THAT OTHERS MAY LEARN:

THREE VIEWS ON VICARIOUS LEARNING IN ORGANIZATIONS

by

Christopher G. Myers

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Business Administration)
in the University of Michigan
2015

Doctoral Committee:

Professor Emerita Kathleen M. Sutcliffe, Chair
Professor D. Scott DeRue
Professor Jane E. Dutton
Assistant Professor Amir A. Ghaferi
Professor James D. Westphal

This dissertation is dedicated to all those who learn,
that others may live.

ACKNOWLEDGEMENTS

When I first began pursuing a PhD, I had in my mind the popular image of an "academic" – the archetypical lone scholar working in isolation to discover some new truth about the world. Five years later, I look back on that view and realize that it couldn't be more wrong. Admittedly, I may be biased by the topic of this dissertation, but I see now that the completion of a PhD (and academic life more broadly) is a fundamentally social journey, replete with vicarious learning. It is my privilege now to get to recognize many (though certainly not all) of the people who have propelled me on my own PhD journey, and from whom I have learned tremendously.

First and foremost, thanks are due to my family, who supported me long before I decided that I was going to pursue a PhD. I am so grateful for their love and encouragement, particularly from my wonderful wife Yemeng, who graciously bore the burden of living 600 miles apart while I moved to Michigan for graduate school. She has been a constant source of support and encouragement for me during this journey – all the while working incredibly hard herself, completing both an MD and MPH degree and earning a position as an ENT/head and neck surgeon. I am lucky to have such an amazing person as a partner in this adventure. I am thankful also for the love and advice of my parents, who taught by their example the importance of pursuing my education, and who have been incredibly supportive of my work, even when they don't always know exactly what it is that I am doing. Indeed, from a young age, they told me "we don't care what you do, so long as you give it your best," and it is that encouragement to always do my best that has guided me when the challenges of the last five years seemed

insurmountable. Finally, my brother Sean and sister Katie have always had my back and energized me, whether it was distracting me from the stress of the PhD with card game marathons at holidays, or inspiring me with their amazing pursuits and successes. I am privileged to have such a wonderful family, and it is only through their love and support that I have accomplished any of what appears in this dissertation.

I also am tremendously grateful for my dissertation committee members, who believed in the tiny germ of an idea I had, and have nurtured that idea (and me along with it) into the dissertation that follows. From my first meeting with Kathie, when I had nothing more than some scribbles on a sheet of paper, she has encouraged and inspired me to take on a big, meaningful idea, while also supporting me through the chaos that sometimes ensued. Indeed, Kathie has been incredibly patient with me as I moved from "superficial simplicity" through the seemingly unending stage of "confused complexity" and always gave me the confidence that eventually I would arrive at "profound simplicity." As a dissertation chair, Kathie always knows what I need at any particular moment – whether it be encouragement, insight and wisdom, or just a friendly listener to my cycles of excitement and frustration as the dissertation unfolded – and I have benefitted tremendously from her mentoring and advice. Scott has been a mentor from the first day of my doctoral program, and has invested heavily in my development and growth as a scholar. Whether in writing, research design, or analysis, he has taught me by experience, always allowing me to give something a try and taking the time to give me feedback and insight on how to improve. He has also served as a role model for what a small-town North Carolina guy and UNC graduate (both traits we share) can accomplish in life (not the least of which was giving me hope that I could survive a Michigan winter). Jane amazes me by how much she has invested in me and in this dissertation, and her encouragement to think deeply about theory has improved

my work immeasurably. I am also grateful for Jane's enthusiasm about ideas – her excitement is contagious and always served as a motivational booster when I was feeling stumped or stuck. Jim is a perfect example of a clear thinker and insightful writer, and his feedback and example have shaped my own aspirations for how to artfully convey complex ideas in my work. Finally, Amir's work has motivated me to conduct research that is meaningful and relevant to the world, and his perspective on my dissertation has helped me make sure that in the pursuit of theoretical and empirical contribution, I don't lose sight of the power of research to change real-world practices that have significant implications for people and society.

In addition to my dissertation committee, I have been fortunate to have a number of other mentors, at Michigan and elsewhere, who shaped my development as a researcher and teacher. Though their names do not appear on the front of this document, they have nonetheless served as advisors, collaborators, and role models, and I would be remiss if I did not mention them here. Among many others, I am particularly thankful for the scholarly advice and mentoring of Sue Ashford, Wayne Baker, Jerry Davis, Amy Edmondson, Francesca Gino, Adam Grant, Shirli Kopelman, Dave Mayer, Lance Sandelands, Gretchen Spreitzer, Brad Staats, Leigh Tost, and Karl Weick. I am also fortunate to have had several wonderful mentors earlier in life – particularly Dave Yeargan and Master Youn Am You – who, through their teaching of outdoor education and martial arts, shaped the person I have become and gave me my first opportunities to shape others through my own teaching.

One of the highlights of my time at Michigan has been the camaraderie, learning, and support of my fellow PhD students. Matt Karlesky, Suntae Kim, Kristina Workman, and my cohort-mate Johan Chu have been consistent companions on this path we chose to walk, and made the journey that much more enjoyable by their friendship. I have also learned from many

other past and present PhD students, including Cassandra Aceves, Michelle Barton, Jeff Bednar, Lindsey Cameron, Marlys Christianson, Adam Cobb, Teddy Dewitt, Lyndon Garrett, Ashley Hardin, Eun Woo Kim, Yong Hyun Kim, Chak Fu Lam, Mrudula Nujella, Samir Nurmohamed, Madeline Ong, Laura Rees, Brent Rosso, Dan Rush, Flannery Stevens, Jason Stornelli, Tim Vogus, Ned Wellman, and Chen Zhang. Indeed, many of the most helpful insights I have received on my work (and on academic life in general) have come from conversations with other students, and I am incredibly grateful to the Ross PhD community (and particularly the inhabitants of R4431), as well as the broader M&O brownbag and Positive Organizational Scholarship communities, for these generative conversations.

Although confidentiality concerns prevent me from naming individuals directly, the staff and leadership of Sigma Flight and Gamma Flight have been wonderfully helpful in allowing me to conduct my field research. In particular, the leadership and staff of Sigma Flight took a gamble on an unknown graduate student, and invited me to participate in many moments of their professional lives –good, bad, and sometimes ugly – embracing my presence and encouraging me in my research. The trust and patience of these Flight Nurses and Paramedics were crucial for revealing many of the findings and insights of my study, and despite my efforts to schlep as much equipment as possible to make myself useful during my observations, I know I will never be able to repay what I learned from these individuals. Indeed, it is in their honor that I chose the title of this dissertation – a play on the US Air Force Pararescue motto "These things I do, that others may live" – and dedicated this work to those who, like these air medical transport teams, engage in vicarious learning in order to better care for the ill and injured.

I also owe tremendous thanks to those who assisted with my research on MBA consulting teams. In particular, I am thankful for the help of Scott DeRue in facilitating access and data

collection, Hakjin Chung, Ashley Hardin, and Chen Zhang for their help and guidance with data analysis and measure development, and YaLe Lim and Allison Sheehan for their assistance with coding. Lastly, to anyone I have omitted here, please accept my humblest apology and know that I truly appreciate your advice, guidance, and support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

Vicarious learning – the process by which an individual learns from another's experience – has long been recognized as a source of development and performance improvement in organizations, at both individual and collective levels. Yet existing perspectives on this critical learning process have been fairly limited, typically casting vicarious learning as a simple process of observation and imitation, enabled by formal organizational knowledge-transfer conduits. Largely absent from prior approaches is a consideration of the interpersonal dynamics underlying vicarious learning, leaving unexplored important questions related to 1) the actual behaviors unfolding when individuals interact to learn from one another's experience, 2) how people coordinate efforts to enact and facilitate these vicarious learning interactions, and 3) the performance impact of different patterns of engagement in these interactions.

In this dissertation, I advance a perspective on vicarious learning that views it as relationally co-created, emergently organized, and dyadically reciprocal, exploring the issues identified above in three distinct chapters. First, I present a theoretical model of what I term coactive vicarious learning, integrating theories of experiential learning and symbolic interactionism to articulate a co-construction process of vicarious learning, arising from individuals' discourse and shared meaning-making. I explore the specific behaviors that constitute interpersonal vicarious learning interactions, as well as detail key antecedents to individuals' engagement in these relational interactions and their impact on development and performance (at both individual and collective levels). Notably, I theorize that these interactions not only increase individuals' knowledge, but also build individual and relational capacity for

future learning, offering a novel explanatory mechanism for the effects of vicarious learning in organizations that moves beyond existing mechanical, information-transfer models towards a more dynamic, growth-focused view of learning.

Second, I present an inductive exploration of how these vicarious learning interactions unfold at work, drawing from a multi-year observation and interview study of two air medical transport teams to qualitatively investigate the organizing processes used to facilitate vicarious learning. In doing so, I advance a view of vicarious learning not as wholly determined by formal structures, but rather as an emergently organized phenomenon, enacted through interpersonal storytelling and facilitated by the coalescence of informal practices and formal structures. Specifically, the grounded process model emerging from this study highlights the importance of mutually agreed-upon times, places, and triggers for enacting vicarious learning interactions, and reveals the mechanisms by which formal structures and informal practices both enable (by building collective capacity and patterns of interrelating that support these interactions) and elaborate (by facilitating the development of routines and the crystallization of knowledge emerging from the interactions) interpersonal vicarious learning, ultimately shaping both individual- and collective-level learning processes.

Third, I present a quantitative examination of different distributions of vicarious learning in work teams. Building on network-based views of learning in teams, I examine the causes and consequences of reciprocity in vicarious learning relationships – where each individual learns from the other's experience (in contrast to the prevailing view of vicarious learning as one-way information transfer). Results from a multi-level study of 441 individuals in 88 consulting project teams demonstrate that individuals' degree of reciprocity in their vicarious learning relationships with other team members is positively influenced by shared norms for learning in the team,

although this influence was attenuated by individuals' intrinsic other-focused motives for learning (i.e., a desire to learn in order to help others), which served as a compensatory driver of reciprocity. Moreover, team-level analyses revealed that greater reciprocation of vicarious learning within a team – above and beyond other aspects of a team's vicarious learning network (i.e., density and centrality) – was associated with increased team performance, both directly and indirectly (by enhancing the performance benefit of the team's external learning activities).

The three chapters presented in this dissertation offer a number of important contributions to the study of learning in organizations (as elaborated at the close of each chapter), and together they provide an integrated and important advancement of the field's understanding of how people learn from each other in organizations. Indeed, despite its name, the theoretical fount of vicarious learning research – social learning theory – has been largely asocial in its application to learning in organizations, focusing instead on intra-personal processes of observation and imitation. The research in this dissertation thus brings novel, interpersonally dynamic theorizing and empirical evidence to this fundamental theory of workplace learning, recognizing that individual-level learning at work is a fundamentally interpersonal process and articulating new modes and mechanisms for understanding vicarious learning in organizations. In this way, this dissertation lays a foundation and provides a set of theoretical and empirical tools for future research to continue exploring the dynamics of individuals' workplace learning interactions, advancing the study and practice of vicarious learning in organizations.

CHAPTER 1

INTRODUCTION AND BACKGROUND

> Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. (Bandura, 1977b, p. 22)

Organizational scholars have long been interested in understanding how individuals learn and develop in the workplace, and substantial prior research has demonstrated that enhanced learning at individual, team and organizational levels yields increased performance and organizational success (Argote & Ingram, 2000; Lipshitz, Friedman, & Popper, 2007). Indeed, learning – the process by which experience alters an agent's views and behavior (Argote, 1999; Bresman, 2013) – not only facilitates individuals' knowledge and growth at work (Huber, 1991; Sitkin, Sutcliffe, & Weick, 1998), but has also been advanced as a critical mechanism enhancing individual job performance (Colquitt, LePine, & Noe, 2000) and team success (Edmondson, 1999), as well as broader routine change (M. D. Cohen et al., 1996) and organizational improvement (March, 1991).

One critical method by which agents learn in organizations is through the vicarious processing of others' actions and consequences (vicarious learning; Bandura, 1977b), in addition to the agent's own lived experience (Ancona & Bresman, 2007; Levitt & March, 1988; Madsen & Desai, 2010; Manz & Sims, 1981). This vicarious learning holds considerable promise, as it can reduce the amount of redundant learning and repeated mistakes, allowing individuals and organizations to reap the benefits of not "reinventing the wheel" (Bresman, Birkinshaw, & Nobel, 1999). A long line of research has shown that when organizational agents effectively

learn from the experiences of others, they are able to speed their own learning curve (Argote, Beckman, & Epple, 1990), improve output quality (Bresman, 2013), and facilitate greater organizational performance (Argote, Ingram, Levine, & Moreland, 2000). This benefit of vicarious learning has not gone unnoticed by organizations themselves, and the business press routinely documents efforts of organizations to promote employees' sharing and learning from one another's experiences. For instance, a Yahoo! internal memo – explaining CEO Marissa Mayer's decision to reduce employee telecommuting – noted that employees' "hallway and cafeteria discussions" allow people to compare and combine experiences, leading to better decisions and innovation, at the same time that Google was announcing a new corporate campus, architecturally engineered to maximize "casual collisions of the workforce" in an effort to promote sharing knowledge, experiences and ideas across units (Lindsay, 2013).

Yet, despite this strong interest from both academics and practitioners, prevailing perspectives on vicarious learning at work are surprisingly limited in several important ways. To illustrate these broad limitations, I first provide an overview of three streams of organizational research examining how organizational actors learn from others– research on observational learning in organizations, on organizational knowledge management and transfer, and on individual knowledge sharing and group learning. The goal of this brief review of the literature is to acknowledge the different ways in which vicarious learning has been considered in organizational studies, while also identifying common assumptions, gaps and limitations in these prior approaches, which I use to motivate the research presented in this dissertation.

Vicarious Learning in Organizational Research

Albert Bandura (1977b) is widely credited with introducing the notion of vicarious learning with his theory of social learning, defining vicarious (observational) learning as a

process of learning through the observation and imitation of a model and noting that "most human behavior is learned observationally through modeling" (22). In his initial work, Bandura focused on direct observation and replication of behavior through a four-stage process of attention (identifying a model), retention (encoding the model's actions), motor reproduction (accurately duplication action) and motivation (reinforcing action; Bandura, 1977b). In his later work (e.g., Bandura, 1989b), he expanded this view to include not only direct observation of a model, but also symbolic processes as well – referring to the reproduction of a model's experience through written or pictorial means (e.g., a written case summary or televised display of action). Bandura based his social learning theory on emerging evidence from psychological studies (many conducted by Bandura himself in the context of childhood development) that had demonstrated how people quickly reproduce actions, attitudes and emotional responses displayed by a model (Bandura & Walters, 1963; Bandura, Ross, & Ross, 1963). He believed this process was fundamental to organized human action, as it allowed greater advances in knowledge than individual reinforcement-based learning, noting that "unlike learning by doing, which requires altering the actions of each individual through repeated trial-and-error experiences, in observational learning a single model can transmit new ways of thinking and behaving simultaneously to many people in widely dispersed locales" (Bandura, 1989b).

Observational Learning in Organizations

This social learning perspective on human behavior was imported from psychology into organizational research in the early 1980s via three theoretical articles integrating various aspects of social learning theory with the work context. Davis and Luthans (1980) noted that vicarious learning could be an important perspective for organizational studies, as it recognized that individuals often learn more from informal observation of others than through formal means,

noting that "job descriptions, rules and policies are more likely to be interpreted from watching what others do than following written directions" (284). Similarly, Manz and colleagues (Gioia & Manz, 1985; Manz & Sims, 1981) elaborated this perspective, describing vicarious learning in organizations as a cognitive process of interpreting and imitating behavioral scripts, suggesting significant implications for training and other organizational behaviors, noting that "learning through modeling does occur on a daily basis in organizations" (Manz & Sims, 1981, p. 109).

Applications of this individual-level approach to vicarious learning in organizations have tended to focus almost exclusively on the use of observation and modeling in organizational training (for a notable exception, see KC, Staats, & Gino, 2013 on surgeons' learning from their own successes and their colleagues failures during cardiac surgery). In the training context, Sorcher and Goldstein (1972) provided an early demonstration of how behavioral modeling could be used for organizational training, as a tool for teaching interpersonal skills that were difficult to train by more formal lecture methods. Following this approach, Latham and Saari (1979) conducted a study where they randomly assigned managers to a behavioral modeling program focused on teaching effective managerial (e.g., interpersonal) behaviors through the use of film recordings of effective managerial interactions. Relative to a control group (who received no training) the modeling group received higher performance ratings and scored better on a managerial simulation (requiring interpersonal skills) at multiple time points over the following year (although after the control group received the modeling training, these differences disappeared; Latham & Saari, 1979). This modeling approach has continued to be popular in organizational training, used for training a wide range of skills (see Taylor, Russ-Eft, & Chan,

2005 for a meta-analysis).[1] For instance, Nadler and colleagues (2003) used a behavioral observation approach to train negotiation skills, finding that students in the observation condition (compared to information, analogical and didactic modes of learning)[2] had significantly higher performance. Interestingly however, participants in the observational condition were the *least* able to articulate the principles they had learned, suggesting a key limitation of observational approaches – that learners often don't know exactly *why* they are imitating an action.

Outside of this focused sub-stream of literature on individual-level behavioral modeling in the training context however, the most substantial interest in vicarious learning has come from its application to the organizational or unit levels of analysis. Despite operating at a higher level of analysis, this research often employs the same mechanisms of observation and imitation, paralleling individual-level studies by attributing these actions to the organization itself (i.e., as the "actor" doing the observation or imitation; Lipshitz et al., 2007) – demonstrated clearly in the introduction of many studies that make statements such as, "Just as individuals learn vicariously from the experience of others, organizations also learn vicariously from the experience of other organizations" (Argote, 2015, p. 154). Building from the notion that organizations engage in two major forms of learning, exploitation of current knowledge and exploration of new knowledge (March, 1991), these studies have investigated how organizations bring in this new knowledge

---

[1] Interestingly, academic interest in, and theoretical development of, this topic has been largely eclipsed by practical interest and application. Indeed, in their meta-analysis of behavioral modeling training, Taylor and colleagues (2005) found a total of 119 studies of modeling, of which only 36 were published studies, while 60 were unpublished organizational training reports (the remainder were unpublished dissertation and thesis studies).

[2] In the observational condition, participants watched a videotaped version of the negotiation. By contrast, in the information condition, participants were given direct information about both party's interests in the negotiation, while in the analogical condition they read short vignettes describing other negotiation situations. In the didactic condition, participants were given a one-page synopsis of key negotiation principles taken from a textbook (Nadler et al., 2003).

by observing actions of others in their environment, imitating or avoiding specific actions or practices based on their perceived impact (Ancona & Bresman, 2007; Cyert & March, 1963; Haunschild & Miner, 1997; Huber, 1991; Levitt & March, 1988; Madsen & Desai, 2010). Moreover, while this tendency to engage in vicarious learning is fairly universal, success in these efforts depends also on a firm's ability to incorporate this new knowledge into their existing knowledge base (i.e., absorptive capacity; W. M. Cohen & Levinthal, 1990).

In terms of empirical findings, much of this research has focused on firms' propensity to imitate the successful actions of others. For instance, in their examination of the acquisition decisions of multi-unit nursing home chains, Baum and colleagues (2000) found that in addition to imitating their own prior successes (i.e., acquiring new nursing homes similar to their recent successful acquisitions), they also imitated the observed actions of other chains (i.e. acquiring nursing homes near the locations of other nursing home chains). Likewise, Zimmerman (1982) found that overall industry experience affected the knowledge of firms constructing nuclear reactors, reducing the costs of opening new plants (although the firm's own experience was more significantly related to performance). Finally Greve (1998; 2000) has noted in several contexts that firms imitate the actions of successful others in their environment, observing that US radio stations implemented new innovations of other successful stations (Greve, 1998) and that small banks in Tokyo established branches in the same geographic areas as large banks (Greve, 2000).

However, this research has also looked at how firms learn from others' failures. For instance, Ingram and Baum (1997) note that hotels joining chains are more successful because of both the opportunity to imitate successes and to avoid repeating prior mistakes. Likewise, Kim and Miner (2007), in their study of the banking industry, found that banks were positively influenced (i.e., had higher survival rates) when there were greater near-failures and failures in

their local area, noting that other firm's failures serve as vicarious "wake up calls", encouraging survivors to search for new actions or devise new business routines. In an interesting study, Madsen & Desai (2010) looked at failure rates in orbital launch vehicles, finding that others' failures drive significant reduction in the failed launch rates of a given organization, but (consistent with the notion of absorptive capacity; W. M. Cohen & Levinthal, 1990), these external learning processes depend on the degree of the firm's internal learning.

Finally, in addition to these purely organization-level studies, more recent work has explained organizational vicarious learning by examining processes and practices at lower (i.e., team or individual) levels of analysis. For instance, within organizations, teams are also thought to engage in both internal and external learning (Ancona & Bresman, 2005; Bresman & Zellmer-Bruhn, 2012; Wong, 2004), using the experiences of others to supplement their own learning activities. Bresman (2010; 2013) has found that engaging in this vicarious observational learning (e.g., learning about the team's task from the prior performance of others) helped to strengthen team performance in the pharmaceutical industry (Bresman, 2010), and that the process by which these teams adopt new performance routines from other firms largely mirrors the four stage process developed by Bandura (1977b) – with teams engaging in processes of identification, translation, adoption and continuation (Bresman, 2013). Interestingly however, Bresman (2013) notes that rather than simple imitation (the second stage in Bandura's process), teams that engage in vicarious learning through in-depth interaction with an outside party (i.e., when both seeker and source interact and engage in discussion to develop an understanding of a problem) are able to not only imitate the actions of these external parties, but also effectively adapt (translate) them to their own context (Bresman, 2013).

Research by Westphal and colleagues (see Westphal & Zajac, 2013 for a recent review) has similarly noted the importance of this interaction and translation, examining overlapping membership of an individual on multiple corporate boards (i.e., a board interlock) as a key site of vicarious learning between organizations. Indeed, board interlock ties have been characterized as a prime vehicles of social learning and imitation, serving as "information conduits" that facilitate learning (cf. Westphal & Zajac, 1997). Though much of this research examines simply the presence (or absence) of a board tie as reflecting the existence of social learning (see Haunschild, 1993 for a notable example), Westphal and colleagues (2001) looked beyond just the presence of the tie (as a conduit) and examined the underlying individual-level actions taken by board members sitting on multiple boards. Specifically, these authors demonstrated that interlocking directors adapted their decision-making processes (in the focal firm) after participating in decision activities at the outside (tied-to) firm, suggesting that this engagement in the activities of the outside firm (vs. just passive observation) was important for learning, particularly for more tacit learning (i.e., learning of decision-making processes; Westphal et al., 2001).

Knowledge Management and Transfer

In line with this more recent work on observational learning, perspectives on knowledge management in organizations have focused inward (within the organization), on the structures and conduits linking organizational sub-units, to understand how to identify and leverage units' collective knowledge and experience (Krogh, 1998). In the context of knowledge management, vicarious learning is thus achieved through the transfer of experience and "best practices" among units within a broader organizational context (Argote & Miron-Spektor, 2011). Indeed, as noted by Argote and Ingram (2000), this knowledge resides in multiple reservoirs within a unit or organization (i.e., within members, tools and tasks) and so the transfer of this knowledge occurs

through structured interrelationships of these various reservoirs within and between groups. In other words (following the typology offered by Davenport, David, & Beers, 1998), knowledge management promotes vicarious learning in three broad ways: 1) by making knowledge visible in an organization (e.g., through communal documents such as knowledge maps), 2) by encouraging knowledge transfer (e.g., through personnel rotation) and 3) by building the necessary infrastructure (e.g., technical and social systems) to encourage the sharing of knowledge.

The majority of knowledge management research that relates to vicarious learning focuses on creating knowledge transfer channels (see Alavi & Leidner, 2001 for a review). These channels can be informal, such as unscheduled meetings or "water cooler conversations," or more formally structured, such as company intranets (e.g., "knowledge portals") or systematic personnel rotation (Fahey & Prusak, 1998). Companies emphasizing the more "computational" approach to knowledge management (Hazlett, McAdam, & Gallagher, 2005) have focused on the information systems necessary to promote vicarious learning, building repositories of units' practices and knowledge for storage and future retrieval (by others; Matzler & Mueller, 2011). For instance, Chiu and colleagues (2006) note that Caterpillar (a *Fortune 100* construction company) launched its online *Knowledge Network* in 1999, allowing employees to connect with others working on similar tasks, enabling substantial gains in coordination and decreased redundancy (i.e., Ardichvili, 2008 reports that the program achieved 200% ROI in a few years).

Another way that channels are created for the transfer of knowledge and vicarious learning within and between organizations is through the systematic use of personnel rotation – moving individual employees between different teams, units, or subsidiaries (Kang, Morris, & Snell, 2007). Indeed, individuals' overlapping team memberships have been noted as key

conduits for the transfer of a wide variety of experiences, process-related insights and innovations (O'leary, Mortensen, & Woolley, 2011). By strengthening the ties between different units, personnel rotation helps build a common framework of understanding and stronger inter-unit ties, as evident in Dyer and Nobeoka's (2000) examination of job rotation at Toyota, which revealed that moving personnel between subsidiaries and main production teams increased communication clarity and motivation to share critical knowledge. Likewise, in a study of accounting firms, creating strong ties through mechanisms such as CPA rotation (movement of CPAs between an accounting firm and a client firm) was revealed to substantially reduce accounting firm dissolution (Pennings, Lee, & van Witteloostuijn, 1998). In an experimental study of student teams, Kane (2010) elaborated on the process by which this rotation helps promote greater learning, finding that when the rotating employee shared a superordinate social identity with the team he or she was joining (e.g., they were both part of the same umbrella organization), more complex, tacit information was able to be transferred, as the shared identity motivated the team to more mindfully consider the new member's information.

In terms of more organic, less technical structures (Hazlett et al., 2005), organizational scholars have examined how groups promote vicarious learning and knowledge management by the use of "communities of practice" (Brown & Duguid, 1991) as a vehicle for knowledge transfer. These communities reflect relatively informal groups of practitioners who gather – either in person or via a virtual community (e.g., Ardichvili, 2008; Chiu et al., 2006) – to engage in discussion and share stories of their work. As Orr (1996) notes in his seminal ethnographic study of Xerox copier repairmen (an earlier version of which formed the basis of Brown & Duguid's 1991 article), sharing stories in these communities serves a number of functions – including reputation and image gains, the provision of social support, and collective

identification – but an undoubted benefit is the creation of a structure for seeking and disseminating knowledge and "best practices" learned through experience (Orr, 1996).

Finally, within this structural approach to understanding vicarious learning, scholars have recognized that these learning conduits are made more or less effective by the quality of the relationships between units (and the individuals that comprise them; Argote, McEvily, & Reagans, 2003). Indeed, recent research has demonstrated that investment in knowledge management and transfer systems has not always led to smooth knowledge sharing activities (A. K. Gupta & Govindarajan, 2000; Matzler & Mueller, 2011), and work on the relational embeddedness of these inter-unit or inter-organizational ties (Uzzi, 1997) suggests that the quality of the dyadic relationship between agents can influence the success or failure of these transfer efforts. For example, Uzzi and Lancaster (2003) found that loan officers with more relationally embedded ties to an entrepreneurial client were better able to transfer private knowledge, while those with more formal ties transferred only public knowledge. Similarly, in a study of hotel chains, Ingram and Roberts (2000) demonstrated that hotel managers with close ties were more likely to transfer unpublicized client data. Even within more unstructured, organic systems like communities of practice, attention to these relationships has been raised as an important issue, with recent research (i.e., Bailey & Barley, 2011) recognizing that the specific enactment of teaching-learning relationships (rather than just broad participation in the community) can differentially impact learning in communities of practice.

Knowledge Sharing and Group Learning

The last arena where vicarious learning has surfaced in prior literature is in the study of individual knowledge sharing in groups and organizations. Though seemingly similar to the study of knowledge transfer, the emphasis in knowledge sharing research is on factors at the

individual level that promote vicarious learning, rather than the unit-level focus of most knowledge transfer studies (e.g., Argote et al., 2000). Indeed, as Posen and Chen (2013) have noted, vicarious learning involves knowledge transfer through observable means (e.g., observing information posted on a rival's website; D. H. Simon & Lieberman, 2010), but also through individuals' interpersonal knowledge sharing. This domain therefore views vicarious learning as resulting from the intentional sharing of knowledge by one individual and/or the seeking of knowledge by another. Yet, people may be more or less inclined to share their experiences with others at work, as this requires time, effort and a willingness to cede "ownership" of knowledge (Davenport et al., 1998; Hansen, Mors, & Løvås, 2005; Quigley, Tesluk, Locke, & Bartol, 2007), while seeking knowledge from others requires a corresponding willingness to risk "feeling incompetent or embarrassed" (Hofmann, Lei, & Grant, 2009, p. 1262). The knowledge sharing literature thus examines the willingness and ability of actors to share (or seek) different types of knowledge from one another, and how these activities impact the group's overall learning.

Indeed, a number of studies have examined this willingness and ability to share knowledge with others as resulting from certain individual attributes, such as the sharer's expertise, personality and motivation (Osterloh & Frey, 2000; Quigley et al., 2007), as well as broader social factors such as trust, and team goal orientation (Bunderson & Sutcliffe, 2003; Ipe, 2003). For instance, Siemsen and colleagues (2009) study employee-reported knowledge sharing events in three companies, finding that these employees' motivation to share their knowledge was associated with their confidence in the knowledge and feelings of psychological safety at work. Likewise, Osterloh and Frey (2000) provide an empirical review arguing that different motivational sources drive employees to share different kinds of knowledge (tacit or explicit),

presenting evidence from prior studies that sharer's intrinsic motivation is more strongly linked to sharing tacit knowledge and extrinsic motivation to sharing explicit knowledge.

On the flip side of the relationship, others have studied the role of the knowledge seeker in promoting vicarious learning in teams and organizations. Indeed, Casciaro and Lobo (2008) have found broadly that individuals seek to work with those who are competent in a task, but only if they have generally positive affect towards the other. Hofmann, Lei and Grant (2009) extend this perspective to information seeking, finding that front-line nurses sought help and advice from experts, but only when these experts were accessible and trustworthy. Also taking the point of view of the knowledge recipient, Levin and Cross (2004) surveyed 127 employees in three international firms, asking them to rate several knowledge sharing interactions in which they had been involved, and finding that perceptions of trust and tie strength (reported about a knowledge sharer by the recipient) interacted to drive the receipt of useful knowledge.

Finally, as noted by these studies, much of the sharing and seeking of knowledge in organizations occurs in the context of organizational groups and teams, where learning has been conceptualized as involving "sharing, distributing and coordinating knowledge across individuals" (Argote & Gino, 2009, p. 343). While the primary focus of this group learning literature is on the collective processing of shared experiences (i.e., experiences that the group encountered together), theories of group learning nonetheless involve an element of vicarious learning, in that they also involve these processes of sharing individuals' unique knowledge (Wilson, Goodman, & Cronin, 2007). Thus, the degree of knowledge sharing within the team becomes a critical element for team success, as noted by Edmondson (1999) in her classic study of psychological safety and learning in manufacturing teams. These various streams of literature are summarized (with a representative, though not exhaustive, list of publications) in Table 1.1.

Table 1.1 Approaches to Studying Vicarious Learning in the Organizational Literature

Approach	View of Vicarious Learning and Representative Publications
Observational Learning	Agents observe others' experience, and its consequences, and imitate (avoid) the successful (unsuccessful) actions themselves. Agents are typically organizations or organizational units, apart from a subset of studies applying observational learning in a training context. **Representative Publications:** *Individual Level:* Hoover et al. (2012) KC et al. (2013) Latham & Saari (1979) Nadler et al. (2003) Taylor et al. (2005) Sorcher & Goldstein (1972) *Organization/Unit Level:* Baum et al. (2000) Beckman & Haunschild (2002) Bresman (2010; 2013) Greve (1998; 2000) Haunschild (1993) Haunschild & Miner (1997) Kim & Miner (2007) Madsen & Desai (2010) Posen & Chen (2013) Westphal et al. (2001)
Knowledge Management and Transfer	Agents create systems, structures, and communities that make available others' knowledge and experience (through documentation or communication). Agents are typically intra-organizational units, but can also be independent or franchised organizations. Some emphasis is placed on individuals' learning, as carriers of knowledge between these units (e.g., personnel rotation, embedded ties). **Representative Publications:** Argote & Ingram (2000) Bailey & Barley (2011) Brown & Duguid (1991) Davenport et al. (1998) Gruenfeld et al. (2000) Hansen (1999) Kane (2010) Szulanski (2000) Uzzi (1997) Uzzi & Lancaster (2003)
Knowledge Sharing and Group Learning	Agents are motivated to share (seek) knowledge and experiences with (from) others as a function of their personal beliefs and abilities, as well as the broader social context. Agents are individuals sharing experiences within their team or organization, but often are representing an entire unit or firm (i.e., engaged in knowledge sharing as a representative of their unit or organization, with another individual representing a separate unit/organization). **Representative Publications:** Borgatti & Cross (2003) Edmondson (1999; 2002) Hofmann et al. (2009) Levin & Cross (2004) Osterloh & Frey (2000) Quigley et al. (2007) Siemsen et al. (2009) Wilson et al. (2007)

Motivation of the Present Research

Integrating these three streams of research, vicarious learning has been seen as a critical process in (and of) organizations, involving the willingness and ability of an agent (either an individual, or more usually a unit or organization) to learn from the observed experience of another, benefitting performance by not having to "reinvent the wheel" (Bresman, 2013). As evident in the review above, research in organizations on *observational learning* (at multiple levels) has addressed the question of how agents learn vicariously from others' experiences, while related studies of *knowledge management* and *knowledge sharing* have examined organizational, relational and individual factors that enable the necessary conduits and motivation to engage in vicarious learning. Yet, this brief review of the literature also points to some key assumptions, tensions, and omissions in these domains of research, yielding a somewhat limited understanding of vicarious learning in organizations.

For instance, the vast majority of studies have been conducted at the unit- or organizational-level of analysis – examining how organizations (or organizational units) use the experience of other units or firms to enhance their own strategies and performance and emphasizing inter-unit linkages and structures as the key means of learning and knowledge transfer. Work that does examine individual-level vicarious learning is either relegated to the training context (Taylor et al., 2005), away from the ongoing day-to-day learning that drives most individual development and performance (e.g., McCall, Lombardo, & Morrison, 1988), or is focused narrowly on the factors that make someone more or less willing to share (or seek) knowledge, rather than the actual process or outcomes of these vicarious learning interactions (e.g., Levin & Cross, 2004). Indeed, though inter-unit and inter-firm vicarious learning often involves interpersonal interactions (e.g., personnel rotation or board interlocks; Posen & Chen,

2013), the fundamental *process* (i.e., the specific actions and interactions) by which vicarious learning occurs between individuals in organizations (and impacts their knowledge and performance) remains critically understudied in the literature (notwithstanding the exceptions highlighted earlier; i.e., Westphal et al., 2001). This relative lack of attention is troubling, as these interpersonal, dyadic learning interactions routinely serve as the underlying (and often unmodeled) mechanism for the ubiquitous assertion that "organizations learn vicariously."

Setting aside philosophical debates about attributing a human action (learning) to a non-human entity (organization; S. D. N. Cook & Yanow, 1993; Lipshitz et al., 2007), focusing on collective levels of analysis leaves under-explored the question of how individuals enact and coordinate vicarious learning efforts to enable the performance improvements observed in research at the unit or organizational level. In other words, the simple presence of a potential conduit for learning and knowledge transfer (e.g., an opportunity to observe another firm, or a knowledge management system to retrieve a prior team's files) is not sufficient to understand the enactment of vicarious learning between people at work. As several prominent organizational learning scholars have noted, "organizational learning research using the term vicarious learning has been agnostic about the activities by which it occurs" (Bresman, 2010, p. 93), and "a greater understanding of the micro processes underlying the transfer of knowledge is needed" (Darr, Argote, & Epple, 1995, p. 1761).

At the same time, the subset of prior studies that do offer a description of individuals' engagement in vicarious learning (e.g., studies of observational learning in individual training contexts) tend to cast it as a passive, one-way process (moving from source to recipient) of observation and imitation. Indeed, the foundational conceptual framework for vicarious learning in organizations (i.e., Bandura, 1986; Gioia & Manz, 1985; Manz & Sims, 1981) foregrounds an

intrapersonal cognitive process of attention regulation and script processing as the underpinnings of effective transfer of knowledge and experience. In this sense, when individuals learn from another's experience, it is because they passively observe the other and attempt to replicate the "script" they encode from this observation in their own practice, with greater or lesser success as a result of their own attention, retention, imitation and motivation abilities (e.g., Bandura, 1977b). The result is an understanding of vicarious learning as a process that occurs almost exclusively within the observer, requiring that the material to be learned be readily observable (or at least comprehendible through written or symbolic reproduction), but requiring no interaction between the observer and the "model."

Yet, this one-way, "arms-length" observation is only one method by which an individual can be exposed to another's experience, and may in fact be a relatively restricting means of exposure, compared to more interactive methods such as discussion and face-to-face interaction. As noted above, studies of group learning and communities of practice have suggested that vicarious learning can occur through social interactions (e.g., Brown & Duguid, 1991), and understanding how these interpersonal processes contribute to individuals' learning from others is key for an understanding of vicarious learning in organizations. Indeed, rather than a model's experience being uniformly internalized by any number of observers (as suggested by Bandura, 1989b), these perspectives note that vicarious learning is often situated in particular interpersonal relationships at work (Uzzi & Lancaster, 2003), introducing the potential for vicarious learning to be truly *interactive* (rather than one-way), and raising the possibility that the observer may actually influence the model's learning as well. Though a few studies (specifically Bresman, 2013; Westphal et al., 2001) have begun to recognize the importance of this learner-model interaction, the dominant perspective nonetheless views vicarious learning as a uniform process

of one-way observation and imitation. Purely passive observation, as implied in these models of vicarious learning, is seemingly rare in modern, interdependent organizations, and as a result, existing perspectives on vicarious learning are likely to be of limited utility in explaining the actual process by which individuals learn from one another's experiences at work.

Three Views on Vicarious Learning in Organizations

In light of the limitations noted above, in this dissertation I offer a new perspective on vicarious learning that is firmly rooted in the interpersonal dynamics of individual interaction in organizations. Whereas prior approaches have focused on the (often organizational-level) process of observation and imitation, the presence of knowledge conduits, or the motivation to share knowledge, I place my emphasis on the underlying interpersonal process – the actual behaviors of individuals in interaction with one another – that constitute vicarious learning. Perspectives that focus solely on intra-personal cognitive processes of imitation make critical assumptions about the vicarious learning process, conceptualizing it as a uniform, one-way transfer of codified information, and in so doing leave unaddressed a number of critical questions related to how individuals learn from each other in organizations. For instance, the literature lacks a fundamental explanation of what actually occurs when individuals interact to share and learn from one another's experiences – what are the micro-processes that constitute vicarious learning interactions between individuals? Moreover, how do different distributions of these vicarious learning interactions (in teams, units, or organizations) impact learning and performance at the collective level? How might individuals organize their work (and their workplace) to promote this vicarious learning (i.e., how do individuals come to make use of available knowledge conduits or "communities of practice")? Finally, what effects does engaging in vicarious learning have on the model/sharer of an experience (in addition to the observer or

recipient of an experience), and when might a model actually learn from an observer (i.e., when might these relationships be reciprocal vs. "one-way")?

In my dissertation, I explore these key questions, addressing the limitations in extant theory and empirical research on vicarious learning by offering three interrelated, but independent, papers on the interpersonal dynamics of vicarious learning in organizations. I primarily ground each paper in a critique of one of the three broad areas of prior research identified above, demonstrating how a consideration of vicarious learning as a truly interpersonal processes can advance the study of learning in each of these areas. Specifically, in my first paper (Chapter 2), I offer a conceptual view of vicarious learning that speaks directly to the research on observational learning in organizations, advancing a theory of *coactive vicarious learning* as an interpersonally co-constructed process of vicarious learning. In doing so, I extend existing theory by introducing a new mode of vicarious learning (to complement existing, more independent modes of observational vicarious learning) and by articulating a relationally embedded process model of vicarious learning interactions. This model focuses on the discursive, mutual sharing of experiences between pairs of individuals, and specifies how these interactions serve to enhance not only individuals knowledge, but more importantly, how they build individual and relational capacity for ongoing development and future performance.

Turning to my two empirical chapters, in my second paper (Chapter 3), I address the literature on knowledge management conduits and communities of practice, using a qualitative study of air medical transport teams to advance a perspective on how individuals *organize* for vicarious learning in organizations. Through participant observation and semi-structured interviews, I explore the interpersonal mechanisms through which vicarious learning occurs, challenging the assumption that the simple presence of conduits for learning from others (e.g.,

knowledge management systems, communities of practice, etc.) is sufficient for this learning to occur. Specifically, using this inductive research approach, I develop a grounded process model of how formal structures (conduits) and informal practices coalesce to enable and elaborate individuals' enacted vicarious learning interactions. In my final paper (Chapter 4), I address the literature on group learning and knowledge sharing through a quantitative, network-based study of different distributions of vicarious learning relationships in teams. In particular, and in contrast to prior work that considers only the amount of learning, I focus on reciprocity in vicarious learning interactions (i.e., the degree to which vicarious learning happens in both directions between two individuals, rather than as a one-way process). Using a study of MBA consulting project teams, and measuring the complete learning networks between team members, I examine both the antecedents of individuals' reciprocity in their vicarious learning interactions, as well as the performance consequences of teams' overall degree of reciprocation. In doing so, I draw on recent methodological advances in assessing weighted reciprocity to introduce and test the impact of reciprocity as a key feature of vicarious learning relationships at work.

Foundational Assumptions

While each of these three papers is an independent research endeavor, they are all linked by a focus on the interpersonal dynamics of learning from others, and thus share three foundational assumptions I make in my perspective on vicarious learning. First, I follow prior research on learning as a process in organizations (rather than learning as an outcome; Edmondson, 1999), and define workplace learning broadly as an intra- and inter-personal process by which experience alters work-relevant beliefs or behavior (see Argote, 1999). I thus view knowledge and growth (i.e., an increased range of potential behavior; see Huber, 1991; Sitkin et al., 1998) as the outcomes of this learning process (Alavi & Leidner, 2001; Polanyi & Prosch,

1975), and note that these outcomes may or many not be observable in individual behavior (e.g., Wilson et al., 2007). Following this view, I rely on individuals' perceptions of their learning and growth (see Sonenshein, Dutton, Grant, Spreitzer, & Sutcliffe, 2013), as well as observable interpersonal behaviors (e.g., engaging in discussion, providing feedback, or asking questions about a prior event to understand its causes and consequences; Edmondson, 1999) as markers of the occurrence of learning.

Central to this definition of learning is a second fundamental assumption – that I ground the proposed research in an experiential learning perspective, viewing experience as the fundamental input to the learning process (with knowledge as its output; Kolb, 1984, p. 38). This perspective views learning as an ongoing cycle of reflecting on experience to develop abstract conceptualizations, which then inform future experiences (i.e., providing the means by which to experiment with new behaviors in a subsequent experience; Kolb, 1984). A key consequence of this assumption is that I distance myself from studies of organizational training, which typically focus on didactic learning processes (e.g., presenting abstract concepts), rather than reflecting on experience. In this sense, rather than the importing of abstract concepts in a discrete learning environment (e.g., via training), experiential learning reflects a process of meaning-making from individual's day-to-day work experiences. However, while this approach is usually employed in regards to an individual's own lived experience, recent work has suggested that others can often be involved in this meaning-making process (Hoover & Giambatista, 2009), allowing their experience and reflection to influence an individual's learning process.

This consideration of others leads to the final major assumption in my dissertation research, that learning is inherently situated in the dynamics of social situations. In their situated learning theory, Lave and Wegner (1991) argue that learning is embedded in activity, interaction

and social context, casting all learning as inexplicably linked to situations and real-life practices. Though the more radical components of this theory reject the notion of any abstraction of learning beyond its specific contextual roots, in its organizational appropriations (e.g., Brown & Duguid, 1991), it has been used simply to recognize that learning occurs within the interpersonal practices and social context of the organization (Contu & Willmott, 2003). I follow this latter approach, accepting the premise from experiential learning that abstract concepts can be drawn from experiences (and carried over to future ones in potentially differing contexts), but viewing this process as socially and interpersonally situated (Lave & Wenger, 1991).

CHAPTER 2

COACTIVE VICARIOUS LEARNING: TOWARDS A RELATIONAL THEORY OF VICARIOUS LEARNING IN ORGANIZATIONS

> In the 1980s…managers at Bain developed a large paper-based document center at its Boston headquarters; it stored slide books containing disguised presentations, analyses, and information on various industries. The library's purpose was to help consultants learn from work done in the past without having to contact the teams that did the work. But as one partner commented, "The center offered a picture of a cake without giving out the recipe." The documents could not convey the richness of the knowledge or the logic that had been applied to reach solutions – that understanding had to be communicated from one person to another. (Dixon, 2000, p. 217)

Learning from the experience of others has long been recognized as critical for individual and organizational success (Argote & Ingram, 2000; Bresman, 2013; T. Davis & Luthans, 1980; Manz & Sims, 1981). Using others' successful and failed experiences to help avoid "reinventing the wheel" allows organizations and their employees to speed their own learning curve, reduce inefficiencies and improve output quality (Argote, Gruenfeld, & Naquin, 2001; Bresman et al., 1999; KC et al., 2013; Kim & Miner, 2007). Building on the foundational work of Albert Bandura (i.e., social learning theory; Bandura, 1977b; 1989a) scholars of organizations have advanced the notion of *vicarious learning* (as well as the related concept of knowledge transfer; Argote & Ingram, 2000) as a means of conceptualizing and comprehending these observed learning and performance benefits, defining vicarious learning as the process by which "an observer learns from the behavior and consequences experienced by a model rather than from outcomes stemming from his or her own performance attempts" (Gioia & Manz, 1985, p. 528).

As evident in this definition, existing perspectives on vicarious learning have centered around the learner's ability to attentively observe the experience of a model (e.g., another individual in his or her workplace) and subsequently retain and imitate the observed actions, with the learner motivating his or her own behavior towards alignment with that of the model (Bandura, 1977b). Correspondingly, research on vicarious learning has foregrounded the learners' ability to identify and imitate what they observed – either directly (i.e., watching a model perform an action and experience consequences) or symbolically, through written or pictorial representations of a model's actions that could be viewed by the observer at a later time (such as written case summaries or media recordings; Bandura, 1986). For example, research[3] has examined how agents replicate others' actions and strategies through direct observation of others' behavior (e.g., using behavioral modeling in organizational training; Taylor et al., 2005), as well through more symbolic means, such as internal databases and knowledge management systems (Davenport et al., 1998) and media documentation of others' experiences (e.g., reviewing a competitor's website; D. H. Simon & Lieberman, 2010).

Uniting these research findings is an emphasis on learners' independent, one-way observation of the model – in each case, the model is a non-participant in the learner's processing of his or her observations. Indeed, in the case of symbolic learning processes, the "model" is often simply an artifact of a prior agent's performance, captured in a write-up or recording that precludes any form of interaction between model and learner. This perspective of one-way observation (going from model to learner without interaction or feedback in the opposite direction) thus presupposes that the learner understands the underlying goals of a

[3] Much of the organizational research on vicarious learning has been conducted at the unit or organizational level of analysis, but utilizes individual- and dyad-level mechanisms of observation and imitation (Lipshitz et al., 2007) that fit this general categorization.

model's actions (e.g., *why* they acted in a particular manner), and knows what elements of the action to emulate (e.g., knowing which elements are critical to successful performance, and which are unrelated "noise" in the observation of a particular individual). Yet, there is growing evidence that this assumption of vicarious learning as an independent, one-way process may not hold in the types of interactive, socially embedded work of modern organizations.

While this one-way process of vicarious learning through observation and imitation may have been well-suited to the work of earlier eras, such as the traditional manufacturing firm (where work is more easily trained and modeled; e.g., Manz & Sims, 1981), or to the domain of childhood education (where Bandura originally developed his social learning theory; e.g., Bandura et al., 1963), the rise of the knowledge economy has substantially altered the ways individuals learn and perform at work (Powell & Snellman, 2004). Indeed, direct observation and modeling are far more difficult in the often global, distributed, or virtual work common to modern organizations (see Hinds & Bailey, 2003), and recent research has emphasized more interactive, interpersonal forms of vicarious learning (such as discreet teaching-learning interactions or the retelling of narratives of past experience; e.g., Bailey & Barley, 2011; Dailey & Browning, 2014) as necessary in these more knowledge-intensive work environments. For example, Bailey and Barley (2011, p. 283) note that existing views of how individuals learn from others at work were "social but not relational" in that they viewed learning as occurring "subtly and unintentionally through newcomers' participation in community activities" (e.g., through simple observation of others in the workplace), but underemphasized the role played by the "teacher" in a learning interaction (i.e., the model of vicarious learning) and the differing nature of teacher-learner relationships, which they demonstrated to be critical in understanding the efficacy of learning practices among groups of engineers (Bailey & Barley, 2011). In these kinds

of knowledge work environments, this interactivity and back-and-forth discussion (i.e., between senior engineer "teachers" and junior engineer "learners" in a teaching-learning interaction) thus seems necessary for understanding what can be learned vicariously from others' experiences, as individuals are likely unable to deduce the "lesson" of another person's experience through passive observation without discussion of the person's thoughts and decision-making processes (i.e., the underlying judgments guiding their actions).

Reinforcing this need for more interactive vicarious learning, recent research on medical handoffs – where physicians or nurses coming in to the hospital to start their shift learn from the experience of outgoing staff's care for patients – has explicated the risks of assuming these social learning experiences as one-way "telegrams" of information, noting that interaction, questions and clarification are essential for the incoming physician's understanding of the patient's condition and the efficacy of care administered by the outgoing physician (M. D. Cohen, Hilligoss, & Amaral, 2012). When these handoffs are conducted as one-way transfers of knowledge, substantial gaps in learning abound – Cohen and his colleagues (2012) reported evidence that one-way handoff communication resulted in agreement and mutual understanding (between the outgoing and incoming physician) about a patients' primary problem in less than 50% of handoffs, and that this failure to learn effectively is increased for patients with more complex conditions. Similarly, in a study of negotiation training, allowing participants to passively observe a successful (in this case, integrative) negotiation before completing their own negotiation yielded performance increases (relative to receiving no training, and marginally increased relative to alternative training conditions), yet participants in the observational learning condition were the *least* able of all participants to effectively articulate a conceptual understanding of what they had learned from the training (Nadler et al., 2003). In other words,

while passive observation of the negotiation "models" allowed participants to effectively imitate strategies, the findings suggest that they did not truly understand why they were imitating these strategies (which would have required insight into the negotiator's underlying decision-making and thought processes).

These examples highlight the notion that learning in organizations involves processing complex and nuanced experiences laden with both explicit and tacit elements (Lipshitz et al., 2007; Polanyi, 1958) that vary considerably in their "learnability" (McIver, Lengnick-Hall, Lengnick-Hall, & Ramachandran, 2013), and the degree to which they can be codified and formally disseminated in organizations (Brown & Duguid, 1991; Davenport & Prusak, 1998). Existing approaches to vicarious learning that emphasize independent, passive processing of a model's experience implicitly assume that what is to be learned is overtly observable (in the case of direct observation of a model) or symbolically codifiable (in the case of learning from written summaries or media recordings). Yet, as Hofmann and colleagues (2009, p. 1261) note, work organizations are sites of substantial "ambiguity, equivocality and uncertainty," evoking questions such as "What's the story here? What does it mean? What do I do next?" that motivate sensemaking and learning through interpersonal communication and interaction (Weick, Sutcliffe, & Obstfeld, 2005). Indeed, in cataloguing the vicarious learning behaviors of pharmaceutical and aerospace product development teams, Ancona and Bresman (2005) note that these behaviors included a number of interpersonal interactions, such as inviting experienced others to discuss past mistakes and talking to others about improvement efforts, in addition to directly observing others' work, encouraging scholars to consider the active engagement of not only the learners, but the ones from whom they are trying to learn as well.

The Present Research: Coactive Vicarious Learning

The time thus seems ripe for an integrated theoretical account of this more interactive form of vicarious learning – specifying the underlying micro-processes of these interactions, as well as their emergence and developmental consequences. While some research, particularly in the sociological tradition, has noted that vicarious learning involves both observation and interactive discussion (e.g., Brown & Duguid, 1991; Elder, 1971; Pitcher, Hamblin, & Miller, 1978) and more recent work on knowledge transfer has suggested boundary conditions on when and with whom these interactions would be more likely (e.g., Uzzi & Lancaster, 2003), the field nonetheless lacks a fundamental understanding of the processes and behaviors underlying this more interpersonal mode of vicarious learning. Therefore, I introduce a conceptual model of *coactive vicarious learning* that captures a more dynamic, co-constructed perspective on vicarious learning, simultaneously challenging and complementing the prevailing view of vicarious learning as an independent, one-way process of finding and copying information. I integrate perspectives from symbolic interactionism (Mead, 1934) with theories of experiential learning (Kolb, 1984; Schön, 1987) to advance this fundamentally interpersonal model of vicarious learning, positing that individuals' idiosyncratic relationships both inform and are cultivated by vicarious learning interactions. Specifically, I follow an experiential learning approach by defining learning as the process of making meaning out of workplace experiences (which then leads to changes in beliefs and future behavior; Kolb, 1984), but particularly emphasize the potential for this meaning to be co-constructed through a dyad's joint, situated understanding of experience (e.g., Dionysiou & Tsoukas, 2013).

