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Tacit Knowledge Transfer and Firm Growth: An Experience-Based Approach

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TACIT KNOWLEDGE TRANSFER AND FIRM GROWTH: AN EXPERIENCE-

BASED APPROACH

A Dissertation Presented

by

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ABSTRACT

TACIT KNOWLEDGE TRANSFER AND FIRM GROWTH: AN EXPERIENCE-
BASED APPROACH

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Scholars frequently suggest that since tacit knowledge is valuable, heterogeneous among firms, and difficult to imitate, it has the potential to provide firms with a sustained competitive advantage. However, the nature of such knowledge can make it difficult for firms to expand and fully exploit its potential. Specifically, the individual orientation of tacit knowledge requires that such knowledge be transferred and replicated internally to achieve scale. This process is difficult and time intensive due to the articulation challenges associated with tacit knowledge. Thus, while tacit knowledge offers the potential for sustained advantage, the ability to realize such an advantage is constrained by the inherent transfer issues associated with this knowledge.

To date, there has been very little scholarly inquiry in the field of management regarding how such difficult to articulate knowledge is transferred and leveraged within firms. I addressed this omission in this dissertation by developing and testing an experience-based approach to the transfer of tacit knowledge. Specifically, I leveraged prior research from cognitive psychology to posit the impact of three experiential characteristics (variety, relatedness, and temporal spacing) on the time needed to transfer

tacit knowledge among individuals within firms. I also examined how the differences in knowledge transfer brought about by the nature of experiences influenced the rate and mode of firm growth.

The validity of the conceptual model developed in this dissertation was tested using a unique multilevel dataset on knowledge-intensive firms. The results provide support for the idea that experiences are an important mechanism through which tacit knowledge is transferred and that differential rates of tacit knowledge transfer influence firm expansion. More specifically, I found that experience variety was positively associated with the rate of tacit knowledge transfer at the individual-level and that this effect was attenuated by the relatedness of the variety. I also found that the rate at which firms transferred tacit knowledge to new staff was directly associated with the rate of firm growth and inversely associated with the use of lateral hires as an alternative growth mode.

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CHAPTER 1

INTRODUCTION

Knowledge-based perspectives in strategic management contend that knowledge resources are a key element of competitive success (Argote, 2013; Grant, 1996; Kogut & Zander, 1992; Nonaka, 1994). Consistent with this notion, a substantial amount of prior research has established a direct link between knowledge resources and firm-level performance outcomes. For example, studies have found that a firm's knowledge resources can enhance innovation (e.g., Dyck, Starke, Micschke, & Mauws, 2005; Kusunoki, Nonaka, & Nagata 1998; Smith, Collins, & Clark, 2005), improve efficiency (e.g., Argote, Beckman, & Epple, 1990; Darr, Argote, & Epple, 1995; Hatch & Dyer, 2004), and positively impact financial- (e.g., Decarolis, 2003; Miller & Shamsie, 1996; Wiklund & Shepherd, 2003) and market-based (e.g., Decarolis & Deeds, 1999; Wang, He, & Mahoney, 2009; Youndt, Subramaniam & Snell, 2004) performance indicators.

Many of the performance benefits associated with knowledge resources derive from a certain type of knowledge: tacit knowledge (Argyris, 1999; Shamsie & Mannor, 2013; Winter, 1987). Tacit knowledge refers to knowledge that is difficult to articulate or convey (Polanyi, 1966). The communication challenges associated with tacit knowledge promote heterogeneity of such knowledge among firms and provide protection against competitor imitation (Coff, Coff & Eastvold, 2006; Kogut & Zander, 1992; McEvily & Chakravarthy, 2002; Winter, 1987; Zander & Kogut, 1995). Thus, the value generated from tacit knowledge has the potential to provide a unique and sustained advantage (Ambrosini, 2003; Barney, 1991; Berman, Down and Hill, 2002; Crook, Ketchen, Combs, & Todd, 2008).

Although tacit knowledge meets the criteria of a strategic resource (i.e., rare, valuable and difficult to imitate - Crook et al., 2008), the nature of such knowledge can make it difficult for firms to fully exploit its potential (Coff et al., 2006). To scale-up and meet demand for the outputs created from tacit knowledge, the knowledge often needs to be replicated internally (Kogut & Zander, 1992). As tacit knowledge inherently resides within the minds of workers (Argote & Ingram, 2000; Grant, 1996; Polanyi, 1966; Simon, 1991; Sternberg, 1994), this requires such knowledge to be transferred among individuals within firms. This process is difficult and time intensive due to the articulation challenges associated with tacit knowledge (Hedlund, 1994; Nelson & Winter, 1982; Polanyi, 1962; Teece, 1977; Winter, 1987). Thus, while tacit knowledge offers the potential for sustained advantage, the ability to realize such an advantage is constrained by the inherent transfer issues associated with tacit knowledge (Coff et al., 2006; Kogut & Zander, 1992).

To address the transfer challenges of tacit knowledge, a few studies have begun to explore processes by which such knowledge moves among individuals within firms. These studies have primarily taken a relational perspective whereby scholars have examined how the configuration and nature of social relationships influence the transfer of tacit knowledge (e.g., Levin & Cross, 2004; Reagans & McEvily, 2003). While the nature of social relationships may play a part in the transfer of tacit knowledge, findings from prior studies on skill acquisition and implicit learning in the psychology literature suggest that greater attention should be given to the role of experiences in the transfer of tacit knowledge. Studies on skill acquisition indicate that repeated exposures to experiences allow: attention to be drawn to salient stimuli (D'Eredita & Barreto, 2006;

Tsoukas, 2003); the logic linking specific stimuli and responses to be conveyed (Ericcson, 2006; Hoffman & Lintern, 2006); and the preconditions and contingent factors associated with tacit knowledge to be accumulated (Dreyfus & Dreyfus, 2005). Additionally, research on implicit learning suggests that individuals' abilities to discern and internalize probabilistic patterns between various stimuli and actions (see Reber, 1993 and Seger, 1994 for reviews) allows them to ascertain and absorb the automatic aspects of tacit knowledge through multiple exposures to the experiences associated with such knowledge. Taken together, the prior research on skill acquisition and implicit learning indicate that experiences are an important mechanism through which individuals attain and develop tacit knowledge. As the absorption and development of tacit knowledge is fundamental to the successful transfer of such knowledge (cf. Gupta & Govindarajan, 2000; Szulanski, 1996), this thereby suggests that much can be learned about the transfer of tacit knowledge by focusing on the nature of experiences associated with the knowledge transfer process. To date, however, scholars in the field of management have not given any consideration to the influence of experiences on the transfer of tacit knowledge.

In what follows, I address this omission by developing an experience-based approach to the transfer of tacit knowledge. Central to my theoretical model is the role of experience repetition. I argue that since multiple exposures to similar experiences are needed to acquire tacit knowledge (Anderson, 1983; Dreyfus & Dreyfus, 1986; Ericsson & Charness, 1994; Ericsson, 2006; Reber, 1993), factors that reduce the rate of experience repetition, such as increased variety, should prolong the time needed to transfer tacit knowledge to individuals. I acknowledge, however, that experience variety

can vary along a number of important dimensions (e.g., Argote & Miron-Spektor, 2011; Boh, Slaughter, & Espinosa, 2007; Schilling, Vidal, Ployhart, & Marangoni, 2003; Staats & Gino, 2012) and also consider the moderating effects of relatedness and temporal spacing on the relationship between experience variety and knowledge transfer time. Specifically, I draw on the research on transfer of learning (Ellis, 1965; Singley & Anderson, 1989) to suggest that relatedness makes it easier to leverage learnings from different types of experiences and that this helps to lessen the detrimental impact of increased variety on knowledge transfer time. Additionally, I argue that temporal spacing of variety can aid in diminishing the cognitive overload that can occur with high levels of variety (cf. Kahneman, 1973; Naveh-Benjamin & Jonides, 1986; Pashler, Johnston & Ruthruff, 2001; Shanks & Channon, 2002) and, as such, help to offset the direct influence of experience variety on knowledge transfer time. Lastly, I consider the interactive effects of relatedness and temporal spacing on the link between experience variety and knowledge transfer time, and argue that temporal spacing is likely to have a complementary effect to relatedness by allowing for the development of more holistic knowledge structures (Dreyfus & Dreyfus, 2005; Estes, 1970) that can improve the ability to absorb new knowledge from different, but related, experiences (Anderson, Reder, Simon, 1996; Singley & Anderson, 1989).

In addition to examining how the nature of experiences that an individual is exposed to during the knowledge transfer process impacts the rate of knowledge transfer, I investigate the organizational consequences of the differences in knowledge transfer brought about by the nature of experiences. More specifically, I consider the influence that knowledge transfer time has on the rate and mode of firm growth. I argue that since

the rate at which knowledge is transferred influences the time it takes before new staff are available to handle the additional tasks that accompany growth (Nelson & Winter, 1982), knowledge transfer time should influence the rate at which firms grow. I also argue that while firms may prefer internally developed staff, prolonged development of such staff may create a sense of urgency for firms due to pressure from stakeholders for growth (Kim, Haleblian & Finkelstein, 2011; Whetten, 1987), and push firms to acquire staff via external means (e.g., lateral hires or mergers and acquisitions).

In summary, this dissertation focuses on two research questions: 1) how does the nature of experiences that an individual is exposed to during the knowledge transfer process impact the time it takes to transfer tacit knowledge?; and 2) how does the time it takes to transfer tacit knowledge among individuals influence the rate and mode in which firms expand? In addressing these questions, this dissertation makes several important contributions. First, it makes a contribution to the literature on knowledge transfer by developing an experience-based approach to the transfer of tacit knowledge. As noted above, prior research on tacit knowledge transfer has focused on the nature and configuration of social relationships. In doing so, scholars have overlooked the important role of experiences in the transfer of tacit knowledge. This is a substantial oversight in that tacit knowledge is inherently experience-based (Ambrosini & Bowman, 2001, Berman et al., 2002; D'Eredita & Barreto, 2006; Nonaka & von Krogh, 2009; Polanyi, 1962; Shamsie & Mannor, 2013), and prior research in psychology on skill acquisition (e.g., Anderson, 1983; Dreyfus & Dreyfus, 1986; Ericsson & Charness, 1994; Ericsson, 2006) and implicit learning (e.g., Reber, 1993) suggests that experiences play a vital role in the absorption and development of tacit knowledge. By focusing on how the nature of

experiences influences the transfer of tacit knowledge, this dissertation addresses this oversight and thus makes important theoretical and empirical contributions to the literature on tacit knowledge transfer.

Second, this study also makes a contribution by examining the consequences of knowledge transfer time on firm growth. Scholars have previously argued that the rate of firm growth is constrained by the speed at which firms can instill the requisite tacit knowledge in new staff (e.g., Coff et al., 2006; Kogut & Zander, 1992; Penrose, 1959). However, this assertion has rarely been explicitly tested. While several studies have looked at the pattern of growth overtime and inferred such effects (e.g., Shen 1970, Tan & Mahoney, 2005), these investigations were not a direct empirical examination of the growth constraints imposed by the rate of knowledge transfer. This study helps to fill this gap by directly examining the effect of knowledge transfer time on the rate of firm growth. Additionally, this dissertation meets calls for more holistic assessments of firm growth by also considering the implications of knowledge transfer time on whether firms choose to grow by internally developing additional staff or acquiring staff from external sources via lateral hires or mergers and acquisitions (i.e., mode of growth). Specifically, McKelvie and Wiklund (2010) noted in a recent review article on firm growth that growth theories have primarily focused on the *rate* of firm growth and that greater consideration is needed on the corollary implications of such theories for the *mode* of expansion.

Lastly, the multilevel perspective adopted in this study makes a contribution to the microfoundations agenda in strategic management. This research area suggests that to truly understand firm-level outcomes, scholars should examine the actions and

interactions of individuals (Felin & Foss, 2005; Felin & Hesterly, 2007; Foss, Husted, & Michailova, 2010). This dissertation focuses on how the nature of experiences impacts the time needed to transfer tacit knowledge to individual workers and considers the influence of aggregated knowledge transfer time on the rate and mode of firm growth. As such, this study investigates how factors at the individual-level can influence firm-level outcomes and therefore provides a multilevel empirical examination of microfoundations associated with firm growth. This is an important contribution in that the vast majority of research on microfoundations has been conceptual and microfoundation studies adopting formal multilevel empirical approaches are practically nonexistent (Moliterno & Ployhart, in press).

This dissertation proceeds by first providing background on the concept of tacit knowledge. Then the role of experiences in the transfer of tacit knowledge is described and hypotheses are developed regarding the influences of the focal experience characteristics (variety, relatedness, and temporal spacing) on the time needed to transfer such knowledge. Next, the influence of internal knowledge transfer on the expansion of firms is discussed and hypotheses are presented that link knowledge transfer time to the rate and mode of firm growth. The hypotheses discussed in the preceding section are then tested with archival data on large law firms located in the United States. Lastly, the results of the data analyses are discussed and several implications and future research questions are provided.

CHAPTER 2

LITERATURE REVIEW

This chapter provides background on the theoretical foundations of this dissertation. The first section describes the concept of tacit knowledge and why knowledge can be difficult to articulate. The second section discusses how much of the interest in tacit knowledge stems from the idea that such knowledge is vital to the competitive success of firms. In this section, I also discuss the inherent scalability issues associated with tacit knowledge that can limit a firm's ability to exploit the full potential of this resource and review the extant research on the leveraging and transfer of tacit knowledge. The third and fourth sections provide brief overviews on the prior research from psychology on skill acquisition and implicit learning, respectively, and provide the motivation for examining the role of experiences in the transfer of tacit knowledge.

2.1 Concept of Tacit Knowledge

Tacit knowledge refers to knowledge that cannot be easily described or communicated. While discussions regarding the ineffable nature of knowledge date back to Socrates and Plato (Drefyus & Drefyus, 2005), the concept of tacit knowledge did not gain widespread attention until the writings of Michael Polanyi (1962, 1966) were published. Polanyi observed that individuals in an array of settings (e.g., arts, craftsmanship, manufacturing, medicine, sports) often had a difficult time describing the principles on which their actions were based. Specifically, Polanyi noted that it is common for individuals to do something and simultaneously be unable to explain how they did it. Swimmers, for instance, stay afloat by regulating their breathing, yet most

swimmers are not aware of this nor can explain how they alter their breathing to stay afloat. Bicyclists remain balanced on a bike by adjusting the curvature of their bike in proportion to the degree of unbalance divided by the square of their speed – a rule that all bicyclists follow, yet few could describe. Examples like these (and many more) ultimately led Polanyi to conclude that individuals often "know more than they can tell" (Polyani, 1966: 4).

Polanyi's insights regarding the notion of tacit knowledge was first introduced to the management literature by Nelson and Winter (1982) and later popularized by the proponents of the knowledge-based view (e.g., Grant, 1996; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995; Spender, 1996). Numerous scholarly books have focused on tacit knowledge in organizations (e.g., Ambrosini, 2003; Baumard, 1999; Collins, 2010) and the concept plays at least some role in most of the knowledge-oriented research in management (e.g., see Grant, 2006, Inkpen & Tsang, 2007; Nonaka and von Krogh, 2009, Phelps, Heidl, & Wadhwa, 2009; Tsoukas, 2009 for overviews). It is commonplace, for instance, to find at least some reference to tacit knowledge in a manuscript that focuses on a knowledge-oriented outcome or invokes knowledge-based theoretical arguments. Thus, the concept of tacit knowledge has received considerable attention by researchers in the field of management.

While the vast research on tacit knowledge involves some points of contention and confusion regarding tacit knowledge, there are two points on which most (if not all) researchers in this area agree. The first point is that since tacit knowledge refers to 'doing', it is inherently focused on skills (Ambrosini & Bowman, 2001; Berman et al., 2002; Nelson & Winter, 1982; Polanyi, 1962, 1966). Many authors equate tacit

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knowledge with know-how (which contrasts with knowing-about something – Dreyfus & Dreyfus, 2005; Kogut & Zander, 1992; Nonaka, 1991; Tsoukas, 2003) or procedural (which contrasts with declarative – Nonaka & von Krogh, 2009) knowledge, thereby suggesting that tacit knowledge has a process or action orientation. This is consistent with many definitions of skills. Nelson and Winter (1982), for instance, describe skills as a *sequence* of coordinated behavior. Additionally, scholars in the human capital literature describe skills as a capability to *perform* a specific job task (e.g., Noe, Hollenbeck, Gerhart, & Wright, 2006; Nyberg, Moliterno, Hale, & Lepak, 2014; Schmitt & Chan, 1998). The skill orientation of tacit knowledge is so strong that Ambrosini and Bowman (2001) even suggest renaming the concept 'tacit skills'.

The second point is that tacit knowledge is not a binary condition where it either is or is not present. Instead, many scholars contend that tacit knowledge is best viewed as a continuum, ranging from low to high levels of tacitness (e.g., Ambrosini & Bowman, 2001; Nelson & Winter, 1982; Nonaka & von Krogh, 2009). Although there is an element of tacitness involved with most tasks (Tsoukas, 2003), certain contexts are more likely to involve higher levels of tacit knowledge than others (Nelson & Winter, 1982). For example, the processes and considerations associated with solving an algebra problem are likely easier to describe in words than those associated with running a successful political campaign, treating a patient in the intensive-care-unit, or defending a client in a law suit. To dig further into why some knowledge may be easier to articulate than others (i.e., why knowledge is low or high on the tacitness continuum), the next section describes why the knowledge that accompanies skillful action can be challenging

to communicate and then describes several contextual factors that accentuate such challenges.

