holding all knowledge that is not explicit knowledge (Oguz & Sengun, 2011; Virtanen, 2010b). A buzzword in KM used to represent opposing conceptualizations of personal knowledge (Oguz & Sengun, 2011).

## Summary

The problem investigated in the current research was the conceptualization of personal knowledge within a KM perspective. The conceptualization of personal knowledge is important in KM research and practice (Heisig, 2009; Hislop, 2009; Oguz & Sengun, 2011; Virtanen, 2010a). The effective handling of knowledge comprises the core practices of KM (Heisig, 2009). If the conceptualization of personal knowledge changes then the practices of KM change (Hislop, 2009; Oguz & Sengun, 2011; Virtanen, 2010a). Thus, an accurate conceptualization of personal knowledge is essential for effective KM in organizations. However, there is much controversy in KM literature over the conceptualization of personal knowledge. This is primarily due to the reliance on just two categories, explicit and tacit, to explain diverse characteristics of knowledge (Heisig, 2009; Oguz & Sengun, 2011; Virtanen, 2010b). This debate is centered on the construct of personal knowledge in organizational knowledge creation theory (Nonaka, 1994; Nonaka & Takeuchi, 1995) and Polanyi's (1958, 1966b) theory of personal knowing. The ongoing KM debate over personal knowledge can be understood as valid attempts to draw out different characteristics of knowledge. However, the debate has been impaired because researchers have chosen to appropriate the phrase tacit knowledge to explain diverse characteristics of knowledge. The next chapter is a review of literature relevant to the current research. The foundation and current state of KM research is explored as well as conceptualizations of personal knowledge within KM. The specific theories of Nonaka (1994; Nonaka & Takeuchi, 1995) and Polanyi are explored as well.

The goal of the current research was to develop a conceptualization of personal knowledge within a KM perspective using GTM. The purpose of GTM is to build rather

than test theory. In GTM the theory is derived from the experience of participants in the phenomenon being investigated. Thus, the goal of the current research was to discover a conceptualization of personal knowledge. This discovery occurred through the analysis of data collected from participants who were in the process of acquiring personal knowledge within a KM perspective. Following the literature review is a chapter devoted to the methodology of the current research.

## Chapter 2

### Review of Literature

#### **Introduction**

The organization of this literature review proceeds from a broad view to a narrow focus and then on to the specific theories of Nonaka (1994; Nonaka & Takeuchi, 1995) and Polanyi (1958, 1966b). The broad view begins by exploring the foundation and current state of KM research. KM is both a relatively new discipline and a discipline with persistence. As an organizational discipline KM traces its roots to the early 60s and its popularization to the 90s (Lambe, 2011). Bibliographic analysis of KM literature has revealed that KM is a persistent fashion rather than a fad that will soon disappear (Grant, 2011; Koenig & Neveroski, 2008). However, concern over the value of KM as an organizational practice has been raised because of low KM satisfaction survey results (Griffiths & Koulpaki, 2010; Lambe, 2011). Nevertheless researchers have identified significant and positive outcomes for KM activities related to competitiveness, economic performance, and organizational performance (Andreeva & Kianto, 2012; Zack, McKeen, & Singh, 2009).

From the broad view of KM this literature review next moves to the narrow focus of the conceptualization of personal knowledge within KM. This conceptualization is dominated by the division of knowledge into the two categories of explicit and tacit

(Heisig, 2009). The division of knowledge into the two categories of explicit and tacit in KM is primarily due to organizational knowledge creation theory (Nonaka, 1994; Nonaka & Takeuchi, 1995), which may be the most influential work in KM (Grant, 2007, 2011; Jennex & Croasdell, 2005; Serenko & Bontis, 2004; Spender & Scherer, 2007). Explicit knowledge is generally viewed as a relatively simple construct and has not generated significant controversy in KM literature. Tacit knowledge on the other hand is a complex construct that has generated much controversy in KM literature. This controversy is far from being resolved (Oguz & Sengun, 2011). Both explicit knowledge and tacit knowledge within a KM perspective are explored in detail in this literature review. The last two sections of this literature review are dedicated to the theories of Nonaka (1994; Nonaka & Takeuchi, 1995) and Polanyi (1958, 1966b) because they have significantly impacted KM (Ma & Yu, 2010).

Nonaka (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) developed and continued to defend and clarify organizational knowledge creation theory. Nonaka has so influenced KM that his core literature on organizational knowledge creation theory has positioned him as the leading figure in KM by a large margin (Ma & Yu, 2010). Thus it is important to consider Nonaka's conceptualization of personal knowledge. This is accomplished in this literature review by exploring the core concepts of organizational knowledge creation theory as well as the details of Nonaka's conceptualization of explicit and tacit knowledge.

Nonaka (1994; Nonaka & Takeuchi, 1995) made citation of Polanyi (1958, 1966b) popular in KM literature. From 1998 to 2002 Polanyi ranked as the third most highly cited author in KM literature and *The Tacit Dimension* (Polanyi, 1966b) ranked as

the fifth most highly cited document in KM literature (Ma & Yu, 2010). However, the popularity of citing Polanyi in KM literature has been at the expense of the loss of the richness of Polanyi's theory of personal knowing (Grant, 2007; Oguz & Sengun, 2011; Virtanen, 2010a). Thus it is important to explore Polanyi's theory of personal knowing and its relationship to KM. This is accomplished in this literature review by exploring the core concepts of Polanyi's theory as well as four significant myths related to Polanyi in KM literature. It is important to understand Polanyi's work in order to evaluate Nonaka's conceptualization of personal knowledge. Thus, the section on Polanyi comes before the section on Nonaka.

A pressing need in KM research and practice is to understand personal knowledge within a KM perspective. This need is the primary research implication of the KM literature presented herein and is discussed in the final section of this literature review. In addition, addressing this need was the purpose of the current research.

### **Foundation of KM**

KM as an organizational discipline traces its roots to the early 60s and its popularization to the 90s (Lambe, 2011). The roots of KM are found in economics, sociology, and the rise of computing based data management beginning in the 70s. The popularization of KM began with the publication of ten KM classics from 1993 to 1998 (Lambe, 2011). Of these ten KM classics only Nonaka and Takeuchi (1995) as well as Davenport and Prusak (1998) have maintained continued significant influence over KM literature (Ma & Yu, 2010). Nonaka and Takeuchi is the most cited KM literature from 1998 to 2007 (Ma & Yu, 2010).

KM is the leveraging of knowledge for competitive advantage (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995). It includes activities associated with creation, storage, sharing, and application of knowledge within the enterprise (Heisig, 2009). KM is important because of the role of knowledge in the economy (Davenport, 2005). Drucker (1968) identified the emerging knowledge society and later (Drucker, 1993) described a post-capitalist society that had achieved a knowledge economy if not quite a knowledge society. In the knowledge economy, knowledge supersedes both capital and labor as the primary source of competitive advantage. In addition, knowledge workers participating in knowledge work are the key drivers of the knowledge economy (Davenport, 2005). KM as a modern discipline grew out of the need for organizations to be competitive in the knowledge economy (Lambe, 2011).

Grant (2011) evaluated KM using management fashion theory through bibliographic analysis of KM literature. Management fashion theory distinguishes between a fashion, which persists over an extended time, and a fad, which peaks and quickly disappears. Grant analyzed the publication of KM literature from 1990 through 2009 in nine sets using the ProQuest online database. The first set was the broad set of KM. The other eight sets were subsets grouped around the themes of intellectual capital, organizational learning, communities of practice, knowledge workers, KM models, KM practices, IT usage in KM, and KM strategy. Annual publication quantities from each of these sets were plotted in order to evaluate the data with management fashion theory. All of the graphs clearly demonstrated sustained growth. Grant concluded that ongoing interest in KM indicated that KM is a management fashion with persistence rather than a management fad that could disappear soon. A similar conclusion was drawn (Koenig &

Neveroski, 2008) through comparisons of bibliographic graphs that plotted literature associated with four management tools: lifecycle of quality circles, total quality management, business process reengineering, and KM. The graphs of the first three tools clearly demonstrated a quick peak and rapid decline in interest while the graph for KM demonstrated steady increase.

Thus, KM is both a relatively new discipline and a discipline with persistence. However, the value of KM for organizations is still in question. The next section will explore the current state of KM including frameworks, practices, and outcomes in order to explore the value of KM to organizations.

#### *Current State of KM*

Concern over the value of KM as an organizational practice has been raised (Griffiths & Koulpaki, 2010; Lambe, 2011) based on global surveys (Rigby & Bilodeau, 2009) of 25 popular management tools. Rigby and Bilodeau (2009) have conducted annual or bi-annual global surveys of industry since 1996. These global surveys have all included a KM satisfaction rating. The most recent survey (Rigby & Bilodeau, 2011) included 1,230 respondents spread across North America, Latin America, Asia, Europe, and the Middle East. Satisfaction was measured on a five-point Likert scale. KM satisfaction ranked 22nd out of 25 management tools. Historically, KM satisfaction has never ranked above 22nd out of 25 since 1996 (Rigby & Bilodeau, 2009). However, the interest and pursuit of KM in research and practice is not waning (Grant, 2011; Koenig & Neveroski, 2008), and researchers have identified significant and positive outcomes for

KM activities related to competitiveness, economic performance, and organizational performance (Andreeva & Kianto, 2012; Zack, et al., 2009).

The current state of KM research and practice is demonstrated by Heisig's (2009) analyses of 160 KM frameworks collected from literature and KM researchers. Heisig's analysis was a three step process: (a) identifying the definition of personal knowledge, the KM activities, and the KM critical success factors from each framework; (b) coding categories and calculating statistics based on the items in step one; and (c) grouping synonyms within KM activities and success factors to produce homogenous content classes. The results from Heisig's research addressing the definition of personal knowledge in KM will be discussed in detail in the following section. Heisig did conclude that there was not a standardized understanding of personal knowledge in the KM frameworks and that the frameworks emphasized different dimensions of knowledge. From the homogenous content classes Heisig identified four key KM activities, which he described as the steps taken to handle knowledge. These steps included create, store, share, and apply. Heisig also identified success factors from the frameworks. The success factors fell into four main categories: human factors such as culture, people, and leadership; organizational factors such as processes and structures; technological factors such as infrastructure and applications; and management process factors such as strategy, goals, and measurement. Heisig concluded that while terms may vary there is actually quite a bit of consensus on KM activities and critical success factors.

Andreeva and Kianto (2012) researched the impact of KM activities on competitiveness and economic performance. The researchers collected data from 234

companies: 90 Finish, 79 Chinese, and 65 Russian. Survey questions focused on seven KM practices in two categories. The human resource management (HRM) category included three KM practices: rewarding of knowledge sharing with non-monetary incentives; rewarding of knowledge sharing with monetary incentives; and individual performance evaluations containing a knowledge sharing component. The information communication technology (ICT) category included four KM practices: ability of the organization's technology to support knowledge work; acceptance, monitoring, and updating of the organization's technology; ability of the organization's technology to enable sharing in the extended value chain; and ability of the organization's technology to support the daily work load. The researchers adapted existing scales to measure competitiveness and economic performance of each of the organizations and then used structural equation modeling to measure the impact of the KM activities on competitiveness and economic performance. Andreeva and Kianto's analysis demonstrated that the seven KM activities explain 17% of the variance in competitiveness and 20.4% of the variance in economic performance. Further, the researchers identified that the impacts of the ICT KM practices were mediated by the HRM KM practices.

Zack, McKeen, and Singh (2009) researched the impact of 12 KM practices on organizational performance and financial performance. The data consisted of survey results from 88 companies in the US, Canada, and Australia. The 12 KM practices were gleaned from literature and included practices such as the benchmarking of knowledge, rewarding knowledge sharing, transferring of best practices, encouraging experimentation, valuing employees for their personal knowledge, developing knowledge

strategy, and exploiting external sources of knowledge. Organizational performance was evaluated via the sub-groups of product leadership, customer intimacy, and operational excellence. Actual measures included product innovation, rate of new product development, customer satisfaction and retention, as well as operating costs. Financial performance was measured as return on assets and profitability. The researchers used partial least squares analysis and found a significant and positive relationship between the 12 KM practices and organizational performance. No significant relationship was found between the KM practices and financial performance. However there was a significant relationship between organizational performance and financial performance. It is possible that organizational performance mediated the relationship between the KM practices and financial performance, but the researchers did not investigate this possibility. The researchers further evaluated the relationship between the 12 KM practices and the organizational performance sub-groups. Three of the KM practices had a significant and positive relationship with operational excellence. Eight of the practices had a significant and positive relationship with product leadership. Finally, all of the practices had a significant and positive relationship with customer intimacy. The researchers also used a two-step clustering method to further evaluate relationships. They discovered clustering around high and low KM performance rather than around specific sets of KM practices or quantity of KM practices. The researchers concluded that high KM capability is more important for organizational performance than a broad set of KM practices.

Thus, research has shown that KM practices can lead to positive outcomes for organizations in spite of poor KM satisfaction survey results (Rigby & Bilodeau, 2011). The positive outcomes of KM are based on a wide range of factors that did not directly

impact the current research. However, the current research has the potential to impact broad research in KM because the conceptualization of personal knowledge is foundational to KM. Thus, the next section will explore the conceptualization of personal knowledge in KM, which was the heart of the current research.

### **Conceptualization of Personal Knowledge in KM**

The dominate view of personal knowledge in KM literature is the division of knowledge into the two categories of explicit and tacit (Heisig, 2009). Heisig's (2009) analyses of 160 KM frameworks revealed that 74% of the frameworks codified a definition of knowledge. Fifty-two percent of frameworks containing a definition of knowledge divided knowledge into two categories. The next largest category at 29% used a strategic asset approach to knowledge. However, describing knowledge as an organizational asset hardly qualifies as a definition of knowledge. Among the KM frameworks that divided knowledge into two categories 68% divided knowledge into explicit and tacit knowledge.

The division of knowledge into the two categories of explicit and tacit in KM is primarily due to organizational knowledge creation theory (Nonaka, 1994; Nonaka & Takeuchi, 1995), which may be the most influential work in KM (Grant, 2007, 2011; Jennex & Croasdell, 2005; Serenko & Bontis, 2004; Spender & Scherer, 2007). However, Nonaka (Nonaka & von Krogh, 2009) claims that he did not intend this bifurcated view of personal knowledge. In spite of Nonaka's claims, his early organizational knowledge creation theory literature clearly described "two very different types of knowledge" (Nonaka, 1991, p. 98) and "two types of knowledge" (Nonaka, 1994, p. 16; Nonaka &

Takeuchi, 1995, p. 224). It is only in Nonaka's later literature that he claims a knowledge continuum comprised of the inseparable concepts of explicit and tacit at either end of the continuum (Nonaka & von Krogh, 2009). Nonaka's early and major organizational knowledge creation theory literature has had the most significant impact on KM research and practice of any KM literature (Ma & Yu, 2010). Thus, the bifurcated view of personal knowledge in KM is primarily due to the influence of organizational knowledge creation theory.

Ma and Yu (2010) used citation, co-citation, and social network analysis to study KM literature published from 1998 to 2007. The researchers used the full databases in the Science Citation Index and the Social Sciences Citation Index rather than limiting their analysis to peer ranked KM journals. Ma and Yu identified 1,230 relevant journal articles containing 29,601 relevant citations and then evaluated these articles and citations to identify the most influential documents and authors in KM literature. Ma and Yu divided their analysis into two time frames: 1998 to 2002 and 2003 to 2007. In the first time frame, 1998 to 2002, Nonaka and Takeuchi (1995) were number one with a frequency of 104. Davenport and Prusak (1998), another of the ten KM classics (Lambe, 2011), was second with a frequency of 71. Nonaka (1994) was third with a frequency of 44. Nonaka's 1994 paper should have been listed as a KM classic by Lambe because it was the original publication of Nonaka's organizational knowledge creation theory and the foundation for *The Knowledge-Creating Company* (Nonaka & Takeuchi, 1995). Most of the content of Nonaka (1994) is reproduced in Nonaka and Takeuchi (1995). Thus, combining the frequency numbers in Ma and Yu for Nonaka and Takeuchi (1995) with those for Nonaka (1994) is the most appropriate way to evaluate Nonaka's early work.

Therefore, from 1998 to 2002 Nonaka's major organizational knowledge creation theory literature was number one with a frequency of 148, which is more than double the second place finisher. In the second time frame evaluated by Ma and Yu, 2003 to 2007, Nonaka's major organizational knowledge creation theory literature was number one with a combined frequency of 197. Nonaka and Takeuchi (1995) was ranked first with 143 and Nonaka (1994) was fourth with 51. Davenport and Prusak were again second in this period with a frequency of 105. In Ma and Yu's author's analysis Nonaka was number one in both time periods. Nonaka's frequency from 1998 to 2002 was 201. Davenport was second with a frequency of 127. Nonaka's frequency from 2003 to 2007 was 281. Davenport was second with a frequency of 158. Thus, Nonaka's organizational knowledge creation theory has had a dominant role in KM.

The remainder of this section explores the conceptualization of both explicit and tacit knowledge in KM literature. First, the significant theoretical conceptualizations of tacit and explicit are explored. These include the writings of three primary authors: (a) Nonaka (1994; Nonaka & Takeuchi, 1995), because of the dominance of his organizational knowledge creation theory in KM literature; (b) Polanyi (1958, 1966b), because of the richness of his theory of personal knowing as well as Nonaka's early and prolonged citation of Polanyi; and (c) Collins (2010). Collins wrote from a sociology perspective rather than a KM perspective. His impact on KM research and practice has been minimal. However, his contributions to the discussion about the conceptualization of knowledge are significant. His first peer reviewed publication (Collins, 1974) was on the subject of tacit knowledge, and his research publications on the conceptualization of

knowledge have spanned over 40 years. The final part of this section explores the challenges of targeting tacit knowledge in empirical research.

### *Explicit Knowledge*

Nonaka (1994) defined explicit knowledge as “transmittable in formal, systematic language” (p. 16) and used *codified knowledge* as a synonym. He characterized explicit knowledge as discrete or digital and existing in libraries, archives, and databases. He later expanded on this description by characterizing explicit knowledge as being spoken or captured in drawings and writing as well as having a “*universal* character, supporting the capacity to act across contexts...[and] is accessible through consciousness” (Nonaka & von Krogh, 2009, p. 636).

The phrase *explicit knowledge* does not appear in *Personal Knowledge* (1958), Polanyi’s magnum opus (Gelwick, 2007-2008), and only appears twice in *The Tacit Dimension* (1966b), which is another of Polanyi’s major works and is ranked as the fifth most highly cited document in KM literature (Ma & Yu, 2010). Polanyi did use the word *explicit* in both of these texts, and he connected it with the idea of the exact and testable in the positivistic objective ideal. Polanyi was more forthcoming in defining explicit knowledge in several works that have had little impact on KM. In *The Study of Man* (1959) Polanyi described explicit knowledge as “what is usually described as knowledge, as set out in written words or maps, or mathematical formulae” (p. 12). He later described explicit knowledge as “not sharply divided [from tacit knowledge because] explicit knowledge must rely on being tacitly understood and applied” (Polanyi, 1966a, p. 7). He

also described explicit knowledge as having an immense power that separates humans from animals, which is the power to “express in exact terms” (Polanyi, 1969b, p. 202).

Collins (2010) has proposed the most robust description of explicit knowledge. Collins wrote from a sociology perspective rather than a KM perspective. His impact on KM research and practice has been minimal. However, his contributions to the discussion about the conceptualization of personal knowledge are significant. Over 40% of his book deals with explicit knowledge. He claimed that explicit knowledge must be understood before tacit knowledge can be understood. And, he found a paucity of literature articulating explicit knowledge (Collins, 2011). Collins (2010) defined explicit knowledge as knowledge that has the potential of being transferred by the use of Collins Strings. To understand this definition it is necessary to explore both Collins Strings and the idea of *affordance of interpretation* as well as Collins’ four meanings of explicable.

A Collins String is “stuff inscribed with patterns...that [are] neither random nor featureless” (Collins, 2010, p. 16). Collins Strings are both physical and patterns. They are like the computer science idea of a variable yet exist outside of software. Collins Strings are not limited by digital transmission, include the medium used to transmit the string, and include everything that is not featureless or random (Collins, 2011). Thus, the act of speaking produces a Collins String. But a Collins String is not equivalent to language because tapping someone to encourage them to move out of your way or even looking at someone in a specific way are both Collins Strings. Other examples include paintings, fireworks, clocks, robotics, and shapes of trees.

Collins Strings have no meaning in themselves. Yet they can communicate through either a mechanical response to the Collins String or by interpretation of the

Collins String by a human. The second way, interpretation by a human, is explained by the idea of affordance of interpretation (Collins, 2010). The interpretation of a Collins String arises from the interpretive capabilities of humans based largely on social and cultural influences. Yet no meaning and no specific meaning is guaranteed. There is only the opportunity for meaning. Affordance is used by Collins as an indicator of effort required to interpret a Collins String. Effort and affordance are inversely related. Thus a photograph of a person in action offers an affordance of interpretation, but the affordance is higher and the effort required is lower for those familiar with the person and the action than for those who are unfamiliar with either. A fireworks display offers an affordance of interpretation, but the affordance is higher and the effort required is lower for those familiar with the local and national customs, such as the United States' Fourth of July Independence Day celebration.

Collins (2010) identified four meanings of explicable: elaboration, transformation, mechanization, and explanation. Elaboration is substituting a longer Collins String for a shorter Collins String. The longer Collins String may increase the affordance for interpretation. For example, a book may have a higher affordance of interpretation than a single page. Although, Collins was quick to point out that a longer Collins String does not guarantee meaning. None of the four methods provide a guarantee of meaning. They simply provide the possibility of an increased affordance of interpretation.

Transformation is physically transforming a Collins String to increase its causal effect and thus its affordance for interpretation. A printed Collins String can be transformed into air wave vibrations by the process of reading out loud. The air wave vibrations increase the affordance of interpretation for those within hearing distance. Mechanization is when

a Collins String is transformed into mechanical action to mimic human action. For example, the human effort of pressing a lever to increase, decrease, or maintain a vehicle's speed can be mechanically accomplished through cruise control. Finally, explanation is when mechanical action is converted to a scientific explanation Collins String such as the falling of an apple being conceptualized and explained as gravity.

All four meanings of explicable (Collins, 2010) are types or methods of substitution of one Collins String for another Collins String. Collins did not provide sufficient reasons to support the four kinds of substitutions requiring their own category. Nor did he provide any justification to support the four kinds of substitutions as the only kinds of substitutions that can occur. For example, Collins noted the danger of assuming that a longer Collins String always provides greater affordance of interpretation than a shorter Collins String (p. 23). Yet, it is only this kind of elaboration, longer for shorter, that Collins elevated to one of his formal methods of substitution. In addition, it is not entirely clear where the boundaries for each of Collins' methods should be drawn. Collins did not give clear examples of the last two definitions, mechanization and explanation, which leads to some confusion. Collins did not explain why a scientific explanation is sufficiently different from a non-scientific explanation as to require its own definition of explicable. In spite of these shortcomings, Collins description of explicit knowledge is robust and should be considered in KM research.

### *Tacit Knowledge*

Tacit knowledge is a complex construct that has generated much controversy in KM literature. This controversy is far from being resolved (Oguz & Sengun, 2011;

Venkitachalam & Busch, 2012). Tacit knowledge has served as a warehouse construct for holding all knowledge that is not explicit knowledge (Oguz & Sengun, 2011; Virtanen, 2010b). Competing conceptualizations of tacit knowledge have led to many attempts to clarify the meaning of tacit knowledge (Gourlay, 2006; Grant, 2007; McAdam, et al., 2007; Mooradian, 2005; Nonaka & von Krogh, 2009; Oguz, 2010; Oguz & Sengun, 2011; Ray, 2009; Takaki, 2009-2010; Tsoukas, 2003; Virtanen, 2010a, 2010b). Yet, consensus on the meaning of tacit knowledge has not been reached (Oguz & Sengun, 2011; Venkitachalam & Busch, 2012). The most influential literature in KM on tacit knowledge is the early work of Nonaka (1991, 1994) (Ma & Yu, 2010).