In doing so, I offer a conceptualization that is explicitly grounded at the relational level of analysis, acknowledging that vicarious learning interactions are embedded in ongoing

relationships (e.g., Uzzi, 1997), and thus that the process and outcomes of learning vary within unique, idiosyncratic dyads (in contrast to learning perspectives that view this learning as unfolding uniformly and equivalently throughout a larger collective; e.g., Wilson et al., 2007). Importantly, this relational model of vicarious learning articulates a fundamentally different mechanism for vicarious learning, shifting away from prior "mechanical" conceptualizations – as a process of observation and duplication (aptly captured by Intel's vicarious learning strategy, termed "Copy Exactly!"; McDonald, 1998), or as a process of knowledge flowing through various transfer "conduits" (e.g., Argote & Ingram, 2000) – towards a more developmental conceptualization focused on enhancing learning *capacity* (the ability of an individual or dyad to learn, both in the current context, as well as in future learning opportunities). This approach to vicarious learning directly acknowledges the potential of these learning interactions to have impact beyond just the simple exchange of knowledge, as Cohen and colleagues artfully describe in their discussion of interactive physician handoffs, when they note that a learning interaction

> "*shapes the viewpoint of the receiving party*…altering the framework of expectations within which new events will be perceived. This is actually the root meaning of *to inform*, 'to give shape to' an actor's subsequent interpretations. It is a far deeper sense of *information* than the more common image that we often fall back on, that of transmitted data, as when text characters or other signals are moved along a wire or an optical fiber" (M. D. Cohen et al., 2012, pp. 304; emphasis in original).

My conceptual model thus offers a novel perspective, theorizing the unique impact that vicarious learning has on not only the knowledge and awareness of each individual in the interaction, but also the way in which these vicarious learning interactions build individual and relational capacity – enhancing individuals' capabilities for learning in future experiences by growing person- and dyad-specific attitudes (e.g., efficacy and trust) and resources (e.g., perspective-taking abilities and shared mental models) that enable greater learning.

In the first section of this chapter, I introduce the concept of coactive vicarious learning (CVL) and articulate the discursive process by which CVL interactions unfold in organizations. The second section places CVL in its relational context, articulating the emergence of these learning interactions from key features of the structural and relational context between two people, as well as individual learning attributes. The third section turns to the consequences of engaging in coactive vicarious learning, specifying its effects on learning, developmental capacity and performance (at both individual and collective levels), in light of the relational architecture described earlier. The final section describes the benefits of this coactive vicarious learning theory to both the conceptual understanding and enacted practice of learning in organizations.

Coactive Vicarious Learning

Organizational scholars have traditionally approached vicarious learning from a social-cognitive perspective, building on the work of developmental psychologists such as Albert Bandura (1977b; 1986; 1989a). Bandura's seminal work on children developing aggression through modeling of adult behavior (the "bobo doll" study; Bandura et al., 1963) and his subsequent development of social learning theory (Bandura, 1977b) gave rise to key organizational perspectives on learning, as organizations were recognized as frequent sites of individuals learning from others (such as training, establishing rules or norms, and learning general work patterns; Manz & Sims, 1981). This perspective asserted that directly observing and modeling others' actions at work could help explain the rapid spread of behavior in the workplace (T. Davis & Luthans, 1980) and posited intrapersonal processes of attention, retention, reproduction, and motivation (Bandura, 1977b) as the key drivers of individuals' ability to find and imitate behavior (Manz & Sims, 1981). In later work, Bandura (1986; 1989b)

argued that vicarious learning could also occur, in addition to direct observation, through symbolic (i.e., written or pictorial) means, such as written summaries or video-recorded performances, noting for instance that "television has vastly expanded the range of models to which members of society are exposed day in and day out" (Bandura, 1989b, p. 22). The inclusion of televised models in this social cognitive perspective on vicarious learning draws attention to the intrapersonal nature of this theory – vicarious learning is seen as occurring entirely within the individual, as a result of one-way observation of a model (without necessarily even physical co-location) and subsequent processing of the "script" implied in the model's actions (Gioia & Manz, 1985). Subsequent research on vicarious learning in organizations has maintained this perspective, typically focusing on agents (individuals, units or organizations) finding and copying the practices of others (e.g., Baum et al., 2000; Taylor et al., 2005), guided by the notion that vicarious learning occurs "essentially at arm's length" (Bresman, 2013, p. 55).

However, as noted earlier, this solely intrapersonal perspective on vicarious learning is limiting, and assuming that one-way, independent observation and imitation constitutes the totality of vicarious learning overlooks the increasingly social nature of learning in organizations (McIver et al., 2013). I thus follow the broader perspective of situated learning (Lave & Wenger, 1991) in rejecting a purely cognitive view of learning in organizations, focusing less on "cognition and what goes on in individual heads" (Weick & Westley, 1996, p. 442) in favor of a focus on experiences and interactions as the primary inputs to learning. Specifically, in contrast to prior cognitive, information-transfer perspectives on vicarious learning, I adopt an experience-based view of learning in organizations (Kolb, 1984), but integrate it with a symbolic interactionist perspective (Mead, 1934) to introduce a more interactive, relational model of

vicarious learning in organization (in addition to the independent forms of vicarious learning described above).

Experiential learning (Kolb, 1984; Schön, 1987) has served as a dominant theoretical framework for studies of individual learning in organizations, viewing learning as a cyclical process of individual meaning-making that occurs through the transformation of experience, via reflective observation, into an abstract concept that can then be refined and applied to future experience (Kolb, 1984). Though typically used in the context of learning from an individual's own direct experience, others' experiences can also be key drivers of an individual's meaning making, problem solving, and learning process (e.g., Hoover & Giambatista, 2009; Posen & Chen, 2013). Indeed, as Posen and Chen (2013, p. 2) note (in the context of organizational learning), these attempts to learn "do not happen in a vacuum, isolated from the knowledge and experience of others."

Despite this recognition of the potential for others' experiences to impact an individual's learning, experiential and vicarious learning perspectives have remained largely separated (Hoover et al., 2012). Yet, viewing experiential learning as a process of meaning-making highlights a connection between this approach and theories of symbolic interactionism (Mead, 1934) that allows for a deeper integration of the role of others in the learning process. The symbolic interactionist perspective is built on three key assertions: that individuals act according to the meaning they make of their experiences, that these meanings are co-created through processes of interpersonal interaction, and that these meanings are continually reinterpreted and modified as the result of further interaction (Blumer, 1969). Consistent with experiential learning, symbolic interactionism thus holds a simultaneous focus on both meaning (what Kolb, 1984 might refer to as "abstract conceptualization") and action (akin to "concrete experience" in

experiential learning theory), but emphasizes the role of others in deriving and modifying this meaning. As each person in the interaction considers the other's perspective (Joas, 1997), they develop an emergent, shared understanding of the symbolic meaning of an object or experience, and a correspondingly shared set of expectations for subsequent action (see Dionysiou & Tsoukas, 2013 for a discussion of this process in the context of organizational routines).

In this sense, it is only through the discourse and dialogue[4] emerging from interactions with others that individuals come to understand (i.e., learn) the meaning of an experience, and this meaning is co-created with their interaction partners, making these interactions fundamental to learning (e.g., Dewey, 1938; Vygotsky, 1978). This relational learning process thus results in the development of a joint, situated understanding of an experience (Blumer, 1969; Weick, 1995), firmly rooted in both the dynamics of interpersonal interaction, as well as in the specific nature of the experience (vis à vis Kolb, 1984; Schön, 1987). This integration of symbolic interactionism and experiential learning is consistent with broader arguments of social construction, which have rejected the notion of the individual as the key locus of knowledge, instead arguing that knowledge is based in, and a fundamental property of, the discourse generated through interpersonal relationships (Gergen, 1997). Adopting these perspective in the context of learning at work, I use the term *coactive vicarious learning*[5] to capture this relational interaction of learning from others' experiences, and formally define it as a discursive process by

---

[4] Though each has its own tradition of study, here I use the terms dialogue and discourse interchangeably, and broadly define them as individuals' discrete communication about, and shared inquiry into, lived experience (see Isaacs, 1993; Weick & Ashford, 2001).

[5] I adopt the term coactive from the literature on computer science and engineering, where it has been used to describe the substantial learning curve acceleration resulting from two independent learning algorithms being allowed to share examples and responses with one another (see, for instance Grecu & Becker, 1998).

which individuals learn through the interactive sharing and joint processing of another's work experience(s).

Independent vs. Coactive Vicarious Learning

In introducing this new concept of coactive vicarious learning (CVL), I offer an interpersonal conceptualization of vicarious learning to challenge, but also complement, the prevailing intrapersonal view (which I refer to as independent vicarious learning, IVL), articulating the relationship between two people as a key site of learning. While each perspective is broadly focused on understanding the way individuals learn from others, they fundamentally differ in the level of involvement of an "other" in the learning process. IVL sees the role of the other as passively providing an individual with an observable experience, casting the remainder of the learning process as occurring within the individual (i.e., others would be involved only in the first stage of the experiential learning process – generating a broader set of concrete experiences upon which the individual can intra-personally reflect, conceptualize, and adopt; Kolb, 1984). In stark contrast, CVL emphasizes the role of the other as a co-creator in the learning process, engaging with the individual jointly in the full "cycle" of experiential learning (Kolb, 1984) – mutually reflecting on an experience, developing shared abstract understandings and collaborating to "try out" possible interpretations and applications of this understanding.

In addition to contrasts with these independent forms of vicarious learning, I also draw a distinction here between CVL and research on knowledge transfer in organizations (Argote et al., 2000), in that CVL is focused on the learning cycle itself, examining the joint, interactive processing of an experience between individuals, whereas work on knowledge transfer focuses on the transfer of (typically codified) information or "best practices" across groups, and what promotes or inhibits this transfer (Argote et al., 1990; e.g., Argote & Miron-Spektor, 2011). This

research is typically conducted at the group- or organization-level, employing individual-level vicarious learning as a (frequently unmodeled) mechanism to explain the diffusion of practices across units, with less attention to the specific action-formation or transformational mechanisms (Hedström & Swedberg, 1998) that drive these collective outcomes (for an exception, see Edmondson, 2002 on work groups' variegated use of questions and reflection as a group-level mechanism underlying organizational learning).[6] Though research in this domain has identified different types of interpersonal relationships as more or less effective conduits for transferring different types of knowledge across units or organizations (e.g., finding that embedded ties allow for the transfer of more private information; Uzzi & Lancaster, 2003), this work is nonetheless focused primarily on the identification of information that might serve as an input to independent vicarious learning (e.g., identifying practices in other units that can be replicated in a focal unit; Argote, 2015). The knowledge transfer literature is thus largely silent on the individual-level behaviors and interpersonal interactions that underlie this learning process, and the little research examining knowledge transfer at the individual level typically explores only an individual's transferring of his or her own knowledge from a prior experience to a current one (cf. Argote & Ingram, 2000), rather than learning between individuals. Therefore, despite some recent recognition that the "model" unit (i.e., the source of knowledge in a transfer process) can play a role in helping adapt and interpret knowledge for a recipient unit (see Bresman, 2013),

[6] Other work in the domain of group learning has affirmed the importance of individuals sharing knowledge interactively with others in their work group or team (see Wilson et al., 2007), but as Vashdi and colleagues note (2013), research and theory in this domain tend to treat learning as a group or team property, focusing primarily on the collective-level processing of (e.g., collectively reflecting on) a *shared* event or experience (one that the group encountered together; e.g., Edmondson, 1999; Moreland & Myaskovsky, 2000; Schippers, Hartog, & Koopman, 2007; van der Vegt & Bunderson, 2005) rather than the vicarious processing of a unique experience brought by a team member.

knowledge transfer fundamentally reflects a higher level-of-analysis process that rests on assumptions of individuals' one-way observation and imitation of another unit's observed practices (i.e., IVL).[7]

Though independent modes of vicarious learning (e.g., observation, case reviews, "best practice" transfer, etc.) certainly can be effective for learning in particular circumstances, introducing a coactive perspective on vicarious learning adds substantial nuance and clarity to our knowledge of how individuals work with one another to learn in organizations. For instance, a purely independent view of vicarious learning downplays the social context within which this learning is situated, casting vicarious learning as an intrapersonal process that functions without awareness or engagement of the "model." This perspective treats vicarious learning as a detached, passive process, akin to the observation of a surgery through one-way glass in an observation deck (e.g., Reznick, 1993), where the model may or may not even be aware of the learner's observation. Yet, in organizations this "sterile" observation is quite rare, as observation in the workplace often takes the form of "shadowing" or mentoring/apprenticing (e.g., Leonard, Barton, & Barton, 2013; Swap, Leonard, Shields, & Abrams, 2001), which involve not only observation, but also a great deal of communication and interaction between the model and the learner. This interactive relationship between model and learner thus becomes critical to understanding the vicarious learning process, as seen in research demonstrating the effect of this relationship (between model and learner) on individuals' willingness to seek or share different

[7] In fact, studies in this domain often attribute learning directly to these higher levels-of-analysis (i.e., units or organizations), making statements such as "Just as individuals learn vicariously from the experience of others, organizations also learn vicariously from the experience of other organizations. This form of learning indirectly from the experience of others is referred to as knowledge transfer" (Argote, 2015, p. 154), masking entirely the underlying intra- and inter-personal processes that constitute this vicarious learning.

types of information and advice at work (Hansen, 1999; Hofmann et al., 2009; Uzzi, 1997). However, beyond just enabling or discouraging greater knowledge sharing, a coactive vicarious learning perspective highlights how the unique idiosyncratic relationship between a given pair of individuals can fundamentally alter the nature of their learning in a vicarious learning interaction. As I elaborate further below, a learners' unique relationship with a model (as well as his or her own background and beliefs) can cause the learner to see particular lessons in the model's experience, drawing different meaning and interpretation than would another person responding to the same stimulus (e.g., Walsh, 1988).

Likewise, a coactive, interpersonal perspective on vicarious learning also captures the potential of these interactions to help individuals vicariously learn from the more tacit dimensions of experience, providing the necessary face-to-face environment (Brown & Duguid, 1991; Davenport et al., 1998) for discussing the underlying reasons for action. An independent perspective on vicarious learning implicitly assumes that what is to be learned needs to be observable (or able to be codified in a symbolic form for later review), in order for it to be adequately perceived by the learner. Yet, critical knowledge in organizations is increasingly tacit in nature (Lipshitz et al., 2007) rather than codified in formal policies and procedures (Tucker & Edmondson, 2003; Weick, 1990), and correspondingly more difficult to observe directly or capture in a summary document (such as those used in knowledge management systems or repositories; see Dixon, 2000; Zander & Kogut, 1995 for examples), highlighting the increasingly important role that interpersonal, coactive modes of vicarious learning are likely to play in modern organizations.

Modes of Coactive Vicarious Learning

As these comparisons indicate, a major conceptual distinction between independent vicarious learning (IVL) and coactive vicarious learning (CVL) relates to the involvement of both model and learner in the learning process, and in the emphasis on jointly processing both the tacit and explicit dimensions of an experience. Yet, similar to IVL, coactive vicarious learning can occur in a variety of "modes" in organizations, ranging from more direct to more symbolic (Bandura, 1989b). In addition to the difference in the actual presence (direct) or recreation (symbolic) of a model's experience, these different modes imply different timing of vicarious learning – with more direct forms of vicarious learning occurring during the course of a model's experience or task performance, and symbolic forms reflecting recreations of a model's experience after it has occurred.[8] As shown in Table 2.1 below, exemplars of CVL that tend to be more direct/online include "shadowing," a common form of vicarious learning employed by organizations where an individual spends time observing and conversing with a more senior employee during the course of the day (see Leonard et al., 2013), or "apprenticing" (i.e., taking the "learner" role in a mentoring program; Blau, 1988). These behaviors (especially shadowing) parallel the kind of direct observation described in IVL, as the learner is present when particular experiences are unfolding, but they allow for the observer and model to interact during and/or immediately after an observation to engage in discussion about what occurred.

Likewise, CVL can manifest in more symbolic/off-line modes (mirroring IVL activities like reviewing prior cases, media reports or knowledge management system entries) through the

[8] This difference in the timing of vicarious learning is also reflected in similar concepts, such as online vs. offline learning (learning occurring at approximately the same time and place as an experience vs. learning that occurs at a distinctly different time, and potentially a different place, than the original experience; Lipshitz et al., 2007).

use of discursive strategies of experience recreation, such as narratives and stories (Garud, Dunbar, & Bartel, 2011) or multi-party simulations (e.g., Pisano, Bohmer, & Edmondson, 2001). Storytelling involves interpersonal exchanges recounting and interpreting past experience (Boje, 1991), while simulations involve recreating (in whole or in part) one particular "narrative" (i.e., an event experienced by members of the organization in the past) in an attempt to generate learning in individuals who were not present in the original event (e.g., McCrary & Mazur, 2008). Such simulations often involve placing participants "in the shoes of" those involved in the original event, and can include discussion between original event members and those engaged in the simulation (as in the "staff rides" of wildland firefighters; Useem, Cook, & Sutton, 2005). These modes of learning allow for the recreation of an experience (outside of the context in which it originally occurred), but again allow for the interaction between model (e.g., storyteller) and learner, allowing for a relational, coactive vicarious learning process to unfold. These more symbolic modes of CVL (as well as symbolic modes of IVL) complement more direct learning opportunities (which by their nature are difficult to structure or arrange), and learning in organizations no doubt requires a combination of not only these symbolic and direct modes, but likely a blend of both independent and coactive vicarious learning as well.

Table 2.1 Independent and Coactive Modes of Vicarious Learning

	Independent Vicarious Learning (IVL)	**Coactive Vicarious Learning (CVL)**
More Direct	• One-way Observation • Case Reviews	• Shadowing • Apprenticing/Mentoring
More Symbolic	• Knowledge Management System Entries • Media Reports	• Interpersonal Storytelling and Discussion • Narrative Simulation

Coactive Vicarious Learning Interactions

While both IVL and CVL can manifest in more or less direct or symbolic modes, the defining characteristic of CVL lies in its grounding in the relational interaction between model and learner. Yet as noted, relatively little is known about what actually occurs in these relational interactions – the various interactional "moves" and micro-processes that constitute vicarious learning (Bresman, 2010; Darr et al., 1995) – as existing approaches have tended to employ the simplified causal imagery of "find and copy" without an understanding of the variety of interpersonal behaviors underlying the vicarious learning process.

Therefore, building from the constructionist perspectives articulated earlier (Blumer, 1969; Gergen, 1997; Mead, 1934), I theorize that vicarious learning interactions are actually relational sites of discursive, co-constructed meaning-making, where each individual participates actively in discourse and development of a shared understanding of the experience. The experiences being shared in a vicarious learning interaction (e.g., the model's experience observed by, or recounted to, the learner) are rich, multi-faceted, and laden with both tacit and explicit elements (Lipshitz et al., 2007), and through the joint processing of this experience (e.g., dialogue focused on reviewing actions, comparing them to prior experiences, etc.) both learner and model are able to generate insight and new knowledge. When a model offers his or her experience (the raw material of the CVL interaction), the learner may respond with a question or observation about the experience, or may reciprocally share a prior experience that either complements or contradicts the model's experience, and these questions and observations may cause the model to draw new insight and understanding about the experience (as in a collective sensemaking process; Weick et al., 2005).

For instance, studies of stories in organizations have noted that storytelling (noted above as one mode of CVL) affords those in the listener role an active, co-producing part (Sawyer, 2003; Tsoukas, 2009), as the listener can ask for clarification or express emotional responses about the story, changing how the storyteller views and understands the experience (Garud et al., 2011). The benefits of storytelling in organizations stem from this "performance" of the story (i.e., the enacted telling of, and listening to, the story; Boje, 1991), as the narrative form allows for multiple interpretations, and more flexible communication of meaning, of an event to be expressed (Browning, 1992; Weick, 1987). Indeed, though often studied as a tool for cultural reproduction or maintenance (e.g., Dailey & Browning, 2014), there is emerging evidence of the value of stories as a means of vicarious learning, arising from the dialogue between storyteller and listener (see D. Roberts, 2010 for a discussion in the nursing context). Tsoukas (2009) has theorized that dialogical processes are central to individual knowledge creation in organizations (facilitating the individual's ability to distance him or herself from previously held perspectives on a prior experience), and I argue that this dialogue facilitates individuals' vicarious learning from others' experience as well.

To develop a more thorough understanding of this dialogue embedded in coactive vicarious learning interactions, I draw from theories of narrative and discourse, and specifically Hernadi's (1987) notion of the hermeneutic triad (cf. Czarniawska, 2000) to articulate three key elements involved in CVL interactions. Hernadi (1987) asserts that individuals interact with a narrative (e.g., a text, story, or experience) in three simultaneous and intertwined ways – through explication ("standing under" the narrative to understand what occurred), explanation ("standing over" the narrative and analyzing what happened), and exploration ("standing with" the narrative and connecting with the teller). Blending this perspective with similar approaches in studies of

speech acts and storytelling in organizations (e.g., Boje, 1991; Gumperz, 1992), I argue that there are three corresponding discursive elements involved in a CVL interaction – experience, analysis and support – that meet each of the three hermeneutics (Hernadi, 1987).

Experience. *Experience* reflects the initial "content" of vicarious learning – a learner is exposed to a model's current or prior experience (through either direct or symbolic means, as noted earlier), putting the CVL process into motion. While prior approaches have described codified information, knowledge or best practices as the content of vicarious learning, here I view learning as an iterative process of experience and reflection on that experience, giving rise to meaning and insight (Kolb, 1984; Mathieu, Heffner, & Goodwin, 2000; Schön, 1987). As noted earlier, while independent approaches to vicarious learning cast this reflection and experiential learning as occurring solely within the learner (i.e., taking in a model's experience and reflecting on it internally), CVL interactions involve interpersonal reflecting on experience, allowing the experience to be reviewed from multiple perspectives and prompting behavioral change for all involved (e.g., Argote et al., 2001). Indeed, in CVL interactions, the learner may also articulate an experience, introducing a prior or contemporaneous experience of their own into the discourse, in response to the model's experience. These additional experiences may thus serve to challenge, reinforce, or clarify the model's experience, creating a broader repertoire of experiences upon which the model and learner can reflect, enabling the construction of richer learning (Garvin, Edmondson, & Gino, 2008; Schippers et al., 2007).

Analysis. The second component of CVL interactions is the *analysis* offered by either the learner or model (or both) on the experience in the course of an interaction. This analysis may take the form of a probing question, a comment, or a request for clarification, among others. While interaction between learner and model is absent in independent modes of vicarious

learning (such as passive observation), the interactive nature of CVL allows the learner to test his or her interpretation of the model's experience by asking questions or making comments, and correspondingly allows the model to clarify or re-examine his or her own interpretation of an experience. As Cohen and colleagues (2012) suggest, learner's questions can cause the model to actively take the learner's perspective, leading them to potentially provide different information (e.g., Connell, Kleįn, & Meyer, 2004), reconsider or codify their own perspective (e.g., Nonaka, 1994), or develop new understanding (Craig, Sullins, Witherspoon, & Gholson, 2006). This process is iterative, and a model may also introduce questions or analytical comments into the conversation, leading to an emergent discourse where both learner and model engage in learning and sensemaking through their reactions and responses (Garud et al., 2011; Hatch & Weick, 1998; Weick, 1995).

Support. The final component of a CVL interaction is *support*, referring to statements or behaviors in the interaction that communicate social or emotional assistance in processing an experience. Research on relational embeddedness and knowledge sharing (e.g., Hansen et al., 2005; Uzzi, 1997; Uzzi & Lancaster, 2003) has shown that relationships containing both informal social ties as well as the formal organizational tie facilitate sharing of more fine-grained, tacit knowledge, as a result of greater trust and development of relationship-specific characteristics. Though these studies typically view social support as stemming from a separate set of relational interactions (i.e., that spending time together outside of work facilitates greater knowledge sharing at work), supportive behaviors may also occur within a given workplace learning interaction, and can help to "smooth" the communication and interaction in CVL (see Lipshitz et al., 2007). For instance, a learner discussing a model's failed experience might express emotional support to the model, building a sense of camaraderie in the relationship that

facilitates more effective discussion in the current interaction, while also strengthening the relationship between the model and learner for future CVL interactions (as an example, see Carmeli & Gittell, 2009 for a discussion of high quality connections and learning). Indeed, social support can help individuals coordinate the sharing and analysis of learning experiences, much as it has been shown to facilitate effective role coordination in complex task performance (i.e., Gittell, 2002), and this shared experience in turn validates each individual's knowledge and relation to the other (Wilson et al., 2007; Wittenbaum, Hubbell, & Zuckerman, 1999). In this sense, support is a critical element exchanged in CVL interactions, lubricating the exchange of experience by establishing common ground and a sense of connectedness while also helping to strengthen the capacity of the relationship for future vicarious learning (described further below).

Enacting Coactive Vicarious Learning

Importantly, I argue that these three elements – experience, analysis, and support – serve as multiplicative components of CVL interactions, such that high levels of all three facilitate greater learning in the interaction, and an absence of any one element can derail learning. As described above, experience is the fundamental "content" of the interaction, and is thus necessary for vicarious learning (as without it, there would be nothing to learn from), but analysis and support are also necessary conditions. Indeed, a learner offering analysis of a model's experience in the absence of any expressed support may come across as criticizing and may make the model less likely to share complete details of the experience (particularly of a failed experience, for example), inhibiting the learner's knowledge of the experience and reducing the potential benefit of the learner's feedback and analysis for the model's own understanding of the experience. Likewise, an interaction characterized by high levels of expressed support for a model's shared experience, but without analysis (from either model or

learner) can inhibit learning, as less visible, underlying issues or tacit elements of the experience are unlikely to be surfaced and discussed (instead, the interaction simply serves to encourage or sympathize with the experience, but creates less opportunity for understanding and addressing the "lessons" of the experience).

As a clarifying example of these elements enacted in a CVL interaction, consider the case of an individual who was recently transferred to a technology division of a consulting firm, and is spending some time shadowing an established member of the team. The model (in this case, the established team member) provides the learner with an initial experience to observe (such as watching the model interact with a client who has very specific demands), after which the learner asks questions of the model to better understand the observed experience, such as: "Is that how all of the clients usually are?" In doing so, the learner is reminded of a prior experience working with a client, which he then brings up to share with the model (to contrast with the current experience): "I remember a client meeting where the client was not at all what we expected. They had no clue what they wanted!" After hearing the learner's description of the experience, the model expresses support for the learner's experience, and offers a story of her own similar experience, saying, "That must have been frustrating, but I'm sure you handled it well. It reminds me of a client meeting we had where they came in with nothing – no ideas, no plan, they just knew they wanted some help, but they didn't really know for what!" This story prompts another question from the learner; "So sometimes the clients don't know what they want, but other times they are like this one and have very specific demands?" The model offers her own analysis in response: "Hmmm, I guess you are right. Thinking about it, its usually the biotech folks that know exactly what they want – you know, they're all former chemists and engineers – but for some of the other firms, they have less of a specific idea of what they need." This leads to

a statement of support from the learner: “That must be kind of exciting, but also a bit difficult, to have to be ready for such a wide variety of clients.” This exemplar of a CVL interaction is displayed graphically in Figure 2.1.

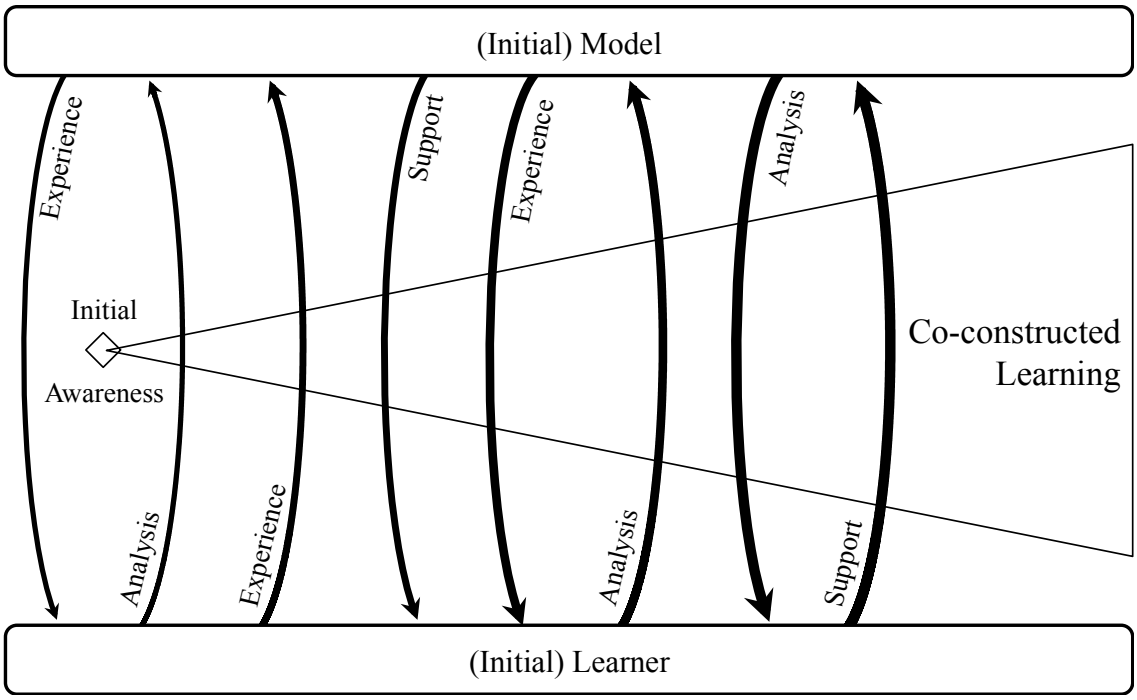

Figure 2.1 Exemplar of a vicarious learning interaction.

This cycle of interaction can carry forward into future learning – for instance, if the model takes the learner to observe a different meeting, it may prompt a return to this discussion and a continuation of the learning process, or may generate an entirely new learning interaction. A key point to note, however, is that the learning from this process is co-constructed by both the model and the learner. While the initial experience offered by the model (observing a client meeting) gave rise to an initial awareness of what was to be learned (i.e., “What are clients like in this division?”), the learning that resulted from reflecting on the experience (i.e., that biotech clients know exactly what they want and other clients are more open-ended) occurred through

the joint processing of the experience, and comparisons drawn to prior experiences, facilitated by statements of support that established a common ground and strengthened the relationship between the two individuals. Indeed, communicated support strengthens subsequent actions by each person (indicated by the increased bolding of the lines in Figure 2.1), building stronger connections that promote further sharing of experience and analysis. Notably, this support may also be embedded in other interactional "moves" – in other words, it may not be a discrete statement, but may instead be incorporated into the sharing of an experience or presentation of analysis. For instance, simply sharing a similar experience (such as a failed client interaction) may communicate support for the experience of the other party, by establishing a common background and communicating that they are not alone in their experience. Also noteworthy is the notion that the roles of "model" and "learner" can fade after a few sequences of interaction (as was the case in this example); as each brings up relevant experiences to consider in the interaction, the distinction between model and learner becomes blurred. However, it is still useful to use the labels "model" and "learner" (even if only for the initial stages of the interaction) in order to clarify each person's role in undertaking the interaction (i.e., categorizing the learner as "knowledge-seeker," and model as "knowledge sharer" to tie these concepts to prior findings). Finally, these interactions are not strict "tit for tat" exchanges, but rather can unfold somewhat unpredictably and organically – sometimes experience is reciprocated with another experience (as in the communal sharing of stories among communities of practice; Brown & Duguid, 1991), while other times a single experience is met with increasingly more detailed analysis (as in the creation of a narrative simulation of a particular event; Conle, 2003).

Emergence of Coactive Vicarious Learning

With a definitional understanding of these discursive coactive vicarious learning interactions, I turn now to theorizing the factors that facilitate the emergence of these vicarious learning interactions (i.e., the CVL antecedents displayed on the left side of Figure 2.2). Understanding what factors give rise to vicarious learning in organizations is important, given the informal nature of vicarious learning that makes these processes difficult to promote simply through managerial or institutional means (relative to more formal learning activities, such as organizational training; Garrick, 1998). As noted earlier, CVL is focused explicitly on the interactive construction of learning embedded within a particular model-learner relationship, and so I focus here on the relational and structural context – reflecting the existing situation from which a CVL interaction would arise between two people – as well as learning-supportive individual attributes, that encourage individuals to engage in these CVL interactions.

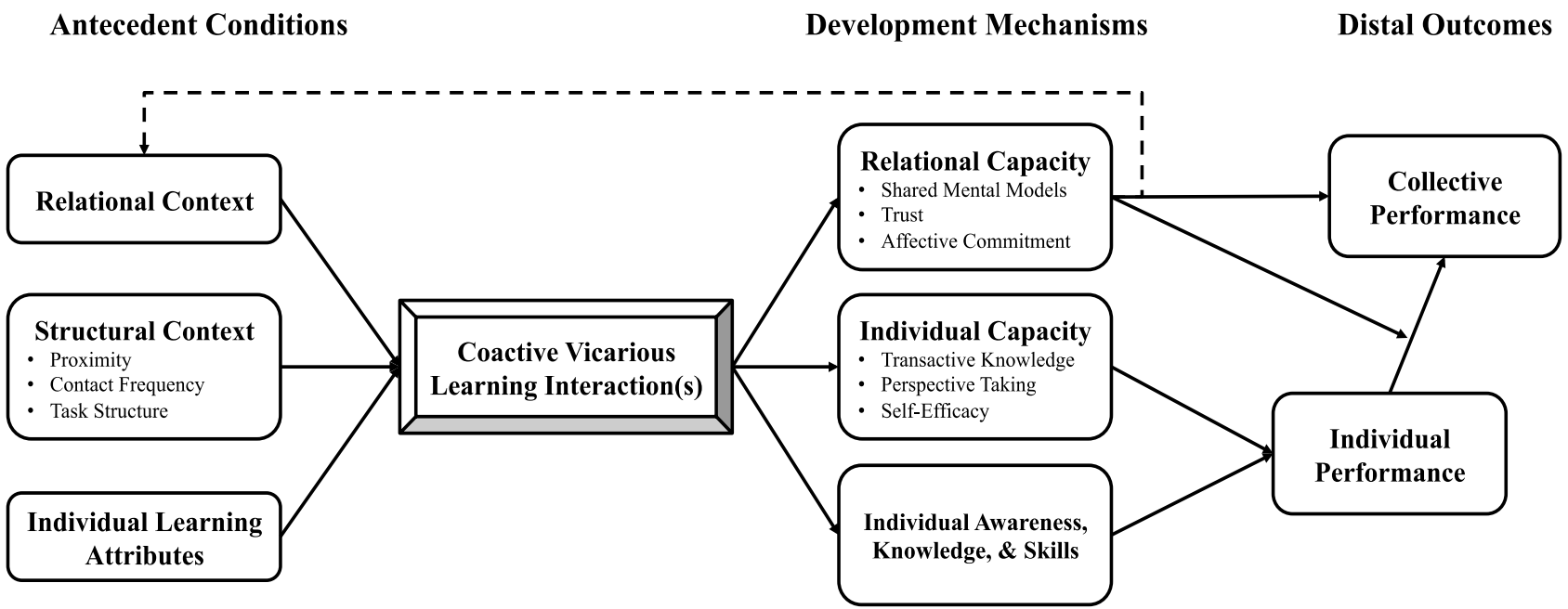

Figure 2.2 Process model of coactive vicarious learning.

Relational Context

Relational context reflects the interpersonal backdrop against which individuals engage in CVL interactions, providing the relational "frame" used to embed these interactions. In other words, the context of a given relationship is a function of individuals' prior interactions, and as such is a property of the relationship itself (unique to any given pair of people in an organization). This relational context captures the qualitative nature of a pair's interactions, reflecting the positive or negative attributes of their relationship, such as its affective tone (Casciaro & Lobo, 2008), level of trust (Levin & Cross, 2004) and "smoothness" of communication (Lipshitz et al., 2007). The quality of this relationship between two people can fundamentally alter how they obtain, evaluate, and interpret the knowledge shared by one another (e.g., Menon & Blount, 2003), leading to different learning among individuals (even in response to the same shared content or knowledge) as a function of the individual's dyadic relationship with the sharer. Indeed, workplace relationships characterized by greater liking and trust have been shown to facilitate individuals' willingness and ability to share knowledge (Adler & Kwon, 2002; A. K. Gupta & Govindarajan, 2000), and particularly more private, proprietary information (Uzzi & Lancaster, 2003). For instance, hotel managers with higher quality relationships were more likely to share unpublicized client preference data with one another than were managers not linked by these embedded ties (Ingram & Roberts, 2000).

In this way, the relational context between two people can help overcome potential psychological and social barriers to engaging in CVL. Specifically, engaging in vicarious learning can be a risky process, as it involves exposing a prior experience to analysis, as well as sharing perspectives with, and seeking opinions from another person in a way that can admit a lack of knowledge (Borgatti & Cross, 2003; Reagans & McEvily, 2003) and risk one's reputation

or preservation of "face" (Hofmann et al., 2009). Similarly, engaging in the interactive analysis of an experience creates the potential for sharing negative feedback on another's performance or handling of a prior experience (that is often deemed socially inappropriate to share at work; Ashford & Tsui, 1991), and in the absence of trust and positive prior interactions, this negative feedback can be perceived as threatening – resulting in rigidity and disengagement from the learning process (Staw, Sandelands, Sandelands, & Dutton, 1981). Yet, when this prior relational context is positive, built on familiarity, trust and positive affect, engagement in learning strategies (e.g., advice-seeking) can be significantly enhanced (Casciaro & Lobo, 2008; Hofmann et al., 2009). Thus, I theorize that, beyond just providing relational support *within* a CVL interaction, the strength of a given pairs' relational context (i.e., their more positive, high-quality prior interactions) motivates greater (i.e., more frequent, in-depth) engagement in coactive vicarious learning interactions in the first place, as indicated in Figure 2.2.

Proposition 1: Stronger relational context leads to greater engagement in coactive vicarious learning interactions.

Structural Context

Beyond this relational context – which reflects a more organic development of the relationship between individuals as a function of their prior interactions, as well as their similarity in attitudes or characteristics – engagement in CVL interactions can also be influenced by more structural features of a pair's work context. The *structural context* of individuals' work can alter their pattern of relationships and interpersonal interactions (altering, for instance, the opportunity to interact with beneficiaries of their work; A. M. Grant, 2007), providing both boundaries and opportunities for interpersonal interactions and learning. Indeed, information seeking/sharing interactions in organizations have been shown to typically mirror the formal structures of the organization (Bailey & Barley, 2011), reflecting boundaries between

departments, functions, and other vertical or horizontal structures. I focus here on the specific structural context linking a given pair of individuals in the organization, including a pair's proximity, contact frequency, and task structure. These three elements – proximity[9] (the distance in either physical or organizational space between two individuals), contact frequency (the relative number of interaction opportunities), and task structure (the nature of the work itself as requiring more or less interaction) – exert significant influence on the nature of learning relationships in organizations. For instance, the networks individuals use for sharing knowledge at work have been shown to reflect their general interaction networks (i.e., their frequent and proximate contacts; McDermott & O'Dell, 2001). Recent work has also demonstrated that contact frequency significantly predicted the willingness to share knowledge (Siemsen et al., 2009), while proximity has long been shown to underlie almost all social interaction (e.g., Festinger, Back, & Schachter, 1950) and has been significantly shown to impact individuals' willingness to seek information from others (Borgatti & Cross, 2003).

Similarly, task structure (i.e., the nature of the work itself) has been recognized as influencing how individuals relate to one another in a variety of ways, including their learning relationships (Barley & Kunda, 2001). Tasks can be structured in a variety of different ways, varying, for instance, in the extent to which they are conceptual or behavioral and require conflict or cooperation (e.g., McGrath, 1984), and these differing structures impact the ways individuals and teams are able to interact and perform (G. L. Stewart & Barrick, 2000).

---

[9] I use the term "proximity" here, rather than a term such as "hierarchical distance" to recognize that organizational hierarchies reflect only one form of distance between individuals within an organization (i.e., vertical distance). Individuals may be horizontally separated (i.e., as members of different divisions) or separated in terms of knowledge level (rather than seniority or hierarchy) as experts and novices in a given domain. Thus, proximity refers to any of these forms of distance within the organizational "chart" or network of work relationships.

Likewise, tasks can be structured to require more independent or interdependent activities (i.e., simple compilation of individual effort vs. a cooperative coordination of efforts where each individual's work is dependent on the work of others), and greater interdependence has been shown to facilitate greater interpersonal learning in work teams (Wageman, 1995). Also relevant for learning, tasks structures can vary in their time demands, having more or less "slack" time and resources, and given that engaging in learning requires time and energy (often drawing these resources away from performance; Singer & Edmondson, 2008), tasks structured with greater "slack" resources can free individuals' resources for engaging in vicarious learning with others. Engaging in CVL involves the investment of significant time and energy into "unpacking" an experience with another person, and requires individuals to engage in reciprocal, interactive discussions (typically conducted face-to-face), and these three features of the structural context (task structure, as well as proximity and contact frequency) likely influence individuals' engagement in these CVL interactions. Indeed, beyond the resources created by task structure, greater proximity and contact frequency increase the likelihood of a face-to-face interaction in an organization, promoting chance, serendipitous encounters (e.g., water cooler interactions) as well as providing the necessary familiarity and overlap in goals, vocabularies and professional orientation for effective shadowing or apprenticing modes of CVL (Lipshitz et al., 2007).

> *Proposition 2: The structural context of individuals' work (e.g., closer proximity, greater frequency of contact, and more interdependent or less time-intensive task structures) facilitates engagement in coactive vicarious learning interactions*.

Individual Learning Attributes

While I cast CVL as a fundamentally relational phenomenon, I also acknowledge that learning is a voluntary, personal activity and theorize that *individual learning attributes* may impact a person's willingness to participate in CVL, irrespective of relational or structural context (as shown in Figure 2.2). I use the term individual learning attributes to refer to the range

of individual characteristics (for instance, learning goal orientation, confidence in learning, self-efficacy or conscientiousness) that have been described as increasing an individual's desire and motivation for learning at work (see Bandura, 1977a; Colquitt et al., 2000; Colquitt & Simmering, 1998; Siemsen et al., 2009). Indeed, this individual drive for learning and development has been shown to explain substantial variance in individuals' enacted learning in organizations, and particularly their engagement in more informal modes of learning (i.e., those not directly sanctioned or managed by the organization; Garrick, 1998; Knowles, 1980; Marsick & Watkins, 1990). I view a CVL interaction as one such informal learning activity in organizations, and thus expect that individuals who possess these individual learning attributes will be more likely to engage in CVL with another person, even in less learning-facilitative relational or structural contexts.

For example, a strong learning goal orientation – the tendency to pursue goals related to learning and mastery in a work situation (Dweck, 1986; VandeWalle, 1997) – can increase learning at both individual (VandeWalle, Cron, & Slocum, 2001) and collective levels (Bunderson & Sutcliffe, 2003), by increasing adaptation and promoting feedback seeking (DeRue, Ashford, & Myers, 2012a; DeShon & Gillespie, 2005). These findings suggest that individuals with a stronger learning orientation might be particularly likely to seek out the experience of another person in a CVL interaction, or use another's experience as a means of adapting their own performance, consistent with research finding that learning orientation promotes increased motivation to engage in learning (Colquitt & Simmering, 1998). Indeed, the motivation to learn (as a more proximal individual attribute, compared to an individual's general goal orientation) should significantly impact engagement in CVL, as high motivation to learn has been associated with a broad range of learning activities and outcomes (see Colquitt et al., 2000

for a review), including the willingness to share information with others (Osterloh & Frey, 2000; Quigley et al., 2007; Reinholt & Pedersen, 2011).

Moreover, in recent work, Myers and DeRue (2013) have offered a more nuanced view of learning motivation, specifying multiple, differing motives underlying an individual's general motivation for learning, and positing that each motive may be more suited to particular learning contexts in organization. Of particular note for examining CVL interactions is these authors' conceptualization of an intrinsic, other-focused learning motive, reflecting an individual's desire to engage in learning in order to benefit others at work (Myers & DeRue, 2013). This particular motive is likely to be strongly linked to engaging in CVL, as these interactions have the express purpose of jointly processing an experience and advancing the knowledge and capacity of both the self and others. To the extent that individuals derive meaning and motivation from utilizing learning to benefit another person (in addition to the self, the often assumed beneficiary of learning and development; Maurer & Tarulli, 1994), they should see CVL as particularly useful, leading to increased engagement in CVL interactions.

Beyond these motivational considerations, other learning-related individual attributes can play a role in driving engagement in CVL. For instance, individuals who are confident in their own knowledge or have strong psychological safety in their work context (Edmondson, 1999) have been shown to engage in greater knowledge sharing (Siemsen et al., 2009), and I expect these findings would extend to engaging in CVL interactions as well. In addition to individuals' confidence in their own knowledge, the actual range of this knowledge (i.e., whether they have a generalist or specialist background; Bunderson & Sutcliffe, 2002) likely also influences the value they place on participating in a CVL interaction. As a simplistic example, generalists might tend to see greater value from learning from another's unique experiences, as they recognize the value

of integrating multiple, diverse perspectives (based on their own lived experience moving across diverse work domains), encouraging greater engagement in CVL interactions.[10]

Proposition 3: Individuals' learning attributes contribute to greater engagement in coactive vicarious learning interactions.

Consequences of Coactive Vicarious Learning

In addition to specifying antecedent conditions of CVL, I extend the conceptual model offered here (shown in Figure 2.2) by theorizing the consequences of engaging in CVL interactions for individuals' development and performance in organizations. A key challenge of much prior research on vicarious learning lies in its use of performance change as the sole indicator of learning, and a number of scholars have called for more direct attention to the specific learning processes and outcomes influenced by vicarious learning (e.g., Argote & Ingram, 2000). Therefore, I specifically address the intervening developmental processes leading to this more distal performance enhancement, while also examining the role that the relational grounding of CVL plays in these more proximal learning and development outcomes.

Proximal Developmental Outcomes

Individual awareness, knowledge, and skills. The primary intended outcome of engaging in any form of vicarious learning is an increase in an individual's awareness, knowledge and skills. Whether through IVL or CVL, individuals benefit from the experiences of others, using those experiences (combined with their own lived experiences) to change their understanding of a task or content domain or develop new skills and abilities. Yet, relative to IVL, engaging in CVL interactions can particularly enhance this knowledge-creating effect in

[10] This range of individual attributes is certainly not exhaustive, and is meant simply to provide a set of exemplar attributes that impact CVL. A reader will no doubt be able to list several attributes that might serve a similar enabling (or disabling) function, which likely merit inclusion in this section, but are omitted for the sake of brevity.

two key ways. First, as CVL involves discussion, analysis and co-creation of learning between two people, both the model and learner are likely to gain understanding, awareness and knowledge from CVL, as each engages actively in the interaction by discussing, processing and revising their emergent understanding of an experience. Thus, beyond just the learner, the model can also learn from the co-constructed understanding, consistent with the observation that the act of sharing knowledge contributes to its codification and may enhance sharer learning (Nonaka, 1994). Second, because CVL interactions allow multiple perspectives to be expressed on a given experience, these interactions are likely to reveal insights that could not be obtained alone (i.e., in a one-way IVL process), yielding greater knowledge (i.e., more accurate and detailed mental representations of an experience) than that created by a single individual's intrapersonal learning process (see van der Vegt & Bunderson, 2005 on the benefits of multiple perspectives in the context of group learning). Indeed, the discursive nature of CVL interactions enables a form of second-order learning akin to Gidden's (1987) notion of the double hermeneutic – the broad idea that an observer's stated understanding of a subject's experience (i.e., an action or display) can influence the subject's own enactment and beliefs about that experience. While Giddens (1987) gives an example at the field level – distinguishing natural science (one-way, single hermeneutic studies) from social science (involving double hermeneutics), the logic of this approach aptly captures the benefits of a discursive interpersonal learning process – namely that individuals can learn not only from their own interpretation of an experience, but from others' reaction to that interpretation. As a result, both individuals engaging in CVL are likely to leave with enhanced awareness, knowledge and skills.

> *Proposition 4: Engaging in coactive vicarious learning increases individuals' awareness, knowledge and skills*.

Individual capacity. While existing empirical treatments of vicarious learning (and knowledge transfer) have stressed only this content-based knowledge resulting from these learning processes (e.g., Nadler et al., 2003; Uzzi & Lancaster, 2003), I extend beyond these knowledge creation outcomes by examining the potential of vicarious learning to impact individuals' future *capacity* for learning, developing and performing. In doing so, I provide a potential mechanism explaining the general observation in prior work (e.g., Argote et al., 2001) that vicarious learning not only impacts learning linearly, but can create exponential learning, altering an agent's learning curve (Quinn, Anderson, & Finkelstein, 1996). In other words, beyond just providing knowledge and skills gleaned from the current experience, I argue that CVL interactions enhance individuals' capabilities for learning and developing from future experiences as well, speeding their future learning process by allowing them to "learn about learning" (cf. Argyris & Schön, 1978 on double-loop learning). For example, at a fundamental level, engaging in CVL increases individuals' awareness of what others in the organization know – what has been termed *transactive knowledge* or transactive memory (K. Lewis, 2004; K. Lewis, Lange, & Gillis, 2005; Moreland & Argote, 2003). CVL interactions expose individuals to the experiences of others (whether as a learner, or as a model hearing about a learner's experience through their reaction and response), and as a result, these individuals leave the interaction with a greater awareness of "who knows what" in the organization, and with a greater ability to find what they need to know in a future learning environment (Kane, 2010; Lipshitz et al., 2007). In other words, the transactive knowledge resulting from a CVL interaction enhances individuals' capacity for learning more quickly and effectively in the future, by reducing their need to expend effort searching for an individual with relevant experience.

A further consequence of engaging in a CVL interaction lies in the potential for development of stronger *perspective-taking* abilities, as these interactions help individuals develop a broader, more integrated understanding of a work experience (a key antecedent of perspective-taking; S. K. Parker & Axtell, 2001). Developing this ability to see issues from other's perspectives enhances future interpersonal interactions (e.g., Batson, 1991), and correspondingly should enable individuals to more effectively engage in future interpersonal learning (whether in a future CVL interaction, or a group learning environment). Likewise, in his work on *self-efficacy*, Bandura (1977a) noted how vicarious learning can enhance an individual's sense of efficacy, as the awareness of another's successful learning experience could boost the individual's own beliefs about being able to effectively accomplish the same feat. Thus, as with perspective taking, the increased self-efficacy from CVL should boost an individual's capacity for learning in the future, as seeing someone else learn from an experience shared during CVL results in an increase in an individual's own felt ability to learn in future opportunities. Consistent with this view, individuals with high self-efficacy have been shown more likely to seek out, engage in and effectively reflect on opportunities for learning and development (Avolio & Hannah, 2008; DeRue & Myers, 2014; Ellis, Ganzach, Castle, & Sekely, 2010).

Proposition 5: Engaging in coactive vicarious learning increases individuals' capacity for future learning.

Relational capacity. In addition to this general enhancement of individuals' learning capacity, engaging in CVL also builds capacity that is specific to the idiosyncratic learner-model dyad, which can also enhance future learning (beyond the current vicarious learning interaction). As noted by research on high quality connections and learning (Carmeli & Gittell, 2009), greater relational capacity reflects a dyadic connection that can both carry greater sentiment or experience and also withstand greater strain (e.g., from changing conditions), and engaging in

CVL helps develop this relational capacity in several ways. While each individual in a CVL interaction develops his or her own transactive knowledge (which they can use to create an overall cognitive "map" of knowledge throughout the organization; Moreland & Argote, 2003), they also develop *shared mental models* (shared knowledge structures regarding a concept or experience; Cannon-Bowers, Salas, & Converse, 1993) that arise out of the unique interaction shared in the relationship. These shared mental models have been shown to enhance interaction process (as well as performance; Mathieu et al., 2000), suggesting that they would enhance a pair's capacity to effectively engage in future CVL, due to the presence of a shared framework for conceptualizing and communicating experiences, analysis and support (the discursive components of CVL). This is consistent with prior research demonstrating that relational ties can lead to the development of relationship-specific language and understandings that allow for the effective transfer of more complex and nuanced information (e.g., Uzzi, 1997).

As noted earlier, engaging in CVL involves not only the exchange of information or experience, but has a strong element of support as well. Supportive statements in a CVL interaction help encourage the sharing of experiences that might be considered embarrassing (such as a failed experience) and facilitate the questioning and analysis of another's shared experiences. As such, these interactions are likely also sites of increasing *trust* and *affective commitment* (e.g., McAllister, 1995). Sharing experiences with one another can create positive affect for, and commitment to, the other person in the relationship, developing emotional bonds from the reciprocal exchange of support in the interaction (e.g., J. D. Lewis & Weigert, 1985). Similarly, through the repeated sharing of experience and useful analysis of the experience, dyads can develop not only their own understanding and knowledge, but also a sense of dependability, based on the other's reliable analysis and insight regarding an experience,

facilitating greater trust in the relationship (Zucker, 1986). Indeed, engaging in vicarious learning requires that individuals be willing to be vulnerable with one another (as it can expose one's prior unsuccessful experience or reveal one's ignorance; Hofmann et al., 2009), which drives the development of trust (R. C. Mayer, Davis, & Schoorman, 1995) and this greater trust correspondingly reduces the costs of future learning (Levin & Cross, 2004). Extending the earlier discussion of relational context, increased affective attachment and trust can thus drive a dyad's future engagement in learning, helping to enhance the future relationship context that would give rise to new iterations of vicarious learning. This point highlights the relationally embedded nature of these CVL interactions – that they both guide and are guided by the relationship between a given dyad. Indeed, enhanced relational capacity can inform a dyad's relational context going forward, creating a virtuous cycle where CVL acts as a mechanism for strengthening (or potentially even repairing) relationships in organizations, and although not formally proposed in the conceptual model, this cyclical process is noted by the dotted line in Figure 2.2.

> *Proposition 6: Engaging in coactive vicarious learning increases relational capacity for future development*.