2.1.1 Sources of Tacitness

The knowledge associated with skills can be conceptualized as multifaceted configurations of causal understandings that link specific stimuli to certain actions within the context of a given goal (Anderson, 1982, 1987). That is, when trying to accomplish a given task (i.e., the goal), individuals use knowledge that represents an interconnected network of if/then statements that involve attending to various situational factors, interpreting such stimuli, and responding with appropriate actions (cf. Logan, 1988). As the accomplishment of most tasks involve multiple steps, the networks of understanding are nested in the sense that an overall response needed to achieve a given goal (e.g., driving from point A to point B), involves a series of sub-skills (e.g., reading a map, using a manual gear transmission, steering) each of which has their own salient stimuli and particular actions (Anderson, 1983; Dreyfus & Dreyfus, 1986).

When an individual is first learning how to complete a specific task, they devote substantial attention to each and every element and consideration of the sub-skills associated with the task (Dreyfus & Dreyfus, 1986). For instance, when learning how to drive a car with a manual gear transmission, attention is focused on the speed at which the vehicle is moving, the sound of engine, etc., and cognitive resources are explicitly devoted to linking such cues with appropriate actions (e.g., whether to shift gears). As individuals become more practiced and familiar with the task, they no longer need to attend to the particular aspects of the requisite sub-skills and instead focus their efforts

and attention more broadly on whether their actions are achieving the intended outcomes (e.g., the car is moving from point A to point B) (Dreyfus & Dreyfus, 1986; Tsoukas, 2003)[1]. In Polanyi's (1962) terms, individuals at this point have only "subsidiary awareness" of their specific actions, whereas there is "focal awareness" of how such actions influence the intended outcomes of a task. That is, by focusing on outcomes or the task as a "whole", Polanyi (1962) contends individuals are only aware of the particulars and specific actions associated with the task in a subsidiary or indirect way. A skilled surgeon, for example, is focally aware of whether his or her efforts are achieving the intended outcome of a surgery (e.g., heart bypass, knee reconstruction), but only subsidiary aware of how instruments are being held or used and how specific actions are altered in response to various situational cues. This means that individuals are no longer consciously aware of the stimuli to which they attend (Tsoukas, 2003) and that the rules being followed (i.e., the if/then understandings) have slipped into the subconscious (Ambrosini, 2003; Nelson & Winter, 1982)[2]. As such, the knowledge associated with skills can be challenging to communicate because such knowledge involves substantial automatic elements (Berman et al., 2002; Logan, 1985).

In addition to the challenges to articulation associated with automaticity, there is also the coherence issue. That is, individuals may have conscious awareness of the knowledge underlying a skill but unable to explain such knowledge in a logical and easy-

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[1] This shift substantially streamlines and improves performance. Polanyi (1962) contends that if individuals focus attention on the particulars (instead of the whole), action will be clumsy. In a similar way, Anderson (1982) and others (e.g., Collins, 2010; Dreyfus & Dreyfus, 1986; Logan, 1988) indicate that this stage in acquiring skills is associated with a substantial improvement in the speed of action and reduction in errors.

[2] This notion is consistent with Logan's (1988) theory of automaticity. Logan (1988) contends that when individuals are first learning how to complete a task, they focus intently on stimuli and use algorithmic cognitive processing approaches to generate an appropriate response. As one becomes more proficient in the task a switch to memory-based cognitive processing is said to occur whereby the mere presence of particular stimuli automatically triggers a response encoded from prior experiences.

to-follow manner.   As noted above, the knowledge associated with skills involve

multifaceted configurations of causal understandings. Nelson and Winter (1982) indicate

that attempts to describe such understandings in a "complete" fashion often result in

incoherency because "…language cannot simultaneously serve to describe relationships

and characterize the things related" (p 82). That is, since individuals cannot

simultaneously characterize the range of stimuli in which they may encounter, the

repertoire of actions associated with responses to such stimuli, nor the logic linking the

stimuli and responses, it can be difficult to parsimoniously describe the full stock of

knowledge associated with skills. This is not to suggest, however, that each of these

considerations could not be described in isolation or that over a long period of time an

individual could adequately describe both the array of stimuli and responses. Rather, the

communication challenges stem from the incoherency that often arises when an

individual attempts to simultaneously provide a thorough account of the stimuli,

responses and preconditions and contingent factors that relate to the network of causal

understandings associated with a given skill. Nelson and Winter (1982) contend that

such descriptions are often difficult to provide in a coherent manner because of the linear

nature of language-based communication and limited capacity of working memory. This

suggests that even if a skill does not involve automatic elements, there still can be

challenges in communicating the knowledge underlying skillful actions.

Although the knowledge accompanying most skills involves tacit elements

(Polanyi, 1962; Tsoukas, 2003), there are two primary contextual factors[3] that influence

the degree of tacitness associated with such knowledge. The first pertains to the speed in

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[3] The contextual factors (task speed and complexity) that are described below have also been described in the literature as factors that can influence the manner in which individual knowledge emerges to group knowledge (e.g., Ployhart & Moliterno, 2011).

which the tasks need to be performed. Tasks that occur at a fast pace – such as hitting a baseball hurled at over 90 mph, diagnosing, stabilizing and treating a patient in an emergency room, or cross-examining a witness during a legal trial – leave scant room for conscious thought and thus promote automaticity (Berman et al., 2002).   Additionally, tasks that occur at a quick pace limit verbal description to the extent that the rate of action exceeds that in which instruction can be uttered (Nelson & Winter, 1982). As a result, individuals in fast-paced environments can have difficulty describing their actions while completing the task. Although one can attempt to discuss the steps and considerations of the task in an ex-ante and ex-post manner, prior research suggests that elicitation of implicit understandings is more likely to be effective if discourse occurs while an individual is working on the focal task (see Hoffman & Lintern, 2006 and Ericsson, 2006 for reviews). Thus, due to the promotion of automaticity and limits on the rate at which words can be uttered, knowledge associated with skills that are deployed in fast-paced environments tend to have greater levels of tacitness than those which occur in slower-paced environments.

The second contextual factor relates to the complexity of the knowledge associated with requisite skills. As the underlying knowledge becomes more complex, the number of stimuli and potential responses increase (Anderson, 1983). This expands the interconnected network of causal understandings required for the task (Anderson, 1982; Hoffman & Lintern, 2006) and increases the incoherency issue associated with describing the details, preconditions, and contingent factors associated with the actions needed for task completion (Dreyfus & Dreyfus, 2005). That is, as the complexity of knowledge associated with a skill increases, individuals will have more difficulty

describing such knowledge in a parsimonious and easy-to-understand manner (Winter, 1987). Additionally, increased complexity tends to encourage automaticity due to the limited cognitive abilities of individuals. Individuals have substantial limits to the amount of information that can be stored in their working (or short-term) memory (see Cowan, 2000 for a review). To address such limits, cognitive psychologists suggests that individuals 'chunk' knowledge into patterns or gestalts (Miller, 1956; Simon & Chase, 1973). This chunking process improves the speed in which knowledge is recalled from memory, but also tends to diminish the conscious awareness individuals have of the details and considerations associated with the knowledge underlying a given skill (Anderson, 1982). As there are limits to the number of chunks in which an individual can consider at any given point in time (Cowan, 2000; Miller, 1956; Simon & Chase, 1973), increased complexity is likely to result in more abstracted chunking, thereby enhancing the degree of automaticity and reducing an individual's ability to describe the knowledge underlying their skills. Taken together, complexity seems to increase the tacitness of knowledge by accentuating the challenges associated with parsimoniously describing the details, preconditions and contingent factors associated with such knowledge and by encouraging automaticity in cognitive processing.

In summary, the knowledge underlying skills involves multifaceted configurations of causal understandings associated with stimuli and responses (Anderson, 1982). Such knowledge is often challenging to articulate because: 1) individuals are not focally aware of the stimuli to which they attend (Polanyi, 1966); 2) the links between such stimuli and actions involve automatic cognitive processes (Logan, 1988); and 3) the network of causal relations cannot be described in a parsimonious manner (Nelson &

Winter, 1982). Although all knowledge associated with skills involves elements of tacit

knowledge (Polanyi, 1962; Tsoukas, 2003), two contextual factors are likely to increase

the degree of tacitness: 1) speed in which the task is to be performed (Nelson & Winter,

1982); and 2) the complexity of the knowledge (Kogut & Zander, 1992; Winter, 1987;

Zander & Kogut, 1995).

2.2 Tacit Knowledge as a Strategic Resource

Much of the attention given to tacit knowledge by management researchers stems

from the idea that such knowledge is an important source of competitive success (Nonaka

& von Krogh, 2009). Scholars have leveraged ideas from resource-based theory (RBT)

to argue that since tacit knowledge meets the criteria of a strategic resource (e.g.,

valuable, rare, and difficult to imitate – Crook et al., 2008), it has the potential to provide

a sustained competitive advantage. Researchers contend, for instance, that the implicit

oriented skills of employees play essential roles in value creation (e.g., Hoopes, Madsen,

& Walker, 2003; Peteraf & Barney, 2003) – either through enhancing innovative

activities (Leonard & Sensiper, 1998; Nonaka, 1994; Tsoukas, 2009) or reducing costs

(Edmondson, Winslow, Bohmer & Pisano, 2003). Additionally, the experiential nature

of tacit knowledge (Ambrosini & Bowman, 2001, Berman et al., 2002; D'Eredita &

Barreto, 2006; Nonaka & von Krogh, 2009; Polanyi, 1962; Shamsie & Mannor, 2013)

and communication challenges that accompany such knowledge (Polanyi, 1966; Tsoukas,

2003) promote heterogeneity among firms and provide protection against competitor

imitation (Coff et al., 2006; Kogut & Zander, 1992; McEvily & Chakravarthy, 2002;

Winter, 1987; Zander & Kogut, 1995). Tacit knowledge is therefore argued to provide

performance benefits to firms by generating a unique competitive advantage that can be sustained through time.

Although empirical tests of the ability of tacit knowledge to generate a sustained competitive advantage are rare, there are a few empirical studies that have examined the performance implications of tacit knowledge. Berman and colleagues (2002), for instance, find that the stock of tacit knowledge within an organization positively influenced performance. Additionally, Shamsie and Mannor (2013) found that productive and administrative forms of tacit knowledge had a positive impact on organizational performance. There is thus preliminary evidence to support the idea that tacit knowledge can provide firm-level performance benefits.

However, it is important to note that both of these prior studies investigated the effects of tacit knowledge on performance in sports contexts. While the fast pace in which tasks are completed in these environments makes such settings an excellent context to study tacit knowledge (Berman et al., 2002), these studies have limited generalizability in that the productive output of these organizations are essentially capped. For example, Major League Baseball (MLB) teams play nine innings per game over a 162 regular game season. If they are successful, they are not expected (nor allowed) to expand their organization by adding another MLB team. This contrasts with other more commercial settings where continued growth and expansion play a vital role in the long-term competitive success of firms (Penrose, 1959; Winter & Szulanski, 2001). Failure to expand, for instance, can limit the ability of a company to meet demand for their outputs – possibly causing customers to defect to competitors that have more capacity and eroding the potential of the firm to reap the full benefits from their core

competencies (cf. Levinthal & Wu, 2010). Growth can also play an important role in the utilization of resources. Penrose (1959) notes that, due to indivisibility and the potential to use resources in a novel or more efficient way, there is often unused productive capacity in resources and that growth is a key way through which firms can improve utilization of resources and create additional value. While growth is indeed often essential to fully exploit the value from strategic resources, the characteristics of tacit knowledge introduce considerable scalability challenges (Nelson & Winter, 1987; Winter, 1987). As a result, it can be difficult for firms to achieve continued expansion when their capabilities are reliant on a substantial amount of tacit-oriented knowledge (Autio, Sapienza, & Almeida, 2000; Kogut & Zander, 1992; Salomon & Martin, 2008). Thus, while tacit knowledge meets the criteria of a strategic resource, the scalability issues associated with tacit knowledge limit the ability of firms to reap the long-term benefits that could be derived from this resource (Coff et al., 2006).

In the next two sections, I first provide an overview of the characteristics of tacit knowledge that create scalability challenges for firms and then discuss the various perspectives in the literature that have been put forth to address such challenges.

2.2.1 Tacit Knowledge Scalability Issues

There are two factors that contribute to the scalability issues associated with tacit knowledge. First, tacit knowledge is inherently embedded within the minds of individuals (Argote & Ingram, 2000; Grant, 1996). The individual orientation of tacit knowledge introduces scalability challenges for firms reliant on tacit knowledge because individuals are constrained in the amount of tasks they can effectively handle at any

given time (Kogut & Zander, 1992). Such constraints stem from the limited mental capacity of individuals. In particular, individuals have limits to the amount of stimuli in which they can attend and process (Pashler & Johnston, 1998; Ocasio, 1997, 2011) and this constrains the number of tasks that an individual can successfully accomplish over a certain time period. Research has shown, for instance, that workers in professional service firms have limits to the number of client projects they can work on at any given time (Maister, 1993) and that exceeding these limits has a negative performance impact (Kor & Leblebici, 2005). Penrose (1959) also notes the growth challenges imposed by tacit knowledge embedded within individuals. Specifically, Penrose (1959) indicates that managers have scarce time and attention and that this can hinder the rate at which firms can achieve profitable growth because the tacit-oriented knowledge of managers is needed to plan for and oversee existing and new operations but can only be applied to a certain number of activities at once. Due to such constraints, the tacit knowledge of individuals needs to be transferred to additional workers if the firm wants to expand their operations (Kogut & Zander, 1992; Nelson & Winer, 1982).

This leads to the second challenge: the transfer of tacit knowledge among individuals is a slow and difficult process due to the inherent articulation challenges associated with such knowledge. Zander and Kogut's (1995) study, for example, found that tacit knowledge slowed the speed at which knowledge was transferred within a firm. Additionally, Szulanski (1996) found that elements of tacitness reduced the successful diffusion of production knowledge throughout the firm. Since these seminal studies, a substantial amount of research in the knowledge transfer literature has demonstrated similar findings: tacitness reduces the degree and rate of knowledge transfer (see Phelps

et al.,2012 for a qualitative review and van Wijk, Jansen, & Lyles, 2008 for a meta-analysis).

2.2.2 Tacit Knowledge Transfer

To reduce the transfer issues associated with tacit knowledge, many scholars suggest that such knowledge should be codified and/or embedded within information technology (e.g., Alavi & Leidner, 2001; Gill, 1996; Lado & Zhang, 1998). While these actions indeed speed the rate at which knowledge can be diffused and accessed throughout an organization (Szulanski, 1996; Zander & Kogut, 1995), they are problematic in two important ways. First, tacit knowledge involves automatic cognitive process (Berman et al., 2002; Polanyi, 1966) and details and contextual considerations (Nelson & Winter, 1982) that are difficult (if not impossible) to fully capture and convey through documents and expert systems (Ambrosini & Bowman, 2001; Berry, 1987; Dreyfus & Dreyfus, 1986). As a result, attempts to codify or incorporate tacit knowledge into information technology are often incomplete or drastically change the nature of the knowledge such that it may no longer generate superior value (cf. Grant, 2006; Haas & Hansen, 2007; Tsoukas, 2003, 2009). Second, conversion of tacit knowledge to more explicit forms of knowledge increases the risk that such knowledge will be obtained or imitated by competitors (Mata, Fuerst, & Barney, 1995; Rivkin, 2001; Teece, Pisano, & Shuen, 1997; Zander & Kogut, 1995). As a result, codifying or embedding tacit knowledge within information technology may negate the isolating mechanism associated with such knowledge and diminish the ability of the competitive advantage

inferred from the original tacit knowledge to be sustained (Coff et al., 2006; Kogut &

Zander, 1992).

Given these inherent challenges to the use of information technology to exploit

value in tacit knowledge, scholars have started to investigate factors that could impact the

transfer of tacit knowledge among individuals. Although this stream of research is still

very much in its infancy, the few studies that have focused directly on the transfer of tacit

knowledge have taken a relational perspective. Reagans and McEvily (2003), for

instance, examined how the configuration and nature of social relationships influenced

the ease in which knowledge was transferred among individuals in a company that

provided R&D services. They found that while the structure of such relationships (e.g.,

network density and diversity) did not impact the transfer of tacit knowledge, the

presence of a strong tie improved the ease of transferring such knowledge[4]. Levin and

Cross (2004) also examined the transfer of tacit knowledge among individuals within a

firm. Their study, which focused on knowledge transfer in dyadic relationships in the

pharmaceutical, banking, and oil and gas industries, found that the presence of a trusting

relationship lessened the challenges associated with transferring tacit knowledge. Taken

together, these studies suggest that the presence of close and trusting relationships can

improve the ability of individuals to transfer tacit knowledge.

Although social relationships may play a part in the transfer of tacit knowledge,

prior research on skill acquisition and implicit learning in the psychology literature

suggest that greater attention should be given to the role of experiences in the transfer of

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[4] The work by Hansen (1999, 2002) also supports the idea that strong ties can improve the ability to
transfer tacit-oriented knowledge. This work is not reviewed here, however, because it is at the business
unit-level of analysis instead of the individual-level of analysis.

tacit knowledge. This research, and its implications for the transfer of tacit knowledge, is discussed in the next two sections.