Nonaka (1991, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) has demonstrated significant consistency in his conceptualization of tacit knowledge throughout the years (see Appendix A). However, there is one major area of inconsistency. The early Nonaka (1991, 1994; Nonaka & Takeuchi, 1995) conceptualized tacit knowledge as one of two types of knowledge. The later Nonaka (Nonaka & von Krogh, 2009) conceptualized explicit knowledge as one end of a knowledge continuum with tacit knowledge on the other end. This change in Nonaka's conceptualization of knowledge is discussed in more detail in the Ikujiro Nonaka's Contribution section below.

Nonaka (1991, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) claimed that his conceptualization of tacit knowledge was influenced by Polanyi (1958, 1966b). Yet, many researchers have taken Nonaka and much of the rest of the KM literature to task for incorrectly applying Polanyi's work (Grant, 2007; Gueldenberg & Helting, 2007; McAdam, et al., 2007; Neuweg & Fothe, 2011; Oguz & Sengun, 2011;

Tsoukas, 2003; Virtanen, 2010a). Nonaka (1994) claimed to provide an expansion of Polanyi's ideas. However, Nonaka's understanding of Polanyi was faulty in two key areas: Nonaka believed that Polanyi's theory of personal knowing was about the division of knowledge into the two categories of explicit and tacit; and, Nonaka believed that Polanyi's work was ideally summarized by the statement, "We know more than we can tell" (Polanyi, 1966b, p. 4). See the discussion that follows Table 2 in the Michael Polanyi's Contribution section below for a full treatment of these two fallacies.

Polanyi (1958, 1966b) plays a significant role in KM literature because of Nonaka (1994; Nonaka & Takeuchi, 1995). Ma and Yu's (2010) citation analysis identified Polanyi as the third most cited author in KM literature from 1998 to 2002 with a frequency of 57 as well as the seventh most cited author from 2003 to 2007 with a frequency of 49. Most of these citations were of *The Tacit Dimension* (1966b) which was third with a frequency of 29 from 1998 to 2002 and ninth with a frequency of 27 from 2003 to 2007.

Grant (2007) evaluated the use of Polanyi (1958, 1966b) in KM literature. Grant began by reading both major works of Polanyi and identifying every reference to tacit or explicit knowledge as well as summarizing Polanyi's arguments. Grant then identified articles (n=52) referencing these works of Polanyi in the *Journal of Intellectual Capital*, *Journal of Knowledge Management*, and *Knowledge and Process Management*. Grant qualitatively analyzed these 52 papers to determine if the authors had read Polanyi's work. Grant concluded that only 37% had clearly read Polanyi, in 42% it was unlikely the authors had read Polanyi, and in 21% it was unclear if the authors had read Polanyi. In addition, Grant determined that 23% of the papers had significantly misrepresented

Polanyi. Grant conducted a wider, more general review and claims to have found similar results, although he did not report the details. Grant concluded that Polanyi is appealed to as an authority in KM literature to support concepts that do not align with his work. However, Grant's analysis reflects his interpretation of Polanyi. Grant derived a tacit-explicit continuum diagram from Polanyi which does not accurately reflect Polanyi's work. It is, for example, different in substance from the clarification of Polanyi presented by Oguz and Sengun (2011).

Oguz and Sengun (2011) conducted a qualitative evaluation of the construct of tacit knowledge in organizational literature. Their study was undertaken because of their perception of continued controversy over the construct of tacit knowledge in literature and their desire to explain misuse of the construct. In the view of these two researchers contentious questions remain in literature because of the misuse of the construct of tacit knowledge. The researchers reviewed key theoretical and research based studies, which were selected based on such things as journal impact, recentness, and number of citations. Oguz and Sengun evaluated the literature for its understanding and operationalization of tacit knowledge. They concluded that the literatures' use of tacit knowledge was closer to Ryle's (1949) knowing-how rather than Polanyi's (1966b) tacit knowing. The former being a kind of knowing and the later being a process of knowing which involves a symbiotic and physical relationship between the knower and the knowledge possessed by the knower (Oguz, 2010).

Polanyi (1958, 1966b) did not divide knowledge into two categories. He rarely used the phrase tacit knowledge. The phrase only appears twice each in *Personal Knowledge* (1958) and *The Tacit Dimension* (1966b). Polanyi's use of the word tacit was

focused on a process of knowing rather than a kind of knowledge (Henry, 2011). For Polanyi, tacit knowing was the act of indwelling. Polanyi's tacit knowing was a robust concept with both a functional and phenomenal structure as well as semantic and ontological aspects. Each of these structures and aspects is discussed in detail in the Michael Polanyi's Contribution section below.

Collins (2010) defined tacit knowledge as that knowledge which either "has not or cannot be made explicit" (p. 85). The explicit can be expressed as Collins Strings. The tacit cannot. Collins identified eight definitions of *cannot* to explain the distinction between explicit and tacit. These definitions included: contingency; logistic practice; technical competence; technological impossibility; logistic principle; scientific principle; somatic limit; and logical impossibility. Contingency is a cannot based on willingly or unwittingly withholding something that could be expressed as Collins Strings. Logistic practice is a cannot based on the lack of available resources. The resources exist somewhere, but they are not readily available. Technical competence is a cannot based on the lack of technical skill. The skill is available without the development of any new principles, but is not readily available. Technological impossibility is a cannot based on hard limits of technology. The necessary technology does not exist now and will not exist in the foreseeable future. Logistic principle is a cannot based on hard limits on resources. There are not enough resources in existence now and there will not be enough in the foreseeable future. Scientific principle is a cannot based on hard limits of science. The scientific understanding of the universe precludes expressing the tacit as Collins Strings. Somatic limit is a cannot based on hard limits of the human body. The human body is not capable of expressing the tacit as Collins Strings. Logical impossibility is a rhetorical

device that did not enter into Collins' discussion about explicit and tacit. Thus, it is listed but ignored by Collins. These eight definitions are organized here in order of weak cannot to stronger cannot. This ordering is general, and not clearly defined by Collins. This ordering also excludes number eight, which was ignored by Collins. Often, multiple cannots are intended in the single usage of a cannot. For example, if someone had said, "We cannot put a man on the moon" in 1940 they would have likely meant at least technological impossibility, logistic principle, scientific principle, and somatic limit cannot.

Collins (2010) divided tacit knowledge into three sub-categories: Relational Tacit Knowledge (RTK); Somatic Tacit Knowledge (STK); and Collective Tacit Knowledge (CTK). RTK is tacit because of realities in society. Although RTK could be made explicit through the use of Collins Strings there are five reasons it might not be made explicit. First, the knowledge may be intentionally kept secret. Second, the knowledge may be so complex that it cannot be spoken in a way that makes it understandable. This second reason, which Collins calls ostensive knowledge, can be made explicit only through observation of some object or activity. The third reason RTK may remain tacit is that it is too logistically difficult to make it explicit. For example, it may not produce sufficient benefits to justify the cost or effort. Fourth, someone may lack awareness that the knowledge should be made explicit. Fifth, the knowledge is unrecognized by the person possessing it. STK is tacit because of the nature of the human body. Collins further divided STK into somatic-limit and somatic-affordance tacit knowledge. Somatic-limit is based on the limits of the human body. Somatic-affordance is based on the nature of the human body that prevents the exact mechanization of what humans are capable of doing.

CTK is tacit because of the realities of social life. As described by Collins, CTK has the strongest tacitness. It is the most difficult to make explicit. CTK is based on the uniqueness of humans acting in a social setting where they are able to act differently based on the context and their interpretation of the context. Collins calls this polymorphic action.

### *Empirical Research on Tacit Knowledge*

Empirical KM research that focused directly on tacit knowledge is rare and problematic. The majority of research that included tacit components focused on KM practices and their impact on organizational performance. Inherent in the rarity of empirical KM research on tacit knowledge is the very concept of tacit knowledge. Based on the oft used descriptions in KM literature, tacit knowledge, once identified and described so that it can be observed, has become explicit. If Collins (2010) is right then tacit knowledge cannot be made explicit and it may be impossible to observe or measure. Of course, this depends on which of Collins' eight definitions of *cannot* is being considered. If Polanyi (1966b) is correct, then tacit knowing is a process that includes an element of focus. When the focus changes the tacitness of the subsidiaries changes. Thus, focusing on the subsidiaries through interviewing or possibly even observation changes the subsidiaries into the focal and thereby removes their tacitness.

Examples of these challenges can be seen in Peet (2012) as well as McQueen and Chen (2010). Both studies observed the impacts of techniques on what the researchers described as tacit knowledge. Peet used generative knowledge interviewing (GKI) to facilitate the retrieval, validation, and sharing of tacit knowledge. McQueen and Chen

observed 12 methods used to create tacit knowledge. Yet, what the researchers describe as tacit knowledge may or may not be tacit. Possibly, by the end of each research project the knowledge being advanced was more explicit than tacit. This would have enabled the knowledge to be more easily shared, observed, and evaluated. The problem in these two studies and all of KM is the ambiguous concept of tacit knowledge. Both studies highlighted here certainly demonstrated positive impacts for the transfer of knowledge. Whether that knowledge was tacit, and by whose definition it was tacit, is an open question.

Peet (2012) developed GKI to facilitate the retrieval, validation, and sharing of tacit knowledge. Peet's conceptualization of tacit knowledge was based on the KM view of Polanyi (1966b) as well as Nonaka and Takeuchi (1995) descriptions of tacit knowledge. The development of GKI was targeted at the leadership development needs of students. GKI is based on two activities: the telling of stories by the person being interviewed; and the indwelling of the stories by the interviewer for the purpose of identifying the interviewee's strengths and capacities. There is also an iterative process in GKI where the interviewer prompts the interviewee to explore and expand on the interviewee's strengths and capacities in specific contexts. Peet used GKI in a university administration setting to assist senior leadership in transition. Peet conducted two rounds of GKI: one round with the outgoing senior leader and one round with the new incoming senior leaders. Data collection included notes from interviews, core capacity documents, researcher's observation notes, and reflection documents by observers. Data collection occurred over a period of two years. Peet used coding techniques from GTM to analyze the qualitative data. Peet identified five activities in GKI that fostered tacit knowledge

sharing: goal identification; key strength identification; core capacity identification; core capacity alignment; and expanding focus. Peet also qualitatively identified positive impacts to four dimensions of knowledge creation.

McQueen and Chen (2010) worked with script-based tacit knowledge, which they connected with the taking of action steps in specific contexts. They defined tacit knowledge as “resident in an individual’s brain” (p. 240) without appealing to any outside sources. The setting for the study was a China based call center where training of employees was based on 12 methods. These methods included activities such as presentations, lab experiments, tests, role playing, job shadowing, and quality audits. McQueen and Chen postulated that these 12 methods facilitate the creation of script-based tacit knowledge. Data collection consisted of reviewing documents, conducting interviews and observing employees. Observations were conducted over a one year time period while Chen was employed at the call center. Coding and pattern matching were used to organize and analyze the qualitative data. McQueen and Chen arrived at two conclusions from this data analysis. First, progression from novice toward expert includes progression from using explicit knowledge toward using more tacit knowledge. This progression is linear rather than circular as described by Nonaka (Nonaka, 1994; 1995). Second, the application of tacit knowledge to a problem occurs in six sequential steps: awareness; attention; diagnosis; action alternative analysis; action taking; and outcome analysis.

Thus, both Peet (2012) as well as McQueen and Chen (2010) demonstrate the problem with tacit knowledge research in KM literature. Both studies investigated aspects of knowledge within a KM perspective. And, both studies identified positive impacts for

the transfer of knowledge. Yet, no definitive claim can be made about the kind of knowledge investigated in these two studies.

### **Michael Polanyi's Contribution**

A brief summary of Polanyi's personal history is relevant to understanding his theory of personal knowing. Polanyi's life has been well documented by Nye (2011), Mitchell (2006), Scott and Moleski (2005), and Gelwick (1977) as well as by a number of other authors (Mullins, 2008). Polanyi's efforts to understand personal knowing were born out of his scientific career and the personal impact of both World Wars. He was born into a secular Jewish family in Budapest, Hungary in 1891. He completed his physician's training in time to serve as a physician in the Hungarian army from the start of World War I. However, due to his illnesses he was afforded time to pursue his interest in chemistry. He had published his first chemistry paper at the age of 19 and earned his doctorate in chemistry during the war. His work in chemistry had been encouraged by Albert Einstein. The end of World War I was complex in Budapest. Polanyi played a minor role in one of the transition governments and subsequently taught at the University of Budapest. In 1919 he was forced from his teaching position and fled to Germany. Polanyi began research work at the Wilhelm Institute of Fiber Chemistry in Berlin in 1920. He remained there until fleeing to England in 1933 because of Hitler's rule in Germany. While in Berlin Polanyi was part of an elite scientific community. During this time he regularly met with Einstein, Planck, Schrodinger, von Neumann, and other notable scientists. This community life of scientists had a large impact on his theory of personal knowing. At Manchester University in England Polanyi held the Chair of

Physical Chemistry from 1933 until 1948. Polanyi moved to the Chair of Social Studies in 1948 to pursue his non-chemistry related interests. His academic and research work in chemistry were of the highest caliber. Although Polanyi never won a Nobel Prize in chemistry, several of his students did, and he was apparently on the right path to win the prize when he shifted his energy to non-chemistry related interests (Scott & Moleski, 2005). Polanyi's non-chemistry related interests included politics, economics, and the social practices of the scientific community. It is this latter interest combined with his own career as a world class scientist as well as the negative direction of scientific communities in both communist and fascist led countries that led Polanyi to develop his theory of personal knowing.

Polanyi's (1958, 1966b) theory of personal knowing is difficult to place in the landscape of academics and research. He was an insider and a leader in the realm of physical chemistry. However, he was an outsider and an upstart in philosophy. His questions, approach, and solutions did not follow the norms in philosophical epistemology (Zmyślony, 2010). Philosophical epistemology is primarily concerned with the justification of propositional knowledge (Moser, 2002; Steup, 2011). The philosophical epistemological idea of propositional knowledge is conditionally similar to the KM idea of explicit knowledge. Polanyi challenged the sufficiency of the epistemological theories of his time (Virtanen, 2010a). He made propositional knowledge secondary and elevated personal knowing as indwelling to the forefront. The discipline of philosophy has not readily accepted his contributions (Zmyślony, 2010). Thus, it is difficult to claim that Polanyi engaged in philosophical epistemology. However, Polanyi

did contribute to epistemology in the larger since by formulating a theory of personal knowing.

Polanyi's (1958, 1966b) theory of personal knowing is complicated, much debated, and often misapplied within KM (Grant, 2007; Oguz & Sengun, 2011). *Personal Knowledge* (Polanyi, 1958) is considered Polanyi's magnum opus (Gelwick, 2007-2008). Polanyi completed this work after "eleven years of intellectual struggle, reflection, creative imagination, consultation and conversation, [and] wide reading" (Gelwick, 2007-2008, p. 19). As an illustration of the significance, complexity, and depth of Polanyi's work, there are a number of societies around the world that are primarily dedicated to pursuing the epistemological works of Polanyi. These include the Michael Polanyi Liberal Philosophical Society in Hungary, which publishes *Polanyiana*; The Society for Post-Critical and Personality Studies in the United Kingdom, which publishes *Appraisal*; and, the Polanyi Society in the United States, which publishes *Tradition and Discovery* as well as holding regular conferences. All of these journals have published decades of discussions, clarifications, controversies, debates, applications, and extensions of Polanyi's non-chemistry related work.

Based on the inherent complexity of Polanyi's (1958, 1966b) theory of personal knowing it should come as no surprise that the discipline of KM has struggled with understanding and applying this theory. The remainder of this section is divided into two sections. The first section introduces Polanyi's theory of personal knowing. The second section identifies and dispels four myths in KM literature related to Polanyi.

*Personal Knowing Theory*

Gelwick (1977) compared the radical nature of Polanyi's (1958) theory of personal knowing with that of the Copernican heliocentric model in the late sixteenth century. Copernicus placed the Sun at the center of the universe rather than the Earth. Polanyi placed the personal at the center of knowledge rather than the positivist's objective ideal. The purpose of *Personal Knowledge* (Polanyi, 1958) was "to show that complete objectivity usually attributed to the exact sciences is a delusion and is in fact a false ideal" (p. 18). Polanyi placed the concept of personal between subjective and objective. The personal is based on commitments to requirements outside of the person. Thus it is different from the subjective, which is based on submitting to internal criteria. The personal is guided by acts of appraisal. Thus it is different from the objective, which is claimed to be determined entirely by observation without any appeal to an act of appraisal.

Polanyi's (1958) theory of personal knowing explained how humans acquire knowledge through acts of comprehension. These acts of comprehension require appraisal and indwelling. Appraisal is a personal act of evaluation within an interpretive framework. This personal act results in rejection of or commitment to something outside the interpretive framework. Indwelling is the central action of all personal knowing. Meaning emerges out of the *from-to* relational structure of indwelling. Both appraisal and indwelling will be explained below. First, justification must be given for excluding the word most frequently associated with Polanyi: tacit.

Polanyi (1958) often used the word tacit in the process of explaining his theory of personal knowing. Tacit played an important but not primary role in *Personal*

*Knowledge*. By the time of the Terry Lectures at Yale University in 1962 tacit had taken on a more primary role. The first of these lectures was entitled *Tacit Knowing*, and the publication of the three lectures in 1966 was entitled *The Tacit Dimension*. However, Polanyi used *indwelling* to conceptually capture the meaning of tacit knowing. He summarized the first Terry Lecture using indwelling (Polanyi, 1966b, p. 55). The second Terry Lecture, which began with a discussion of indwelling, was summarized using tacit knowing (Polanyi, 1966b, pp. 30, 55). In addition, tacit knowing and indwelling are both comprised of the same two components (Polanyi, 1966b, pp. 9, 30). The same year as the Terry Lectures, Polanyi (1962) published a paper in which he described tacit knowing as appearing in the act of indwelling. In that same paper he discussed degrees of tacit knowing and indwelling as interchangeable concepts. Finally, he stated that “all understanding is tacit knowing, all understanding is achieved by indwelling” (Polanyi, p. 606). Thus, indwelling is an ideal focus for the discussion of Polanyi’s theory of personal knowing.

There is an additional justification for avoiding the term tacit in explaining Polanyi’s (1958) theory of personal knowing. The use of tacit knowledge is tangled and much debated in KM literature, especially in its connection with Polanyi (Grant, 2007; McAdam, et al., 2007; Oguz & Sengun, 2011; Tsoukas, 2003; Virtanen, 2010b). The debate in KM literature centers on the word tacit and not the word knowledge as well as on the depth and richness of Polanyi’s theory of personal knowing. Thus avoiding the use of tacit may facilitate a deeper and more precise discussion about Polanyi’s theory of personal knowing and the conceptualization of personal knowledge in KM.

Indwelling involves two conceptual classes, which Polanyi (1958) called either focal and subsidiary (1958) or distal and proximal (1966b). These conceptual classes can be explained by contrasting the use of a white cane by a skilled blind person with the use of the same cane by an unskilled sighted person. The unskilled sighted person who is blindfolded and handed a white cane will struggle to interpret the meaning of the cane's vibrations. This person will, at least initially, be focused on the cane itself: its weight and feel in the person's hand. Thus, this unskilled person will miss the signals coming from the tip of the cane. In contrast, the skilled blind person will pay attention to the vibrations of the cane rather than the cane's interface with the person's hand. The skilled blind person will indwell the cane, and the cane will thus become an extension of the skilled blind person's body. Thus, the skilled blind person will focus on interpreting the signals coming from the tip of the cane. A white cane can instantiate as either the focal conceptual class or the subsidiary conceptual class. The cane is the focus of the unskilled sighted person, and is therefore an instance of the focal conceptual class. The cane is indwelt by the skilled blind person, and is therefore an instance of the subsidiary conceptual class. Polanyi (1958) extended this example to the full range of human experience including thought, action, personal history, social constructs, and traditions. For example, a beginning reader will necessarily focus on the pronunciation of individual letters in each word. In contrast, a skilled reader will focus on the words and sentences until the person encounters an unfamiliar word. The skilled reader has indwelt the letters, vocabulary and grammar, which functions as the subsidiary conceptual class, in order to focus on the words and sentences, which function as the focal conceptual class. When the skilled reader encounters an unfamiliar word this person shifts focus from the words and

sentences to the pronunciation of the unfamiliar word. Thus, at this point, the letters, context, and grammar of the unfamiliar word have instantiated as the focal conceptual class for the skilled reader. A person's focal attention is limited in scope and depth, but a person's subsidiary attention is virtually unlimited. Therefore, all that is indwelt by a person comprises an instantiation of the subsidiary conceptual class for that person. In the case of the skilled reader encountering an unknown word, the subsidiary includes all presuppositions about culture, vocabulary, interpretation, and understanding as well as much more.

Anyone who has experienced arriving at a destination without detailed memory of driving to that destination has experienced indwelling. The act of driving and the details of the route have been so indwelt that the person is able to focus on something else, such as a conversation or their own internal thoughts. This indwelling is not perfect, as is illustrated by certain kinds of vehicle accidents.

The two conceptual classes of indwelling have a functional and phenomenal structure as well as a semantic and ontological aspect (Polanyi, 1969a). The functional structure is the from-to relational structure when attending from the subsidiary to the focal. The skilled blind person attends from the white cane to the vibrations at the tip of cane, thus creating a relational structure between the from-to. The skilled reader attends from the letters to the words and sentences creating a similar structure. The phenomenal structure is the awareness of the subsidiary only in the appearance of the focal. The subsidiary disappears as a unique and independent entity in the from-to relationship. The skilled blind person is aware of the white cane only in the appearance of the vibrations from the tip of the cane. The skilled reader is aware of the letters only in the appearance

of the words and sentences. The functional and phenomenal structures of the from-to relationship between subsidiary and focal give rise to meaning. This emergence of meaning is the semantic aspect. A vibration at the tip of the white cane has meaning for a skilled blind person. This meaning emerges from the functional and phenomenal structures and has significance beyond the person and the cane. Sentences and paragraphs have meaning for the skilled reader. Their meaning has significance beyond the person and definitions of individual words. The ontological aspect places meaning into context. This meaning-in-context, or knowing, is deduced by the person from the combining of the functional structure, phenomenal structure, and semantic aspect. The white cane gives the skilled blind person knowledge about the physical world around the person. A text gives the skilled reader knowledge about the story being presented. There is no guarantee of accuracy or exactness in either case.

Polanyi (1958) called appraisal the “personal coefficient, which shapes all factual knowledge” (p. 17). Appraisal is a personal act of evaluation within an interpretive framework. This personal act results in rejection of or commitment to something outside the interpretive framework. The interpretive framework consists of presuppositions formed within the life and language of a specific context. The acceptance of a set of presuppositions is an indwelling in them. Through indwelling people focus their attention on the application of the presuppositions rather than the presuppositions themselves. These presuppositions may or may not be convincing when analyzed, but analysis can only occur when indwelling ceases. People commit themselves to something by fitting it, even temporarily, into their interpretive framework. Thus, commitment leads to an indwelling of the thing committed to and an integration of the thing into the interpretive

framework. Polanyi described four classes of appraisal based on a person's interpretive framework and the application of that interpretive framework (see Table 1).

Table 1. Polanyi's Four Classes of Appraisal.

Class	Accredited Interpretive Framework	Accredited Application of Interpretive Framework	Description
Correct	Yes	Yes	"Correct inferences reached within a <i>true system</i> " (Polanyi, 1958, p. 374).
Mistaken	Yes	No	"Like an <i>error</i> committed by a <i>competent</i> scientist" (Polanyi, 1958, p. 374).
Subjective	No	Yes	"Correct use of a fallacious system. This is an incompetent mode of reasoning" (Polanyi, 1958, p. 374).
Deranged	No	No	" <i>Incoherence</i> and <i>obsessiveness</i> as observed in the ideation of the insane" (Polanyi, 1958, p. 374).