Individual and Collective Performance Outcomes

Given the absence of specific developmental mechanisms underlying the performance effects of vicarious learning observed in prior research, I have focused my discussion of the consequences of CVL on the ways in which it influences both knowledge (for individuals) and capacity for learning (for individuals and relational dyads) in order to develop an understanding of the proximal developmental impact of CVL. I turn now to a brief consideration of how these proximal developmental mechanisms influence more distal performance in organizations, at both the individual and collective level, building on the substantial research evidence linking these

constructs (e.g., knowledge, self-efficacy, perspective taking, trust, or shared mental models) to performance.

In terms of the drivers of individual performance, greater awareness, knowledge, and skill have long been associated with increased performance (see Colquitt et al., 2000 for a meta-analysis of these effects in the domain of training). Likewise, the components of individual development capacity have also been robustly associated with performance (as an example, see the meta-analysis by Stajkovic & Luthans, 1998 on the performance effects of self-efficacy), as individuals' greater capacity drives increased engagement in learning activities and corresponding performance gains. For instance, Singh and colleagues (2010) highlight the role of transactive knowledge in helping individuals locate experts in an organization, allowing them greater access to this pool of expert knowledge and enabling better performance.

> *Proposition 7: Greater individual awareness, knowledge, and skills increase individual performance*.

> *Proposition 8: Greater individual capacity for future development increases individual performance*.

Turning to relational capacity, the components of this capacity – affective commitment (Seo, Barrett, & Bartunek, 2004), trust (McAllister, 1995) and greater distribution of shared mental models (Lim & Klein, 2006) – have each been empirically linked to greater performance in dyads, groups and teams. Indeed, recent research has demonstrated that greater relational resources (e.g., greater familiarity and experience working together) facilitate knowledge integration and enhanced performance in teams (Gardner, Gino, & Staats, 2012), and I thus expect that relational capacity will have a similar direct, positive effect on collective performance. However, drawing on the extensive body of research by Gittell and her colleagues on relational coordination (Gittell, 2002; 2003; Gittell, Seidner, & Wimbush, 2010; Gittell, Weinberg, Pfefferle, & Bishop, 2008), I also propose that this relational capacity influences the

transformation of individual effort into greater collective performance. Indeed, greater relational capacity enables individuals to better coordinate their separate performance efforts (Gittell et al., 2010), meaning that increases in individual performance should contribute more strongly to collective performance when individuals possess high relational capacity with others in their team or workgroup. Therefore, in addition to its direct effect on collective performance, I propose that relational capacity strengthens the relationship between individual performance and collective performance.

> *Proposition 9a: Greater relational capacity for future development increases collective performance*.

> *Proposition 9b: Greater relational capacity for future development enhances the effect of increased individual performance on collective performance*.

Discussion

This chapter presented a theoretical framework of *coactive vicarious learning* in organizations. In this framework, I explore the specific interactions that constitute interpersonal vicarious learning in organizations, as well as detail key antecedents to individuals' engagement in these relational interactions, and their impact on development and performance (at both individual and collective levels). Introducing this conceptual model of CVL, and its explication of the relational dynamics underlying vicarious learning, stands to make a number of important contributions to the study of learning in organizations.

Notably, the conceptual model presented here provides a challenge to perspectives that have equated vicarious learning with solely observational learning in organizations (e.g., Baum et al., 2000; Gioia & Manz, 1985; Hoover et al., 2012; Manz & Sims, 1981), offering a novel co-construction mechanism for understanding vicarious learning at work. As noted earlier, the rise of the knowledge economy (Powell & Snellman, 2004) and the increasingly social nature of work suggest that "find and copy" approaches to vicarious learning are likely to be of

increasingly limited utility in understanding learning in today's complex and interdependent organizations. In contrast to the more rote or formal learning necessary in prior work eras (for instance, in formal training or more rote manufacturing contexts), learning in modern organizations involves more tacit, complex information (K. D. Miller, Zhao, & Calantone, 2006) that resists codification. Indeed, whereas existing perspectives only explain vicarious learning where the material to be learned was overtly observable or extensively documented in an organizational knowledge repository, introducing a more socially dynamic, co-construction model of how individuals learn from each other provides a means for understanding how people use their interpersonal interactions to learn not only these explicit bits of knowledge, but also make meaning of the more tacit elements of another's experience at work (Davenport et al., 1998). Though research has begun to acknowledge the importance of these social interactions and relationships – identifying them as key sites or conduits for sharing knowledge and learning (e.g., Argote et al., 2003; Ingram & Roberts, 2000; Uzzi, 1997; Uzzi & Lancaster, 2003) – these approaches nonetheless still rely (explicitly or implicitly) on an underlying mechanism of observation/imitation. For instance, despite highlighting the importance of broader organizational (i.e., social) context, studies of knowledge transfer within and between organizations (as well as studies of transfer in organizational training; e.g., Taylor et al., 2005) have left unchallenged the underlying assumption that this learning operates through a simple observational mechanism, focusing solely on the processes of exposing individuals to others' (sharer's) knowledge and implying that simply by observing others' experience, individuals can imitate it. Though these studies move beyond purely observational methods, recognizing that learning occurs through individuals' sharing of experiences and knowledge, their sole focus on the sharing or transfer of knowledge still ignores the question of whether and how individuals

(differentially) learn from this shared experience. In other words, by measuring only the sharing of knowledge, or the creation of opportunity for its transfer (e.g., a personnel rotation system; Kane, 2010), these studies treat vicarious learning as simply an issue of identification, and assume that once others' knowledge is identified (i.e., shared), it is unproblematic for individuals to replicate that knowledge in their own work (although see Bresman, 2013 for a notable exception, examining sharer's role in helping recipients adapt shared knowledge). This treatment of vicarious learning as unproblematic imitation is thus itself problematic, particularly in light of recent findings demonstrating that organizational investment in sharing and transfer systems does not always facilitate smooth knowledge sharing and learning (Alavi & Leidner, 2001; A. K. Gupta & Govindarajan, 2000; Matzler & Mueller, 2011). The relationally-embedded model of CVL presented here, with its focus on the co-construction of learning between people in interaction with one another, thus provides a more robust mechanism for exploring when and how individuals do (or do not) learn from others' experiences.

In particular, the model of CVL presented here brings explicit attention to the underlying behaviors of vicarious learning, which have been largely absent from prior research. As prominent scholars in this domain have noted, "organizational learning research using the term vicarious learning has been agnostic about the activities by which it occurs" (Bresman, 2010) and "a greater understanding of the micro processes underlying the transfer of knowledge is needed" (Darr et al., 1995, p. 1761). Thus, the model presented here moves beyond simply recognizing what kinds of relationships inhibit or encourage transfer (e.g., that shared identity or embedded relationships encourage knowledge sharing; Kane, 2010; Uzzi & Lancaster, 2003) towards an understanding of what actually occurs in these interactions to facilitate vicarious learning. In this sense, prior studies have recognized *that* vicarious learning occurs in

interactions or relationships with others, but has offered less insight into *how* vicarious learning occurs. Drawing on theories of discourse and narrative analysis, the model presented here thus suggests several fundamental behavioral "building blocks" of these interactions (specifically the expression of experience, analysis, and support) and locates this process of co-constructing learning (through CVL interactions) within a broader nomological network of antecedents and consequences of vicarious learning. This behavioral focus brings attention to the "micro-moves" of vicarious learning, providing an interactive, dyadic-level process model of learning that also offers a contribution to more collective-level (i.e., unit- or organization-level) studies of vicarious learning. Specifically, introducing a relational model of vicarious learning contributes to these unit- and organization-level studies of vicarious learning by offering a lower level explanatory mechanism (e.g., P. J. Anderson et al., 2006; Hedström & Swedberg, 1998) for observed vicarious learning at these more collective levels. Indeed, these studies have often relied on individual-level processes and imagery to explain the movement of knowledge between units or organizations (Lipshitz et al., 2007), but tend to treat these interpersonal processes as un-modeled "black boxes" underlying more collective-level changes in practice or performance.

This emphasis on understanding the behaviors enacted by individuals in their learning relationships with one another brings to light another key contribution of the CVL model, namely its focus on vicarious learning as a capacity-building process, rather than as a more mechanical exchange of knowledge. Capacity has been recognized as a critical resource for learning – whether it be a unit's capacity for taking in new knowledge and information (absorptive capacity; W. M. Cohen & Levinthal, 1990), or an individual's capacity to quickly and flexibly learn in a new environment (learning agility; DeRue et al., 2012a) – and the CVL model advanced here provides an understanding of how vicarious learning can help build

individuals' capacity for learning. Indeed, the CVL model goes beyond (but includes) the simple flow of knowledge from one person to another in the present interaction, bringing greater attention to the potential for CVL to increase future learning as well, by building individual (i.e., perspective taking abilities) and relational (i.e., shared mental models between two people) capacity for learning. For instance, when a pair develops shared mental models, as part of what Huber and Lewis call "cross-understanding" (2010), they are able to engage in more efficient and effective learning with less "wasted" energy spent trying to share and analyze experiences, as individuals are able to communicate ideas in language that they know others will understand and appreciate. As these authors note, "without an understanding of one another's mental models, [individuals] are apt to make arguments or proposals…that are technically, politically, or otherwise unacceptable to those whose mental models they do not understand, thus contributing to confusion, conflict or stalemate" (Huber & Lewis, 2010, p. 10). This attention to capacity embedded in the CVL framework thus provides an explanatory mechanism for the observation that vicarious learning creates not just linear knowledge growth (as would be expected in a purely mechanical exchange of information), but rather can promote exponential learning, putting agents on steeper learning curves (Argote et al., 2001; Quinn et al., 1996).

An additional consequence of this capacity-based view, and the corresponding rejection of a purely mechanical view of vicarious learning (Argote & Ingram, 2000) lies in the recognition that vicarious learning is unique to idiosyncratic dyads of individuals at work (rather than unfolding uniformly throughout at team or unit). In other words, beyond just the recognition that learning is enhanced or attenuated by the strength or quality of relationships (e.g., Gardner et al., 2012; Uzzi & Lancaster, 2003), the CVL framework suggests that each pair of individuals co-construct fundamentally different learning (not just more or less learning) than other dyadic

pairs, even when discussing the same experience. As noted at the outset of this chapter, prior conceptualizations have made the assumption that vicarious learning occurs uniformly across various combinations of people. For example, Bandura's (1989b) discussion of television-based models for behavior implies that the experience of the model would be equivalently understood and learned by all observers. Likewise, perspectives on team member/personnel rotation (e.g., Kane, 2010), as well as on group learning (e.g., Wilson et al., 2007) assume that when a team member shares an experience with the rest of the group, this experience is internalized uniformly by all team members (i.e., yielding a shared conceptualization of the experience among the entire team). In strong contrast, the model advanced here theorizes that what knowledge and capacity an individual derives from a vicarious learning interaction is highly contingent on the nature of the relationship between the model and the learner, as well as each individual's own background and learning attributes. In other words, even if vicarious learning occurred in a group setting (i.e., a single model is sharing an experience with several people at once), the learning process (and its outcome) would be unique to each person (i.e., each model-learner pair), as a function of their own attributes and relationship to the model. This insight raises the need to consider individuals' learning from others as an integral part of their ongoing relationship dynamic. For example, drawing on Heider's (1958) balance theory, the quality of the relationship between two people (e.g., the extent to which it is generally positive or negative) should alter how each individual reacts to an experience shared by the other, in order to maintain balance in the self-other-experience triad. Correspondingly, the more positive the pair's relationship, the more likely individuals would be to view the experience in a positive light and see it as a potential learning opportunity, which should lead them to expend greater effort to process and incorporate the experience into their own repertoire of knowledge and action, relative to an experience shared by

someone with whom they share a more negative relationship (which according to balance theory would be viewed negatively, to maintain the balance in the relationship; Heider, 1958).

In this way, the CVL framework also brings to light the importance of focusing on specific, idiosyncratic dyads when understanding how learning unfolds in group settings. In contrast to perspectives that aggregate learning as a group-level property (see Wilson et al., 2007), this insight suggests that learning in groups might be better understood as constituted, at least in part, by the network of dyadic learning relationships within the group (in addition to truly collective learning efforts, such as shared reflection on a common experience). Such a perspective recognizes each individual learner in the group as a "node" that can be engaged in a number of different learning relationships with others in the team, and opens avenues for exploring the nature of the distribution of these relationships in the group (e.g., exploring the role of reciprocity in these vicarious learning relationships, see Myers, Chapter 4). Indeed, the relational view implied here posits that learning moves not only from the "model" to the "learner," as generally assumed in studies of vicarious learning and knowledge transfer, but rather that these labels are at best temporary "starting points" for the interaction. By providing analysis and support, a "learner" can help shape the "model's" understanding and knowledge of his or her shared experience, and (as described earlier), a "learner" may counter a model's sharing of experience with a story of his or her own prior experience, shifting the roles in the interaction and providing a new source of learning and knowledge for the model as well. Indeed, even just by sharing the experience with another person, models may enhance their own knowledge and understanding of the experience, through the effort exerted to organize and present their thoughts about the experience (see Di Stefano, Gino, Pisano, & Staats, 2014; Nonaka, 1994). The CVL framework thus provides a two-way learning mechanism, in contrast to

the more limited assumptions of one-way learning in prior studies, that assume the "model" and "learner" roles as fixed (and often equivalent to "expert" and "novice" roles, or as corresponding with hierarchical level in the organization). In the flatter, more specialized, increasingly global and fluid work of modern organizations (DiMaggio, 2009), teaching and learning roles are far less fixed or directly associated with hierarchy (see Bailey & Barley, 2011 for an example), suggesting that a new perspective, less reliant on these on-way assumptions of fixed learning roles, is warranted for making sense of individuals' learning from others at work.

Directions for Future Research

Building on the perspectives advanced here, future research should continue exploring the nature of individuals' interactive learning relationships at work, and though certainly not an exhaustive list, I describe here several potential direction for future work in this domain. For instance, future work is needed to continue exploring the consequences of the relational and structural context for engaging in vicarious learning. The CVL framework advanced in this chapter emphasizes many of the benefits of possessing a strong, proximate relationship for creating the trust and understanding necessary to effectively learn from one another, suggesting that relationship quality, proximity, and contact frequency should make individuals more likely to gain knowledge from a vicarious learning interaction, as they would possess the necessary frameworks in which to place the experiences shared in the interaction (given their similarity), facilitating analysis of the experience (e.g., Uzzi & Lancaster, 2003). However, findings from some studies of group expertise diversity (see Bunderson & Sutcliffe, 2002 for a thorough introduction) have suggested that overly similar individuals are actually at risk of reduced learning, given the absence of divergent perspectives and experiences, arguing instead that learning with individuals who have functionally *dissimilar* backgrounds helps generate

innovation and enhanced performance (e.g., Bantel & Jackson, 1989). In their review and empirical examination, Bunderson and Sutcliffe (2002) reconcile these seemingly divergent views by distinguishing the notion of intrapersonal functional diversity (variety of experience within an individual) from the notion of dominant function diversity (as variety of experience between individuals), revealing that the benefits of experience diversity were realized only when this diversity was located within the individual. This reconciliation supports the beneficial role of structural similarity and relationship quality advanced here, but future research might more thoroughly examine these potential "dark sides" of strong relationships for vicarious learning.

Additionally, future research is needed to explore in greater depth the cross-level implications of the dyadic CVL framework. As noted earlier, these dyadic interactions may serve as the mechanism for observed vicarious learning at higher levels of analysis (i.e., between different units or firms), however the pattern of these underlying dyadic interactions deserves greater attention in future work. For instance, future work might examine, at the individual or dyadic level, how longer "chains" of vicarious learning interactions – where an individual shares an experience with multiple people in sequence, or where individuals learn from one person's experience, and in turn share that experience with a third person (as in the retelling of another person's story of experience; Dailey & Browning, 2014) – influence the learning process. How might individuals' early sharing of an experience (and their revised understanding of its meaning through these interactions) impact their later sharing of that experience? Likewise, considering collective-level vicarious learning as constituted by a series of dyadic vicarious learning interactions raises similar questions about sequencing and learning "chains." For instance, when unit A learns from the experience of unit B, the framework presented here suggests that this learning occurs through an initial dyadic interaction *between* members of each unit (A and B),

followed by subsequent vicarious learning interaction(s) involving members *within* unit A (to spread the knowledge of the newly imported experience from unit B and co-construct an understanding of how it could be applied). The framework of CVL thus provides a means for exploring collective level learning as a chain of interpersonal learning interactions, but future research could no doubt explore a number of questions related to the efficacy of these chains (e.g., related to communication medium, physical proximity, within-unit cohesiveness, etc.) in driving more collective-level changes in learning or performance.

Finally, future research considering how this process might unfold in different situations, and in concert with other learning practices, would advance the field's understanding as well. For instance, how might the learning generated in CVL interactions abstract to varying task domains? Situated learning theorists (e.g., Lave & Wenger, 1991) argue that learning is inherently tied to the situation (i.e., the meaning made of a particular experience), but in work settings where individuals have a broader variety of experiences, might comparisons with others' experiences enable individuals to develop more robust abstractions? Likewise, are there situations where certain elements of the CVL interaction (i.e., experience, analysis, and support) be more or less salient or important to the learning process? In more emotionally taxing work environments (such as the bereavement photographers studied by Dutton, Workman, & McClain, 2013) for instance, support may be a more influential aspect of CVL interactions than in a lower stress context where direct analysis (without support) may be sufficient for encouraging meaning-making and learning. These differing work environments may also yield different combinations of CVL interactions in concert with other forms of learning. CVL interactions may be more prevalent, and more powerful, in settings where individuals "don't know what they're going to get into next" (see Myers, Chapter 3) or where direct accumulation of experience is

more difficult. Similarly, CVL interactions might be employed in concert with more independent forms of vicarious learning (to varying degrees) in different settings, suggesting a potential future research direction exploring their relative frequency or interaction in driving learning. As an example, a new resident physician working in an emergency room may engage in independent vicarious learning during the treatment of a patient (watching a more experienced physician treat the patient), but then engage in more coactive vicarious learning after the patient has been stabilized, asking questions and making meaning of the experienced physician's actions during a post-action debrief or discussion. Considering how CVL unfolds in these different work domains offers an opportunity to enhance the theory of coactive vicarious learning offered here, extending the field's knowledge of how individuals learn from one another in work organizations.

Conclusion

In his foundational work on social learning, Albert Bandura noted that "learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do" (Bandura, 1977b, p. 22), capturing the critical importance of vicarious learning, particularly in organizations – where making mistakes and "reinventing the wheel" can be costly (Bresman, 2010). Yet, despite its name, research on vicarious learning has been largely *asocial* in its development and application to learning in organizations, focusing on solely intrapersonal processes of observation and imitation of others' actions. In this chapter, I advanced a novel theoretical model of coactive vicarious learning, offering a form of vicarious learning that occurs not through passive observation and imitation, but rather through individuals' engagement in interpersonal interactions and co-construction of the meaning of a person's experience. In this way, I both challenge and complement existing views of this more passive, independent vicarious learning by articulating a relational

perspective that identifies the specific behaviors involved in a vicarious learning interaction, and also recognizes the role of vicarious learning in building knowledge and capacity for future learning. This relational model of CVL offers a fundamentally different way of thinking about how individuals learn from one another in organizations – and in particular a way of thinking that is more consistent with the kinds of learning observed in modern, knowledge-based workplaces – advancing the field's understanding of learning at work and laying a foundation for more nuanced, robust, and truly social, research on learning in and of organizations.

CHAPTER 3

THE STORIES WE TELL: ORGANIZING FOR VICARIOUS LEARNING IN AIR MEDICAL TRANSPORT TEAMS

> "You really never know what you are going to get into. We don't fly just the average patient; we fly very very sick patients …We may be going on an ICU to ICU for a patient who is in liver failure [or] if you are going on a scene call and it's just trauma, you have to be able to manage that patient… We are constantly learning [so that we're ready to handle these cases].
>
> *A Flight Nurse, describing the challenges of preparing for the uncertainty and complex nature of air medical transportation*

Individual learning – the process by which experience alters one's beliefs or behavior (Argote, 1999; Bresman, 2013) – has long been regarded as critical for employee (Colquitt et al., 2000), team (Edmondson, 1999), and organizational success (March, 1991). Yet, in an era of ever-more complex, interdependent and diverse workplace experiences, where individuals are more likely to encounter unusual or unique work demands (Cascio, 2003), learning based solely on individuals' own experience may falter (Garud et al., 2011; M. W. Morris & Moore, 2000). In contrast to prior work eras, employees are increasingly experiencing the kind of work described in the opening quote (from a member of an air medical transport team – teams of clinicians who transport patients from a small hospital or accident scene to receive critical care at a larger hospital), where "you really never know what you're going to get into" (see also Sanchez, 1994). In these contexts, developing expertise from an accumulation of similar prior experiences is insufficient, as tasks require broad and diverse knowledge (i.e., not only expertise in a particular

function), making it unlikely that any one individual will have direct prior experience in all necessary areas for accomplishing the task (e.g., Sullivan, 1999).

Recognizing this limitation of learning only from one's own direct experiences, employees increasingly rely on more vicarious learning (where *others*' experiences alter one's beliefs or behavior), allowing them to use the lessons of others' experiences in order to develop the requisite variety (Weick, 1979) necessary to meet dynamic work demands within their organization. As Bandura (1977b, p. 22) summarizes, "learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do." Accordingly, engaging in vicarious learning has been shown across a number of domains to reduce inefficiencies and improve performance (Argote et al., 1990; 2001; Kim & Miner, 2007; Szulanski, 1996). Though much of this research has been conducted at the organizational level of analysis (Ancona & Bresman, 2007; Haunschild & Miner, 1997; examining how organizations use the experience of other firms to enhance their own learning and performance; e.g., Huber, 1991; Madsen & Desai, 2010), significant attention has also been paid to understanding the structures and practices that promote individual learning from others within organizations (see Bresman, 2013).

Examining this within-organization vicarious learning, research frequently points to formal structures and knowledge transfer conduits as critical. It was long assumed that knowledge sharing was simply a natural function of the workplace, occurring "automatically" (see Ipe, 2003), but scholars and practitioners have increasingly come to see the structuring of resources in the learning environment as necessary for knowledge sharing (e.g., Siemsen et al., 2009). In this view, knowledge resides in multiple reservoirs within a unit or organization and is transferred through structured linkages (conduits) between these various reservoirs (Argote &

Ingram, 2000). For instance, organizations can use knowledge management systems to create repositories of prior practices and knowledge for storage and future retrieval by others (Alavi & Leidner, 2001; Fahey & Prusak, 1998; Matzler & Mueller, 2011), or can employ formal practices of personnel rotation – moving individual employees between different teams, units, or subsidiaries to facilitate the sharing of knowledge, insights, and innovation (Kane, 2010; Kang et al., 2007; O'leary et al., 2011).

Yet, despite the identification of these potential structural conduits for vicarious learning, our understanding of how people learn from one another in organizations is still quite limited, as a process-oriented, micro-level view of how people create, adapt and make use of these conduits remains largely omitted from prior research (Bresman, 2013; Darr et al., 1995; Styhre, Ollila, Roth, Williamson, & Berg, 2008). In other words, the focus of prior work has been on the simple presence or absence of learning conduits, rather than on what unfolds between individuals within these conduits. This omission is problematic, as sharing knowledge and experience in modern organizations has been identified as a complex, multifaceted process (S. Wang & Noe, 2010), and simply investing in the creation of potential knowledge conduits (such as implementing a knowledge management system) does not always enhance interpersonal learning (see A. K. Gupta & Govindarajan, 2000; Matzler & Mueller, 2011; McIver et al., 2013).

Contrasting this focus on formal learning conduits, a separate stream of research has viewed this vicarious learning as situated in more informal, less technical processes and practices within organizations (see Contu & Willmott, 2003; Hazlett et al., 2005). In particular, prior research has explored the impact of "communities of practice" (Brown & Duguid, 1991), relatively informal groups of practitioners who gather – either in person or via a virtual community (e.g., Ardichvili, 2008; Chiu et al., 2006) – to share knowledge and best practices

learned through experience (Orr, 1996). Individuals are viewed as learning from others' experiences through increased engagement in work tasks and "fuller" participation in the community (i.e., moving from the periphery to the core of the community; Lave & Wenger, 1991). However, as with the literature on formal conduits, research on communities of practice has also largely ignored the underlying interpersonal interactions that constitute this vicarious learning, assuming that learning occurs unintentionally through a general process of socialization into the community (i.e., attending less to the dynamics of the actual interactions, or the construction of specific teaching-learning relationships; Bailey & Barley, 2011).

Integrating these two streams of research thus reveals that, despite the identification of potential sites of vicarious learning, we still know relatively little about how vicarious learning is actually enacted at the interpersonal level within these formal conduits or informal communities of practice. Indeed, several scholars have noted that "organizational learning research using the term vicarious learning has been agnostic about the activities by which it occurs" (Bresman, 2010, p. 93), and that "a greater understanding of the micro processes underlying the transfer of knowledge is needed" (Darr et al., 1995, p. 1761). At the same time, reviewing these competing research paradigms – one advocating formal transfer structures and the other highlighting informal learning practices among community members – also reveals two largely disparate approaches to promoting individuals' learning from others' experiences with little understanding of how formal structures and informal practices might both simultaneously influence individuals' enactment of vicarious learning at work (although see M. Thompson, 2005 for a discussion of the role of organizational structure in the formation and dissolution of communities of practice). This lack of understanding is problematic, particularly in light of the long-standing view that work processes (such as learning) are jointly dependent on formal *and* informal elements of the

organization (McEvily, Soda, & Tortoriello, 2014). The field is thus in need of understanding regarding both the underlying interpersonal micro-processes by which individuals enact vicarious learning in organizations, as well as how formal structures and informal practices interact with these interpersonal processes to impact learning.

The Present Research: Organizing for Vicarious Learning

In light of these two needs, what seems missing is a perspective on how individuals *organize* for vicarious learning at work. Weick (1979, p. 11) defines organizing as a process of "resolving of equivocality in an enacted environment by means of interlocked behaviors embedded in conditionally related processes," explicitly calling attention to the simultaneous interplay of practices (interlocked behaviors) and structures (conditional processes) in the interpersonal processes individuals employ to make sense of events and enact this sense back into the world (Weick et al., 2005). Indeed, an organizing perspective is inherently attuned to both informal practice and formal structure, as it involves individuals sharing their varying, distributed experiences through interpersonal interactions, which are then incorporated into collective understandings and routines that inform future experiences (e.g., Christianson, Farkas, Sutcliffe, & Weick, 2009; Garud et al., 2011; Weick & Sutcliffe, 2007). Moreover, a focus on organizing emphasizes a process-oriented view of vicarious learning, placing its focus on the interpersonal interactions and discourse occurring between individuals as they make sense of one another's experiences (i.e., emphasizing ongoing actions, rather than the simple presence or absence of conduits). Focusing on how individuals organize for vicarious learning thus provides a means for addressing the needs identified above, helping develop a clearer understanding of the processes by which individuals learn from others' experiences at work (while also answering

recent calls for more in-depth, meso-level research on learning practices in organizations; Noe, Clarke, & Klein, 2014).

Developing this clearer understanding offers a significant contribution to theories of vicarious learning in organizations by providing a process model of how individuals learn from one another's experiences in dynamic, knowledge-intensive organizational contexts. Prior theories emphasizing vicarious learning as occurring through formal conduits for replicating successful practices (with less attention to the underlying interpersonal actions) were likely fueled by the high-volume manufacturing organizations that dominated the time of their introduction (Tucker & Edmondson, 2007), where large-scale imitation of successful practices within and across plants was achievable with the mere introduction of a knowledge-sharing conduit. However, the social context of learning in organizations has changed dramatically over time (Noe et al., 2014), moving away from easily replicable assembly line work tasks (Bailey & Barley, 2011; or the pre-industrial production models often invoked in theories of situated learning and communities of practice; Gherardi, 2006) to more service-oriented, interdependent work environments requiring greater social coordination, more interpersonal interaction, and transmission of tacit knowledge (Tucker, 2011). In these environments, a robust theory of vicarious learning requires consideration of not only the presence or absence of various conduits and communities for learning, but also of the actions individuals take as they engage in interpersonal processes of interaction and reflection (Daft & Weick, 1984; Garud et al., 2011; Weick, 1995) to learn from others' experiences. Whereas early approaches to studying vicarious learning in organizations relied on a largely intrapersonal mechanism of observing and imitating the behavior of "models" (e.g., Bandura, 1986; Gioia & Manz, 1985), more recent theorizing emphasizes a coactive mechanism of vicarious learning, where individuals co-create an

understanding of their experience through reciprocal discourse (Myers, Chapter 2). Extending this coactive vicarious learning mechanism, an organizing perspective explores how these discursive interactions unfold in organizations.

It is this unexplored question of how people organize for vicarious learning that I seek to examine in this paper. Drawing from a comparative qualitative study of two air medical transport teams, I inductively build an understanding of the interpersonal process of vicarious learning, as well as the interplay between informal practices and formal structures in the enactment of this learning. Members of air medical transport teams face a work context where experiences are both scarce and diverse (i.e., they are unlikely to obtain direct experience treating every possible injury or illness they might face), and where the need for reliable performance is high (Weick & Sutcliffe, 2007), weakening their ability to rely on direct experiential learning (e.g. "trial and error" learning) as a means of developing and improving their performance. As a result, these team members benefit from efforts to vicariously learn from their colleagues' experiences, as a tool for sensemaking and navigating the uncertainty and complexity of medical work (Hofmann et al., 2009; Tucker & Edmondson, 2003; Weick et al., 2005). Yet this need for organizationally-embedded vicarious learning is not limited to the healthcare field, as many industries face dynamic environments where employees may have differing experiences that can inform one another's learning, and where "reinventing the wheel" has substantial costs (Argote & Ingram, 2000; Bresman et al., 1999). Therefore, though the context of air medical transportation can be seen as a somewhat "unconventional" research setting for a study of these organizing processes, the potential impact of learning from others' experiences (and the consequences for failing to learn) in this environment throw into sharp relief the actions and structures that facilitate vicarious learning, allowing me to capture "constructs and relationships that may be too weak to

notice or capture in traditional settings, thus facilitating the development of rich theory" (Bamberger & Pratt, 2010, p. 668) and answer recent calls for rich, qualitative investigations of knowledge work in modern organizations (i.e., Bechky, 2006).

Drawing my analytical lens from theories of organizing (e.g., Weick, 1979), I focus on the interactions individuals use to share their experiences with one another in air medical teams, and in particular on storytelling interactions (i.e., sharing narratives of prior experience; Boje, 1991; Pentland, 1999) as a key interpersonal site of vicarious learning. I then explore how individuals in these teams use various pre- and post-interaction structures and practices to organize their work in support of vicarious learning interactions, advancing a three-stage process of enabling, enacting, and elaborating vicarious learning. I thus challenge and extend theories of vicarious learning by introducing a process-model of the interpersonal interactions that constitute vicarious learning (absent from prior theories), while also detailing the role of formal structures and informal practices in organizing the work environment to support vicarious learning.

Methods

Scholars have long established that "how" questions are well-suited to qualitative research methods (T. W. Lee, Mitchell, & Sablynski, 1999; Yin, 1989), particularly where little theory exists to guide an investigation (Edmondson & McManus, 2007), as is the case with research on vicarious learning (see Bresman, 2013). Given that organizing involves the development and understanding of a shared action emerging from the interplay between individuals' deliberate behavior and creation of structures, qualitative methods can address the full range of the phenomenon, as they lend themselves to exploring individuals' meaning-making (i.e., centering on the participants' perspective) while also capturing the dynamics of the context – exploring a phenomenon in its natural setting (Maxwell, 2005). I thus explore my research

question using an inductive, qualitative study of air medical transport teams, relying on both participant observation and interview methods. Indeed, consistent with recent views of vicarious learning as a process of individual belief and behavior change emerging from a discursive interaction and coactive processing of another's experiences (e.g., Myers, Chapter 2), assessing whether or not learning occurs involves examining both observable practices and structures (e.g., discussion or opportunities for reflection; Edmondson, 1999) as well as individuals' self-perceptions of growth and development (e.g., Sonenshein et al., 2013), suggesting that qualitative methods such as observation and interviews would be appropriate.

Research Setting

I conducted a qualitative investigation of vicarious learning in the context of air medical transport teams – teams of healthcare providers that work in pairs to transport patients via helicopter (or occasionally fixed-wing aircraft or ambulance) from smaller hospitals or accident scenes to a large, tertiary-care center with greater capacity to care for the patient's injuries or illness. Following the logic of theoretical sampling (Eisenhardt, 1989), the healthcare context provides a useful setting for examining my research questions relating to individuals' vicarious learning efforts. Healthcare providers face a context of rapid advances in knowledge, coupled with highly complex and uncertain work (Tucker, 2011). This need to keep up with complex, ever-changing knowledge, and the uncertainty about exactly how to apply that knowledge to any given patient (i.e., due to variability in the presentation of a particular disease) creates a context where continuous learning is a necessity, and where learning from others' experiences can be particularly helpful. Indeed, in the specific context of air medical transportation, beyond just providing rapid transportation, pairs of providers treat a patient's condition to the best of their ability en-route, requiring that they be willing and able to make decisions that have a significant

impact on patients' outcomes. By definition, the cases that air medical teams are called upon to transport are relatively infrequent and typically non-routine, as patients with more routine injuries or illnesses (i.e. ones that are more common or easily cared for) are typically treated in a smaller hospital facility or transported by a ground ambulance team. As a recent medical review of air medical transportation notes, the average patient transported by helicopter is more severely injured and requires more medical resources than a patient transported by ground ambulance (Desmettre et al., 2012), presenting air medical providers with a high level of complexity and uncertainty, which has been shown to lead medical professionals to seek advice and learn from others (e.g., Hofmann et al., 2009).

This degree of complexity and diversity, combined with a need for highly reliable performance (e.g., Leape, 1994; Rosenthal & Sutcliffe, 2002; Weick et al., 2005), makes it difficult for air medical team members to learn everything they need to perform effectively from their own direct experience, and thus makes air medical transport teams an ideal case in which to observe vicarious learning. Indeed, discussing when vicarious learning might occur, Bandura (1977b) specifically identifies surgery (and other medical procedures) and flying an aircraft as examples of critical contexts wherein relying solely on an individual's own pattern of success or failure experiences for learning would be quite limited. Given that air medical transportation encapsulates both of these task conditions, it is an ideal industry in which to examine how individuals organize to support effective vicarious learning.

Research sites. The primary site for my research was Sigma Flight,[11] an air medical transport team affiliated with a large university-based tertiary care hospital in the Midwest United States. I gained access to the site through contact with the team's manager and medical

[11] All names of individuals and organizations are pseudonyms.

director, and was afforded complete access to the team's operations, allowing me to gather the detailed, rich data necessary to address my research questions. Sigma Flight transports approximately 1,300 cases per year, with a mixture of inter-facility transports (moving patients from smaller community hospitals to their respective university-based hospital) and scene transports (responding directly to the scene of a serious accident). The team transports patients using both rotor-wing (helicopter) and fixed-wing (jet plane) aircraft, with two helicopters in service at two different base locations 24 hours per day. Most transports are flown in the helicopters, with the fixed wing aircraft available on standby for longer transports. The helicopters are staffed with two flight nurses (who are both also certified as paramedics), in addition to the pilot (an employee of a third-party aviation vendor) and occasional "third riders" such as resident physicians or other specialists. The program employs approximately 20 flight nurse/paramedics (who make up what I will refer to as the "flight team members"). In addition to these flight team members, Sigma Flight employs a number of communication specialists who operate the dispatch center (where flight requests are received from outside hospitals and EMS agencies), as well as mechanics for the aircraft (also employed by the third-party vendor). Flight team members work twelve-hour shifts at one of Sigma Flight's bases with a partner, and respond to any flight requests sent through the dispatch center during that time. A shift typically involves spending a significant portion of time in the flight office, completing paperwork on prior transports, working on continuing education requirements, discussing prior cases, practicing techniques, as well as eating and resting. Shifts involve two flight requests on average, which can come at anytime, and require immediate response from the flight team.

Flight team members are called upon to transport a broad spectrum of patients – ranging in age from newborns to the elderly, and covering a wide range of diagnoses – and fly many of

the most difficult cases, which others (e.g., ground ambulance teams) are unable to transport, due to lack of equipment, training, and expertise. This puts a significant amount of pressure on individual team members to learn and stay current on a wide range of techniques, medications, and treatment methods, as well as to be proficient in their use and application for differing patient populations. As a way of meeting these broad learning demands, Sigma Flight utilizes a generalist staffing structure, requiring that all flight team members be dual-licensed as both a nurse and a paramedic (rather than one or the other), and also engages in deliberate learning practices, such as weekly "grand rounds," where cases transported in the previous week are reviewed by the program's flight team members, education coordinator and medical director.

After evaluating the initial qualitative data stemming from my research at Sigma Flight, I decided to gather data from a second site, in order to complement and refine my understanding of the vicarious learning processes observed at Sigma Flight. This second air medical program, Gamma Flight, operates the same number of bases and aircraft as Sigma Flight, and flies a similar volume of transports, although it is located in a separate state, and thus is not a direct competitor of Sigma Flight. Gamma Flight is affiliated with a university-based tertiary care hospital in the Southeast United States, and engages in many of the same operations as Sigma Flight. I obtained access to Gamma Flight after being embedded in the Sigma Flight context, through a personal contact between the managers of each program. Though similar in their operations and flight volume, Gamma Flight differs from Sigma Flight in a few respects. Gamma Flight team members work twenty-four hour shifts at one of the program's two bases, and gather for staff meetings and case review only once per month (in contrast to Sigma Flight's weekly grand rounds). Most notably, Gamma Flight team members are typically licensed as either a flight nurse or paramedic (in contrast to Sigma Flight's dual-licensed staff), and Gamma Flight

uses a separate, specialized team to transport pediatric patients, consisting of a nurse and respiratory therapist (in contrast to Sigma Flight's use of generalist teams to transport patients across the age spectrum). I draw on this variance in practices across my two research sites to develop a more nuanced understanding of the process of vicarious learning and refine the theory emerging from my inductive analysis (Eisenhardt, 1989; Yin, 1989). In this way, my choice of these two research sites was both theoretical and purposive, reflecting a deliberate effort to observe varying practices across two different settings (to refine the precision of my theorizing), within an industry context where vicarious learning is particularly impactful.

Data Sources

Following widely-accepted recommendations for grounded theory development (Barley, 1990a; Eisenhardt, 1989; Miles & Huberman, 1984) and recent examples of such theory development, particularly in medical contexts (e.g., Edmondson, Bohmer, & Pisano, 2001; K. J. Klein, Ziegert, Knight, & Yan, 2006), I explored individuals' organizing processes of vicarious learning utilizing several overlapping data sources. Specifically, I conducted participant observation and informal discussion (across two distinct phases) at both Sigma Flight and Gamma Flight, as well as a third phase of semi-structured interviews with team members from each site, accompanied by analysis of archival materials. By triangulating insights from these overlapping data sources, I am able to improve the validity of my theorizing (Eisenhardt, 1989; Jick, 1979; Yin, 1989).

Observation and informal discussion. The first source of data involved participant observation of Sigma Flight and Gamma Flight teams as they perform their daily work routines, gathered in two distinct phases. Observational methods allow researchers to study people as they engage in repeated organizational practices, which can facilitate an understanding of changes in

behavior or thought (Engeström & Middleton, 1998) making it an ideal method for understanding learning (as a process of altering through or behavior as a result of an experience; Kolb, 1984). In the first phase of data collection, I conducted approximately 200 hours of shift observations at Sigma Flight, accompanying a given pair of team members as they completed their entire 12-hour shift (although my observation periods often ran for 14 hours or more, to include the arrival of the team and handoff from the prior shift, and to accommodate "late flights" that extended beyond the anticipated shift end). I immersed myself in the research setting by observing a variety of shifts, spanning day and night shifts, weekday and weekend shifts, and shifts at both bases, in order to obtain a representative understanding of the experience of flight team members. During these shifts, I accompanied team members through their daily routine, including their shift briefings, discussions, "downtime," and other activities (e.g., meals), as well as accompanying them on flights. During the treatment and transport of the patients, I observed from a few feet away from the patient's side (while we were in a hospital or at an accident scene), and sat alongside the crew during transport in the helicopter or jet aircraft, observing as they treated the patient. When not transporting a patient, I frequently engaged in conversations with team members, which enhanced my understanding of the setting and the events unfolding, and also served as opportunities to engage in informal interviewing.

Throughout my observations and informal interviewing, I took written notes, which I later converted into detailed field notes, including quotations from conversations with and among the flight crew (which I recorded verbatim in my notes whenever possible; Emerson, Fretz, & Shaw, 1995; J. Lofland, Snow, Anderson, & Lofland, 2006). My presence as an observer did not seem to alter the behavior of the team, as they were used to having a "third rider" along on their flights, because of their university hospital's program for medical residents to fly along with the

team. During these transports (as well as at other points), I assisted the crew with simple tasks, such as carrying equipment or preparing minor documents, which facilitated greater trust and understanding between myself and the crew, reducing the potential tension of being observed while also creating opportunities to inquire about what was going on. Indeed, as Michel (2007) has noted, participating in the work of a team allows the researcher to ask detailed questions that would be disruptive if coming from an observer, as the researcher is embedded in the task itself, and so work-process questions fit more naturally into expected communication.

In addition to this observation of team members during their shifts, I also observed a large number of Sigma Flight's weekly "grand rounds" meetings, totaling approximately 125 hours over a period of two years (both during and after my non-participant observation of flight shifts). As with my shift observations, I used these meetings as an opportunity to not only observe, but also to engage in unstructured, informal discussions with team members, which I recorded in my field notes and include in my analysis.

In a second phase of data collection, which took place approximately 18 months after my shift observations with Sigma Flight, I engaged in similar non-participant observations at Gamma Flight. Scholars have recommended taking a break in between major rounds of qualitative data collection, in order to allow reflective time and distance that help to identify themes and gaps in understanding (Barley, 1990b). Over a period of several months, I accompanied Gamma Flight team members on their shifts, logging approximately 100 hours of observation, including transport of patients, "downtime" between flights, and other informal activities (e.g., meals, restocking equipment, etc.), following the same procedures as at Sigma Flight. I again used my role as an observer to engage team members in informal conversations, and collected my observations and quotes from these conversations in detailed field notes.

Semi-structured interviews. In a third phase of data collection, I conducted semi-structured interviews with both Sigma Flight and Gamma Flight team members (see Appendix A for a copy of the semi-structured protocol). Given that learning is a personal, thoughtful process, utilizing interviews to generate rich descriptions from the team members themselves granted me a window into their lived experience (Marshall & Rossman, 2010). At the same time, these rich descriptions facilitated integration of individuals' different perspectives, as well as my own observations, at both the "local" level (i.e., matching observations and interview responses of a particular individual; Eisenhardt, 1989) and the more "inclusive," abstract level (i.e., integrating different individuals' perceptions and descriptions and comparing them to existing theory; K. D. Locke, 2001). I conducted 29 semi-structured interviews, lasting 53 minutes on average, with team members from both Gamma Flight (10) and Sigma Flight (19). Team members received a small gift card for participating, and all interviews were audio-recorded and later professionally transcribed verbatim.

Archival documents. Finally, both Sigma Flight and Gamma Flight provided access to a range of internal and external documents, including training materials, job descriptions, and protocols that facilitated my understanding of learning in these contexts. Through analyzing these documents, I gathered archival evidence to help triangulate an understanding of the various structures and actions enacted to organize for vicarious learning.

Data Analysis

My interest in this study was to explore the process by which individuals organize to promote individual-level vicarious learning from others' experiences, and so my primary unit of observation was a vicarious learning interaction – an interpersonal interaction that focused on one participants' prior experience with a goal of generating lessons of the experience for future

use (i.e., a learning episode; see Sole & Edmondson, 2002). I mark these interactions as having occurred through the presence of either observed practices (e.g., discussion, reflection, or feedback sharing; Edmondson, 1999) from my field notes, or individuals' own perceptions of having learned from others stemming from semi-structured interview responses (e.g., Sonenshein et al., 2013). Yet, given the emphasis in prior literature on formal structures and informal practices, I also attend to collective and structural elements in my observations and how these elements influence vicarious learning interactions. Thus, I take an inherently cross-level approach to my analysis, using my varying sources of qualitative data to explore how the vicarious learning process unfolds through a coalescence of individual thought processes (from interviews), interpersonal interactions (from observations) and collective structures (from meetings and archival documents). Importantly, my focus in this paper is on how individuals organize in support of vicarious learning, rather than on the specific outcomes of the vicarious learning interaction itself, and thus I rely on participants' descriptions of what they learned from a particular interaction as evidence of vicarious learning (in contrast to studies of social learning in classroom settings that utilize formal assessments of individuals' learning; see Taylor et al., 2005).

Following traditional approaches to grounded theory building (Glaser & Strauss, 1967), I engaged in an iterative analysis process, beginning with an open reading and review of my field notes and interview transcripts, coding passages in each text with substantive labels based on their content (i.e., without overt reference to any abstract content or perspective; Maxwell, 2005). This open coding surfaced themes in observations and responses – frequently used and important (from the participant's perspective) labels of action and behavior (Glaser & Strauss, 1967; Miles & Huberman, 1984), which I used to construct initial frameworks of understanding, reflecting

my early identification of broader trends and categories derived from these open "in vivo" codes (K. D. Locke, 2001). I continued to move between the data and my emerging framework of understanding, both during my periods of observation (using insight from each observation to inform and focus my subsequent observation), as well as after each major phase of data collection (i.e., between each set of observations).

In the next step of my analysis, I integrated across my various sources of data in order to focus on theoretically relevant insights that reflect a conceptual model of the vicarious learning process (K. D. Locke, 2001; Maxwell, 2005). Specifically, I combined and compared data from each of the sources as they related to particular theoretical insights, developing a more integrative framework that revealed the connections among different emerging concepts (Corbin & Strauss, 2008). I continued this integrating process, refining my emergent theory to generate a conceptual framework that best accounted for my data (Miles & Huberman, 1984; Strauss & Corbin, 1990). Throughout the data analysis process, I engaged in repeated discussion with key informants at both Sigma Flight and Gamma Flight, who verified and reinforced my emerging interpretations (Glaser & Strauss, 1967; Pratt, 2000).

Findings

The findings of my qualitative exploration of vicarious learning in these air medical transport teams revealed a nuanced, multi-stage process model of vicarious learning, where interpersonal interactions served as a primary site of team members' learning, and further demonstrated that these interactions are situated in organized practices and structures, rather than occurring haphazardly or "automatically" (Ipe, 2003). Indeed, these findings demonstrated that individuals engaged in interpersonal storytelling (Boje, 1991; Orr, 1996) as a mechanism for learning, but that the impact of these interactions was dependent on contextual cues, and was

supported by pre- and post-interaction practices and structures. To help organize and make sense of my inductive findings, I first describe the challenges of learning in these air medical transport teams and how Sigma Flight and Gamma Flight address this challenge with differing degrees of vicarious learning, before laying out the multi-stage process model of how individuals organize for vicarious learning that emerged from my analysis. Specifically, I use the differences vicarious learning between Sigma Flight and Gamma flight to elucidate the nature of the interactions that enact this vicarious learning, as well as how formal structures and informal practices coalesce to help prepare and enable individuals to engage in these interactions, while also contributing to the elaboration and reinforcement of the learning stemming from these interactions among air medical transport team members.

The environment air medical team members face is one of intense ambiguity coupled with an unusually high degree of responsibility, requiring them to engage in ongoing learning and development to stay on top of the demands of their work. Whereas a nurse in a hospital is typically responsible for one particular type of patient, and relies on a team of physicians and other nurses to make treatment decisions and assist with care (respectively), in the air medical context, team members have only themselves and one another to rely on, and are often forced to make decisions that would not be within the purview of a nurse in the hospital context. As the flight nurse below notes, this combination of complex patients and limited resources can serve as a challenging work environment, encouraging team members to engage in continuous learning:

> There are cases that are very, I don't want to say overwhelming, but very complex. I sometimes will walk to the bedside and take a minute to just do that quick "once-over" look. There are times when I still think, "Where the hell do I start?" When they've got nine drips [IV lines] going, [they're] on a ventilator, and [with] chest tubes and suction, and the blood components are infusing and they're increasing the drips or decreasing drips, or adding more drips – sometimes it's amazing what we come across. It's interesting that there'll be four of five people in a room working on this one patient. Then when we get here, it's got to be the

> two of us. … Not every single case is like "to the max" with complexity I guess, but even the simplest case can demand a lot from you. I think I've seen a lot, I've done a lot but I'm sure there's more. I feel like if I don't learn something new every day then it's time for me to go home.

The learning challenge for these flight team members stems more from the degree of ambiguity in the cases – the need to decide how to treat a patient in the face of equivocal information –than from uncertainty (lacking information about what to do; Weick, 1995), although both challenges coexist in their work. Flight team members possess a great deal of technical knowledge, but their work requires them to engage in sensemaking (Weick et al., 2005), deciphering often conflicting cues or signals to determine how best to treat and transport a patient. For instance, during my observations at Sigma Flight, I observed the transport of a patient who had been diagnosed at a small community hospital with signs of a heart attack (a myocardial infarction [MI]). En route back to the university hospital, the patient became extremely anxious and began pulling off his oxygen mask. The patient had informed the crew that he got nervous flying and might become airsick, but anxiety is also a sign of a worsening heart attack, so the patient's agitated grasping at his mask could have multiple causes (equivocality) that would require very different treatments. Over the flight intercom (activated through a microphone in each team member's helmet, which the patient is unable to hear), one of the flight nurses commented, "This guy makes me fucking nervous… If he infarcs [has a heart attack] there isn't that much slack to pick up… damn it, why is he taking off his mask again? I hate MI patients, especially anxious ones…" to which his partner replied, "Exactly. Is he anxious from flying or from his heart crapping out? We don't know, so we can't give him meds to mellow him out, which would reduce his anxiety, but would throw his heart out of whack and probably cause him to have an MI. It's a fine line." This responsibility for making treatment decisions in the face of ambiguous patient symptoms is one

of the key challenges for flight team members, and represents a significant departure from the experience these nurses would have in their prior work (i.e., within the hospital context).

Though both Sigma Flight and Gamma Flight team members face this ambiguity and responsibility for patient care, my findings revealed stark differences in the learning strategies used to meet these challenges. Team members at Gamma Flight utilize a primarily individual-focused system of learning and continuing education, engaging in independent study and review of clinical materials, or attending courses to maintain their certifications and knowledge. As two Gamma Flight team members noted, when asked how they engaged in learning,

> I use journals as much as I can. I'll try and read journals and also ... [the university] has a website called *UpToDate* [that] … we can access from work. You can pick any topic, any diagnosis or condition and it gives you all the current research - that is actually really great. … [In terms of learning] probably the benchmark for me is [two other flight nurses]… they basically read journals continuously and then, [one flight nurse] especially, will go to a lot of in-house programs and continuing ed[ucation] that he can get.

> I try to do at least one conference a year, just to get fresh information … we get the emergency nursing journals, so you have research articles in there too … I think for the most part we're all highly driven people, and that leads to a lot of seeking our own information.

By comparison, the focus of learning at Sigma Flight tends to be more interpersonal, utilizing formal and informal interactions between flight team members (i.e., at weekly rounds or just in informal discussion during work) as a key site of vicarious learning and ongoing development. In sharp contrast to the emphasis on journals and courses, the Sigma Flight team member below (along with the examples in Table 3.1) describes her learning processes as much more social, relying on interactions with peers as a fundamental learning mechanism:

> We do, I don't know, 1000, 1200 flights a year, and we don't work all the flights, right? I don't know everything that is happening with everybody's flight, so those interesting cases that I don't know about that I get to hear about at rounds are cool, because guess what? Tonight I may have to deal with a case or something very similar. … I listen to them present the case and then as they are going through the case and what things they initiated and things they provided, I start

> dissecting it, "Okay, so you guys start this drug, tell me why." I learn best by trying to pick their brains on their rationale for things. I'm not a learner with a book. Give me an example, show me. I think that is what rounds are. They are great examples of things, of real-life situations that I may encounter at any time in my career. I don't want to read about Toxic Shock Syndrome in a book. Tell me about your case you have just flown. What did he present? What did it look like? What did you do for him? We have protocols and stuff but what if you guys added something that wasn't in the protocol? Tell me why? Did it work? That kind of stuff, I learn that way from somebody's example versus just reading what it is in a textbook and what they may look like.

These social learning interactions allow team members at Sigma Flight to complement their own learning efforts with the lessons of others' experiences, providing an additional source of knowledge and development. Indeed, as one Sigma Flight nurse aptly summarized, "It's 1,400 experiences a year that I don't have [personally]. The more you know about those other patients, the more you're ready for the next one."

Importantly, these differences in learning strategy are not dichotomous, and interpersonal learning certainly does occur at Gamma Flight (as does independent learning at Sigma Flight). However, my observations and interviews clearly revealed that the general emphasis is on an independent strategy at Gamma Flight, with interpersonal learning viewed as less of a core mechanism for development. One Gamma Flight team member noted:

> We have just such a huge variety of con-ed [continuing education] classes that we can take, and different conferences that we're able to attend and be a part of – so making sure that you are constantly taking classes or in conferences when you can afford to be off of staffing is a big deal. .... [Also] we have some of the best nurses and respiratory therapists that are out there. Most of them are really, really good resources to go to and just have discussion with. Our medical director [also] does a lot of our case reviews and presentations at our monthly staff meeting. We have open discussion about that and he gives us his input and that kind of thing. I think that helps too to actually discuss actual cases and treatment plans that a crewmember did. … [However] there's supposed to be a staff meeting and [then] our education, but it's pretty much more of a staff meeting. We don't really get a lot of education in those, per se. We'll usually review two or three cases [and] that's pretty much our education. That's probably one of the things our program could do a lot better on, … we've just kind of I think dropped the ball on that.