2.3 Skill Acquisition

Over the past thirty years, researchers in psychology have devoted a substantial amount of attention to understanding how novices develop the tacit-oriented skills of experts. Within this broad research area, three perspectives have gained considerable traction among scholars. The first is Anderson's (1982, 1987) ACT theory, which contends that the acquisition of skills involves three stages. In the first stage, individuals learn declarative knowledge via written or verbal description. Such knowledge involves facts about aspects associated with the skill and must be interpreted in order to become useful. This interpretation process happens through an instructor demonstrating application of the declarative knowledge and/or remedial instruction where erroneous application by the student is corrected (Anderson, 1982). In the second stage, the declarative knowledge becomes converted into procedural form through considerable practice. By repeatedly working on a task with an instructor, individuals begin to encode more abstract understandings of the task. Such abstract understandings involve storing declarative information in long-term memory (as opposed to limited working memory) and collapsing multiple steps into singular procedures (Anderson, 1982). The time needed to perform the task drastically reduces in this stage. The final stage involves automatization of the skills associated with the task. Through continued practice individuals are able to refine their approaches to complete the task and respond to a

stimulus without devoting substantial attention or conscious cognitive resources. Performance at this stage is fast and errors become increasingly unlikely.

There is considerable empirical support for the ACT theory of skill acquisition. Anderson and his colleagues have studied skill acquisition in numerous areas – such as mathematics (Anderson, 1983), computer programming (Anderson, 1987; Singley and Anderson, 1989), language processing (Anderson, 1982), and problem solving (Anderson, 1993; Anderson & Fincham, 1994) – and found that the theory has validity in explaining the process through which individuals acquire the largely automatic (i.e., tacit) skills of experts (Speelman & Kirsner, 2005). Anderson's ACT theory of skill acquisition is well regarded among scholars in this research area and it has made a substantial contribution to the broader literature on cognitive psychology. Scholars contend, for instance, that ACT theory laid the groundwork for a more unified theory of cognition (Newell, 1989; Speelman & Kirsner, 2005).

The second key perspective in this area is Dreyfus and Dreyfus' (1986) model of skill acquisition. This model involves five-stages (novice, advanced beginner, competence, proficiency, expertise) that are conceptually similar to the overall process described in Anderson's (1982, 1987) ACT theory (Shuell, 1990). In the Dreyfus and Dreyfus' model, individuals start to learn a new skill by receiving and focusing on explicit facts and rules to guide behavior. This knowledge is widely held in the focal domain and is the sort of information found in the "how-to" or introductory textbooks associated with the skill.

Dreyfus and Dreyfus (1986) indicate that as individuals gain more experience with the task, they start to develop their own understanding of how to apply and use the

explicit oriented facts and rules they were provided when they were first exposed to the task. This characterizes the advanced beginner stage. In this stage, individuals also begin to realize that there are additional situational factors that are not described by or accounted for in the initial guidance they received regarding completion of the task. Some of these situational factors defy verbal description and can only be obtained through direct experience. For instance, it is difficult to describe to a medical student how a particular breathing sound may indicate that a patient has a certain pulmonary dysfunction. Likewise, it can be challenging to explain to a customer service worker the specific cues that distinguish an unhappy, confused, or puzzled customer (cf. Tsoukas & Vladimirou, 2001). While difficult to verbally describe, Dreyfus and Dreyfus (1986) contend that such factors can be identified through repeated experiences with the tasks. Instructors play a vital role in this stage by drawing attention to important contextual considerations and discussing or demonstrating appropriate responses.

In the subsequent stage (labeled as "competence" by Dreyfus and Dreyfus), the amount of details, contextual considerations and repertoire of appropriate responses often become taxing on the individual. Instructors aid at this stage by helping the individual focus their attention on the salient stimuli in each situation. Such focus limits the number of considerations and eases the complexity associated with decision-making. Continual feedback from instructors in this phase also helps to refine the individual's understanding between the presence of certain situational factors and responses. This feedback reinforces appropriate actions while deterring those that do not yield satisfactory results. Additionally, the discourse that surrounds feedback provides the opportunity for the individual to ask for further clarification. This helps to refine the individual's causal

understandings associated with stimuli-response links and also can trigger reflection on the part of the instructor, which can be vital in the elicitation of otherwise implicit understandings (cf. Tsoukas, 2003, 2009; Hoffman & Lintern, 2006).

As individuals gain additional experience with the task, they develop the ability to successfully identify the salient factors when exposed to a given set of stimuli. They have not, however, developed the capacity to autonomously respond to such stimuli yet. Instead, individuals at this phase (labeled as "proficiency" by Dreyfus and Dreyfus) must devote considerable cognitive resources to decide which action is most appropriate in each situation. With additional practice and guidance from the instructor, individuals move to the final stage in Dreyfus and Dreyfus' model: expertise. At this point, individuals have automatized the manner in which they attend to stimuli and the appropriate responses.

Dreyfus and Dreyfus' (1986) model was based on inductive studies of individuals learning a number of complex skills in military settings. For example, much of their early research was funded by the army and air force and related to skills associated with flying jets, driving tanks or commanding army units (e.g., Dreyfus & Dreyfus, 1977, 1979, 1980; Dreyfus, 1982). They have also applied their model to understand the acquisition of chess skills and learning to drive a car (e.g., Dreyfus & Dreyfus, 1986). Additionally, the model has been used to understand the development of nursing expertise. Patricia Benner, for instance, has extensively studied skill acquisition in the nursing profession and found that the Dreyfus and Dreyfus' model has substantial validity in regards to the process through which novices develop the tacit-oriented knowledge of expert nurses (see Benner, 2004 for a review). In addition to frequent

reference in the cognitive psychology literature as a common theory of skill acquisition (e.g., Ericsson, 2008; Shuell, 1990), the Dreyfus and Dreyfus model of skill acquisition has had a substantial impact on artificial intelligence research by showing the limits through which machines can mimic the tacit knowledge of experts (Collins, 2010).

The third key perspective relates to research on expert performance. This stream of research focuses on the final stages of skill acquisition whereby individuals refine their performance on tasks. Central to research in this area is the importance of focused practice (Ericsson & Charness, 1994). Such practice allows individuals to gradually acquire the knowledge of experts, which often involves substantial tacit elements (Cianciolo, Matthew, Sternberg, & Wagner, 2006; Phillips, Klein, & Sieck, 2004), by providing multiple opportunities for feedback and refinement of actions (Ericsson, 2006). In particular, this research area contends that while it is common for individuals to become proficient at a task, the development of expertise requires a much more focused approach (Ericsson, Krampe & Tesch-Romer, 1993). A critical part of such practice is working with a coach or mentor, who by focusing attention on specific aspects of the task and providing continual feedback is able to convey their knowledge and guide the individual in a manner such that performance continues to improve (Ericsson, 2006).

Expert performance has been studied in numerous domains ranging from medicine (Ericsson, 2008; Norman, Eva, Brooks, & Hamstra, 2006), writing (Kellogg, 2006), and mathematics (Butterworth, 2006) to music (Lehmann & Gruber, 2006), sport (Hodges, Starkes, & MacMahon, 2006), and chess (Gobet & Charness, 2006). Early research in this research area indicated that a minimum of 10 years of focused practice was required to obtain the tacit knowledge of experts (e.g., Bryan & Harter, 1899;

Ericsson et al., 1993; Simon & Chase, 1973; Raskin, 1936). While some exceptions have

been found for the 10-year threshold, all of the studies in this literature have found that

the tacit knowledge associated with experts is only acquired after a substantial amount of

practice (Ericsson, 2006). The extant research on expert performance has made as

substantial contribution to the skill acquisition literature by focusing on how individuals

continue to develop and improve their performance after becoming proficient at a task

(Ericsson, 2006). Additionally, this research has made a contribution to work on

cognitive development by highlighting factors outside of general intelligence[5] that

influence the development of skills (Cianciolo et al., 2006; Ericsson et al., 1993;

Ericsson, Prietula, & Cokely, 2007).

Although the three perspectives discussed above vary in several nuanced ways,

they are consistent in that they each place considerable emphasis on the role of

experiences. Specifically, each of the perspectives suggests that individuals only obtain

the tacit-oriented knowledge of experts by repeatedly being exposed to experiences.

Research on Anderson's ACT theory, for instance, supports the idea that explicit oriented

knowledge of tasks in a given domain is only transformed into procedural and automatic

(i.e., tacit) knowledge through continual practice, and guidance and feedback from an

expert. Likewise, the extant work associated with Dreyfus and Dreyfus' model of skill

acquisition highlights that experiences are needed to apply the explicit facts and rules in a

given domain. Additionally, experiences allow attention to be drawn to salient stimuli

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[5] It is instructive to note, however, that prior research has shown that individual differences can influence skill acquisition. In general, this research demonstrates that cognitive ability can have a positive influence on the acquisitions of skills. The strength of the effect does tend to vary, however, based on the phase of skill acquisition and the specific dimension of cognitive ability. For example, general abilities often have a greater impact early in the process of skill acquisition, whereas the impact of perceptual speed is larger in the middle part of the process (Ackerman, 1988, 1992). While a detailed review and integration of this literature is outside the scope of this dissertation, I include a proxy for cognitive ability in my analyses to help control for the influence of such factors.

and for appropriate responses to such stimuli to be learned. Lastly, research on expert performance indicates that focused practice over long-periods of time is needed for individuals to obtain the tacit-knowledge needed for expert performance.

Taken as a whole, the work on skill acquisition suggests that individuals can only absorb tacit knowledge through multiple exposures to experiences. As the absorption of knowledge is fundamental to its transfer (Gupta & Govindarajan, 2000; Szulanski, 1996), the prior research on skill acquisition therefore suggests that experiences are likely to play an important role in the transfer of tacit knowledge. In this way, the skill acquisition research provides substantial motivation for focusing on the nature of experiences involved in the knowledge transfer process.

2.4 Implicit Learning

Research on implicit learning contends that individuals are able to learn without conscious awareness (Frensch & Runger, 2003; Reber, 1989). Scholars in this area contend that the human mind has the ability to discern probabilistic patterns in a stimulus environment to uncover rules that are not verbally or otherwise described (Seger, 1994). The detection of patterns is said to happen implicitly in the sense that individuals are able to ascertain them without an explicit focus on the underlying rules. That is, research on implicit learning suggest that repeated exposure to a stimulus environment allows individuals to detect and absorb rules inherent to such stimuli – even if the individuals do not intend to uncover such rules nor think they exist (Seger, 1994). Because the absorption of rules happens without explicit cognitive awareness, scholars in this area

argue that individuals often cannot articulate the knowledge they have obtained from such experience with the stimulus environment (Reber, 1993).

The notion of implicit learning has received substantial empirical attention from cognitive psychologists. Early studies in this area focused on the learning of artificial grammar (Reber, 1967). These experiments exposed individuals to various letter strings (e.g., TSSXXVV, PTVPXVPS, TSXS, PVV) that were generated using complex grammatical rules that bear no resemblance to anything the subjects would have previously encountered. After being exposed to the letter strings numerous times, individuals are then asked to judge whether novel letter strings are grammatically correct. While individuals are often able to successfully judge the grammar of the letter strings, they are unable to accurately describe the rules they are using in their assessment (Reber, 1989).

The findings from the initial studies using artificial grammar have also been replicated using a variety of other experimental tasks. Lewicki (1986), for instance, showed subjects pictures of people and provided descriptions of each person's personality type. With repetition, the subjects were able to uncover a link between hair length and personality type and implicitly use this link to accurately predict the personality of the people in the photos. Lewicki also explored implicit learning with his colleagues on a matrix-scanning task (e.g., Lewicki, Czyzweska, & Hoffman, 1987). Individuals were exposed to a complex matrix of numbers in four quadrants. The study used multiple runs, each with seven trials where the individuals were exposed to a different array of numbers in the matrix and had to press a button to indicate the quadrant that a target number (e.g., 6) was located in each trial. The critical trial in each run was

the seventh trial. The location of the target number in the seventh trial of each run was determined based on an algorithm (i.e., rule) that used the location of the target number in the previous trials of that run. For example, if the target number was located in quadrant 3, 1, 4, and 2 in trials 1, 3, 4 and 6, then it would appear in quadrant 1 on the seventh trial; if it was located in quadrant 4, 1, 3, and 2 in trials 1, 3, 4, and 6, then it would be located in quadrant 3 in the seventh trial; etc. The link between the location of the target number in previous trials and the seventh trial followed a specific rule that was not described to the subjects. The study found that after extensive experience with the task (e.g., several thousand runs), individuals were able to correctly identify the location of the target number on the seventh trial at a substantially improved speed; thereby suggesting that they had learned the underlying pattern represented in the trials. In follow up interviews, the authors found that individuals were not consciously aware of any rule linking the location of the target number in the seventh trial to its location in the previous trials.

Collectively, these and other studies (see Reber, 1993 and Seger, 1994 for reviews) in this research area provide considerable empirical support for the argument that individuals can implicitly learn underlying rules by repeatedly being exposed to a stimulus environment and that they can apply the rules without being able to communicate such rules. In respect to the transfer of tacit knowledge, this research suggests that multiple exposures to experiences can allow such knowledge to be conveyed to individuals without verbal or other forms of description. Specifically, the implicit learning literature indicates that if an individual is repeatedly exposed to various situational factors and responses, they can discern probabilistic patterns and ascertain the

tacit-oriented rules underlying skillful action. As such, this body of research

compliments the skill acquisition literature in highlighting the important role that

experiences play in the transfer of tacit knowledge.

CHAPTER 3

THEORETICAL DEVELOPMENT AND HYPOTHESES

This chapter integrates and builds upon the theoretical foundation that was laid in Chapter 2 into an overall conceptual model and presents hypotheses that link (1) the nature of experiences to the rate of tacit knowledge transfer at the individual-level and (2) the aggregate rate of tacit knowledge transfer to the rate and mode of firm growth. A visual depiction of the model is provided in Figure 1.

3.1 Hypotheses Linking Nature of Experiences to Knowledge Transfer Time

In the literature review section, it was noted that tacit knowledge is skill oriented and represents deeply engrained multifaceted configurations of cause and effect relationships (Ambrosini & Bowman, 2001; Nonaka, 1991). These causal understandings can be difficult to articulate because: 1) individuals are not focally aware of the stimuli to which they attend (Polanyi, 1966); 2) the links between such stimuli and actions involve automatic cognitive processes (Berman et al., 2002; Logan, 1988); and 3) the network of causal relations cannot be described in a parsimonious manner (Nelson & Winter, 1982).

The extant research on skill acquisition and implicit learning indicate, however, that these communication challenges can be circumvented with multiple exposures to experiences associated with such knowledge. The skill acquisition literature, for instance, indicates that through repeated exposure to experiences: attention can be drawn to salient stimuli (D'Eredita & Barreto, 2006; Dreyfus & Dreyfus, 1986); the logic linking specific stimuli and responses can be conveyed (Ericcson, 2006; Hoffman & Lintern, 2006); and

preconditions and contingent factors can be accumulated (Anderson, 1982; Dreyfus & Dreyfus, 2005). Additionally, research on implicit learning indicates that repeated exposure to experiences allows individuals to implicitly discern and internalize the probabilistic patterns between certain situational factors and actions (Reber, 1993; Seger, 1994). Taken together, the extant work on skill acquisition and implicit learning indicate that multiple exposures to experiences are needed to transfer tacit knowledge.

Given the criticality of repeated exposure to experiences to the transfer of tacit knowledge, the time needed to transfer such knowledge to new staff[6] is likely impacted by the degree of experience repetition in these settings. That is, since multiple exposures to experiences are needed to transfer tacit knowledge (D'Eredita & Barreto, 2006; Dreyfus & Dreyfus, 2005), the rate at which such knowledge transfers should be directly related to the rate at which particular experiences repeat. This thereby suggests that to understand differences in the rates of tacit knowledge transfer, we should examine factors that influence the degree of experience repetition.

One key factor that can influence the frequency in which individuals are exposed to particular experiences is the amount of variety. Specifically, individuals that encounter a substantial amount of variety are exposed to a large array of experiences over the knowledge transfer process and this reduces the rate at which particular experiences repeat. For example, an individual that is exposed to five different groups of experiences will encounter greater variety than an individual that is exposed to two different groups of experiences, and this difference in variety is likely to result in the first individual being exposed to certain experiences at a less frequent rate than the second individual. Thus, in

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[6] In this dissertation, new staff refers to those individuals that are in their initial training in a profession.

that multiple exposures to experiences are needed to transfer tacit knowledge (D'Eredita & Barreto, 2006; Dreyfus & Dreyfus, 2005) and increased variety in experiences reduces the frequency in which individuals are exposed to certain experiences during the knowledge transfer process, increased variety should therefore increase the time it takes to transfer the requisite tacit knowledge. Accordingly:

Hypothesis 1: For an individual recipient of knowledge, the level of experience variety will be positively associated with knowledge transfer time.

Although increased experience variety is likely to increase the overall knowledge transfer time, recent research in the knowledge-based perspective acknowledges that experiences can vary along a number of dimensions and that such dimensions have important implications for knowledge-oriented outcomes (Argote & Miron-Spektor, 2011). Consistent with this general movement towards providing more fine-grained analyses of experiences, I consider how experience variety can differ in respect to two dimensions. The first is relatedness, which refers to the degree of similarity among the experience variety, and the second is temporal spacing, which refers to the degree to which variety is spaced out over time. In what follows, I provide additional detail on these dimensions of experience variety and postulate their moderating effect on the relationship between experience variety and knowledge transfer time.