In summary, Polanyi's (1958) theory of personal knowing explained how humans acquire knowledge through acts of comprehension. These acts of comprehension require appraisal and indwelling. Appraisal is a personal act of evaluation within an interpretive framework. This personal act results in rejection of or commitment to something outside the interpretive framework. Indwelling is the central action of all personal knowing. Meaning emerges out of the from-to relational structure of indwelling.

#### *Four Significant Myths Related to Polanyi in KM Literature*

A number of authors have identified the disparity between the writings of Polanyi (1958, 1966b) and the citations of Polanyi in KM literature (Grant, 2007; Neuweg & Fothe, 2011; Oguz & Sengun, 2011; Virtanen, 2011). This disparity is rooted in the

complexity of Polanyi's writings, Nonaka's (1991, 1994) application of Polanyi, and the likelihood that many authors citing Polanyi have not actually read the works of Polanyi (Grant, 2007). Thus, Polanyi is appealed to as an authority to support concepts within KM literature that do not align with his work. This has led to four persistent myths related to Polanyi in KM literature (see Table 2). Ultimately, each myth results in something that is not Polanyian even though Polanyi is cited. Table 2 provides examples of KM literature that perpetuates each myth. All of the examples in Table 2 come from journals ranked among the top 10 most influential KM journals (Bontis & Serenko, 2009; Serenko & Bontis, 2009). In addition, all of the examples appeal to *The Tacit Dimension* (Polanyi, 1966b) for their support. The remainder of this section explores and attempts to dispel each myth.

The first myth claims that Polanyi (1958) was the first to conceptualize knowledge as explicit and tacit. He was not. Both phrases, tacit knowledge and explicit knowledge, were in use before Polanyi published his theory of personal knowing. Examples of explicit knowledge include science (McKay, 1932), psychology (Ichheiser, 1943), sociology (Schütz, 1944), philosophy (Carnap, 1946), and mathematics (Koopmans & Reiersol, 1950). A notable example is Khun (1950), who was a contemporary of Polanyi's and worked within the philosophy of science, the same discipline at which *Personal Knowledge* (Polanyi, 1958) was targeted. Examples of tacit knowledge include advertising (Acheson, 1917), education (Jones, 1919), politics (Spurr, 1920), astronomy (Myers, 1931), and psychology (Brussel, 1945). None of these older citations developed any kind of a theory or conceptualization of knowledge. These older

Table 2. Four Significant Myths Related to Polanyi in KM Literature

Myth	Examples of literature that perpetuates the myth
Polanyi was the first to conceptualize knowledge as explicit and tacit.	<p>“..explicit and tacit knowledge – were first introduced by Polanyi (1966)” (Harvey, 2012, p. 401).</p> <p>“..explicit and tacit knowledge. Polanyi (1966) was the first to introduce these concepts...” (Hassandoust, 2011, p. sect. 2.1).</p>
Polanyi’s theory of personal knowing is about the division of knowledge into the two categories of explicit and tacit.	<p>“...Polanyi (1966) classifies knowledge into explicit and tacit knowledge...” (Sharma, Banati, &amp; Bedi, 2012, p. 3)</p> <p>“Polanyi (1966) categorized knowledge into two types: explicit knowledge and implicit (tacit) knowledge...” (C. Wang &amp; Han, 2011, p. 804).</p> <p>“Knowledge may be classified into two general categories: explicit and tacit (Polanyi, 1966)” (Nold, 2011, p. 85).</p> <p>“Knowledge is classified into two types as tacit and explicit by Polanyi (1966, p. 135-146)” (Ramasamy &amp; Thamaraiselvan, 2011, p. 278). The cited text, <i>The Tacit Dimension</i> ends at page 92.</p> <p>“The premise of the ‘knowledge creation theory’ is the supposition that knowledge can be classified as either tacit or explicit (Polanyi, 1966)...” (Magnier-watanabe, Benton, &amp; Senoo, 2011, p. 18).</p> <p>“As for knowledge itself we work with Polanyi’s concept of two dimensions, explicit and tacit (Polanyi, 1966)” (MlÁdková, 2011, p. 252).</p>
“We know more than we can tell” (Polanyi, 1966b, p. 4) is an ideal summation of Polanyi’s theory of personal knowing.	<p>“Tacit knowledge is often referred to as knowing ‘more than we can tell’ (Polanyi, 1969, p. 4)” (Peet, 2012, p. 47).</p> <p>“Polanyi (1966, p. 4) concisely sums up tacit knowledge with the phrase ‘we know more than we can tell’ (Suppiah &amp; Sandhu, 2011, p. 464).</p>
Nonaka incorporated Polanyi’s theory of personal knowing into organizational knowledge creation theory.	<p>“Nonaka’s theory is based on Polanyi’s (1966) notion that there are two types of knowledge explicit and tacit” (Arling &amp; Chun, 2011, p. 232).</p> <p>“..explicit and tacit knowledge. Polanyi (1966) was the first to introduce these concepts then further explained by Nonaka and Takeuchi (1995)” (Hassandoust, 2011, p. sect. 2.1).</p>

citations simply paired common English language words together to convey relatively simple concepts. Ascribing the creation of these phrases to Polanyi fails to recognize the richness of his process of knowing and raises the phrases to the unwarranted level of explaining Polanyi's theory of personal knowing, which they cannot.

Polanyi (1959) did use the categories of explicit and tacit as a beginning point to the Lindsay Memorial Lectures of 1958. However, too much should not be made of his statement, "in my view...human knowledge is of two kinds" (1959, p. 12). He described these lectures as an introduction to *Personal Knowledge* (1958), which had just been published. The categories were offered in the third paragraph of the first lecture as a beginning point for those stuck with the idea of the existence of only explicit knowledge. Polanyi proceeds through the remainder of the lectures to explain his early conceptualization of indwelling, which can be seen further developed in *The Tacit Dimension* (Polanyi, 1966b).

This first myth is significant because it establishes the wrong foundation and direction for understanding and applying Polanyi's work to KM. In addition, this myth contributes to the second myth, that Polanyi's theory of personal knowing is about the division of knowledge into the two categories of explicit and tacit (Henry, 2011). A more accurate understanding of Polanyi's work will recognize that he focused on a process of knowing rather than two kinds of knowledge (Henry, 2011).

The second myth claims that Polanyi's theory of personal knowing is about the division of knowledge into the two categories of explicit and tacit. It is not (Grant, 2007; Henry, 2011; Oguz & Sengun, 2011; Willcocks & Whitley, 2009). Polanyi rarely used

the phrases tacit knowledge and explicit knowledge. Polanyi used tacit knowledge only twice each in *Personal Knowledge* (1958) and *The Tacit Dimension* (1966b). The phrase explicit knowledge does not appear in *Personal Knowledge* (1958), and only appears twice in *The Tacit Dimension* (1966b). Polanyi developed a rich, robust theory of personal knowing as demonstrated in the explanation in the previous section of this literature review. This theory cannot be interpreted or reduced to an argument for the dichotomous nature of knowledge. Doing so is worse than oversimplification and loses the depth and richness of Polanyi's work. This myth is tantamount to claiming that Leonardo De Vinci painted a smiley face, when in fact he painted the Mona Lisa. The Mona Lisa has a famous smile (Trumble, 2004), but she is much more than a smiley face. Polanyi dealt with the tacit as well as the tension between explicit and tacit in his theory of personal knowing. However, the theory is much more than just two categories of knowledge.

The third myth claims that the quote, "We know more than we can tell" (Polanyi, 1966b, p. 4) is an ideal summation of Polanyi's theory of personal knowing. It is not. This quotation is often taken out of context. However, the context is very significant. "I shall reconsider human knowledge by starting from the fact that *we can know more than we can tell*. This fact seems obvious enough; but it is not easy to say exactly what it means" (p. 4). This statement comes from the beginning of the first Terry Lecture of 1964. It is the seventh paragraph, and like the myth one content from the Lindsay Memorial Lectures, this statement is clearly intended as a starting point. It is not Polanyi's conclusion. In the middle of that first lecture Polanyi demarcated a transition in thinking based on conceptually building on the oft cited statement from the beginning of

the lecture (1966b, pp. 17-18). Finally, Polanyi himself summarized the first lecture by stating, “My first lecture dealt with our power of tacit knowing. It showed that tacit knowing achieves comprehension by indwelling, and that all knowledge consists of or is rooted in such acts of comprehension” (p. 55). There is no reason to take the beginning point and treat it like the conclusion. If KM researchers are serious about incorporating Polanyi’s work into KM then they will grapple with Polanyi’s own summation of his lecture and ignore the beginning of the lecture except when using it as a starting point as Polanyi himself did.

The fourth myth claims that Nonaka (1994; Nonaka & Takeuchi, 1995) incorporated Polanyi’s (1958) theory of personal knowing into organizational knowledge creation theory. He did not. Nonaka built his conceptualization of personal knowledge in his theory on the myths listed above. Nonaka claimed that “Polanyi classified human knowledge into two categories. ‘Explicit’ or codified knowledge... [and] ‘tacit’ knowledge” (p. 16). Nonaka also claimed that “one dimension of this knowledge creation process can be drawn from a distinction between two types of knowledge—‘*tacit knowledge*’ and ‘*explicit knowledge*.’ As Michael Polanyi (1966, p. 4) put it, ‘We can know more than we can tell’” (p. 16). Many researchers have taken Nonaka to task for incorrectly applying Polanyi’s work (Grant, 2007; Gueldenberg & Helting, 2007; McAdam, et al., 2007; Oguz & Sengun, 2011; Tsoukas, 2003; Virtanen, 2010a). Nonaka claimed that Polanyi wrote from a philosophical context, and Nonaka claimed to provide an expansion of Polanyi’s ideas “in a more practical direction” (p. 16). He did not. What Nonaka did was metaphorically closer to looking at the Mona Lisa and painting a smiley face.

The last myth may be the most dangerous and difficult to overcome for the discipline of KM because it supports and perpetuates the other three myths. Ultimately though, each myth results in something that is not Polanyian even though Polanyi (1958, 1966b) is cited. If the conceptualization of personal knowledge within KM is to advance then these myths about Polanyi in KM must be abandoned.

### **Ikujiro Nonaka's Contribution**

Nonaka (1994) developed organizational knowledge creation theory based on 20 years of research and observation of Japanese organizations and their contrasts with Western organizations. Organizational knowledge creation theory was further clarified (Nonaka & Takeuchi, 1995) and continues to be defended and clarified (Nonaka & von Krogh, 2009). Nonaka and Takeuchi (1995) is one of the ten KM classics that launched KM as a major discipline (Lambe, 2011). Nonaka (1994; Nonaka & Takeuchi, 1995) consistently appears at the top of citation charts for KM literature (Grant, 2007; Jennex & Croasdell, 2005; Ma & Yu, 2010) and may be the most influential work in KM (Grant, 2011; Ma & Yu, 2010; Spender & Scherer, 2007). Together, these publications by Nonaka (1994; Nonaka & Takeuchi, 1995) ranked as number one in citations by a large margin from 1998 through 2007 (Ma & Yu, 2010).

The core concepts of organizational knowledge creation theory (Nonaka, 1994; Nonaka & Takeuchi, 1995) include the four modes of knowledge conversion, the spiral of organizational knowledge creation, and the tacit-explicit knowledge continuum. Apart from the tacit-explicit knowledge continuum, the core concepts of organizational knowledge creation theory do not directly impact the problem and research goals of the

current research. However, citations of Nonaka's work are pervasive in KM literature, and the tacit-explicit continuum is essential to the problem in the current research. Thus, it is important to give an overview of the other core concepts of Nonaka's theory.

### *Organizational Knowledge Creation Theory*

Nonaka (1994) defined four modes of knowledge conversion: tacit-to-tacit, labeled socialization; tacit-to-explicit, labeled externalization; explicit-to-explicit, labeled combination; and explicit-to-tacit, labeled internalization. Individuals create knowledge using the conversion processes of socialization, externalization, combination, and internalization (SECI). However, knowledge conversion using SECI "is a 'social' process *between* individuals and not confined *within* an individual" (Nonaka & Takeuchi, 1995, p. 61). Thus, knowledge creation is performed by individuals, but not in isolation. Individuals require community in order to use SECI to create knowledge. Organizational knowledge creation occurs when the organization amplifies and extends individual knowledge creation by involving larger and larger groups of individuals in SECI. Amplification and extension is called the spiral of organizational knowledge creation and is supported by five conditions: intention, autonomy, fluctuation, redundancy, and requisite variety (Nonaka & Takeuchi, 1995).

Nonaka, Byosiere, Borucki, and Konno (1994) collected data from 105 Japanese middle managers using an instrument with 184 questions in order to validate portions of organizational knowledge creation theory. For SECI they reported first-order confirmatory factor analysis of 73% for socialization, 51.5% for externalization, 64.3% for combination, and 55.5% for internalization. Nonaka and Takeuchi (1995) claimed that

the confirmatory factor analysis values reported in Nonaka et al. empirically validated all four phases of SECI. Gourlay (2003) as well as Gourlay and Nurse (2005) challenged this claim as two of the four processes did not surpass a 60% threshold. Gourlay and Nurse evaluated the empirical foundation of organizational knowledge creation theory and concluded that the SECI model was not empirically grounded by Nonaka (1994; Nonaka & Takeuchi, 1995). Gourlay and Nurse arrived at three conclusions based on their evaluation of Nonaka's empirical data: the data primarily came from early information creation studies, rather than new studies on knowledge creation, which posed conceptual problems for empirical validation; the survey used by Nonaka did not validate the process model of SECI because of the content focus rather than process focus of the survey as well as because of the results of the survey; and the descriptions of case studies did not support three of the four modes in SECI. Nonaka et al. did acknowledge limitations to their findings. Nonaka et al. acknowledge that their study was the first post-pilot test use of the survey instrument, but they gave no analysis on how the survey might be improved. Additionally, they acknowledged the heterogeneous and small sample size, which limited analysis, posed possible internal validity questions, and limited generalizability of SECI beyond the Japanese culture.

Byosiere and Luethge (2008) duplicated the relevant portion of the Nonaka et al. (1994) study, including using the same questions, by collected data from 159 middle managers in a global telecommunications company. For SECI Byosiere and Luethge reported first order confirmatory factor analysis of 66.2% for socialization, 53.5% for externalization, 59.9% for combination, and 63.6% for internalization. Between the two studies (Byosiere & Luethge, 2008; Nonaka, et al., 1994) the only phase with a consistent

confirmatory factor analysis above 60% was socialization. These results indicate a potential problem in the foundation of organizational knowledge creation theory. This problem was also pointed out by Rice and Rice (2005), who investigated literature on the application of SECI in multi-organizational projects. Their findings led them to conclude that the SECI framework is resistant to empirical validation. Rice and Rice cited both the “philosophical elements” (p. 673) of SECI as well as the vague boundaries between explicit and tacit knowledge as barriers to empirical validation. They found that the testable portions of SECI were related to organizational structures that support KM rather than knowledge transfer.

These results indicate a potential problem in the foundation of organizational knowledge creation theory that is related to the current research. SECI is built on the tacit-explicit bifurcation of knowledge. As noted above, organizational knowledge creation theory has been significantly challenged in KM literature because of Nonaka’s (1994) conceptualization of tacit knowledge in relation to Polanyi’s (1958, 1966b) theory of personal knowing. On top of this challenge is the tenuous empirical foundation of SECI. These two sets of challenges to organizational knowledge creation theory support continued pursuit of the conceptualization, role, and function of personal knowledge within a KM perspective.

#### *Explicit and tacit Knowledge in SECI*

The early Nonaka (1991, 1994; Nonaka & Takeuchi, 1995) conceptualized tacit knowledge as one of two types of knowledge (see Appendix A). The later Nonaka (Nonaka & von Krogh, 2009) conceptualized explicit knowledge as being on one end of a

knowledge continuum with tacit knowledge on the other end. Nonaka and von Krogh (2009) cited two of Nonaka's (1991, 1994) earliest works in their claim of a knowledge continuum. However, there is nothing in these early articles that indicates a knowledge continuum (Jasimuddin, Klein, & Connell, 2005). Nonaka introduced (Nonaka & Toyama, 2003) and then developed (Nonaka & Peltokorpi, 2006) the knowledge continuum, but failed to include it as one of the "central elements" (Nonaka, von Krogh, & Voelpel, 2006, p. 1179) of organizational knowledge creation theory until much later (Nonaka & von Krogh, 2009). Additionally, Nonaka (1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) used the idea of *conversion* to describe changing tacit knowledge into explicit knowledge. Conversion was originally based on the ACT model (Anderson, 1983), which divided knowledge into two categories, and which Nonaka (1994) described as compatible with Ryle's (1949) two categories of knowing. However, Nonaka and von Krogh describe conversion as "the interaction between tacit and explicit knowledge along the continuum" (2009, p. 638). Thus, Nonaka originally intended to describe two categories of knowledge with the conceptualization of explicit and tacit knowledge in organizational knowledge creation theory. The tacit/explicit knowledge continuum is therefore a late development in organizational knowledge creation theory.

Nonaka and von Krogh's (2009) knowledge continuum consisted of explicit knowledge on one end and tacit knowledge on the other end with dynamic interaction along the full length of the continuum. Nonaka and von Krogh described this continuum as functioning in an analog fashion. This analog continuum permits knowledge to reside and move along the continuum in a continuous fashion. Thus, knowledge has both

explicit and tacit characteristics, but more or less of each depending on where it falls on the continuum.

### **Research Implications**

This literature review has demonstrated that KM has a problem at its foundation regarding the conceptualization of personal knowledge. There is not a standardized understanding of personal knowledge in KM even though personal knowledge is at the foundation of KM research and practice (Heisig, 2009; Neuweg & Fothe, 2011; Virtanen, 2011). In addition, research and discussion about the conceptualization of personal knowledge in KM is mired in a debate about the meaning and nature of explicit and tacit knowledge. At the core of this debate is the popularity of organizational knowledge creation theory and Nonaka's (1994) simplistic conceptualization of personal knowledge compared with Polanyi's (1958, 1966b) robust theory of personal knowing.

A pressing need in KM research and practice is to understand personal knowledge within a KM perspective. KM literature clearly points to the importance of the conceptualization of personal knowledge in the practices and outcomes of KM. However, KM literature is devoid of attempts to reconceptualize personal knowledge based on the actual experience of participants in the process of acquiring knowledge. The current research was designed to begin filling this void. In doing so, the current research may begin a process of harmonizing diverse explanations of knowledge such as that presented by Nonaka and von Krogh (2009), Oguz and Sengun (2011), as well as Tsoukas (2003) by recognizing the validity of the different perspectives within a more robust conceptualization of personal knowledge.

## Chapter 3

### Methodology

#### **Introduction**

The goal of the current research was to develop a conceptualization of personal knowledge within a KM perspective using grounded theory methodology (GTM). The purpose of GTM is to build rather than test theory. GTM is ideally suited for theory building (Urquhart, et al., 2010). In GTM the theory is derived from the experience of participants in the phenomenon being investigated. Thus, the goal of the current research was to discover a conceptualization of personal knowledge. This discovery occurred through the analysis of data collected from participants who were in the process of acquiring personal knowledge within a KM perspective. Specifically the current research targeted data collection from new employees who were baristas.

A barista is an employee at a mobile cart, coffee shop, café, or restaurant who prepares drinks using an espresso machine. Baristas use other equipment and can make non-coffee bean based drinks. However, the defining characteristic of a barista is the use of an espresso machine. Good quality espresso drinks are based, in part, on the barista's ability to effectively use the espresso machine, which is complicated (Barron, et al., 2012; Caprioli, et al., 2012; Dold, et al., 2011; Illy & Navarini, 2011). The complicated nature of preparing drinks using an espresso machine was ideal for data collection for the current research.

The current research followed the Corbin and Strauss (2008) GTM approach. Corbin and Strauss was selected because: (a) it was originally written as a textbook (Morse, et al., 2008) and contains a thorough description of the GTM process with significant examples; (b) it is directly connected to one of the original authors of GTM; (c) it has been updated regularly and recently due to its popularity; and (d) it is compatible with dissertation requirements such as research questions and literature review. References to GTM in this methodology section refer to the Corbin and Strauss approach to GTM unless otherwise noted.

This methodology section explains how the GTM approach was used in the current research. The organization of this section is linear, but GTM is not a linear process (Corbin & Strauss, 2008). Identification of participants occurred throughout the data collection process. The selection of participants was based on the GTM concept of theoretical saturation. Data collection and data analysis, while they are explained in separate sections herein, were pursued concurrently by the researcher.

### **Participant Identification**

Participants in the current research met all of the requirements listed below. Requirements one through four were procedural. Requirement five focused attention on knowledge acquisition in the KM context.

1. Employed as a barista at the time the participant is interviewed.
2. Read and signed the Consent Form for Participation (see Appendix B) prior to the first interview.
3. Work in the state of Oregon or Washington.

4. Be an English speaker.
5. Started working in a new job as a barista not more than six months before the first interview.

Six months was selected as the cutoff for participation in the current research because the first six months of employment are considered significant in new hire literature. This includes organizational socialization (Bauer, Bodner, Erdogan, Truxillo, & Tucker, 2007), turnover (Smith, Amiot, Callan, Terry, & Smith, 2012), task performance (Li, Harris, Boswell, & Xie, 2011), and safety (Burt, Williams, & Wallis, 2011). Organizational socialization is “the process through which individuals acquire the knowledge, skills, attitudes, and behaviors required to adapt to a new work role” (Wanberg, 2012). Within this body of literature collecting data within the first six months is normative for new hire research (Saks & Gruman, 2012). In addition, the Specialty Coffee Association of America (SCAA) certifies baristas through the Barista Guild of America (BGA) (2013). The first level of BGA certification, level one, certifies that baristas have the “basic knowledge and skills” (p. 22) required to be a barista. The BGA recommends that baristas have at least six months of full-time professional barista experience before attempting the level one certification examination.

The number of participants for the current research was determined by the GTM concept of theoretical saturation (Corbin & Strauss, 2008). Theoretical saturation is the point in the GTM process where new data adds little to the already discovered concepts, their properties and dimensions, as well as the relationships around the core concept. Theoretical saturation is a subjective end point in the GTM approach where a new theory

is considered to be grounded in the data. The author of the current research implemented theoretical saturation by monitoring the properties, dimensions, and relationships of emerging categories. As data collection and analysis proceeded, certain categories reached saturation before other categories. Those categories which were slower to reach saturation required the researcher to seek more participants. Thus, new participants were interviewed until all emerging categories reached saturation. When all emerging categories reached saturation then the research had reached theoretical saturation.

Thomson (2010) analyzed 100 published GTM research papers and concluded that “researchers cannot make a judgment regarding sample size until they are involved in data collection and analysis...they must allow the data to dictate the sample size” (p. 49). Thomson found that theoretical saturation occurred “between 10 and 30 interviews” (p. 50). It is unclear in Thomson whether the interview range requires unique individuals for each interview or if the interview range can include multiple interviews with fewer than ten to 30 participants.

The combined input of fifteen experts (Baker & Edwards, 2012) regarding the correct number of interviews can be summarized by the response of Wolcott, “The old rule seems to hold that you keep asking as long as you are getting different answers” (p. 3). This quotation captures the concept of theoretical saturation. Baker and Edwards (2012) reported two related summations of the experts’ opinions. First, it is impossible to select a fixed number of interviews at the beginning of a study. Second, this impossibility forces the GTM researcher to conduct data collection and data analysis as coprocesses rather than linear steps. A few experts did provide actual numbers, which ranged from 12 to 60 interviews. As with Thomson (2010), it is unclear in Baker and Edwards whether

the interview range requires unique individuals for each interview or if the interview range can include multiple interviews with fewer than 12 to 60 participants.

Based on this analysis of the literature, no target number of participants was set in advance of starting the current research. The number of participants in the current research was determined by the GTM concept of theoretical saturation. Thus, the data dictated the sample size.