As this individual describes, though there are opportunities to learn through interactions with others at Gamma Flight, these are seen as relatively minor in comparison to more independent forms of learning (e.g., enrolling in outside classes and conferences, see Table 3.1).

Reinforcing this independent approach, during my shift observations at Gamma Flight, there were many times that team members spent several hours in separate rooms, working independently without interacting with one another. Whereas the flight nurses at Sigma Flight spend their entire shift in a shared office area, because the shifts at Gamma Flight are longer (24 hours), each team member is provided a private room to rest. As emphasized by one Sigma Flight nurse who had spent a number of years working in another program, this opportunity for isolation encourages a more independent learning approach, limiting individuals' learning from one another. This team member goes on to suggest that this limited learning also restricts individuals' ability to care for patients, resulting in outside agencies (such as local EMS or small community hospitals) preferring to request Sigma Flight for more complex cases:

> At the other program that I worked with, basically their learning is self-study or self-'whatever you want to do'. The goal would be to sometimes bounce things off of each other, but as I found, … many of them would go to a room and go to sleep. That is why they [outside agencies requesting a transport] call us [Sigma Flight] and we [transport] certain things and they [transport] their certain thing.

This vicarious learning from others' experiences at work, as a supplement to learning from one's own experiences, thus came to the fore in both my observations and interviews as a valuable learning mechanism, allowing air medical providers to extend their own patient care capabilities through the lessons of others' experiences. For instance, one example of this learning from others' experiences impacting a future patient occurred during my observation of a Sigma Flight meeting, where several flight nurses were discussing a recent case. The case involved transporting a patient who had flipped his bicycle and impaled the handlebars into his torso, and one of the flight nurses who transported the patient noted his unfamiliarity with impalement

injuries, saying, "I had never actually seen something like that before." When I asked the two transporting nurses how they knew how to treat and transport the patient, despite admitting that neither of them had ever dealt with such an injury, one replied, "Well, I haven't done it, but it's been done before. A while back, we transported a pregnant lady that fell off a balcony and landed on a microphone stand. [To the assembled group] Do you guys remember that one? It was such a crazy story, because the angle it went in, it missed her heart and the baby, and both she and baby did well." When I commented that this recent experience must have been memorable, one of the flight nurses replied, "No, that was actually, gosh, probably almost ten years ago. It was before I got here. But you hear that story, and you show up on a scene and it just kind of kicks in – well, that's what they did with her [the microphone stand patient], so that's as good a place as any to start."

I draw on these differences in the degree of vicarious learning at Sigma Flight and Gamma Flight to develop a detailed process-model of how individuals organize for vicarious learning. My goal is not to causally explain the variance in practices across the two sites (i.e., to explain the causes and consequences of Sigma Flight displaying more vicarious learning than Gamma Flight), but rather to harness the variation between the two sites to develop a richer understanding of the process of vicarious learning itself. For instance, drawing comparisons between the two sites revealed that vicarious learning is enacted through interpersonal storytelling interactions that occur in designated contexts and are triggered by key contextual cues. Moreover, these comparisons further revealed that although Gamma Flight also engaged in these storytelling interactions (to a lesser degree), the interactions at Sigma Flight were further facilitated and reinforced by particular formal structures and informal practices. This variation thus revealed a more nuanced, complex model of the vicarious learning process, involving not

only how vicarious learning is *enacted* in the moment of an interaction, but also how it is *enabled* before an interaction (i.e., how structures and practices build individuals' capacity for, and attention to, a vicarious learning interaction) and *elaborated* following an interaction (i.e., how structures and practices reinforced and crystallized the learning from an interaction).

In the sections below, I use these labels of enabling, enacting, and elaborating (cf. Vogus, Sutcliffe, & Weick, 2010) to articulate in greater detail the three-stage process model of vicarious learning that emerged from my analysis. Consistent with the two research needs identified at the outset of this paper, I begin by focusing on how vicarious learning is enacted through storytelling interactions (to uncover the interpersonal micro-processes of vicarious learning), before turning to how these interactions are enabled and subsequently elaborated in the organizational context (to explore how formal structures and informal practices coalesce with interpersonal processes to impact vicarious learning).

Table 3.1 Differing Learning Approaches at Sigma Flight and Gamma Flight

Theme	**Evidence**
Interpersonal Learning Efforts at Sigma Flight	Rounds started way back when … and it's always been something that we've done. Not every program did it. I remember going to some of the big national conferences years ago and talking about our weekly grand rounds and people would look at us and say, "Do what?" … It was very helpful and other programs didn't do that. … I think people are upping their game, so to speak, and they do a lot more as far as education and participation with those kinds of things now. But we've always done those. (Sigma) It's helpful to share your experience with somebody else who's been through it or is here to do the next one, because they can give you feedback - feedback from each other at this level. It is very, very helpful and it's also very informative. (Sigma) So going in [to Sigma Flight for the first time], and just sitting there, and just hearing them dissect cases, and talk through the molecular level of what was going on and stuff, was definitely intimidating. …[In other units], you would get a really strong nurse here or there, that would be able to do a little, but not

	anything like what you would see around this kind of group. … I can't say that I have ever really gone through and reviewed a lot of cases … [at my prior job], they would have rounds, so your attending [physician] and your residents and nurses would go through and round on your patients, [but] again, there's mostly doctors running it. The nurse would be like, "yeah, the patient pooped, the patient is eating fine" – nothing really medically based. … Coming in [to Sigma Flight], everybody is throwing in their input, you know, you're talking about these really sick patients, everybody is throwing in their ideas, what they might have done, what they thought went well, [putting in] that group effort on it. (Sigma) [Talking] informally … with the crew and say, "Hey, how did that turn out? Tell me how that progressed?" Because some of the stuff we do is cool. … That's why I go to rounds too, it's like it'd be nice to know how that [aortic] dissection [patient] did, or whatever else, because I could be there tomorrow. I could walk into that hot mess tomorrow and [learning] how to diffuse the situation better - that's tough. [So] I think that's a huge part of my learning process. I mean the day that [listening to others' cases] stops being fascinating is the day you probably should go work in the spine clinic. (Sigma)
Independent Learning Efforts at Gamma Flight	So after we have staff meetings all together, the Peds [pediatric] and Adult teams each go off and do their own education thing. So we'll have somebody come in and give a lecture or an update on a procedure or illness or something. Like last week we had the guy come in, because we are now a regional stroke center, and he explained the differences between a stroke hospital, stroke center, etc., and what we would be doing now with these stroke patients. It was good just to get updated on this stuff that is going on. (Gamma Obs) Back in the day, we had binders. Each specialty - obstetrics, trauma, neuro - things like that, would have a section, and then we would put current articles in there. Articles that we found and researched, things like that. However, with the way electronic media and everything is going, we don't do that anymore. … One of the best things we have … is the UpToDate website that, if [a flight team member] has a question, say they … see a pre-eclampsia [patient], they could look up pre-eclampsia on that site, and it gives a whole list of articles to read. They could research and I get the homework with that to follow up on. (Gamma) Personally, I read, read, read, read. I keep up with the trends outside of air medical [practice]. … You really have to know what's happening in the [broader] industry - medicine in general. I keep up [because] I read New England Journal of Medicine. … I'm always on the AAPA [American Academy of Physician Assistants] web site and AMA [American Medical

	Association] web site. There's always something out there that we might think about in a different or say, "Look, this is what's coming down the pike." … You don't want to ever be behind. As an individual I don't want to be behind. I also want to have the people I work with or the people I work closely with to go, "Hey, look, this is kind of what's trending. This is what we're looking at right now." [So, my learning strategy] is always reading on my own time, at work, textbooks. … I probably have $3,000 worth of just reference books that are sitting here in my house … I like to be able to tell people a page number when they ask me a question off the top of my head. (Gamma)
	We have to be self-motivated to do our own continuing education [and] go to conferences. There's a lot of on-line stuff now that you can do. … You just have to go and search for all the specialty courses that apply to that certification … There's really no other way. Most people tend to like going to classes more than on-line. I guess you get that personal attention when you go to a class. You can ask questions and stuff like that. [But online] it's always available. You can look online and there are courses all throughout the state for whatever you're looking for. (Gamma)

Note: "Sigma" = Interview Quote or Observation from Sigma Flight; "Gamma" = Interview Quote or Observation from Gamma Flight. Quotes from non-participant observations and informal discussion are drawn from detailed field notes, and are marked with "Obs." All names are pseudonyms.

Enacting Vicarious Learning

Analyzing the observation and interview data gathered at Sigma Flight revealed that vicarious learning was enacted primarily through informal interactions between flight nurses, where stories of prior experiences are discussed, analyzed and interpreted. Stories, and the process of storytelling (as a performance where multiple individuals interpret past experience; Boje, 1991), have been recognized as sensemaking and sensegiving processes in organizations, providing a useful basis for developing shared meanings and understandings of an experience (Garud et al., 2011; Sonenshein, 2010). As Weick (1987, p. 125) notes, stories also "register, summarize, and allow reconstruction of scenarios that are too complex for logical linear summaries to preserve" (see also Browning, 1992). These characteristics make stories a useful

tool for vicarious learning among flight team members, as it allows them a means of sharing the complex, ambiguous experiences they have in their transports. As one flight nurse articulated:

> I think we tell stories. … I think every report-off [discussion at shift change] is a very animated storytelling process I think. ... You start out with, "Did you guys do anything last night?" [and they reply] "Oh, yeah, we did this and it was a hot mess, and this is what we did and [that] is what we did." … That's the first process ensuring the information is shared. … I learn from that.

This response highlights the informal nature of this storytelling, providing a means by which flight team members can recount both the successful and unsuccessful actions of a transport and provide the necessary context and background information in which to those actions were situated. The narrative format of these interactions allows individuals to convey the rich, nuanced, and tacit details of their experience, which are often the most important pieces for informing others' future treatment of similar patients. For instance, as the quote below demonstrates, these stories not only convey clinical facts, but also provide a forum for discussing more tacit elements of the job (such as communicating with staff at a referring facility):

> [Interactions consist of] "Hey, these are the snags I had. We slammed a seatbelt in the door." It's often logistical things in the shift change hand-off, but the medical stuff does come up, too. "Hey, did you know we're doing this here? Hey, did you know this?" I mean back to the other patient … with the dissection [a case where an outside hospital had administered heparin, a contra-indicated drug for an aortic dissection], I learned about that guy because they were talking about the 20-hour surgery and the fact he died … [You learn several things:] If somebody pushes heparin on a dissection, which will happen again, what do you do? How do you give dantrolene [a drug given to reverse the effects of the heparin]? Because I've never given it, I've seen a bottle of it once. What can you do when somebody's [at the referring hospital] is pissed off at you? How could you have headed that off from the beginning? You can't nice guy your way out of every situation. How do you diffuse that? Those are three interesting things right there

In this way, storytelling interactions provide a forum for discourse, where both the storyteller and listener(s) contribute thoughts and experiences and have the opportunity to learn and change their future practice. Indeed, at Sigma Flight, it is the interest and engagement of the

listeners that transform a report-off at shift change into a vicarious learning interaction, rather than simply a quick statement of facts from the prior shift:

> I also think it's two-way [communication]. I think if you're not interested in what I'm saying, then [the report off is] pretty short, but a lot of times they are curious, [they'll ask] "What did you do? How'd that work out? Did you have to tube [intubate] him?" All that stuff, [including] "Did the tube go well? What's the SICU [Surgical Intensive Care Unit] like today? Did they have their act together? Did they not?" … It gets you ready. [You think] "Okay, these are the things I need to be ahead of today because they were caught last night." … It may happen or it may not happen, but at least it's in your thought process.

To better illustrate this discursive, interactive storytelling process, and how it informs flight team members learning, I present below an example, from my field notes, of a report-off interaction that I observed and captured as close to verbatim as possible. This interaction took place a few feet from the entrance to the flight nurse's work area (just off the hospital helipad), and unfolded within a few minutes of the incoming flight nurse's arrival:

> 18:45: As Justin arrived for the beginning of the night shift, he told Matt, "Oh, we had a good one, me and Jake the other night. It was a crazy tension pneumo [pneumothorax, a collapsed lung]." Matt replied, "Oh yeah, how'd it go?"
>
> "It was so crazy. We get in the back of this ambulance and there's just too much to do, so we split up. I take the airway and Jake starts getting chest-tubes in [the patient]. I tried twice to get the airway, but when I would look in there, everything was shifted - the epiglottis was super deviated. So I checked, and sure enough he's got some crepitus in his chest, so I'm thinking, 'Man, this guy's got a pneumo!' So I tried twice, took two looks at it, but it was so deviated, we ended up just using a S.A.L.T. airway [a supraglottic airway laryngopharyngeal tube, an emergency airway device used when standard intubation is unsuccessful]. But it was a real cluster - when we got back, I guess anesthesia didn't know what a S.A.L.T. was, so they ended up removing it by accident when they transferred him, and he had a bad event while they were trying to get him transferred. They recovered though – they ended up cric-ing him [performing a cricothyrotomy, an uncommon surgical airway procedure]. So I guess, the question I had was, could we have handled it better? Tell me what you think. James and I debriefed afterwards and he asked me if I would have done anything differently."
>
> Matt replied, "No, I don't know what I would have done - if the epiglottis is that deviated, there's not much you can do to try to get him tubed. You know, it reminds me of some of my first days as a tech in the ER. This guy came in, and I had palpated his chest and I was like 'that's weird, its kind of crunchy…' and then

> the resident was trying to tube him, and I just heard him saying 'That's so weird, it's like everything is shifted over. What the hell, how do I get this in there?' And I was just standing there, and then it suddenly hit me from the book - like I had read it but it just didn't click - crunchy crepitus and a deviated airway, this guy has a tension pneomothorax! So I go to run over and tell the resident, but they've figured it out and are handling it. But it's funny, I always think about that - I was just sitting there, bumming around and all the sudden it was like 'Oh shit, I know what's wrong with him!' But I've never run into it that clearly again in the field, so I don't know that I would have done anything different."
>
> Justin followed up by asking, "I mean, would you have worked together with your partner, done things one at a time rather than splitting up tasks, so that we could both be focused on the airway?"
>
> Matt replied, "I mean, that might have helped, but the only thing that was going to un-deviate his airway is getting a chest tube in, so you kind of have to be doing both…I think I would have done exactly what you guys did, hauled ass and got him back. I think it was a solid case."

This exchange highlights the interactive nature of these vicarious learning interactions, as they are not simply narration of one person's actions and experience (that can then be imitated by others), but rather involve the exchange of ideas and experiences by multiple parties. Indeed, it was quite common for one story to be met (as in this example) with another story of past experience, and this discussion and comparison of experience allowed all individuals involved in the interaction to enhance their understanding (as compared to perspectives on knowledge sharing in organizations that emphasize the one-way transmission of knowledge from more experienced to less experienced individuals; Matzler & Mueller, 2011). Rather, even highly experienced individuals can learn from these interactions, by testing their existing understanding against others' experience, and updating their knowledge by recounting and re-interpreting their prior experiences for others (e.g., Weick & Roberts, 1993).

Triggering stories in downtime. This example of a vicarious learning interaction also highlights an important contextual determinant of this learning process – the provision of a mutually agreed-upon time and space for engaging in vicarious learning (e.g., Connell et al.,

2004). Interestingly (and in contrast to prior studies; e.g., Orr, 1996), flight team members do not engage in these storytelling interactions during their actual task performance (i.e., during the flight itself), but rather in designated "downtime" between flights. Because of the time pressure facing flight nurses when treating a patient, it is necessary for them to learn and gather knowledge from others during their downtime, so that they can be ready to implement this knowledge when they are on a flight in the future. As one flight nurse noted:

> [During transport] is not really the time for sharing war stories I think. I think there's too much going on for there to be a "hey, listen to this story" or "this happened and this…". It seems to be a more informal, [when you're] sitting around sharing war stories.

In this sense, Sigma Flight team members have created and maintain a shared expectation for when it is appropriate to engage in vicarious learning interactions and storytelling (a "story time"). This shared expectation transforms what would typically be viewed as "lost" time (time spent waiting for the next task assignment) into a designated space for engaging in informal learning from one another. Underscoring the importance of defining this space for learning, interviews with Sigma Flight nurses revealed that many felt they learned just as much in these informal, downtime interactions with their colleagues, as they did from gathering direct experience through transporting patients. One Sigma Flight nurse summarized this notion well, describing how team members learn from each other even on days when an entire shift passes without receiving a request for a transport (vs. a busy day with four requests):

> Everyone learns from each other, [by] flying together, running scenarios, bullshitting with each other, [or] sitting around here. We'll bring stuff up and somebody will say, "Well this is how we did it here," "This is what they do now," or "I remember a time when…" You may not fly, but I tell you what …you may learn more on that 12-hour shift with your fellow co-workers, [than] had you gone on four flights."

Though the entire downtime of a shift (including meals, equipment cleaning, etc.) provides opportunities for these vicarious learning interactions, one designated "story-time" that Sigma

Flight nurses rely on extensively for these learning interactions occurs at shift change, where the outgoing crew hands off the ship to the oncoming crew for the next 12-hour shift. Shift hand-offs have long been recognized as sites of knowledge exchange in hospital settings (M. D. Cohen et al., 2012), but these exchanges typically focus on transferring information about a particular patient to the oncoming staff that will be caring for that patient. At Sigma Flight the oncoming team members are unlikely to ever interact with a patient transported during a previous shift, but this space is still utilized for sharing experiences of transporting prior patients, in the event that the other team members might encounter a similar patient at some point in the future. This shared practice of telling stories at shift-change is practiced diligently throughout the team, even when circumstances change normal shift times. For instance, while observing a night shift (which typically run from 7PM to 7AM), there was a scheduling conflict that resulted in two nurses changing shift at 3 o'clock in the morning. Despite the oddness of the hour, they nonetheless conducted their handoff and engaged in a lengthy discussion about a prior transport immediately after the oncoming nurses arrival, as an excerpt from my field notes demonstrates:

> 02:50: Donald arrived. As he entered, Eli took off his headphones and told him, "We didn't do much tonight, just had the balloon pump [transport] earlier." Donald responded, "Did Andrew tell you about our guy who turned purple [indicative of serious difficulty breathing]?"
>
> Eli asked, "Did he have a pneumo?" Donald replied, "No, he was just having trouble, he all the sudden was complaining of pain breathing."
>
> Eli asked, "How far out were you guys?" Donald responded, "About 5 minutes out…pilot asked if we wanted to hot offload [unloading the patient without stopping the helicopter rotors, in order to save time], I looked at Andrew and we said 'yeah, lets do it.' We hot offloaded him, and as soon as we got to trauma, some intern is trying to intubate him with a big old blade, and the dude is wide awake, no drugs, no nothing. We ended up sedating him and taking him straight to OR [Operating Room]."

By engaging in these storytelling interactions in the downtime between their actual transports, vicarious learning at Sigma Flight is largely prospective (learning things from others'

experiences that might be needed for some future transport), rather than problemistic (searching for a solution from others' experiences to a current problem), as has often been assumed in prior literature (e.g., Orr's [1996] examination of Xerox repairmen, who would share stories of prior repairs while sitting in front of the disassembled, malfunctioning machine). This prospective nature of the learning interactions thus calls attention to a need to understand what "triggers" these interactions. While problemistic learning is triggered by the need to resolve the current problem at hand, Sigma Flight nurses must rely on other mechanisms to trigger vicarious learning during their downtime. Learning interactions can be triggered by both the potential sharer of an experience, or by someone who might desire to learn about another's prior experience (see, for instance, Bailey and Barley's [2011] study of learning triggered by both learners and teachers), as individuals draw on objects or actions within the environment that cue them to engage in learning (Weick & Ashford, 2001). For instance, though the designated "story time" at Sigma Flight (i.e., downtime between flights) provides the arena for vicarious learning interactions, the content of the interaction is often triggered by one person's review of another's chart – the documentation of a mission. These charts provide an overview of the actions and events of a transport (i.e., medications administered, patient vital signs at regular intervals, etc.), and can trigger vicarious learning by making an individual aware of another's experience and cueing them to ask about it. The learning benefit of others' transport experiences lies primarily in *why* they engaged in particular actions (i.e., their decision-making processes), rather than *what* they actually did, and though charts provide excellent documentation of what occurred, they do less to describe the underlying reasoning or decision-making process. Thus, as the flight nurse below describes, the chart does not capture the complete "story" of the transport, but rather serves as a starting point for learning from the other person's experience:

> Another one of the things we do is all the charts are reviewed. … I think that's an important learning thing. … I could have reviewed your chart today and then work with you tomorrow and at breakfast it's like, "You couldn't transport that person? What happened?" I don't want to say that is the 'real' story, but [it reveals] more about what you think happened … For instance, you don't document that you want some place and had a bad [interpersonal] experience like last night, when [they] had a bad experience [with the staff at an outside hospital].

Vicarious learning interactions can also be triggered by more informal aspects of the context, including a story that someone else told, or even something mentioned in passing in the background, such as a television report (as described in Table 3.2). For instance, in the shift change communication detailed earlier, Justin's experience with a difficult pneumothorax patient prompted Matt to recall his own experience treating a similar patient. In this way, triggers serve a critical (but under-appreciated) function in the vicarious learning process, helping individuals draw from a broad pool of latent experiences to select one to share that would be relevant for the learning interaction. This became clear in interviews with flight team members when they were asked to provide an example of a time when they had learned from another's experience. Many team members had difficulty recalling an example "on demand" during the interview, despite being able to tell stories of prior transports in great depth during vicarious learning interactions while working shifts. As the flight nurse below articulated:

> They're [stories] usually specific to whatever the discussion is. If it's an ARDS [Acute Respiratory Distress Syndrome] case everybody's got their stories on what they do in an ARDS case. … I don't know if I have a representative or iconic story … I'm not very good at pitching one out of the air.

Focusing on peer experiences. The emphasis, noted earlier, on telling stories to help understand *why* team members engaged in certain actions (rather than just simply documenting what they did, as in a chart) points to an additional element of these vicarious learning interactions. This vicarious learning is focused on understanding experience (i.e., the entire process of a prior transport), whereas other learning activities tend to be focused on gathering

information (i.e., evidence-based guidelines for treatment of a particular condition). Weick (1995) captures these different goals of learning by distinguishing between actions directed towards resolving equivocality from those directed towards resolving uncertainty. Uncertainty stems from a lack of information, and requires individuals to look for additional facts and ways to interpret them, whereas equivocality refers to a state of confusion (rather than ignorance), where individuals face multiple, often conflicting, meanings or interpretations of an event. Though individuals can resolve uncertainty by seeking out additional information, Weick notes that resolving equivocality requires more in-depth interaction that creates a frame of reference for processing the ambiguous information in the environment. He describes this interaction (citing a passage from Huber and Daft) as occurring when individuals "organize cues and messages to create meaning through their discussion and joint interpretation" (Huber & Daft, 1987, p. 151; as cited in Weick, 1995, p. 99).

Given that the learning challenges facing flight team members often involve ambiguity and equivocality (as described in the earlier example of a heart attack patient whose anxiety could have been caused by multiple issues that would require exact opposite treatments), the experience-focused, discursive vicarious learning interactions these individuals engage in provide a useful forum for the kind of joint interpretation Weick describes. Indeed, among the Sigma Flight team members, these interpersonal vicarious learning interactions formed a distinct, differentiable learning activity that complemented their more independent, uncertainty-resolving learning activities, such as attending courses or asking the advice of an expert. For example, as the flight nurse below highlights, they often learn from physicians or other experts within the university hospital, as these individuals can provide new information about a medical topic:

> I think that's another thing that's associated with working here because first of all the people that you work with are bright and educated and love to share

> knowledge, [but also] the people that you bring patients to are bright and educated and love to share their knowledge with other people. … If I have a question about something, the answer is right upstairs [in a unit of the university hospital]. …We have to work with all the new residents [in these units], who are sharp. They're sharp, they bring us information.

This reliance on superiors and experts as a source of concrete knowledge is consistent with existing perspectives on information seeking (which generally casts individuals as more frequently seeking information from superiors, rather than peers; Cross & Sproull, 2004). Yet, when flight nurses describe their practice of vicarious learning, where they are attempting to understand the more tacit, procedural elements of transporting patients (dealing with the ambiguity of transport, rather than a lacking piece of clinical information), they emphasize their peers as the primary individuals with whom they would engage in storytelling interactions. In order to learn how to manage the ambiguity of their work, these flight team members rely on the discourse-based processing of prior experiences that only others who have "been there" and dealt with the full range of a transport experience (i.e., the clinical, social, and emotional elements of flying a patient) can provide:

> One of the things it's really helpful is hearing the experiences of my colleagues. … We talk about these really critical patients and the complex transports that they do and the procedures that they do. … It helps me to kind of pull all that information together. … It's like knowing that we're all doing the same job and that they've done it. They've experienced it. This is what they have learned. This is the way they did it and it worked well for them. Or when we've had those cases where [you realize] "Oh yeah, next time I won't do that. I'll do it this way." That also is very, very helpful in knowing what works and what doesn't work.

These interpersonal storytelling interactions between flight team members, characterized by peer-to-peer discourse about prior experiences triggered during designated downtime, thus constitute the mechanism by which individuals enact in vicarious learning. However, though these interactions are necessary for vicarious learning, comparing Sigma Flight and Gamma Flight learning efforts revealed that storytelling interactions alone are not sufficient to organize

for vicarious learning. Indeed, flight team members at Gamma Flight engage in similar, though less frequent, storytelling interactions that also occur between peers during downtimes like shift change, as the Gamma Flight paramedic below notes (and as also evident in Table 3.2):

> We do shift change, [and] we spend the first hour sitting, talking … basically, telling the things we need to know about the helicopter or equipment or staffing issues or those types of things. … There have been numerous times where I've heard the [outgoing] crew ran into something or had a situation or issue ... Sometimes, it turns into a training session at shift change where we would pull out the protocol book and we look at it and you may have four people in the room and all of us had a different thought on what [the answer] was supposed to be.

However as noted earlier, these interactions at Gamma Flight were not as substantial a source of learning as those at Sigma Flight, suggesting that there may be additional, necessary elements in place at Sigma Flight that facilitate vicarious learning. Further analysis of the observation and interview data at each site revealed a combination of formal structures (e.g., organizational policies and required procedures) and informal practices (e.g., shared learning norms or unofficial activities) in place at Sigma Flight that served to *enable* more effective engagement in vicarious learning interactions, as well as *elaborate* the learning emerging from the interaction.

Table 3.2 Enacting Vicarious Learning

Theme	**Evidence**
Learning from Others' Stories	I think sometimes [hearing others' stories] can be like getting a traffic ticket. We're getting pulled over for going too fast. Sometimes you need a little reminder that you're driving over the speed limit and there are hazards associated with that. You don't get the ticket, but from that on for a while you're driving at the correct speed limit. The take away points that are there get reinforced. [It might remind you to] pay attention on every transport, because either ones that seem easy are not [gong to be easy] or vice versa…. I think those are important take home points. (Sigma) As an example [two flight nurses] went out on a case where a guy ended up needing a surgical airway. It was sort of an airway disaster. He'd had a

	psychotic break and cut his neck. He had a neck injury and became increasingly stridulous [difficult, strained breathing]. He needed airway protection… it hit the fan and it got ugly for a couple of seconds it sounded like. During the retelling of the story, everybody puts their own spin on what possibly happened [sharing it during conversation]. I imagine myself in that situation. What decisions hopefully would I make that that would mitigate against that? I find real value in that…. that gets me thinking. I envision myself in that situation. I can see myself doing exactly that same, having the same reaction. (Sigma) [When you hear others' stories] you get this cringe because you've been there. A racecar driver could say, "I was doing 210 miles an hour around the third curve, and I began to get a little skid, and I heard my carburetor..." and every other racecar driver will go, "Oh, my God." To me, I'm like, "I don't understand." [But] if I walk in and say to somebody here, "Man, we went over to get somebody that had a beta-blocker overdose," everybody all of a sudden, could just really cringe and [say], "Oh, God. What happened?" That's what we hear in report, every morning, when you hear people report, they are trying to tell you, "We ran into this situation." … I mean, it's like they already know what you are going to have to face, and when you begin to relate the story, you're working through what you did, and what they would do …[and] you go, "Oh, okay, that's a great idea. I'm going to put that in my bag of tricks." … You know, you're trying to figure out for your next time, when you run into that, what you heard - a little probe of wisdom, or a little way of doing something to help out. (Sigma)
Storytelling during Downtime	A lot of times we go in to an ER and it's a quick assessment, [and then] "let's go." You need to know what that drip is up there for, what the dosages of it are, what are the contraindications, do we need it, do we get rid of it? … There's no time to sit and ask your partner a lot of things - it's quick. You go to a scene call and you've got to know what the hell you're doing, right now. … That's why I do a lot of my learning when we get back; these were the vitals, these were the meds, these were the drips, this were the history, and then kind of put it all together afterwards because there's just no time out there. … When you're like, "Whew! The patient is here [at the destination facility]" then you can tear the chart apart and look at the history and that kind of stuff and figure stuff out. [Then with] my partner, it's "Tell me why is this patient on this med or why did you start that med? Did you start it because of this or just tell me what you're thinking," because a lot of times you just can't stop to talk about that stuff at the bedside. (Sigma) [Learning] is going to be not necessarily just in [formal] orientation. It's going to be just informal, sitting around having breakfast or sitting with your partner and hearing stories of transports past. In some ways that's instilling the

experience or knowledge or lessons learned from those transports onto [others] in an informal way, which, (a) let's them know the potential for that crazy, unique, different transport that's out there, and that it could happen. Then, (b) they'll pick up on the strategies we employ to manage it. I never really gave it much thought, but just talking about it [now], I see that happen. I mean those stories are lessons in a sense. … I think there's an educational component to that that goes unrecognized. … I think everybody loves to share stories, and the job we do is unique so those unique circumstances occur and when there's a new person there, and you want to share with them what the job is like, [you say] "Well, let me tell you about this one transport I did. It was freaking crazy." [It could happen when you're] sitting around as you are bullshitting downstairs. At breakfast there seems to be a lot of stories passed on. … Especially with [new team members on orientation] - going through this orientation stuff will elicit memories of transports that have happened in the past. …It helps prepare people for the craziness. It helps prepare them for the unexpected, and it just shows them what's required. They see the decision-making, or how that transport went. (Sigma)

[Learning happens when you] come in the door, at breakfast and lunch, when we are sitting upstairs … because it's more relaxed ... you are discussing, you are just talking about a case. … It happens just sitting down here. I can't tell you how many times you're doing something and someone said, "Let me tell you about this case," and you sit back and you discuss it. … Those incidental places, like walking in the door, because you have to, you report off, and usually you don't want to keep the outgoing shift too much longer with questions, but you get that information. (Sigma)

[There are a lot of issues that can be solved at the breakfast table, and learned about as well, through stories. We share a lot of stories with each other. I think there's value in that. … If I had a bad day the other day or I had a good day or I did this or I did that. … In my mind that's fairly valuable. A lot of people on the West Coast, the dot com people, will have lunch brought in for their employees. Don't be fooled. It's not because they want to feed you, it's because they want you and I to sit down and yak over lunch and solve the world's problems. Same thing [here]. … I think it's more storytelling at breakfast with some learning points, [whereas] it's more formal at rounds I think. It's more an informal [process of] me sorting through what I think are interesting stories to tell, versus "here's all the cases that we did [this week]" … It's all about the stories really… I guess it's an informal way to go overall the trials and tribulations in a non-threatening environment. (Sigma)

Usually [sharing stories] could last us until eight o'clock. We do shift change at seven o'clock, so then it can last us until eight o'clock, and we [have scheduled] morning brief, so then we'll say, "OK, we're out, have fun, and have a good day. Bye." Then the conversation will just stop. It doesn't matter if you were in the middle of a sentence or not, that's the end of the

	conversation for the most part. Which is fine with all of us and we all kind of have that general understanding that if we're not hanging out for shift brief we need to go now - we've been here for 24 hours and now we're heading on out. (Gamma)
Triggers of Storytelling	"Every time somebody does a chart, it's got to be reviewed by a co-worker and sent along the way before it gets processed. … I'll look through it and I'll say, "Hey, we need to talk about this because that doesn't seem to be the way it should be," or people will [ask me], "Why didn't you give this medication sooner," or, "Why did this happen?" or, "Why didn't you do that?" A lot of times it's like, "Hey, we didn't' have it available," or "We did it as fast as we could. The guy was trying to kick the window out." There's usually a logical explanation, [and] that's a lot of reason why they review charts, is to go through the thought process of *why* you did what you did. If you have good rationale for it, nobody's going to fault you. [They just want to know] what you were thinking, why you did what you did." (Sigma) "It's so hard [to provide an example] because I honestly don't even know where to begin. There's so many. When an opportunity comes up to talk [about experiences], something will prod or poke my mind and it will jog my memory - "Oh yeah, I remember why we have this, this and this [equipment on board the aircraft] is because so and so didn't have it on the scene [of an accident]. … It's [only] when something comes up that you go, "Oh yeah I remember."" (Sigma) Once Dale finished the chart, they started talking about big accident scenes [prompted by the coverage of a large plane crash on TV]. Steve asked Dale, "Did you go to the crash where that little girl lived but everyone else died? Was that before your time?" Dale responded, "No, I wasn't at Sigma Flight then, but I went to it by ambulance. I have never seen anything like that." Steve responded, "Yeah, [one of the pilots] told me there were just body parts all around." [Conversation continued…] (Sigma Obs) "That combative patient [looking at the news report on TV] reminds me of the time we had this PCP-addicted patient who was yelling and screaming at me…" (Gamma Obs)
Storytelling with Peers (vs. other learning strategies)	I think talking to your partners, spending the first few minutes of a shift or while you guys are checking the helicopter, just to say, "Hey did you guys do anything interesting this week or your last couple of nights? What did you do last night?" If you get a pretty interesting case, [something] really cool or really different that you don't see [often], you're going to want to talk about it

	anyways. Who better to talk about it than your partner who understands whatever it is? I think you can learn some of that just by general conversation and talking to your partner … The other piece that we get is when we do shift change, I will always ask the crew, "Did you guys do anything today?" … "Okay, anything interesting?" That's a good way at shift change to talk about some of the experiences from another crew. (Sigma)
	When we get a really interesting case, there is a core group of people that will just say "Hey did you hear about that? Holy shit, this was crazy." and we'll just talk about it, and it's a great way to learn. We'll bounce things off each other - it is back and forth so I'll ask questions … to debrief yourself. We've all been on those horrific calls that just suck from start to finish and you want to talk about it with other people because you want to get ... you hopefully want to get a little bit of input from them on what they would do in the situation. (Sigma)
	There's a lot of, obviously there's a lot of stuff that we have to keep up, certifications and all that stuff we have to do. [For] me, it's constantly, with the new people coming in, we're learning as they're learning. … It's that next level of learning where [you] see one, do one, teach one. … We're going through it with [new staff members]. Protocols change all the time, so one of those things is, usually newer people are the smartest people. They bring a lot to the table; they keep you on your toes. Next thing you know, they're teaching [you], they're like, "the protocol says this," and you pull up the protocol and you're going through it with them. (Sigma)
	"[It's all just] talking about it [our prior cases] … saying, "What in the heck? What did I miss? This is what happened." … We still have to mentor and foster each other because again, we don't work in a calm, relaxing environment. You lose a patient or you lose a kid, those feelings don't just sit at the door and walk away. They are there and nobody really gets it but your partner because they are the ones experiencing it with you. I depend a ton on my partners, my coworkers, for that. It's not to say that my husband or my sister or mother can't provide it. They can provide support but they don't understand it - but my partner does." (Sigma)

Note: "Sigma" = Interview Quote or Observation from Sigma Flight; "Gamma" = Interview Quote or Observation from Gamma Flight. Quotes from non-participant observations and informal discussion are drawn from detailed field notes, and are marked with "Obs." All names are pseudonyms.

Enabling Vicarious Learning

Enabling elements refer to the structures and practices that prepare Sigma Flight team members to better learn from one another's experiences in their storytelling interactions.

Specifically, various formal structures within the organization, as well as team members' more informal norms and practices, help ready individuals to more frequently and effectively engage in these vicarious learning interactions.[12]

Fulfilling learning requirements. One set of formal structures that enable individuals' vicarious learning at Sigma Flight are the mandatory learning requirements and scenario-based training sessions that all flight nurses must complete (typically each quarter). The goal of these required learning "modules" is to compensate for areas where flight team members may not get adequate exposure through their day-to-day work. For each major diagnosis or treatment category, such as obstetric (OB) or neonatal care, the flight team members will be required to log a certain number of hours of learning credit, as the flight nurse below describes:

> Yes, we have a different module quarterly, and we just finished our OB and neonate. Because we do very few OB and neonate transports, we have to go get that education. [The education coordinator] will set up a lecture and we will get two hours worth of a lecture on OB but … we have to have four hours [total], and we don't get four hours unless we go to the OB unit for two hours.

Though on face, these required training hours seem to reflect more of an independent approach to learning, and indeed these required training sessions and "con-ed" classes form a core component of the independent learning at Gamma Flight, they play a different role at Sigma Flight. As the educational coordinator described to the staff during a weekly meeting:

> Look, let's be honest: four hours is not anywhere near enough for mastering the high-risk OB cases that we fly. You're not going to learn everything you need in those four hours, and no one expects you to. What those four hours are for is to make sure that you are familiar enough that when somebody does fly one of these cases, and we sit down and debrief it, or discuss it during rounds, that you are able to get something out of that. … It's to make you familiar enough to have a good discussion about the few cases of high-risk OB that we do get, so that we can all learn from those.

---

[12] I define "effective" engagement in these interactions as that where individuals recognize the learning benefit of the interaction, and develop their knowledge and capacity to respond to a future event as a result.

In this sense, rather than having required education courses form the core of learning (as is the case at Gamma Flight), Sigma Flight team members use formal learning opportunities as tools to build the baseline understanding necessary to effectively engage in vicarious learning. Establishing this shared baseline understanding allows individuals to draw more out of others' stories, as the flight nurse below describes when asked how Sigma Flight prepares new flight nurses for the variety of tasks they will face:

> When we talk about stuff at rounds, [new staff] are familiar with it, but not familiar with the specific circumstances. They know an unconscious 22-year-old in a car is not good, [but] they've never experienced that. Now, they've seen an unconscious 22-year-old in the ICU, and they know that the patient is going to need to be intubated … [B]ut again I could tell you all day long how to put the tube in [perform an intubation], but you've got to come to the [training] lab and see it, and do one. When you've seen one and done one, you're like, "Oh. Oh, okay. Okay, got it." It will be like me, telling you about a Walt Disney movie, if you've never seen a movie, I'm sorry … unless you've seen a movie, you're not going to be able to conceptualize that.

This two-step learning method, where individuals obtain the basic understanding through formal training and education and then expand on that understanding through vicarious learning, allows team members to make the best use of their mandatory education, and creates a shared logic for learning (i.e., independently establish baseline, then seek others' experiences). For example, as one of the newer flight team members described when asked about his process for learning:

> If I don't understand it, I will look it up first, just to get a basic understanding, and then I'll ask the flight nurses to kind of give me a context, or a little additional information about it, or how it would apply to us. … A lot of them will give me stories of their experiences, what they have seen, what's worked for them, what hasn't worked for them. That's kind of the good standard approach to it.

Hiring generalists. A second formal structure that enables vicarious learning within Sigma Flight lies in its staffing policies. Sigma Flight transports patients with a crew of two flight nurses, who are also dual-licensed as paramedics, and team members fly patients of any age when flight requests come in (from neonatal patients to adults), requiring that individuals

have multiple years of experience in adult and pediatric nursing units (across both emergency departments and ICUs). By contrast, at Gamma Flight crews are more differentiated, with dedicated, separate teams for adult and pediatric transports, and teams fly with one team member certified as a nurse, and another certified as a paramedic (or a respiratory therapist, on the pediatric team). As a result, team members at Sigma Flight are better able to develop shared practices and understanding, as the flight nurse below notes when comparing Sigma Flight nurse/nurse teams to more differentiated nurse/paramedic teams at another program:

> Another program [I flew with previously], you're flying a nurse and a paramedic and so the level of education and priority is totally different … I don't know everything 100%. I can't know everything 100% and so I depend on my colleague to bounce things off of, or if I'm in the aircraft, to assist me and also understanding what's wrong or what the parameters are. For example, flying for them, the paramedic and what his normal values are looking at that monitor, totally different than what my normal levels are, but that's because his background is so much different than mine and so is the training, where here … I can fly with any given person and we know the steps that what we're going to do. We know the process … and that's what also allows us to continue to go ahead and grow.

Sharing this similar educational background and expectations for learning enables the flight nurses to "speak the same language," both during their transports and in recounting them afterwards, facilitating their ability to share experiences with one another. Across the entire team, there is a common core of knowledge, language and identity that facilitates their ability to develop shared meanings about an experience that someone may share. By comparison, these shared meanings are more difficult to develop across Gamma Flight, as the divisions in certification (nurse, paramedic, respiratory therapist) and specialty (pediatric, adult teams) create divisions in identity and knowledge. For example, when Gamma Flight team members gather for their monthly education and staff meetings, education is conducted separately for the pediatric and adult teams, as the team member below describes:

> …[At these meetings], we separate people [by specialty] for education because they do so much different work. We're free to attend either one, but they're both

> offered at the same time, so we really know that they split them up. The peds [pediatric] education is much more organized and formal than the adult education …[because of] who sets it up.
> *(Interviewer) Is there a lot of cross-education between peds and adult teams?*
> It's pretty exclusive to one or the other.

These staffing policies also enable vicarious learning at Sigma Flight by creating greater potential for the spread of stories between individuals. By maintaining a pool of "generalist" flight nurses, it is conceivable for everyone to work with one another. Though Sigma Flight has team members who work the day and night shift, there are also team members who work "rotator" shifts, and day or night shift team members also occasionally work a different shift time when filling in for someone else. This scheduling allows experiences to be shared more broadly, as team members can interact with almost all of their peers and learn from their experiences:

> I think that's another interesting thing because we don't have regular partners. Today I'm working with Kristina. Tomorrow I might be working with somebody else. All the stuff generally gets shared. By not having permanent partners my perspective gets shared with you and your perspective gets shared with me. … We're like individual teams but we're also really one big team.

At Gamma Flight, the specialized certification of each person creates three sub-pools of team members, making it extremely unlikely that two members of the same pool would work together (i.e., two nurses may never work together, as they would always be paired with a paramedic), and thus restricting the potential set of partners for individuals' vicarious learning interactions. At the same time, this specialized staffing also creates a sense of domain expertise for each of the three sub-pools, restricting the range of peers with whom an individual might discuss a case. For instance, after a difficult respiratory case, Gamma Flight team members might typically seek out a respiratory therapist to discuss the case, missing insight that a nurse or paramedic might have had about the flight and limiting their opportunity to engage in this broader vicarious learning:

> The adult team, we work a nurse / paramedic configuration, and our nurses come to us with at least a combination of ICU and ER background. Those guys are just such a wealth of knowledge. I really lean on my nurses for our ICU patients …

> [for understanding] different lab values and things that I may not necessarily be familiar with, [or] different pieces of equipment that I may not necessarily be familiar with.
>
> Typically, what happens or occurs is immediately after transferring the patient [diagnosed with a respiratory issue]…. I'll seek out the respiratory therapist after that and talk with them and discuss things with them, so that I know what to do [to] better care for the patient.

Conforming to storytelling norms. In addition to these more formal structures, there are several informal practices that help prepare individuals to more effectively engage in vicarious learning interactions. Indeed, observations and interviews at both Sigma Flight and Gamma Flight revealed that interpersonal storytelling was more likely to occur, and was more effective, when the individuals involved followed informal guidelines and norms for engaging in this vicarious learning. For instance, engaging in storytelling has been characterized as an art or shared performance (e.g., Boje, 1991), and these performance in the air medical teams was accompanied by informal norms and shared rules for how stories should be told. Flight team members spoke openly about the practice of storytelling, and admired individuals who were particularly adept at telling stories, as the flight nurse below notes when describing someone who used to work with Sigma Flight (and who flew the microphone stand injury described earlier):

> Jim, who used to work with us, that guy should write a book. He always had the craziest cases, and he would tell us about them. He was a great storyteller - he had a very animated way of describing the scenes and the flights he went on. One time, he flew a pregnant woman who had passed out, fallen off a balcony and impaled herself on a microphone stand, it went right through her lung, missed her heart by this much [holding his fingers up very close together]!

Flight team members at both Sigma and Gamma Flight also described how these storytelling interactions follow a complex set of informal rules. When a story is told, for instance, listeners are often most interested in the thought processes, decisions, or intuitive feelings that the storyteller had, rather than the discreet values of clinical parameters (e.g., blood pressures, heart rate, etc.). As noted earlier, these storytelling interactions help share the more tacit elements of

an experience (e.g., how a flight nurse decided to pursue one of multiple, equivocal courses of action), but new flight nurses' prior experience in hospital nursing units would have taught them to only present the objective values and test results (as the physician would be the one making a decision in the hospital context). As a result, the practice of storytelling is something that new flight team members must learn as they join the team:

> I mean, presenting - coming in and presenting, and doing it in an open environment in front of your peers is very challenging. And it's very intimidating. Talking to [a new flight nurse] now, he gets nervous when he's presenting a routine case. You know? I mean, nothing went wrong! It's fine! They just want you to practice presenting. … They [new flight nurses] have to practice routine cases so that when they do get into challenging cases, they have the format down of what information you need to know.

There are also emergent rules and norms for how individuals respond to the sharing of others' stories and experiences. Though the listener often has similar experiences that provide a basis for interpreting the story, asking questions, and providing feedback to the storyteller about how they could learn from the experience, there is a shared understanding that the listener "wasn't there." In other words, listeners can offer insight and feedback on the experience, but for these vicarious learning interactions to be effective, they must do so in a way that acknowledges the storyteller's experience as unique, and that listeners may not understand all of the intricacies that were involved. As the quotes below (as well as in Table 3.3) highlight, when individuals approach the storytelling interaction as one where they assume the storyteller did the best they could in the face of a tough situation, the interactions are often more effective for learning. Correspondingly, at both Sigma Flight and Gamma Flight, when these vicarious learning interactions broke down, it was often due to a breach in the informal rules, such as when a listener became overly critical, "armchair quarterbacking" a storyteller's experience:

> I think [what helps learning is] a crowd that's willing to know that they can't necessarily throw stones. That they've been there, and that we want to do no harm, but we are not infallible; we are humans. A piece of equipment was forgotten on a

> transport awhile back, and it was deemed as incomprehensible, unjustifiable, wrong, etc. But the bottom line was, they forgot it. I'm sorry, you can have all the checklists in the world, you can check the check boxes, you can have a Sherpa standing next to you, [but] shit happens.
>
> My patients are kind of my patients to dissect. Somebody else's, you got to be careful you don't step on their toes. You got to be careful you don't armchair quarterback. You don't want to seem like you're armchair quarterbacking, that's a lesson I learned early in the process, because I think people just shut down.

Approaching interactions with a learning orientation. Vicarious learning interactions are also enabled by Sigma Flight team members' shared endorsement of a learning orientation – approaching these interactions with a commitment to learning, and to place this learning above concerns for how they might "look" to others (Dweck, 1986; VandeWalle, 1997). As evident in some of the quotes above, these vicarious learning interactions often revolved around stories of less-than-successful experiences, and a key enabler of these interactions is the willingness of the individuals involved to discuss their mistakes. A key informal practice among Sigma Flight nurses is thus the shared encouragement to approach these storytelling interactions with a learning orientation. As one Sigma Flight nurse summarized:

> We are not perfect and there are going to be things that we can do much better. There are going to be mistakes we have made, but we have to learn from them and the way we learn best is from somebody else's mistake. If I made a mistake at the bedside with patient care, as hard as that is to go in front of all my peers, [or even] my management and my medical director, and say "I screwed up," guess what? My mistake may prevent somebody else from doing that. I think it is important to talk about those cases that we could have done something differently or we should have done something differently, or we could have done better, because that is how you learn.

When individuals do not adopt this learning orientation – trying to cover up a potential mistake, for instance – they are not only less likely to engage in vicarious learning (avoiding telling stories of their experiences), but when they do engage in these storytelling interactions, they often devolve into uncomfortable critiques, as the flight nurse below describes:

> I try to take ownership in it and come prepared to be able to say, "We screwed up." Everybody here says that's the key. … I've seen a couple people say, "Yeah, we screwed up" and it seems to be tolerated really well, but even more than that, is I've seen somebody sit there and try to backpedal and justify something that was wrong, and it's really uncomfortable. [You think] "My God man, save yourself! Just say you screwed up." … [Others] can really tell if you start backpedalling, and [when] you're trying to justify and it just does not makes sense … [you] better watch out. … If you go in there and say, "Listen, this is what we were thinking," …[and] you take ownership of it, it's a lot easier than if you don't. … Don't try to bullshit your way [out of it]. … I just think that fosters professionalism … I try to take ownership on what I know and what I don't know, just trying to make life a little bit easier.

Adopting a learning orientation also encourages individuals to engage in these vicarious learning interactions with a broader set of others, including not only superiors or more experienced flight nurses, but also with those who may have less experience as well. Flight nurses join the Sigma Flight team with a long history of prior experience, and by engaging in vicarious learning with even the newest team members, flight nurses are able to learn from this breadth of experience. Moreover, as the quote below notes, the wide variety, low volume, and random distribution of the patients the flight team transports means that a more junior colleague may actually have greater experience with a particular diagnosis or condition, further reinforcing the enabling effect of adopting a learning orientation on the success of vicarious learning:

> If I could do something better I certainly would like input. … Over half of the people here have been here longer than me so they've got stuff to teach, and even the people who haven't been here that long [do too]. I've been here 7 years, and I've never done an ECMO transport. Jake's done 6 in the last 2 months.

Table 3.3 Enabling Vicarious Learning

Theme	**Evidence**
Enabling Structures (Hiring Policies and Required Learning)	You kind of have to [have a generalist background] because this job essentially is the jack of all trades and master of none. We all come with past experiences. … We all have our strengths and weaknesses and it's up to us to strengthen the areas where weaken and maintain proficiency and efficiency in the areas that we are good in. That's what we look for in the new flight nurse

… because you're going to be alone with them flying in the helicopter and it's just going to be you and that person responsible for one patient, you want to make sure that that person is strong as a clinician as they can be. (Sigma)

…there's techniques that you use to help your partner get it [secure an airway] and that's why we have that consistent training is so that we can help do that, to complement each other when it becomes a difficult airway. Like with the bougie [a piece of equipment that helps orient the intubation tube] - holding the bougie up top [or] not letting it flap in the wind - because we've had that little bit of extra training here. [As another example,] the BURP [Backward, Upward, Rightward Pressure] method [for intubating] was something that I learned day one that I was here; it was drilled down my throat by [other flight nurses], so whether if I went with Diana or if I went with Jake or if I went with Stanley, it will be that [shared practice]. (Sigma)

It's the combination. It's every single person that has come in to this position, because like I said everyone has come from a different background. There is something to learn from every single person that comes in here, even the new people because they are fresh out of the ICUs, they are fresh from the bed side of sitting with a pediatric patient for 12 plus hours at a time. They know what they're doing when it comes to that particular patient. The problem is now they have to expand their horizons and take care of everything. That's our goal is to bring them up to speed. Everyone learns from each other. (Sigma)

There were a couple things that I learned doing the simulator training, that I had no clue [about]. [The education coordinator] threw out a scenario, and I was like, throwing my hands up, "I don't know what the answer is," and then he said, "A, B, and C." I'm like, "God, I never thought of that." I'll never forget that. I went to somebody and I said, "Did you know that if you did this and that, and whatnot," and he goes, "Yeah, I had one of those in ER last week." … and now he presents it in a scenario, and it's like, "Wow, that is really great because I will never forget that." (Sigma)

So you have a crew of a nurse and medic, and between the two of us, we bring a range of experience. The nurse has the ICU experience and the medic has that street experience, so between the two of us we cover a really wide range, and it works nicely. So we each bring certain expertise that allows us to function, when you put us together, as a complete critical care unit. (Gamma Obs)

I have the same partner that I've worked with now consistently every single [week]. Give or take a couple of days here or there basing on schedule requests and that kind of thing, I've had the same partner on [that day] for the last two and a half years. We have a phenomenal system down. It worked very well for us and alleviates our stress levels. …. On the flipside of that, if you are continually paired with a partner … who is not necessarily a strong

	partner, it makes work life difficult and you're constantly carrying the load. (Gamma)
Enabling Practices (Storytelling Norms and Learning Orientation)	Oh, yeah. Yeah. Yeah. Well, absolutely. I heard you ... there's a case that just happened that I just sought out that person and said, "I heard about it, what happened?" Because I want to know where they went with it, where it went off the rails if it did, so that I cannot … so I can prevent that from happening, mitigate it before it happens and or find a solution. I think you'll find that in just the sort of incidental conversations that you have when we're all sitting around at coffee in the morning. … I think that's very healthy if you ask me, to be able to talk about those things, because everybody knows you don't have all the information. You're never going to have all the information, and all of us here know that 'I wasn't there.' For the most part, I'm not going to sit there and 'Monday morning quarterback' it because I wasn't there. It's a whole different world standing outside a Buick in 5-degrees cold trying to intubate, and sitting in rounds and talking about it. It's a different world, but virtually everyone, virtually everyone who's doing the talking has been there. It it's like, "Okay, what happened?" When they say, "I'm sitting on [the highway] in the trunk of a Buick," you feel like, "Huh. I've never been in the trunk of a Buick, but I've been in the trunk of a Chevy, and I know what it's like when it's 5-degrees, I know what it's like when the tracheal tube is cracking in your hands, because it's freezing cold and the light is off. You just make all those relations right away. Boom. You can empathize with where they are at, and sometimes predict what would come next, if that makes sense. (Sigma) I heard about a case the other day, I was actually teaching and one of the instructors that was teaching with me was like, "Did you hear about what [the Gamma Flight crew] had?" Yesterday I actually worked with one of the providers that was on that, and I was like, "Hey, I heard you guys had a really tough mission the other day with the four-month old." She was like, "Yeah, it sucked." … She started talking to me about it, and then as she was talking to me about it we just had a discussion back and forth about it. I don't think that she felt like I was going, "Well I can't believe you did that." That's not what I was saying at all. I think you [have to] approach it from that aspect where you're trying to learn from it versus always trying to feel like people are trying to critique you. I think people are so competitive up there [referring to the Gamma Flight office upstairs] because of the nature of what we do. They always feel like they have to show how much they know and if they can one-up somebody by catching something that they didn't do, or that they should have done. (Gamma) Although what we do is protocol driven, there are still some things that have to occur, decisions that have to be made that are difficult to be made. There's a lot of responsibility that comes with the job which people need to learn about. They need to learn how to accept feedback as well. … If you go out on

	a flight and you have a bad outcome or whatever then you need feedback on what you can do next time to have a better outcome for instance. You shouldn't necessarily think about this as punitive. It's done to bring you to a new standard. When we switched from nurse-doctor to nurse-nurse, when you went out with a physician, if there was a bad outcome it's, "I'm the nurse, they're the physician. It's because they didn't do something." When there's two nurses it's like, "it's us." (Sigma)
	Even though they weren't there, everyone has a perspective to offer. What you choose to do with their perspectives is on you but everybody has something to offer you. When you listen, the more people we talked to about it, the more perspective I gained and the more reassurance I had because a lot of my coworkers, if not all of them would have done exactly what we did. … I do think it is important to talk to them about things that you have gone through or things that you are going through in the moment. I think you learn best from each other that way. (Sigma)
	None of us are okay with our level of learning. We still have more that we can learn. We just haven't found the right thing that we need to learn yet, … listening what went right and what went wrong, and then learning from went wrong. Not everything's going to go right, so we've got to learn what does work and what doesn't work, and change it (Sigma)
	That's why I said I love flying with those guys because I know that I'm going to learn something every time we go somewhere. They're also open to me teaching them some stuff. You have to have a certain amount of knowledge to come here. Even though I'm [one of] the newest flight nurse[s], there are things that I do know … because I was a respiratory therapist before I was a nurse. [For example,] with these crazy ARDS patients and all this vent management that we're doing, Stanley would be like, "Listen. I'm so glad that you're here. Tell me what you're doing, walk me through it. I need to learn it from you." It's just cool like it's a nice back and forth. … It's nice to fly with people who have a little bit of respect for what I did. You know what I mean? There are certain people where that relationship is more apparent … If you're not scared when the tones go off or if you think that you're never going to learn anything and that you've got it all down pat, you don't belong there. I don't care if you've been here 20 or 30 years or 10 months, there's something to learn from every flight. (Sigma)

Note: "Sigma" = Interview Quote or Observation from Sigma Flight; "Gamma" = Interview Quote or Observation from Gamma Flight. Quotes from non-participant observations and informal discussion are drawn from detailed field notes, and are marked with "Obs." All names are pseudonyms.