3.1.1 Moderating Influence of Experience Relatedness

Experiences can be related in respect to similarities among stimulus environments (Ellis, 1965; Schilling et al., 2003) and/or the logic linking stimuli to certain cognitive processes and actions (D'Eredita & Barreto, 2006). For example, an individual that works in an accounting firm on tax structuring and audit preparation projects for publicly traded firms has experiences that are similar in regards to the stimulus environment (e.g. those related to business) and to the underlying logic linking stimuli to actions (e.g., approaches to deal with regulators and business clients, application of financial reporting standards and tax laws). In contrast, an accountant that works on tax issues for high net worth individuals and process improvement projects for manufacturing firms has stimulus environments that share few attributes (e.g., one pertains to individuals whereas the other pertains to business operations) and is deploying underlying logic to complete tasks in these areas that differs in several regards. As a result of these differences in stimulus environments and logic linking stimuli to actions, the accountant in the latter example would have experiences that are less related than those of the accountant in the former example[7].

In that related experiences involve similarities between stimuli and/or the logic underlying action, it should therefore be easier to make connections between experiences that are of the related nature. Such connections are likely to lessen the effort needed to make sense of and absorb knowledge from experiences (D'Eredita & Barreto, 2006).

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[7] The accountants in this example, however, would have the same amount of experience variety as both individuals have two groups of experiences (individual 1: tax accounting and audit preparation; individual 2: tax accounting and process improvement consulting). Similar to Schilling et al. (2003) this dissertation conceptualizes relatedness as a characteristic of a given level of variety. Thus, while the accountants in this example would have the same amount of experience variety, they would differ in respect to the degree of relatedness among the experience variety (e.g., individual 1's experience variety would be more related than individual 2's experience variety).

This assertion is consistent with research on the transfer of learning[8], which is a body of

research that examines factors that influence whether prior experiences enhance learning

and/or performance in a novel situation (Ellis, 1965). Research in this area contends that

learning is more likely to occur when an experience can be connected to existing

concepts in an individual's knowledge structure[9] (Bower & Hilgard, 1981). As such, a

key tenet in this literature is that the degree of relatedness between experiences is a

central driver of successful learning transfer (Anderson et al., 1996; Ellis, 1965; Estes,

1970; Thorndike & Woodworth, 1901). Indeed, there is empirical support for the validity

of this argument. Studies have shown, for instance, that similarity in stimulus

environments improves the likelihood of a positive learning transfer (Ellis, 1965; Perkins

& Salomon, 1992; Salomon & Perkins, 1989). Additionally, studies have shown that

similarities in the causal logic linking stimuli to action can also enhance learning transfer

(Anderson et al., 1996). For example, Singley and Anderson (1989) found that

individuals were able to learn a second task at a faster pace if it shared procedural rules

with an earlier task. Lastly, researchers suggest that when two tasks share similarities in

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[8] It is important to note that while the term "transfer" is used in both the transfer of learning and knowledge transfer literatures, these research areas use the term in different ways and focus on different phenomena. The knowledge transfer literature uses the term to refer to the transmission of a stock of knowledge between individuals, whereas the transfer of learning literature uses the term to refer to the ability of an individual to leverage the knowledge they obtained from a prior task to learn a *different* task. For example, the knowledge transfer literature focuses on how to transfer knowledge regarding task X to another person, whereas the transfer of learning literature focuses on how an individual may or may not be able to leverage knowledge they have regarding task X to task Y. Thus, transfer of learning research looks at the leveraging of knowledge within an individual between two different tasks, whereas research on knowledge transfer examines the movement of knowledge between individuals for a given task.
[9] This argument is similar to that found in research on absorptive capacity, which suggests that a firm's existing knowledge structure influences a firm's ability to notice and derive value from information in the external environment. Indeed, Cohen and Levinthal (1990) referenced research findings on the transfer of learning in their seminal paper on the topic. As it is essential, however, to match the level of theory and level of analysis (Rousseau, 1985), I reference and focus on the transfer of learning research (as opposed to that on absorptive capacity) because this research is at the individual-level (whereas absorptive capacity is invoked as a firm-level concept – e.g., see Lane, Koka, & Pothak, 2006 and Volberda, Foss; & Lyles, 2010).

stimulus environments and/or the logic linking stimuli to actions, the overall knowledge structure needed for the tasks is less complex, and therefore can be obtained in a more effective and efficient manner (Estes, 1970). Taken as a whole, the research on transfer of learning provides support for the idea that the ability to absorb knowledge from experiences is enhanced when experiences are of a related nature.

Drawing on this prior research, I therefore suggest that since relatedness among experiences improves the ability of individuals to glean knowledge from experiences, it should lessen the number of times that individuals need to be exposed to particular experiences. That is, if individuals can leverage learnings from prior experiences to enhance their learnings from subsequent related experiences, then they may not need to be exposed to such experiences as many times to acquire the requisite tacit knowledge. This suggests that relatedness may lessen the direct effect of increased variety on knowledge transfer time. Specifically, by reducing the number of times that individuals need to be exposed to particular experiences, relatedness can offset the detrimental effects that increased variety imposes on the rate of repetition of such experiences, thereby reducing the impact of increased variety on knowledge transfer time. Thus:

Hypothesis 2: The association between the level of experience variety and knowledge transfer time will be negatively moderated by the relatedness of the experience variety.

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3.1.2 Moderating Influence of Temporal Spacing of Experiences

Experience variety can be evenly distributed, such that individuals encounter the same level of variety throughout the knowledge transfer process, or it can be spaced over time, whereby the amount of variety increases during the process. For example, consider an individual hired by a high technology firm to be a manager with responsibilities in the areas of R&D, input procurement, production, and warehousing. During the course of their training (i.e., knowledge transfer), they can be exposed to experiences in all of the functional areas upon entering the firm, or they can first focus on one functional area (e.g., input procurement) and then obtain the requisite experiences in the other functional areas (e.g., production, warehousing, and R&D) later in the knowledge transfer process. In this case, both approaches result in exposure to the same amount of experience variety; however, the latter approach involves a greater degree of temporal spacing of such variety than the former.

The spacing of variety in a temporal manner has important implications for the ability of individuals to adequately attend to and encode knowledge from experiences. Individuals have a finite capacity of attention (Pashler & Johnston, 1998) and working memory (Cowan, 2000). Thus, when individuals encounter a high level of experiential variety upon entering the firm, it is easy for such capacities to be taxed and result in cognitive overload. Research has demonstrated, for instance, that working on multiple tasks within a similar timeframe places constraints on individuals' attention and working memory and that such constraints reduce task performance (Kahneman, 1973; Pashler & Johnston, 1998; Pashler et al., 2001). As attention and working memory play vital roles in learning (Baddeley, 1992; D'Eredita & Barreto, 2006; Logan, 1988; Paas, Renkl, &

Sweller, 2003; Sweller, van Merrienboer, & Paas, 1998; van Merrienboer & Sweller, 2005), it is also likely that the cognitive overload that can occur with high levels of experience variety can negatively impact the ability of individuals to effectively learn from experiences.

Several empirical studies lend credence to this assertion. Naveh-Benjamin and Jonides (1986) found that individuals encode and retrieve less information about a particular situation when exposed to multiple types of situations within a similar time period. Additionally, Cohen, Ivry and Keele (1990) demonstrated that inclusion of an additional task while an individual is trying to learn a focal task creates distractions and reduces the speed in which the requisite knowledge for that task is absorbed. Lastly, Shanks and Channon (2002) found that having individuals work on multiple tasks within a given timeframe lessened the degree to which individuals could focus their attention on a specific task, and that this decreased the rate of learning. Thus, based on this prior research it seems likely that immediately exposing individuals to the full level of experience variety upon entering the firm could lead to cognitive overload and lessen the ability of individuals to learn from experiences[10].

Temporal spacing of experience variety, however, can lessen the influence of such variety on cognitive overload. Specifically, when experience variety is spaced out over time, individuals can focus their scarce attention and working memory resources on a more narrow range of experiences earlier in the knowledge transfer process. This allows learnings from initial experiences to be more readily converted into long-term memory (Anderson, 1983; Atkinson & Shiffrin, 1968) and frees up working memory and

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[10] The focus here is on the moderating effect of temporal spacing. The next hypothesis considers how temporal spacing may interact with relatedness to influence the impact of experience variety on knowledge transfer time.

attention resources to focus on additional variety introduced later in the process (cf. Ericsson & Kintsch, 1995; Sweller & Chandler, 1994; Sweller et al., 1998).   As working memory and attention are essential elements of learning (Baddeley, 1992; D'Eredita & Barreto, 2006; Logan, 1988; Paas et al. 2003; Sweller et al., 1998; van Merrienboer & Sweller, 2005), the ability to focus these limited cognitive resources on a particular experience should improve the rate at which individuals can accumulate knowledge from the experience. That is, by spacing variety overtime, individuals are likely to be able allocate a greater amount of their working memory and attention to each exposure to a particular experience, and this increased availability of cognitive resources should enable individuals to learn more from each encounter with the experience. The freeing up of attention and working memory also allows individuals to more fully immerse themselves in particular experiences and such indwelling has been noted by Polanyi (1962) as vital to the absorption of tacit knowledge. If individuals can learn more from each exposure, then they will likely need to be exposed to a particular experience a smaller number of times to accumulate the requisite level of tacit knowledge associated with the experience. Thus, since temporal spacing of variety can improve an individual's ability to focus their attention and working memory on a specific experience, and since such focus can enhance learning, then temporal spacing should lessen the number of times that individuals need to be exposed to specific experiences. By reducing the number of times an individual needs to encounter a specific experience, temporal spacing can therefore lessen the detrimental effect that increased experience variety has on knowledge transfer time. Accordingly, I hypothesize:

Hypothesis 3: The association between the level of experience variety and knowledge transfer time will be negatively moderated by the temporal spacing of the experience variety.

3.1.3 Moderating Influence of Relatedness and Temporal Spacing of Experiences

In the preceding two hypotheses, it was argued that relatedness and temporal spacing can improve the rate at which individuals acquire the requisite tacit knowledge from experiences and that this should lessen the direct effect that increased experience variety has on knowledge transfer time. Prior research suggests that in addition to these separate effects of relatedness and temporal spacing, there is also likely to be complementary effects between these two dimensions that can further enhance the moderating influence of these factors. Specifically, the research on transfer of learning indicates that the degree to which learning from a task aids in learning a related task is influenced by the amount of time the individual has spent with the earlier task (Haskell, 2001). Scholars argue that spending additional time with the task increases the knowledge developed about the task and this improves the likelihood and speed in which knowledge associated with a related task is learned (Ellis, 1965; Anderson et al., 1996). The basic reasoning associated with this argument relates to associative learning. As noted above, it is easier to learn from a given experience if the situational factors and/or underlying logic behind particular responses can be connected to an individual's existing knowledge structure (Bower & Hilgard, 1981). When an individual is exposed to a certain experience many times they are able to develop a more holistic understanding of the knowledge associated with the experience (Dreyfus & Dreyfus, 2005; Estes, 1970).

This enhanced knowledge structure improves the possibility that new knowledge from a different, but related, experience is noticed and linked to such knowledge structures (Anderson et al., 1996; Singley & Anderson, 1989). The enhanced possibility of linking experiences to existing knowledge means that individuals are likely to need a smaller number of exposures to subsequent related experiences to develop the requisite tacit knowledge from such experiences (cf. Ellis, 1965). As a result of individuals needing less exposure to experiences, the rate of tacit knowledge transfer should increase.

In that temporal spacing of experience variety provides individuals with more opportunities to be repeatedly exposed to initial experiences, it should allow individuals to develop more comprehensive knowledge structures from those experiences, and this, in turn, should enhance the speed in which knowledge is absorbed from related experiences introduced later in the knowledge transfer process. That is, by providing a means through which individuals can learn more from initial experiences, temporal spacing can enhance the influence of relatedness on knowledge transfer time. I expect this complementary effect of temporal spacing on relatedness to manifest itself such that the moderating influence of relatedness is accentuated when it is coupled with temporal spacing. Formally:

Hypothesis 4: Temporal spacing impacts the moderating influence of relatedness on the association between experience variety and knowledge transfer time: the negative moderating effect of relatedness increases when temporal spacing is present.

3.2 Hypotheses Linking Aggregate Knowledge Transfer Time to Rate and Mode of Firm Growth

In the literature review section, I explained that the individual orientation of tacit knowledge can limit the rate at which firms that are reliant on such knowledge can grow. It was noted that since individuals have a finite amount of time and attention, they are limited in respect to the volume of tasks that can be accomplished (Kogut & Zander, 1992). These limitations place constraints on growth because expansion inherently involves increasing the volume of tasks that need to be completed within the firm (Penrose, 1959). To accommodate the increased volume of tasks, firms can transfer the tacit knowledge of their existing employees to new staff (Coff et al., 2006). The rate at which such knowledge is transferred influences the time it takes before new staff are available to handle additional tasks, and this, in turn can influence how fast the firm can grow. Based on this, it therefore seems that the rate at which firms can grow is influenced by the rate of tacit knowledge transfer (Penrose, 1959). In particular, I expect that as knowledge transfer time increases, it should take firms longer until they develop new staff with the capacity to take on additional work, and that this will decrease the rate at which firms grow. Formally:

Hypothesis 5: The aggregated knowledge transfer time will be negatively associated with firm growth.

In general, firms often prefer internally developed staff. Such staff have greater levels of firm specific knowledge and this can enhance productivity (Hatch & Dyer,

2004). Specifically, by developing the requisite knowledge in individuals within the focal firm, such knowledge is inherently tailored to the idiosyncratic aspects of the firm's operations. This increases the potential for complementarities with other resources in the firm and can help to maximize the value that can be derived from the firm's resources (Kor & Mahoney, 2004; Penrose, 1959). Additionally, there is a substantial amount of research that indicates that acquiring talent from external sources can have negative performance effects. Studies have found, for instance, that due to the need to develop firm-specific knowledge and modify habits/routines to match idiosyncrasies of a firm's operations, externally developed workers often perform worse than their internally developed counterparts (Bidwell, 2011; Dokko, Wilk & Rothbard, 2009).   Research has also shown that worker performance can decrease when they move laterally to a new organization (Cambell, Saxton, & Banerjee, 2014; Groysberg, Lee & Nanada, 2008; Huckman & Pisano, 2006). Based on these findings and the tendency for lateral hires to earn higher wages than internally developed workers (Bidwell, 2011), it therefore seems that a heavy reliance on lateral hires could determinately impact organizational performance.   In a similar vein, there are also many studies that demonstrate that mergers and acquisitions, which provide instant access to additional skilled individuals, can have an adverse impact on organizational performance (see King, Dalton, Daily, & Covin, 2004 for a review). Thus, if a firm can efficiently and effectively develop staff internally, they are less likely to acquire staff from external sources.

As the time needed to develop staff internally increases, firms may be more apt to consider and use externally oriented means of obtaining additional skilled staff. Such tendencies stem from the negative effects that increased development time imposes on

growth and the significant pressures that firms often face from key stakeholders to achieve high levels of growth. Shareholders, for instance, often place considerable emphasis on growth rates (Kim et al., 2011). Additionally, growth is important to customers as failure to grow may hinder the ability of the firm to meet the needs of an expanding client and cause the client to defect to competitors. Lastly, employees value expansion because it creates more promotion opportunities and enhances the image of their employer (Dent, 1959; Greve, 2008; Whetten, 1987). Thus, due to the importance of growth to key stakeholders (shareholders, customers and clients) and the negative effect knowledge transfer time can have on firm growth, firms may feel substantial pressure to acquire talent from external sources as the time needed to internally develop staff increases.

In summary, firms often prefer internally developed staff because such employees tend to have higher performance and cost less than staff that is acquired externally (Bidwell, 2011). If it takes a long time to develop staff internally, firms will have a difficult time expanding at an adequate pace and may feel pressure from stakeholders to find an alternative means of obtaining additional staff for growth (cf. Kim et al., 2011). Externally acquired staff may indeed need to develop firm specific knowledge and modify habits/routines to be fully productive in a new organization (Dokko et al., 2009; Huckman & Pisano, 2006; Kor & Leblebici, 2005; Penrose, 1959), however, they often have a baseline level of competence in a given area (Somaya, Williamson, & Lorinkova, 2008), and as such, can provide a means (albeit imperfect) through which firms can accommodate the additional tasks that accompany growth. Thus, while internally developed staff are likely to be the preferred means of growth, firms may feel a sense of

urgency to achieve growth as internal staff development time increases, and such urgency

may propel firms to use external means of obtaining additional skilled staff that are

suboptimal in performance but allow the firm to realize improved growth (cf. Kim et al.,

2011). Since knowledge transfer time is a central component of internal development of

staff, I therefore hypothesize:

Hypothesis 6a: The aggregated knowledge transfer time will be positively associated with the use of Merger and Acquisitions.

Hypothesis 6b: The aggregated knowledge transfer time will be positively associated with the use of lateral hires.