### **Data Collection**

Data collection addressed RQ1.

1. What are the perceptions of novices regarding their acquisition of knowledge?

Data collection in the current research was accomplished by audio recordings of interviews as well as by the researcher taking notes during interviews. Note taking is preferred over audio or video recording in the GTM approach because GTM is concerned with finding concepts in data rather than presenting exact transcripts (Morse, et al., 2008). The focus of GTM interviewing is concerned with hearing the story of the participant, listening for key events, contexts, and processes (Charmaz, 2003). However, audio recordings provide an opportunity for review of notes after an interview is finished. Therefore, both audio recordings and note taking were used in the data collection process. Interviews flowed between unstructured and semi-structured in order to facilitate increased data density (Corbin & Strauss, 2008). Interviews were started with an open ended question such as, "Tell me about your first day at work." Follow-up questions depended on the direction the interviewee chose to take the interview. Example follow-up

questions include, “Tell me what it was like to make a cappuccino for the first time” or “Why do you describe foaming milk as difficult?” Appendix C contains sample interview questions adapted from Charmaz (2003). The goal of interview questions is to give the participant an opportunity to share their experience of acquiring personal knowledge.

The GTM concept of theoretical sampling (Corbin & Strauss, 2008) influenced the direction of interviews. Theoretical sampling guides the researcher in collecting data that will most benefit the analysis process based on emerging concepts. Theoretical sampling connects data analysis with data collection (Holton, 2010; Thomson, 2011). The researcher implemented theoretical sampling through evaluation of categories that emerged from data via the coding process. As data collection and analysis proceeded certain emerging concepts needed additional clarification. This resulted in the researcher asking specific questions and pursuing certain threads presented by participants.

Interviews were conducted at the participant’s location of choice. A total of three interviews over three weeks were scheduled with each of the participants per Seidman (2006). The first interview was conducted sometime during the employee’s first six months at the new job. The remaining interviews were conducted every week following the first interview. Multiple in-person interviews facilitate rapport building between participant and researcher much better than the alternatives (Seidman, 2006). Rapport building is important for getting at the details of the participant’s experience (Charmaz, 2003; Seidman, 2006). In addition, multiple interviews are preferable to a single interview because multiple interviews allow concepts to be explored more deeply than a single interview (Charmaz, 2003). Weekly interviews allow participants time to process the previous week’s interview as well as allow adequate spacing between interviews

(Seidman, 2006). In addition, participants in the current research were in the process of acquiring personal knowledge throughout the interview schedule. Thus, each interview had the potential to reveal new insights related to the conceptualization of knowledge.

Confidentiality was maintained by assigning numbers to interviewees. At the conclusion of the current research records connecting interviewees with their assigned number were destroyed. During the current research these records were stored on a single computer that was password protected. Backups were stored in an encrypted file on a flash drive. Names were not used in this report and will not be used in any future reports to identify individual participants. The Nova Southeastern University (NSU) Graduate School of Computer and Information Sciences (GSCIS) Institutional Review Board (IRB) process (L. Wang, 2012) was followed prior to beginning interviews.

### **Data Analysis**

Data analysis addressed RQ2, RQ3 and RQ4.

2. What categories, sub-categories, and relationships can be constructed from RQ1?
3. What core categories and relationships can be constructed from RQ1 and RQ2?
4. What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3?

Data analysis was facilitated through memos, diagrams, and coding (Corbin & Strauss, 2008). As the researcher collected data he recorded his analysis of that data in

the form of memos as well as related analytical concepts in the form of diagrams. Memos and diagrams do not contain data. Rather they contain the free-flow brainstorming and analysis of the researcher: a kind of creative abstract thinking. As noted above, GTM is critically dependent on the creative analytical efforts of the researcher (Corbin & Strauss, 2008; Glaser, 2001; Morse, et al., 2008). Corbin and Strauss (2008) characterized GTM results as a kind of mathematical sum of the data plus the researcher. Morse, et al. (2008) emphasized the importance of the researcher's thinking processes and instincts. They went as far as to claim that "the self is the instrument of the research" (p. 51).

Memos are intended to capture the birth of ideas in the mind of the researcher. As the GTM process unfolds memos are referenced, sorted and re-sorted, compared, and added to in order to allow the researcher to see the data from an abstract level. Memos are essential for GTM and were created regularly throughout data collection and analysis. Diagrams were created as needed. The MAXQDA software was used to store and sort memos. The MAXMaps feature of MAXQDA was used to store diagrams.

The researcher used coding to extract concepts from data and relate the concepts via their properties and dimensions (Corbin & Strauss, 2008). Coding occurred through open coding and axial coding. Open coding feeds into axial coding. However, GTM relies on recursively revisiting and reverifying the outcomes of these two coding techniques. Open coding is the process of naming and categorizing phenomena in the data and includes making comparisons and asking questions. Naming involves conceptually labeling responses, sentences, phrases, or words of the participants. The concepts from naming are then grouped and categorized based on properties. Axial coding is the process of identifying connections between the open coding categories

through subcategories and relationships. Axial coding uses conditions, context, action and interactional strategies, as well as consequences to create subcategories.

Integration is a third type of GTM coding. As open coding feeds into axial coding, axial coding in turn feeds into integration. However, GTM relies on recursively revisiting and reverifying the outcomes of these three coding techniques. Integration facilitates theory emergence. Theory emergence begins with the very first step of data analysis and culminates in integration. Integration is the process of identifying core categories and their relationships with all of the other categories. The core categories serve as apexes under which other categories, codes, and concepts can be grouped. Integration revealed categories that required further development. This sent the researcher back to open coding and axial coding as well as back to data collection. The MAXQDA software was used to store and sort codes as well as to facilitate integration.

The researcher conducted data analysis in tandem with data collection and continued data analysis until theoretical saturation occurred (Corbin & Strauss, 2008). Theoretical saturation is the point in the GTM process where new data adds little to the already discovered concepts, their properties and dimensions, as well as the relationships around the core concept. Theoretical saturation is a subjective end point in the GTM approach where a new theory is considered to be grounded in the data.

### **Methods of Quality for this GTM Research**

Terminology and methodology for establishing quality in qualitative research are often debated (J. Reynolds et al., 2011; Thomas & Magilvy, 2011). At the root of this debate are the fundamental differences between quantitative and qualitative research

methodologies. Some would abandon the common terminology of quantitative research and, instead, use such terms as credibility, dependability, confirmability, and trustworthiness (Thomas & Magilvy, 2011). Others would use the same terminology as quantitative research, such as rigor, reliability, and validity, but redefine the methodology to fit the creative, interpretive nature of qualitative research (Maxwell, 2013; Thomson, 2011). Corbin (Corbin & Strauss, 2008) prefers the word quality over terms such as rigor, reliability, and validity. In Corbin's view these latter terms carry too much over from quantitative research and fail to capture the creative aspect of GTM. Thus, the term quality was adopted in the current research.

Corbin (Corbin & Strauss, 2008) lists nine conditions that can contribute to quality and ten criteria that can be used to judge quality. However, Corbin's emphasis on creativity results in conditions and criteria that are difficult to manage in the context of a dissertation. For example, the condition that the researcher should "relax and get into touch with the creative self" (p. 304) and the criterion that the researcher should "demonstrate sensitivity to the participants and to the data" (p. 306). In addition, Corbin acknowledges the need to select methods of quality that fit with the context of each study and points readers to other literature such as Charmaz (2006) and Maxwell (2013). Because of the nature of Corbin's conditions and criteria as well as her pointing to other literature, the methods of quality for this GTM research were drawn from Corbin and Strauss as well as other literature sources.

The first method of quality for this GTM research was methodological consistency (Corbin & Strauss, 2008). Methodological consistency is the process of being faithful to the methods of the qualitative approach selected for a particular study. There

are two opposites of methodological consistency. The first opposite is selectively picking major procedures from one or more particular qualitative methods and combining them into a new method to create a Frankenstein (Shelley, 1994) qualitative approach. The second opposite is selectively using only some of the major procedures from a particular qualitative method. The current research maintained methodological consistency by fully following all of the major procedures for GTM as described by Corbin and Strauss (2008) and by not including any other major procedures.

The second method of quality for this GTM research was embracing creativity through interpretation (Corbin & Strauss, 2008). This method summarizes a number of Corbin's (Corbin & Strauss, 2008) conditions and criteria and supports the first proposed method of quality. Not only is qualitative research not quantitative research, but different forms of qualitative research are not equivalent to one another (Corbin & Strauss, 2008). GTM is unique as a theory building qualitative research methodology. As such, methodological consistency requires fully embracing the creative and interpretive aspects of GTM. In practical terms this means that the memos, diagrams, and codes, as well as the core categories with their relationships derived by the researcher from the data gathered in the current research are not required to be identical or even similar to what a different researcher might develop (Corbin & Strauss, 2008). Thus, there is no requirement of duplicability of results. The theory developed from the data gathered in the current research was grounded in the experience of baristas who were in the process of acquiring new knowledge. In addition, the theory developed from the data gathered in the current research was the result of the creative and interpretive work of the researcher.

The third method of quality for this GTM research was adhering to accepted qualitative research interview practices (Charmaz, 2003; Holstein & Gubrium, 2003; Seidman, 2006). Key practices include conducting multiple in-person interviews, weekly interview spacing, and respect of participants. Multiple in-person interviews facilitate rapport building between participant and researcher much better than the alternatives (Seidman, 2006). Rapport building is important for getting at the details of the participant's experience (Charmaz, 2003; Seidman, 2006). In addition, multiple interviews are preferable to a single interview because multiple interviews allow concepts to be explored more deeply than a single interview (Charmaz, 2003). The model of multiple interviews used in the current research was three weekly interviews per Seidman (2006). Weekly interviews allow participants time to process the previous week's interview as well as allow adequate spacing between interviews (Seidman, 2006). In addition, participants in the current research were in the process of acquiring personal knowledge throughout the interview schedule. Thus, each interview had the potential to reveal new insights related to the conceptualization of knowledge. The qualitative research interview practice labeled respect of participants means allowing the participants to share their stories. This includes listening more than talking, refraining from interrupting, active listening, and pursuing the concepts raised by the interviewee (Seidman, 2006). Respect of participants was adhered to in the interviews for the current research.

The fourth method of quality for this GTM research was a weak form of member check. Member check expands on the idea of respect of participants. The procedures for conducting a full member check include confirmation by participants of both the data and

interpretations (Creswell & Miller, 2000; Guba & Lincoln, 1985). Full member checks were not compatible with the second method of quality for this GTM research: embracing creativity through interpretation. However, a weak form of member check was compatible. In this weak form of member check the researcher verified his notes and his understanding of what the participant was saying during the interview. In addition, the audio recordings were used to provide verification of the participants' exact words.

The final method of quality for this GTM was maintenance of an audit trail (Creswell & Miller, 2000). An audit trail provides the opportunity for in-depth evaluation of a study by outside entities. An actual in-depth audit is very resource intensive. However, maintenance of an audit trail provides accountability of the researcher to outside entities, such as a dissertation committee, without requiring a full audit. Auditable records that were maintained for the current research included interview notes, interview audio recordings, memos, diagrams, and codes as well as the core categories and its relationships. The audio recordings of the interview notes are the source data. The memos provided the creative and interpretive thinking of the researcher. Thus, memos provided a logical flow from source data to diagrams and code and, ultimately, to the core categories and its relationships from which the theory emerged. The presentation of results in Chapter 4 and in Appendix D include key examples of the auditable records to illustrate the flow from source data to memos to codes to the core categories. These key examples include quotations from interviews as well as the subsequent memos and codes that the researcher derived from these quotations.

In the final analysis the quality of the current research can only be determined by the results of the current research (Corbin & Strauss, 2008; Maxwell, 2013). The five

methods defined above helped facilitate quality, but they did not guarantee quality. Thus, the conclusive evidence of quality is this dissertation report.

### **Resources**

The following resources were required to complete the current research.

1. Access to willing and qualified participants.
2. MAXQDA software to assist with data coding and analysis.
3. A computer to run MAXQDA software.
4. A computer to record audio files.

## Chapter 4

### Results

#### **Introduction**

This chapter provides results derived from addressing the following research questions:

1. What are the perceptions of novices regarding their acquisition of knowledge?
2. What categories, sub-categories, and relationships can be constructed from RQ1?
3. What core categories and relationships can be constructed from RQ1 and RQ2?
4. What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3?

Thirty-seven interviews were conducted with fourteen participants. Eleven participants completed all three interviews. One participant quit her job after the first interview and was thus not qualified to continue with interviews. One participant completed one interview and then withdrew from participation. One participant completed two interviews and then withdrew from participation. The number of interviews completed in the current research was within the range identified in literature (Baker & Edwards, 2012; Thomson, 2010) as normal and acceptable for GTM studies.

The remainder of this chapter is organized around presenting the results for each research question.

**RQ1: What are the perceptions of novices regarding their acquisition of knowledge?**

The results for RQ1 are fully contained in the raw data of the interviews conducted for the current research. Examples of these results to RQ1 are provided in the quotations used to demonstrate the results to RQ2, RQ3, and RQ4 below. In addition, Appendix D contains examples of the results to RQ1 for each of the participants in the current research. Both the quotations and Appendix D serve as partial fulfillment of the fifth method of quality for this GTM research, which was maintenance of an audit trail. The results for RQ1 were achieved by following the methodology described in the Data Collection section of Chapter 3 as well as the third and fourth methods of quality described in Chapter 3. The third method of quality for this GTM research was adhering to accepted qualitative research interview practices (Charmaz, 2003; Holstein & Gubrium, 2003; Seidman, 2006). The fourth method of quality for this GTM research was a weak form of member check.

Data collection included both hand-written notes and audio recordings. Audio recordings were made using the SoundNote application on an iPad. Recordings ranged from eight minutes to 23 minutes. Audio recordings were transferred to a laptop computer and imported into the qualitative data analysis software MAXQDA 11. Per Chapter 3 and the IRB process, audio recordings were not transcribed. Instead, the researcher repeatedly listened to the audio recordings and extracted key quotations from the interviews for data analysis. The examples of the results to RQ1 provided in this

report were all taken from these extracted quotations from the audio recordings. Thus, they represent the exact words used by participants.

**RQ2: What categories, sub-categories, and relationships can be constructed from RQ1?**

The results for RQ2 were achieved through GTM data analysis including memos, diagrams, and coding as described in the Data Analysis section of Chapter 3. The results for RQ2 were also achieved through the second method of quality described in Chapter 3, which was embracing creativity through interpretation. Examples of memos and coding are provided in Appendix D. Examples of coding are also provided in the narrative and quotations used to explain each of the categories described in this section. The examples in both the narrative and in Appendix D serve as partial fulfillment of the fifth method of quality for this GTM research, which was maintenance of an audit trail. Several transitional diagrams were developed during the data analysis to aid the researcher. However, no diagrams were developed to represent the final form and relationship of the categories discussed in this section. Thus, no diagrams have been provided in this section.

The number of categories, names of categories, and relationships between categories changed multiple times during the data analysis process. These changes occurred as a result of theoretical sampling in data collection as well as the processes of writing memos, diagramming, and coding. The highest number of categories used at any one time during data analysis was 33 categories. Ultimately, the data analysis process led to eight categories: *being overwhelmed*, *questioning self*, *seeking help*, *microthinking*, *being confident*, *remembering*, *multitasking*, and *speed*. No sub-categories survived to the

end of data analysis. The remainder of this section describes each of the eight categories. Relationships identified during data analysis are discussed in the explanation of the eight categories in this section.

*Being overwhelmed* was the primary way in which participants described their early knowledge acquisition experience. Being overwhelmed was an in vivo code (Corbin & Strauss, 2008). Overwhelmed was the actual word used most often by participants to describe their early knowledge acquisition experience. Often an exclamation such as AHH!, AGH!, or UGH! was used to express the experience of being overwhelmed. After using AHH!, Participant 13 explained the exclamation as “I have no clue what I’m doing. Kind of just overwhelming” (Interview 1). Other expressions of the experience of being overwhelmed included being “scatter brained or flustered” (Participant 3, Interview 1), being “freaked out” (Participant 10, Interview 1), and “chaotic, it’s nothing making sense, and I don’t know what to do” (Participant 2, Interview 1). Participant 8 described being overwhelmed as, “Oh my gosh, like, I feel so busy and overwhelmed” (Interview 3). Being overwhelmed decreased as knowledge acquisition progressed.

Participants described information overload as a part of being overwhelmed. Information overload can occur when there is too much information for the individual to take in and process (Eppler & Mengis, 2004). Participant 10 received 12 packets of information ranging from several pages to over 100 pages per packet. The recipe packet was nearly 50 pages. Participant 7 reported the need to remember nearly 50 codes for drink descriptions in addition to the recipes themselves. Participant 13 described six hours of information packed training. Participant 11 said that he had “tons of information thrown” (Interview 1) at him. Both participants 6 and 10 described similar situations

around early information overload. They both were told something during initial training but failed to integrate the information. Later, participant 6 was told this same thing and participant 10 discovered it on her own. In each case this new information, that was actually old, made a significant difference on the participants' ability to effectively do their job. Participant 10 described her situation as being rooted in "too much information" (Interview 3). Participant 6 described the new information as having a "profound impact" (Interview 2) on his work. He went on to explain why he had been unable to initially integrate the information as "I was being taught thousands of other things that were being shoved in my brain. It just didn't make it in" (Interview 2).

Thus, information overload was an important element of being overwhelmed. Yet, being overwhelmed was a response to the requirements of actually being a barista more than just a response to too much information. In this way being overwhelmed was closer to the cognitive overload of cognitive load theory (Sweller, 1988) than information overload (Eppler & Mengis, 2004). Cognitive load theory posits that working memory is limited in size and this size limit can negatively impact knowledge acquisition in complex situations. Cognitive load theory can be explained in terms of its concern for learners who are overwhelmed because their working memory has been overloaded (Kirschner, Paas, & Kirschner, 2009). Participant 2 described the cognitive overload of her working memory as "it's just like so many processes going on in my mind at once. It's like I forget everything" (Interview 1). The contrast between information overload and cognitive load theory in relation to being overwhelmed can be seen in multiple participants. Neither participant 10 nor participant 13, who were highlighted above in the information overload paragraph, described themselves as overwhelmed with the new

information they received. Participant 10 received the packets at home, yet she did not become overwhelmed until she stood in front of an espresso machine to make a drink for the first time. Participant 13 was not overwhelmed during her six hours of information packed training. Instead, she became overwhelmed on her first shift when she had to actually make espresso drinks: when she was “not a shadow anymore” (Interview 1). Participant 6 described doing the work of a barista as initially “outrageously difficult” (Interview 1) because of the need to run the espresso machine, keep track of recipes, and talk to customers. Participant 12 described being overwhelmed as “that feeling of trying to think through everything in my head while at the same time there is a lot going on around me in the environment” (Interview 1). Participant 8 described being overwhelmed as “AGH! There’s just so much to do” (Interview 3). Thus, being overwhelmed was rooted in the experience of being a barista, which gave it similarities to the cognitive overload of cognitive load theory (Sweller, 1988).

Expectations also played a role in participants being overwhelmed. Participants universally described helpful and supportive co-workers. Yet, participants also described the need to meet co-worker expectations as a significant part of being overwhelmed. No participant claimed that co-workers or the organization forced expectations on them. The expectations expressed in relationship to being overwhelmed appeared to be internally generated expectations, perhaps from external cues. Participant 13 described the message from her co-workers as, “Its’ OK to not know. And it’s OK to ask questions” (Interview 1). However, she explained her use of the word stressful as the intimidation she felt at being the new barista among her experienced co-workers. She was most intimidated whenever a co-worker would ask her to make a drink for the co-worker. Participant 6 was

not concerned about his ability to provide acceptable coffee to the customers. But he was concerned with his ability to provide acceptable coffee to his co-workers. Participant 12 expanded on her experience of being overwhelmed by citing her desire to impress her boss and be a good team member. She used these two pressures to summarize being overwhelmed by calling them “the bigger portion of that weight of feeling overwhelmed...I just don’t want to drop the ball” (Interview 1). She made these statements right after talking about the helpful and supportive nature of her co-workers. The sense of the expectations expressed by participants in relationship to being overwhelmed can be understood through an example. Saying the words, *Will you go to dinner with me?* is not complicated or difficult. However, asking this question of someone with whom you want to build a relationship with can be overwhelming. There are expectations and fears associated with asking this simple question in this specific context. This is the sense of expectations expressed by participants in relationship to being overwhelmed. An illustration of this was provided by Participant 10 when she described going into a blank mode of thinking: she was unable to think of anything that needed done to make the drink. This occurred on the first day of training, but only when she was being watched by the trainer. Participant 10 was able to make the drink when the trainer told participant 10 to make the drink for herself and then the trainer walked away from participant 10.

Thus, being overwhelmed was the primary way in which participants described their early knowledge acquisition experience. Being overwhelmed was rooted in the experience of being a barista. It included information overload (Eppler & Mengis, 2004)

and had similarities to the cognitive overload of cognitive load theory (Sweller, 1988). Being overwhelmed decreased as knowledge acquisition progressed.

*Questioning self* included statements questioning and criticizing self-worth as well as ability and possible outcomes. Participants described negative perceptions about their ability to successfully complete tasks as well as concerns about appearing incompetent or not satisfying customers. In his first interview participant 1 described a cyclical process that began with him being slow and making mistakes. Then he would question his methods and his thinking processes in *I shouldn't be* statements. Ultimately, this would distract him and result in him forgetting something else. In his final interview Participant 1 defined being comfortable as "I question myself less" (Interview 3). Participant 3 used a similar phrase, stating that she was "questioning myself if I can do it or not" (Interview 1). Participant 3's questioning was connected with the information overload of *being overwhelmed*. Participant 10 referred to setting herself up for failure by "telling myself, 'Oh. You're not going to be able to make it right'" (Interview 1). In interview 2 she expressed a significant increase in *being confident*, which surprised her because she had been coming in to work thinking "Oh no. Am I going to be terrible?" Participant 5 expressed her questioning self as simply "Can I do this?" (Interview 1). Participant 6 referred to questioning self as "second guessing myself" (Interview 3). Participant 14 said that her questioning self was related to making mistakes. Participant 4 described foaming milk as scary because she questioned whether she could do it correctly. Participant 10 explained her use of the word scary by describing it as questioning self, saying, "Am I going to, you know, make good coffee" (Interview 1). Questioning self decreased as knowledge acquisition progressed.

*Seeking help* included asking co-workers as well as looking up recipes and instructions in manuals or on quick reference cards. Participants sought help frequently early in knowledge acquisition and much less so as knowledge acquisition progressed. Seeking help was often connected with *questioning self*. Participant 2 initially sought help in the recipe book “almost every other drink” (Interview 1). Participant 4 asked for help about once a week at the time of interview 2. She compared this to her need to ask for help “a couple times a day” (Interview 2) several weeks prior to this same interview. Participant 10 described early seeking help as general in nature and centered on how questions. She described later seeking help as more specific and centered on why questions. Participants often viewed their own seeking help as both negative and temporary. Participant 2 referred to feeling or looking dumb when she asked for help. She went as far as to make drinks wrong instead of asking for help. Participant 10 described being embarrassed when she needed to ask for help. Participant 6 described seeking help as disruptive to his activities at that moment. Participant 12 described seeking help as disruptive to both her and her co-workers’ activities at that moment. She described it as switching gears and stated, “I just don’t want to have one more instance where they need to come alongside and help me” (Interview 1). She made these statements right after talking about the helpful and supportive nature of her co-workers. Participant 9 described loving her job in part because her co-workers were so helpful. Yet, she described doing tasks on her own without help as positive progress. Participant 2 identified the ability to help others rather than seeking help as important to her. In spite of the negative perception of seeking help, participants sought help to increase *being confident*. Participant 2 described the recipe book as giving her “a little more confidence”

(Interview 1). Participant 10 said that she would get nervous and then ask questions to ensure she was “doing it perfectly...I just like to ask questions a lot, and just make sure I am doing it right” (Interview 3).