Elaborating Vicarious Learning

Complementing the practices and structures that enable individuals for vicarious learning interactions, Sigma Flight also utilizes formal structures and informal practices that serve to elaborate these vicarious learning interactions (see Table 3.4). These elaborating structures and practices help individuals extend and crystallize the lessons emerging from stories of others' experiences into individual and collective action going forward, allowing Sigma Flight to use vicarious learning as a core learning strategy for improving future patient care efforts.

Reviewing cases formally. One of the primary formal structures Sigma Flight uses to elaborate vicarious learning is its weekly grand rounds sessions, where cases from the prior week are reviewed in a group setting, led by the medical director and educational coordinator. During these meetings, the individuals who transported a particular patient will present their case to the group, and discuss what they learned from the actions and outcomes they experienced. Importantly, these meetings are generally not a "primary" site of vicarious learning interactions, in that prior to presenting the case at rounds, flight nurses will have engaged in more informal storytelling about the case with others, as the flight nurse below describes:

> All the good transports - where something was done different or [with] something that's done rarely - those seem to make the rounds around the water cooler, and everybody hears about them without the need for [grand] rounds or any kind of formal dissemination. I think if there's a good lesson to be learned from a transport, it makes its way through the group in unofficial ways pretty quick. Everybody likes to talk about the transports they have, so you'll hear about it.

In contrast to informal storytelling interactions that address the full range of tacit and explicit elements of an experience (and often pull in details and comparisons to other prior experiences), rounds focuses more on presenting a portion of the case, building consensus with other flight nurses, and getting input from the medical director on appropriate action. Because of the more public nature of rounds (i.e., presenting in front of a large number of peers, as well as the

medical director), stories of cases told at rounds tend to be more focused and emphasize only one or two particular issues that the nurses who flew the case (or the educational coordinator) determined would be useful to discuss in a collective forum. Summarizing this focused, condensed nature of cases presented at rounds, one flight nurse noted that, "I think it's cleaner in front of the medical director…it's a cleaner story."

What these grand rounds meetings thus provide is an opportunity to gather as a collective (rather than in dispersed vicarious learning interactions) to address a learning point from a particular case and develop a shared understanding of how to respond. This consensus building, guided by the input from the medical director, is then transformed into changes at the collective level, such as a revision to the program's protocols – documents that provide guidelines (based on evidence and prior experience) for how to handle a variety of patient conditions:

> We try to develop and design our protocols to cover enough to keep you safe in pretty much every situation. There are certain basic things that you need to make sure that the patient has in order to sustain normal physiologic responses or as close to normal as possible. … The process is designed that if that is a case that we present during rounds, then we can take a look at our existing guidelines and say, "Hey, is this something we need additional guidance on? Is this something that we need to revise existing protocols for?" If this is one of those things that you will never see in another million years, then it is probably not worth it but if it is something that hey, after we have discussed in rounds, [other people say], "Hey I have seen it before too and I didn't really know what it was" then you get those "ah-ha" moments where people may actually come together and say, "This is what it really is and this is how we as a group need to respond to that."

Similarly, by providing a regular convening place for the discussion of cases among the whole organization (i.e., not only flight nurses, but also managers, the education coordinator and the medical director), these grand rounds meetings create an opportunity to raise issues that need to be addressed at a higher level. Though the flight nurses can learn from each other through their peer-to-peer storytelling interactions, the lessons of these experiences sometimes require changes to be made at a higher level, and rounds provides an opportunity to raise these issues to managers

and directors who can begin to implement the changes. For instance, the flight nurse below describes a case where the team was promised an additional resource from another department - a team of ECMO specialists, who would come to the small hospital where the flight team was treating a patient and bring additional, specialized equipment to accomplish the transport – but after begin told they were coming, the flight team was later told the specialists were unavailable. By discussing the case in rounds, the medical director was made aware of the issue and was able to take up the issue with the director of the appropriate unit within the university hospital:

> I think rounds are a very good tool as a review. … I think that is a great learning tool and that's a great sharing experience to help people who had some of those bad flights to sit and say, "This really sucked. This is what I did. Here I am in that hospital and the ECMO team is not coming." Everybody was like, "Holy crap, what did you do?" That needs to go up farther than just us. Those kinds of things are addressed at a higher level, which is also very helpful in [terms] of doing those flights and coordinating that kind of stuff. … We need to make sure that if we send our team out that we have support for them. [Since raising it at rounds] it's been better. I think there's been a couple cases where [the ECMO team] did actually go out and cannulate, and brought a couple patients back on ECMO now.

Developing simulations. A second formal structure that the flight team utilizes to elaborate vicarious learning is the use of in-depth training scenarios with patient simulators – advanced, wireless computer-controlled mannequins that can simulate a wide range of illnesses and injuries. These scenarios are used for a variety of organizational training goals, including interviewing and onboarding new staff, as well as for continuing education of flight nurses, and even as a public service tool (where flight nurses will go to a local EMS station, for instance, to administer scenarios). These scenarios are created from prior cases that the team has flown, using these prior experiences to develop a rich, detailed re-creation of the experience to facilitate others' learning. As one flight nurse involved in the simulation process noted:

> Coming up with scenarios is pretty interesting. There's so many things you can do, but it helps having rounds and stuff because you get some great ideas, just [based on] what you've seen out there. It's easy to come up with. We discuss cases, and … it's like, "You couldn't even make that one up. What happened to

> that patient under those circumstances, I couldn't make that up. That's incredible." What you do is you take those cases and you make it in to a scenario and you see how other flight nurses would have responded to that same scenario. … Which is very interesting because some people might have done something different. Others may have done better, done worse, done the same, but that goes back to being able to look at continuity of experience, education and how we all perform.

As this nurse indicated, scenarios reinforce collective abilities, helping to translate the experience that two flight nurses faced into a standard, routine response that all team members could implement. These scenarios are particularly effective for this collective translation, because the simulation process allows for the recreation of the multi-faceted experience that emerged from the story of a case – focusing on not only the clinical challenges, but also the associated experiences (i.e., addressing distraught parents of a sick child or dealing with the staff at an outside hospital) that cannot be captured in a clinical chart or protocol. This realism makes scenarios an effective tool for developing flight nurses' abilities, and helping ensure all team members get practice responding to the conditions that someone faced in a particular case:

> When we run human-patient [simulations], we will actually incorporate fellow flight nurses to play a physician, or [get] fellow flight nurses to play a difficult mom and dad [of a child patient]. Our flight nurses have to take care of the human patient simulator, start calling the shots on what are they going to do, what are the things going on, what needs to be done on the patient and actively do it on the simulator. [But] as they're doing that, then you have the physician that we've prompted to come in and be a difficult physician and be like, "Why are you still here? This patient needs a Level 1 trauma center. You need to wrap this patient up and get out of here." … You get to see [whether] people will put their feelings aside and not get into an altercation with the physician, or you have the overbearing mom that's like, "Save my baby. What's going on? Why are you doing this? Why are you touching my kid?" You've got to take care of the child, [and be able to] deduct the mom. … Like I said it's all about that realism. You want to bring that stressful situation into the simulation atmosphere, to just come at the person from all angles, because that's what this job is.

By incorporating the "full-range" of tacit and explicit elements of experience into the simulation, flight nurses are able to approximate the cases their colleagues have flown in a repeatable

environment, which then allows them to rehearse and develop routines for responding to those situations, reinforcing the lessons learned from the case and spreading them throughout the team.

Building mental repertoires. Beyond these formal elaborating structures, there are also informal, individual practices that serve to elaborate the lessons learned vicariously from others' experiences at Sigma Flight. Indeed, flight team members consistently noted that they did not learn "automatically" from hearing the story of another's experience, but had to engage in active efforts to incorporate that experience into their ongoing learning process. As one flight nurse aptly expressed, this effortful learning is the key challenge for team members to continually develop their practice and patient care:

> I like the fact that I'm challenged, [that] I could challenge other people, and [that] I can go to the resources and educate myself and hopefully educate other people in [preparation for] that next thing that might come. … My feeling on this is you're only as good as your next patient. … Unless you invest in that next patient, you can't use that last 2,000 patients. You've got to use that next one as your reference for how good you're performing.

One way that individual flight nurses learn from others' cases is by consciously adding a technique or treatment that another person used successfully to their mental repertoire, or removing a technique from the repertoire if another found it to be unsuccessful. While this expanding of the "mental toolkit" occurs subtly during all learning, when flight nurses learned from others' experiences, they often spoke of making a conscious, deliberate note of the experience in their "arsenal" of treatment. Whereas one's own experiences more automatically update a repertoire of skills (as the first quote below notes), when considering others' experiences, flight nurses had to take more deliberate efforts, such as creating tangible artifacts to incorporate the lessons of others' experiences:

> Well, you get flashbacks of prior experiences … take a scene call [for example]. ... I mean, the big thing is intubating patients at scene calls, and you always think about all the horrible ones that you've been involved in, and you try to improve your technique to incorporate all the disasters that you've had along the way. ... If

> you were to do a skill for the first time at a scene call, you might make it, you might not, but you learn from that and you have a little pearl in the back of your head for that procedure. The next time you do it, it goes really well and then you remembered something you did differently, you save that pearl. After about 30 or 40 of those, you've got a little algorithm in the back of your head on how you're going to make it work and how you're not going to let it go bad because of your past experience. You might subconsciously think about those things.
>
> When they [other flight nurses] bring [an experience] up, there are also similar circumstances that I have been in that were so similar, or identical, where I happened to get by it and not have the same consequences … [so] I can go, "Whew, dodged the bullet there, I'm not going to forget that." … You learn from it. I mean I write stuff down. Sometimes like, [respondent miming writing on a piece of paper] "Oops, not going to do that."

Orienting future learning efforts. Though flight nurses often directly incorporated the lessons of others' experiences with their own prior cases to update their mental repertoire, a second informal practice used to elaborate these lessons is to allow others' experiences to guide individuals' subsequent independent learning efforts. Given the wide range of knowledge flight team members must maintain, it can be difficult to determine what one should attempt to learn at any given time. In the face of this broad array of potential learning, others' experiences can serve as a useful filtering mechanism, providing guidance on relevant topics on which individuals can focus their independent learning efforts.

For instance, this guidance can involve directing individuals to a new skill to learn, as I observed during a Sigma Flight grand rounds meeting. The group was discussing a case where the flight nurses were required to intubate a patient who was still trapped in the seat of a car, pinned against a tree. Though intubating is normally a procedure done with the patient lying down on his or her back (to facilitate access to the airway), the flight nurses involved had to do intubate from the uncommon position of being directly in front of a seated patient ("tomahawking"), which they had never experienced before. After presenting the case, the medical director and several other flight nurses commented that they had never actually seen it

done that way before, and commended the flight nurses involved on using the uncommon strategy successfully. Another flight nurse commented, “Yeah, their case actually inspired us downstairs today – we were sitting there with the [simulator] mannequin for an hour or two, just to see if we could do it, and to figure out the best angle.” Moreover, beyond introducing new skills that a flight nurse might not have experienced before, stories of others’ transport experiences can also encourage the review of existing knowledge. As the flight nurse below describes, others’ experiences present a vicarious “audit” of one’s familiarity with a given topic, inspiring learning and review of less familiar topics:

> It's those conversations that … provide much more information because it prompts me to [review] what I know, what I don't know, and what I need to go find out. If I'm having a conversation with Bert about the HeartMate II [a new model of LVAD] they transferred; what I hear is, ‘they transferred a HeartMate II, it was a prisoner and they needed to bring him back.’ [Now] I've got to go look at the prisoner transport protocol and find out what are our policies in transporting prisoners. I need to go look at the HeartMate II as opposed to the HeartMate I, and what do you have to bring [with it]. Those were my thoughts this morning - "Do I have to bring a backup battery pack, or do I just bring a controller? When was the last time I looked at a HeartMate II?” [So] I'm going to go back and look at some information on HeartMate II, because it's been three or four months since I did it. I [also] don't know the prisoner transport policy – “Do they have a guard or don't have a guard? Is it okay to take them flying without being handcuffed?" That's what it prompts me to do.

Table 3.4 Elaborating Vicarious Learning

Theme	**Evidence**
Elaborating Structures (Weekly Rounds and Scenarios)	[If you are unable to transport a patient,] you immediately sit down with your partner and you walk through it, "What could we have done," and even before you leave the bedside. "Can you think of anything else? Did we do this? Did we try this?" Then you come back and when you're reporting … where we thought we were successful, where we thought that it didn't help the case at all. Then it's brought up again at rounds to cover the case, just by virtue of the fact that it … failed to be transported. “What did you do? How did you learn? What did you find?” There's a sense of relief on people's faces in the room because they think, "Whew. That’s probably what I would have done," but somebody else in the room may go, "Why didn't you try this, or do another

	[test]?" It's a sense of, "I've been there before, maybe this would help." So, you review it. (Sigma) Rounds are really good as a consolidation of everybody's comments, but on a day to day basis at the change of shifts, the night crew will tell me they did this flight last night. They went for a stroke patient or a patient with a dissection and they did this and this. You hear the stories and decision-making, the ideas and what prompted them to make the choices they did. I think that's also very helpful. (Sigma) At shift change, you'll get [stories], because we always ask, "Where did you guys fly today? Where did you guys do?" And … you'll hear, "Oh God, let me tell you about this one." You hear some interesting stories and then those stories get passed on and then rounds comes, [where] you'll hear it again play by play. (Sigma) A lot of times you might have changes to protocols based on a bizarre case. Let me give you an example. We went to [another hospital] to get a young kid who was last seen two days before, and he'd overdosed on heroin and bath salts and a whole bunch of other crap. We got there and the kid actually had a heart rate of 270; he was just really crazy. … We straightened him around on the ventilator side … and got his heart rate down somewhat. We got him back, and he was a handful for a while, but as a result of that, because I had the toxicology protocol, I requested [during rounds] that we review the algorithm to address tachycardia with cocaine and all these crazy drugs that kids are taking these days; how to address that particular piece of it… So if it ever comes up again, it's like, "Oh, yeah, we got that down here in the protocol. If this happens, you might consider these things." (Sigma) What happens [when we review charts] they'll have the initial peer review and I might do the secondary peer review. I'm looking more for protocol violations, and then try to give feedback as far as just care issues for improvement. What I have to do is then, read the initial comments, see if those were addressed and then, read the chart again. Then, I kind of go through and pull things out. If I put in a QA response [a note on the chart, for the transporting crew to review further], maybe I note three things that need to be addressed, typically what happens is, one of them - the first one I put in - might get addressed. Then, from there on, that's it. [The others] gets missed ... because they'll go and look up that first thing that got a reference to the chart, and take some time to go do that, and then, they either forget or it just slips their mind to go back and see [the others]. (Gamma)
Elaborating Practices (Adding to	There was a discussion recently about THAM [tris-hydroxymethyl aminomethane, a medication given for post-cardiac arrest acidosis] and hypoglycemia [low blood sugar] - if you give THAM too fast, it can cause

Repertoire and Follow-up Learning)	hypoglycemia. That's not part of my mental drug library of things to do; there's so many side effects, you don't always pick up on every single thing. And the older I get, the more difficult it is to keep all that knowledge in there and pull it out as readily. [So when a recent patient] got hypoglycemic because [the transporting flight nurses] gave THAM, and they showed up here with a [low] glucose, they were kicking themselves for not having picked up on that. And then the discussion was, "well, you gave them THAM, and one of the side effects of THAM is hypoglycemia." And I'm like, "Oh, wow!" You know? Live and learn, because I didn't realize that that was a complication from THAM. …[So] from their mistakes, and their complications, I am able to put that into my arsenal of "Don't do that." (Sigma) One of the things that I try to do, because one of my areas that I am weaker in would be airways, I try to come in and just do a quick RSI [rapid sequence intubation] on the mannequins, just to practice my technique. [It's] being prepared for the fact that I may get an airway that night. The one thing I have learned throughout the years and a couple of my partners have taught me this is listen, there is an airway, it's just a matter of finding it. … Both bases have the mannequins with the equipment lying there. We did that purposely because that is one of the areas that many people call us for is advanced skilled airway techniques. (Sigma) In education, it's not that you're all smart; education teaches you where to find the answers. That's the same thing with what we do. The experience will build you and make you stronger, but half the battle is knowing where to find the answer. In these right here [holds up cards], I've got cheat sheets in here that have been laminated, I couldn't tell you how many times. These are oven 15 years old and they are my cheat sheets for … everything. (Sigma) If you just pay attention, you can pick stuff up pretty easy… like the snake bite [a previously discussed case where other flight nurses had transported a poisonous snakebite patient], I've see one snake bite in 22 years of being a nurse. I probably should know something more than I do about that, and we have so many electronic resources. It's two clicks away. Any weird pathology is about two clicks away. (Sigma)

*Note: "Sigma" = Interview Quote or Observation from Sigma Flight; "Gamma" = Interview Quote or Observation from Gamma Flight. Quotes from non-participant observations and informal discussion are drawn from detailed field notes, and are marked with "Obs." All names are pseudonyms.

Discussion

Through an inductive exploration of the ways by which individuals learn from others' experiences in air medical transport teams, the findings presented here suggest a conceptual model of vicarious learning as an organized phenomenon, involving both formal structures and informal practices that aid in enabling and elaborating the enactment of interpersonal vicarious learning interactions. This grounded process model situates vicarious learning at the interpersonal level of analysis, and demonstrates how vicarious learning interactions can inform both individual- and collective-level learning processes, answering recent calls for rich, qualitative studies of learning and knowledge workers in modern organizations (e.g., Bechky, 2006). Below, I integrate the emergent findings described above with existing theory to develop a generalizable model of organizing for vicarious learning, before turning my attention to the model's implications for the study and practice of vicarious learning in organizations.

Organizing for Vicarious Learning

The conceptual model of vicarious learning emerging from these findings (shown in Figure 3.1) emphasizes the critical role of interpersonal interactions as a primary site of learning, both by providing a liminal space for building an understanding of another's experience, as well as by providing a venue for formal structures (e.g., learning requirements) and shared practices (e.g., storytelling norms) to exert their influence on vicarious learning. Placing these interpersonal interactions at the core of my conceptual model of vicarious learning suggests several important features of my emergent theory. First, the model recognizes the fundamentally human nature of learning in organizations (Lipshitz et al., 2007; in contrast to existing perspectives which place the act of learning at the organizational or collective level; H. A. Simon, 1991), but also articulates that this learning occurs in the day-to-day verbal and physical

interactions between individuals (Weick & Ashford, 2001). In doing so, the model is open to individuals' learning of practices, skills and routines ("know-how") as well as more cognitive acquisition of knowledge ("know-that;" Weick & Ashford, 2001). Moreover, by emphasizing interpersonal interactions, the model is rooted firmly at the relational level of analysis, suggesting a potential mechanism for how vicarious learning links individual and collective learning processes. Indeed, others' experiences can serve as an input into individual –level cycles of action and reflection (i.e., experiential learning processes; Kolb, 1984), providing an additional concrete experience upon which to reflect and develop more abstract generalizations that inform the individual's future actions. Likewise, individuals' sharing of experiences with one another enables more collective learning (i.e., a change in collective response sets; Sitkin et al., 1998), as these learning interactions move learned content into a shared domain (i.e., into collective memory; Walsh & Ungson, 1991), outside of a single individual's mind. This allows the learning to outlive any particular individual and contribute to collective adaptation and structural change, providing a mechanism for explaining collective responses to future environmental changes (Bailey & Barley, 2011; Weick & Ashford, 2001). This bridging role of vicarious learning is demonstrated in Figure 3.1 by the placement of these interpersonal learning interactions at the intersection of individual and collective learning cycles.

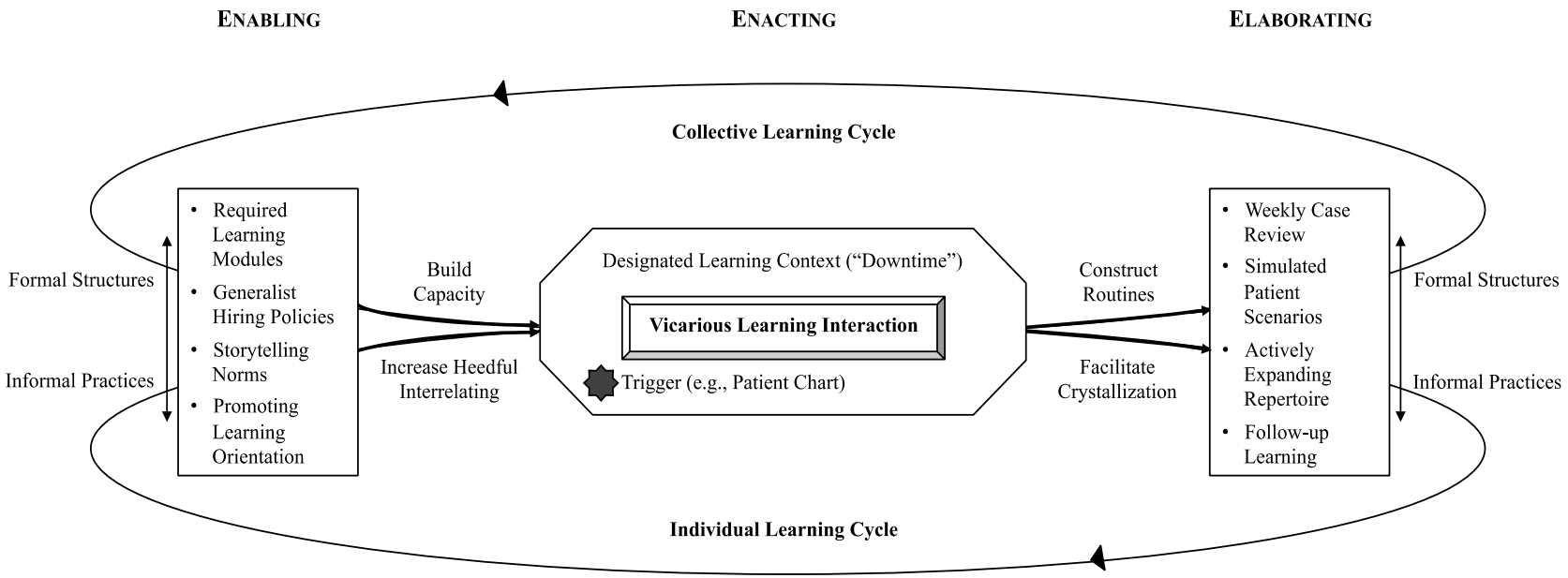

Figure 3.1 Organizing for vicarious learning at Sigma Flight.

In this way, my conceptual model also strongly emphasizes the organized context in which these interactions take place, advocating a multi-stage, process-oriented view of vicarious learning. Specifically, consistent with prior perspectives on organizing (Weick, 1979), this process of enabling, enacting and elaborating vicarious learning is attentive to the environment where this learning is enacted (learning context), the shared behaviors of actors in this environment (informal practices), as well as the overarching processes (formal structures) in which these behaviors are embedded. Below, I theorize more generally about the role of context and triggers in individuals' engagement in vicarious learning, then look backward (pre-interaction) and forward (post-interaction) from this central stage of the model to describe how formal structures and informal practices both enable and elaborate this vicarious learning, articulating mechanisms for how these actions influence individual and collective learning.

Contexts and triggers. A key aspect of this process model of vicarious learning lies in the recognition of the role of designated contexts for engaging in vicarious learning interactions. Interpersonal learning interactions do not take place in a vacuum, and the selection of the appropriate time and place for these interactions (e.g., the use of downtime to tell stories) is thus critical to understanding how they promote learning in organizations (Connell et al., 2004). This role of physical and temporal context has been under-appreciated in prior work, which has tended to assume that learning interactions unfold during actual task performance (such as in communities of practice Brown & Duguid, 1991), or left the issue of context of interaction unaddressed (as in much work on knowledge transfer; see Argote & Ingram, 2000). Yet as evident in this study, the context can play an active role in cueing vicarious learning interactions by surfacing latent individual knowledge (e.g., triggering a memory of a past experience), as well

as motivating participation in storytelling by serving as a shared signal of normatively appropriate times and places for vicarious learning interactions.

Theories of situated learning have stressed the importance of context (Lave & Wenger, 1991), arguing that learning from others occurs while the individual is engaged in the task domain – that is, while the individual is doing the task to be learned. However, this emphasis on the context of *doing* as the site of learning is somewhat restrictive, and as demonstrated by the flight team members studied here, there are often contexts of engaging in vicarious learning that take place away from the domain of task performance. Thus, rather than this more problemistic triggering of learning (derived form the need to resolve a problem at hand; e.g., Orr, 1996), the conceptual model presented here suggests the presence of a range of other potential triggers of vicarious learning. While the identification of all of these potential "offline" triggers (i.e., those taking place outside of direct task performance) is beyond the scope of this paper, my findings suggest that these triggers can include another's telling of a related story, tangible documents and case summaries (e.g., the charts documenting prior transports), or even seemingly unrelated background cues (e.g., the TV news reports described in Table 3.2). Indeed, Brookfield (1987, p. 26) defined a trigger event as any cue that created a sense of "inner discomfort and complexity," suggesting that a variety of cues and experiences in organizations could prompt the confusion or curiosity necessary to trigger a vicarious learning interaction.

Enabling structures and practices. In addition to being rooted in context, interpersonal vicarious learning interactions are also influenced by efforts to enable individuals to participate in these interactions. These enabling actions span levels-of-analysis, and include more formal structures (such as the mandatory learning and staffing policies at Sigma Flight) as well as more emergent practices of individuals within Sigma Flight (such as promoting a shared learning

orientation and conforming to storytelling norms). Though not an exhaustive list of such structures and practices, these enabling efforts observed at Sigma Flight played a key role in individuals' more frequent and effective engagement in vicarious learning (relative to Gamma Flight team members). More specifically, these enabling structures and practices serve to increase the collective learning capacity of individuals within Sigma Flight (i.e., absorptive capacity; W. M. Cohen & Levinthal, 1990), by establishing a shared language and baseline level of knowledge that facilitates the assimilation of new experiences into individuals' existing knowledge. Absorptive capacity reflects an individual or organizational ability to assimilate new information, such as experiences introduced by another party (i.e., "external learning"), as a function of ongoing "internal" learning efforts. The enabling actions described here, and in particular the formal structures of requiring ongoing independent learning and hiring individuals with greater intrapersonal expertise variety (Bunderson & Sutcliffe, 2002), thus ready individuals for vicarious learning by providing the rich and diverse pool of existing knowledge necessary to build absorptive capacity (W. M. Cohen & Levinthal, 1990). In other words, these formal structures guarantee that all team members are engaging in continuous learning of a broad variety of topics, which they can connect to their own breadth of prior knowledge, building the capacity of the entire team for engaging in vicarious learning.

At the same time, more informal actions individuals take can help enable individuals' vicarious learning by creating more attentive, heedful interrelationships between team members. Heedful interrelating refers to interpersonal interactions characterized by attentiveness, alertness and care, where individual needs are subordinated to a shared goal (Weick & Roberts, 1993), resulting in relationships where knowledge and experience are more easily shared between individuals (Styhre et al., 2008). Indeed, by establishing norms for interacting, as well as

building individuals' willingness to participate in these interactions (by adopting a learning orientation), individuals are able to more attentively and alertly engage in vicarious learning, and are more likely to demonstrate mutual respect and care in these interactions (which increase interpersonal trust and psychological safety, further promoting their learning from one another; e.g., Edmondson, 1999). This heedful interrelating thus provides a mechanism for understanding how emergent enabling practices (alongside formal enabling structures) facilitates greater access to others' experiences, creating a relational environment where "everyone has something to teach me" (rather than the defensive, "armchair quarterbacking" described earlier), helping individuals better incorporate others' experiences into their own ongoing learning processes.

Elaborating structures and practices. Turning attention to what follows vicarious learning interactions, the conceptual model emerging from my findings recognizes the role of formal elaborating structures and informal elaborating practices in translating these interactions into enhanced individual and collective learning. Again, the formal structures (collectively reviewing cases in weekly grand rounds, and creating training scenarios) and emergent practices (adding directly to response repertoires and guiding future learning) that elaborate vicarious learning at Sigma Flight do not present an exhaustive list, but do suggest more general mechanisms for this elaboration. Specifically, by creating venues for developing collective consensus and implementing policy change (i.e., grand rounds), as well as tools for rehearsing responses to others' prior case experiences (i.e., human-patient simulator scenarios), the formal elaborating structures displayed at Sigma Flight help build collective routines for future action and thus facilitate greater learning (Wilson et al., 2007). These routines are not merely stable habits of action, but rather flexible tools that guide the initial approach to an experience before being modified and refined as they are used and re-used by different organizational members

(Feldman, 2003). Exemplifying this mechanism of flexible routines, the clinical protocols at Sigma Flight provide team members a working guide (based on accumulated wisdom to date) for approaching a particular patient transport, but through interpersonal vicarious learning and subsequent review at grand rounds meetings, these protocols can be updated in response to a particular case, enhancing the collective's readiness for addressing a similar case in the future. Additionally, these formal structures help team members develop a shared sense of collective efficacy, by making everyone aware of the cases that were transported, and developing rehearsed responses (e.g., through simulated scenarios) for addressing those cases in the future. Collective efficacy refers to a future oriented judgment about the group's capability to execute a course of action to attain a goal (Bandura, 2000), and this confidence in collective ability can influence how effectively individuals make use of prior learning in the face of a future challenge (Goddard, Hoy, & Hoy, 2004).

In terms of the more emergent practices that elaborate vicarious learning, these practices work through a mechanism of facilitating greater crystallization of learning at the individual level. Crystallizing refers to the challenge of internalizing a complex learning experience and articulating a tractable plan for future action (see Nonaka, 1994), and individuals are better able to crystallize their learning and transfer it to a future experience when they have opportunities to "follow-up" on their learning, such as by putting it into practice or connecting it to their prior knowledge base (see Argote & Ingram, 2000; Baldwin & Ford, 1988; Colquitt et al., 2000). The informal practices at Sigma Flight of incorporating techniques from others' experience directly into one's own response repertoire, as well as allowing others' experience to guide subsequent independent learning, provide important opportunities for this follow-up and crystallization. Expanding one's repertoire allows the individual to directly put what they learned from another's

experience into practice (either in a future transport, or in a simulation or scenario), while engaging in independent learning in response to another's experience (e.g., looking up research articles on an illness that someone else transported) allows individuals to draw deeper connections between others' experiences and one's own base of knowledge. These elaborating practices (as well as the formal structures described earlier) thus allow vicarious learning interactions to serve as a component of individual learning cycles (i.e., of experience and reflection; Kolb, 1984) by facilitating individuals' ability to internalize the learning stemming from these interactions and more readily apply it to their future experiences.

Contributions to the Study of Vicarious Learning

The results of this research elaborate and extend existing theory on vicarious learning in organizations in at least three ways. First, by focusing on the interpersonal interactions by which individuals learn from each other, I provide a micro-level perspective on vicarious learning in organizations, in contrast to the more macro-level perspectives offered in prior research. Indeed, the vast majority of studies have been conducted at the unit- or organizational-level of analysis, examining how organizations (or organizational units) use the experience of other units or firms to enhance their own strategies and performance, emphasizing inter-unit linkages and structures as the key means of learning and knowledge transfer. Though these inter-unit and inter-firm vicarious learning often invoke interpersonal interactions (such as personnel rotation or board interlocks; e.g., Haunschild & Beckman, 1998) as an explanatory mechanism, an understanding of these underlying interpersonal processes (i.e., the specific actions and interactions by which vicarious learning occurs between individuals in organizations) has nonetheless remained largely omitted from this literature (Bresman, 2013; Darr et al., 1995; Styhre et al., 2008). As noted at the outset of this article, the simple presence of a potential conduit for learning and knowledge

transfer (e.g., a personnel rotation program or a knowledge management system) is not sufficient to understand the emergence of vicarious learning between people at work. My findings revealed a conceptual model of these underlying interpersonal vicarious learning interactions, while also recognizing the important role played by collective-level structures, providing an opportunity to integrate prior findings into a more unified, multi-level theoretical account of vicarious learning.

The second contribution of the present research lies in its focus on vicarious learning as an organized, multi-stage process. The more macroscopic, structural approach of much prior research assumes (either explicitly or implicitly) that individuals will automatically learn from one another if provided the opportunity, neglecting to explore the actions and interactions by which individuals construct their practice of learning within these structures (such as developing distinct teaching-learning ecologies; Bailey & Barley, 2011). Studies that do examine individual-level vicarious learning have been either relegated to the training context (Taylor et al., 2005), away from the ongoing day-to-day learning, or is focused narrowly on the factors that make someone more or less willing to share (or seek) knowledge, rather than the actual process or outcomes of these vicarious learning interactions (e.g., Levin & Cross, 2004). By developing a three-stage model of how individuals enable, enact, and elaborate vicarious learning interactions, the findings of this study thus provide a rich procedural account of vicarious learning, revealing this learning as a decidedly "organized" phenomenon (rather than a natural or haphazard process). Specifically, my conceptual model points to the role of mutually-agreed-upon context for interaction as a necessary (but not sufficient) pre-requisite for vicarious learning, while also recognizing how these interactions are triggered by various elements in the learning environment and are further supported by "upstream" and "downstream" structures and practices (that reflect the confluence of both formal and informal elements of the organization; McEvily et al., 2014).

Indeed, the observation that Sigma Flight's ability to rely on vicarious learning as a core strategy stemmed more from the presence of these enabling and elaborating actions (rather than differences in how each team actually engaged in interpersonal vicarious learning interactions) underscores the importance of this nuanced, procedural view of vicarious learning.

A third contribution of this study arises from air medical team members' enactment of vicarious learning as focused on peer-to-peer discussion and analysis of rich experiences. Though vicarious learning at the individual level has traditionally been conceptualized as the simple observation and imitation of others' behavioral scripts (Bandura, 1977b; Manz & Sims, 1981), the findings presented here demonstrate that individuals engage in vicarious learning outside of their direct performance of observable actions (a required condition of traditional theories of vicarious learning). Instead, vicarious learning in these teams occurs through re-constructing experiences in narratives told during "downtime," with an emphasis on back-and-forth discussion and development of mutual understanding, rather than simply imitating others' observed actions. This discursive, experience-based view of vicarious learning also helps distinguish it from related constructs, such as advice seeking or knowledge sharing, which tend to focus more on the transfer of (typically codified) information across groups (e.g., Argote et al., 1990; Argote & Miron-Spektor, 2011), rather than on the mutual discussion of both tacit and explicit elements of experience. Indeed, flight team members distinguished their engagement in vicarious learning with peers from other learning activities (such as seeking expert advice or information), helping demonstrate the unique benefits of the more discursive process of vicarious learning: it allows team members to learn in the face of significant ambiguity and equivocality in the application of knowledge, while these other learning activities can address only the simple lack of information (i.e., uncertainty; Weick, 1995).

Additional Contributions and Future Directions

Beyond these contributions to the vicarious learning literature, the results presented here also advance the study of narratives and stories in organizations. Though there has been a long-held interest in understanding how narratives contribute to learning within organizations (Garud et al., 2011), much of the literature on narratives focuses on "non-core" stories (see, for instance, the typology developed by Martin, Feldman, Hatch, & Sitkin, 1983 that emphasizes stories such as "Is the big boss human?"), leading some to claim that "critical skills, including deep knowledge of a content domain, would be very difficult to transfer via stories" (Swap et al., 2001, p. 103). This disconnect may have arisen from the fact that studies of narratives often emphasize the sharing of these stories as a tool for cultural reproduction, rather than learning (e.g., Dailey & Browning, 2014). Moreover, many studies view stories as only shared during task performance (cf., Orr, 1996), yet many work domains do not provide opportunities to take time during task execution to tell stories with coworkers. For instance, consultants' stories of managing a difficult client presentation are unlikely to be discussed while they are actually delivering a client presentation (in the way Orr's repairmen sat in front of a dysfunctional machine telling stories). Indeed, as Bechky (2006) has noted, sharing stories has been criticized as a "quaint" approach to learning in the face of modern organizational challenges. The results presented here may thus advance studies of learning from narratives in organizations by re-focusing attention on elements of the story performance (i.e., Boje, 1991), such as the location of storytelling interactions (e.g., storytime and storyplace; Connell et al., 2004) or environmental elements that trigger these interactions, in order to develop theories of learning from narratives in "offline" contexts that may be more relevant in modern organizations.

This offline, discursive approach to vicarious learning highlights several practical implications of these findings for a variety of organizations. Organizations in a variety of industries are facing challenges similar to those of air medical transport teams – engaging in increasingly knowledge-intensive work, and frequently encountering ambiguity in determining how best to apply knowledge to the delivery of products and services. Given that prior theories of vicarious learning reflect the high-volume manufacturing organizations of their origin (Tucker & Edmondson, 2007), they may not prove as tractable in this current ambiguous environment of learning in organizations (Noe et al., 2014). Having been developed in this modern learning environment, the process described here may thus reveal a more useful set of tools and techniques for promoting vicarious learning in organizations where "reinventing the wheel" is costly (Bresman et al., 1999). For instance, organizations might consider changes to meeting structures and project debriefs that better allow them to elaborate more informal learning that occurred during a project, implement structures that help build individuals' capacity and heedful interrelating, or create designated spaces and times for promoting interpersonal learning. As an example of this latter approach, in a recent press release announcing their new corporate campus, Google described how the facility was deliberately architecturally engineered to maximize "casual collisions of the workforce," in an effort to promote sharing knowledge, experiences and ideas across units (Lindsay, 2013).

Finally, though the context of air medical transportation is an unusual one, this extremity threw the vicarious learning process into sharper relief, allowing for the development of richer, more nuanced theoretical insights than would have been allowed in a milder context (Bamberger & Pratt, 2010; Eisenhardt, 1989). Nevertheless, future research will need to more fully address the generalizability of this framework to other contexts. For instance, researchers might explore

how this process of organizing for vicarious learning unfolds in virtual work teams (e.g., Martins, Gilson, & Maynard, 2004), or other environments where interpersonal interaction is more limited. Future work that more systematically examines the proposed relationships and mechanisms in the emergent theory presented here would also offer a meaningful extension of this work. Indeed, the rich, qualitative data and inductive approach employed here was suitable for the paper's goal of developing theory in an underexplored domain (Golden-Biddle & Locke, 2007), and answered recent calls for greater qualitative, meso-level attention to learning practices in organizations (Noe et al., 2014), but was nonetheless unsuitable for explicitly testing the causal relationships proposed by this theory. Finally, the structures and practices used to enable and elaborate vicarious learning that emerged from my analysis represent only an initial foray into these concepts, and there are likely many other structures and practices that enabling and elaborating vicarious learning. Future research is thus warranted to develop more complete taxonomies of these formal structures and informal practices, and might reveal additional mechanisms for their effects on vicarious learning.

Conclusion

When it comes to caring for patients who present with extreme injuries or illnesses that require rapid transportation to a major hospital, "trial and error" is typically the least preferred method of learning. Observing the work of air medical transport team members revealed that learning in this critical context is often a function of "the stories we tell," reflecting an emergent, organized process of vicarious learning from discursive interactions about others' experiences. These insights thus facilitate the development of a multi-stage theoretical process model of vicarious learning, demonstrating how these interpersonal interactions occur amidst a confluence of formal structures and informal practices that enable individuals to engage vicarious learning,

guide their enactment of storytelling interactions, and elaborate the learning that emerges from these interactions. The result is an understanding of how individuals organize for vicarious learning, allowing the lessons of others' experiences to impact individual and collective learning and guide future performance.

CHAPTER 4

RECIPROCITY IN TEAM LEARNING NETWORKS: ANTECEDENTS AND PERFORMANCE BENEFITS OF RECIPROCAL VICARIOUS LEARNING

> Knowledge is one of the few assets that grows most – also usually exponentially – when shared … As one shares knowledge with other units, not only do those units gain information (linear growth) they share it with others and feed back questions, amplifications, and modifications that add further value for the original sender, creating exponential total growth. (Quinn et al., 1996, p. 8)

Team learning – the process of sharing, distributing and coordinating knowledge across individuals within a team (Argote & Gino, 2009) – has been recognized as a critical activity for high-performing teams and organizations (Argote et al., 2001; Bunderson & Sutcliffe, 2003; Edmondson, 1999; 2002; Matzler & Mueller, 2011; Quigley et al., 2007; Tsai, 2001; Wong, 2004). The ability to effectively share and utilize knowledge drives team and organizational effectiveness (Argote et al., 2000; Quigley et al., 2007; Senge, 1990), as it creates the conditions necessary for both innovation (Leonard-Barton, 1995; Wong, 2004) and greater performance efficiency (Argote et al., 1990; Bunderson & Sutcliffe, 2003). Particularly in modern organizations – where work tasks, and the expertise required to perform them, are increasingly distributed across both people and places – transferring knowledge in organizational teams is a key competitive advantage (Argote & Ingram, 2000; R. M. Grant, 1996), emerging from the development of strong group and interpersonal dynamics that support the sharing and integration of diverse knowledge and experiences (Davenport et al., 1998; Moreland & Myaskovsky, 2000).

Research in the team learning tradition predominantly views this learning as a process (rather than an outcome; e.g., Edmondson, 1999), emphasizing activities like discussion,

reflection, and after-action reviews (DeRue, Nahrgang, Hollenbeck, & Workman, 2012b; Edmondson, 1999; Ellis & Davidi, 2005; Ellis, Mendel, & Nir, 2006; Senge, 1990) as key drivers of group learning. While much of this work focuses on teams learning from their communal experiences (i.e., discussing and reflecting on events that the team encountered together), research has also emphasized the interpersonal sharing of each team member's unique knowledge and experiences. As Argote and Gino (2009, p. 343) note, "for group learning to occur, group members must have access to others' knowledge – either because it has been shared with them by the relevant individuals or because they know that they can access the knowledge by consulting the individuals." This interpersonal experience- and knowledge-sharing component of group learning (in contrast to groups' collective learning from shared experience) can thus be characterized as a form of *vicarious learning* (Bandura, 1977b; Bresman, 2013; Gioia & Manz, 1985). Vicarious learning refers to one's learning (i.e., changing beliefs or behavior) from a process of absorbing and interpreting another's experience(s), which are shared from one person to another through observational or interactional means (Myers, Chapter 2).

A vicarious learning perspective thus emphasizes individual interactions as the fundamental building blocks of team learning, as individuals share and seek knowledge and experiences through their network of relationships with one another (e.g., Glynn, Lant, & Milliken, 1994). Correspondingly, substantial research attention has been devoted to the factors that drive these sharing and seeking processes underlying vicarious learning, such as individuals' expertise, personality and motivation (Alavi & Leidner, 2001; Foss, 2009; Hofmann et al., 2009; Ipe, 2003; Osterloh & Frey, 2000; Quigley et al., 2007; Siemsen et al., 2009), as well as broader social factors such as trust, psychological safety, team goal orientation, and relationship strength (Argote et al., 2000; Bunderson & Sutcliffe, 2003; Edmondson, 1999; Levin & Cross, 2004;

Uzzi, 1997). Yet, despite these efforts toward understanding vicarious learning in groups, existing perspectives on how team members learn from one another's experiences are still limited in at least two important ways.

First, prior research has tended to view this process of vicarious learning as unidirectional – that there is a "sharer" of knowledge and a "learner" who receives the knowledge, and that these roles are stable within a dyadic learning relationship – making critical assumptions about how the process unfolds, such as assuming that a "sharer" would never learn from the "learner" in the relationship. This assumption can be seen in the focus of prior research on examining *either* what might drive a person (e.g., an expert team member) to share knowledge with someone (e.g., a novice team member), or what leads to the seeking of knowledge by these more novice members from experts (e.g., Hofmann et al., 2009; Levin & Cross, 2004). For example, Osterloh and Frey (2000) provide an empirical review arguing that different motivational sources cause employees to share different kinds of knowledge (tacit or explicit), while Levin and Cross (2004) take the point of view of a knowledge recipient, finding that recipient's perceptions of sharer trust and tie strength increased the receipt of useful knowledge. Indeed, by focusing on only one party (i.e., sharer or recipient) in isolation, these studies are structurally unable to overcome this "one-way" learning assumption, as they make ex-ante conceptual and empirical determinations of individuals' roles (i.e., surveying people about their receipt of knowledge from others, but not their own sharing of knowledge; see Levin & Cross, 2004 for an example).[13] This

[13] In one notable exception that did examine the role of sharer and recipient together, Quigley and colleagues (2007) demonstrated different motivational antecedents for sharing knowledge (based on norms and incentives) and recipients utilizing the shared knowledge (based on self-efficacy, trust and self-set goals) in a dyadic knowledge sharing experiment. However, their study nonetheless treated sharing and receiving knowledge as independent processes – examining what motivates individuals to share knowledge, and the separate motivators of the use

assumption of prior research is problematic, as network learning perspectives (i.e., viewing learning as a network of interpersonal connections; e.g., Glynn et al., 1994; Weick & Roberts, 1993), as well as more recent theorizing on vicarious learning as a coactive process of mutually co-constructed learning (Myers, Chapter 2), assert that knowledge and experience can flow both ways between two individuals during a learning interaction. Indeed, when individuals learn vicariously from others, they do not simply "consume" a sharer's experience (Matzler & Mueller, 2011), but rather, they often "feed back questions, amplifications, and modifications that add further value" (Quinn et al., 1996, p. 8).

Second, prior studies of team learning have made a key assumption of uniformity – viewing learning as happening equivalently between all individuals in the team (i.e., representing team knowledge simply in aggregate, rather than as a network of differently distributed knowledge; Espinosa & Clark, 2014). Indeed, when a team member shares his or her knowledge or experience (such as when a new team member describes an experience from his or her prior work team; Vashdi et al., 2013), prior approaches have assumed that the other group members each learn the same "lesson" from the shared experience (see Bandura, 1989b). Yet each team member participates in vicarious learning differently as a function of his or her differing background and position in the team learning network (Singh et al., 2010), in addition to differences in individual learning attributes, and may draw different lessons from another's shared experiences based on the nature of his or her relationship with the sharer (Myers, Chapter 2). Individuals may be more or less inclined to share their experiences with a particular team member, as they must cede "ownership" of knowledge (Davenport et al., 1998; Hansen et al.,

---

of this knowledge – with less attention to the nature and evolution of the sharing/learning interaction (e.g., whether the receipt of knowledge might motivate the recipient to in turn share knowledge).

2005; Quigley et al., 2007), and may be less comfortable ceding this ownership to certain team members (e.g., a rival) relative to others. Likewise, seeking knowledge from others requires a willingness to risk "feeling incompetent or embarrassed" (Hofmann et al., 2009, p. 1262) by demonstrating a lack of knowledge and understanding, which is likely more easily undertaken in certain dyadic relationships (such as a mentor-protégé relationship). While a few studies of vicarious learning in organizations have cast this learning as embedded in relationships that vary in their strength (e.g., Levin & Cross, 2004; Uzzi & Lancaster, 2003), most research has tended to view these learning processes as a team-level property (Edmondson, 2002; Vashdi et al., 2013; see Wilson et al., 2007 for a review) varying only in amount, implicitly assuming that learning is distributed uniformly across the team (rather than differentially among team member dyads).

These critical assumptions of unidirectionality and uniformity mask key differences in the way individuals learn from one another within a team, resulting in overly broad generalizations of this learning process (i.e., an emphasis on *how much* a team learns from its members, rather than *how* this learning occurs among team members) that inhibit the field's understanding. For example, prior approaches have been largely unable to reconcile how this within-team, internal learning (team members' learning from one another's experiences) might interact with other key team learning processes, such as efforts to bring in new knowledge and capabilities from outside the team (i.e., external learning; Ancona & Bresman, 2005). These external learning activities have been paradoxically viewed as complementing internal team learning (positively interacting to enhance performance) but also as conflicting with internal learning (such that engaging in external learning in addition to internal learning harms performance), with empirical studies reporting evidence in support of both perspectives (see Bresman, 2010; Wong, 2004). Indeed, the findings of these studies reveal that learning within a

team (internal learning) sometimes enhances the performance benefits of the team's external learning efforts (Bresman, 2010), consistent with arguments for absorptive capacity (W. M. Cohen & Levinthal, 1990); but other times internal learning diminishes these performance benefits of external learning (Wong, 2004), potentially because engaging in both forms of learning draws too heavily on the team's cognitive, temporal, and attentional resources (detracting from the resources available for performance; Singer & Edmondson, 2008). These results suggest that team members' internal learning from one another may be unfolding differently across teams, such that only certain teams (i.e., those engaging in vicarious learning among team members in a particular way) are able to benefit from greater external learning, but existing research has yet to explore these different underlying patterns of engagement in learning from others within teams.

The Present Research: Vicarious Learning Reciprocity

These paradoxical findings serve as an exemplar of the limitations of prior approaches to understanding individuals' vicarious learning from others within teams. Therefore, there is a need for a more nuanced understanding of the patterns of *how* this learning occurs (e.g., examining the impact of two-way, vs. unidirectional, learning relationships, and the potentially non-uniform distribution of these learning relationships within a team) rather than simply assessing how much learning goes on overall in the team. One critical element of this pattern of learning lies in the degree of *reciprocity* of vicarious learning between individuals in a team – where person A learns from the experiences and insight shared by person B, and B in turn learns from those shared by A, rather than in only one direction but not the other. Broad concerns for reciprocity have been conceptually linked (at the unit- and organizational-level of analysis) to greater motivation to engage in knowledge sharing (between organizational subunits or

subsidiaries; Dyer & Nobeoka, 2000; Schulz, 2001), and recent work has empirically observed reciprocity as an important feature of inter-unit knowledge relationships (Caimo & Lomi, 2014; Lai, Lui, & Tsang, 2015; Van Wijk, van den Bosch, Volderba, & Heinhuis, 2005) as well as associated perceptions of a unit's learning reciprocity with improved care in medical clinics (Leykum et al., 2011; Noël, Lanham, Palmer, Leykum, & Parchman, 2013). Yet, despite this evidence that reciprocity occurs in learning relationships at work (at least at aggregated unit- or firm-levels), relatively little is known about the antecedents and consequences of reciprocal learning relationships between individuals (i.e., members of a particular team or unit).

The degree of reciprocity in team members' vicarious learning relationships thus reflects a fundamental, but poorly understood, feature of a team's network of learning relationships that carries important implications for learning and performance in the team. For instance, individuals with a more reciprocal learning relationship (i.e., one where they each learn from the other) are likely more attuned to each other's background and perspectives (e.g., Huber & Lewis, 2010), facilitating mutual understanding, smoother communication, and ultimately greater learning capacity than would be expected between individuals who have only a one-way or "arms-length" learning relationship (Myers, Chapter 2). This enhanced learning capacity is important for a variety of reasons, including its potential to help address the performance paradox of teams' simultaneous engagement in internal and external learning noted earlier. Indeed, greater reciprocity in vicarious learning may help resolve this paradox, as it creates the communication and understanding necessary for teams to more effectively incorporate diverse external knowledge without over-taxing time and attentional resources (and reducing performance).