CHAPTER 4

METHODS

4.1 Context

To test the hypotheses presented above, I used archival data from large law firms located in the United States. Law firms are an appropriate sample for this study for several reasons. First, law firms are knowledge intensive organizations (Mayer, Somaya & Williamson, 2012; Moeen, Somaya & Mahoney, 2013; von Nordenflycht, 2010) that are heavily reliant on tacit knowledge in the production process (Hitt, Bierman, Shimizu, & Kochhar, 2001; Hitt, Bierman, Uhlenbruck, & Shimizu, 2006). These firms produce outputs that require professionals to consider and integrate a substantial amount of factors associated with the law (e.g., existing laws and court decisions regarding the interpretation of such laws) to support a client's position and counteract the opposing parties line of defense against the advocated position. The knowledge underlying the skills needed to produce these outputs involve a considerable amount of complexity, and such complexity substantially increases the level of tacitness associated with the skills needed in production (Marchant & Robinson, 1999; Spaeth, 1999). Additionally, the outputs produced by law firms typically require that professionals "think on their feet" and quickly manifest multiple facets of knowledge when interacting with clients and/or the opposing party on a particular case (Mills & Moberg, 1982; Skaggs & Youndt, 2004). This increases the speed in which the requisite skills need to be applied and also increases the tacitness of knowledge underlying the requisite skills in these firms (cf. Nelson & Winter, 1982).

Second, law firms are heavily reliant on skilled human action in production and this accentuates the scalability challenges associated with tacit knowledge. More specifically, the nature of client interactions and need to customize outputs to client idiosyncrasies introduces significant variance into the production process (Greenwood, Li, Prakash, & Deephouse, 2005; Karreman, Sveningsson & Alvesson, 2002; Mills, 1986; Skaggs & Huffman, 2003; von Nordenflycht, 2010). To address this variation, law firms need to have experienced staff (i.e., partners) to be directly involved in the production and delivery of services to clients (Hitt et al., 2001; Marchant & Robinson, 1999; Wholey, 1985). This creates considerable constraints on the growth of these firms, as there are limits to the number of clients that partners can be involved with at any given time (Kor & Leblebici, 2005) and necessitates that such firms develop additional partners to take on more clients (Maister, 1993).

Lastly, there is a considerable amount of high quality individual- and firm-level data available on law firms. At the individual-level, there is considerable biographical data on lawyers practicing in large law firms in the United States. For example, the *Martindale-Hubbell Law Directory* provides detailed information on lawyers practicing in large law firms in the United States (Baker & Parkin, 2006; Wholey, 1985). Additionally, there is a substantial amount of high quality biographical data available on lawyers on company websites and professional networking websites, such as Linkedin. These data are well regarded by practitioners in the law industry (BTI Consulting Group, 2011) and have also previously been used in empirical studies published in top-tier management journals (Arora & Nandkumar, 2012; Dokko & Gaba, 2012; McEvily, Jaffee, & Tortoriello, 2012; Wholey, 1985). At the firm-level, there are trade (*The*

American Lawyer, National Law Journal) and recruiting (*National Directory of Legal Employers*) oriented publications that provide detailed data on large law firms located in the United States. These data are also commonly used by practitioners in the law industry and have been leveraged by management scholars in high-quality research (e.g., Hitt et al., 2001, 2006; Kor & Leblebici, 2005; Malos & Campion, 2000). The use of law firms is thus appropriate because there are detailed individual- and firm-level data available that allow me to examine the multilevel research questions posed in this dissertation.

Data were collected on large law firms located in the United States from 2009 to 2012. I chose to focus on large law firms because such firms are more likely to have a continual need to transfer knowledge (Maister, 1993) and the resources to grow and/or acquire other firms. To ensure that the firms in the sample were large law firms, I focused on those firms in the top 200 law firm list published by *The American Lawyer*. Only those law firms that were listed in the top 200 list for each of the years in the timeframe of this study were considered as data from *The American Lawyer* report were required to calculate several of the variables included in the analyses. Additionally, law firms with substantial international operations (e.g., 10% or more of attorneys located outside of the United States) were excluded from the study because there are a number of different regulations associated with the education and other requirements to practice law in foreign countries and there are also other potential confounding factors associated with the ownership structure and other regulations of international law firm operations. Applying these criteria resulted in an initial sample of 149 law firms. Over the timeframe examined in this study, these firms promoted 2,961 attorneys to partner.

At the individual-level of analysis, data were obtained for all of the variables in the models for 63 law firms and 490 lawyers promoted to partner. The final sample at the individual-level of analysis represents 17% of the initial sample and there are no significant differences between the final sample and the remaining attorneys in the initial sample with respect to gender (t = 0.589, p = 0.556), prestige of law school (t = 0.493, p = 0.622), firm size (t = 0.457, p = 0.648), firm profits (t = 0.356. p = 0.722) or leverage ratio (t = 0.290, p = 0.773). At the firm-level of analysis, data were obtained for all of the variables in the models for 136 law firms. This represents 91% of the initial sample and there are no significant differences in firm size (t = 0.931, p = 0.353), firm profits (t = 0.486, p = 0.628) and leverage ratio (t = 1.124, p = 0.263) between the firms in the beginning and final sample.

4.2 Dependent Variables

Knowledge transfer time was measured as the number of years that it takes an associate to develop into a partner. Individuals in law firms enter as an associate and spend numerous years working closely with one or more partners to develop the requisite tacit-oriented skills needed to effectively obtain and manage client projects (Wholey, 1985; Baker & Parkin, 2006). Many scholars in management refer to this development as a knowledge transfer process whereby the partners in the firm are transferring their tacit knowledge to associates (e.g., Hitt et al., 2001, 2006; Master, 1993; Sherer, 1995).

From a process standpoint, promotion decisions in law firms are determined by a committee of the firm's partners (Kirkland, 2005). This committee typically meets once a year, systematically pools and assesses information about associates, determines raises

and bonuses, provides feedback to associates regarding their progress and prospects for partnership, and makes recommendations to management regarding the promotion of specific associates to partner (Spurr & Sueyoshi, 1994). These recommendations are reviewed by management, and if approved, are typically voted on by the firm's partners.

A central consideration in the promotion to partner in law firms is whether the associate has obtained the requisite skills to attract and provide services to clients (Malos & Campion, 1995; Morris & Pinnington, 1998). The criticality of this consideration stems from reputation and partnership profitability factors. From a reputation standpoint, it is vital that partners have the requisite skills to meet the needs of clients because they are the key interface between the firm and client (Kor & Leblebici, 2005), and thus directly influence clients' service satisfaction and perception of the firm. A partner who does not have the requisite skills, for instance, could deliver subpar services to clients and this could have a detrimental impact to the reputation of the law firm (cf. Nayyar, 1990). Given the inherent information asymmetries that are present between clients and providers in professional service firm settings (Skaggs & Snow, 2004), it is vital that law firms and other professional service firms develop and maintain impeccable reputations (Greenwood et al., 2005). To avoid potential negative reputational effects, law firms are therefore careful to only promote associates to partners that have accumulated the requisite skills (Morris & Pinnington, 1998).

With respect to partnership profitability, law firms have an incentive to only promote those individuals that have demonstrated that they have the requisite skills to attract and provide services to clients because promotion of an associate without such skills could dilute existing partners' profits (Galanter & Palay, 1991; Malos & Campion,

1995). Promotion to partner triggers costs associated with the addition of support staff (e.g., additional associates) for the attorney (Morris & Pinnington, 1998) and also provides the attorney the ability to receive a share of the profits generated by the firm (Hitt et al., 2001; Wholey, 1985). Dilution of profits can thus occur if an associate is promoted to partner who does not have the requisite skills to attract and provide services to clients. Such dilution could occur because the lack of skills possessed by the new partner could make it difficult for that individual to generate revenue to cover the costs of additional support staff or equal to that generated by the other partners in the firm (Galanter & Palay, 1991; Morris & Pinnington, 1998). To avoid the potential for partner profits to be diluted, law firms are therefore incentivized to only promote those associates that have obtained the requisite skills (Malos & Campion, 1995).

The decision to promote an associate to partner is thus an indicator that the associate has developed the requisite skills needed to work independently with clients. As noted above, such skills are highly tacit due to the nature of production in these firms. Specifically, the production process involves high levels of complexity and interaction with the client (Greenwood et al., 2005), and both of these factors accentuate the tacitness of knowledge underlying the skills used in production (Marchant & Robinson, 1999; Spaeth, 1999). There is also support in the literature for the tacitness of skills used in the production and delivery of services in the legal sector. For example, the general literature on professional service firms, of which law firms are often a prototypical example (von Nordenflycht, 2010), indicates that tacit knowledge is central to the skills used by professionals in the production process of these firms (e.g., Malhotra, 2003, Maister, 1993). This perspective is also echoed in research focused on law firms (e.g., Hitt et al.,

2001, 2006; Marchant & Robinson, 1999; Spaeth, 1999). Thus, in that promotion to partner is an indicator that an associate has obtained the requisite skills (Morris & Pinnington, 1998) and tacit knowledge underlies such skills (Marchant & Robinson, 1999; Spaeth, 1999), the promotion to partner is a signifying event that the tacit-oriented knowledge necessary to attract and lead client projects has been successfully transferred to and absorbed by an associate (Hitt et al., 2001). The time that it takes for an associate to be promoted to partner can therefore be viewed as a valid indicator of tacit knowledge transfer time.

Data for this variable were obtained from multiple sources. The date that an attorney entered the firm was collected from biographical information listed in attorney profiles on company websites, professional networking sites (e.g., Linkedin) and the *Martindale-Hubbell Law Directory*. The start date was listed in more than one source for 182 of the promoted lawyers and there was 100% agreement in the start date between these different data sources. The date of promotion to partner was based on the press releases of the law firm. The knowledge transfer time variable was calculated as the difference between the start and promotion dates.

Firm growth was measured as the compound annual growth rate (CAGR) in revenues between 2009 and 2012. This measure of firm growth has been used in prior studies (Baum & Bird, 2010; Cho & Pucik, 2005) and is appropriate in the context of this study because it captures the degree to which increased revenues are obtained by these firms over the time frame. A focus on growth in other indicators, such as number of employees, would not be appropriate in this study because a firm could simply add additional employees without actually obtaining and managing additional business. The

data for this variable was collected from *The American Lawyer* annual Survey of Top 200 Law Firms.

     Lateral Partner Hires was measured as the number of partners that a law firm hired from competitors between 2009 and 2012. The data for this variable were obtained from *ALM Legal Intelligence's* Lateral Partner Moves database. These data represent partner moves in and out of the top 200 law firms and are based on *The American Lawyer's* annual Lateral Partner Moves survey of the top 200 law firms and *ALM Legal Intelligence's* systematic reviews of industry publications, press releases and company websites. *Merger and Acquisitions* was measured as the number of mergers and acquisitions that the law firm engaged in between 2009 and 2012. These data were obtained from the *LexisNexis Company Dossier* and *Altman Weil's* Mergerline report. The *Altman Weil's* Mergerline report is based on reviews of press releases and includes all mergers and acquisitions that involve a law firm located in the United States.

4.3 Independent Variables

     To gain insight into the nature of experiences that associates are exposed to during the knowledge transfer process, I focus on the tasks that these individuals work on. In the context of law firms, the practice areas of a lawyer provide important insight into the tasks and therefore their nature of experiences. Data for the practice areas of each associate were obtained from the *Martindale-Hubbell Law Directory*.

     I measured the level of *experience variety* during the knowledge transfer as the number of practice areas that an associate has at the time they are promoted to partner. An associate with a large number of practice areas, for instance, is likely to have more

variety in the experiences they are exposed to than an associate that has a small number of practice areas.

The level of *relatedness* among these practice areas was measured using a two-step approach. First, the specific practice areas of the associate were categorized into practice clusters. The practice clusters were developed by Sherer (1995) and represent similarities among the various practice areas (Kor and Leblebici, 2005). Table 1 lists the practice clusters and the practice areas such clusters encompass. In the second step, the Herfindahl index of dispersion was used to measure the degree to which an associate's practice areas are focused in a cluster of similar practice areas or spread among multiple practice clusters. The specific equation that was used is the following:

$$Relatedness = \sum (P_{j,i} / P_{i})^2$$

where $P_{j,i}$ is the number of practice areas in practice cluster j for individual i and P_{i} is the total number of practice areas for individual i. A value equal to one indicates that an associate's practice areas are all in related areas, whereas a value approach zero indicates that an associate's practice areas are broadly distributed among different practice clusters.

To measure *temporal-spacing*, I needed to capture whether an associate's level of experience variety was introduced in a bunched manner, such that multiple practice areas are added in a similar time period, or spaced out over time. To accomplish this, I looked at the number of practice areas that an associate had at the beginning, middle, and end of their time with the firm. If the number of practice areas at the beginning of the attorney's time with the firm was greater than or equal to that at the end of their time with the firm, a value of zero was assigned as this indicates that there was no temporal spacing in regards to the addition of practice areas. Otherwise, the degree of temporal-spacing was

calculated by taking the absolute difference between the proportion of practice areas added in the first and second half of the associate's tenure at the firm. Specifically, I used the following calculation:

$$Temporal\ Spacing = 1 - |(PA_1 / PA_{total}) - (PA_2 / PA_{total})|$$

where PA_1 is the number of practice areas added in the first half of the associate's tenure, PA_2 is the number of practice areas added in the second half of the associate's tenure, and PA_{total} is the number of practice areas the associate has at the time of promotion to partner. A value equal to one would occur when the proportion of total practice areas was evenly added in the first and second half of the associate's tenure. This would indicate that practice areas were added in a spaced out manner. A value less than one would occur when there is a difference in the proportion of total practice areas that were added in the first and second half of the associate's tenure. As the difference in proportions increase, the value approaches zero as this indicates greater bunching (i.e., lack of temporal spacing) in respect to the addition of practice areas. Examples of these calculations are depicted in Table 2.

Aggregate knowledge transfer time was operationalized as the mean time to partner for attorneys promoted to partner between 2009 and 2012.

4.4 Control Variables

For Hypotheses 1 – 4, I controlled for a number of factors at both the individual- and firm-level. At the individual-level, I controlled for the gender of the associate as

studies have found that gender can influence the assignment of work (Epstein, 1970) and

promotion of associates to partner (Kumra & Vinnicombe, 2008; Spurr, 1990). Gender

was identified based on the language used to describe the attorney in the promotion press

release (e.g., "he," "his" or "Mr" indicates males, whereas "she," "her," "Ms" or "Mrs"

indicates female), or, if such language was not provided, visual inspection of the

attorney's picture on the law firm's website. This variable was measured using a dummy

code, where the value was equal to 1 if the attorney was a male and 0 if the attorney was

a female.

I also controlled for the *prestige of the law school* by including the rank of the law

school attended by the associate in the models. It is important to control for the prestige

of the law school for two reasons. First, the prestige of the law school serves as a proxy

for the general human capital of the associate (McEvily et al., 2012), and research has

shown that factors associated with general human capital, such as cognitive ability,[11] can

influence the speed at which new knowledge is absorbed (Ackerman, 1988, 1992; Ree &

Earles, 1992; Schmidt & Hunter, 2004). Second, it provides insight into the social capital

of the associate (Hitt et al., 2001, 2006), and this can influence the degree to which the

associate may have existing relationships with large corporations that could be exploited

to develop new clients. As this can be an important driver to becoming partner (Morris &

Pinnington, 1998), it is important to account for this potential influence.

To measure the rank of the law school, I used the rankings published by *US News*.

The *US News* rankings are the most comprehensive for law schools and have been used

previously in scholarly studies (e.g., Hitt et al., 2001). While *US News* ranked the vast

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[11] Scores on the Law School Admission Test (LSAT) influence law school rankings and are also highly correlated with cognitive ability (Ceci, 1996)

majority of law schools attended by the associates in the sample, there were some associates that attended unranked law schools. To account for both ranked and unranked law schools, I adopted the approach used by Somaya et al. (2008). This approach involves four steps. First, if an associate graduated from a ranked law school, the actual rank order of the school is assigned. Second, a relative ranking is calculated for all of the law schools in the data set. Third, the median of the remaining unranked scores is assigned to all associates who attended an unranked law school. For example, if the attorneys in the sample attended 150 different law schools and only the first 99 were ranked, an attorney who attended one of the ranked law schools would receive the actual rank order associated with their school and an attorney who attended an unranked school would be assigned the median rank between 100 and 150 (i.e., 125). Lastly, an *unranked law school dummy* variable was created, where a value of 1 was assigned to an attorney who attended an unranked law school and a value of 0 was assigned to an attorney who attended a ranked law school. As Somaya et al. (2008) points out, the dummy variable effectively provides a separate intercept in the models for those attorneys that attended an unranked law school.

At the individual-level, I also controlled for the degree of *shared experiences* between the associate and the partners of the firm. Specifically, I measured the percentage of partners at the firm that attended the same law school as the associate. Research suggests that similarities in respect to prior experiences can influence the likelihood of a mentoring relationship. In that such relationships can be valuable to the advancement of individuals (Kram, 1983), it would therefore seem that this can have an important influence on the speed at which associates develop into partners. The law

school data for associates and partners was obtained from attorney profiles on company websites, professional networking sites (e.g., Linkedin) and the *Martindale-Hubbell Law Directory.*

Lastly, I controlled at the individual-level for any prior work experience that an associate had when they joined the law firm. Law firms have historically tended to hire associates immediately after law school or a year of clerkship (Nelson, 1988). However, it is possible for firms to hire associates that have spent time as an associate in another law firm (Kor & Leblebici, 2005). In such a case, the associate would have already started to develop tacit knowledge regarding the practice of law and this may influence the knowledge transfer time at their new firm. To account for this possible influence, a variable was included in the models that accounts for the number of years of work experience an associate had at the time of hire. An associate's *inbound prior experience* was measured as the number of years between when the associate finished law school and was hired by the firm.