Both questioning self and seeking help appeared to be related to media richness theory (Daft, Lengel, & Trevino, 1987), but at an individual level rather than a team or organizational level. The actual richness of the media was not an issue. Almost all of the communication with baristas was face to face and, thus, was at the highest level of media richness. The only exception to this was the written documentation of recipes and procedures. These were at the lowest end of the media richness scale. The significant elements of media richness theory that relate to questioning self and seeking help are uncertainty and equivocality. Uncertainty is the gap between the information possessed and the information needed to accomplish a task. Equivocality is “multiple and conflicting interpretations” (Daft, et al., 1987, p. 357) that can cause, among other things, misunderstanding. Baristas may experienced both uncertainty and equivocality to varying degrees and expressed these in questioning self and seeking help.

*Microthinking* is the act of thinking through the details of a process.

Microthinking was the mode of thinking for participants early in knowledge acquisition. Participants did not use the word microthinking, yet the idea was clearly present in their descriptions. For example, participant 1 said, “I still have to think individually, for the most part, about each and every step that goes into the process” (Interview 1). Participant 12 said that she was “trying to think through everything” (Interview 1). Later in that same interview she anticipated that at some point she would not have to think about the details, but, “right now I know that I need to pay attention to all the little details and all the

steps.” Participant 2 said, “I had to stop, and I had to think” of every detail in order to make a drink. Participant 8 said that she was focused on answering the question, “what does this mean?” (Interview 2) to get at the details required for each drink. Participant 6 used the phrase, “Every single thing, I had to think about” (Interview 1) to summarize his focus on details.

Participants eventually transitioned to macrothinking, which is large-scale thinking. But the largeness of the scale is relative to the level of detail in microthinking. Participants rarely described macrothinking. Instead, they described the absence of microthinking. That is why macrothinking did not survive as a separate category in the data analysis process. Participant 9 described taking her time and being meticulous when she was focused on the details. She compared it to using a measuring cup to get a precise amount of an ingredient in a recipe and contrasted that with eventually being able to work with “a pinch of things” (Interview 2). Participant 7 described the absence of microthinking as, “I don’t even think about that it has [x] pumps...I just grab, see the cup size, and go over there and do it” (Interview 2). Participant 1 said he was “not literally thinking” (Interview 1) about details of a process unless he was unfamiliar with the process. Participant 10 described macrothinking as the details being “in the back of my head as I’m doing it” rather than at the forefront. Participant 6 contrasted the “uh-oh, what is...?” (Interview 3) type thinking focused on the details with the “super easy” (Interview 3) nature of doing things when he did not have to think about the details. Participant 6 had earlier described macrothinking as a “pivotal moment, um, in your growth, when...all of the minor tasks in making an espresso beverage become one task” (Interview 1).

Participants shifted from macrothinking back into microthinking as required to solve a problem or acquire new knowledge. Participant 7 described a situation where his manager identified an unsanitary practice related to how he was picking up the cups. To solve the incorrect behavior he had to “intentionally think about” (Interview 2) how he was picking up cups 100% of the time. After several weeks he only had to think about how to pick up a cup 25% of the time. Participant 1 described the need to “think more in-depth” (Interview 1) whenever he came to something he did not know. Participant 2 described her response to making mistakes as slowing down, being more cautious, and “paying particular attention to what I am doing” (Interview 3). Participant 4 described a similar response of paying more attention to details after a mistake she made.

Microthinking and macrothinking are very close to Polanyi’s (1958) focal and subsidiary constructs. The primary difference is that the indicators are modes of thinking and Polanyi’s constructs are about the focus of one’s attention. Microthinking and macrothinking may also be related to the idea of chunking in information processing theory (Miller, 1956). Miller (1956) established that only about seven items can be processed at one time in short-term memory. A person’s capacity to process can improve if the seven items are not individual items but chunks of items logically grouped together. This same concept may also have impact on the *multitasking* indicator discussed below. Microthinking and macrothinking have nothing in common with the constructs of mindfulness and mindlessness seen in some IS literature. Mindfulness in IS literature is about mental adaptability and flexibility, which includes an element of willingness and effort (Butler & Gray, 2006; Nevo & Nevo, 2012). Mindlessness in IS literature is the absence of the willingness and effort to mentally adapt to new situations (Butler & Gray,

2006; Nevo & Nevo, 2012). In contrast, microthinking and macrothinking are modes of thinking that illustrate different scopes associated with thinking through the details of a task.

*Being confident* was the primary way in which participants described their later knowledge acquisition experience. Being confident was an in vivo code (Corbin & Strauss, 2008). Confident was the actual word used most often by participants to describe their later knowledge acquisition experience. Being confident appeared to have much in common with the tenants of self-efficacy theory (Bandura, 2010; Compeau & Higgins, 1995). Self-efficacy relates to an individual's belief about his ability to produce desired effects or outcomes. Participant 5 explained being confident by stating, "I am more secure in my knowledge with, with the drinks and what I need to do on a daily basis" (Interview 1). However, this explanation came only after she was prompted to give a positive description of her experience. She had been describing it as not being anxious. This was characteristic of many of the participants' descriptions. They often described confidence as the absence of something associated with *being overwhelmed*, *questioning self*, *seeking help*, or *microthinking*. Participant 2 said, "Confidence is looking at that long line of people and knowing I can get through them in just a few minutes and not feeling overwhelmed" (Interview 1). She would later describe being confident as, it "makes you feel good. You don't feel like an idiot" (Interview 2). Participant 1 said, "I'm more comfortable doing it now. Like, rarely do I feel, um, overwhelmed" (Interview 3) to describe his confidence. He later described the confidence he felt about not messing up, not slowing things down, and not delivering bad drinks. Participant 6 said, "throw me on bar. I can handle it. A big rush and I'm fine. I don't get terrified" (Interview 1) and

referred to being “unafraid of a line” (Interview 3) to convey his confidence. Participant 7 described looking back on handling a long line and realizing that he had not struggled with making all the drinks as a significant event revealing his confidence. Participant 10 described being confident as being “comfortable with making drinks without asking questions” (Interview 1).

Being confident was also described in relationship to participants’ abilities. Participant 10 described her work as “not too difficult anymore...[because] I’m more confident in my abilities” (Interview 2) and connected her confidence with her *multitasking*. Participant 4 related being confident with *remembering* through knowing how to make the drinks and knowing customer’s names as well as being able to talk with customers and not *seeking help* very often. She referred to herself as “still cautious, but more confident now” (Interview 2) in connection with these abilities. Participant 13 described her confidence in non-espreso based drinks and in steaming milk. She added, “I’m confident that I’m going to get there” (Interview 1) to explain that she was also confident that she would eventually be confident in pulling espreso shots. Participants 6 described a situation where training information repeated to him several weeks after training made a significant difference in his job performance because he thought it “made me more confident in what I was doing” (Interview 2).

Participants’ confidence did not guarantee correctness. Participant 7 described situations with both the way he was picking up a cup and the way he was handling the coffee timers as examples of incorrect performance on his part. Yet, he was confident that he was doing his job correctly prior to these problems being pointed out to him. Participant 8 exclaimed, “OH! I thought I knew everything, but I didn’t” (Interview 2) in

regard to having several errors pointed out to her. There seems to be some relationship between these situations and the tenants of cognitive dissonance theory (Festinger, 1962). Cognitive dissonance theory states that individuals will strive for consistency between their thoughts and behavior. When there is dissonance then often the thoughts get changed to align with the behavior.

Thus, being confident was the primary way in which participants described their later knowledge acquisition experience. Being confident appeared to have much in common with the tenants of self-efficacy theory (Bandura, 2010; Compeau & Higgins, 1995). Participants' descriptions of being confident were often expressed as the absence of something associated with one of the categories discussed above. In addition, being confident did not ensure correctness, which may be related to cognitive dissonance theory (Festinger, 1962). Being confident increased as knowledge acquisition progressed.

*Remembering* is the act of instant recall. Remembering appeared to be related to the description of long-term memory usage in information processing theory (Miller, 1956). Information processing theory posits that coding into long-term memory is necessary for retention of information. Participants used the words remember, memorize, and automatic as well as the phrase *I just know* to describe the experiences that fit within this code. Participants identified the need to remember recipes, codes, and processes. The importance of remembering was conveyed by participant 6 who described the interruption that occurred in his work as well as his co-worker's work when *seeking help* because he could not remember. "Now I'm uncomfortable. I'm second guessing myself...I'm starting to slow down the process. That means my shots may expire, my milk is going to get done, and that drink is now going to sit there while I'm figuring this

out” (Interview 3). Participants 8 and 9 also connected remembering with not *seeking help*. Participant 8 said that she could “just, like, whip out their drink, and I don’t have to look at anything” (Interview 1). Remembering increased as knowledge acquisition progressed.

The use of the word memorize was never directly associated with simple rote memorization of written material. Instead, the sense of the usage of this word was remembering through experience. Participant 9 used the word memorize, but several times used the phrase “learn as you go” (Interview 2) to explain her method of memorizing. Participant 3 described her job as getting easier because she was beginning to memorize the recipes and names of drinks as evidenced by the fact that she was “not having to look up every single drink” (Interview 1) as she made the drinks for customers. Participant 7 described memorizing recipes as one of the hard things for him at the beginning. He further described this memorization as “just remembering...45 to 50 different combinations” (Interview 1) of ingredients and processes in order to be able to make drinks.

Several participants described remembering as their actions becoming automatic and then explained automatic by using an *I just know* phrase. Participant 2 said that her work had become “pretty automatic now” (Interview 3). She went on to explain her meaning of automatic as “just easy. It’s not like, I don’t have to think about it. I know it...it’s just I, I automatically know” (Interview 3). Participant 9 explained her use of the word automatic as “you have to learn as you go, and once you start learning and knowing where things are at, you just know. It’s already there. It’s in your brain” (Interview 2). Remembering was often described through these *I just know* phrases. Participants

described both effortless and mystery with just knowing. The best example of this combination of effortless and mystery comes from participant 9. She had described working several busy shifts. When asked how she kept track of everything that was going on, she responded, “I don’t even know. It just kind of comes to me. I don’t know what goes on in my brain” (Interview 2). Participant 6 used the phrase, “my brain just knows these things” (Interview 1) to describe remembering the recipe and process to make a drink. In contrast, Participant 10 used the phrase “racking my brain” (Interview 1) to describe her lack of remembering early in knowledge acquisition. Participant 8 described her lack of remembering as “I kind of, like, stared at the cup...I was really focused on, ‘Ok. What does this mean?’” (Interview 2).

*Multitasking* is the ability to work on more than one task at a time. Like *remembering*, multitasking may also be connected to information processing theory (Miller, 1956). Multitasking may be related to the ability to chunk information in short term memory in better ways over time. As familiarity with processes increased the ability to create one chunk out of many details could have helped to facilitate multitasking. This same concept may also have impacted the *microthinking* indicator discussed above. Participants either used the word multitasking or simply described doing multiple tasks at one time. Participant 7 compared multitasking to juggling and stated, “I need to be aware of several different things going on at one time” (Interview 1). Descriptions of multiple tasks focused on *remembering* recipes, sequencing drinks, and communicating with customers. Sequencing drinks is the act of making multiple drinks at one time through interleaved multithreading of the individual drink processes. For example, while shots are being pulled for one drink, the milk is being steamed for a second drink, and several

pumps of syrup are being added to a third drink before the shots for the first drink are finished.

References to multitasking early in knowledge acquisition were about the participant's inability and frustration with multitasking. References to multitasking later in knowledge acquisition were about the participant's ability and ease of multitasking. Participant 6 described doing the work of a barista as initially "outrageously difficult" (Interview 1) because of the need to run the espresso machine, keep track of recipes, and talk to customers. He went on to describe customers informing him that he was stopping in mid-sentence as he attempted to communicate with them and make their drinks. After describing the difficulty of making two drinks at one time, participant 2 added, "sometimes you do three or four drinks at a time. Just like AHH!" (Interview 1). Participant 14 described sequencing combined with the need to communicate with customers as the "hardest part for me" (Interview 1).

The ability to multitask was often contrasted with the need for *microthinking* early in knowledge acquisition. Participant 8 described transitioning from being able to only make one drink at a time because of her need to focus on the details of that drink to being able to make three drinks at one time. Participant 7 described being able to do tasks without thinking about the details, which allowed him to "keep my attention on something else," (Interview 1) such as communicating with customers. Participant 3 described multitasking when *microthinking* was not required as, "I can do a bunch of things at once when I actually know what I'm doing" (Interview 2). Implicit in these descriptions is a form of large-scale thinking or macrothinking that is in contrast to

*microthinking*. When discussing multitasking participants did not describe macrothinking. Instead, they described the absence of *microthinking*.

*Speed* of producing espresso drinks increased over time. Speed may also be related to the idea of chunking in information processing theory (Miller, 1956). Macrothinking and multitasking may mediate the relationship between speed and chunking. Participants recognized their speed had increased over time and anticipated that it would continue to increase over time. Participants consistently viewed increased speed as a positive step in their knowledge acquisition. When asked about breakthroughs in the previous week participant 9 proudly described a time when her café was “slammed and I got, I think, several orders of coffee drinks done in less than five minutes” (Interview 2). Participant 2 explained her statement, “I’ll get it” (Interview 1) as less *seeking help* and increased speed. Participant 1 said, “I am slower at it then I would like to be” (Interview 1). Later in that same interview he anticipated that he would “be faster at each step” at some point in the future.

Participants related increased speed to other indicators and specific practices. Participant 6 connected *microthinking* with being slower. He said, “I had everything going on in my mind to try to get the drink right...that I was slow” (Interview 1). Participants 1 and 4 connected increased speed with *being confident*. Participant 4 said, “it was, like, definitely confidence that helped with being faster” (Interview 1). Participant 1 answered, “I’m faster at it” (Interview 3) to explain what had happened with operating the espresso machine in connection with his increased *being confident*.

**RQ3: What core categories and relationships can be constructed from RQ1 and RQ2?**

Data analysis through memos, diagrams, and coding continued as described in the Data Analysis section of Chapter 3 until core categories and relationships were identified. These were the results for RQ3. The achievement of these results was aided by the second method of quality described in Chapter 3, which was embracing creativity through interpretation. As above, several transitional diagrams were developed during this portion of the data analysis process to aid the researcher. However, no diagrams were developed to represent the final form and relationships of the core categories. Thus, no diagrams have been provided in this section.

Two core categories emerged from the data in the current research. One core category represented the absence of personal knowledge. It was the category *being overwhelmed*. The categories *questioning self*, *seeking help*, and *microthinking* fit under being overwhelmed. Together these categories were inverse indicators because they all decreased as knowledge acquisition progressed. The other core category represented the presence of personal knowledge. It was the category *being confident*. The categories *remembering*, *multitasking*, and *speed* fit under being confident. Together these categories were direct indicators because they all increased as knowledge acquisition progressed.

*Being overwhelmed* and *being confident* were the two categories under which all other categories were organized in the results of the current research. However, this organization was not meant to imply causation or definition. The current research did not investigate causation. Thus, no claim was being made that the inverse indicators caused

or led to being overwhelmed or that the direct indicators caused or led to being confident. Nor did these groups of indicators define being overwhelmed or being confident. Instead, the inverse indicators were organized under being overwhelmed as participants' descriptions of their early knowledge acquisition experience. Being overwhelmed was the most common description of this early knowledge acquisition experience, but it was not the only description. All of the inverse indicators were concepts that helped to explain participant's early knowledge acquisition experience. The direct indicators were organized under being confident as participants' descriptions of their experience as knowledge acquisition progressed. Being confident was the most common description of participants' experience as knowledge acquisition progressed, but it was not the only description. All of the direct indicators were concepts that helped to explain participant's experience as knowledge acquisition progressed.

**RQ4: What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3?**

The result for RQ4 was achieved through two major conclusions drawn from the results of RQ2 and RQ3. The result for RQ4 is presented here, but the conclusions that supported the result for RQ4 are presented in Chapter 5. The result for RQ4 was that personal knowledge within a KM perspective is a complex adaptive system maintained through acts of first-person epistemology.

**Summary**

This chapter provided results for the research questions asked in the current research. The results were grounded in the interviews with participants and included the

formation of eight categories: *being overwhelmed*, *questioning self*, *seeking help*, *microthinking*, *being confident*, *remembering*, *multitasking*, and *speed*. These eight categories were organized around being overwhelmed and being confident. Being overwhelmed represented the absence of personal knowledge. The categories *questioning self*, *seeking help*, and *microthinking* fit under being overwhelmed. Together these categories were inverse indicators because they all decreased as knowledge acquisition progressed. Being confident represented the presence of personal knowledge. The categories *remembering*, *multitasking*, and *speed* fit under being confident. Together these categories were direct indicators because they all increased as knowledge acquisition progressed. The final result was that personal knowledge within a KM perspective is a complex adaptive system maintained through acts of first-person epistemology. The conclusions that led to this final result are thoroughly explored in Chapter 5.

## Chapter 5

### Conclusions, Implications, Recommendations, and Summary

#### **Introduction**

This chapter interprets the results presented in Chapter 4. The Conclusion section of this chapter addresses the strengths, weaknesses, and limitations of the current research. In addition, the Conclusion section presents the answers to each of the research questions and draws several conclusions based on the answers to RQ2 and RQ3. The implications section of this chapter addresses the contributions the current research makes to the field of KM. These contributions are presented in their connection to the literature review in Chapter 3. The recommendations section of this chapter presents recommendations for the field of KM based on the implications just covered. Finally, a standalone summary of the current research is provided at the end of this chapter.

#### **Conclusions**

This section of Chapter 5 provides answers to the research questions asked in the current research. This section also discusses the strengths, weaknesses, and limitations of the current research. The current research answered the following research questions.

1. What are the perceptions of novices regarding their acquisition of knowledge?
2. What categories, sub-categories, and relationships can be constructed from RQ1?
3. What core categories and relationships can be constructed from RQ1 and RQ2?

4. What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3?

The answer to each research question was grounded in the data. However, the higher numbered research questions included more interpretation and drawing of conclusions than the lower numbered research questions. There were two reasons for this situation. First, the research questions were organized hierarchically building one on top of the other. Second, the GTM process is critically dependent on the creative analytical efforts of the researcher (Corbin & Strauss, 2008; Glaser, 2001; Morse, et al., 2008). These creative analytical efforts required interpretation of the data. The raw data of the interviews were the answer for RQ1. But the answers for RQ2 and RQ3 were an interpretation of the data within the GTM process. The answer for RQ4 was based on conclusions drawn from the answers to RQ2 and RQ3.

The strengths of the current research included the GTM process and the nature of barista work. The GTM process was ideal for revealing the experience of knowledge acquisition of the participants. The semi-structured interviews were ideal for allowing participants to share their story in their words. The recursive nature of data collection with data analysis was ideal for mining the participants' experience of knowledge acquisition for insights into personal knowing and personal knowledge. The nature of barista work was also a strength of the current research. Becoming a barista requires significant knowledge acquisition in a limited time. In addition, baristas are hired, in part, on their ability to build relationships with customers. Thus, the participants in the current research were articulate and willing to share details about their knowledge acquisition.

The combination of knowledge acquisition requirements and social skills of baristas proved ideal for the current research.

The weaknesses and limitations of the current research included the narrow participant profile and the nature of GTM analysis. Fourteen people participated in the current research. While this is sufficient for a GTM research it is still a weakness. In addition, all participants lived and worked in a small geographic area within the state of Oregon in the United States of America (USA). The second limitation of the current research was the nature of GTM analysis. GTM is a complex and challenging methodology that is critically dependent on the analytical efforts of the researcher. Thus, the conclusions from the current research represent a symbiosis between the participants' experience and the researcher's analysis of that experience. A different group of participants or a different researcher might have led to different conclusions. These weaknesses and limitations are further addressed in the Recommendations section below.

*RQ1: What are the perceptions of novices regarding their acquisition of knowledge?*

The answer to RQ1 was fully contained in the raw data of the interviews conducted for the current research. Examples of the answer to RQ1 are provided in the quotations used to demonstrate the answers to RQ2, RQ3, and RQ4 below. Chapter 4 also contains a significant number of examples of the answer to RQ1. In addition, Appendix D contains examples of the answer to RQ1 for each of the participants in the current research. No conclusions were drawn from the data in connection with answering RQ1.

*RQ2: What categories, sub-categories, and relationships can be constructed from RQ1?*

The answer for RQ2 was the final eight categories and their relationships (see Figure 1). The eight categories were *being overwhelmed*, *questioning self*, *seeking help*, *microthinking*, *being confident*, *remembering*, *multitasking*, and *speed*. Being overwhelmed was most closely connected to questioning self, seeking help, and microthinking. These connections were compatible relationships, meaning that the indicators co-existed. Being overwhelmed was also connected with being confident, which was an incompatible relationship. The less overwhelmed a participant was the more confident they were. Questioning self was also connected with being confident, remembering, and seeking help. The more confidence a participant had the less they questioned themselves. This was true for more remembering as well. The more a participant questioned themselves the more they would seek help. Seeking help was also connected to being confident and remembering. Participants would seek help in order to boost their being confident. The more a participant remembered the less they would seek help. Microthinking was connected to being confident, multitasking and speed. The less microthinking a participant engaged in the more they were confident, able to multitask, and achieve greater speed. Being confident was most closely connected to remembering, multitasking, and speed. These connections were compatible relationships. Remembering was also connected to multitasking. The more a participant remembered the more they could multitask. Multitasking was also connected to speed. The more a participant could multitask the greater was their speed. No conclusions were drawn from the data in connection with answering RQ2.

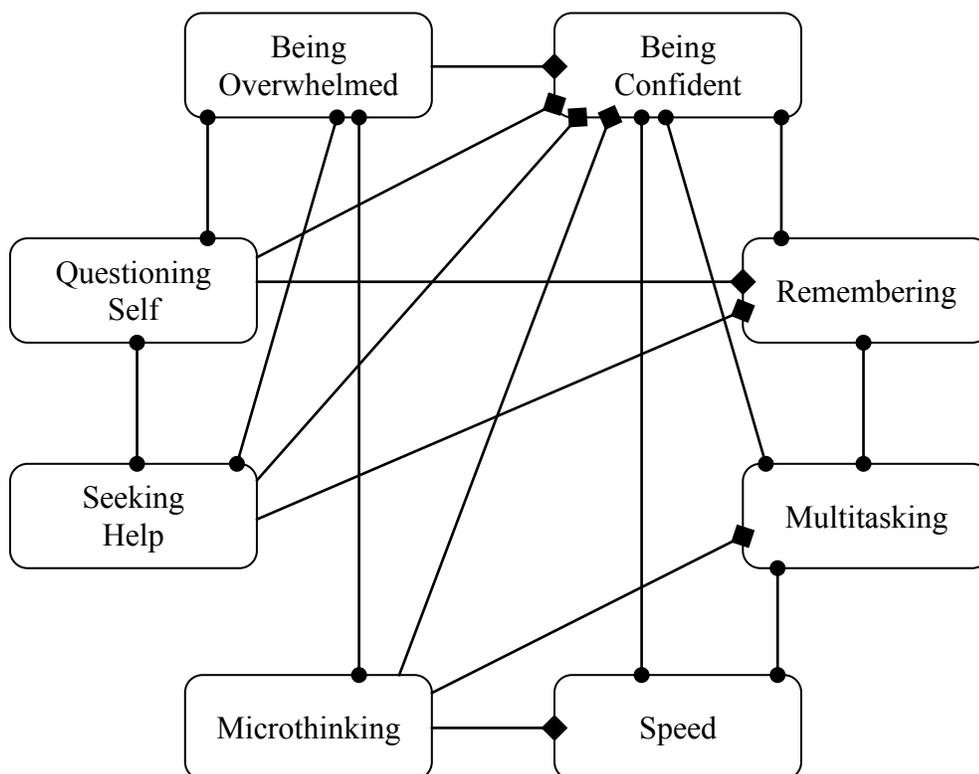


Figure 1. Relationships between indicators. Lines with circles at both ends indicate compatible relationships (i.e. the indicators co-existed). Lines with a square at only one end indicate incompatible relationships (i.e. the indicator with the square increased while the other indicator decreased as knowledge acquisition occurred).