Therefore, building on theories of team learning as a network of dyadic learning relationships (e.g., Glynn et al., 1994), as well as recent theory on coactive vicarious learning

(Myers, Chapter 2), the present chapter introduces the concept of vicarious learning reciprocity by developing and testing a conceptual model of 1) the conditions under which individuals engage in reciprocal vicarious learning in teams, and 2) how teams' differing distributions of these reciprocal vicarious learning relationships impact performance. Specifically, I examine the role of individuals' functional background diversity (e.g., more generalized or specialized; Bunderson & Sutcliffe, 2002) and motives for learning (Myers & DeRue, 2013), as well as team learning norms, as predictors of engagement in reciprocal learning relationships with others in the team. I then explore how vicarious learning reciprocation among teams impacts performance, and in particular can resolve the paradox of balancing this team (internal) learning with efforts to learn from external sources (Argote, 2015; Bresman, 2010; Wong, 2004).

I test my conceptual model in a sample of 441 MBA students working in 4-6 person, full-time consulting project teams, using a novel approach to measure both individual-level reciprocity and team-level reciprocation (building on recent developments in network methods; Squartini, Picciolo, Ruzzenenti, & Garlaschelli, 2013) that attends not only to the presence of reciprocal ties, but also to their strength. Prior approaches to studying reciprocity in networks within work organizations have relied solely on binary (0/1) conceptualizations of reciprocity, or have looked only at the relative balance of weighted ties (for recent examples, see Caimo & Lomi, 2014; Kleinbaum, Jordan, & Audia, 2015; Lai et al., 2015), making a number of critical simplifications that limit the field's understanding of reciprocity (such as treating a weak balanced tie as equivalent to a much stronger balanced tie, as discussed further below). Using these new measures of vicarious learning reciprocity, I demonstrate that strong norms for shared learning in the team (contingent on individuals' learning motives) positively influence individuals' degree of reciprocal vicarious learning with other team members. Moreover, I show

that greater vicarious learning reciprocation at the team level improves team performance, both directly and indirectly by enhancing the relationship between external learning and performance.

Below, I first introduce the notion of vicarious learning reciprocity, before developing and testing my conceptual model of its antecedents and consequences. I conclude by discussing the implications of these findings for studies of learning in organizational teams.

Reciprocity in Vicarious Learning

Learning has long been seen as a social phenomenon in organizations that involves action at both the individual and collective level (Argyris & Schön, 1978; Weick, 1979; 1995), leading scholars to consider network-based approaches (in contrast to aggregate group-level study) as a means of understanding organizational learning (e.g., Glynn et al., 1994). In a network approach, emphasis is placed on the composition of relationships between individuals situated within the team or organizational context, as a way of capturing the interpersonal dynamics of learning (cf. Weick, 1995). As a result, this approach models learning as "emergent from interpersonal and/or behavioral connections" rather than simply one-way "information transfer from one individual mind to another," recognizing that learning is "not located in individual learning entities or 'nodes'…but in the connections between nodes." (Glynn et al., 1994, pp. 56-57). Following this approach, network scholars have examined how the distribution of relationships (e.g., structural holes; Burt, 1992) and their characteristics (e.g., the strength or embeddedness of a tie; Granovetter, 1973; Uzzi, 1997) influence learning in organizations (Levin & Cross, 2004). For instance, weak ties have been shown to facilitate the search for diverse information in a consulting firm (Hansen, 1999), while Uzzi and Lancaster (2003) find that embedded ties allow for the transfer of more tacit knowledge and experience between bank loan officers and clients.

The features of these learning relationships are critical for allowing individuals to learn from the experiences of others at work (Wong, 2004), and whereas the embeddedness of a tie is one feature of a network relationship, another key feature is whether or not the relationship is reciprocal. Though broadly associated with the strength of a tie (e.g., Granovetter, 1973), the reciprocity of a tie reflects a distinct focus on the tendency of a given pair of individuals to develop mutual connections with each other (rather than just a one-way connection; Newman, 2009). In the context of vicarious learning, a reciprocal learning relationship can thus be considered one where each individual learns from the experiences and insight of the other (i.e., in a mutual give-and-take of knowledge; Ipe, 2003) and can be contrasted with a non-reciprocal (one-way) relationship, where one person shares knowledge and experience with the other, but where the reverse is not true. Research in communication (e.g., Rogers & Kincaid, 1981) has noted reciprocity to be an integral part of information sharing, because it helps refine and shape emerging insights from shared knowledge, suggesting that it is key to realizing the learning benefits of a workplace relationship (Adler & Kwon, 2002; Kang et al., 2007). Indeed, broad concerns for reciprocity have been tied to organization- and unit-level knowledge sharing in several prior studies (Dyer & Nobeoka, 2000; Hall, 2001), finding for instance, that organizational units receiving knowledge from others tended to share their own knowledge with those other units (Lai et al., 2015; Schulz, 2001). While these studies were at a more collective level of analysis, this underlying concern for reciprocity applies to individuals as well. Indeed, sharing knowledge with others can be risky, as others can potentially exploit the information (Empson, 2001) without sharing anything in return, and so individuals' expectations of reciprocity can impact their willingness to share experiences for others' learning (Obstfeld, 2005; Reinholt & Pedersen, 2011).

Yet, apart from this general norm or expectation of reciprocity in learning (e.g., Kang et al., 2007), little is known about who is more or less likely to engage in reciprocal learning, or about the relative performance effects of these reciprocal vicarious learning relationships (compared to one-way knowledge sharing relationships). Recent theorizing about *coactive*, interpersonally co-constructed forms of vicarious learning (in contrast to independent, one-way forms; Myers, Chapter 2) has begun to explore this notion, and may thus provide a useful lens through which to view the impact of reciprocity. This perspective has cast coactive, reciprocal vicarious learning interactions as influenced in part by individuals' background and attitudes for learning, and suggests that their performance effects should be greater than one-way (independent) learning relationships because they allow both parties in the interaction to play an active role in the production of learning (Sawyer, 2003; Tsoukas, 2009; Weick, 1995). This co-production allows insights and alternatives to surface more easily (i.e., through discussion and comparison of experiences shared by each party; Garud et al., 2011), and should thus allow teams to better harness the knowledge and experiences of their members as a greater proportion of these members engage in reciprocal vicarious learning with one another.

Individual Reciprocity vs. Team-level Reciprocation

In exploring the antecedents and performance impact of reciprocal vicarious learning, I distinguish between two levels of reciprocity, one at the individual level and the other at the team level. At the individual level, I define *individual vicarious learning reciprocity* as the extent of a person's involvement in reciprocal (vs. non-reciprocal) vicarious learning relationships. In other words, this construct captures the extent to which a given individual learns vicariously from others who also learn vicariously from that individual. The more vicarious learning that occurs in both directions between an individual and another team member (across all of an individual's

dyadic learning relationships in the team) the greater the individual's degree of vicarious learning reciprocity.

Correspondingly, I define *team-level reciprocation* of vicarious learning as the distribution of these individual-level reciprocal vicarious learning relationships in a team. Following network-based perspectives on team learning that view learning as emerging from the compilation of individual learning relationships within the team (Glynn et al., 1994; Weick, 1995), I see team-level reciprocation as a compositional construct, consisting of the proportion of reciprocal vicarious learning ties between team members (out of all ties in the team network).[14] In this sense, team-level reciprocation of vicarious learning is distinct from other characteristics of a network, such as its density (Newman, 2009). While density reflects the overall proportion of ties realized in the network out of all possible ties, reciprocation emphasizes the directionality of these ties, specifically capturing the proportion of bi-directional ties out of the total number of realized ties. I thus use these terms – individual reciprocity and team-level reciprocation – in the remainder of this chapter to refer to the individual tendency to reciprocate and the team's overall degree of reciprocation in it's members' ties, respectively. These differences can also be seen in Figure 4.1, which displays the full conceptual model, and denotes team-level vicarious learning reciprocation of vicarious learning as composed of team member's individual-level reciprocity in their vicarious learning relationships (indicated by the dotted lines).

---

[14] The examples provided here refer to the simple presence/absence of ties, but these definitions are equivalent when considering tie weight. Specifically, reciprocation of weighted ties is defined as the proportion (out of the total weight of all realized ties) of the total tie weight present in both directions between all pairs of nodes in the network, whereas density refers to the total weight of the realized ties divided by the maximum potential weight of all possible ties. I discuss these definitions (and the novel method utilized for measuring reciprocity) further below.

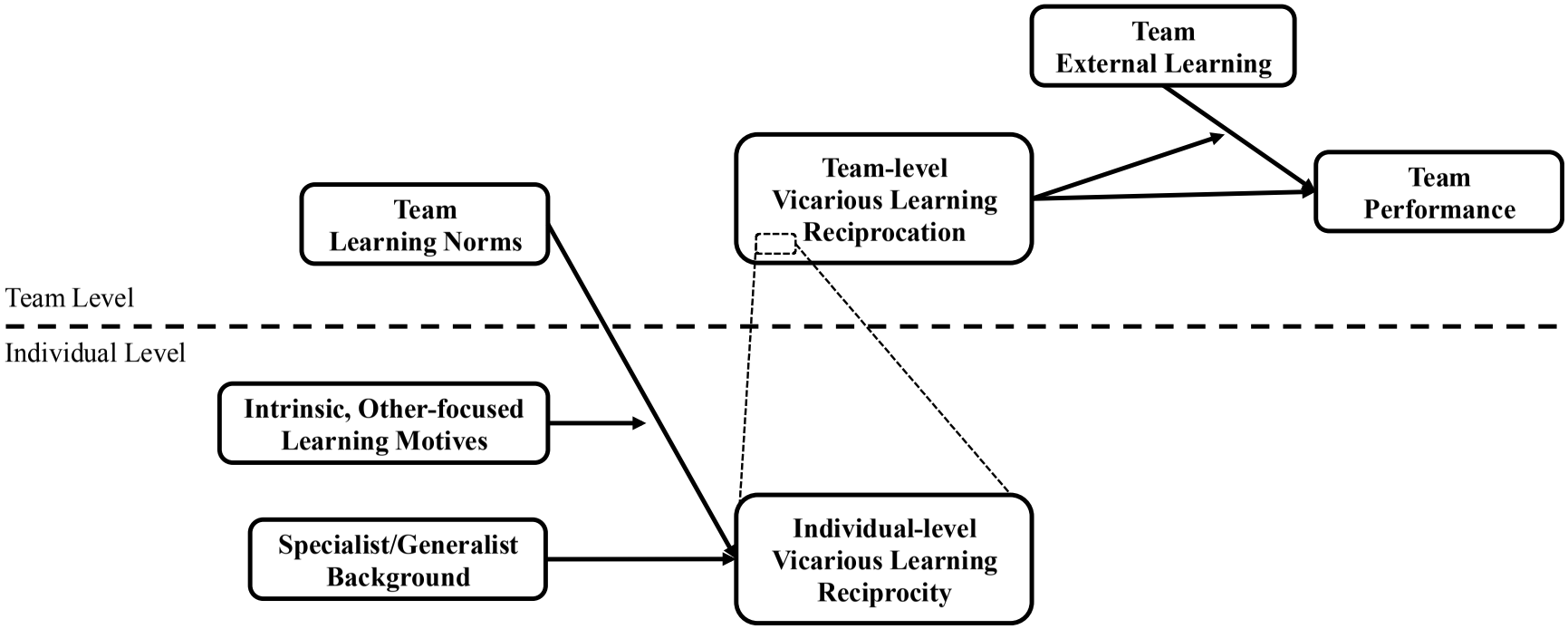

Figure 4.1 Antecedents and consequences of vicarious learning reciprocity in teams.

Antecedents to Individual Reciprocity of Vicarious Learning

In light of the potential benefits of reciprocal vicarious learning noted earlier, a critical question is to determine why individuals would be more or less likely to reciprocate in their learning relationships. The bulk of research on learning networks (and indeed networks more broadly) tends to focus on the consequences of an individual's position in the network (see Borgatti & Cross, 2003), but there is also a growing interest in understanding the determinants of an individual's network relationships (e.g., K. J. Klein, Lim, Saltz, & Mayer, 2004; Matzler & Mueller, 2011; Singh et al., 2010). These perspectives have identified personal attributes (such as demographic characteristics and values) as key predictors of an individual's network position, finding for instance, that education, personality and values explained who was likely to have a central position in an advice network (K. J. Klein et al., 2004).

Generalist vs. Specialist Background

One personal characteristic identified in several studies is an individual's more generalist or specialist perspective, emerging from his or her diversity of background experiences in different functions or domains (e.g., the individual's intrapersonal functional diversity; Bunderson & Sutcliffe, 2002). This difference in breadth of prior experience can change the way individuals evaluate problems and opportunities (e.g., changing the way executives evaluate strategic acquisitions; Hitt & Tyler, 1991) and how they engage with others in their team (Rulke, 1996). For instance, teams made up of more "generalists" have been shown to engage in greater information sharing and coordination, while "specialists" engaged in this knowledge sharing only under certain structural conditions (i.e., a decentralized structure; Rulke & Galaskiewicz, 2000). Scholars have argued that this effect is driven by generalists' greater understanding of how their actions interface with those of others (Brown & Duguid, 1991), which allow them to

facilitate connections and promote learning between different functional areas (Kang et al., 2007; Leonard-Barton, 1995).

For example, in their study of functional diversity in top management teams, Bunderson and Sutcliffe (2002) argue that this background affects knowledge sharing through both social categorization and motivational mechanisms. Individuals with more specialized backgrounds are likely to see others on the team as different from them, restricting communication (by introducing potentially negative stereotypes about others; Williams & O'Reilly, 1998) and decreasing the likelihood that they would engage in reciprocal learning relationships with others. Indeed, these specialists are likely to see their learning relationships as more formal, "arms length" ties (Uzzi & Lancaster, 2003) involving the transfer of required knowledge from one specialized function to another, rather than as more socially-embedded, interactive relationships based on reciprocal learning. By contrast, generalists should be more likely to engage in reciprocal learning relationships, not only because they perceive less social categorization in the team (i.e., seeing themselves as similar to others because of their breadth of prior experience; Bunderson & Sutcliffe, 2002), but also by virtue of more positive motivation to both share their own knowledge and learn from the experiences of others.

As Bunderson and Sutcliffe (2002) note, individuals make expectancy (Will the shared knowledge and experience be understood?) and instrumentality (Will this understanding of experience lead to better performance?; Vroom, 1964) judgments about whether to share or seek knowledge in teams. They argue that generalists will be more likely to have positive expectancy and instrumentality beliefs, suggesting that these generalists should be motivated to engage in greater reciprocal vicarious learning, because they see value in comparing and combining diverse experiences, and are more confident in their ability to "translate" knowledge effectively across

different domains (Leonard-Barton, 1995). Thus, when others share an experience or an insight with generalists, the generalists are more likely to reciprocate by sharing their own experience, because they sees fewer barriers or discontinuities between experiences in different domains, and feel more confident in their ability to present a prior experience in a way the other person will appreciate and understand. In the same way, generalists should also be more likely to seek out and motivate others' reciprocal sharing of experience, as a means of comparing perceptions and developing a broader understanding of experience. Specialists, on the other hand, should be significantly less likely to engage in reciprocal vicarious learning. Though they may still engage in the sharing of their knowledge and experience, this sharing is likely to be much more unidirectional, as specialists are less likely to see value in comparing and integrating different experiences, and may be less confident in their ability to translate experiences from multiple different domains. Indeed, specialists may see the sharing of knowledge as more of a "consultation," providing specialized, expert input on a particular issue someone else is facing, but are less likely to see a need for seeking reciprocal knowledge or experience from the other (and vice-versa when others share their knowledge).

> *Hypothesis 1: A more generalized (specialized) background positively (negatively) influences an individual's reciprocal vicarious learning with other team members*.

Team Learning Norms

Beyond individual attitudes and background, the context within which individuals are engaging in vicarious learning likely drives their willingness to reciprocate. Aspects of the team environment have long been linked to individual learning and performance, such as Edmondson's (1999) finding regarding psychological safety as an enabler of greater learning behavior, or Bunderson and Sutcliffe's (2003) demonstration of the effects of team learning orientation on short- and long-term performance. Though much of the research on these learning

climates has been conducted in classroom or training contexts (e.g., Ames & Archer, 1988), work on "communities of practice" (Brown & Duguid, 1991) emphasizes that shared behavioral norms develop even in informal groups of employees and practitioners, and are critical to knowledge sharing and learning in organizations. Norms reflect shared perceptions about appropriate behavior that develop over repeated interactions with other members of a group (Bettenhausen & Murnighan, 1985), and influence the way group members communicate with one another (Argote et al., 2003), establishing common language about team processes, which reduces uncertainty (e.g., Michel, 2007) and enables knowledge sharing (Reagans & McEvily, 2003).

Yet, whereas norms about any team process facilitate greater sharing of knowledge among team members (by developing "common ground" about what each process means), norms can also be developed around the learning process itself (e.g., Bartol & Srivastava, 2002; Brown & Duguid, 1991; Davenport et al., 1998; Quigley et al., 2007). In other words, teams can develop shared language and anticipated behaviors centered around learning from one another, and establishing this mutual learning as a norm reduces the costs and risks of engaging in knowledge sharing (Borgatti & Cross, 2003). Thus, team learning norms should help facilitate greater reciprocity in vicarious learning in the team by removing some of the barriers to sharing one's knowledge and experience (Bartol & Srivastava, 2002), but also by developing a common, known expectation that vicarious learning is to occur in the team. As an example, if one person shares an experience with another team member, this behavior should cue (in the other) the team's norm for learning and sharing knowledge, thereby encouraging the other to share in return (consistent with research on the absence of these cues in virtual teams suppressing knowledge sharing; Hinds & Bailey, 2003; Hollingshead, 1996). In this sense, in the presence of

a norm that team members should learn from one another and use their knowledge to help others learn, engaging in one-way vicarious learning (e.g., sharing knowledge from one team member to another) is likely to trigger reciprocal learning, as each person strives to abide by the team norm, yielding greater individual reciprocal vicarious learning with other team members.

> *Hypothesis 2: Team norms promoting learning and knowledge sharing positively influence an individual's reciprocal vicarious learning with other team members.*

The Moderating Role of Learning Motives

Though team norms can alter individuals' motivation to engage in knowledge sharing, leading to more or less reciprocal vicarious learning, this motivation is complex and multi-determined, and can impact knowledge sharing at work in a number of ways (Colquitt et al., 2000; Osterloh & Frey, 2000; Quigley et al., 2007). For instance, recent research has explored individuals' differing reasons for engaging in learning at work, finding that people vary in their underlying motives for learning, leading them to attend to different elements of their work context as motivators for learning and development (Myers & DeRue, 2013). Myers and DeRue (2013) articulate four broad motives underlying individuals' learning at work that differ along dimensions of intrinsic/extrinsic and self-/other-focused, reflecting the motivation to learn for one's own love of learning (intrinsic, self-focused); to reap the career rewards of greater knowledge (extrinsic, self-focused); to use learning to help others at work (intrinsic, other-focused); or to learn because it is expected by others (extrinsic, other-focused). These motives have been linked to qualitatively different learning strategies at work, and to systematic differences in performance (for jobs with greater or lesser amounts of challenge; Myers & DeRue, 2013).

Of particular relevance for understanding reciprocal vicarious learning is the intrinsic-other focused (IO) learning motive. Indeed, this motive encourages individuals to engage in

learning interactions at work that allow them to not only improve their own work (the often assumed beneficiary of learning and development; Maurer & Tarulli, 1994), but also use learning as a tool for helping others develop. As such, an IO learning motive should help individuals see experiences as beneficial to others' learning in the team, and should encourage more reciprocity in knowledge sharing, even in the absence of shared learning norms. Indeed, as noted by Quigley and colleagues (2007) in their study of learning norms in a dyadic knowledge-sharing task, social aspects of motivation (such as norms) often have an interactive effect with other existing motivational sources when driving individual behavior (Geen, 1991). While Quigley et al. examined the interactive effect of learning norms and an individual incentive (i.e., a *self-focused* motivator) on the willingness to share knowledge (Quigley et al., 2007), considering individuals' intrinsic, *other-focused* motives for learning may be particularly relevant in promoting vicarious learning. As noted above, individuals with a strong IO learning motive are likely to already see value in sharing their experience and knowledge with others as a way of helping other team members, and are correspondingly likely to seek out others' experience for their own learning. IO-motivated individuals already recognize the value of learning as a social process and how it can benefit others (beyond just the self), and should therefore experience less of a boost in reciprocal vicarious learning from team norms. IO learning motives can thus be seen as compensatory with strong learning norms (such that strong norms for sharing knowledge in the team substitute for low IO learning motives, and vice versa), and I expect that strong IO learning motives will attenuate the relationship proposed in Hypothesis 2, such that the effect of learning motives is weaker (stronger) for those with greater (lesser) IO learning motives.

> *Hypothesis 3: Greater intrinsic, other-focused (IO) motives for learning attenuate the positive effect of team norms on an individual's reciprocal vicarious learning with other team members*.

Team-level Reciprocation of Vicarious Learning and Team Performance

While the preceding section dealt with the factors that drive individuals to reciprocate in their learning relationships with other team members, I turn now to a consideration of the effects of differing distributions of these reciprocal vicarious learning relationships in teams. Organizations have long used teams as a vehicle for channeling individuals' knowledge into performance outcomes, and the effectiveness of this performance is driven by teams discerning and incorporating the relevant experience of each team member (Littlepage, Robison, & Reddington, 1997; Thomas-Hunt, Ogden, & Neale, 2003). Though most perspectives on team learning recognize this interpersonal sharing of experience, it is typically summed, averaged or otherwise aggregated at the group level (i.e., concluding that the group engages in simply a greater or lesser amount of learning), yet understanding how this learning is distributed across individuals in the team (i.e., who learns with and from whom) is critical for understanding the effects of team learning (e.g., Argote & Ophir, 2002).

Effects of Team-level Reciprocation

Team-level reciprocation of vicarious learning can thus be considered one important aspect of how learning relationships are distributed in the team – representing the proportion of reciprocated vicarious learning relationships/ties in the team (out of all vicarious learning ties). Understanding this particular form of distribution of vicarious learning in the team is important, as recent theorizing about coactive vicarious learning (Myers, Chapter 2) suggests that reciprocal vicarious learning relationships can generate a number of benefits above and beyond one-way vicarious learning relationships, including greater transactive knowledge (Moreland & Argote, 2003) and the development of shared mental models (Cannon-Bowers et al., 1993). Indeed, though one-way vicarious learning or knowledge sharing allows the receiver to become aware of

what the sharer knows (transactive knowledge), the reverse is not true – a sharer is assumed to gain no new awareness about what the receiver may know. By contrast, in a reciprocal vicarious learning relationship, each person develops a rich set of transactive knowledge about the other, affording them a more robust "map" of the expertise in the group, which has been shown to significantly enhance group performance (Hollingshead, Gupta, Yoon, & Brandon, 2011; Moreland & Myaskovsky, 2000). Likewise, the creation of a shared mental model requires interaction and dialogue in both directions, as team members develop their understanding of each other's perspective through repeated discussion and exchange of information (e.g., Cannon-Bowers et al., 1993), enhancing future interactions and performance (Mathieu et al., 2000).

Building on these prior findings, greater reciprocation of vicarious learning should have a direct, positive effect on team performance, as it reflects team members' greater understanding of each other's knowledge and mental models, above and beyond the simple transfer of knowledge and awareness that would occur in a one-way vicarious learning interaction. I thus hypothesize that, controlling for the general strength of vicarious learning relationships in the team (i.e., density) and other aspects of the distribution of the team's vicarious learning relationships (specifically the centralization of these ties), greater reciprocation of vicarious learning in a team positively influences team performance.

> *Hypothesis 4: Greater team-level reciprocation of vicarious positively influences team performance*.

Team-Level Reciprocation and the Effects of External Learning

Beyond this direct effect of team vicarious learning reciprocation on performance, the degree of reciprocation in a team's vicarious learning relationships can also impact performance indirectly, by resolving the contradictory effects of teams' engagement in external learning on performance observed in prior studies. In addition to their internal learning (i.e., the vicarious

learning between team members discussed thus far), teams often engage in learning beyond their boundaries (external learning; Ancona & Bresman, 2005), through processes such as team member rotation or knowledge transfer through a team member's outside relationships (e.g., Kane, 2010; Uzzi & Lancaster, 2003). These external learning practices help the team bring in new ideas and capabilities (Ancona & Caldwell, 1992; Hansen, 1999) to complement their existing skills and knowledge, in pursuit of both exploration of new practices and exploitation of current ones (e.g., March, 1991). Indeed, both internal and external learning can potentially help the team develop knowledge and perform effectively (Argote et al., 2001) – by refining and improving existing capabilities (internal learning) and discovering new capabilities (external learning). However, existing research (most notably Bresman, 2010; Wong, 2004) has reported conflicting results about the benefits of teams engaging in this external learning (in addition to their ongoing internal learning).

Wong (2004), in a study of 73 teams from a variety of industries (financial services, healthcare, technology and industrial), found support for the hypothesis that greater internal learning promoted greater efficiency (exploitation), while greater external team learning promoted greater innovation (exploration). However, she also found that high external learning reduced the effect of internal learning on teams' efficiency (with no corresponding interaction of internal and external learning on innovation), indicative of a detrimental overall performance effect of engaging in high levels of external learning on top of internal learning (Wong, 2004). However, Bresman (2010) explored a similar question in 62 pharmaceutical teams, hypothesizing that external vicarious learning activities (specifically those where the team learns about its task from those outside the team) increased team performance, particularly for teams

engaging in more internal learning activities. Results supported both hypotheses, with internal and external team learning complementing one another to enhance performance.

Though there are certainly contextual differences in the setting of the two studies that can partially explain the divergent findings (e.g., pharmaceutical teams being in a more dynamic, fluctuating environment where external and internal learning are less at odds; Bresman, 2010), the underlying tension of engaging in *too much* learning remains. As noted by Bunderson and Sutcliffe (2003), learning is performance-enabling, in that it promotes adaptability and ongoing improvement (Argote et al., 2001), but can also be performance-inhibiting because it consumes resources and diverts attention away from performance (e.g., March, 1991; Singer & Edmondson, 2008). Indeed, this balancing of external (exploratory) and internal (exploitative) learning presents a fundamental paradox for organizations and teams, and effectively engaging in both learning strategies (i.e., becoming "ambidextrous" O'Reilly & Tushman, 2013) can be difficult, as each form of learning is distinct, but draws on a similar pool of coordianted cognitive, temporal, or attentional resources. In this sense, a team's engagement in external learning (in addition to their internal learning) can potentially harm performance, as it further saps the team's resources away from performance, dedicating an even greater portion of time, energy, and attention to learning activities.

Considering a team's reciprocation of vicarious learning relationships might thus help reconcile this paradox. Teams with greater vicarious learning reciprocation, as noted earlier, should have pairs of team members with greater shared mental models and understanding of each other's perspectives – developed through mutual sharing of experience (Myers, Chapter 2). This team-level compilation of dyadic understanding of others' perspectives is described well by Huber and Lewis's (2010) notion of *cross-understanding*. As these authors suggest, greater

cross-understanding can allow team members to learn and perform both more effectively and more efficiently – devoting less time and energy to communicating and sharing knowledge:

> "Specifically, by understanding what others know, believe, are sensitive to, and prefer, members are much more able to anticipate other members' behaviors and thereby choose their own actions more effectively… Cross-understanding increases the effectiveness of communication by enabling members to choose concepts and words that are maximally understandable and minimally off-putting to other group members…Without an understanding of one another's mental models, members are apt to make arguments or proposals concerning group processes and products that are technically, politically, or otherwise unacceptable to those whose mental models they do not understand, thus contributing to confusion, conflict or stalemate." (Huber & Lewis, 2010, pp. 9-10)

Thus, by virtue of creating a greater degree of shared mental models and cross-understanding, greater reciprocation of vicarious learning should enable teams to engage in internal learning more efficiently, freeing resources (i.e., time and attention) to incorporate new, external perspectives without impeding performance (building what W. M. Cohen & Levinthal, 1990 would term the absorptive capacity for incorporating this external learning). Returning to the conflicting case examples, though few details are available about the teams in Wong's (2004) study, the description provided by Bresman (2010) of the pharmaceutical teams notes their rich, dense interactions involving significant discussion and feedback (e.g., after a "trial and error"), as well as their established working relationships as "core team members" who had been involved with the entire duration of the project – all elements that would seem to support the presence of reciprocal vicarious learning relationships, potentially explaining the positive results found in his study. Moreover, the context of pharmaceutical in-licensing teams likely yielded a strong set of shared learning norms (as these teams were "innovation teams," which tend to engage in more learning behavior; Edmondson, Dillon, & Roloff, 2007), and as argued earlier, these norms should help further promote individual reciprocity of vicarious learning (the building block of team-level reciprocation). Though these assertions are purely post-hoc

interpretations of the publicly available description of each sample, and are in no way able to draw firm comparisons (particularly without further information on the teams in Wong's 2004 study), when combined with the conceptual arguments above related to resource use, they provide a measure of anecdotal support for the notion that teams' engagement in external learning (in addition to their internal learning) may harm performance, but not for teams with greater team-level reciprocation of vicarious learning. Indeed, by facilitating shared mental models and more efficient learning among team members, and therefore freeing cognitive and attentional resources, I expect that teams with greater reciprocation of vicarious learning should experience performance gains from engagement in greater external learning.

> *Hypothesis 5: Greater team reciprocation of vicarious learning moderates the negative relationship between team external learning and team performance. Specifically, when team vicarious learning reciprocation is higher (lower), greater team external learning will more positively (negatively) influence team performance.*

Methods

Context and Procedure

I tested the hypotheses advanced above in the context of MBA consulting project teams, which consisted of MBA students from a large university in the Midwestern United States (on average 27.5 years old; 66 percent male) who worked full time in consulting teams over 7 weeks on a project for an organizational client (as described below, $n = 441$ individuals in 88 teams, average team size = 5.1 members). The university's MBA program office assigned students to cross-functional teams based on members' academic concentration.

Singleton and Straits (1993) note that in order to draw accurate conclusions from a survey study, it is necessary to select a sample appropriate to one's theory and hypotheses. Given my interest in understanding how team members reciprocally (or non-reciprocally) share experiences

and learn from one another in the service of current team performance, these consulting project teams provided an ideal context for several key reasons. First, these teams were involved in a realistic, but novel, business challenge that required them to draw on and integrate their background knowledge and diverse prior experiences to succeed. The challenges were not limited to a single functional area (i.e., accounting or marketing) and team members did not all come from similar backgrounds, providing both a breadth of prior experiences and the impetus for integrating these prior experiences (i.e., the need to integrate across different areas) to promote vicarious learning.

Additionally, utilizing MBA consulting teams allowed me to test my hypotheses in a context with high response rates, providing an ideal empirical setting for a study of vicarious learning reciprocity, particularly given the "whole network" approach (i.e., examining the distribution of learning ties within the entire team) employed within each team. Indeed, while in undirected network studies, one individual's response is often taken to indicate the presence or absence of a relationship, even if the other party did not complete the measure, in a directed network (where each direction of the relationship between two people is treated as independent), high response rates are critical (e.g., Burt, 1987; Stork & Richards, 1992). Because the surveys were associated with an established MBA program, and were seen as a critical part of the project experience, very high response rates were attained in this sample. Specifically related to the vicarious learning measures, only one team provided less than 100% response rate, and was thus excluded from analysis, resulting in the final sample of 88 teams (n = 441).

In terms of the study procedure, students completed multiple surveys over the course of their consulting project to assess their own attitudes and behaviors, as well as assess their learning relationships with other team members. At Time 1, prior to beginning the project (and

before learning the identity of other team members), participants completed a survey assessing their motives for learning and their expectations for learning in the project. During the project (Time 2), once teams had experience working together, participants completed a second survey about their prior familiarity with each other team member, the extent to which the team had strong norms for shared learning, and their own engagement in learning behaviors (specifically, feedback-seeking behavior) during the team's work. Finally, at the conclusion of the project (Time 3), participants completed a third survey assessing their vicarious learning relationship with each other team member, as well as assessing the team's degree of external learning. After the conclusion of the project (shortly after Time 3), the company project sponsor (i.e., the client for each consulting project) provided a rating of the team's performance on a separate survey sent at the completion of the project.

Measures

As noted earlier, these teams are expected to complete three surveys as part of their participation in the program, and below I describe the measures (and their timing) used to capture each of my constructs of interest. As my conceptual model includes constructs at both the individual and group level of analysis (K. J. Klein & Kozlowski, 2000), I take care to distinguish concepts measured by individuals about themselves (individual-level constructs), concepts measured by individuals and aggregated to the individual- or team-level (what K. J. Klein & Kozlowski, 2000 term either a shared or a configural group construct, depending on the nature of aggregation), and concepts measured at the team level by outside sources (global group constructs). Unless otherwise noted, all measures were assessed on a 1-to-5 scale (1 = strongly disagree; 5 = strongly agree).

Individual-level measures. At the individual level, the key variables involved in my hypotheses are individuals' motives for learning, specialist/generalist background, and vicarious learning reciprocity. Individual *learning motives* were assessed at Time 1, using the four-motive measure developed by Myers and DeRue (2013). This measure includes 20 items (see Appendix B), which address the extent to which individuals are motivated by different broad reasons for learning and developing at work, including the simple joy of learning and developing (intrinsic, self-focused learning motives, $\alpha = .92$), to use learning to help others at work (intrinsic, other-focused learning motives, $\alpha = .93$), to obtain career rewards that come from development (extrinsic, self-focused learning motives, $\alpha = .92$) or to meet the expectations of others (extrinsic, other-focused learning motives, $\alpha = .85$). Only the intrinsic, other-focused (IO) learning motives were hypothesized to influence individuals' vicarious learning reciprocity (as a moderator of team learning norms), however I included all four motives (and their interactions with learning norms) for conceptual completeness, and to rule out confounding effects.

Specialist/generalist background was assessed in two different ways. First, following prior approaches to studying functional background diversity with managers (e.g., Bunderson & Sutcliffe, 2002; Walsh, 1988), I created a heterogeneity index measure of intrapersonal functional diversity (i.e., generalist background) that considers the number of years spent in different functional areas or domains. The MBA program administering the project teams provided archival data on participants' prior work experience, from which research assistants generated 19 broad functional domains or areas of work (i.e., engineering, investing, accounting, management, etc.). The research assistants then categorized each participant's prior work history (as reported to the MBA program office), noting the number of years of work experience each individual had in each functional area. For instance, an individual with five years of work

experience in engineering would receive a 5 in the engineering category (and a 0 in all other categories), while one who had also worked five years, but with two in marketing and three in sales, would receive a 2 in the marketing category, a 3 in the sales category, and a 0 in all other categories. Participants' background diversity was then calculated as:

$$\left(1 - \sum_{u=1}^{19} p_{iu}^2\right)$$

where p_{iu} equals the percentage of individual i's total years of experience spent in the uth functional area (out of 19 distinct areas determined by research assistants). Higher values represent a more diverse background, reflecting a more generalist orientation as compared to an individual with a more specialized (less diverse) functional background ($M = .37$, $s.d. = .23$).

Though this intrapersonal diversity approach has been used in prior research among full-time employees, within a single organization and a more limited set of functional areas (e.g., Bunderson & Sutcliffe, 2002), the relatively limited prior work experience of MBA students, combined with the much broader range of prior functional areas (including traditional business functions as well as work in broader domain areas such as military service, teaching, or music) present in the sample, indicates that this measure may not be an effective means of capturing generalist/specialist background. To complement this existing measure, I also created a broader measure of *generalized background*, capturing a coarser-grained view of generalization vs. specialization in individuals' prior experiences. Specifically, research assistants coded each participant's work experience and prior education (also provided by the MBA program office administering the project) to indicate whether a given individual: 1) had previously worked in multiple functions, 2) had previously worked in multiple organizations, 3) had completed an undergraduate degree in a major other than business, 4) possessed an advanced (i.e., Masters or

Doctorate) degree, and 5) was pursuing a dual degree (alongside the MBA degree). Including these educational measures better reflected the variation in prior experience among the sample, and the five codes were summed together to provide a measure (ranging from 0 to 5) of more generalized (vs. more specialized) background experience (M = 2.50, $s.d.$ = 1.02).[15]

Individuals' *vicarious learning reciprocity* was measured via a whole-network, within-team survey (conducted at Time 3), asking individuals to rate the extent to which they learned from the experiences shared by each other team member. Building from existing measures that assess learning or advice relations (e.g., Cross, Borgatti, & Parker, 2001; Leykum et al., 2011), I constructed a two-item measure of vicarious learning, where each individual assessed (for their relationship with each other team member) the extent to which: "[This person] often shares his/her prior experiences, expertise, or knowledge with me to help my learning," and "I am able to draw meaningful lessons from the experiences and information [this person] shares with me."

This approach generated 1,935 unique assessments of individuals' vicarious learning with other members of the team (α = .89). Following general conventions in the measurement of knowledge networks, I assessed learning from the perspective of the recipient of shared knowledge or experience (as the sharer may be unaware if the other person learned anything from his or her sharing). A dyadic vicarious learning tie (between two members of a team) therefore consists of each member's assessment of his or her own learning from the experiences shared by the other. I define the in-degree flows of the dyadic tie (the portion coming into the focal individual) as the individual's vicarious learning from the experiences shared by the other,

---

[15] As noted in my analysis section, none of the models including either of these variables revealed any significant effects, and moreover the archival data informing these measures were only available for 351 out of the 441 individuals in the sample. Thus, these variables were ultimately dropped from the analysis in order to test the remaining hypotheses using the full sample.

and the out-degree flows as the amount of vicarious learning (reported by the other) stemming from the focal individual's sharing of experience. In this way, the directional flow of the tie reflects the movement of knowledge/experience from the sharer to the learner.

Importantly, these assessments capture not simply the presence (i.e., 0/1) of a vicarious learning relationship, but more specifically the extent (on a scale from 1 to 5) of each person's learning from the other's experience (i.e., tie strength or weight). Prior approaches to studying reciprocity in workplace networks focus solely on the presence or absence of mutual ties either directly measuring ties as present/absent (i.e., 0/1) or dichotomizing weighted tie measures to 0/1 based on some minimum tie strength threshold (for examples, see Caimo & Lomi, 2014; Cross et al., 2001; Kleinbaum et al., 2015). This is consistent with the observation in broader domains of science that the measurement and understanding of reciprocity in binary networks has greatly outpaced that of reciprocity in weighted networks (Squartini et al., 2013). Considering reciprocity only as a binary characteristic masks important considerations of relative tie strength that are critical for understanding the complex network of relationships in organizations. For instance, a learning relationship in a team where both individuals report learning from each other to a moderate degree (i.e., 3 out of 5) is likely quite different from one where each individual learns from the other to a very great degree (i.e., 5 out of 5), but both get treated as equivalent in a binary approach, to the detriment of our understanding of the flow of knowledge in a team.[16]

---

[16] Other studies have used an approach examining the balance of in-degree and out-degree flows (i.e., in-strength and out-strength) by taking the absolute value of in-flows minus out-flows (for an example, see Lai et al., 2015). While this approach does not dichotomize reciprocity, it suffers from many of the same limitations, recasting reciprocity as the degree of (im)balance between two nodes and masking the strength of the relationship. To demonstrate this similarity in limitation, consider that in this approach, a relationship consisting of an incoming tie of weight 2 (out of 5) and an outgoing tie of weight 3 results in an equivalent "balance" measure (of 1) as a relationship consisting of an incoming tie weight of 4 and an outgoing tie weight of 5.

In the present study, I thus build on recent developments in network methods described by Squartini and colleagues (2013) to consider vicarious learning reciprocity not as the simple presence of bi-directional vicarious learning ties, but rather as the relative strength of the reciprocated tie, such that dyads can have more or less reciprocal vicarious learning relationships (rather than simply reciprocal or not). As an example, consider the dyad in Figure 4.2. In this dyad, individual *i* reports learning vicariously from the experience of individual *j* to a great extent (5), while individual *j* reports learning vicariously from the experiences shared by *i* to a lesser extent (2). As conceptually and empirically demonstrated by Squartini and colleagues (2013), this dyadic relationship can be decomposed into a fully reciprocated tie (of weight 2) and a fully unreciprocated tie (from *j* to *i*) with a weight of 3.

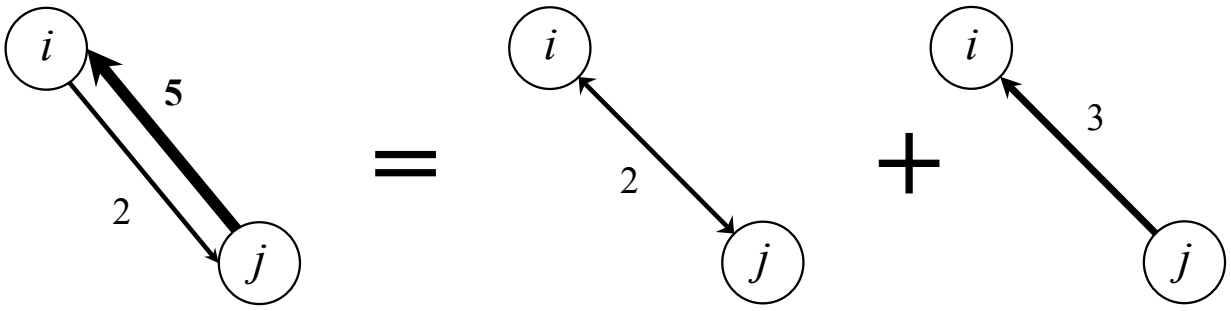

Figure 4.2 Basic decomposition of tie strength in an asymmetric network dyad. The dyadic tie represented by (w_{ij}= 2, w_{ji}= 5) can be decomposed into a fully reciprocated component ($w_{ij}^{\leftrightarrow}$= 2) and a fully unreciprocated component ($w_{ij}^{\leftarrow}$= 3), which implies $w_{ij}^{\rightarrow}$= 0 (adapted from Squartini et al., 2013, p. 2).

Stated more formally, any dyadic relationship (w_{ij}, w_{ji}) can be equivalently decomposed as $(w_{ij}^{\leftrightarrow}, w_{ij}^{\rightarrow}, w_{ij}^{\leftarrow})$, where $w_{ij}^{\leftrightarrow}$ represents the fully reciprocal portion of the tie weight, while $w_{ij}^{\rightarrow}$ and $w_{ij}^{\leftarrow}$ represent the fully unreciprocated portions of the out-degree and in-degree weight (for individual *i*), respectively. This reciprocal weight between *i* and *j* can thus be expressed as:

$$w_{ij}^{\leftrightarrow} = \min[w_{ij}, w_{ji}] = w_{ji}^{\leftrightarrow}$$

and the unreciprocated weight from *i* to *j* as:

$$w_{ij}^{\rightarrow} = w_{ij} - w_{ij}^{\leftrightarrow}$$

Of note, if $w_{ij}^{\rightarrow} > 0$ then $w_{ij}^{\leftarrow} = 0$, reflecting the unidirectionality of this portion of the tie weight (i.e., $w_{ij}^{\rightarrow}$ and $w_{ij}^{\leftarrow}$ cannot both be nonzero), which also defines (see Squartini et al., 2013):

$$w_{ij}^{\leftarrow} = w_{ji} - w_{ij}^{\leftrightarrow} = w_{ji}^{\rightarrow}$$

Using this decomposition, I calculated the reciprocal and unreciprocated tie weights for the dyadic vicarious learning relationship between an individual and each other member of their team. I then calculated total reciprocal and unreciprocated tie strength for each individual, using common node-level tie weight aggregation methods (Squartini et al., 2013), such that each individual's total reciprocal tie strength ($s_i^{\leftrightarrow}$), total unreciprocated tie in-strength ($s_i^{\leftarrow}$), and total unreciprocated tie out-strength ($s_i^{\rightarrow}$) are defined as:

$$s_i^{\leftrightarrow} = \sum_{j \neq i} w_{ij}^{\leftrightarrow}$$

$$s_i^{\leftarrow} = \sum_{j \neq i} w_{ij}^{\leftarrow}$$

$$s_i^{\rightarrow} = \sum_{j \neq i} w_{ij}^{\rightarrow}$$

Given that project teams ranged from 4-6 members, these measures of total tie strength required adjustment to account for differences in the number of ties in each team network. I thus scaled these measures by dividing each strength measure by one less than the total number of team members, which is equivalent to the number of potential dyadic ties for any given individual in the team network. This choice of scaling has the benefit of creating a measure interpretable as the average tie strength (reciprocal strength, unreciprocated in-strength and unreciprocated out-

strength, respectively) per potential dyadic network tie. Following this approach, I calculated average reciprocal vicarious learning tie strength as:

$$\bar{s}_i^{\leftrightarrow} = \frac{\sum_{j \neq i} w_{ij}^{\leftrightarrow}}{(n-1)}$$

and average unreciprocated vicarious learning tie in-strength and out-strength (respectively) as:

$$\bar{s}_i^{\leftarrow} = \frac{\sum_{j \neq i} w_{ij}^{\leftarrow}}{(n-1)}$$

$$\bar{s}_i^{\rightarrow} = \frac{\sum_{j \neq i} w_{ij}^{\rightarrow}}{(n-1)}$$

Though the hypotheses advanced earlier focus on the antecedents of individuals engaging in greater reciprocal vicarious learning (i.e., greater average reciprocal tie strength), I also include unreciprocated tie strength as dependent variables in these models, allowing for the covariance of the three portions of the decomposed tie weight (as noted in the analysis section below).

Individual-level control measures. In addition to these hypothesized constructs, my individual-level analyses also controlled for several measures related to individuals' learning attitudes and behaviors, to control for underlying heterogeneity among learners in terms of their views of the project as a learning opportunity and engagement in active learning behaviors during the project. Depending on both the characteristics of the project (i.e., its particular task demands), as well as individuals' own attitudes and background, team members may have varied in their approach to learning in the project. For instance, if a particular consulting project was heavily focused on finance or accounting issues, a team member with a strong marketing background (vs. someone with greater experience in accounting) may see the project as more of a learning opportunity, potentially altering the way they engage in vicarious learning, as well as in the project more generally (e.g., potentially asking for more feedback from other team members on their performance). I thus examined the effects of the hypothesized antecedents of

reciprocal vicarious learning (i.e., shared learning norms, specialized vs. generalized background, and learning motives) above-and-beyond individuals' expectations for learning (i.e., expectancy beliefs for learning; Vroom, 1964), as well as their seeking of feedback (Ashford, Blatt, & VandeWalle, 2003), as key indicators of their desire for learning in the project. Specifically, I controlled for individuals' *expectations for learning* in the project, measured (at Time 1) using 3 items developed for the context of the project, including "My project will provide me with an opportunity for learning" and "There are opportunities for personal growth in this project." Factor analysis confirmed that these items reflect a single factor, and the measure demonstrated adequate internal consistency reliability ($\alpha = .78$). I then controlled for individuals' engagement in *feedback-seeking behavior*, measured (at Time 2) using 3 items adapted from Ashford (1986), that assessed the extent to which individuals "directly asked your teammates for feedback about the quality of your work" and "directly asked your teammates for feedback on your teamwork skills" ($\alpha = .87$).

Team-level measures. At the team level, the hypotheses advanced earlier involve teams' learning norms, vicarious learning reciprocation, and external learning. *Team learning norms* were assessed using a 5-item measure adapted from existing studies (Bunderson & Sutcliffe, 2003; Quigley et al., 2007). Each team member assessed the extent to which they felt the team had norms or expectations that, for instance, "team members should seek out opportunities for the team to learn," and that "team members should share information when it might help others" ($\alpha = .83$; see Appendix B for all items). As these learning norms reflected a shared group construct (K. J. Klein & Kozlowski, 2000) among team members, individuals' ratings were tested for intra-group agreement, revealing a median $r_{wg(5)} = .91$ across all teams, indicative of

strong agreement within each team, and warranting aggregation of the ratings into a single, team-level rating of shared learning norms (LeBreton & Senter, 2007).

Team vicarious learning reciprocation was measured to capture the overall degree of reciprocal vicarious learning tie strength within the team. Again following Squartini and colleagues (2013), this team-level reciprocation measure was calculated using an adaptation of the standard binary approach (which calculates reciprocity as the proportion of the total number of reciprocal ties in the team divided by the total number of ties) to account for weighted ties. Specifically, team vicarious learning reciprocation was calculated by taking the proportion of the sum of all team members' total reciprocal vicarious learning tie weight ($s_i^{\leftrightarrow}$, described earlier) out of the total weight of the network:

$$\frac{W^{\leftrightarrow}}{W} = \frac{\sum_{i=1}^{n} s_i^{\leftrightarrow}}{W} = \frac{\sum_{i=1}^{n} \sum_{j \neq i} w_{ij}^{\leftrightarrow}}{\sum_{i=1}^{n} \sum_{j \neq i} w_{ij}}$$

Team external learning was measured by surveying all team members (at Time 3) regarding the extent to which the team engaged in information-gathering or learning from a variety of sources outside of the team. Specifically, adapting an approach used in prior research (e.g., Ancona & Caldwell, 1992; Bresman & Zellmer-Bruhn, 2012) to fit the project team context, team members were asked to rate the extent to which their team learned from 5 different sources, including "Industry experts," "Other teams," and "Faculty." Intra-team agreement was quite high (median $r_{wg(5)} = .90$), warranting aggregation, although internal consistency reliability was somewhat lower than typical thresholds ($\alpha = .66$).[17]

[17] Given that the components of this measure were discrete sources of potential external learning, rather than alternative measures of an identical concept, the reliability coefficient (alpha) is less relevant to the validity of the measure (as noted by Quigley et al., 2007).

Finally, *team performance* was assessed by the company project sponsors (i.e., the liaison from the client organization for whom the project team was working) using a 6-item measure developed by the MBA program office. Sample items asked the sponsor to rate "the team's mix of skills," "the team's communication with you," and "the overall quality of the team." Factor analysis confirmed that the items loaded on a single factor, and internal consistency reliability was high ($\alpha = .93$). 8 teams had performance ratings from multiple liaisons (working for the same client organization), and so these ratings were averaged together when calculating team performance. After accounting for missing data and removing one anomalous sponsor rating (which was more than 4 standard deviations from the mean of performance ratings), useable performance ratings were available for 61 teams, limiting the sample size for team-level analyses as noted below.

Team-level control measures. To better understand the effects of team vicarious learning reciprocation, I also control for several other features of teams' vicarious learning. Specifically, I control for *team vicarious learning centralization* in order to understand the effects of reciprocation (as one form of tie distribution) relative to how centralized or dispersed the ties are, in terms of their distribution in the network. Drawing from the classic definition of centralization offered by Freeman (1979), as well as more recent guidance on calculating centralization within asymmetric, weighted networks (Wei, Pfeffer, Reminga, & Carley, 2011), I define team centralization by first calculating the centrality of each individual in the team (simultaneously accounting for both in-degree and out-degree tie weights) as:

$$C_i = (\sum_{j \neq i} w_{ij} + \sum_{j \neq i} w_{ji})$$

Team centralization can then be calculated as the sum of differences between the team's most central member and each other member, divided by the maximum potential value of such difference (for a network of that size). Specifically, this is calculated as:

$$\frac{\sum_{i=1}^{n}(C^* - C_i)}{Max\sum_{i=1}^{n}(C^* - C_i)} = \frac{\sum_{i=1}^{n}(C^* - C_i)}{(n-1) \times (2n-4) \times w^*}$$

where C^* represents the highest centrality among nodes in the network, and w^* represents the maximum possible weight assignable to a tie in the network.

I also control for *team vicarious learning density* in order to isolate the effects of the distribution of ties (i.e., reciprocation and centralization) above-and-beyond the total weight (strength) of the ties present in the network. Following traditional methods, I calculate vicarious learning density as the total weight of the vicarious learning ties in each team's network, divided by the maximum potential weight of the team network. Formally, this is calculated as:

$$\frac{W}{W^{max}} = \frac{\sum_{i=1}^{n}\sum_{j\neq i} w_{ij}}{n(n-1) \times w^*}$$

where *n* represents the number of team members and w^* represents the maximum possible weight of a tie in the network.

Additional control measures. In order to further reduce the probability that confounding variables may influence the results of my analyses, I also include several control variables for team size, team familiarity, and demographic characteristics (specifically age and gender) in both individual- and team-level analyses. Though most of the key measures (i.e., individual vicarious learning reciprocity, team vicarious learning reciprocation, team vicarious learning centralization, and team vicarious learning density) are scaled to account for team size, the *number of team members* (i.e., the size of the network) may still have unaccounted-for effects on

the propensity for strong ties to form, as well as on other unscaled measures, and was thus controlled for in all analyses.

Familiarity was included as a control to address any potential heterogeneity in team members' prior experience interacting or working together. At Time 2, all team members were asked to rate the extent to which they knew each of their teammates prior to the project (using a single item measure). These ratings were then averaged at the individual-level (i.e., for all team member ratings of the focal individual) to create an individual-level measure of familiarity to be included as a control in individual- and team-level models (using the team mean at the team-level). Familiarity thus represents a configural (rather than shared) construct, as each team member's familiarity with the focal individual is independent and not expected to necessarily converge, therefore evidence of within-group consistency is not appropriate or required (K. J. Klein & Kozlowski, 2000).

Finally, *age* and *gender* (obtained from archival program measures) were included as demographic controls in both individual- and team-level models (using team means at the team-level), as these may influence individuals' decision to engage in learning and knowledge sharing with others in the team (e.g., Singh et al., 2010), and at the team-level can effect the overall pattern of interpersonal relationships that develop (e.g., Lau & Murnighan, 1998; Pelled, 1996).