At the firm-level, I controlled for a number of factors that could influence the time it takes to transfer the requisite tacit knowledge to associates. First, I controlled for *firm size* as it may influence the number of practice areas (Baker & Parkin, 2006; Greenwood, Morris, Fairclough & Boussebaa, 2010; Kor & Leblebici, 2005; Nayyar, 1990) and knowledge transfer (van Wijk et al., 2008). Firm size was measured as the natural logarithm of the total number of lawyers. Second, I controlled for the level of *slack* in these firms as it could influence the financial resources available for associate development activities. Slack was measured as the ratio of profits to partners (cf. Sharfman, Wolf, Chase & Tansik, 1988). Third, I controlled for the *leverage ratio,*

which refers to the ratio of associates to partners, because this can influence the availability of partners to offer high quality mentoring during the knowledge transfer process (Hitt et al., 2001). The leverage ratio also helps to control for the degree of competition within the firm for partnership promotions as higher leverage ratios reduce the promotion chances of associates (Greenwood et al., 2005). The firm size and leverage ratio variables were obtained from data reported in the *National Law Journal's* annual survey of Top 250 Law firms and the slack variable was obtained from data reported in *The American Lawyer*'s annual Survey of Top 200 Law Firms.

Fourth, I controlled for several aspects related to formal training and development as such aspects may influence the speed at which individuals develop the knowledge needed to become a partner. For example, I controlled for whether the firm had dedicated *professional development staff* by using a dummy variable that was equal to 1 if the firm had such staff and 0 otherwise. I also controlled for whether the firm counted training hours as billable hours. Associates in large law firms are often under substantial pressure to meet or exceed minimum targets for billable hours (e.g., 1800 to 2000 hours per year) (Fortney, 2005). Counting training hours as billable hours can potentially reduce this pressure and thus increase the likelihood that associates will participate in such training. Additionally, crediting training time for billable hours signals that the firm highly values and prioritizes formal training activities. To measure this component of training, I used a dummy variable (*training as billable hours*) that was equal to 1 if the firm counted training time as billable hours and 0 otherwise. Additionally, I controlled for whether formal appraisals occurred on an annual or semi-annual basis because research suggests that the frequency of employee appraisals can influence professional

development (Levy, 2004). To measure *evaluation frequency*, I included a dummy variable that takes on a value of 1 if associate appraisals are completed on a semi-annual basis and 0 if they are completed on an annual basis. And finally, I controlled for whether the law firm provided *upward reviews*. Such reviews give associates the opportunity to evaluate and provide feedback to supervising lawyers on an array of topics ranging from project management, communication, and training. This variable was measured using a dummy variable that was equal to 1 if the firm used upward reviews and 0 otherwise. These training and development oriented dummy variables are all measured based on information provided in the *National Directory of Legal Employers.*

Lastly, I included time dummy variables in the models to control for any idiosyncratic factors associated with the year in which the attorney was promoted. The time dummy for 2012 was omitted from the models to avoid perfect collinearity with the other time dummy variables.

In testing Hypotheses 5 – 6B, I included many of the firm-level controls. *Firm size,* for instance, can influence firm growth (Barron, West, & Hannan, 1995; Hart & Oulton, 1996; Lockett, Wiklund, Davidsson, & Girma, 2011; Somaya et al., 2008) and merger and acquisition activity (Amburgey & Miner, 1992; Sanders, 2001). Additionally, prior studies have demonstrated that *leverage ratio* can influence the growth trajectory of law firms (Sherer & Lee, 2002). Lastly, *slack* can impact resource availability and this can influence the rate of firm growth (Weinzimmer, Nystrom & Freeman, 1998) and merger and acquisition activity (Sanders, 2001).

In addition to these control variables, I also controlled for the number of *merger and acquisitions*, *lateral partner hires,* and *partner departures* in the models assessing

Hypothesis 5 – 6B as prior studies have shown that such activities can impact firm

growth (Hitt, Hoskisson, Johnson & Moesel, 1996; Kim et al., 2011; Somaya et al.,

2008). To the extent that a firm's hiring of associates with prior work experience may

influence aggregate knowledge transfer time, I also controlled for *mean inbound work*

experience of associates promoted to partner between 2009 and 2012 when testing

Hypotheses 5 – 6B.

4.5 Analyses

For Hypotheses 1 – 4, the data involve a nested structure whereby individuals are

nested within firms. To account for this, I used a fixed effects modeling approach for

these analyses. This approach essentially includes a dummy variable for each firm in the

sample, and, in doing so, reduces the bias that could be introduced by the nested nature of

the data (Allison, 2009). The firm-level fixed effects included in the model also helped

to capture the effect of unobserved firm heterogeneity in the sample. The regression

equation for the full model associated with Hypotheses 1 through 4 is the following:

*Knowledge Transfer Time = b_0 + b_1(Gender) + b_2(Prestige of Law School) + b_3(Unranked Law School Dummy) + b_4(Shared Experiences) + b_5(Inbound Prior Experiences) + b_6(Firm Size) + b_7(Leverage Ratio) + b_8(Slack) + b_9(Professional Development Staff) + b_{10}(Training As Billable Hours) + b_{11}(Evaluation Frequency) + b_{12}(Upward Reviews) + b_{13}(2010 Promotion Year Dummy) + b_{14}(2011 Promotion Year Dummy) + b_{15}(Experience Variety) + b_{16}(Relatedness) + b_{17}(Temporal Spacing) + b_{18}(Experience Variety * Relatedness) + b_{19}(Experience Variety * Temporal Spacing) + b_{20}(Relatedness * Temporal Spacing) + b_{21}(Experience Variety * Relatedness * Temporal Spacing) + Firm Fixed Effects + error*

Since the analysis for Hypothesis 5 does not involve nested data, I used ordinary least squares (OLS) regression to test this hypothesis. The regression equation for Hypothesis 5 is the following:

Firm Growth = b_0 + b_1(Firm Size) + b_2(Leverage Ratio) + b_3(Slack) + b_4(Mergers & Acquisitions) + b_5(Lateral Hires) + b_6(Partner Departures) + b_7(Mean Inbound Work Experience) + b_8(Aggregate Knowledge Transfer Time) + error

Poisson regression was used to analyze Hypotheses 6a and 6b as the dependent variables for these hypotheses were count oriented. OLS is not an appropriate statistical technique for count data because such data are not typically normally distributed. This places these analyses at risk of violating the normality assumption of OLS and such a violation could bias the coefficient estimates and hinder the ability to make inferences from the results. The regression equations for Hypotheses 6a and 6b are the following:

Mergers & Acquisitions = b_0 + b_1(Firm Size) + b_2(Leverage Ratio) + b_3(Slack) + b_4(Mean Inbound Work Experience) + b_5(Lateral Hires) + b_6(Partner Departures) + b_7(Aggregate Knowledge Transfer Time) + error

Lateral Hires = b_0 + b_1(Firm Size) + b_2(Leverage Ratio) + b_3(Slack) + b_4(Mean Inbound Work Experience) + b_5(Mergers & Acquisitions) + b_6(Partner Departures) + b_7(Aggregate Knowledge Transfer Time) + error

CHAPTER 5

RESULTS

5.1 Hypothesis Tests – Individual-Level Analyses

Descriptive statistics and correlations for the individual-level analyses are

reported in Table 3. All of the correlations were below .6, with the exception of the

correlations between prestige of law school and unranked law school dummy ($r = 0.876$)

and leverage ratio and slack ($r = .736$). In that such a correlation could potentially bias

the estimates and standard errors, I examined the possibility of collinearity problems by

looking at variance inflation factors (VIFs). VIFs cannot readily be calculated in a fixed

effects models, so I estimated the VIFs using OLS regression and found that the mean

VIF was 2.03 and the highest VIF was 5.13. This is below the common cut value of 10

and thus suggests that multicollinearity is not an issue in these analyses (Chatterjee and

Hadi, 2006).

The results of the fixed effects regression models associated with Hypotheses 1 -

4 are reported in Table 4. This table includes four models. Model 1 has the controls and

main effects to test Hypothesis 1, which predicts that experience variety will be positively

associated with knowledge transfer time. The results are consistent with this prediction

as the relationship between experience variety and knowledge transfer time is positive

and significant ($b = 0.061$; $p < 0.05$). Thus, Hypothesis 1 is supported.

To test the interactions associated with Hypotheses 2, 3 and 4, the focal

independent variables (*experience variety*, *relatedness* and *temporal spacing*) were

centered to reduce multicollinearity within the interactions tests (Aiken & West, 1991).

In Model 2, knowledge transfer time was regressed onto the control and main effect

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variables associated with the interactions. In Model 3, I entered the interaction terms

associated with Hypotheses 2 and 3 (*experience variety* X *relatedness*; *experience variety*

X *temporal spacing*) and tested the models and interaction terms to see if they were

significant. The main effects and interaction models were both significant ($F = 12.84$, p

$< .001$; $F = 12.14$, $p < .001$) and the change in model fit between the two models was also

significant ($\Delta R^2 = 0.010$, $\Delta F = 4.40$; $p < .05$). The coefficient associated with the

interaction term for experience variety and relatedness was negative and significant ($b = -$

0.387, $p < 0.01$) and a graph of the interaction confirms that it is in the intended direction

(see Figure 2). That is, higher levels of relatedness appear to reduce the effect of

increased experience variety on knowledge transfer time.   Hypothesis 2 is therefore

supported. The coefficient associated with the interaction term for experience variety and

temporal spacing, however, was not significant. Thus, Hypothesis 3 is not supported.

In Model 4, I entered the additional two-way interaction for relatedness and

temporal spacing and the three-way interaction term for experience variety, relatedness,

and temporal spacing to test Hypothesis 4. Neither the change in model fit nor the

coefficient associated with the three-way interaction were significant. Hypothesis 4 is

therefore not supported.

5.2 Hypothesis Tests – Firm-Level Analyses

Descriptive statistics and correlations for the firm-level analyses are reported in

Table 5. In that several correlations among the variables exceeded 0.6, I examined the

VIFs to check for potential collinearity problems. The mean VIF was 2.03 and the

highest VIF was 2.87. As this is substantially below the cut value of 10, it suggests that

multicollinearity is also not an issue for the firm-level analyses (Chatterjee and Hadi, 2006).

The results of the OLS regression model associated with Hypothesis 5 are listed in Table 6. Hypothesis 5 postulates that aggregate knowledge transfer time will be negatively associated with firm growth. The results are consistent with this prediction as the relationship between aggregate knowledge transfer time and firm growth is negative and significant (b = -0.007, p < 0.01). Thus, Hypothesis 5 is supported.

Table 7 lists the results of the poisson regression models associated with Hypotheses 6a and 6b. Hypothesis 6a predicts that aggregate knowledge transfer time will be positively associated with the number of mergers and acquisitions. The results of the analysis, which are depicted in Model 1 of Table 7, do not support this contention, as the relationship between aggregate knowledge transfer time and mergers and acquisitions is not significant. Hypothesis 6a is therefore not supported.

Model 2 of Table 7 includes the main effects and control variables to test Hypothesis 6b, which predicts that aggregate knowledge transfer time will be positively associated with the number of lateral partner hires. The impact of aggregate knowledge transfer time on lateral partner hires was negative and significant (b = -0.043, p < 0.05). This relationship, while significant, is in the opposite direction from that predicted in the hypothesis. Thus, Hypothesis 6b is not supported.

CHAPTER 6

DISCUSSION

In this dissertation, I developed and tested an experience-based approach to the transfer of tacit knowledge at the individual-level and also examined the firm-level growth consequences of differences in knowledge transfer time. The results provide support for the idea that the nature of experiences that individuals are exposed to during the knowledge transfer process influences the time it takes to transfer tacit knowledge among individuals, and that knowledge transfer time has important implications for the rate and mode of firm growth. Specifically, my analysis of individual-level tacit knowledge transfer found that increases in experience variety were positively associated with knowledge transfer time and that this effect was attenuated by the relatedness of the variety. Additionally, I found that a firm's ability to quickly transfer tacit knowledge to new staff had a positive impact on the rate of firm growth and that prolonged knowledge transfer time reduced the use of lateral hires as an alternative growth mode. In general, the results make an important contribution to the literature on knowledge transfer (e.g., Argote, 2013; Phelps et al., 2012; van Wijk et al., 2008) by highlighting experiences as a mechanism through which tacit knowledge transfers and demonstrating that the rate of tacit knowledge transfer influences the expansion of firms. Additionally, the results raise a number of important questions and issues that research on knowledge transfer and the broader knowledge-based literature has yet to address. I discuss the results and these important implications below.

In Hypothesis 1, it was argued that since multiple exposures to experiences are needed to transfer tacit knowledge (D'Eredita & Barreto, 2006; Dreyfus & Dreyfus,

2005), and variety reduces the rate of experience repetition, increased experience variety during the knowledge transfer process would increase the time needed to transfer tacit knowledge. The results support this conjecture and lend credence to the criticality of repeated exposure to experiences in the transfer of tacit knowledge. Specifically, this finding suggests that the rate at which tacit knowledge is transferred is directly influenced by the frequency with which individuals encounter experiences associated with that knowledge.

Hypothesis 2 posited that the direct influence of increased experience variety on knowledge transfer time would be less pronounced when such variety is of the related nature. The results are consistent with this assertion as relatedness was found to negatively moderate the association between experience variety and knowledge transfer time. In particular, the results indicate that the impact of high levels of experience variety on knowledge transfer time is substantially less when such variety is at high levels of relatedness than when it is at low levels of relatedness. This supports the idea that related variability provides opportunities for individuals to transfer learnings among different experiences (e.g., Ellis, 1965; Singley & Anderson, 1989), and that this can offset the negative effects of the reduced repetition of experiences that accompany increased variety. However, an examination of the graphical depiction of the interaction indicates that the effects of relatedness are perhaps more pronounced than was initially expected (see Figure 2). Specifically, while the relationship between experience variety and knowledge transfer time is positive when variety is at low levels of relatedness, it appears to be *negative* when the variety is highly related. That is, increased variety seems to increase the time it takes to transfer tacit knowledge when it is relatively

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unrelated in nature, and *decrease* the time it takes when the variety has a high degree of relatedness. This suggests that increased experience variety can enhance the rate at which tacit knowledge transfers if it is of the related nature.

There are two potential explanations for the beneficial influence of related variety. First, related variety may make it easier to compare and contrast experiences. This can potentially help reinforce learnings from prior experiences (Maskarinec & Thompson, 1976) and/or enhance the speed at which learnings are transferred from other related experiences (Anderson et al., 1996; Lowenstein, Thompson & Gentner, 1999; Perkins & Salomon, 1992). Additionally, the drawing of distinctions between related experiences may aid in the partial elicitation of otherwise implicit understandings (Tsoukas, 2009), and the resulting articulation of such knowledge can accelerate transfer. The second potential explanation is that related variety may encourage the development of more abstract understandings associated with skills. Research in psychology, for instance, suggests that related variety promotes the development of schema or general rules associated with skills pertaining to a group of tasks (Schilling et al., 2003), and that these more abstract understandings can improve that rate at which skills are acquired (Schmidt, 1975; van Merrienboer & Sweller, 2005).

My finding on the benefits of relatedness to the transfer of tacit knowledge is consistent with the results reported by Schilling et al. (2003) who examined the influence of variety on group learning in a laboratory setting. Their study examined the rate at which groups learned problem-solving board games (e.g., *Go, Reversi, Cribbage)* and found that the learning rate was enhanced in situations of related variety. The similarity in results provides support for the validity and robustness of my finding regarding the

benefits of relatedness. However, my dissertation also extends the findings of Schilling et al. (2003) in that it examined the influence of related variety in a commercial setting and demonstrated that the benefits of related variety may also provide learning benefits for tasks that involve a substantial amount of complex and difficult to articulate knowledge. This therefore lends credence to the idea that related variety may have substantial learning benefits for organizations.

Hypotheses 3 and 4 consider the moderating influences of temporal spacing. In both of these hypotheses I argued that temporal spacing of experience variety allows individuals to focus their scarce attention and working memory resources on a more narrow range of experiences, and that this can help to offset the direct influence of experience variety on knowledge transfer time. Contrary to my expectations, I failed to find any moderating influence of temporal spacing. This may suggest that cognitive overload is not an impediment to the transfer of tacit knowledge under conditions of high levels of experience variety. It could also be that temporal spacing does have a moderating influence, but that I failed to find such an effect because I did not account for the cognitive style of individuals in my sample. Cognitive style refers to the different ways in which individuals process information when problem solving or learning (Kozhevnikov, 2007). Research indicates, for instance, that a key dimension of cognitive style is *holist-analyst* (Riding & Cheema, 1991). Holists look at situations in their entirety and gain understanding by identifying and focusing on patterns or trends, whereas analysts take more of a serial and modular approach by focusing on a few discrete elements at a time and then considering the links among the elements (Gully & Chen, 2010; Kozhevnikov, 2007; Pask, 1972; Pask & Scott, 1972). Based on this

categorization it would therefore seem that temporal spacing of experience variety would be beneficial to individuals with an analyst cognitive style and detrimental to those with a holistic cognitive style. These positive and negative effects of temporal spacing would cancel each other out if these cognitive styles were evenly dispersed among those individuals in my sample and thus equate to a nil overall effect. While I am not able to assess the validity of this potential explanation in this study, future research should consider the moderating influence of cognitive style on the impact of temporal spacing in knowledge transfer.