*RQ3: What core categories and relationships can be constructed from RQ1 and RQ2?*

The answer for RQ3 was the two core categories and their relationships to the other categories. One core category represented the absence of personal knowledge. It was the category *being overwhelmed*. The categories *questioning self*, *seeking help*, and *microthinking* fit under being overwhelmed. Together these categories were inverse indicators because they all decreased as knowledge acquisition progressed. The other core category represented the presence of personal knowledge. It was the category *being confident*. The categories *remembering*, *multitasking*, and *speed* fit under being confident.

Together these categories were direct indicators because they all increased as knowledge acquisition progressed. Additional conclusions were drawn from the data in connection with answering RQ3. Those conclusions are presented next.

The second method of quality for the current research identified creativity as a critical element in the GTM process. Adhering to this method of quality resulted in the development of a metaphor that helped to illustrate the knowledge acquisition story told by the participants. The metaphor was developed in the process of answering RQ2 and RQ3 to aid the researcher in coding. The metaphor was quality checked at the final interview of the last three participants. Each of these participants fully identified with and embraced the metaphor.

Imagine yourself standing on top of a hill looking at a large river flowing below you. To your left the river flows through a narrow channel, the descent is steep, and there are many large boulders for the river to flow over and around. Here the river is tumultuous and loud. In front of you the river is hidden. To your right the river is wide, the descent is slight, and there are no boulders in the river. Here the river is quiet and smooth.

The loud river is not knowing. The smooth river is knowing. The loud river is being overwhelmed. The smooth river is being confident. The loud river is chaos. The smooth river is *Integrated Complexity* (IC). IC was the conceptualization of personal knowing within a KM perspective discovered in the data collected in the current research. The data collected in the current research also revealed a process of knowing: *From Overwhelmed to Confident* (OC). OC was the conceptualization of the process of personal knowing within a KM perspective discovered in the data collected in the current

research. Neither a conceptualization of personal knowing nor a conceptualization of a process of knowing were directly sought in the current research. However, the data clearly revealed these conceptualizations. When combined *Integrated Complexity: From Overwhelmed to Confident* (ICOC) tells the story of personal knowing revealed in the data collected in the current research. ICOC is illustrated by the smooth river metaphor and further explained by the categories described above. The full conceptualization of ICOC was scattered throughout the data and is represented in the narratives of RQ2 and RQ3 in Chapter 4 as well as in Appendix D. However, participant 8 expressed the essence of ICOC in a compact statement.

Like I said, like the first week I told you, like, I was nervous. And, I was focused. And, I couldn't really multitask. I just focused on one drink. And, since I've been working more, um, I know all the drinks. And, it's easier and I can multitask and I'm comfortable with, um, working here. At first I was kind of nervous, but, now I'm comfortable. That's how it's, nervous now I'm comfortable. (Interview 2).

The smooth river metaphor and ICOC represent the story of personal knowing revealed in the data collected in the current research. There are no known parallels to this representation in the KM literature. Nonaka's (1991, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) organizational knowledge creation with SECI did not represent this story. Collins' (2010) description of knowledge from a sociology perspective did not represent this story. However, Polanyi's (1958, 1966b) theory of personal knowing has similarities to the story revealed in the current research. Polanyi's indwelling is the integration found in the smooth river metaphor. This similarity is explored further in the Implications section below.

*RQ4: What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3?*

The answer for RQ4 was based on two conclusions drawn from the answers to RQ2 and RQ3. The two conclusions drawn from the data collected in the current research were: (a) personal knowing as first-person epistemology is a universally lived experience that includes commitments to internal and external requirements as well as a bias toward integration; and (b) personal knowledge can be viewed as a complex adaptive system (CAS). This section explores these two conclusions before presenting the answer to RQ4.

Personal knowing as first-person epistemology is a universally lived experience that includes commitments to internal and external requirements as well as a bias toward integration. First-person epistemology fully recognizes the *personal* in personal knowledge. Each participant in the current research made claims about what they knew. Participants described *being overwhelmed* in terms of not knowing: “I don’t know what I’m doing” (Participant 13, Interview 1); “I don’t know what to do” (Participant 2, Interview 1); and “I don’t know if I can take on all of it (Participant 3, Interview 1). Participants described *being confident* in terms of knowing: “I know all the drinks” (Participant 8, Interview 2); “I know what I produce is acceptable (Participant 1, Interview 3); “Feel like I know what I’m doing pretty well. I mess up sometimes. But I feel like I know what I am doing” (Participant 4, Interview 1). Each of these claims was an expression of first-person epistemology. Each of these claims was backed by personal judgments about sources, scope, and criteria for knowledge. And, every participant in the current research made these first-person epistemological claims. Every participant decided what they knew. And, they each lived out their decisions of what they knew on a

daily basis. They each did things because of what they knew. They each impacted their surroundings and other people as a result of their decisions about what they knew.

First-person epistemology is not the norm in philosophical epistemology or the research and practice of KM. However, first-person epistemology was a core concept for Polanyi (1958) even though he did not use this exact phrase. Polanyi simply defined epistemology as first-person epistemology: “Epistemology reflects on knowledge we ourselves believe we possess” (p. 365). He went on to contrast this with third-person epistemology, again, not using this exact phrase, where someone, “studies knowledge which he believes to have been acquired by another individual and studies also the shortcomings of such knowledge” (p. 365). This third-person epistemology is the norm in philosophical epistemology as well as in the research and practice of KM. Yet, third-person epistemology is problematic for philosophers (S. L. Reynolds, 2011; Stevenson, 1999; van der Schaar, 2011) as well as for the research and practice of KM. For example, third-person epistemology is characterized by conclusions such as the following.

On the standard analysis, if you know that  $p$ , then it is true that  $p$ . If, therefore, it is false that minds are brains, then you do not know that minds are brains. It is thus misleading to say, e.g., that astronomers before Copernicus knew that the earth is flat; at best they justifiably believed that they knew this (Moser, 1999, p. 274).

Based on the standard set forth in the conclusion above the set of propositions that can be known is only the set of propositions that cannot be shown to be false at any time in the future. Yet, this is an untenable situation for the research and practice of KM because participants in the current research claimed to know things and acted on their

knowledge in ways that impacted their organizations and customers. They engaged in first-person epistemology. Furthermore, to the extent that the participants in the current research represented the normal population of working adults in which KM is concerned, first-person epistemology is a universally lived experience.

Polanyi (1958) addressed the inherent problem of third-person epistemology by correctly observing that “the word ‘true’ does not designate, then, a quality possessed by the sentence *p*, but merely serves to make the phrase ‘*p* is true’ convey that the person uttering it still believes *p*” (p. 305). He thus restated the standard third-person epistemological approach in a more accurate first-person epistemological form. Third-person epistemology, therefore, is simply projected first-person epistemology. Therefore, all knowing is grounded in acts of first-person epistemology. Polanyi (1958) thoroughly demonstrated this through a detailed analysis of specific cases in the history of science. However, a more recent example may help to convey the significance of the claim that all knowing is grounded in acts of first-person epistemology.

In 1956 McKenzie (2006) stumbled upon a solution for certain kinds of back pain. McKenzie pursued and advanced this solution because the efficacy of it convinced him that the solution was correct. Thus, through acts of first-person epistemology McKenzie determined that he knew how the spine worked as well as the solution to certain kinds of back pain. McKenzie related the following story from the 1983 American Orthopaedic Association meeting to demonstrate that his knowledge was not accepted by everyone. “One prominent orthopaedic surgeon of the day stood and challenged me saying, ‘Mr. McKenzie, we orthopaedic surgeons have been in there [meaning at surgery] and the disc does not move. You must not keep on saying that!’” (p. 11). The original statement in

(McKenzie, 2006) contains the bracketed words “[meaning at surgery]” exactly as provided above. This prominent surgeon had also engaged in acts of first-person epistemology and determined that he knew how the spine worked. Both McKenzie and the prominent surgeon lived out their first-person epistemological decisions on a daily basis. They each did things because of what they knew. And, the things they each did significantly impacted the lives of other people. In the case of surgery the impact from complications could have been so severe as to put the very life of another person in danger. According to McKenzie, in 2003 the prominent surgeon “apologized to me for his error” (p. 11). In 2004 McKenzie was selected as the most influential person in orthopedic physical therapy based on a survey of 320 members of the American Physical Therapy Association (Schrupp, 2004). Schrupp compared McKenzie’s work to the discovery of gravity by Newton and stated that “no one should be surprised to find Robin McKenzie’s name on the top of this list” (p. 62).

The point of the above story is the knowledge of the prominent surgeon. It would seem ludicrous to claim that in 1983 the prominent surgeon did not know that McKenzie (2006) was wrong. The prominent surgeon not only knew but convinced others that he knew. The others most likely included colleagues, staff, and administrators at hospitals. The others certainly included patients. The prominent surgeon was so confident in his knowledge that he convinced patients to allow him to cut open their bodies and make alterations on the inside. Yet, the prominent surgeon was eventually proved wrong and was convinced that he had been wrong. Thus, by 2003 he had gained new knowledge and had confidence in his new knowledge. This is the reality of first-person epistemology. This is the real world. This is the world in which KM is concerned.

The RQ2 section of Chapter 4 presented results that demonstrated that *being confident* did not guarantee correctness. Being confident was an indicator of knowing for participants in the current research. Thus, being confident was an outcome and an indicator of acts of first-person epistemology. Yet, first-person epistemology, saying, “I know what to do” (Participant 1, Interview 1), did not guarantee that the participant knew what to do. Polanyi (1958) called this the “ineradicable tension between our conviction that we know something and the realization that we may conceivably be mistaken” (p. 305). KM is the leveraging of knowledge for competitive advantage (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995). It includes activities associated with creation, storage, sharing, and application of knowledge within the enterprise (Heisig, 2009). All of this knowledge is grounded in acts of first-person epistemology. And, all of this knowledge is subject to the tension described by Polanyi and demonstrated by the prominent surgeon story above. Thus, it is not surprising that participants in the current research reached a level of being confident and still found themselves being corrected at times. This simply indicates that the participants in the current research lived and acted daily within their organizations with the tension described by Polanyi. To the extent that the participants in the current research represented the normal population of working adults in which KM is concerned, the tension between knowing and possibly being wrong is a universally lived experience.

A possible argument against accepting the role of first-person epistemology within KM may be based on a perception that first-person epistemology is entirely subjective. In this argument subjectivity is defined as an individual’s commitment to only internal requirements. This argument is unsubstantiated because personal knowing as

first-person epistemology includes commitments to both internal and external requirements. The results from the current research indicated that new baristas could only acquire the knowledge necessary to properly pull espresso shots if they committed to the methods presented to them in KM efforts. Each participant described the need to commit to external requirements. Participant 13 described being a “shadow” (Interview 1) to experienced baristas to describe this experience with external requirements. Participant 12 described acquiring a “whole new lingo” (Interview 1) to describe aligning her vocabulary with external requirements. Participant 11 described external requirements regarding “how to pull the espresso right” (Interview 1). These external requirements included adjustments of coarseness, dose, and time. Participant 10 described having to make judgments between competing external requirements where shift supervisors had different standards for a similar task. Participant 8 and 7 both described adjusting to the external requirements of the multiple timers used in their organizations. When these timers sounded it indicated immediate action was required to handle such things as expired coffee and cream.

Nonaka (1991, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) as well as Collins (2010) addressed commitment to external requirements but failed to significantly explore commitment to internal requirements. However, this is not surprising given their respective research agendas. Nonaka was focused on organizational knowledge. In Nonaka’s organizational knowledge creation theory individuals require community in order to use SECI to create knowledge. Organizational knowledge creation occurs when the organization amplifies and extends individual knowledge creation by involving larger and larger groups of individuals in SECI. Collins wrote from a sociology

perspective focusing on the social aspects of knowledge. He used organizing terms such as relational and collective. Collins went as far as to claim that Polanyi's (1958) "stress on the personal element of...knowledge can do damage to the proper understanding of the idea, the profound parts of which have much more to do with the collective embedding of knowledge" (p. 148). In making this claim Collins emphasized external requirements while engaging in an act of first-person epistemology that demonstrated his commitment to both internal and external requirements. This claim represented Collins' personal knowledge even as he denied the value of the personal in knowledge. Polanyi's magnum opus (Gelwick, 2007-2008) was entitled *Personal Knowledge*. He explored both internal and external requirements. See the discussion about appraisal surrounding Table 1 in Chapter 2 for an overview of Polanyi's approach to internal and external requirements.

Participants in the current research each described a similar story. At first this story was confusing because it sounded like the participants were describing personal knowing as the absence of something: the absence of the chaos associated with being overwhelmed. This absence of something was universal, immediately identifiable, and obvious with each participant's story. The smooth river metaphor (see the RQ3 discussion above in this Conclusion section) was developed to cope with this personal knowing as the absence of something. Participants could easily and emphatically describe the chaos of being overwhelmed as represented by the loud river. Often an exclamation such as AHH!, AGH!, or UGH! was used to express the experience of being overwhelmed. After using AHH!, Participant 13 explained the exclamation as "I have no clue what I'm doing. Kind of just overwhelming" (Interview 1). Participant 2 described

being overwhelmed as “chaotic, it’s nothing making sense, and I don’t know what to do” (Interview 1). However, participants provided fewer and less descriptive statements about being confident as represented by the smooth river. In addition, as noted above, these descriptions were often expressed by the absence of the chaos associated with being overwhelmed. Participant 5 expressed being confident as “the anxiety is, is way, way less now” (Interview 1). Only after being asked for a positive description of this did Participant 5 describe it as “I am more secure in my knowledge” (Interview 1). Participant 10 calmly described her work as “it hasn’t been too difficult anymore” (Interview 2). This was in sharp contrast to her previous descriptions of “freaking out” (Interview 1). Additional examples can be found in the RQ2 section of Chapter 4 and in Appendix D.

The tendency to focus on the absence of the chaos of being overwhelmed may be connected with perceptions of normal. Consider the following scenarios: (a) you are asked to describe a normal drive to work; (b) you are asked to describe the drive to work on a day that included a catastrophe, perhaps all of the stop lights were out due to a power outage, or there was significant police activity due to a search for a fugitive, or there was a freeway bending earthquake. You would likely describe the second scenario more readily and emphatically as well as more often than the first scenario. When this logic was applied to the story told by the participants it led to the conclusion that the integration represented by the smooth river was perceived as the normal experience by participants. This conclusion was supported by the data as well. All participants sought integration. No participant expressed consideration of a different destination. And, participants achieved integration even at the expense of being incorrect in their personal

knowing. Polanyi (1958) addressed this bias toward integration with his concept of indwelling. He described indwelling as the central action of all personal knowing. The relationship between the integration in the current research and Polanyi's indwelling is discussed further in the Implications section below.

The first major conclusion drawn from the current research was about personal knowing as first-person epistemology. Personal knowing as first-person epistemology is a universally lived experience that includes commitments to internal and external requirements as well as a bias toward integration. The second major conclusion drawn from the current research was that personal knowledge can be viewed as a CAS.

There is not a universal definition for a CAS (Miller & Page, 2010). However, there is significant consensus around the idea of a CAS as a network of diverse, connected, interdependent, adaptive agents that produce emergent phenomena (Holland, 2012; Page, 2009). The data in the current research revealed that personal knowledge has a number of characteristics of CAS. This conclusion is not unique to the current research (Morowitz & Singer, 1995). CASs have even been defined as knowledge creating and storing systems: "Systems that absorb information from their environment and create stores of knowledge that can aid action are often called 'complex adaptive systems'" (Foster, 2005, p. 874).

The data in the current research revealed that personal knowledge has a number of characteristics of a CAS. Personal knowledge appeared open, adaptable, diverse, and interconnected. Personal knowledge also exhibited nonlinearity and produced emergent phenomena. Taken together, these characteristics qualify personal knowledge as a CAS per the descriptions provided by (Holland, 2012; Page, 2009).

Open means that the scope of someone's personal knowledge can increase. It is not a closed system. Adaptable means that personal knowledge copes with changing environments through modification. It is not static. Diverse means that personal knowledge includes variety. This variety can result in competing knowledge. Interconnectedness means that personal knowledge is a network of knowledge with variety in the connectedness. Thus, knowledge is connected to and impacts other knowledge. Exhibiting nonlinearity means that personal knowledge does not always produce the same output for a given input. Producing emergent phenomena means that the output from personal knowledge is not simply the sum of the inputs. The combination of exhibiting nonlinearity and producing emergent phenomena means that the output of personal knowledge may at times be unpredictable.

These characteristics were revealed in the data. Examples of both the open and adaptable characteristics are trivial. All of the participants gained new knowledge and their knowledge adapted to the work of being a barista. Diversity was illustrated by a number of participants who described receiving competing instructions from different co-workers. In these situations participants had to make decisions about whose instructions to follow. Sometimes that meant following the instructions of the co-worker the participant happened to be working with at the time. This illustrates the adaptability as well as the diversity of personal knowledge. Interconnectedness was revealed through descriptions ranging from relationship building to increased confidence outside of work to foaming milk. Exhibiting nonlinearity and producing emergent phenomena are illustrated by the following specific examples. These examples also demonstrate a number of the other characteristics as well. Participant 6 chose to continue using a certain

technique with pouring foam even though he did not need the technique. He chose to continue using the technique in part because a co-worker sounded “pompous” (Interview 3) in declaring the co-worker himself did not need the technique. Participant 6 also described being told information during training and then being told the same information weeks later. When he was told the information during training it had no impact. When he was told the information the second time it had a “profound impact” (Interview 2). Participant 10 reported attending college classes more often because of her experience in becoming a barista. She gained a new perspective on her responsibility to college as one of her jobs. Participant 13 described struggling with foaming milk because she was attempting to mimic her trainer in all details, including the position and angle of the milk cup. A co-worker encouraged her to experiment with alternative positions and angles of the cup. This experimentation was helping her find her own ideal positioning and angle. Participant 2 described intentionally making a drink wrong by inventing her own recipe because she did not want to “look dumb” (Interview 3) to the customer by seeking help. Participant 3 quit her job because of the way she was being treated by co-workers. Participant 8 regularly used phrases such as “I know everything now” (Interview 2) even though she repeatedly shared stories of being corrected by co-workers.

The conceptualization of personal knowledge as a CAS is in sharp contrast to the literature reviewed in Chapter 2. Polanyi (1958, 1966b) was focused on a process of knowing rather than defining knowledge (Gelwick, 1977; Henry, 2011; Oguz & Sengun, 2011). His process of knowing aligned with a number of conclusions from the current research, but not the conceptualization of personal knowledge as a CAS. Nonaka (1991, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009), Collins (2010), and much

of KM literature (Heisig, 2009) have demonstrated a bifurcated conceptualization of knowledge with knowledge being either effable or ineffable. The conceptualization of personal knowledge as a CAS subsumes this bifurcated view of knowledge by recognizing that effableness and ineffableness may simply be two of the many characteristics of personal knowledge. This possibility is discussed further in the Implications section below.

An analogy may help to highlight the differences between the bifurcated conceptualization of knowledge persistent in KM literature and the conceptualization of personal knowledge as a CAS. The analogy uses a landscape to explain different conceptualizations of knowledge. Polanyi (1958, 1966b) described the formation of the landscape without specifying the contents of the landscape. The early Nonaka (1991, 1994; Nonaka & Takeuchi, 1995) described a barren landscape where knowledge was represented by stones. The stones were either visible or not visible. The later Nonaka (Nonaka & von Krogh, 2009) said that in this barren landscape stones may have both visible and not visible characteristics at the same time. Collins (2010) provided a description of how the stones in this barren landscape are either visible or not visible as well as how certain not visible stones can become visible. Conceptualizing personal knowledge as a CAS claims that the landscape is not barren, but rather is a living, active, dynamic ecosystem. The ecosystem may contain stones that are either visible or not visible. But it may also contain grasses, shrubs, trees, insects, mammals, birds, streams, lakes, mountains, valleys, forests, deserts, oceans, etc. These members of the ecosystem may have multiple characteristics beyond simply being visible or not visible. The members are diverse in nature yet connected, interdependent and adaptive. In addition,

there is dynamic interaction between the members of the ecosystem. This dynamic interaction produces nonlinear results and emergent phenomena.

The goal of the current research was to answer RQ4: What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3? Given the two conclusions presented above, personal knowing as first-person epistemology and personal knowledge as a CAS, an answer to RQ4 can now be presented. Personal knowledge within a KM perspective is a complex adaptive system maintained through acts of first-person epistemology.

### **Implications**

A pressing need in KM research and practice is to understand personal knowledge within a KM perspective. The results and conclusions from the current research provided significant insight into personal knowledge within a KM perspective. This insight can be divided into two areas: (a) support for Polanyi's (1958, 1966b) theory of personal knowing; and (b) a way to reconcile the diversity surrounding the conceptualization of personal knowledge in KM literature and thereby move forward the research and practice of KM.

The results and conclusions from the current research have much in common with Polanyi's (1958, 1966b) theory of personal knowing. Polanyi's appraisal is an act of first-person epistemology. Polanyi's focal and subsidiary conceptual classes are similar to the microthinking and macrothinking identified in the current research. Polanyi's indwelling is the integration found in the smooth river metaphor.

Polanyi's (1958, 1966b) theory of personal knowing explained how humans acquire knowledge through acts of comprehension. These acts of comprehension require appraisal and indwelling. Polanyi called appraisal the "personal coefficient, which shapes all factual knowledge" (1958, p. 17). Appraisal is a personal act of evaluation within an interpretive framework. This personal act results in rejection of or commitment to something outside the interpretive framework. Acts of first-person epistemology as explained in the Conclusion section above include judgments about sources, scope, and criteria for knowledge. Polanyi's appraisal is such a personal act of judgment. Thus, Polanyi's appraisal is an act of first-person epistemology.

Indwelling involves two conceptual classes, which Polanyi (1958, 1966b) called focal and subsidiary. These conceptual classes were earlier explained via two examples. The first example was a contrast between an unskilled sighted person's focus on the feel of a white cane in their palm versus a skilled blind person's focus on the environment around them via the vibrations coming from the end of the white cane. The second example was a contrast between a beginning reader's focus on individual letters versus a skilled reader's focus on the meaning of words and sentences. In both of these examples the unskilled person is focused on the details of using the tool and the skilled person is focused on the meaning provided by the tools. This is very close to the meaning of microthinking and macrothinking identified in the current research. Microthinking was defined as the act of thinking through the details of a process. Macrothinking was defined as large-scale thinking. But the largeness of the scale is relative to the level of detail in microthinking. An unskilled barista focuses on each step in the process of making a latte. A skilled barista focuses on making a latte. This barista example can be used to explain

both Polanyi's focal and subsidiary conceptual classes as well as the microthinking and macrothinking identified in the current research. Thus, Polanyi's focal and subsidiary conceptual classes are similar to the microthinking and macrothinking identified in the current research

Indwelling is the central action of all personal knowing. "All understanding is achieved by indwelling" (Polanyi, 1962, p. 606). The skilled blind person has indwelt the white cane and all that is involved in interpreting its input. The skilled reader has indwelt the vocabulary, understanding, culture, and interpretations required to read. The skilled barista has indwelt the process required to make a latte as well as the other activities and social aspects of being a barista. This indwelling is the integration found in the smooth river metaphor. In the smooth river metaphor the chaos of being overwhelmed gave way to the integration associated with being confident. This integration is the indwelling achieved by the skilled barista. Thus, the results and conclusions from the current research supported and complimented Polanyi's (1958, 1966b) theory of personal knowing.