Analysis and Results

As my hypotheses involve effects at the individual- and team-levels, I conducted two sets of analyses. For the individual-level hypotheses, I created a set of multi-level regression models in Mplus 7 (L. K. Muthén & Muthén, 2012), and for the team-level hypotheses I used a set of hierarchical linear regression models. The means, standard deviations, and correlations for the individual- and team-level variables included across both analyses are presented in Table 4.1.

Table 4.1 Means, Standard Deviations and Correlations

Variables[a]	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
Individual-level														
1. Gender[b]	.33	.47	--											
2. Age	27.51	2.52	-.19**	--										
3. Familiarity	1.94	.61	.10*	-.01	--									
4. Expectations for Learning	4.65	.48	.10*	.02	-.01	(.78)								
5. Feedback-seeking Behavior	2.37	.90	.02	.01	.05	.04	(.87)							
6. IS Learning Motives[c]	4.52	.53	.00	.01	.00	.43**	.13**	(.92)						
7. IO Learning Motives[c]	4.32	.62	.07	.04	.03	.42**	.18**	.54**	(.93)					
8. ES Learning Motives[c]	2.60	.95	.04	-.03	-.03	-.06	-.11*	-.26**	-.09*	(.92)				
9. EO Learning Motives[c]	2.39	.81	.01	.02	-.04	-.11*	.01	-.29**	-.02	.60**	(.85)			
10. Reciprocal VL Strength[d]	3.55	.60	.04	-.06	-.02	.10*	-.00	.10*	.14**	-.01	-.08	--		
11. Unreciprocated VL In-strength[d]	.41	.47	.00	.14**	-.01	.05	.04	-.04	.02	.05	.09†	-.43**	--	
12. Unreciprocated VL Out-strength[d]	.41	.43	-.03	-.09	.09†	-.11*	.00	.02	-.08†	-.06	-.04	-.36**	-.46**	--
Team-level														
1. Number of Team Members	5.11	.93	--											
2. Team Learning Norms	3.83	.36	-.24*	(.83)										
3. Team VL Density	.80	.07	-.30**	.40**	--									
4. Team VL Centralization	.11	.05	.01	-.12	-.49**	--								
5. Team VL Reciprocation	.90	.05	-.26*	.21*	.66**	-.38**	--							
6. Team External Learning	3.01	.41	.09	-.02	.01	-.04	-.26*	(.66)						
7. Team Performance[e]	4.46	.61	-.07	.15	.17	-.06	.43**	-.22†	(.93)					

[a] Coefficient alphas appear on the diagonal in parentheses. $n = 441$ (Individual-level); $n = 88$ (Team-level), unless otherwise noted.
[b] 0 = Male, 1=Female.
[c] IS = Intrinsic, self-focused learning motive, IO = Intrinsic, other-focused learning motive, ES = Extrinsic, self-focused learning motive, EO = Extrinsic, other-focused learning motive.
[d] Reciprocal VL Strength = Average reciprocal vicarious learning tie strength, Unreciprocated VL In-strength = Average unreciprocated incoming vicarious learning tie strength, Unreciprocated VL Out-strength = Average unreciprocated outgoing vicarious learning tie strength.
[e] $n = 61$
† $p < .10$ * $p < .05$ ** $p < .01$ (Two-tailed tests)

Individual-level Vicarious Learning Reciprocity Results

Given that the predictors of individual-level vicarious learning reciprocity were at multiple levels, I used a multi-level regression model, and moreover allowed for random slopes in Mplus 7 to probe the cross-level interactions between individual-level (learning motives) and team-level (learning norms) predictors. At the individual level (Level 1), I included my measures of specialist/generalist background, learning motives (including IO learning motives, my variable of interest, as well as the other three learning motives developed by Myers & DeRue, 2013 as controls) and my other individual-level controls (gender, age, familiarity, expectations for learning, and feedback-seeking behavior), and at the team level (Level 2), I included team learning norms and a control variable for number of team members. Given that I am interested in population-level variance, rather than within-group variance, I grand mean-centered all variables in my analyses to facilitate interpretation of the interaction results.

Before testing my hypotheses, I computed a null model to determine whether systematic Level 1 and Level 2 variance existed for the individual-level dependent variable (reciprocal vicarious learning strength). This analysis revealed significant between- and within-group variance in reciprocal vicarious learning (VL) strength (Mean [γ_{00}] = 3.57, within-team variance [ρ^2] = .17, $p < .001$, between-team variance [π_{00}] = .19, $p < .001$), indicating that multi-level modeling is appropriate.

I next constructed a multi-level model where, after accounting for the Level 1 and Level 2 controls, specialist/generalist background and learning motives (Level 1) predicted individuals' average reciprocal VL strength (Level 1), and team learning norms (Level 2) predicted average reciprocal VL strength as well as the slope coefficients of each learning motive's Level 1 effect. I included the interactions between learning norms and all four learning motives in order to test

the effects of the hypothesized learning norm x IO learning motive interaction above and beyond any effects of other learning motives. Finally, in order to account for the unreciprocated portion of individuals' decomposed tie weights, I simultaneously regressed this model of predictors on not only reciprocal VL strength (VL $\bar{s}_i^{\leftrightarrow}$), but also unreciprocated VL in-strength (VL $\bar{s}_i^{\leftarrow}$) and unreciprocated VL out-strength (VL $\bar{s}_i^{\rightarrow}$), allowing for covariances between the three dependent measures (only the covariance between the two unreciprocated strength measures was significant; $\sigma = -.02$, $p < .001$).[18]

To test my hypothesis regarding the effects of specialist/generalist background on reciprocal VL strength, I computed models using the two different measures described earlier (functional background diversity and generalized background). None of the results for either measure approached significance in these models, leaving Hypotheses 1 unsupported. Moreover, the archival data used to construct these measures were only available for 351 of the 441 individuals in the sample, therefore I dropped these variables from the analysis in order to test my remaining hypotheses with the complete sample.[19] The final tested model (excluding the measures of generalist/specialist background) is presented in Table 4.2.

[18] Including or excluding these additional dependent measures (and their covariances with one another) did not meaningfully alter any hypothesized results in sign, magnitude, or significance. In order to help rule out alternative explanations (i.e., that the predictors were simply driving greater in- or out-degree vicarious learning, rather than reciprocal vicarious learning), I include these additional measures as a more conservative test of my hypotheses.

[19] All of the other hypothesized results were consistent in sign and magnitude between this reduced-sample model and the reported, full-sample model, but significance values were slightly weakened by the smaller sample size.

Table 4.2 Cross-level Moderated Regression Analyses Predicting Vicarious Learning Strength

Variables[a]	Model 1			Model 2		
	VL $\bar{s}_i^{\leftrightarrow}$	VL $\bar{s}_i^{\leftarrow}$	VL $\bar{s}_i^{\rightarrow}$	VL $\bar{s}_i^{\leftrightarrow}$	VL $\bar{s}_i^{\leftarrow}$	VL $\bar{s}_i^{\rightarrow}$
Intercept (γ_{00})	3.55**	.41**	.41**	3.55**	.41**	.41**
	(.05)	(.02)	(.02)	(.05)	(.02)	(.02)
Number of Team Members (γ_{01})	-.12*	.04	.04	-.12*	.04	.04
	(.05)	(.04)	(.04)	(.06)	(.03)	(.02)
Team Learning Norms (γ_{02})	**.39****	-.07	-.07	**.42****	-.07	-.08
	(.13)	(.12)	(.12)	**(.13)**	(.05)	(.05)
Gender[b] (γ_{10})	-.03	.04	-.03	-.03	.04	-.03
	(.07)	(.33)	(.27)	(.04)	(.08)	(.08)
Age (γ_{20})	-.02	.03	-.01	-.02*	.03*	-.02
	(.02)	(.03)	(.02)	(.01)	(.01)	(.01)
Familiarity (γ_{30})	.05	-.04	.04	.06	-.04	.04
	(.11)	(.47)	(.37)	(.05)	(.09)	(.09)
Expectations for Learning (γ_{40})	.03	.07	-.09	.03	.08	-.10†
	(.09)	(.19)	(.12)	(.05)	(.13)	(.05)
Feedback-seeking Behavior (γ_{50})	.03	.01	-.01	.03	.01	-.01
	(.03)	(.27)	(.26)	(.02)	(.04)	(.06)
IS Learning Motives[c] (γ_{60})	.04	.07	.08	.04	-.09	.08
	(.14)	(.40)	(.28)	(.06)	(.08)	(.11)
X Team Learning Norms (γ_{11})				.04	-.03	-.01
				(.21)	(.23)	(.23)
IO Learning Motives[c] (γ_{70})	.07	.02	-.06	.07	.03	-.06
	(.10)	(.19)	(.11)	(.05)	(.06)	(.08)
X Team Learning Norms (γ_{21})				**-.25***	.09	.03
				(.12)	(.21)	(.29)
ES Learning Motives[c] (γ_{80})	.05	.00	-.03	.05	-.00	-.03
	(.03)	(.07)	(.07)	(.03)	(.09)	(.03)
X Team Learning Norms (γ_{31})				.08	.03	-.18*
				(.10)	(.09)	(.08)
EO Learning Motives[c] (γ_{90})	-.08†	.04	.01	-.09*	.04	.01
	(.04)	(.07)	(.05)	(.04)	(.09)	(.04)
X Team Learning Norms (γ_{41})				-.01	.03	.06
				(.01)	(.16)	(.20)

[a] Values are unstandardized regression coefficients (standard errors in parentheses). Values in bold represent hypothesized effects. VL$\bar{s}_i^{\leftrightarrow}$ = Avg. reciprocal vicarious learning strength, VL$\bar{s}_i^{\leftarrow}$= Avg. unreciprocated incoming vicarious learning strength, VL$\bar{s}_i^{\rightarrow}$= Avg. unreciprocated outgoing vicarious learning strength. *n* = 441 (Individual-level); *n* = 88 (Team-level).
[b] 0=Male, 1=Female.
[c] IS = Intrinsic, self-focused learning motive, IO = Intrinsic, other-focused learning motive, ES = Extrinsic, self-focused learning motive, EO = Extrinsic, other-focused learning motive.
† p < .10 * p < .05 ** p < .01 (Two-tailed tests)

As indicated in Table 4.2 (Model 1), team learning norms significantly and positively predicted individuals' average reciprocal VL strength (γ_{01} = .39, p = .002), supporting Hypothesis 2. Adding in the moderating effect of IO learning motives (Model 2) revealed that team learning norms remained a significant positive predictor (γ_{01} = .42, p = .001), and further revealed a significant cross-level interaction between IO learning motives and team learning norms, as the learning norm variable was a significant predictor of the slope coefficient for the effect of IO learning motives on reciprocal VL strength (γ_{21} = -.25, p = .04), supporting Hypothesis 3.[20] To further understand the impact of these effects, I also calculated a pseudo-R^2, computed as [(unrestricted within-person variance – restricted within-person variance)/unrestricted within-person variance] (Kreft & De Leeuw, 1998), which revealed that the hypothesized model (represented in Model 2 of Table 4.2) explained 18.2 percent of the variance in reciprocal vicarious learning strength (relative to the null model tested above).

I next plotted the cross-level interaction between team learning norms and IO learning motives at one standard deviation above and below the mean for each variable and tested their simple slopes (Preacher, Curran, & Bauer, 2006). As shown in Figure 4.3, for individuals with low IO learning motives, the effect of team learning norms on reciprocal VL strength was significant and positive (β = .57, p < .001), but for individuals with high IO motives, this positive slope for the effect of learning norms was significantly weaker (β = .26, p < .001; $Z_{\text{Low IO Slope}}$ = 14.93, $Z_{\text{High IO Slope}}$ = 7.55). Thus, IO learning motives weakened the effect of team learning

[20] Results also revealed an unexpected negative main effect of extrinsic, other-focused (EO) learning motives on reciprocal VL strength (γ_{90} = -.09, p = .02), and a significant interaction between extrinsic, self-focused (ES) learning motives and team learning norms on vicarious learning out-strength (γ_{31} = -.18, p = .03), which I explore further in the discussion section.

norms on reciprocal VL strength, in support of the hypothesized compensatory relationship proposed in Hypothesis 3.

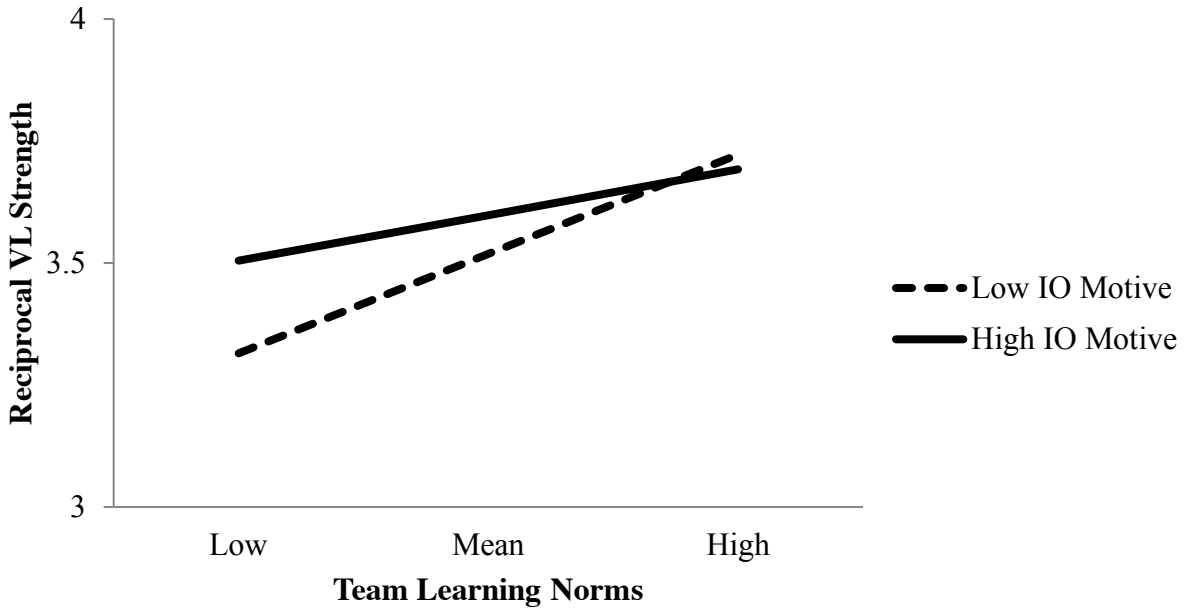

Figure 4.3 Moderating effects of intrinsic, other-focused (IO) learning motives on the relationship between team learning norms and reciprocal vicarious learning (VL) strength.

Team-level Vicarious Learning Reciprocation Results

At the team-level, all variables were at a single level of analysis, and so I used step-wise ordinary least-squares regression models to test my hypotheses for the effects of team vicarious learning reciprocation (and its interaction with external learning) on team performance. As indicated earlier, team performance measures were not obtainable for all teams, reducing the sample to 61 for tests of my team-level hypotheses.

After controlling for number of team members and team-level controls (i.e., team means for gender, age, and familiarity), as well as for the team learning norms included in my earlier model (for parsimony across the two sets of models), I entered the measure for team vicarious

learning reciprocation, as well as controls for other vicarious learning network characteristics (i.e., density and centralization). As shown in Table 4.3 (Step 1), team vicarious learning density had a marginal, negative effect on team performance (b = -2.53, p = .10) and team vicarious learning centralization had no effect (b = .90, *n.s.*), while team vicarious learning reciprocation had a significant, positive effect on team performance (b = 7.34, $p < .001$), providing strong support for Hypothesis 4.

To test Hypothesis 5, which predicted that team vicarious learning reciprocation would moderate the effect of external learning on team performance, such that external learning would more positively predict performance when reciprocation was high, I entered the main effect term for team external learning into the model (Table 4.3, Step 2), followed by the interaction term for team vicarious learning reciprocation x team external learning (Table 4.3, Step 3). Results revealed that team external learning had a slightly negative, but non-significant main effect (b = -.08, *n.s.*), and further that external learning did significantly interact with vicarious learning reciprocation to predict performance (b = 9.38, p = .003), explaining an incremental 11 percent of the variance in team performance (ΔR^2 = .11, p = .003) in support of Hypothesis 5.[21]

[21] In a supplemental analysis, I constructed a model that also included interaction terms for the moderating effects of team vicarious learning density and centrality on the relationship between external learning and performance. In this model, the interaction term for team VL reciprocation x external learning remained significant (p = .02), while neither of the other interaction terms (for team VL density x external learning or for team VL centrality x external learning) were significant (both ps > .50).

Table 4.3 Moderated Regression Analyses Predicting Team Performance

Variables[a]	Team Performance		
	Step 1	**Step 2**	**Step 3**
Constant	-5.70*	-5.27†	21.34*
	(2.54)	(2.76)	(8.77)
Number of Team Members	.06	.06	.08
	(.08)	(.09)	(.08)
Team Mean Gender[b]	.34	.36	.02
	(.30)	(.31)	(.30)
Team Mean Age	.13*	.13*	.12*
	(.06)	(.06)	(.06)
Team Mean Familiarity	.22	.21	.18
	(.18)	(.18)	(.16)
Team Learning Norms	.28	.28	.25
	(.22)	(.22)	(.20)
Team Vicarious Learning Density	-2.53†	-2.43	-2.21
	(1.53)	(1.56)	(1.44)
Team Vicarious Learning Centralization	.90	.86	1.08
	(1.57)	(1.59)	(1.46)
Team Vicarious Learning Reciprocation	**7.34****	7.03**	-22.73*
	(1.80)	(1.96)	(9.56)
Team External Learning		-.08	-8.33**
		(.18)	(2.61)
Team Vicarious Learning Reciprocation X Team External Learning			**9.38****
			(2.96)
Adjusted R^2	.22**	.21**	.33**
ΔR^2		.00	.11**

[a] Reported values are unstandardized regression coefficients. Values in bold represent hypothesized effects. $n = 61$.
[b] 0=Male, 1=Female.
† $p \leq .10$ * $p \leq .05$ ** $p \leq .01$ (Two-tailed tests)

Plotting the form of this interaction and calculating simple slopes revealed that, as shown in Figure 4.4, when team vicarious learning reciprocation was low, external learning had a significant, negative effect on team performance ($\beta = -.50$, $p = .02$), but when vicarious learning

reciprocation was high, the effect of external learning on performance was significant and positive (β = .52, p = .05). These results thus provide further support for the hypothesized directional effects of this interaction. The form of the interaction also suggests an explanation for the non-significant main effect, as the performance effects of external learning mirrored one another (but in opposite directions) depending on the degree of vicarious learning reciprocation. Below, I discuss the interpretation and implications of these results for the study of learning in organizations.

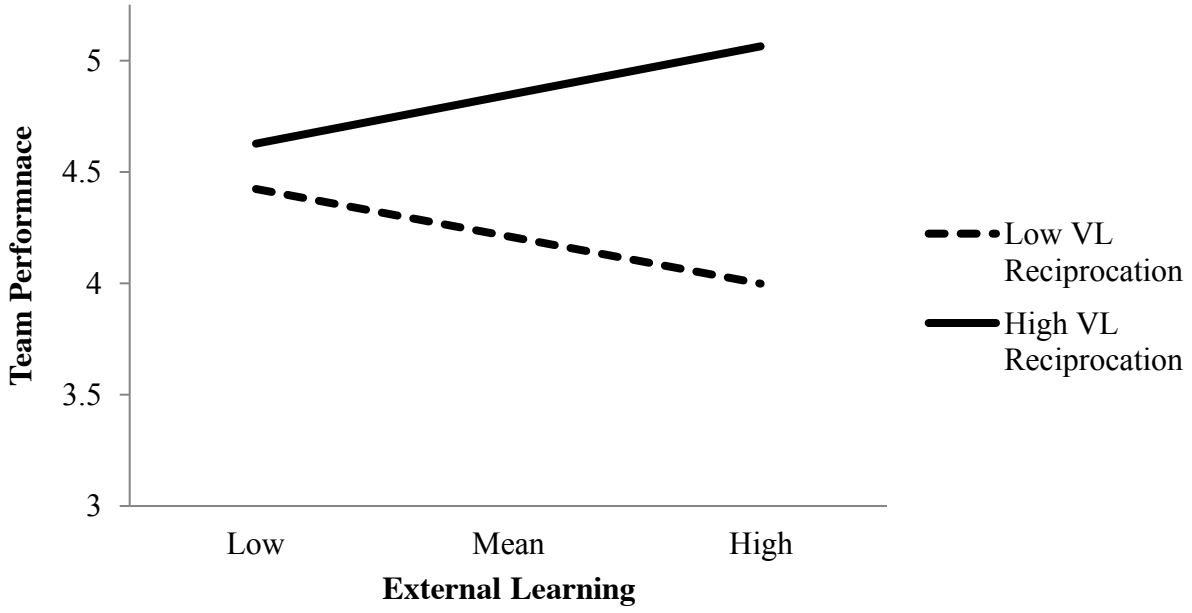

Figure 4.4 Moderating effects of team vicarious learning reciprocation on the relationship between team external learning and team performance.

Discussion

Drawing from a network-based view of learning – conceptualizing team learning as consisting (in part) of team member's dyadic vicarious learning from one another's experiences

and expertise – the present study introduced the notion of *reciprocity* in these vicarious learning relationships. In contrast to prior views of vicarious learning as unidirectional and uniform within teams, a reciprocity perspective reveals key differences in the distribution of vicarious learning among team members that fundamentally change how teams learn and perform. Specifically, results from a study of 441 individuals embedded in 88 consulting project teams revealed that greater reciprocation of vicarious learning within a team contributed to enhanced team performance, both directly and indirectly through increasing the performance benefit of external (extra-team) learning activities. Indeed, the effects of external learning were completely reversed depending on the team's vicarious learning reciprocation, such that greater external learning helped high-reciprocation teams, but hurt low-reciprocation teams. Results further revealed that individual team members' degree of vicarious learning reciprocity in their dyadic relationships (the constituent components of team-level reciprocation) were positively influenced by shared norms for learning in the team, although this influence was attenuated by individuals' intrinsic other-focused motives for learning (i.e., a desire to learn in order to help others), which served as a compensatory driver of reciprocity. These effects were above and beyond a variety of controls related to individual- and team-level learning, which generally had sparse effects on reciprocal vicarious learning and team performance. However, age did emerge as an important predictor of both reciprocity and team performance, such that older team members had somewhat weaker reciprocal vicarious learning relationships, likely because they had greater in-degree vicarious learning (i.e., learning more from others' experiences; Table 4.2, Model 2), and teams with a higher average age had greater performance (Table 4.3).

Although hypothesized, individuals' specialist or generalist background did not influence their degree vicarious learning reciprocation, but unexpectedly, extrinsic other-focused (EO)

motives for learning had a significant, negative effect on reciprocity. This motive for learning reflects individuals' desire to learn in ways that meet others' demands or expectations, and so (exploring this result post-hoc) individuals with strong EO learning motives may have been driven to engage in more one-way (rather than reciprocal) learning relationships, as they felt an expectation of the project to share or seek domain expertise in the team, but felt less obligation to reciprocate. Much like individuals with a specialist background, those with EO motives likely interpret a cross-functional team environment as one where each person is expected to contribute their particular expertise, but may have felt less drive to reciprocate these contributions, as they would only share their experience if the project required or demanded it (i.e., sharing their prior experience in accounting only if the team was facing a particular accounting-related challenge). As noted below, further exploration of these alternate effects of learning motives is warranted to better understand these emergent influences.

Contributions to Theory and Practice

Introducing reciprocity to the study of vicarious learning advances the literature on learning in teams and organizations in several important ways. Building on network-based views of learning (e.g., Glynn et al., 1994), reciprocity represents a fundamental structural feature of interpersonal learning relationships (and their aggregation to team-, unit-, or organization-level learning), and demonstrating the creation and consequences of this reciprocity provides empirical evidence of the importance of a dyadic network approach for team learning (rather than approaches that aggregate learning at the group level). Notably, this research uses a whole network approach, examining not only the likelihood of reciprocity in a given dyad, but also examining the impact of different team-level distributions of reciprocal learning relationships on performance outcomes. In doing so, this study provides an explicit test of network theories in

interpersonal learning, in contrast to prior research that has tended to employ an "auxiliary network approach" (Wasserman & Faust, 1994), examining attributes of dyadic relationships, but not the larger structure of the network (cf. Siemsen et al., 2009). Further, by bringing an intra-team network approach (in contrast to the inter-unit or inter-organizational focus of much knowledge transfer research; Hansen, 1999), the findings of this study help clarify major theories of group learning, which acknowledge "sharing knowledge" as key components, but provide little detail about the nature of this sharing process (e.g., Wilson et al., 2007). As noted earlier, the bulk of this research aggregates this sharing behavior to a property of the team as a whole, implicitly assuming that sharing occurs uniformly and smoothly across all team members. By considering individuals' reciprocation in vicarious learning, the model presented here shifts the conversation about group learning processes, providing a dyadic-level explanatory mechanism for differences in teams' ability to learn from their members' unique experiences and knowledge.

At the same time, focusing on reciprocity of vicarious learning challenges a long-standing (albeit largely implicit) assumption in prior literature that learning occurs only in one direction between individuals (e.g., novices learning from experts). In the realm of knowledge sharing (and related research on advice seeking, as well as knowledge transfer between units or organizations; e.g., Argote & Ingram, 2000; Hofmann et al., 2009; Quigley et al., 2007; Uzzi & Lancaster, 2003), existing studies tend to focus on the antecedents and/or impact of either knowledge sharing *or* knowledge seeking, casting the ensuing learning relationship as markedly one-way (only moving from sharer to receiver). Indeed, these studies typically focus on only a single actor in the relationship, assessing their perceptions of the other and using these perceptions to predict knowledge transfer outcomes (e.g., Levin & Cross, 2004; Siemsen et al., 2009), ignoring the possibility that the relationship could be reciprocal – that sharer and seeker

roles could reverse (either in the same interaction or in a future learning interaction). The model presented here thus attends to vicarious learning in both directions within a dyad, while also placing strong emphasis on the process of *learning* in these interactions. Prior approaches often over-simplify interpersonal learning at work, examining merely the sharing or seeking of knowledge with little attention to whether the recipient actually learned from the shared knowledge. Indeed, seeking or sharing knowledge are necessary, but not sufficient, components of the learning process (as sought knowledge may not be shared, and shared knowledge may not actually be learned). By placing conceptual and empirical emphasis on an individual's actual learning from others' experience (i.e., by theorizing and measuring how much an individual learns from the experiences of others, rather than just how much is shared), the present study thus addresses the true underlying process of interest (learning), rather than inferring learning from the presence of constituent components (knowledge sharing). A vicarious learning lens may thus provide a means for integrating prior research on knowledge sharing and seeking into a more unified perspective of interpersonal learning at work, while also providing a mechanism of aggregation to the collective-level through the distribution (including the reciprocity) of vicarious learning dyads within the broader group, team, or organization.

The demonstrated consequences of vicarious learning reciprocation on team performance (by moderating the effects of external learning) described earlier also carry important implications for the study and practice of external learning in teams. Channeling a fundamental paradox of organizations – the need to engage in both exploratory and exploitative learning (March, 1991) in an "ambidextrous" way (O'Reilly & Tushman, 2013) – the debate about the relative benefits and consequences of simultaneous engagement in internal (intra-team, exploitative) and external (extra-team, exploratory) learning presents a fundamental challenge to

studies of team learning. Though typically applied at the organizational level, concerns for ambidexterity and balancing exploration/exploitation nonetheless result from the efforts of individuals to learn from one another within a situated "space" in the organization (K. D. Miller et al., 2006), such as a team. Balancing this distant and local learning thus requires the purposeful management of resources and capabilities to overcome the intrinsic inefficiencies of engaging in both types of learning (O'Reilly & Tushman, 2013), and prior research has observed sharply different results of these balancing efforts (Bresman, 2010; Wong, 2004). Greater reciprocation of vicarious learning relationships between team members presents a resource allocation mechanism that can explain when teams are more or less effective in their attempts at ambidexterity. The results of this study revealed that greater vicarious learning reciprocation – insofar as it creates greater shared mental models, mutual cross-understanding, and smoother communication among team members (building on Myers, Chapter 2) – allows teams to expend fewer resources on internal learning, freeing them to more efficiently and effectively integrate external learning in ways that boost performance.

Beyond these contributions to the study of learning in organizational settings, the method for assessing reciprocity (and reciprocation) advanced here offers a contribution to organizational studies more broadly. Existing research on reciprocity in workplace networks (e.g., Caimo & Lomi, 2014; Cross et al., 2001; Kleinbaum et al., 2015; Lai et al., 2015) has used methods that simplify the concept of reciprocity by measuring only the presence or absence of mutual ties (i.e., creating a binary network), by dichotomizing weighted tie measures to a binary network based on some minimum tie strength threshold, or by subtracting the two component tie weights from one another (i.e., creating a measure of the absolute balance or "perfect reciprocation" of each tie). These simplifications mask critical characteristics of these dyadic

relationships, as evident in the fact that all of these approaches would fail to distinguish between a reciprocal tie consisting of two weights of 2 and 2 (i.e., in degree of two and out-degree of two for each individual in the dyad), and a tie consisting of weights of 5 and 5. Though this problem is not restricted to organizational studies (as binary approaches to reciprocity have predominated most network studies; Squartini et al., 2013), by bridging novel conceptual approaches in the physical sciences (Squartini et al., 2013) and demonstrating their computation and impact in an organizational context (i.e., team networks), the present research offers a path forward for scholars of organizations interested in reciprocal processes. The tie-decomposition approach used in this study allows for more robust investigations of reciprocity in weighted networks, while also being fully "backward compatible" with unweighted networks (as the decomposed tie weights, $w_{ij}^{\leftrightarrow}, w_{ij}^{\rightarrow}, w_{ij}^{\leftarrow}$, reduce to a dichotomous measure for unweighted ties). Considering reciprocal tie *strength* opens new avenues for scholarly research in organizations, for instance, exploring what factors might strengthen or weaken a pre-existing reciprocal tie (beyond just its presence/absence), or what might drive the unreciprocated in-strength and out-strength components of dyadic ties (as noted below).

Finally, from a practical standpoint, the conceptual model and empirical findings presented here carry important implications for how learning is enacted in work organizations. By acknowledging reciprocity as an impactful feature of interpersonal learning relationships in organizations, managers might re-direct efforts for promoting these relationships, re-framing mentoring programs (for example) to recognize the importance of bi-directional learning between mentors and protégés. Likewise, organizational teams would likely benefit from investments in greater opportunities for vicarious learning (i.e., face-to-face meetings, where these reciprocal learning interactions might be more likely, rather than email communication;

Myers, Chapter 2), particularly when they need to engage in external learning for a project's success. Indeed, this study reveals that reciprocation is not simply a defining characteristic of team learning networks, but further that it can be enhanced (through increasing individual reciprocity of vicarious learning) by attending to team learning norms and individuals' motives for learning. The establishment of team norms is well within the purview of employees and managers, and the results here suggest that investment of time and energy into creating these norms (as well as individual awareness of their own motives for learning) can positively shape the team's learning network in ways that can enhance performance.

Limitations and Future Directions

Despite these noted contributions and strengths, the present study has several limitations that warrant attention and inspire future research in this domain. Most notably, this study used a sample of MBA student consulting teams, and though the teams were engaged in full-time work with their team for an organizational client (similar to teams working in any organizational context), some drawbacks of the sample merit mentioning. Team members had relatively little experience working with one another (as evident in the low average familiarity scores), as teams were assigned by the MBA program based on a desire to mix teams based on students' declared degree concentrations. While this allowed a more random assignment of individuals to teams (reducing the influence of potential confounding factors from teams' make-up), in organizations teams are often established for long-durations and multiple projects, introducing the potential for exploring how reciprocity in vicarious learning might be influenced by team members' shared prior experiences. For instance, it is possible that a large volume of shared prior experiences might reduce the need for vicarious learning (as individuals would have more shared than unique experiences), or conversely may encourage greater vicarious learning, as the shared experiences

provide a “common core” that individuals can reference when sharing their unique experiences for others’ learning. Exploring these learning processes in teams with greater tenure and shared experience might thus help better understand the boundary conditions and temporal influences (i.e., how learning relationships evolve or change over time) of reciprocal vicarious learning.

Similarly, individuals in these teams tended to have relatively limited prior experiences, having only worked for a few years before joining the MBA program, and came from a wide variety of prior experiences (i.e., not just work experience, but also military experience or other advanced degree programs in engineering, etc.). This profile of background experience is somewhat different from the background experiences of individuals working in organizational teams, who likely have greater variety in their tenure and more industry-specific functional background diversity (i.e., diversity in a more targeted set of functions, as in Bunderson & Sutcliffe, 2002), potentially explaining the lack of significant results for individuals’ background experience as a predictor of vicarious learning reciprocity in this setting. Research that compares the distribution of vicarious learning relationships across multiple industries, or multiple organizing styles within the same industry (e.g., different learning "ecologies;" Bailey & Barley, 2011), would no doubt advance the model presented here in interesting and important ways, and help build an understanding of the context-specific effects of vicarious learning.

One additional feature of these teams deserving of future research attention lies in the fact that there were no designated leaders or formal power differences among team members. While differences in informal influence no doubt emerged as the team progressed through the project, an absence of formal hierarchy and assigned positions of power allowed for a relatively unfettered view of vicarious learning in the team. Indeed, power and status differences in teams alter individuals’ performance, participation and communication (e.g., Katz & Benjamin, 1960;

Wittenbaum, 2000), and can affect the way knowledge and expertise is shared in the group (French & Raven, 1959; Singh et al., 2010; Thomas-Hunt et al., 2003). However, these power dynamics are inherent to the work of many organizational teams, and future research is needed to understand how vicarious learning might change when reciprocity intersects formal power relationships, to build on the "baseline" case (i.e., without power differences) established here. Prior research has shown that formal hierarchical relationships between organizational units can provide a conduit for greater advice seeking and sharing (Caimo & Lomi, 2014; Cross & Sproull, 2004), and it is likely that the knowledge/experiences individuals share with others in a similar position of power (peers) vs. in a higher position of power (e.g., a supervisor) might differ, and moreover that individuals may be less likely to engage in reciprocal vicarious learning with those in high power (instead engaging in only a one-way learning process). Research exploring the difference in vicarious learning content, differences in the tendency for reciprocation within different power dynamics, or organizational interventions that encourage greater vicarious learning across hierarchical levels (i.e., executives hosting open "office hours" to learn from subordinates' feedback) would provide a meaningful extension of the findings presented here.

Finally, the research questions presented here focused solely on dyadic reciprocity, but reciprocity may take multiple forms, reflecting a more generalized sense of reciprocity within the team (e.g., where team members may not immediately reciprocate vicarious learning to a sharer, but rather "pay it forward" to other team members; e.g., Baker & Bulkley, 2014). Examining these more complex forms of reciprocity, including potential reciprocal triads (where person A learns from person B, who learns from person C, who learns from person A), would be of value, particularly in larger networks (i.e., beyond the context of small team networks). Additionally, while this study was interested predominantly in reciprocity of vicarious learning, the methods

advanced here also reveal interesting trends in the tendency for individuals to have unreciprocated in- and out-strength in their relationships. Indeed, the results of this study revealed that individuals' extrinsic, self-focused (ES) learning motives (the motive to learn in order to "look good" and stand out from others) interacted with team learning norms to reduce vicarious learning out-strength, suggesting that sharing experience with others for their learning (i.e., greater out-flows of vicarious learning) may be particularly unlikely to make someone "look good" when the team has strong norms for learning (as sharing experience is a "normal" part of team life, and would not be a way of standing out). Though it was beyond the scope of this study, developing hypotheses about not only the reciprocal strength, but also how individual and contextual attributes might predict the imbalance in individuals' learning relationships, would be of interest to future research.

Conclusion

Though this study (like all studies) had a few notable limitations, it nonetheless introduced, conceptualized, and empirically demonstrated the impact of *reciprocity* in individuals' vicarious learning relationships in a work team. Whereas prior research has noted the importance of individuals' willingness and ability to share their unique knowledge and experiences with others in their team (in addition to engaging in broader, collective team learning about shared experiences), to date relatively little research has considered the degree of reciprocity in these relationships. Thus, by examining antecedents and performance consequences of greater reciprocity in teams' network of interpersonal vicarious learning relationships, this study brings reciprocity to the forefront as an important characteristic of vicarious learning, and contributes to a more interpersonally dynamic view of learning in teams and organizations

CHAPTER 5

CONCLUSION

> Learning has been something of a Cinderella of management theory and practice. In the study of management, it has tended to be treated as a worthy but unexciting topic that is tucked away in introductory courses in organizational behavior. For practitioners, it is associated most closely with training. Until comparatively recently…attentiveness to "organizational learning" was confined [only] to the margins of study and practice (Contu & Willmott, 2003, p. 283)

Organizational scholars have long acknowledged the importance of learning from other's experiences and expertise. This vicarious learning plays a role in processes of development and performance at individual (e.g., Hoover et al., 2012), group (e.g., Bresman, 2013) and organizational (e.g., Madsen & Desai, 2010) levels, driving enhanced growth, innovation and efficiency by using the consequences of other's experiences to guide learning (Argote & Ingram, 2000). However, despite its ubiquity and potential for impact, the concept of vicarious learning in organizations has lacked significant attention and development – frequently cast as merely a haphazard, one-way process of observing and imitating the behaviors of others. This conceptual and empirical underdevelopment of vicarious learning has left the field unable to answer important questions about the mechanisms of vicarious learning and how it impacts learning and performance in organizations. Indeed, as noted in the quote above, learning from others (and learning in general) has been seen as a relatively marginal topic of study in the organizational literature, and scholars have yet to fully explore key dimensions of this learning process – including the interactive behaviors and micro-processes that constitute vicarious learning, the efforts required to facilitate engagement in vicarious learning in a work setting, or the impact of

differing distributions of individual's vicarious learning interactions in a group, team, or organization.

In this dissertation, I advanced a perspective on vicarious learning that views it as relationally co-created, emergently organized and structurally reciprocal. While acknowledging that individuals can (and do) independently observe and imitate others' actions, I contend that there are more interactive processes of vicarious learning that are likely prevalent as well, particularly in modern, knowledge-based organizations. Drawing on theories of experiential learning and symbolic interactionism, I thus argued for a new conceptual view of vicarious learning, based on coactive, interpersonal learning relationships between individuals at work. These interactions involve the mutual processing of an individual's experience and the co-creation of learning from this discourse (i.e., the sharing of experience, analysis, and support). I further argued that this coactive vicarious learning leads to not only linear growth in individuals' knowledge, but also growth in their individual and relational capacity for future learning, offering a novel mechanism for the effects of vicarious learning (that is consistent with the observation that vicarious learning actually alters individual learning curves; Argote et al., 2001).

At the same time, I presented two empirical chapters that further enhance the field's understanding of vicarious learning and extend the theoretical model in Chapter 2. By examining the organizing processes used to promote vicarious learning in two air medical transport teams in Chapter 3, I advanced a view of vicarious learning not as a haphazard process, nor as one solely driven by formal structures (e.g., personnel rotation or knowledge management interfaces), but rather as an emergently organized phenomenon, driven by the coalescence of individuals' informal practices and the formal structures of the organization. Specifically, I demonstrated that vicarious learning interactions, enacted through storytelling in designated "downtime" (in the

context of air medical transport teams), are both enabled and elaborated by informal practices and formal structures in the workplace. Structures and practices enable vicarious learning by providing the capacity and interrelating necessary for vicarious learning interactions to unfold more frequently and effectively, and these interactions are subsequently elaborated by structures that enable the construction of routines (from the experience shared in the interaction) and practices that facilitate crystallization of the learning created in the interaction. In this way, I demonstrated that vicarious learning is far from "automatic" at work, and requires individual and collective efforts to organize a work environment in support of greater vicarious learning.

In my second empirical study (Chapter 4), I presented a quantitative investigation of vicarious learning at work, examining the role of reciprocity of vicarious learning relationships in teams. In contrast to most studies of group or team learning, which assume that once knowledge is shared (unidirectionally, from the "sharer" to "learners") it is adopted uniformly and equivalently among all members of a group, I adopted a dyadic-level network perspective and examined the distribution of (non)reciprocal learning relationships among team members. By examining the reciprocity of individuals' vicarious learning, I advanced a model with the potential to explain how learning occurs more or less effectively and efficiently in the team, offering a path forward for resolving tensions in prior work (e.g., resolving the paradox of teams engaging in external learning on top of intra-team learning; Argote, 2015; Bresman, 2010; Wong, 2004). Notably, I demonstrated that greater reciprocation of vicarious learning (at the team level) improved performance and allowed teams' engagement in external learning to enhance performance. I also demonstrated key individual-level antecedents to vicarious learning reciprocity, showing that team learning norms, conditional on individuals' motives for learning,

increased individual's average strength of vicarious learning reciprocity (with each other member of their team).

Integrating the three chapters presented in this dissertation, I believe this work contributes several different literatures within organizational studies (as elaborated at the close of each chapter), but that together, they fundamentally contribute to building a greater understanding of how people learn from each other in organizations. Indeed, the conceptual model of coactive vicarious learning offered in Chapter 2 contributes a new mode (interpersonal, coactive interactions) and mechanism (capacity building) of vicarious learning, providing a theoretical account of what actually occurs, in terms of interpersonal behaviors, when individuals learn from one another at work. The inductive, qualitative work presented in Chapter 3 then takes these interpersonal vicarious learning interactions (using storytelling as one example of the coactive interactions articulated in Chapter 2) and examines the organized structures and practices that enable and elaborate them, contextualizing the enactment of these theorized coactive vicarious learning relationships in organizations. Finally, the quantitative research presented in Chapter 4 builds further on these enacted vicarious learning interactions, examining how their differing distribution (in this case, their greater or lesser reciprocity) – emerging in part from particular structures and shared practices (e.g., team learning norms) – fundamentally shapes the impact of individuals' learning efforts in work teams, enhancing performance and the beneficial use of external learning. In this way, the three papers build outwards from the "core" concept of interpersonal vicarious learning interactions – first articulating (theoretically) what goes on within these interactions, then exploring (qualitatively) how individuals organize to facilitate the occurrence and learning benefits of these interactions, and finally examining (quantitatively) how constellations of these interactions ultimately shape group learning and

performance. Though each chapter has its unique strengths and limitations, together they present a robust, multi-method investigation of vicarious learning interactions, building a unified case for the benefits of introducing a more interpersonally dynamic view of vicarious learning to the study of organizations.

Contributions

Though the independent contribution of each of the three research efforts has been discussed previously (at the close of each chapter), here I offer a brief discussion of the contributions emerging from the integration of the independent, but fundamentally interrelated chapters presented in this dissertation. For instance, one notable contribution of this research arises from each chapter's shared emphasis on discursive, two-way interpersonal interactions as the enacted mechanism of vicarious learning, providing a set of conceptual and empirical findings that challenge existing view of vicarious learning as a simple process of observation and imitation. Despite increasing recognition of interpersonal relationships as conduits for learning between units or organizations (e.g., Argote et al., 2003; Ingram & Roberts, 2000; Uzzi & Lancaster, 2003), the extant literature nonetheless still relies (explicitly or implicitly) on an underlying mechanism of observation/imitation for explaining vicarious learning, as Bresman (2013, p. 35) summarizes when he notes that, "the few instances of empirical work on vicarious learning in which the process is mentioned tend to treat it as a matter of finding and copying practices." This assumption has faced isolated, sporadic challenges from different literatures (i.e., Bresman, 2013; Westphal et al., 2001), but the three studies offered in this dissertation provide a unified challenge that cuts across multiple literatures, methods, and perspectives, creating the momentum and convergent evidence necessary to unseat this long-held assumption. In fact, the interpersonally dynamic perspective advanced across these three chapters not only challenges

this assumption, but actually supplants it with a more robust mechanism for exploring when and how individuals do (or do not) learn from others' experiences, focused on capacity building (rather than the mechanical transfer or replication of knowledge). This new mechanism goes beyond (but includes) the simple flow of knowledge from one person to another in the present interaction, bringing greater attention to the potential for vicarious learning interactions to increase future learning as well, by building individual (i.e., perspective taking abilities) and relational (i.e., shared mental models between two people) capacity for learning.

A second, related contribution of the three chapters lies in their focus on the actual behaviors underlying vicarious learning in these interpersonal interactions. As noted by several scholars in the literature on learning in organizations, "organizational learning research using the term vicarious learning has been agnostic about the activities by which it occurs" (Bresman, 2010, p. 95) and "a greater understanding of the micro processes underlying the transfer of knowledge is needed" (Darr et al., 1995, p. 1761). The three papers presented here thus move beyond simply recognizing that vicarious learning occurs, towards an understanding of *how* this learning occurs through organized (via informal practices and shared structures; Chapter 3) interpersonal interactions (consisting of the sharing of experience, analysis, and support; Chapter 2) that differ (i.e., in terms of their reciprocity; Chapter 4) across different pairs of individuals. For instance, the qualitative study of Chapter 3 revealed the actual behaviors (i.e., storytelling interactions) used to enact vicarious learning in one organizational setting (air medical transport teams), as well as specific behaviors (and structures) that served to enable and elaborate these storytelling interactions. Moreover, the theoretical model of Chapter 2 advanced a framework of underlying behaviors that constitute vicarious learning interactions more broadly, and provided examples of specific behavioral modes of vicarious learning (in addition to storytelling) that

might be employed in other organizational settings. This focus on the actual behaviors of vicarious learning not only adds nuance and specificity to the field's understanding of how people learn from others at work, but also opens new avenues for research and exploration, revealing the role of different "times and places" for vicarious learning. Prior views of this learning as observation and imitation rest on individuals witnessing the performance of observable actions (i.e., dictating that the "time and place" of learning is during task performance), but recognizing that different behaviors – such as storytelling, shadowing, or narrative simulating – can be used to enact vicarious learning opens up additional times and places relevant for learning from others. As revealed in Chapter 3, where flight team members use "downtime" as a mutually-agreed-upon domain for engaging in vicarious learning, considering what triggers vicarious learning in particular contexts (outside of direct task performance) is critical for the field's understanding of vicarious learning, and the studies presented in this dissertation provide an initial step in that direction.

A third contribution of the chapters presented in this dissertation arises from their emphasis on idiosyncratic, individual-level dyads as the operative level of analysis for understanding vicarious learning within a collective workgroup (i.e., among members of a team, unit, or organization). This dyadic perspective can be seen across all three studies, from the theoretical embedding of coactive vicarious learning in a pair's ongoing relationship quality (Chapter 2), to the recognition that individual flight team members' learning depended (and differed) based on their experience working with a particular person and their ability to absorb lessons from the story of that person's experience (Chapter 3), and the explicit treatment of vicarious learning as dyadic network relationships in teams (Chapter 4). Specifically, in contrast to perspectives that aggregate learning as merely a collective-level property (see Wilson et al.,

2007), the perspective advanced in this dissertation suggests that learning in groups can be better understood as constituted, at least in part, by the network of dyadic learning relationships within the group. As noted most prominently in Chapter 4, this perspective allows the field to move beyond simplistic models of greater or lesser learning among employees in a collective (team, unit, or organization) by exploring features of the distribution of this learning (such as the degree of reciprocity in vicarious learning among team members). Indeed, perspectives that do recognize the role of relationships in the learning process have focused primarily on the relationship as a knowledge conduit *between* two collectives (i.e., facilitating knowledge sharing between managers of hotels or banks; Ingram & Roberts, 2000; Uzzi & Lancaster, 2003), but assume the learning and knowledge *within* each collective (e.g., within each hotel, bank, or other "node" of the relationship) to be a uniform, collective-level property. Thus, although the notion that individuals may be more willing or able to learn from, or share experiences with, particular people in a work group (and not others) would likely find little objection among scholars of learning in organizations, this notion gets largely ignored when learning is aggregated to collective levels. The perspective advanced across these three chapters therefore provides a conceptual, empirical, and methodological contribution by demonstrating the importance of considering these dyad-level features of learning and the ways they can be compiled to understand collective-level learning, while also providing an example of the compositional methods (in Chapter 4) necessary for doing so.

A final contribution of this dissertation arises from each chapter's explicit focus on *learning* as a distinct, multi-faceted process, rather than emphasizing merely one component of the process (e.g., sharing knowledge). By conceptualizing vicarious learning as a discursive, two-way process of meaning-making (Chapter 2), recognizing that it requires individual and

collective follow-up in addition to the sharing of others' experiences (Chapter 3), and operationalizing it using measures that explicitly capture the individual's learning (vs. only the other's sharing of experience; Chapter 4), the perspective advanced here addresses how individuals actually learn from others' experiences, rather than simply examining their exposure to an opportunity to learn. In other words, studies of knowledge sharing (or seeking) typically, and perhaps inherently, emphasize merely an opportunity for learning (when someone shares their knowledge), at the expense of emphasizing whether someone actually learns anything from the shared knowledge. For instance, studies of knowledge transfer within and between organizations (as well as studies of transfer in organizational training; e.g., Taylor et al., 2005) typically focus only on the processes of exposing individuals to others' (sharer's) knowledge, implying that simply by observing others' experience, individuals can imitate it. Seeking or sharing knowledge are thus necessary, but not sufficient, components of the learning process. By moving beyond the focus of prior research on one-way knowledge sharing (i.e., from experts to novices), and conceptualizing vicarious learning as co-constructed through actions by both the "sharer" and "learner" in the interaction (and moreover, recognizing that these labels are at best temporary "starting points" in an interaction that may reverse, such that experiences could be shared and learned from reciprocally), the studies in this dissertation address the actual underlying process of interest (learning), rather than inferring learning from the presence of constituent components (knowledge sharing). The interpersonally dynamic view of vicarious learning – as discursively co-created, emergently organized, and dyadically reciprocal – offered across these chapters may thus provide a means for integrating prior research on knowledge sharing and seeking into a more unified perspective of vicarious *learning* at work.

Implications

In light of these contributions, the findings of this dissertation carry significant implications for organizational studies, not only sharpening existing theories of learning at work, but offering a framework of vicarious learning that is tractable and relevant in modern organizations. In other words, to borrow Corley and Gioia's (2011, p. 22) language, the contributions of this work have "scope," not merely focusing on "filling theoretical gaps simply because they exist" or "advancing theory for theory's sake." Rather, the research in this dissertation seeks to advance the field's understanding of vicarious learning "for utility's sake," offering a perspective that is useful for making sense of learning in modern organizations, in pursuit of "both scientific and practical utility that deals with a topic of interest for a broad audience and integrates existing views into a coherent and comprehensive theoretical model" (Corley & Gioia, 2011, p. 22).

More specifically, as noted in earlier chapters, the rise of the knowledge economy (Powell & Snellman, 2004) and the increasingly social nature of work suggest that earlier "find and copy" approaches to vicarious learning are likely to be of increasingly limited utility in understanding learning in today's complex and interdependent organizations. In contrast to the more rote or formal learning necessary in prior work eras (for instance, in formal training or more rote manufacturing contexts), learning in modern organizations involves more tacit, complex information (K. D. Miller et al., 2006) that resists codification. Given that prior theories of vicarious learning reflect the high-volume manufacturing organizations of their origin (Tucker & Edmondson, 2007), they may not prove as tractable in this current ambiguous environment of learning in organizations (Noe et al., 2014), suggesting that a new perspective is warranted for making sense of individuals' learning from others at work. Indeed, whereas these existing

perspectives only explain vicarious learning when the material to be learned is overtly observable or extensively documented in an organizational knowledge repository, introducing a more interpersonally dynamic model of how individuals learn from each other provides a means for understanding how people use their interpersonal interactions to learn not only these explicit bits of knowledge, but also make meaning of the more tacit elements of another's experience at work (Davenport et al., 1998). The model of vicarious learning offered in this dissertation, rooted in these social and informational complexities of modern organizations, may thus reveal a more useful set of tools and techniques for promoting vicarious learning at work, particularly in work environments where "reinventing the wheel" is costly (Bresman et al., 1999).

One example of a domain where this interpersonally dynamic perspective on vicarious learning can reveal significant new insight is that of healthcare organizations. Providing patient care (for instance, in a hospital setting) is a complex and interdependent task, laden with tacit and explicit knowledge, which carries significant costs for mistakes or gaps in knowledge. As shown in Chapter 3, this dynamic environment is thus one where vicarious learning can be particularly effective, but existing strategies (relying on one-way transfers of codified information and sharing of "best practices" across units or hospitals) often fall short of facilitating this learning. For instance, a review of patient outcomes after various surgical procedures revealed that, in contrast to the focus of existing hospital- and government-funded interventions on implementing structures for reducing surgical complications (e.g., through transferring "best practices"), differences in complication rates (e.g., the likelihood of a patient developing an infection or other complication from the surgery) did not account for the stark differences in patients' adverse outcomes and mortality following surgery observed across hospitals (Ghaferi, Birkmeyer, & Dimick, 2009). Instead, this research revealed the importance of "rescuing" patients after a

complication had occurred, which requires significant sharing of knowledge and learning (i.e., learning from a senior colleague who has dealt with a rare complication in the past), and reflects a combination of structural interventions as well as informal practices shared among care providers (i.e., a safety culture; Ghaferi & Dimick, 2015; Vogus et al., 2010). Likewise, recent research on medical handoffs – where physicians or nurses coming in to the hospital to start their shift learn from the experience of outgoing staff's care for patients – has explicated the risks of assuming these social learning experiences as one-way "telegrams" of information, noting that interaction, questions and clarification are essential for the incoming physician's understanding of the patient's condition and the efficacy of care administered by the outgoing physician (M. D. Cohen et al., 2012). When these handoffs are conducted as one-way transfers of knowledge, substantial gaps in learning abound; Cohen and his colleagues (2012) report evidence that one-way handoff communication resulted in agreement and mutual understanding (between the outgoing and incoming physician) about a patients' condition in less than 50% of handoffs, and that this failure to learn effectively is increased for patients with more complex conditions.