Another potential explanation is that there may be some general negative learning aspects from temporal spacing that could offset the learning benefits temporal spacing provides in respect to reducing cognitive overload. For example, temporal spacing of variety may lessen the ability for individuals to compare and contrast their experiences early in the knowledge transfer process and this could reduce the rate of learning (Kurtz, Miao & Gentner, 2001). Additionally, temporal spacing could lead to knowledge degradation over time as the knowledge gained from early experiences would suffer from periods of nonuse once additional variety was introduced later in the knowledge transfer process (Arthur, Bennett, Stanush & McNelly, 1998). Thus, while temporal spacing may provide learning benefits by reducing cognitive overload, it may also lessen learning by reducing opportunities for individuals to compare and contrast experiences and allowing knowledge to decay. I am not able to separate these potential positive and negative effects in this dissertation. However, I encourage future research to attempt to tease out these differential effects of temporal spacing on the transfer of tacit knowledge.

Lastly, the measurement of temporal spacing used in this study may also have influenced my ability to detect a moderating influence of temporal spacing. Specifically, I used a relatively coarse-grained measure of temporal spacing by looking at three points during the knowledge transfer process, and this may have reduced my ability to detect the impact of temporal spacing. Future research could therefore investigate temporal spacing using more fine-grained measures. For example, researchers could use diary methodologies to capture the specific experiences that individuals are exposed to on a daily basis (Bolger, Davis & Rafeli, 2003), and use these daily records to derive a fine-grained measure of temporal spacing to assess its influence on the transfer of tacit knowledge.

As a whole, the results at the individual-level of analysis (Hypotheses 1-4) suggest that the nature of experiences that individuals are exposed to during the knowledge transfer process influences the rate at which tacit knowledge transfers. This supports the idea that experiences are an important mechanism through which tacit knowledge is transferred among individuals and lends credence to the experience-based approach advanced in this dissertation. As a result, the findings make an important contribution to the knowledge transfer literature where very little research has focused on the transfer of complex and difficult to articulate knowledge. I believe future research could build off this experience-based approach by investigating how different organizational contextual factors influence the impact of the experiential characteristics examined in this dissertation. For instance, research could explore how firm-level factors - such as availability of mentors (cf. Kram, 1983), formal training (cf. Kozlowski, Chao, & Jensen, 2010), and quality of peer group (cf. Crocker & Eckardt, 2014) - influence the

impact of the experiential characteristics on tacit knowledge transfer time. These types of cross-level studies have received very little attention in the knowledge transfer literature (e.g., see Phelps et al., 2012 and van Wijk et al., 2008), but they have the potential to yield important insight on how knowledge is transferred among individuals in organizations (Foss et al., 2010).

The final three hypotheses considered the implications of the rate of tacit knowledge transfer on the rate and mode of firm growth. Hypothesis 5 contends that aggregate knowledge transfer time will be inversely associated with firm growth. The results support this assertion and lend credence to the view that firm growth is constrained by the rate at which tacit knowledge can be transferred to new staff. Knowledge-based researchers have made this argument for over fifty years (e.g., Coff et al., 2006; Kogut & Zander, 1992; Penrose, 1959). However, this is the first empirical study to directly test and find empirical support for this contention. As such, this finding makes an important empirical contribution to the knowledge-based literature.

Future research could extend this finding by examining the firm-level performance implications of differences in knowledge transfer time. Extant theory suggests that growth is a vital organizational outcome because it allows firms to fully exploit the value of their resources to take advantage of external opportunities (Coff et al., 2006; Penrose, 1959). In that the transfer of tacit knowledge can place constrains on the rate of firm growth, it therefor seems that differences in knowledge transfer time could influence firm performance. Future research could thus examine the contemporaneous performance effects of tacit knowledge transfer time. Scholars could also examine the performance implications of tacit knowledge transfer time in a

longitudinal manner as the link between knowledge transfer time and firm performance may manifest in different ways over the longer-term. For example, while a high rate of tacit knowledge transfer may allow firms to fully exploit the value of such knowledge and lead to positive performance effects in the short-term, prolonged periods of such exploitation may hinder the ability of firms to learn from their new employees and/or explore new areas; this in turn could have negative long-run performance implications (March, 1991).

In Hypotheses 6a and 6b, I argued that aggregate knowledge transfer time would slow the rate at which firms could internally develop staff, and that the negative effects this can have on firm growth would propel firms to acquire staff via external means. The results do not support this assertion, as aggregate knowledge transfer was not found to be positively associated with mergers and acquisitions or lateral partner hires. In the case of mergers and acquisitions, the lack of association between aggregate knowledge transfer time and mergers and acquisitions may have occurred because the law firms in the sample engaged in very few mergers and acquisitions during the time frame of the study. Specifically, the mean number of mergers and acquisitions over the three years examined in this study was 0.265. This means that there were many firms that did not engage in any mergers and acquisitions during this timeframe. As a result, there may have been inadequate variability among the firms in the sample with respect to merger and acquisition activity. It could also be that mergers and acquisitions are driven more by factors related to the augmentation of a firm's stock of knowledge (e.g., Ranft & Lord, 2002; Vermeulen & Barkema, 2001; Zollo and Singh, 2004) rather than factors associated with the efficiency in which current knowledge can be transferred and

replicated. Given this possibility, future research could examine these competing hypotheses directly by looking at aggregate knowledge transfer and changes in a firm's stock of knowledge in the same study.

In the case of the lateral partner hires (Hypothesis 6b), an association was found with aggregate knowledge transfer time, but in the opposite direction from what was predicted. That is, increases in aggregate knowledge transfer time were found to decrease the number of lateral partner hires. There are two potential explanations for this unexpected finding. The first relates to research on sunk costs and managerial decision-making. Work in this area suggests that managers have a difficult time thinking at the margin regarding investment decisions. This creates a tendency to fixate on sunk costs and escalate commitment to those activities where prior resource investments are substantial and performance subpar (Shimizu & Hitt, 2005; Staw, 1976). Prolonged knowledge transfer processes often require considerable investments by the firm in the development of staff (Teece, 1977). As a result, managers may feel compelled to remain committed to the internal approach of obtaining new staff necessary for growth, and escalate this commitment in the face of slow growth by not pursuing alternative approaches of acquiring staff from external sources. That is, the sunk costs that result from prolonged knowledge transfer times may cause managers to ignore the potential marginal benefits that lateral partner hires could provide in respect to firm growth.

The second potential explanation is that this effect is due to motivational considerations. A lengthy knowledge transfer time requires significant commitment and effort on the part of the recipient (Dreyfus & Dreyfus, 1986). To entice individuals to remain engaged in such activities, there are often promotion opportunities available for

those that successfully complete the process and obtain the requisite knowledge and skills (Galanter & Palay, 1991). If individuals in the knowledge transfer process observe the firm filling a large number of the higher-level positions through external hiring, they may perceive that such hires reduce their likelihood of being able to obtain such promotions (Chan, 1996). This, in turn, could negatively influence the motivation of the knowledge transferees and have other negative spillover effects, such as reduced moral (Bidwell & Keller, in press). Such effects could occur at any rate of knowledge transfer, but are likely to be pronounced in situations involving lengthy knowledge transfer, as individuals have been putting forth substantial effort for a greater amount of time. Accordingly, firms with long tacit knowledge transfer times may engage in less lateral partner hiring to reduce the negative motivational effects that such actions could trigger. While I am not able to test the validity of either of these potential explanations in this dissertation, I encourage future research to examine these factors in greater detail to shed light on the association between knowledge transfer time and lateral hires.

There are also two noteworthy findings that were not part of the formal hypotheses associated with the dissertation. The first is the negative and significant association listed in Table 4 between gender and knowledge transfer time ($b = -0.438$, $p <0.05$). Since gender was a dummy variable that was coded such that a value of 1 identifies male and 0 identifies female, this suggests that males had knowledge transfer times that were significantly less than females. This finding is consistent with a large body of research (Eby, 2006; Kuma & Vinnicombe, 2008; Spurr, 1990) that contends there are biases against females in respect to professional development and promotion. Future research could dig further into this finding by examining whether the within-level

association between gender and knowledge transfer is influenced by firm-level

characteristics such as the gender composition of top management (cf. Gorman, 2005)

and knowledge transferors (cf. Burke & McKeen, 1990; Burke, McKeen, & McKeena,

1990; Raigns & Cotton, 1999; Turban, Dougherty, & Lee, 2002), and human resource

management practices (cf. Dickens, 1998).

The second noteworthy finding is the negative and significant association listed in

Table 7 between the leverage ratio (i.e., number of associates per partner) and lateral

partner hires (b = -0.330, p <0.001). A potential explanation for this finding is that low

levels of partner leveraging reduce the pipeline of internally developed staff and that such

reduced supply of internally developed staff propel firms to acquire staff through lateral

hires. This finding is consistent with the recent work of Bidwell and Keller (in press),

who found that the grade ratio, which refers to the number of employees one grade below

relative to the number of employees in the focal position, was directly related to the

probability of a position being filled via internal means (as opposed to external hiring).

The consistency of findings lends credence to the idea that the supply of internal workers

may be an important driver of the "make or buy" decision associated with human capital.

The link identified between the leverage ratio and lateral partner hires is also

noteworthy as it adds to a line of research on professional service firms that demonstrates

that partner leveraging is an important structural decision that has strategic implications

for these types organizations. Prior research has shown, for instance, that the leverage

ratio is associated with firm strategy (Sherer, 1995; Wasserman, 2008) and performance

(Hitt et al., 2001, Greenwood et al., 2005; Kor & Leblebici, 2005). This dissertation

therefore contributes to the research on professional service firms by showing that the leverage ratio also influences the different approaches that these firms can use to grow.

In addition to the research questions and issues discussed above, this dissertation also has several other important implications. The first pertains to research on development and training, which is a body of scholarly work in organizational psychology that examines how organizations can influence the knowledge, skills and abilities of employees (Salas, Weaver, & Shuffler, 2012). While there has been a considerable amount of research on this topic, the vast majority of it has focused on formal training approaches (Salas et al., 2012; Thayer & Goldstein, 2010). This dissertation examined how the nature of experiences influences the rate at which tacit knowledge is accumulated by individuals during the knowledge transfer process, and found that experience variety and relatedness are important experiential characteristics. In that individuals encounter such experiences in the tacit knowledge transfer process via informal/on-the-job learning, the findings of this dissertation therefore imply that research on development and training could greatly benefit by giving greater consideration to informal approaches. As a result, I concur with Tannenbaum, Bear, McNall, and Salas (2010) that there is an important need for scholarship on development and training to design and execute research projects that explore the use and effectiveness of informal ways in which firms can influence the knowledge and skills of their employees.

The second implication pertains to research on the microfoundations of strategic management. This research area contends that substantial insight can be gained about firm-level outcomes by investigating the actions and interactions of individuals (Felin &

Foss, 2005; Felin & Hesterly, 2007; Foss et al., 2010). The findings in this dissertation

provide support for this argument as they demonstrate that the rate of tacit knowledge

transfer among individuals has an influence on firm expansion. This makes an important

empirical contribution to the microfoundations literature, as the vast majority of prior

research in this area has been conceptual. It also suggests that the microfoundations

perspective may be a useful lens to investigate other knowledge-oriented topic areas.

Future research, for instance, could adopt the experience-based approach advanced here

to examine the microfoundations of organizational learning curves (cf. Argote, 2013;

Kozlowski et al., 2010), firm-level performance implications of knowledge retention (cf.

Eckardt, Skaggs, & Youndt, in press) and a number of other organizational knowledge

topics such as knowledge creation (cf. Floyd & Wooldridge, 1999; Nonaka, 1994;

Tsoukas, 2009), absorptive capacity (Volberda, Foss, & Lyles, 2010), and interfirm

knowledge transfer (cf. Moliterno & Mahony, 2011).

The third implication pertains to research on the benefits of mutual knowledge.

Scholars argue that high levels of mutual knowledge offer benefits to firms by facilitating

the creation and utilization of knowledge (e.g., Cohen & Levinthal, 1990; Cramton, 2001;

Kotha, George & Srikanth, 2013; Mathieu et al., 2005; Nonaka, 1994) and ensuring

availability of staff to meet customer needs (Crowston, 1997). However, other

researchers note that substantial overlap among the knowledge of workers creates

redundancy that can be extremely costly when the knowledge is tacit due to transfer

difficulties (Grant, 1996, 2006). The results of this dissertation suggest that the degree of

difficulty associated with the transfer of tacit knowledge depends on the nature of

experiences one needs to encounter during the transfer process. Since the cost of

knowledge redundancy is a function of the difficulty involved and timed needed to transfer tacit knowledge to individuals (cf. Kogut & Zander, 1992; Teece, 1977), the findings thereby imply that the costs associated with redundancy of tacit knowledge among workers may vary based on the nature of experiences that one is exposed to during the knowledge transfer process. As such, my results suggest that the differences in tacit knowledge transfer time brought about by the nature of experiences may result in differential costs of knowledge redundancy. This idea that firms may face marginal differences in the cost of knowledge redundancy based on differential tacit knowledge transfer rates has several important implications for research on mutual knowledge. First, it implies that the cost of redundancy in settings that utilize tacit knowledge is not as uniform as insinuated by prior knowledge scholars. Second, it suggests that firms can gain marginal advantages by having the benefits of mutual knowledge along with reduced costs of redundancy if their knowledge transfer processes involve experiential characteristics (i.e., low or related variety) that are conducive to quicker transfer of tacit knowledge. Lastly, it suggests that firm-level decisions that influence the nature of experiences that workers encounter, such as strategic scope and structure, may be important moderators of the effects of mutual knowledge on firm performance.

CHAPTER 7

LIMITATIONS AND CONCLUSIONS

While I believe the finding provide support for the experience-based approach advanced in the dissertation, there are three potential limitations worth noting. First, the use of a single industry is a potential limitation of this dissertation. This approach is frequently used in strategic management studies (Sharp, Bergh, & Li, 2013). However, it does raise questions about whether the findings generalize to other settings. Although my findings are most applicable to other knowledge-intensive settings where skilled human action is critical in production, it is also likely that the findings of this dissertation can be generalized to settings where skilled human action is less critical (e.g., manufacturing), as there can be a substantial amount of tacit knowledge in the managers of these organizations that needs to be replicated in order for a firm to expand (e.g., Penrose, 1959; Nelson & Winter, 1982; Winter, 1987). That said, the reduced overall reliance on tacit knowledge by firms in settings with less skilled human action is likely to result in a less pronounced association between knowledge transfer time and firm growth. As such, I encourage future research to investigate the potential moderating influence of industry context on the results of this dissertation.

The second potential limitation is the level of missing data. Usable data were only obtained from 17% of the initial sample at the individual-level and 91% at the firm-level. While it is common to have a substantial amount of missing data in management studies that utilize archival data from multiple data sources (e.g., Barnett & Salomon, 2012; Schijven & Hitt, 2012), it is a potential limitation in that the results may have been different if there were differences between those firms with and without missing data. I

checked for differences between the final sample and those remaining in the initial

sample on a number of different dimensions (e.g., gender, education, firm size, firm

profits, and leverage ratio) and did not find any significant differences. Nonetheless, I

cannot effectively rule out the possibility that the results would have been different if

there were less missing data. As such, the level of missing data is a potential limitation.

The third potential limitation is the use of proxies. Specifically, time until partner

promotion was used as a proxy for the time needed to transfer tacit knowledge, and an

attorney's practice areas were used as a proxy for the nature of experiences. Proxies are

frequently used in the general strategic management literature (Ketchen, Ireland & Baker,

2013) and widespread in knowledge-based research (Argote & Miron-Spektor, 2011).

Additionally, the proxies used in this dissertation are supported by prior research as valid

indicators of the constructs that they purport to measure (e.g., Hitt et al., 2001, 2006;

Malos & Campion, 1995; Marchant & Robinson, 1999; Master, 1993; Morris &

Pinnington, 1998; Sherer, 1995). While I would have liked to had more direct and

granular measures of the rate of tacit knowledge transfer and nature of experiences, it is

quite difficult to develop and implement such measures in a single study given the

magnitude of time involved in the transfer process and the inherent ineffable nature of

tacit knowledge (Ambrosini & Bowman, 2001; Argote & Miron-Spektor, 2011).

Nevertheless, future research is encouraged to validate my findings using more direct and

fine-grained measures of the nature of experiences and rate of tacit knowledge transfer.

In summary, the purpose of this dissertation was to develop and test an

experience-based approach to the transfer of tacit knowledge and to examine the

implications of differences in knowledge transfer time on firm growth. My results

demonstrate that the nature of experiences that an individual is exposed to during the knowledge transfer process influences the rate of tacit knowledge transfer; in turn, the rate of tacit knowledge transfer impacts the rate and mode by which firms expand. In general, these findings lend credibility to the idea that experiences are an important mechanism through which tacit knowledge is transferred among individuals and that tacit knowledge transfer time has important implications for the growth of firms. This makes a substantial contribution to the knowledge transfer literature, where very little research has examined the transfer of tacit knowledge. It is my hope that the findings presented here will encourage knowledge-based researchers to give greater attention to the mechanisms involved in the transfer of tacit knowledge among individuals, as well as to the firm-level implications these mechanisms have for the leveraging of tacit knowledge resources.