The results and conclusions from the current research also provided a possible path for reconciling the diversity surrounding the conceptualization of personal knowledge in KM literature. The nonlinearity and emergent phenomena of personal knowledge as a CAS could lead to multiple conceptualizations of personal knowledge as well as debates over attributes and characteristics of personal knowledge. Perhaps the confusion and debates are a result of studying a CAS without recognizing that it is a CAS. Thus, Heisig's (2009) conclusion that there was not a standardized understanding of personal knowledge in the 160 KM frameworks he studied and that the frameworks

emphasized different dimensions of knowledge can be explained by conceptualizing personal knowledge as a CAS. In addition, Nonaka and von Krogh's (2009) explanation of dynamic interaction along a continuum may have merit. They posited that knowledge can have both effable and ineffable characteristics at the same time. This is somewhat confusing and has not gained much traction within KM literature. However, their idea of competing characteristics may have merit if personal knowledge is conceptualized as a CAS. The science of CAS can provide a solid theoretical foundation for grappling with multiple attributes and characteristics of personal knowledge, some of which may appear to be in competition with each other. This is true of Collins' (2010) explanation of knowledge as well. Collins provided a robust description of knowledge that included four meanings of explicable, eight definitions of cannot, and three sub-categories of knowledge. Collins moved beyond a simplistic bifurcation of knowledge and offered a complicated definition of knowledge. Conceptualizing personal knowledge as CAS would permit researchers to evaluate the multiple attributes and characteristics of personal knowledge identified in literature, including those of Collins, as properties of a CAS rather than only as competing definitions of personal knowledge.

Reconciling the diversity surrounding the conceptualization of personal knowledge in KM literature could move forward the research and practice of KM. The conceptualization of personal knowledge plays a critical role in KM research as well as in the practice of KM in organizations. The conceptualization of personal knowledge is fundamental to the goals and outcomes of KM (Heisig, 2009; Hislop, 2009; Oguz & Sengun, 2011; Virtanen, 2010a). The effective handling of knowledge comprises the core practices of KM (Heisig, 2009). If the conceptualization of personal knowledge changes

then the practices of KM change (Hislop, 2009; Oguz & Sengun, 2011; Virtanen, 2010a). Thus, reconciling the diversity surrounding the conceptualization of personal knowledge in KM literature has the potential to impact all of KM.

If KM is impacted then the design of KM IS will be impacted. IS consist of people, processes, and technology (Chen & Popovich, 2003). The discipline of KM has had a long history of neglecting the people element of this triad (Rechberg & Syed, 2012; Swan, Scarbrough, & Preston, 1999). The current research focused on people in order to ultimately impact processes and technology. Therefore, reconciling the diversity surrounding the conceptualization of personal knowledge in KM literature has the potential to impact all of KM by impacting the processes of KM and the technology of KM. Future research will need to determine exactly how the potential impacts unfold.

### **Recommendations**

Recommendations for future research arising from the current research fall into three categories. The first category is duplication of the current research. The second category is recommendations identified in Chapter 2 and supported by the results as well as the conclusions of the current research. The third category is recommendations based solely on the results and conclusions of the current research.

First, future research should expand the participant profile and geographical representation of this GTM research. This expansion could be accomplished by duplicating the current research with participants from other occupations and geographies. Future research of this nature would serve to ground the results and conclusions of the current research in a broader representation of participants as well as

analysis from different researchers. Thus, future research of this nature would serve to reduce the main weaknesses and limitations of the current research.

Second, future research should embrace the richness of Polanyi's (1958, 1966b) process of knowing and abandon the four significant myths associated with Polanyi in KM literature (see Table 2). Polanyi developed a rich, robust theory of personal knowing as demonstrated in the Chapter 2. Polanyi's theory was supported by the results and conclusions of the current research as demonstrated in the Implications section above. Researchers should read and understand the fundamental concepts of Polanyi's theory of personal knowing before citing his work. At the heart of these fundamental concepts is indwelling as the central action of all personal knowing, which is an act of first-person epistemology. Future research should abandon the bifurcated view of personal knowledge championed by Nonaka (1991, 1994; Nonaka & Takeuchi, 1995). This bifurcated view of personal knowledge was not supported in the results and conclusions of the current research. In addition, researchers should abandon the restrictive vocabulary of *tacit* and *explicit* when investigating personal knowledge. The results and conclusions of the current research demonstrated that the restrictive vocabulary of *tacit* and *explicit* have led KM researchers to too narrowly focus their explorations of personal knowledge. Personal knowledge is much more diverse than just the characteristic of being either effable or ineffable.

Third, future research should seek to further understand and apply ICOC as well as the conceptualization of personal knowledge as a CAS maintained through acts of first-person epistemology. This should include evaluations of KM processes and KM IS design based on the findings in the current research. This should also include thorough

analysis of the science of CAS in connection with personal knowledge as a CAS. This should also include thorough analysis of acts of first-person epistemology. Significant questions include the following. What are the similarities and differences between the CAS of personal knowledge and other CASs such as ecosystems, economies, and social groupings? How does diversity and competing knowledge within the CAS of personal knowledge impact an individual's knowledge acquisition experience? What is the range of non-linearity from the CAS of personal knowledge for various settings of KM? What is the range of emergent phenomena from the CAS of personal knowledge for various settings of KM? What specific internal and external requirements are committed to in acts of first-person epistemology within various settings of KM? What are the functional limits of the bias toward integration in acts of first-person epistemology in various settings of KM? How are acts of first-person epistemology impacted by social dynamics in various settings of KM? What are the social and organizational impacts when someone remains overwhelmed for an extended period of time within various settings of KM? How can creating an overwhelming condition be intentionally and effectively used as a KM practice? What are the social and organizational impacts when someone remains confident yet incorrect, based on the evaluation of the social grouping, for an extended period of time within various settings of KM? What KM practices impact the initial formation or subsequent alteration of being confident in various settings of KM? What is the range of being confident and how does this range impact organizational performance?

Finally, related to the results and conclusions of the current research, future research should investigate the issue of quality. Oddly, no significant focus on quality appeared in the responses from participants in the current research. The pursuit of quality

in services and products has been a longstanding concern in research and practice (Parasuraman, Zeithaml, & Berry, 1985, 1988; Pitt, Watson, & Kavan, 1995). Future research should investigate the role of service and product quality in knowledge acquisition.

### **Summary**

The current research focused on the conceptualization of personal knowledge within the discipline of knowledge management (KM). The discipline KM has been mired in debate over the construct of personal knowledge (Oguz & Sengun, 2011). This debate has its origins in the construct of personal knowledge in organizational knowledge creation theory (Nonaka, 1994; Nonaka & Takeuchi, 1995) and Polanyi's (1958, 1966b) theory of personal knowing. The goal of the current research was to develop a conceptualization of personal knowledge within a KM perspective using grounded theory methodology (GTM). The purpose of GTM is to build rather than test theory. In GTM the theory is derived from the experience of participants in the phenomenon being investigated. Four research questions were asked.

1. What are the perceptions of novices regarding their acquisition of knowledge?
2. What categories, sub-categories, and relationships can be constructed from RQ1?
3. What core categories and relationships can be constructed from RQ1 and RQ2?
4. What conceptualization of personal knowledge within a KM perspective can be constructed from RQ2 and RQ3?

Participants in the current research were baristas, which are employees at a mobile cart, coffee shop, café, or restaurant who prepare drinks using an espresso machine. Good quality espresso drinks are based, in part, on the barista's ability to effectively use the espresso machine, which is complicated (Barron, et al., 2012; Caprioli, et al., 2012; Dold, et al., 2011; Illy & Navarini, 2011). Thirty-seven interviews were conducted with fourteen participants. The number of interviews completed in the current research was within the range identified in literature (Baker & Edwards, 2012; Thomson, 2010) as normal and acceptable for GTM studies.

The current research revealed eight indicators of knowledge acquisition: *being overwhelmed*, *questioning self*, *seeking help*, *microthinking*, *being confident*, *remembering*, *multitasking*, and *speed*. Four of these were inverse indicators that decreased as knowledge acquisition occurred: *being overwhelmed*, *questioning self*, *seeking help*, and *microthinking*. The other four were direct indicators that increased as knowledge acquisition occurred: *being confident*, *remembering*, *multitasking*, and *speed*.

*Being overwhelmed* was the primary description of the loud river and was rooted in the experience of being a barista. However, being overwhelmed also included information overload (Eppler & Mengis, 2004) as well as internal expectations. *Questioning self* included statements questioning and criticizing self-worth as well as ability and possible outcomes. Participants described negative perceptions about their ability to successfully complete tasks as well as concerns about appearing incompetent or not satisfying customers. *Seeking help* included asking co-workers as well as looking up recipes and instructions in manuals or on quick reference cards. *Microthinking* is the act of thinking through the details of a process. Participants eventually transitioned to

macrothinking, which is large-scale thinking. But the largeness of the scale is relative to the level of detail in microthinking. Participants rarely described macrothinking. Instead, they described the absence of microthinking. That is why macrothinking did not survive as a separate category in the data analysis process. Participants shifted from macrothinking back into microthinking as required to solve a problem or acquire new knowledge.

*Being confident* was the primary way in which participants described achieving the integration of the smooth river. However, their descriptions were often expressed as the absence of something associated with one of the inverse indicators. In addition, being confident did not ensure correctness. *Remembering* is the act of instant recall. Participants used the words remember, memorize, and automatic as well as the phrase *I just know* to describe the experiences that fit within this code. Participants identified the need to remember recipes, codes, and processes. The use of the word memorize was never directly associated with simple rote memorization of written material. Instead, the sense of the usage of this word was remembering through experience. *Multitasking* is the ability to work on more than one task at a time. Participants either used the word multitasking or simply described doing multiple tasks at one time. References to multitasking early in knowledge acquisition were about the participant's inability and frustration with multitasking. References to multitasking later in knowledge acquisition were about the participant's ability and ease of multitasking. *Speed* of producing espresso drinks increased over time. Participants consistently viewed increased speed as a positive step in their knowledge acquisition.

Three significant conclusions were drawn from the data collected in the current research. The first conclusion was a conceptualization of personal knowing, *Integrated Complexity*, and a conceptualization of a process of personal knowing, *From Overwhelmed to Confident*. When combined *Integrated Complexity: From Overwhelmed to Confident* (ICOC) tells the story of personal knowing revealed in the data collected in the current research. The inverse indicators, organized under *being overwhelmed*, represented the beginning of this story. The direct indicators, organized under *being confident*, represented the end of this story.

The second conclusion was that personal knowing as first-person epistemology is a universally lived experience that includes commitments to internal and external requirements as well as a bias toward integration. First-person epistemology fully recognizes the *personal* in personal knowledge. Each participant in the current research made claims about what they knew. Each of these claims was backed by personal judgments about sources, scope, and criteria for knowledge. Each of these claims required commitment to both internal and external requirements. Every participant decided what they knew. And, they each impacted their surroundings and other people as a result of their decisions about what they knew. The bias toward integration was a bias toward being confident even at the expense of being wrong. This may be related to cognitive dissonance theory (Festinger, 1962).

The last conclusion was that personal knowledge can be viewed as a complex adaptive system (CAS). A CAS is a network of diverse, connected, interdependent, adaptive agents that produce emergent phenomena (Holland, 2012; Page, 2009). The data in the current research revealed that personal knowledge has these characteristics of CAS.

While this is not unique to the current research (Morowitz & Singer, 1995), it is in sharp contrast to the dominant conceptualization of knowledge in KM, which is focused on a bifurcated view of knowledge (Heisig, 2009). However, the data in the current research revealed that rather than being effable or ineffable, personal knowledge is open, adaptable, diverse, and interconnected, and it exhibits nonlinearity and produces emergent phenomena.

These conclusions led to an answer to RQ4: personal knowledge within a KM perspective is a complex adaptive system maintained through acts of first-person epistemology. This answer was a fulfillment of the goal of the current research. Two significant implications were drawn from this answer, the above conclusions, and the results from the current research.

The first implication was support for Polanyi's (1958, 1966b) theory of personal knowing. The results and conclusions from the current research have much in common with Polanyi's theory of personal knowing. Polanyi's appraisal is an act of first-person epistemology. Polanyi's focal and subsidiary conceptual classes are similar to microthinking and macrothinking identified in the current research. Polanyi's indwelling is the integration found in *Integrated Complexity*.

The second implication was a possible way to reconcile the diversity surrounding the conceptualization of personal knowledge in KM literature and thereby move forward the research and practice of KM. The nonlinearity and emergent phenomena of personal knowledge as a CAS could lead to multiple conceptualizations of personal knowledge as well as debates over attributes and characteristics of personal knowledge. Perhaps the confusion and debates are a result of studying a CAS without recognizing that it is a

CAS. Reconciling the diversity surrounding the conceptualization of personal knowledge in KM literature could move forward the research and practice of KM. The conceptualization of personal knowledge plays a critical role in KM research as well as in the practice of KM in organizations. Thus, reconciling the diversity surrounding the conceptualization of personal knowledge in KM literature has the potential to impact all of KM.

Recommendations from the current research fall into three categories. First, future research should expand the participant profile and geographical representation of this GTM research. Future research of this nature would serve to ground the results and conclusions of the current research in a broader representation of participants as well as analysis from different researchers. Second, future research should embrace the richness of Polanyi's (1958, 1966b) process of knowing and abandon the four significant myths associated with Polanyi in KM literature as well as abandon the bifurcated view of personal knowledge championed by Nonaka (1991, 1994; Nonaka & Takeuchi, 1995). Personal knowledge is much more diverse than just the characteristic of being either effable or ineffable. Finally, future research should seek to further understand and apply the conceptualization of personal knowledge as a CAS maintained through acts of first-person epistemology. This should include thorough analysis of the science of CAS in connection with personal knowledge as a CAS. This should also include thorough analysis of acts of first-person epistemology.

## Appendix A

## Nonaka's Descriptions of Tacit Knowledge

Source	Description of Tacit Knowledge
Nonaka (1991)	<p>One of “two very different types of knowledge” (p. 98).  “Not so easily expressible” (p. 98) as explicit knowledge.  “Hard to formalize and, therefore, difficult to communicate to others” (p. 98).  “Deeply rooted in action and in an individual’s commitment to a specific context” (p. 98).  “Consists partly of technical skills—the kind of informal, hard-to-pin-down skills captured in the term ‘know-how’ (p. 98).  Has a cognitive dimension comprised of “mental models, beliefs, and perspectives so ingrained that we cannot easily articulate them...[that] profoundly shape how we perceive the world” (p. 98).</p>
Nonaka (1994)	<p>One of the “two types of knowledge” (p. 16).  “Deeply rooted in action, commitment, and involvement in a specific context” (p. 16).  “Has a personal quality, which makes it hard to formalize and communicate” (p. 16).  “‘It ‘indwells’ in a comprehensive cognizance of the human mind and body” (p. 16).  Has a cognitive element comprised of “schemata, paradigms, beliefs, and viewpoints...[that are] images of reality and visions for the future.” (p. 16).  Has a technical element comprised of “concrete know-how, crafts, and skills that apply to specific contexts” (p. 16).  “A continuous activity of knowing...[with an] ‘analogue’ quality” (p. 16).</p>
Nonaka and Takeuchi (1995)	<p>“Highly personal and hard to formalize, making it difficult to communicate or to share with others” (p. 8).  “Deeply rooted in an individual’s action and experience, as well as in the ideals, values, or emotions” (p. 8).  Has a cognitive dimension comprised of “schemata, mental models, beliefs, and perceptions so ingrained that we take them for granted” (p. 8).</p>
(continued)	

<p>Nonaka and Takeuchi (1995) (continued)</p>	<p>The cognitive dimension “reflects our image of reality (what is) and our vision for the future (what ought to be)..[that] cannot be articulated very easily...[and] shape the way we perceive the world around us” (p. 8).</p> <p>Has a technical dimension “which encompasses the kind of informal and hard-to-pin-down skills or crafts captured in the term ‘know-how’” (p. 8).</p> <p>One of the “two types of knowledge” (p. 225).</p>
<p>Nonaka and von Krogh (2009)</p>	<p>“Is unarticulated and tied to the senses, movement skills, physical experiences, intuition, or implicit rules of thumb” (p. 635).</p> <p>Is “conceptually distinguished along a continuum” (p. 636) with explicit knowledge.</p> <p>“Is rooted in action, procedures, routines, commitment, ideals, values, and emotions” (p. 636).</p> <p>“Can be accessible through consciousness if it leans toward the explicit side of the continuum. However, most of the details...are inaccessible through consciousness” (p. 636).</p> <p>“Often ‘indwells’ in a comprehensive cognizance of human mind and body” (p. 637).</p> <p>“Tacit and explicit knowledge should not be seen as separate entities but rather mutually complementary based on the same continuum” (p. 640).</p>

## Appendix B

### Consent Form for Participation in the Research Study Entitled *Construction of a Conceptualization of Personal Knowledge within a Knowledge Management Perspective using Grounded Theory Methodology*

Funding Source: None.

IRB protocol # 12031202Exp.

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For questions or concerns about your research rights, contact:  
Human Research Oversight Board (Institutional Review Board or IRB)  
Nova Southeastern University  
(954) 262-5369/Toll Free: 866-499-0790  
IRB@nsu.nova.edu

Site Information:  
Broadway Coffeehouse  
1300 Broadway St. SE  
Suite 100  
Salem, OR 97301

#### **What is the study about?**

You are invited to participate in a research study. The goal of this study is to understand knowledge from the perspective of those who are in the process of acquiring new knowledge.

#### **Why are you asking me?**

We are inviting you to participate because you have recently been hired as a barista.

#### **What will I be doing if I agree to be in the study?**

You will be interviewed three times by the researcher, Eric Straw, at your place of employment. The first interview will occur sometime during your first six months of your employment as a barista. The remaining two interviews will occur weekly following the first interview. Eric Straw will ask you questions about your experience in acquiring knowledge. The interviews will last no more than 30 minutes.

Initials: \_\_\_\_\_ Date: \_\_\_\_\_

**Is there any audio or video recording?**

This research project will include audio recording of interviews through the use of a digital recording device. This audio recording will be available to be heard by the researcher, Eric Straw, the IRB, and Dr. Timothy Ellis, the dissertation adviser. The recording will not be transcribed. The recording will be kept securely on the password protected computer of the researcher. The recording will be kept for 36 months, per IRB requirements, and destroyed after that time by digital deletion. Because your voice will be potentially identifiable by anyone who hears the recording, your confidentiality for things you say on the recording cannot be guaranteed although the researcher will try to limit access to the recording as described in this paragraph.

**What are the dangers to me?**

Risks to you are minimal, meaning they are not thought to be greater than other risks you experience every day. During the interview you will be asked to share your opinions, thoughts, and feelings about your knowledge acquisition. Sharing your opinions, thoughts, and feelings may be uncomfortable for you. If you have questions about the research, your research rights, or if you experience an injury because of the research please contact Eric Straw at (503) 589-8179. You may also contact the IRB at the numbers indicated above with questions about your research rights.

**Are there any benefits to me for taking part in this research study?**

This research study will give you the opportunity to think through how you acquire new knowledge. This opportunity may or may not prove beneficial for you.

**Will I get paid for being in the study? Will it cost me anything?**

There are no costs to you nor are there payments made for participating in this study.

**How will you keep my information private?**

Confidentiality will be maintained by assigning a number to you and your interview records. At the conclusion of this study records connecting you with your assigned number will be destroyed. During this study these records will be stored on a single computer that is password protected. Backups will be stored in an encrypted file on a flash drive. Names will not be used in any study report to identify individual participants. The IRB, regulatory agencies, or Dr. Timothy Ellis, the dissertation adviser, may review research records.

**What if I do not want to participate or I want to leave the study?**

You have the right to leave this study at any time or refuse to participate. If you do decide to leave or you decide not to participate, you will not experience any penalty or loss of services you have a right to receive. If you choose to withdraw, any information collected about your knowledge acquisition experience before the date you leave the study will be kept in the research records in perpetuity and may be used as a part of the research.

Initials: \_\_\_\_\_ Date: \_\_\_\_\_

**Other Considerations:**

If the researcher learns anything which might change your mind about being involved, you will be told of this information.

**Voluntary Consent by Participant:**

By signing below, you indicate that

- this study has been explained to you
- you have read this document or it has been read to you
- your questions about this research study have been answered
- you have been told that you may ask the researcher any study related questions in the future or contact them in the event of a research-related injury
- you have been told that you may ask Institutional Review Board (IRB) personnel questions about your study rights
- you are entitled to a copy of this form after you have read and signed it
- you voluntarily agree to participate in the study entitled *Construction of a Conceptualization of Personal Knowledge within a Knowledge Management Perspective using Grounded Theory Methodology*

Participant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Participant's Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of Person Obtaining Consent: \_\_\_\_\_

Date: \_\_\_\_\_

Initials: \_\_\_\_\_ Date: \_\_\_\_\_

## Appendix C

### Sample Interview Questions

#### Open-ended Initial Interview Questions

- Tell me about your first day at work.
- Tell me about this past week at work.

#### Precise Follow-up Questions

- When did you use the espresso machine for the first time?
- What was it like using the espresso machine for the first time?
- What was it like using the espresso machine this week?
- What has influenced your use of the espresso machine? How?
- Who has influenced your use of the espresso machine? How?
- What drinks have you made for customers?
- What was it like making your first drink for a customer?
- What kind of feedback have you received from customers?
- How do you make a [cappuccino/latte]?
- How many [cappuccinos/lattes] have you made?
- Did you make [cappuccinos/lattes] the same this week as previously?
- How would you describe yourself at the beginning of this week?
- How would you describe yourself today?
- What happened next?
- Is there anything else you want me to know?

#### Adaptive Follow-up Questions

- What was it like to \_\_\_\_\_ for the first time?
- What was it like to \_\_\_\_\_ this week?
- How did doing \_\_\_\_\_ this week compare with doing it in the past?
- What changes have you noticed in \_\_\_\_\_ ?
- Why do you describe \_\_\_\_\_ as \_\_\_\_\_ ?
- What contributed to \_\_\_\_\_ ? How?
- Who contributed to \_\_\_\_\_ ? How?
- Can you describe the events leading up to \_\_\_\_\_ ?
- Is there anything else you want me to know about \_\_\_\_\_ ?

## Appendix D

### Example Source Data, Codes, and Memos

#### **Example 1: Participant 1, Interview 1**

##### *Quotation*

“I’m slower at it than I would like to be. But, I know what to do. I have obtained that knowledge, I guess, per say. Like. I don’t have to look at a sheet or anything like that. Like, I know what to do. It’s just that I’m slower at it because I haven’t done it enough.”

##### *Codes*

Speed  
Seeking Help

##### *Memo*

The participant is describing having a goal or ideal, but not having reached that goal. The goal is based on the speed at which the participant can make drinks. The participant has made enough progress in knowledge acquisition to not have to seek help, but not enough progress to meet his speed goal. The participant is expecting repetition to improve his speed. He is anticipating a point at which he will have “done it enough.”

#### **Example 2: Participant 1, Interview 3**

##### *Quotation*

“I guess I'm more comfortable doing it now. Like, rarely do I feel, um, overwhelmed or out of, out of place. I still am not super confident in, ah. Like, I know what I produce is acceptable, but that's, at least here, that's not what they strive for. And that's what they encourage. Like they don't encourage us to strive for just acceptable. So, like, wow. It's OK. I would like to be doing better still. But, I at least don't have to feel bad about what I give to people. I'm just not particularly thrilled I suppose.”

##### *Codes*

Being Confident

## Being Overwhelmed

### *Memo*

The participant is linking being comfortable and being confident. These are contrasted with being overwhelmed. He is comfortable, but not “super confident.” There is a time element as well as evidence of some interspersing of the states of being overwhelmed and being comfortable. He did not indicate that he is never overwhelmed, but only that he is “rarely” overwhelmed. He is also using a social standard to classify his performance. The standard is established by the culture of the business where he works. He has met a minimum threshold of making “acceptable” drinks. Yet this is not enough because of the culture.