Figure 1: Theoretical Model of Tacit Knowledge Transfer Time and Mode and Rate of Firm Growth
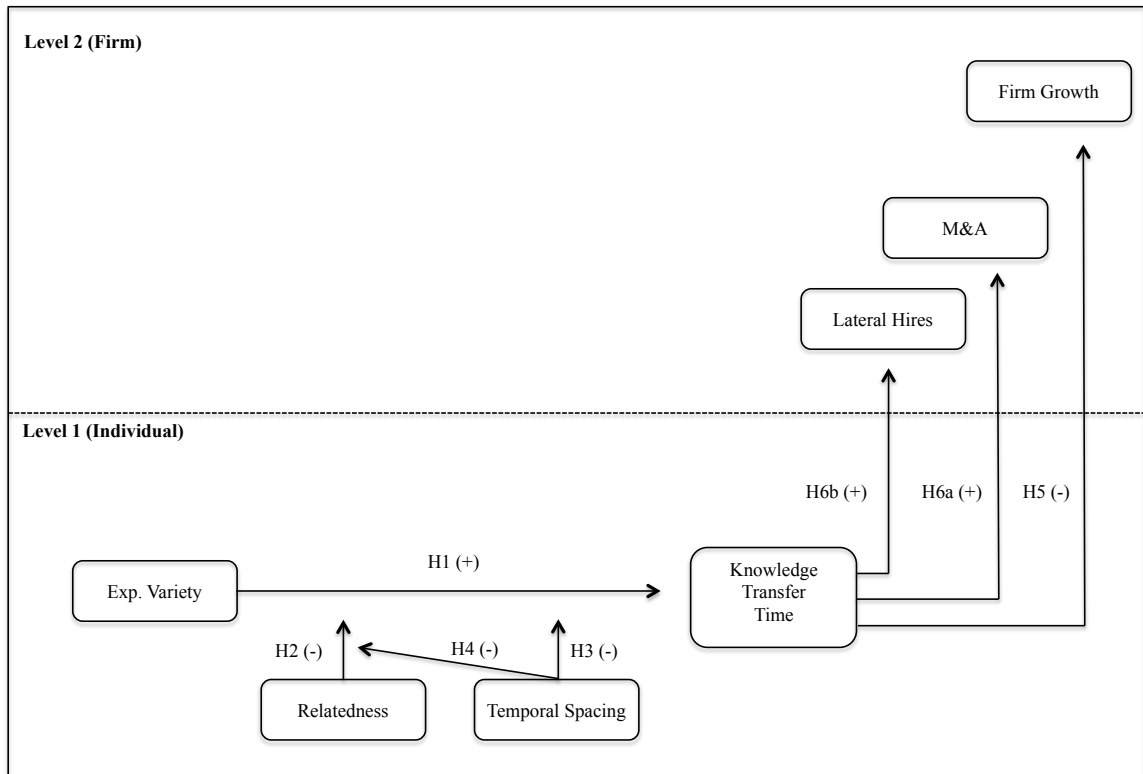
Table 1: Practice Areas by Practice Clusters[a]

Practice Cluster	Example Practice Areas
Corporate/Banking	Antitrust, Business, Commercial, Contract, Corporate, Industries, Franchising, Trade, Unfair Competition, Banking, Bankruptcy, Bonds, Creditor's Rights, Finance, Financial Institutions, Financial Services, Insolvency, Private Equity, Mergers and Acquisitions, Securities, Transactions
Tax/Trust	Tax, Estates, Trusts, Wills, Probate
Property	Construction, Copyrights, Intellectual Property, Land and Resources, Land Use, Patents, Property, Real Estate, Real Property, Trademarks, Zoning
Employment	ERISA, Employee Benefits, Employment, Labor, Worker's Compensation
Litigation	Appellate, Litigation, Trial Advocacy, Arbitration
Government	Administrative Law, Government (Municipal, Federal, State), Government Contracts, Legislation, Lobbying, Election and Political, Regulation
International	International, Immigration, Non-US Countries
Family Law	Family Law, Matrimonial
Liability	Product Liability, Professional Liability, Malpractice, Insurance
Criminal Law	Criminal Law, White Collar Crime, Fraud
Entertainment Law	Entertainment Law, Sports Law
Energy Law	Oil and Gas Law, LNG Law, Nuclear Energy, Biofuels
Transportation	Aviation, Maritime and Admiralty, Trucking, Railroad Law
Technology/Telecommunications	Telecommunications, Internet Law, Wireless Communications, Data Security
Health Care	Health Care, Food and Drug Law, Hospitals and Healthcare Facilities, Medical Law, Mental Health Law
Environment	Environmental Law, Climate Change, Endangered Species
Education	Public School Law, Higher Education Law
Gaming Law / Hospitality	Gaming Law, Par-mutel Racing, Restaurants, Hospitality
Native American Law	Tribal Law, Indian Tribal Governments

a. Based on Sherer (1995) and Kor andLeblebici (2005)

Table 2: Example Calculations of Temporal Spacing Variable

Associate ID	Number of Practice Areas			Proportion 1	Proportion 2	Absolute Difference in Proportions	Temporal Spacing
	Beginning	Middle	End				
1	4	4	4	0.00	0.00	0.00	0.00
2	2	7	8	0.63	0.13	0.50	0.50
3	3	4	7	0.14	0.43	0.29	0.71
4	1	3	5	0.40	0.40	0.00	1.00

Note. Proportion 1 = (Middle - Beginning) / End; Proportion 2 = (End - Middle) / End

Table 3: Correlations, Means and Standard Deviations for Individual-Level Analyses

Variables:	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Knowledge Transfer Time	6.442	3.154																		
2. Gender	0.682	0.466	-0.064																	
3. Prestige of Law School	56.528	52.975	-0.034	-0.016																
4. Unranked Law School Dummy	0.167	0.374	-0.057	-0.001	0.876**															
5. Inbound Prior Experiences	5.111	5.977	-0.537**	0.025	0.070	0.110**														
6. 2010 Promotion Year Dummy	0.379	0.485	-0.004	-0.013	-0.027	-0.039	-0.030													
7. 2011 Promotion Year Dummy	0.273	0.446	-0.048	0.035	0.010	-0.011	-0.002	-0.478**												
8. 2012 Promotion Year Dummy	0.348	0.477	0.049	-0.020	0.018	0.050	0.032	-0.571**	-0.448**											
9. Shared Experiences	0.052	0.079	0.120**	-0.005	-0.173**	-0.116**	-0.171**	0.079*	0.027	-0.106**										
10. Leverage Ratio	0.902	0.486	0.014	0.075*	-0.207**	-0.118**	0.071	0.096**	0.044	-0.139**	-0.051									
11. Slack_Millions	0.918	0.475	-0.036	0.044	-0.110**	-0.011	0.086*	-0.024	0.058	-0.030	-0.075*	0.736**								
12. Upward Reviews	0.203	0.403	0.049	0.067	-0.048	-0.016	-0.004	0.119**	-0.118**	-0.011	0.055	0.246**	0.189**							
13. Professional Development Staff	0.953	0.211	0.033	0.030	-0.047	-0.040	0.050	0.065	-0.084*	0.012	-0.034	0.041	-0.036	0.031						
14. Training as Billable Hours	0.281	0.450	-0.118**	-0.012	0.014	0.014	0.070	-0.004	0.035	-0.028	-0.053	0.040	-0.005	-0.164**	0.023					
15. Firm Size_ln	6.144	0.522	-0.090*	-0.012	0.071	0.077*	0.123**	-0.054	-0.002	0.057	-0.258**	-0.036	0.258**	-0.094*	0.141**	-0.065				
16. Evaluation Frequency	0.265	0.442	0.082*	0.023	-0.019	-0.028	-0.113**	-0.026	0.030	-0.002	0.256**	-0.090*	-0.075*	0.223**	0.059	-0.120**	-0.249**			
17. Experience Variety	3.497	3.931	0.104**	-0.014	0.068	0.037	0.008	-0.080*	-0.020	0.100**	0.005	-0.108**	-0.152**	-0.081*	-0.055	0.123**	-0.095*	-0.021		
18. Relatedness	0.718	0.277	-0.111**	0.019	-0.014	-0.013	0.022	0.127**	-0.015	-0.115**	0.110**	0.069	0.076*	0.032	0.026	-0.059	0.099**	0.037	-0.428**	
19. Temporal Spacing	0.164	0.254	0.225**	0.040	0.001	-0.012	-0.167**	-0.094*	0.055	0.044	-0.051	-0.010	-0.051	-0.015	0.058	0.022	-0.040	0.061	0.266**	-0.319**

* $p < 0.05$

** $p < 0.01$

Table 4: Results of Fixed Effects Regression Analyses for Knowledge Transfer Time, Experience Variety, Relatedness and Temporal Spacing

Variables:	Model 1		Model 2		Model 3		Model 4	
Gender	-0.438*	(0.209)	-0.512*	(0.218)	-0.548*	(0.216)	-0.535*	(0.218)
Prestige of Law School	0.002	(0.004)	0.004	(0.004)	0.004	(0.004)	0.004	(0.004)
Unranked Law School Dummy	-0.138	(0.558)	-0.281	(0.585)	-0.120	(0.583)	-0.121	(0.585)
Inbound Prior Experiences	-0.289***	(0.017)	-0.241***	(0.018)	-0.238***	(0.018)	-0.238***	(0.018)
2010 Promotion Year Dummy	0.041	(0.338)	-0.151	(0.350)	-0.135	(0.347)	-0.118	(0.348)
2011 Promotion Year Dummy	-0.417	(0.283)	-0.466	(0.292)	-0.458	(0.290)	-0.429	(0.292)
Shared Experiences	3.147*	(1.526)	2.595†	(1.561)	2.887†	(1.552)	2.914†	(1.556)
Leverage Ratio	1.006	(1.025)	0.732	(1.068)	0.707	(1.063)	0.729	(1.066)
Slack_Millions	1.934	(2.772)	1.772	(2.893)	1.551	(2.871)	1.597	(2.876)
Upward Reviews	-0.718	(0.617)	-0.725	(0.652)	-0.777	(0.649)	-0.664	(0.662)
Professional Development Staff	0.551	(1.174)	0.472	(1.140)	0.886	(1.142)	0.696	(1.162)
Training as Billable Hours	-0.455	(0.721)	0.463	(0.799)	0.540	(0.794)	0.479	(0.801)
Firm Size_ln	-2.436	(2.611)	-1.268	(2.644)	-1.634	(2.626)	-1.688	(2.632)
Evaluation Frequency	1.218	(1.326)	1.497	(1.387)	1.681	(1.377)	1.726	(1.380)
Experience Variety	0.061*	(0.028)	0.039	(0.036)	-0.055	(0.051)	-0.042	(0.053)
Relatedness			-0.197	(0.440)	-0.472	(0.448)	-0.557	(0.458)
Temporal Spacing			0.928	(0.464)	1.009†	(0.485)	1.070†	(0.509)
Experience Variety X Temporal Spacing					0.103	(0.142)	0.275	(0.256)
Experience Variety X Relatedness					-0.387**	(0.146)	-0.350*	(1.526)
Relatedness X Temporal Spacing							-0.384	(1.801)
Experience Variety X Relatedness X Temporal Spacing							0.655	(0.712)
R^2	0.455		0.547		0.557		0.558	
F	21.59***		12.84***		12.14***		11.00***	
Observations	729		490		490		490	

Note. Standard errors given in parentheses. Fixed effects absorbed via the STATA *areg* function. Gender dummy equals 1 for male and 0 for female

† $p < 0.10$

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$
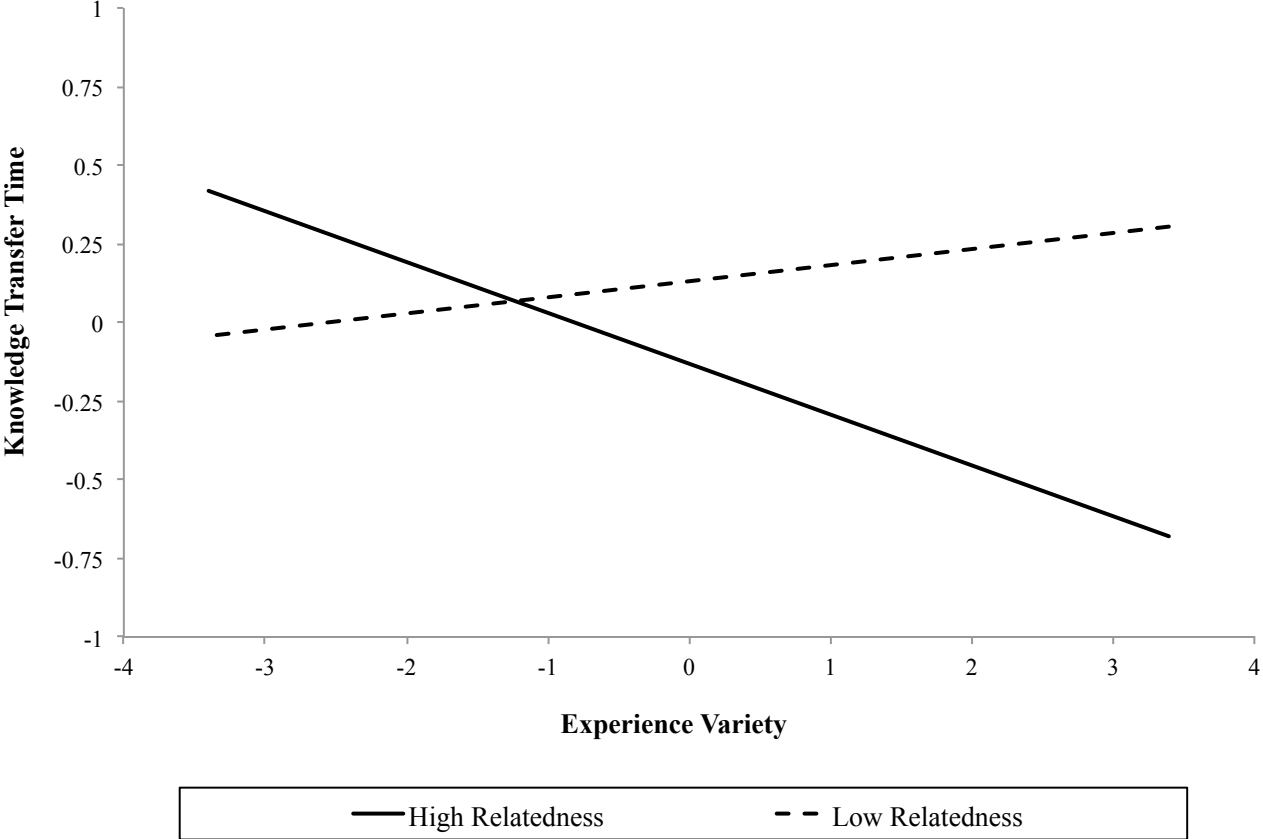
Figure 2: Experience Variety and Relatedness Interaction

Table 5: Correlations, Means and Standard Deviations for Firm-Level Analyses

Variables:	Mean	s.d.	1	2	3	4	5	6	7	8
1. Firm Growth	0.029	0.038								
2. Firm Size_ln	5.982	0.508	0.199*							
3. Leverage Ratio	1.029	0.659	0.016	0.146						
4. Slack_Millions	1.006	0.631	0.121	0.149	0.771**					
5. Lateral Partner Hires	22.000	19.797	0.231**	0.660**	-0.123	-0.021				
6. Partner Departures	13.757	14.799	-0.113	0.661**	0.001	0.071	0.626**			
7. Mergers & Acquisitions	0.265	0.534	0.249**	0.104	-0.192*	-0.259**	0.107	0.040		
8. Mean Inbound Work Experience	4.634	2.049	0.123	0.106	0.056	0.052	0.127	0.048	0.093	
9. Aggregate Knowledge Transfer Time	6.661	1.316	-0.379**	-0.144	0.053	-0.103	-0.177*	0.013	-0.094	-0.447**

* $p < 0.05$

** $p < 0.01$

Table 6: Results of OLS Regression Analyses for Firm Growth and Aggregate Knowledge Transfer Time

Variables:	Firm Growth	
Firm Size_ln	0.181*	(0.008)
Leverage Ratio	-0.006	(0.007)
Slack_Millions	0.015*	(0.007)
Lateral Partner Hires	0.001**	(0.000)
Partner Departures	-0.001***	(0.000)
Mergers & Acquisitions	0.017**	(0.005)
Mean Inbound Work Experience	-0.001	(0.002)
Aggregate Knowledge Transfer Time	-0.007**	(0.002)
R^2	0.350	
F	8.53***	
Observations	136	

Note. Standard errors given in parentheses.

† $p < 0.10$

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Table 7: Results of Poisson Regression Analyses for Mergers and Acquisitions, Lateral Partner Hires and Aggregate Knowledge Transfer Time

Variables:	Mergers & Acquisitions		Lateral Partner Hires	
	Model1		Model 2	
Firm Size_ln	0.633	(0.521)	1.006***	(0.053)
Leverage Ratio	0.227	(0.769)	-0.330***	(0.054)
Slack_Millions	-2.498**	(0.938)	-0.073	(0.050)
Lateral Partner Hires	0.004	(0.011)		
Partner Departures	0.004	(0.015)	0.006***	(0.001)
Mergers & Acquisitions			-0.051	(0.035)
Mean Inbound Work Experience	0.070	(0.101)	0.032**	(0.011)
Aggregate Knowledge Transfer Time	-0.039	(0.153)	-0.043*	(0.017)
Pseudo R^2	0.131		0.436	
Likelihood Ratio Chi-Square	22.98**		1198.72***	
Observations	136		136	

Note. Standard errors given in parentheses.

† $p < 0.10$

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

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