### **Example 3: Participant 2, Interview 1**

### *Quotation*

“It's just so overwhelming. Your like, they want me to make two drinks at a time. HA HA HA. When am I suppose to start that second drink. I'm suppose to start. I'm suppose to steam the milk. And then as soon as the milk steaming you put the thing down and then you're suppose to get your espresso shot. And then what if they want flavor? And, so you're suppose to go over and put your flavor in it. And what if they want two flavors. You gotta get both flavors before you gotta get that cup underneath there before the espresso shot start comming down. And then that's when you start your second drink. So you take your other, after that milks steamed you put that steamed milk to the side. The espresso shot still comming out from the first. You're suppose to get a clean pitcher. Put in fresh milk. Start another steam milk going. And then that's when you're suppose to finish the second one. You know. HA HA HA. It's just overwhelming.”

### *Codes*

Being Overwhelmed  
Multitasking

### *Memo*

The participant is clearly stating that she is overwhelmed. She is also demonstrating being overwhelmed through the speed of her delivery and voice inflections. This was a rapid fire presentation of the process, which is evident from the grammar structure, but much more evident in the audio recording. She is giving the experience of being overwhelmed. It does make me overwhelmed just listening to her description. There is a definite process that the participant is following in this description. She seems to know the process, but it still overwhelms her. Of course, I don't have any information to confirm that she gave me the correct process. But, she can still rattle off a complex process. She has that much down, but is still overwhelmed. The laughter was

not stressed or nervous laughter. Instead it seemed more like a good natured humor laughter.

#### **Example 4: Participant 2, Interview 3**

##### *Quotation*

“Just easy. It's not like, I don't have to think about it. You know. I know it. It's just. Before, I had to stop, you know, and pause and think about it, you know, and. But, now, it's just I, I automatically know.”

##### *Codes*

Microthinking  
Remembering

##### *Memo*

The participant has been using the words simple, automatic, and habit. Here she is working to explain what she means by these words. She begins with a contrast: There was a time when she had to think about the details. Now, she does not have to think about the details. She “just knows it” now, which is contrasted to having to think about the details. The “automatic” just seems to happen without effort.

#### **Example 5: Participant 3, Interview 1**

##### *Quotation*

“I don't think it's bad. Like, it wasn't. At first I was overwhelmed and stressed out. But it's gotten a lot easier...There was like a lot of little things to learn about the machines. And, It was like, when I first was being told, or taught, It was like overwhelming and all that.” I asked if she still gets overwhelmed. “When it's busy and I'm by myself I still get overwhelmed. But not as much, like, it's getting easier.” I asked why she thought it was getting easier. “Cause I'm starting to memorize the recipes and what goes in what, and like, the different names of the drinks. And, I'm not having to look up every single drink now.”

##### *Codes*

Being Overwhelmed  
Remembering  
Seeking Help

*Memo*

The participant was describing what it has been like to learn how to be a barista. She was overwhelmed at first because of the amount of information. Now, she does not get overwhelmed as often. She attributes this to memorizing the recipes and names of drinks. She also references seeking help in the book.

**Example 6: Participant 3, Interview 1***Quotation*

“It's not so to me. Now that I've done it. It doesn't seem like to me. Why was I so overwhelmed? Like, I don't understand why. But, just, I guess at the time I felt like I don't know if I can take on all of it. Cause I felt like I've never done this before and there's so many things I have to do. But it wasn't that bad.”

*Codes*

Being Overwhelmed

*Memo*

I had just summarized the things the participant had said overwhelmed her. These included closing for the first time as well as the recipes and drink names. I asked if that was a good summary of her experience. This is her answer. She recognizes she was overwhelmed, but struggles with why. Thinking back, after the fact, she is not sure why it overwhelmed. Yet, she can tell me that it was overwhelming enough that she did not know if she could do it all. Now, it sounds to her, when I repeat the description back, as if it “wasn't that bad.”

**Example 7: Participant 4, Interview 1***Quotation*

“Um. I was scared. Cause I thought steaming milk would be hard, but it wasn't. Just kind of making it perfect, the right amount of foam.” I asked why she was scared. “That I wouldn't do it right, and I'd fail and get fired. Ah, Ah, Ah. A little dramatic, but.”

*Codes*

Questioning Self

*Memo*

I asked the participant what it was like to steam milk for the first time. Getting fired sounds “dramatic” to her now, but at the time it was apparently real and genuine. The laugh “Ah, Ah, Ah,” was a nervous laugh. She was scared because she questioned whether she could steam the milk correctly. In her mind failure could have resulted in getting fired, which is a significant consequence.

**Example 8: Participant 4, Interview 1***Quotation*

“Um, well, It's a lot smaller in size than [other location], which kind of like knowing where everything is at. Um. I don't know. It's kind of like feeling, I don't, have, like, an older lady, like, yells a lot, watching over my shoulder. I felt safe, like, I knew what I was doing now. And, I felt confident. It was, like, definitely confidence that helped with the being faster.” I asked what she meant by confidence. “Feel like I know what I'm doing pretty well. I mess up sometimes. But I feel like I know what I am doing.”

*Codes*

Speed  
Being Confident

*Memo*

The participant was talking about being faster, so I asked her to expand on why she is faster. She begins by comparing the size of her kiosk to the kiosk where she was trained. In the smaller kiosk she knows where everything is at. Then, she shifts to confidence because her trainer “older lady” was not “yelling” at her. That is a fascinating shift. She “felt safe” and confident. Her explanation of her feeling of being confident is in contrast to how she felt when her trainer was yelling at her.

**Example 9: Participant 5, Interview 1***Quotation*

“Anxiety of not being able to steam the milk right. Not getting the right amount of foam. Somehow messing up the drink...It was just, ah, not wanting to mess up somebody's drink by not steaming the milk right or getting the right consistency to it.”

*Codes*

Questioning Self

*Memo*

I had asked the participant to explain her usage of “nervous and anxious” in describing the first time she used an espresso machine. She connects nervous and anxious with foaming milk and the possibility of not being able to foam correctly as well as perhaps “messing up the drink.” So, she has a lot of expectations going in to the process. Her questioning seems to center around these expectations and whether she will meet these expectations. The expectations seem to be internal.

**Example 10: Participant 5, Interview 1***Quotation*

“Probably during training, um, a minor level of negative self-talk. Especially when we were first learning the drinks and tasting them, and executing them. Um, you know, making sure, wanting to know that you're putting out something that people would want to drink. And, so, a certain level of negative self-talk. And, you go home feeling overwhelmed. Especially the first day is when it was, I think, prominent. Um, the first day, of oh my gosh, you know, second guessing, am I sure this is what I want to do? Is this what I want? You know. Can I do this?”

*Codes*

Questioning Self  
Being Overwhelmed

*Memo*

The participant had been describing questioning herself, so I asked if her questioning ever rose to the level of negative self-talk. This was her answer. She is describing her initial experience during training. It was so overwhelming that she was not sure she could do it or that she even wanted to do it. But her description is still more questioning than really negative self-talk, such as “I can't...”

**Example 11: Participant 6, Interview 1***Quotation*

“And, my brain just knows these things. Intuitively based on the reference, um, I guess the notation available on the cup. Where before, I was reading it and translating it into motions...It's a [size]. That means my brain knows I'm using two machines. Where as instead of going in, what is a [size]. A [size] is [x] shots. That means I'm going to queue two, queue one.”

*Codes*

Microthinking

*Memo*

The participant is contrasting a detailed micro focus in his thinking with a broader macro focus. There is a time element. Before, earlier, at a point in the beginning he had to translate the code written on the side of the cup into specific steps. He first thinks about what the code means. Then he thinks about what he must do to make the drink. This is contrasted with the present situation. Again, there is this time line from before to now. Now, he does not have to think about what the code means. Instead, he jumps directly to a high level description, “using two machines.” The contrast between using two machines and “queue two, queue one” is significant. The queue terminology is about what he does with the machines. The individual steps. That was then. Now, he is just talking about the machines themselves rather than the steps he takes with the machines. He has moved from detailed thinking to system thinking.

**Example 12: Participant 6, Interview 2***Quotation*

“Just having that simple thing, like-for-like. It's when I take a milk off I can very easily see I've just taken a milk off. I need to put a milk on. I've just taken a cup out. I need to put a cup on. So maybe, maybe that is why it was such a profound difference. But, I think it also just made me more confident in what I was doing. Um. And, it was something that I was told from the beginning. Um. I remember that in like day two of training: Like-for-like. But, yea, it didn't stick I guess.”

*Codes*

Being Confident

Being Overwhelmed

Multitasking

*Memo*

The participant is describing a simple instruction that had a “profound” impact. He originally heard this instruction early in training. But it “didn’t stick.” There is a hint of cognitive overload here. Maybe he had so many inputs that this one was unable to stick? Why did it “stick” at this point? Why did it boost his confidence? Why did it have a profound impact? There is also the timeline in this statement. Early in training to now.

### **Example 13: Participant 7, Interview 1**

#### *Quotation*

“Each drink that's ordered has a very set routine of steps that you do to make that drink. But rarely are you ever just doing that one thing alone. Your attention is pull, is directed to your. But at the same time you kind of have to be talking to your customers. Engaging them. Looking down and seeing what the next drink is. And. So, it's a matter of learning how to jump from one point of attention to another...At first it's extremely overwhelming. You just have so much information coming at you. And, eventually you begin to sort it out and build up, like, muscle memory, almost, with different things. To where, like, now If I need to grab a jug of milk from the fridge, I don't have to look to do it. I can just reach down and pull open the door and grab it. So, I can keep my attention on something else, so it doesn't take any thought to do that.”

#### *Codes*

Multitasking  
Being Overwhelmed  
Microthinking

#### *Memo*

The participant describes a set process, but emphasizes the need to multitask. Multitasking requires keeping track of multiple things like the drink process and talking to your customers. Each of these “pull” at your attention, so multitasking is not easy. It is a “learned” skill. There is a timeline here. “At first” he was overwhelmed because of the amount of information. Later, “eventually” he “sorted out” this information and made progress toward multitasking. On this timeline he also contrasts when something takes thought (at the beginning) to now, when it “doesn’t take any thought.” He is able to multitask without having some of the tasks “pull” his attention because he does not have to think about them.

### **Example 14: Participant 7, Interview 2**

#### *Quotation*

“If I see a [kind of] latte. I don't even think about that it has [x] pumps of [syrup] in it. I just have done it so many times, that a [size] has [x] pumps. That I just grab, see the cup size and go over there and do it. And, I guess I'm counting in my head, but not really paying attention to that. Like, I can have a whole conversation with a customer. Or, watch around the store and see what is going on, but not even pay attention to what my hands are doing. Cause they know it well enough to where I don't have to think specifically about it.”

*Codes*

Microthinking  
Multitasking  
Remembering

*Memo*

The participant is describing the absence of microthinking. There must have been a time when he had to hear himself count the pumps of syrup. But now, he does not have to hear himself count. As a result of this absence he can more easily multitask. He is able to have a conversation or observe the store while not counting.

**Example 15: Participant 8, Interview 2***Quotation*

“I worked with [name] the other day. I made a drink, and she's, like, ‘that's not how you make it’. And, I was like, ‘What!’ And, it's just like add water. And, so there's still little things I'm still getting used to. And some [drinks] I realized it needs the [specific] syrup. So, I'm still kind of learning those little tiny things that, they aren't a huge deal. But, you know, the drinks still needs them. And, so, probably, yea, this past, last week, I still. I was like, ‘OH! I thought I knew everything but I didn't.’” I asked how she felt when the co-worker pointed out the error. “I felt like why didn't I learn that during training. And, I don't know. I was just like, Really! Like, I should have known that. Cause I've looked at the recipe cards before and I guess I just didn't notice it. And, I didn't think, like, Oh, it needed that. And just like a little minor thing I missed. But when [co-worker] pointed it out I was kind of bummed out because I thought I knew everything.”

*Codes*

Seeking Help  
Being Confident  
Remembering

*Memo*

The participant is expressing a confidence that was not correct. She thought she knew, thus she did not seek help. She questions why she did not know that this syrup was supposed to go into the drinks. She references both training and the recipe cards. She clearly states that she should have known about using the syrup. At the end she again emphasizes her confidence. She was “bummed out” because she had been confident but incorrect. Even though she had made multiple drinks wrong she considered the syrup mistake a “little tiny thing.” So, while expressing disbelief in her not knowing, she does

not question herself. Her confidence seems very high even in the face of making mistakes. While she acknowledges that she didn't know everything there is no clear articulation of, thus, I still don't know everything. Instead, she sees this correction, again, as a "little tiny thing."

### **Example 16: Participant 8, Interview 2**

#### *Quotation*

"Well, when I first started I was focused. Cause I was like, I kind of like stared at the cup. I was like, Ok. What kind of syrup do I need for this drink. [She described making a specific drink] And, then, um, if they ask for decaf. Or, you know. So I was really focused on Ok, what does this mean. But since now I know it, I'm not really, I'm still focused on the drink, but I'm not as, like, concentrated and not talking to them. Now I can talk to them and do my own thing. And, I'm more open. So, I'm not like all just not talkative and just trying to figure out what I need to do. And that's how I was when I first started."

#### *Codes*

Microthinking  
Multitasking  
Remembering

#### *Memo*

The participant had used the word focus, so I asked her to explain what she meant. She describes early on not being able to multitask in making the drink and talking to the customer. Instead, at that early point, she had to concentrate on the details of the drink in order to get the drink right. Now, she is able to make the drink and talk with customers. This ability is tied to "now I know it."

### **Example 17: Participant 9, Interview 2**

#### *Quotation*

"I don't even know. It just kind of comes to me. I don't know what goes on in my brain. That's kind of a tough question to answer. Things just come, people write it down and I just know what to grab and get it out as fast as I can. Especially on our busy days like today."

#### *Codes*

Remembering  
Microthinking

## Speed

### *Memo*

The participant had been describing working the busiest shifts and what is required to work those shifts. She described things in some detail. Then I asked her, “How do you keep track of all those things.” This was her response. She is describing remembering and doing, yet there is an effortless and mystery to the remembering. She doesn’t know how she knows. She just knows. In her knowing she is not focused on the details, but rather is focused on the high level task of getting the drinks out quickly.

### **Example 18: Participant 9, Interview 2**

### *Quotation*

“When you first start you obviously don't know where things are. So you have to learn as you go. And then once you start learning and knowing where things are at. You just know. It's already there. It's in your brain. It's gone from your short term to your long term memory. And now you just do things rather than being told to do things.”

### *Codes*

Remembering

### *Memo*

The participant had used the word automatic and was describing what she meant by automatic. I asked her what it was like to go from not automatic to automatic. This is her explanation. She begins with not knowing. She learns as she is in the process of doing. Her focus is on where things are located in the café rather than on recipes or processes. She also connects her idea of automatic with not having to be told what to do. Her explanation includes her perception of what is happening in her memory, but this is not her perspective. She has been told this sometime. Her perspective is that “you just know.” She correlates “just know” with what she had previously been told about memory.

### **Example 19: Participant 10, Interview 1**

### *Quotation*

“It was like an exciting scary. But it was also a, a fear of am I going to be able to do well at this. I am going to, you know, make good coffee. Even though it starts with, you know, the coffee itself has to be good in order to make good coffee. But, um, you know, I've had really bad coffee from good beans. So I just, I was very fearful that I wasn't going to make the customers happy and that's the ultimate goal.”

*Codes*

## Questioning Self

*Memo*

The participant had used the word “scary” so I asked her to explain what she meant. Her fear is connected with her own experience of having bad coffee. She has an ideal that she wants to meet. However, she questions whether she will be able to meet this ideal. Her questioning rose to the level of fear, which seems to be centered on pleasing the customer.

**Example 20: Participant 10, Interview 2***Quotation*

“Slightly. It's a little less nerve racking for me I guess. Cause its just, there's just one in my hand as apposed to when I'm, like, pulling a shot and putting some hot water into this cup and paying attention to the coffee that's being made behind me that I have to pour into the a, like, thing that keeps it warm. I don't know what those are called. The air pots. Um. And, so I have to pay attention to at least three or four separate things at one time as apposed if it's just one thing that does a few things. I can, I can handle that one thing better than handling all these other things going on at one time. So, it's kind of, I think it's easier. Because, like, all those four things that I'm having to focus on they each have, like, four separate things that I have to think about for each one. So, it's kind of, I'm thinking about a bunch of things at one time when I'm having to multitask in that capacity.” I asked if she could communicate with customers while doing this. “Not so much. I can say ‘Hi’ and, like, ‘I'll be with you in a second.’ You know, and try and do stuff like that. But, for the most part, it's like, my brain doesn't make words come out of my mouth. It just doesn't happen very much so. I mean. I suppose when I have even more experience that I'll be able to do that even better.”

*Codes*

Multitasking  
Microthinking

*Memo*

She had been telling me about how she can clean the portafilter basket without burning herself, without making a mess, and while communicating with customers. I asked if that was an example of “doing a lot at once” “multitasking.” Both were phrases she had just used. She expresses her example of multitasking and her current limits and anticipation for what she will be able to do in the future with “even more experience.” This illustrates the progression of multitasking from her first day of training (blank mode

of thinking from fear) to this fairly advanced form of multitasking to a, hopeful, future of even better multitasking. She connects her inability to multitask to the need to think about details for the various processes. She blames her brain for not being able to communicate when she is focused on the details.

### **Example 21: Participant 11, Interview 1**

#### *Quotation*

“Um, so I mean, like, first coming in tons of information thrown at me. Um, on how to pull the espresso right, how to make the coffee right. Um, and then there's also all this information of how the coffee is processed. Um, from like down to the farmers, the people who are picking and how they process it. And, then, when it leaves their farm and reaches these other processes and they bag it up. And, how all those little things can change a huge role in when it comes to here. Um, or the roastery. Um, and then the whole roasting process. So, it's just one of the most interesting things was learning how many hands actually touch the coffee before it actually reaches us. Um, so, the thing that like really stuck out to me when they were, like, training me, was that we are viewed as, like, the showcase for the farmers and the roastery. Um, us as the barista have to present their product, um, the best we possibly can. Um, in the customer service and in the quality that we pull the espresso or make the coffee. Um, so that was really the biggest thing.”

#### *Codes*

Being Overwhelmed

#### *Memo*

The participant is listing or describing the “tons of information” that was “thrown” at him. This choice of words seems to apply mostly to his task in making the espresso drinks. He had previously used this same phrasing when talking about adjusting coarseness, dose, and time for the espresso shots. He said it was “fun, but really challenging to take all that information in at once.” Back to this statement, there is additional information about the bean growing and curing process. He seems to enjoy or thrive on this additional information and his role in the process. This may be connected back to the “fun” in the midst of being challenging.

### **Example 22: Participant 11, Interview 2**

#### *Quotation*

“I mean, it's just try, like, earlier it's trying to grasp all this information at once. Um, and it happens at a lot of jobs where you get in and it's, it's all this information kind of thrown at you. And you're supposed to remember and respond to it all. And, so, earlier it's just trying to grasp it and what not.”

*Codes*

Remembering

*Memo*

The participant is describing the early part of knowledge acquisition. He focuses on the amount of information and the need to grasp, remember and respond to that information.

**Example 23: Participant 12, Interview 1***Quotation*

“There's different types of drinks. So once you get on the track of learning how to do hot drinks and then someone throws in a cold drink. It kind of throws me off. Cause I'm like, OK this is built differently. So I have to kind of switch gears and ask questions. Um. And then because I'm not able to perform at what I know would be my best it gets a little overwhelming.”

*Codes*Being Overwhelmed  
Seeking Help*Memo*

The participant connects being overwhelmed with an inability to meet her internal ideal of her “best”, which causes her to need to seek help. So, there is an internal ideal. Something happens where she fails to meet the ideal (e.g. a drink is ordered that she does not know how to make). She must ask for help. There is a “switching of gears” from making the hot drinks to making the cold drinks, from meeting her ideal to not meeting her ideal, from not seeking help to seeking help. This is “a little overwhelming.”

**Example 24: Participant 12, Interview 1***Quotation*

“Um. Just wanting to do my best. Impress my boss. You know, make my boss happy. Be a good, um, part of the team. Be a good team member. Cause I, I know that the staff understands that they, um, need to support me and help me. But at the same time I want to stand on my own two feet, and I want to do as much of the work as I possibly can without asking for that help so they can continue doing their job. So that, that really is

probably the bigger portion of that weight of feeling overwhelmed. It's just the relationships with people.”

*Codes*

Being Overwhelmed  
Seeking Help

*Memo*

The participant is continuing to describe being overwhelmed. Here she connects it, in fact says it is the “bigger portion,” to the need to seek help. Her co-workers are willing and do help her, but she wants to get to a point that she does not have to seek help from her co-workers. The “weight of feeling overwhelmed” appears to be based on her internal expectations of her own performance. She connects this with her relationships to her co-workers. She wants to be a good team member, which means standing on her own.

**Example 25: Participant 13, Interview 1**

*Quotation*

“So, like, when I first went into the first training shifts I was, like, AHHHHH! Just cause I, I had so much information thrown at me but I, like, didn't have, know the motions.” I asked her if she could put a word to her exclamation. “Um, I have no clue what I'm doing. Kind of just overwhelming.” I asked her if she would describe her explanation in any other way. “Um, I think just. I don't know, just jumping into the deep end. Just like, I don't know, there's no really any, like, leading in the shallow end.”

*Codes*

Being Overwhelmed

*Memo*

The participant uses the exclamation to express what she latter describes as “just overwhelming.” This matches so well with what other participants have said. Many have used these exclamations to express being overwhelmed. Her metaphor of “the deep end” is a new way of explaining being overwhelmed. Overwhelmed is contrasted with a “leading,” presumably by someone, into the “shallow end.” She is talking about the training shifts, not the training. I clarified this a bit later in the interview. In the training shifts she was expected to produce product on the espresso machine for customers. Later in the interview she used the phrase, “you're not a shadow anymore.” So there is pressure to perform to an acceptable standard. The training shift can be contrasted with the training because the training itself did not produce the “AHHHHH!” but the training shifts did.

**Example 26: Participant 13, Interview 1***Quotation*

“I mean, I think, being thrown in, just my first reaction is, like, yea, I don't know what I'm doing. But, once, and I'm sure, I mean. I still don't. Not that I don't know what I'm doing. But, I'm still, I'm still learning. Um, but it's not as stressful and it's not as scary anymore. Like, when it comes to the espresso, like, the more espresso you taste, like, good or bad and the more you adjust it and learn what makes it taste good the more confident you'll be. And, I'm, I'm not there yet.”

*Codes*

Being Overwhelmed

Being Confident

Questioning Self

*Memo*

The participant is describing a middle ground between being overwhelmed and being confident. Her “first” reaction was “I don’t know what I am doing.” She had earlier used this same phrase to describe “overwhelming.” Now, her current state is not as “stressful” or “scary”. These are terms that illustrate some level of questioning herself (“stressful and scary”) in the beginning. But that questioning is largely gone (“not as...”) now. In the future she anticipates confidence. There is timing and flow here. Overwhelmed, with questioning, eventually gives way to confidence. She anticipates confidence based on the outcome, taste, of the espresso shots she pulls. She anticipates the taste of those shots will improve.

**Example 27: Participant 14, Interview 1***Quotation*

“It makes you really nervous, in a kind of, you know, it knocks down your self-esteem a little bit. Because you're like, Oh god, you know. You're like, oh gosh. You're messing up, and it's not like the greatest feeling in the world. As long as, you know, keep practicing and stuff then you'll get it. But in the beginning you kind of feel down sometimes because you want to do it perfectly. You want to impress everybody. And, sometimes you just don't get it.”

*Codes*

Questioning Self

*Memo*

The participant was describing being on bar for the first time. She had just talked about messing up a customer's drinks. She is expressing her experience when she made the mistake and how that made her feel. She begins with the notion of being "nervous" and then expands on and explains her meaning of being nervous. She focuses on her feelings – not the greatest, down – and connects this to self-esteem. She also has expectations for herself. She "wants to" but doesn't or can't. These expectations appear to further explain why she has these specific feelings when making mistakes on bar. She does anticipate doing better, but recognizes she is not there. So, she has expectations for the future as well.

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