Applying the perspectives offered in this dissertation would offer a tractable framework for understanding and improving vicarious learning in the face of these challenges, supplanting existing structural or one-way knowledge transfer strategies with approaches promoting (for instance) coactive, reciprocal vicarious learning during patient hand-offs, or implementing a multi-faceted organizing strategy (i.e., involving formal structures, informal practices, and enacted "time and place") that can help facilitate the vicarious learning necessary for rescuing patients from complications. Though this is only one example of the various organizational domains where this new perspective on vicarious learning may offer (previously inaccessible) insight and understanding, it is a particularly important one, considering that healthcare is the

fastest-growing sector of the U.S. economy (M. Ross & Kulkarni, 2013) and that expenses on healthcare (which are increased by errors or gaps in learning) represent an growing portion of national spending (US Department of Health and Human Services, 2008). Nevertheless, I expect that the findings of this dissertation would help make sense of individuals' vicarious learning across a broad range of organizations in today's increasingly knowledge-intensive work environments.

Conclusion

The 18th century French philosopher Voltaire once observed, "Is there anyone so wise as to learn by the experience of others?" However, as is often the case with wisdom, it is easier said than done – in other words, the goal (of learning from others) is easier identified than the path to get there. Research in organizational studies is replete with admonitions *that* vicarious learning is important, but our understanding of *how* individuals learn vicarious learning from others' experiences in organizations has remained substantially underdeveloped. Specifically, this extant literature has, for too long, equated individuals' learning with organizational training, and when scholars have studied vicarious learning, they frequently take groups or entire organizations as their unit of analysis, accepting individual learning as a "given" and treating it as an unmodeled mechanism for collective-level learning. Yet as the nature of work continues developing in the era of a knowledge economy – trading routine, bounded labor for broader, varying tasks that require ongoing learning and development (Drucker, 1998) – the ability for individuals in organizations to learn vicariously from others and avoid "reinventing the wheel" (Bresman, 2010) is as important as ever.

Through this dissertation, I thus hope to increase attention to the fact that individual-level learning at work is a fundamentally interpersonal and social process, and begin to more

thoroughly specify the modes and mechanisms by which individuals learn from one another's experiences in organizations. Indeed, despite its name, the theoretical fount of vicarious learning research – social learning theory (Bandura, 1977b) – has been largely *asocial* in its application to learning in organizations, focusing instead on intra-personal processes of observation and imitation. In this way, the research presented in this dissertation brings new, interpersonally dynamic theorizing and empirical evidence to this fundamental theory of workplace learning, advancing the way vicarious learning is studied and applied in organizations.

APPENDICES

Appendix A: Semi-Structured Interview Protocol for Chapter 3 Study

Background

- Tell me a little bit about your job at [Program Name]. How long have you worked here?
    - What aspects of the job drew you to this role?
    - What aspects of the job are the most challenging?
    - What are you proudest of in your job?
- What is a typical day like in your job? A typical week?
- How do you interact with others in your job?
    - Who do you see the most?
    - What is the quality of the relationships people have at [Program Name]?
    - Are these relationships important? Why? Please provide an example.

General Tools for Learning in Air Medical Transportation

- How do you keep up-to-date with the various skills and knowledge needed for your job?
    - What enables you to learn and stay on top of this material?
    - What hinders your ability to learn?
    - What tools, resources, or people do you use when you feel like you need to learn?
- Think about someone who you feel is really effective at learning in [Program Name].
    - What is it that this person does differently than others to make them effective?
    - What is the impact of this effective learning? What does it enable him/her to do?
- How do you train/socialize new team members to learn effectively at [Program Name]?
    - What skills would they need to develop to effectively learn from others?
    - What might challenge them in their learning when they first join?

Vicarious Learning in Air Medical Transportation

- How do you learn from a case that someone else transported?
    - Is this learning important for your work at [Program Name}?
    - What aspects of the other person's experience would help your learning?
- Can you tell me about a time that you learned from someone else's case?
    - How did you hear about the case? How did you come to know it occurred?
    - What did the other person do to share the experience with you?
    - Was this sharing done in person or via another method (e.g. online, phone, etc.)?
    - Describe the interaction – who started it and what happened as it unfolded?
- Can you tell me about a time you shared your own case experience to help others learn?
    - What method (e.g., email, face-to-face, etc.) do you use to share the experience?
    - Did you seek out the other person(s) to share the case with them, or did they seek you out? How did that unfold?
    - Why did you think this case was worth sharing with others?
    - How did others react to you sharing your experience? What did they do?
- What structures are in place at [Program Name] to help you learn from others' cases?
    - What does the organization provide to help/hurt your ability to learn?
    - What do leaders do that helps facilitate/constrain this learning?

Appendix B: Key Construct Survey Items for Chapter 4 Study

Learning Motives

I am motivated to learn and develop because…

1. I enjoy it.
2. It's fun.
3. I find it engaging.
4. I find it intrinsically satisfying.
5. I love to learn.

(Intrinsic, self-focused motives)

6. It will make me look good to others.
7. It will impress others.
8. It will enable me to look better than my coworkers.
9. It will bring me recognition.
10. I want other people to find out how good I am.

(Extrinsic, self-focused motives)

11. It will make me more effective in helping others.
12. It will help me have a positive impact on others.
13. It will enhance my ability to do good or others.
14. It will allow me to contribute to the well-being of others.
15. It will give me the chance to make a difference in the lives of others.

(Intrinsic, other-focused motives)

16. I feel that it is required by others.
17. Others expect me to.
18. I'll get in trouble if I don't.
19. That's what others think I'm supposed to do.
20. Others ask me to.

(Extrinsic, other-focused motives)

Vicarious Learning

Please assess the degree to which you agree with the following statements about your learning relationship with each member of your team:

1. This person often shares his/her prior experiences, expertise, or knowledge with me to help my learning.
2. I am able to draw meaningful lessons from the experiences and information this person shares with me.

Team Learning Norms

To what extent do each of these statements reflect an expected "norm" or shared value of your team:

1. Team members should seek out opportunities for the team to learn.
2. Team members should share information when it might help others.
3. Team members should go out of their way to help others with a problem or question.
4. Team members should be willing to take risks on new ideas to find out what works.
5. Team members should see learning and developing skills during the project as an important goal.

External Team Learning

To what extent did your team engage in learning with (i.e., gathered information from, or asked questions of) the following sources:

1. Faculty
2. Industry Experts
3. Other Teams
4. Second-year MBAs
5. Personal Network Contacts

REFERENCES

Adler, P. S., & Kwon, S.-W. (2002). Social Capital: Prospects for a New Concept. *Academy of Management Review*, *27*(1), 17–40.

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, *25*(1), 107–136.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology*, *80*(3), 260–267.

Ancona, D. G., & Bresman, H. (2005). Begging, Borrowing, and Building on Ideas from the Outside to Create Pulsed Innovation Inside Teams. In L. L. Thompson & H.-S. Choi, *Creativity and Innovation in Organizational Teams* (pp. 183–198). Mahwah, NJ: Lawrence Erlbaum Associates.

Ancona, D. G., & Caldwell, D. F. (1992). Bridging the Boundary: External Activity and Performance in Organizational Teams. *Administrative Science Quarterly*, *37*(4), 634–665.

Ancona, D., & Bresman, H. (2007). *X-teams: How to build teams that lead, innovate, and succeed*. Cambridge, MA: Harvard Business Press.

Anderson, P. J., Blatt, R., Christianson, M. K., Grant, A. M., Marquis, C., Neuman, E. J., et al. (2006). Understanding Mechanisms in Organizational Research: Reflections From a Collective Journey. *Journal of Management Inquiry*, *15*(2), 102–113. doi:10.1177/1056492605280231

Ardichvili, A. (2008). Learning and Knowledge Sharing in Virtual Communities of Practice: Motivators, Barriers, and Enablers. *Advances in Developing Human Resources*, *10*(4), 541–554. doi:10.1177/1523422308319536

Argote, L. (1999). *Organizational learning: Creating, retaining and transferring knowledge*. Norwell, MA: Kluwer.

Argote, L. (2015). Knowledge Transfer and Organizational Learning. In K. Kraiger, J. Passmore, N. R. dos Santos, & S. Malvezzi, *The Wiley Blackwell Handbook of the Psychology of Training, Development, and Performance Improvement* (pp. 154–170).

Argote, L., & Gino, F. (2009). Group Learning. In *Encyclopedia of Group Processes and Intergroup Relations*. Sage Publications.

Argote, L., & Ingram, P. (2000). Knowledge Transfer: A Basis for Competitive Advantage in Firms. *Organizational Behavior and Human Decision Processes*, *82*(1), 150–169.

Argote, L., & Miron-Spektor, E. (2011). Organizational Learning: From Experience to Knowledge. *Organization Science*, *22*(5), 1123–1137. doi:10.1287/orsc.1100.0621

Argote, L., & Ophir, R. (2002). Intraorganizational Learning. In J. A. Baum, *Blackwell Companion to Organizations* (pp. 181–207). Blackwell Publishing.

Argote, L., Beckman, S. L., & Epple, D. (1990). The Persistence and Transfer of Learning in Industrial Settings. *Management Science*, *36*(2), 140–154.

Argote, L., Gruenfeld, D., & Naquin, C. (2001). Group learning in organizations. *Groups at*

Work: Theory and Research, 369–411.
Argote, L., Ingram, P., Levine, J., & Moreland, R. L. (2000). Knowledge Transfer in Organizations: Learning from the Experience of Others. *Organizational Behavior and Human Decision Processes*, *82*(1), 1–8.
Argote, L., McEvily, B., & Reagans, R. (2003). Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science*, 571–582.
Argyris, C., & Schön, D. A. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.
Ashford, S. J. (1986). Feedback-Seeking in Individual Adaptation: A Resource Perspective. *Academy of Management Journal*, *29*, 465–487.
Ashford, S. J., & Tsui, A. S. (1991). Self-Regulation for Managerial Effectiveness: The Role of Active Feedback Seeking. *Academy of Management Journal*, *34*(2), 251–280.
Ashford, S., Blatt, R., & VandeWalle, D. M. (2003). Reflections on the Looking Glass: A Review of Research on Feedback-Seeking Behavior in Organizations. *Journal of Management*, *29*(6), 773–799. doi:10.1016/S0149-2063(03)00079-5
Avolio, B. J., & Hannah, S. T. (2008). Developmental readiness: Accelerating leader development. *Consulting Psychology Journal: Practice and Research*, *60*(4), 331.
Bailey, D. E., & Barley, S. R. (2011). Teaching-Learning Ecologies: Mapping the Environment to Structure Through Action. *Organization Science*, *22*(1), 262–285. doi:10.1287/orsc.1090.0511
Baker, W. E., & Bulkley, N. (2014). Paying It Forward vs. Rewarding Reputation: Mechanisms of Generalized Reciprocity. *Organization Science*, *25*(5), 1493–1510. doi:10.1287/orsc.2014.0920
Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology*, *41*(1), 63–105. doi:10.1111/j.1744-6570.1988.tb00632.x
Bamberger, P. A., & Pratt, M. G. (2010). Moving forward by looking back: reclaiming unconventional research contexts and samples in organizational scholarship. *Academy of Management Journal*, *53*, 665–671. Retrieved from http://amj.aom.org/content/53/4/665.short
Bandura, A. (1977a). Self-efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review*, *84*(2), 191–215.
Bandura, A. (1977b). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
Bandura, A. (1986). *Social foundations of thought and action*. Prentice Hall.
Bandura, A. (1989a). Human agency in social cognitive theory. *American Psychologist*, *44*(9), 1175–1184.
Bandura, A. (1989b). Social Cognitive Theory. In R. Vasta, *Annals of Child Development* (pp. 1–60). Greenwich, CT: JAI Press LTD.
Bandura, A. (2000). Exercise of Human Agency Through Collective Efficacy. *Current Directions in Psychological Science*, *9*(3), 75–78. doi:10.1111/1467-8721.00064
Bandura, A., & Walters, R. H. (1963). *Social learning and personality development*. New York: Holt, Rinehart and Winston.
Bandura, A., Ross, D., & Ross, S. A. (1963). Imitation of film-mediated aggressive models. *The Journal of Abnormal and Social Psychology*, *66*(1), 3–11.
Bantel, K. A., & Jackson, S. E. (1989). Top Management and Innovations in Banking: Does the Composition of the Top Team Make a Difference? *Strategic Management Journal*, *10*, 107–124.

Barley, S. R. (1990a). Images of Imaging: Notes on Doing Longitudinal Field Work. *Organization Science*, *1*(3), 220.
Barley, S. R. (1990b). The alignment of technology and structure through roles and networks. *Administrative Science Quarterly*.
Barley, S. R., & Kunda, G. (2001). Bringing work back in. *Organization Science*, *12*(1), 76–95.
Bartol, K. M., & Srivastava, A. (2002). Encouraging Knowledge Sharing: The Role of Organizational Reward Systems. *Journal of Leadership & Organizational Studies*, *9*(1), 64–76. doi:10.1177/107179190200900105
Batson, C. D. (1991). *The altruism question: Toward a social-psychological answer*. Lawrence Erlbaum Associates, Inc.
Baum, J. A., Li, S. X., & Usher, J. (2000). Making the Next Move: How Experiential and Vicarious Learning Shape the Locations of Chains' Acquisitions. *Administrative Science Quarterly*, *45*(4), 766–801.
Bechky, B. A. (2006). Talking About Machines, Thick Description, and Knowledge Work. *Organization Studies*, *27*(12), 1757–1768. doi:10.1177/0170840606071894
Beckman, C. M., & Haunschild, P. R. (2002). Network Learning: The Effects of Partners' Heterogeneity of Experience on Corporate Acquisitions. *Administrative Science Quarterly*, *47*(1), 92–124.
Bettenhausen, K., & Murnighan, J. K. (1985). The Emergence of Norms in Competitive Decision-Making Groups. *Administrative Science Quarterly*, *30*(3), 350–372.
Blau, G. (1988). An investigation of the apprenticeship organizational socialization strategy. *Journal of Vocational Behavior*, *32*, 176–195.
Blumer, H. (1969). Symbolic interactionism: Perspective and method.
Boje, D. M. (1991). The storytelling organization: A study of story performance in an office-supply firm. *Administrative Science Quarterly*, *36*(1), 106–126.
Borgatti, S. P., & Cross, R. (2003). A relational view of information seeking and learning in social networks. *Management Science*, *49*(4), 432–445.
Bresman, H. (2010). External Learning Activities and Team Performance: A Multimethod Field Study. *Organization Science*, *21*(1), 81–96. doi:10.1287/orsc.1080.0413
Bresman, H. (2013). Changing Routines: A Process Model of Vicarious Group Learning in Pharmaceutical R&D. *Academy of Management Journal*, *56*(1), 35–61. doi:10.5465/amj.2010.0725
Bresman, H., & Zellmer-Bruhn, M. (2012). The Structural Context of Team Learning: Effects of Organizational and Team Structure on Internal and External Learning. *Organization Science*. doi:10.1287/orsc.1120.0783
Bresman, H., Birkinshaw, J., & Nobel, R. (1999). Knowledge Transfer in International Acquisitions. *Journal of International Business Studies*, *30*(3), 439–462.
Brookfield, S. (1987). Developing critical thinkers.
Brown, J. S., & Duguid, P. (1991). Organizational Learning and Communities-Of-Practice: Toward a Unified View of Working, Learning, and Innovating. *Organization Science*, *2*(1), 40–57.
Browning, L. D. (1992). Lists and Stories as OrganizationaI Communication. *Communication Theory*, *2*(4), 281–302. doi:10.1111/j.1468-2885.1992.tb00045.x
Bunderson, J. S., & Sutcliffe, K. M. (2002). Comparing alternative conceptualizations of functional diversity in management teams: Process and performance effects. *Academy of Management Journal*, 875–893.

Bunderson, J. S., & Sutcliffe, K. M. (2003). Management team learning orientation and business unit performance. *Journal of Applied Psychology*, *88*(3), 552–560. doi:10.1037/0021-9010.88.3.552

Burt, R. S. (1987). Social contagion and innovation: Cohesion versus structural equivalence. *American Journal of Sociology*, *92*, 1287–1335.

Burt, R. S. (1992). *Structural holes: the social structure of competition*. Cambridge, Mass.: Harvard University Press.

Caimo, A., & Lomi, A. (2014). Knowledge Sharing in Organizations: A Bayesian Analysis of the Role of Reciprocity and Formal Structure. *Journal of Management*. doi:10.1177/0149206314552192

Cannon-Bowers, J. A., Salas, E., & Converse, S. A. (1993). Shared mental models in expert team decision making. In N. J. Castellan, *Individual and group decision making: Current issues* (pp. 221–246). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Carmeli, A., & Gittell, J. H. (2009). High- quality relationships, psychological safety, and learning from failures in work organizations. *Journal of Organizational Behavior*, *30*, 709–729.

Casciaro, T., & Lobo, M. S. (2008). When competence is irrelevant: The role of interpersonal affect in task-related ties. *Administrative Science Quarterly*, *53*, 655–684.

Cascio, W. (2003). Changes in workers, work, and organizations. In W. Borman, R. J. Klimoski, & D. R. Ilgen, *Handbook of Psychology, Volume Twelve: Industrial and Organizational Psychology* (pp. 401–422). New York: John Wiley & Sons.

Chiu, C.-M., Hsu, M.-H., & Wang, E. T. G. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. *Decision Support Systems*, *42*(3), 1872–1888. doi:10.1016/j.dss.2006.04.001

Christianson, M. K., Farkas, M. T., Sutcliffe, K. M., & Weick, K. E. (2009). Learning Through Rare Events: Significant Interruptions at the Baltimore & Ohio Railroad Museum. *Organization Science*, *20*(5), 846–860. doi:10.1287/orsc.1080.0389

Cohen, M. D., Burkhart, R., Dosi, G., Egidi, M., Marengo, L., Warglien, M., & Winter, S. G. (1996). Routines and other recurring action patterns of organizations: Contemporary research issues. *Industrial and Corporate Change*, *5*(3), 653–698.

Cohen, M. D., Hilligoss, B., & Amaral, A. (2012). A handoff is not a telegram: an understanding of the patient is co-constructed. *Critical Care*.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, *35*(1), 128–152. doi:10.2307/2393553

Colquitt, J., & Simmering, M. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. *Journal of Applied Psychology*, *83*, 654–665.

Colquitt, J., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: a meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology*, *85*, 678–707.

Conle, C. (2003). An Anatomy of Narrative Curricula. *Educational Researcher*, *32*(3), 3–15. doi:10.3102/0013189X032003003

Connell, N., Kleįn, J. H., & Meyer, E. (2004). Narrative approaches to the transfer of organisational knowledge. *Knowledge Management Research & Practice*, *2*(3), 184–193. doi:10.1057/palgrave.kmrp.8500034

Contu, A., & Willmott, H. (2003). Re-Embedding Situatedness: The Importance of Power

Relations in Learning Theory. *Organization Science*, *14*(3), 283–296.
Cook, S. D. N., & Yanow, D. (1993). Culture and Organizational Learning. *Journal of Management Inquiry*, *2*(4), 373–390. doi:10.1177/105649269324010
Corbin, J., & Strauss, A. L. (2008). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage.
Corley, K. G., & Gioia, D. A. (2011). Building Theory about Theory Building: What Constitutes a Theoretical Contribution? *Academy of Management Review*, *36*(1), 12–32.
Craig, S. D., Sullins, J., Witherspoon, A., & Gholson, B. (2006). The deep-level-reasoning-question effect: The role of dialogue and deep-level-reasoning questions during vicarious learning. *Cognition and Instruction*, *24*(4), 565–591.
Cross, R., & Sproull, L. (2004). More Than an Answer: Information Relationships for Actionable Knowledge. *Organization Science*, *15*(4), 446–462. doi:10.1287/orsc.1040.0075
Cross, R., Borgatti, S. P., & Parker, A. (2001). Beyond answers: dimensions of the advice network. *Social Networks*.
Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. *Prentice-Hall*. Prentice-Hall.
Czarniawska, B. (2000). *The uses of narrative in organization research*. *rapport nr.: GRI reports* (Vol. 5). GRI Reports.
Daft, R. L., & Weick, K. E. (1984). Toward a Model of Organizations as Interpretation Systems. *Academy of Management Review*, *9*(2), 284.
Dailey, S., & Browning, L. D. (2014). Retelling Stories in Organizations: Understanding the Functions of Narrative Repetition. *Academy of Management Review*, *39*(1), 22–43. doi:10.5465/amr.2011.0329
Darr, E. D., Argote, L., & Epple, D. (1995). The Acquisition, Transfer, and Depreciation of Knowledge in Service Organizations: Productivity in Franchises. *Management Science*, *41*(11), 1750–1762. doi:10.1287/mnsc.41.11.1750
Davenport, T. H., & Prusak, L. (1998). *Working knowledge: Managing what your organization knows*. Boston: Harvard Business School Press.
Davenport, T. H., David, W., & Beers, M. C. (1998). Successful knowledge management projects. *Sloan Management Review*, *39*(2), 43–57.
Davis, T., & Luthans, F. (1980). A social learning approach to organizational behavior. *Academy of Management Review*, *5*(2), 281–290.
DeRue, D. S., & Myers, C. G. (2014). Leadership Development: A Review and Agenda for Future Research. In D. V. Day, *Oxford Handbook of Leadership and Organizations* (pp. 832–855). New York: Oxford University Press.
DeRue, D. S., Ashford, S. J., & Myers, C. G. (2012a). Learning Agility: In Search of Conceptual Clarity and Theoretical Grounding. *Industrial and Organizational Psychology*, *5*(3), 258–279. doi:10.1111/j.1754-9434.2012.01444.x
DeRue, D. S., Nahrgang, J. D., Hollenbeck, J. R., & Workman, K. (2012b). A quasi-experimental study of after-event reviews and leadership development. *Journal of Applied Psychology*, *97*(5), 997–1015. doi:10.1037/a0028244
DeShon, R. P., & Gillespie, J. Z. (2005). A Motivated Action Theory Account of Goal Orientation. *Journal of Applied Psychology*, *90*(6), 1096–1127. doi:10.1037/0021-9010.90.6.1096
Desmettre, T., Yeguiayan, J.-M., Coadou, H., Jacquot, C., Raux, M., Vivien, B., et al. (2012). Impact of emergency medical helicoptertransport directly to a university hospital trauma

center on mortality of severe blunt trauma patients until discharge. *Critical Care*, *16*(5), R170. doi:10.1186/cc11647
Dewey, J. (1938). *Logic, the theory of inquiry*. New York: Holt Publishing.
Di Stefano, G., Gino, F., Pisano, G. P., & Staats, B. R. (2014, March 25). Learning by Thinking: How Reflection Aids Performance. *Harvard Business School Working Paper Series*.
DiMaggio, P. J. (2009). The twenty-first-century firm: changing economic organization in international perspective. doi:10.2307/j.ctt7rrcq
Dionysiou, D. D., & Tsoukas, H. (2013). Understanding the (Re)Creation of Routines from Within: A Symbolic Interactionist Perspective. *Academy of Management Review*, *38*(2), 181–205. doi:10.5465/amr.2011.0215
Dixon, N. M. (2000). Common knowledge: How companies thrive by sharing what they know.
Drucker, P. R. (1998). From capitalism to knowledge society. Woburn, MA: Butterworth.
Dutton, J. E., Workman, K., & McClain, J. (2013). Readying for Compassionate Work. Presented at the Annual Meeting of the Academy of Management, Orlando, FL.
Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, *41*, 1040–1048.
Dyer, J. H., & Nobeoka, K. (2000). Creating and Managing a High-Performance Knowledge-Sharing Network: The Toyota Case. *Strategic Management Journal*, *21*(3), 345–367.
Edmondson, A. C. (1999). Psychological Safety and Learning Behavior in Work Teams. *Administrative Science Quarterly*, *44*(2), 350–383.
Edmondson, A. C. (2002). The local and variegated nature of learning in organizations: A group-level perspective. *Organization Science*, *13*(2), 128–146.
Edmondson, A. C., & McManus, S. E. (2007). Methodological Fit in Management Field Research. *Academy of Management Review*, *32*(4), 1155–1179. doi:10.5465/AMR.2007.26586086
Edmondson, A. C., Bohmer, R. M., & Pisano, G. P. (2001). Disrupted Routines: Team Learning and New Technology Implementation in Hospitals. *Administrative Science Quarterly*, *46*(4), 685–716.
Edmondson, A. C., Dillon, J. R., & Roloff, K. S. (2007). Three Perspectives on Team Learning: Outcome Improvement, Task Mastery, and Group Process. *Academy of Management Annals*, *1*(1), 269–314.
Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review*, *14*(4), 532.
Elder, G. H. (1971). Racial Conflict and Learning. *Sociometry*, 151–173.
Ellis, S., & Davidi, I. (2005). After-Event Reviews: Drawing Lessons From Successful and Failed Experience. *Journal of Applied Psychology*, *90*(5), 857–871. doi:10.1037/0021-9010.90.5.857
Ellis, S., Ganzach, Y., Castle, E., & Sekely, G. (2010). The effect of filmed versus personal after-event reviews on task performance: The mediating and moderating role of self-efficacy. *Journal of Applied Psychology*, *95*(1), 122–131. doi:10.1037/a0017867
Ellis, S., Mendel, R., & Nir, M. (2006). Learning from successful and failed experience: The moderating role of kind of after-event review. *Journal of Applied Psychology*, *91*(3), 669–680.
Emerson, R. M., Fretz, R., & Shaw, L. L. (1995). *Writing Ethnographic Fieldnotes*. University of Chicago Press.
Empson, L. (2001). Fear of Exploitation and Fear of Contamination: Impediments to Knowledge

Transfer in Mergers between Professional Service Firms. *Human Relations*, *54*(7), 839–862. doi:10.1177/0018726701547003
Engeström, Y., & Middleton, D. (1998). *Cognition and Communication at Work*. Cambridge University Press.
Espinosa, J. A., & Clark, M. A. (2014). Team Knowledge Representation: A Network Perspective. *Human Factors: the Journal of the Human Factors and Ergonomics Society*, *56*(2), 333–348. doi:10.1177/0018720813494093
Fahey, L., & Prusak, L. (1998). The eleven deadliest sins of knowledge management. *California Management Review*, *40*(3), 265–276.
Feldman, M. S. (2003). Reconceptualizing Organizational Routines as a Source of Flexibility and Change. *Administrative Science Quarterly*, *48*(1), 94. doi:10.2307/3556620
Festinger, L., Back, K. W., & Schachter, S. (1950). Social pressures in informal groups: A study of human factors in housing, (3).
Foss, N. (2009). Alternative research strategies in the knowledge movement: From macro bias to micro- foundations and multi- level explanation. *European Management Review*.
Freeman, L. C. (1979). Centrality in social networks conceptual clarification. *Social Networks*, *1*(3), 215–239.
French, J. R., & Raven, B. (1959). *The Bases of Social Power*.
Gardner, H. K., Gino, F., & Staats, B. R. (2012). Dynamically Integrating Knowledge in Teams: Transforming Resources into Performance. *Academy of Management Journal*, *55*(4), 998–1022. doi:10.5465/amj.2010.0604
Garrick, J. (1998). Informal learning in corporate workplaces. *Human Resource Development Quarterly*, *9*(2), 129–144.
Garud, R., Dunbar, R. L. M., & Bartel, C. A. (2011). Dealing with Unusual Experiences: A Narrative Perspective on Organizational Learning. *Organization Science*, *22*(3), 587–601. doi:10.1287/orsc.1100.0536
Garvin, D. A., Edmondson, A. C., & Gino, F. (2008). Is yours a learning organization? *Harvard Business Review*, *86*(3), 109–134.
Geen, R. G. (1991). Social motivation. *Annual Review of Psychology*, *42*, 377–399.
Gergen, K. J. (1997). *Realities and relationships: Soundings in social construction*. Harvard University Press.
Ghaferi, A. A., & Dimick, J. B. (2015). Understanding Failure to Rescue and Improving Safety Culture. *Annals of Surgery*, 1–2. doi:10.1097/SLA.0000000000001135
Ghaferi, A. A., Birkmeyer, J. D., & Dimick, J. B. (2009). Variation in Hospital Mortality Associated with Inpatient Surgery. *New England Journal of Medicine*, *361*(14), 1368–1375. doi:10.1056/NEJMsa0903048
Gherardi, S. (2006). Organizational knowledge: The texture of workplace learning.
Giddens, A. (1987). Social theory and modern sociology.
Gioia, D. A., & Manz, C. C. (1985). Linking Cognition and Behavior: A Script Processing Interpretation of Vicarious Learning. *Academy of Management Review*, *10*(3), 527–539.
Gittell, J. H. (2002). Coordinating Mechanisms in Care Provider Groups: Relational Coordination as a Mediator and Input Uncertainty as a Moderator of Performance Effects. *Management Science*, *48*(11), 1408–1426.
Gittell, J. H. (2003). The Southwest Airlines way: Using the power of relationships to achieve high performance.
Gittell, J. H., Seidner, R., & Wimbush, J. (2010). A Relational Model of How High-Performance

Work Systems Work. *Organization Science*, *21*(2), 490–506. doi:10.1287/orsc.1090.0446
Gittell, J. H., Weinberg, D., Pfefferle, S., & Bishop, C. (2008). Impact of relational coordination on job satisfaction and quality outcomes: a study of nursing homes. *Human Resource Management Journal*, *18*(2), 154–170.
Glaser, B. G., & Strauss, A. (1967). *The Discovery of Grounded Theory*. Hawthorne, NY: Aldine.
Glynn, M. A., Lant, T. K., & Milliken, F. J. (1994). Mapping Learning Processes in Organizations: A Multi-level Framework Linking Learning and Organizing. In C. Stubbart, J. R. Meindl, & J. F. Porac, *Advances in Managerial Cognition and Organizational Information Processing* (Vol. 5, pp. 1–2). London: JAI PRESS INC.
Goddard, R. D., Hoy, W. K., & Hoy, A. W. (2004). Collective Efficacy Beliefs:Theoretical Developments, Empirical Evidence, and Future Directions. *Educational Researcher*, *33*(3), 3–13. doi:10.3102/0013189X033003003
Golden-Biddle, K., & Locke, K. D. (2007). *Composing qualitative research*. Sage.
Granovetter, M. S. (1973). The Strength of Weak Ties. *American Journal of Sociology*, *78*(6), 1360–1380.
Grant, A. M. (2007). Relational job design and the motivation to make a prosocial difference. *Academy of Management Review*, *32*(2), 393–417.
Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, *17*, 109.
Grecu, D. L., & Becker, L. A. (1998). Coactive Learning for Distributed Data Mining. Presented at the 4th International Conference on Knowledge Discovery and Data Mining, New York.
Greve, H. R. (1998). Managerial cognition and the mimetic adoption of market positions: What you see is what you do. *Strategic Management Journal*.
Greve, H. R. (2000). Market Niche Entry Decisions: Competition, Learning, and Strategy in Tokyo Banking, 1894-1936. *The Academy of Management Journal*, *43*(5), 816–836.
Gruenfeld, D. H. H., Martorana, P. V., & Fan, E. T. (2000). What Do Groups Learn from Their Worldliest Members? Direct and Indirect Influence in Dynamic Teams. *Organizational Behavior and Human Decision Processes*, *82*(1), 45–59. doi:10.1006/obhd.2000.2886
Gumperz, J. J. (1992). Contextualization and understanding. In *Rethinking context: Language as an interactive phenomenon* (Vol. 11, p. 229). Cambridge University Press.
Gupta, A. K., & Govindarajan, V. (2000). Knowledge Flows within Multinational Corporations. *Strategic Management Journal*, *21*(4), 473–496.
Hall, H. (2001). Input-friendliness: motivating knowledge sharing across intranets. *Journal of Information Science*, *27*(3), 139–146. doi:10.1177/016555150102700303
Hansen, M. T. (1999). The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits. *Administrative Science Quarterly*, *44*(1), 82–111.
Hansen, M. T., Mors, M. L., & Løvås, B. (2005). Knowledge Sharing in Organizations: Multiple Networks, Multiple Phases. *Academy of Management Journal*, *48*(5), 776–793.
Hatch, M. J., & Weick, K. E. (1998). Critical Resistance to the Jazz Metaphor. *Organization Science*, *9*(5), 600–604.
Haunschild, P. (1993). Interorganizational Imitation: The Impact of Interlocks on Corporate Acquisition Activity. *Administrative Science Quarterly*, *38*, 564–592.
Haunschild, P. R., & Beckman, C. M. (1998). When do interlocks matter?: Alternate sources of information and interlock influence. *Administrative Science Quarterly*, *43*(4), 815–844. doi:10.2307/2393617

Haunschild, P. R., & Miner, A. S. (1997). Modes of Interorganizational Imitation: The Effects of Outcome Salience and Uncertainty. *Administrative Science Quarterly*, *42*(3), 472–500.
Hazlett, S.-A., McAdam, R., & Gallagher, S. (2005). Theory Building in Knowledge Management: In Search of Paradigms. *Journal of Management Inquiry*, *14*(1), 31–42. doi:10.1177/1056492604273730
Hedström, P., & Swedberg, R. (1998). Social mechanisms: An analytical approach to social theory.
Heider, F. (1958). *The Psychology of Interpersonal Relations*. New York: John Wiley & Sons.
Hernadi, P. (1987). Literary Interpretation and the Rhetoric of the HUman Sciences. In J. S. Nelson, A. Megill, & D. N. McCloskey, *The Rhetoric of the Human Sciences* (pp. 263–275). Madison, WI: University of Wisconsin Press.
Hinds, P. J., & Bailey, D. E. (2003). Out of Sight, Out of Sync: Understanding Conflict in Distributed Teams. *Organization Science*, *14*(6), 615–632.
Hitt, M. A., & Tyler, B. B. (1991). Strategic Decision Models: Integrating Different Perspectives. *Strategic Management Journal*, *12*(5), 327–351.
Hofmann, D. A., Lei, Z., & Grant, A. M. (2009). Seeking help in the shadow of doubt: The sensemaking processes underlying how nurses decide whom to ask for advice. *Journal of Applied Psychology*, *94*(5), 1261–1274. doi:10.1037/a0016557
Hollingshead, A. B. (1996). Information suppression and status persistence in group decision making the effects of communication media. *Human Communication Research*.
Hollingshead, A. B., Gupta, N., Yoon, K., & Brandon, D. P. (2011). Transactive memory theory and teams: Past, present, and future. In *Theories of Team Cognition: Crossdisciplinary Perspectives* (pp. 421–455).
Hoover, J. D., & Giambatista, R. C. (2009). Why Have we Neglected Vicarious Experiential Learning. *Developments in Business Simulation and Experiential Learning*, *36*, 33–37.
Hoover, J. D., Giambatista, R. C., & Belkin, L. Y. (2012). Eyes On, Hands On: Vicarious Observational Learning as an Enhancement of Direct Experience. *Academy of Management Learning and Education*, *11*(4), 591–608. doi:10.5465/amle.2010.0102
Huber, G. P. (1991). Organizational Learning: The Contributing Processes and the Literatures. *Organization Science*, *2*(1), 88–115.
Huber, G. P., & Daft, R. L. (1987). The information environments of organizations. In F. M. Jablin, L. L. Putnam, K. H. Roberts, & L. W. Porter, *Handbook of Organizational Communication* (pp. 130–164). Newbury Park, CA.
Huber, G. P., & Lewis, K. (2010). Cross-understanding: Implications for group cognition and performance. *Academy of Management Review*, *25*(1), 6–26.
Ingram, P., & Baum, J. A. (1997). Chain affiliation and the failure of Manhattan hotels, 1898-1980. *Administrative Science Quarterly*, *42*, 68–102.
Ingram, P., & Roberts, P. W. (2000). Friendships among Competitors in the Sydney Hotel Industry. *American Journal of Sociology*, *106*(2), 387–423. doi:10.1086/316965
Ipe, M. (2003). Knowledge Sharing in Organizations: A Conceptual Framework. *Human Resource Management Review*, *2*(4), 337–359. doi:10.1177/1534484303257985
Isaacs, W. N. (1993). Taking flight: Dialogue, collective thinking, and organizational learning. *Organizational Dynamics*, *22*(2), 24–39. doi:10.1016/0090-2616(93)90051-2
Jick, T. D. (1979). Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Administrative Science Quarterly*, *24*(4), 602–611.
Joas, H. (1997). GH Mead: A contemporary re-examination of his thought.

Kane, A. A. (2010). Unlocking Knowledge Transfer Potential: Knowledge Demonstrability and Superordinate Social Identity. *Organization Science*, *21*(3), 643–660. doi:10.1287/orsc.1090.0469

Kang, S.-C., Morris, S. S., & Snell, S. A. (2007). Relational Archetypes, Organizational Learning, and Value Creation: Extending the Human Resource Architecture. *Academy of Management Review*, *32*(1), 236–256.

Katz, I., & Benjamin, L. (1960). Effects of white authoritarianism in biracial work groups. *The Journal of Abnormal and Social Psychology*, *61*(3), 448–456.

KC, D., Staats, B. R., & Gino, F. (2013). Learning from My Success and from Others' Failure: Evidence from Minimally Invasive Cardiac Surgery. *Management Science*, *59*(11), 2435–2449. doi:10.1287/mnsc.2013.1720

Kim, J.-Y. J., & Miner, A. S. (2007). Vicarious Learning from the Failures and Near-Failures of Others: Evidence from the U.S. Commercial Banking Industry. *Academy of Management Journal*, *50*(3), 687–714.

Klein, K. J., & Kozlowski, S. W. J. (2000). From Micro to Meso: Critical Steps in Conceptualizing and Conducting Multilevel Research. *Organizational Research Methods*, *3*(3), 211–236. doi:10.1177/109442810033001

Klein, K. J., Lim, B.-C., Saltz, J. L., & Mayer, D. M. (2004). How Do They Get There? An Examination of the Antecedents of Centrality in Team Networks. *The Academy of Management Journal*, *47*(6), 952–963.

Klein, K. J., Ziegert, J. C., Knight, A. P., & Yan, X. (2006). Dynamic Delegation: Shared, Hierarchical, and Deindividualized Leadership in Extreme Action Teams. *Administrative Science Quarterly*, *51*(4), 590–621.

Kleinbaum, A. M., Jordan, A. H., & Audia, P. G. (2015). An Altercentric Perspective on the Origins of Brokerage in Social Networks: How Perceived Empathy Moderates the Self-Monitoring Effect. *Organization Science*. doi:10.1287/orsc.2014.0961

Knowles, M. (1980). *The modern practice of adult education: From pedagogy to andragogy*. New York: Cambridge Press.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.

Kreft, I. G., & De Leeuw, J. (1998). *Introducing multilevel modeling*. Sage.

Krogh, Von, G. (1998). Care in Knowledge Creation. *California Management Review*, *40*(3), 133–153.

Lai, J., Lui, S. S., & Tsang, E. W. K. (2015). Intrafirm Knowledge Transfer and Employee Innovative Behavior: The Role of Total and Balanced Knowledge Flows. *Journal of Product Innovation Management*, n/a–n/a. doi:10.1111/jpim.12262

Latham, G. P., & Saari, L. M. (1979). Application of social-learning theory to training supervisors through behavioral modeling. *Journal of Applied Psychology*.

Lau, D. C., & Murnighan, J. K. (1998). Demographic Diversity and Faultlines: The Compositional Dynamics of Organizational Groups. *Academy of Management Review*, *23*(2), 325–340.

Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation.

Leape, L. L. (1994). Error in medicine. *JAMA-Journal of the American Medical Association*, *272*(23), 1851–1856.

LeBreton, J. M., & Senter, J. L. (2007). Answers to 20 Questions About Interrater Reliability and Interrater Agreement. *Organizational Research Methods*, *11*(4), 815–852.

Lee, T. W., Mitchell, T. R., & Sablynski, C. J. (1999). Qualitative research in organizational and vocational psychology, 1979–1999. *Journal of Vocational Behavior*.
Leonard, D., Barton, G., & Barton, M. (2013). Make yourself an expert. *Harvard Business Review*.
Leonard-Barton, D. (1995). *Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation*. Harvard Business Press.
Levin, D. Z., & Cross, R. (2004). The Strength of Weak Ties You Can Trust: The Mediating Role of Trust in Effective Knowledge Transfer. *Management Science*, *50*(11), 1477–1490. doi:10.1287/mnsc.1030.0136
Levitt, B., & March, J. G. (1988). Organizational Learning. *Annual Review of Sociology*, *14*, 319–340.
Lewis, J. D., & Weigert, A. (1985). Trust as a Social Reality. *Social Forces*, *63*(4), 967–985.
Lewis, K. (2004). Knowledge and Performance in Knowledge-Worker Teams: A Longitudinal Study of Transactive Memory Systems. *Management Science*, *50*(11), 1519–1533. doi:10.1287/mnsc.1040.0257
Lewis, K., Lange, D., & Gillis, L. (2005). Transactive Memory Systems, Learning, and Learning Transfer. *Organization Science*, *16*(6), 581–598. doi:10.1287/orsc.1050.0143
Leykum, L. K., Palmer, R., Lanham, H., Jordan, M., McDaniel, R. R., Noël, P. H., & Parchman, M. (2011). Reciprocal learning and chronic care model implementation in primary care: results from a new scale of learning in primary care. *BMC Health Services Research*, *11*(1), 44. doi:10.1186/1472-6963-11-44
Lim, B.-C., & Klein, K. J. (2006). Team mental models and team performance: a field study of the effects of team mental model similarity and accuracy. *Journal of Organizational Behavior*, *27*(4), 403–418. doi:10.1002/job.387
Lindsay, G. (2013, April 7). Engineering Serendipity. *The New York Times*, p. SR12. Retrieved from http://www.nytimes.com/2013/04/07/opinion/sunday/engineering-serendipity.html?_r=0
Lipshitz, R., Friedman, V. J., & Popper, M. (2007). *Demystifying Organizational Learning*. Thousand Oaks, CA: Sage Publications.
Littlepage, G., Robison, W., & Reddington, K. (1997). Effects of task experience and group experience on group performance, member ability, and recognition of expertise. *Organizational Behavior and Human Decision Processes*, *69*(2), 133–147.
Locke, K. D. (2001). *Grounded Theory in Management Research*. London: Sage Publications.
Lofland, J., Snow, D. A., Anderson, L., & Lofland, L. (2006). *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Belmont, CA: Wadsworth/Thomson Learning.
Madsen, P. M., & Desai, V. (2010). Failing to Learn? The Effects of Failure and Success on Organizational Learning in the Global Orbital Launch Vehicle Industry. *Academy of Management Journal*, *53*(3), 451–476. doi:10.5465/AMJ.2010.51467631
Manz, C. C., & Sims, H. P. (1981). Vicarious Learning: The Influence of Modeling on Organizational Behavior. *Academy of Management Review*, *6*(1), 105–113.
March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, *2*(1), 71–87.
Marshall, C., & Rossman, G. B. (2010). *Designing Qualitative Research*. Sage.
Marsick, V. J., & Watkins, K. (1990). *Informal and Incidental Learning in the Workplace*. New York: Routledge.

Martin, J., Feldman, M. S., Hatch, M. J., & Sitkin, S. B. (1983). The Uniqueness Paradox in Organizational Stories. *Administrative Science Quarterly*, *28*(3), 438.
Martins, L. L., Gilson, L. L., & Maynard, M. T. (2004). Virtual teams: What do we know and where do we go from here? *Journal of Management*, *30*(6), 805–835. doi:10.1016/j.jm.2004.05.002
Mathieu, J. E., Heffner, T. S., & Goodwin, G. F. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology*, *85*(2), 273–283.
Matzler, K., & Mueller, J. (2011). Antecedents of knowledge sharing – Examining the influence of learning and performance orientation. *Journal of Economic Psychology*, *32*(3), 317–329. doi:10.1016/j.joep.2010.12.006
Maurer, T. J., & Tarulli, B. A. (1994). Investigation of perceived environment, perceived outcome, and person variables in relationship to voluntary development activity by employees. *Journal of Applied Psychology*, *79*(1), 3–14.
Maxwell, J. A. (2005). *Qualitative Research Design: An Interactive Approach*. Thousand Oaks, CA: SAGE.
Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An Integrative Model of Organizational Trust. *Academy of Management Review*, *20*(3), 709–734.
McAllister, D. J. (1995). Affect-and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal*, *38*(1), 24–59.
McCall, M. W., Lombardo, M. M., & Morrison, A. M. (1988). *The lessons of experience: How successful executives develop on the job*. Lexington, MA: Lexington Books.
McCrary, N. E., & Mazur, J. M. (2008). Conceptualizing a narrative simulation to promote dialogic reflection: using a multiple outcome design to engage teacher mentors. *Educational Technology Research and Development*, *58*(3), 325–342. doi:10.1007/s11423-008-9100-y
McDermott, R., & O'Dell, C. (2001). Overcoming cultural barriers to sharing knowledge. *Journal of Knowledge Management*, *5*(1), 76–85.
McDonald, C. J. (1998). The evolution of Intel's Copy EXACTLY! technology transfer method'. *Intel Technology Journal*, *4*(1).
McEvily, B., Soda, G., & Tortoriello, M. (2014). More Formally: Rediscovering the Missing Link between Formal Organization and Informal Social Structure. *The Academy of Management Annals*, *8*(1), 299–345. doi:10.1080/19416520.2014.885252
McGrath, J. E. (1984). Groups: Interaction and performance, *14*.
McIver, D., Lengnick-Hall, C., Lengnick-Hall, M., & Ramachandran, I. (2013). Understanding Work and Knowledge Management from a Knowledge-in-Practice Perspective. *Academy of Management Review*, *38*(4). doi:10.5465/amr.2011.0266
Mead, G. H. (1934). *Mind, self, and society: From the standpoint of a social behaviorist*. Chicago: University of Chicago Press.
Menon, T., & Blount, S. (2003). The Messenger Bias: A Relational Model of Knowledge Valuation. *Research in Organizational Behavior*, *25*, 137–186. doi:10.1016/S0191-3085(03)25004-8
Michel, A. A. (2007). A distributed cognition perspective on newcomers' change processes: The management of cognitive uncertainty in two investment banks. *Administrative Science Quarterly*, *52*, 507–557.
Miles, M. B., & Huberman, A. M. (1984). *Qualitative data analysis: A source book of new methods*. Beverly Hills, CA: Sage.
Miller, K. D., Zhao, M., & Calantone, R. J. (2006). Adding Interpersonal Learning and Tacit

Knowledge to March's Exploration-Exploitation Model. *The Academy of Management Journal*, *49*(4), 709–722. doi:10.2307/20159794?ref=no-x-route:90698b8aa699b12d1cac701c17987731
Moreland, R. L., & Argote, L. (2003). Transactive Memory in Dynamic Organizations. In R. Peterson & E. Mannix, *Leading and Managing People in the Dynamic Organization* (pp. 135–162). Mahwah, NJ: Lawrence Erlbaum Associates.
Moreland, R. L., & Myaskovsky, L. (2000). Exploring the Performance Benefits of Group Training: Transactive Memory or Improved Communication? *Organizational Behavior and Human Decision Processes*, *82*(1), 117–133. doi:10.1006/obhd.2000.2891
Morris, M. W., & Moore, P. C. (2000). The Lessons We (Don't) Learn: Counterfactual Thinking and Organizational Accountability after a Close Call. *Administrative Science Quarterly*, *45*(4), 737–765. doi:10.2307/2667018
Muthén, L. K., & Muthén, B. O. (2012). *Mplus User's Guide* (pp. 1–856). Los Angeles, CA: Muthén & Muthén.
Myers, C. G., & DeRue, D. S. (2013). Learning motives and their implication for development and performance. Presented at the 28th Annual Conference of the Society for Industrial and Organizational Psychology, Houston, TX.
Nadler, J., Thompson, L., & Van Boven, L. (2003). Learning negotiation skills: Four models of knowledge creation and transfer. *Management Science*, *49*(4), 529–540.
Newman, M. (2009). *Networks: an introduction*. Oxford University Press.
Noe, R. A., Clarke, A. D. M., & Klein, H. J. (2014). Learning in the Twenty-First-Century Workplace. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*(1), 140114155134003. doi:10.1146/annurev-orgpsych-031413-091321
Noël, P. H., Lanham, H. J., Palmer, R. F., Leykum, L. K., & Parchman, M. L. (2013). The importance of relational coordination and reciprocal learning for chronic illness care within primary care teams. *Health Care Management Review*, *38*(1), 20–28. doi:10.1097/HMR.0b013e3182497262
Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, *5*(1), 14–37. doi:10.1287/orsc.5.1.14
O'leary, M. B., Mortensen, M., & Woolley, A. W. (2011). Multiple Team Membership: a Theoretical Model of its Effects on Productivity and Learning for Individuals and Teams. *Academy of Management Review*, *36*(3), 461–478.
O'Reilly, C. A., III, & Tushman, M. L. (2013). Organizational Ambidexterity: Past, Present, and Future. *Academy of Management Persepcitves*, *27*(4), 324–338. doi:10.5465/amp.2013.0025
Obstfeld, D. (2005). Social Networks, the Tertius Iungens Orientation, and Involvement in Innovation. *Administrative Science Quarterly*, *50*(1), 100–130. doi:10.2189/asqu.2005.50.1.100
Orr, J. E. (1996). Talking about machines: An ethnography of a modern job.
Osterloh, M., & Frey, B. S. (2000). Motivation, knowledge transfer and organizational forms. *Organization Science*, *11*(5), 538–550.
Parker, S. K., & Axtell, C. M. (2001). Seeing another viewpoint: Antecedents and outcomes of employee perspective taking, *44*(6), 1085–1100. Retrieved from http://amj.aom.org/content/44/6/1085.short
Pelled, L. H. (1996). Demographic Diversity, Conflict, and Work Group Outcomes: An Intervening Process Theory. *Organization Science*, *7*(6), 615–631.
Pennings, J. M., Lee, K., & van Witteloostuijn, A. (1998). Human Capital, Social Capital, and

Firm Dissolution. *The Academy of Management Journal*, *41*(4), 425–440.
Pentland, B. T. (1999). Building Process Theory with Narrative: From Description to Explanation. *Academy of Management Review*, *24*(4), 711. doi:10.2307/259350
Pisano, G. P., Bohmer, R. M., & Edmondson, A. C. (2001). Organizational differences in rates of learning: Evidence from the adoption of minimally invasive cardiac surgery. *Management Science*, *47*(6), 752–768.
Pitcher, B. L., Hamblin, R. L., & Miller, J. L. L. (1978). The Diffusion of Collective Violence. *American Sociological Review*, *43*(1), 23–35.
Polanyi, M. (1958). *Personal knowledge: Towards a post-critical philosophy*. London: Routledge.
Polanyi, M., & Prosch, H. (1975). Meaning.
Posen, H. E., & Chen, J. S. (2013). An Advantage of Newness: Vicarious Learning Despite Limited Absorptive Capacity. *Organization Science*, *24*(6), 1701–1716. doi:10.2307/42002929?ref=search-gateway:16c9ff6f5d0c5400259eb79c0029d7ff
Powell, W. W., & Snellman, K. (2004). The Knowledge Economy, *30*, 199–220. doi:10.1146/annurev.soc.29.010202.100037
Pratt, M. G. (2000). The Good, the Bad, and the Ambivalent: Managing Identification among Amway Distributors. *Administrative Science Quarterly*, *45*(3), 456. doi:10.2307/2667106
Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational Tools for Probing Interactions in Multiple Linear Regression, Multilevel Modeling, and Latent Curve Analysis. *Journal of Educational and Behavioral Statistics*, *31*(4), 437–448. doi:10.3102/10769986031004437
Quigley, N. R., Tesluk, P. E., Locke, E. A., & Bartol, K. M. (2007). A Multilevel Investigation of the Motivational Mechanisms Underlying Knowledge Sharing and Performance. *Organization Science*, *18*(1), 71–88. doi:10.1287/orsc.1060.0223
Quinn, J. B., Anderson, P., & Finkelstein, S. (1996). Leveraging Intellect. *Academy of Management Executive*, *10*(3), 7–27.
Reagans, R., & McEvily, B. (2003). Network Structure and Knowledge Transfer: The Effects of Cohesion and Range. *Administrative Science Quarterly*, *48*(2), 240–267.
Reinholt, M., & Pedersen, T. (2011). Why a Central Network Position Isn't Enough: The Role of Motivation and Ability for Knowledge Sharing in Employee Networks. *Academy of Management Journal*, *54*(6), 1277–1297.
Reznick, R. K. (1993). Teaching and testing technical skills. *The American Journal of Surgery*.
Roberts, D. (2010). Vicarious learning: A review of the literature. *Nurse Education in Practice*, *10*(1), 13–16. doi:10.1016/j.nepr.2009.01.017
Rogers, E. M., & Kincaid, D. L. (1981). *Communication Networks: Toward a New Paradigm for Research*. New York: Free Press.
Rosenthal, M. M., & Sutcliffe, K. M. (2002). *Medical Error: What do we know? What do we do?* San Francisco, CA: Jossey-Bass.
Ross, M., & Kulkarni, S. (2013). *Healthcare Monitor Supplement* (pp. 1–13). Retrieved from http://www.brookings.edu/~/media/research/files/reports/2013/06/28-metromonitor-health/healthcare-monitor-final.pdf
Rulke, D. L. (1996). Member selection strategy and team performance: Cognitive integration vs. social integration in cross-functional teams. *Academy of Management Proceedings*.
Rulke, D. L., & Galaskiewicz, J. (2000). Distribution of Knowledge, Group Network Structure, and Group Performance. *Management Science*, *46*(5), 612–625.

Sanchez, J. I. (1994). From documentation to innovation: Reshaping job analysis to meet emerging business needs. *Human Resource Management Review*.
Sawyer, R. K. (2003). Improvised dialogues: Emergence and creativity in conversation.
Schippers, M. C., Hartog, Den, D. N., & Koopman, P. L. (2007). Reflexivity in Teams: A Measure and Correlates. *Applied Psychology*, *56*(2), 189–211. doi:10.1111/j.1464-0597.2006.00250.x
Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass.
Schulz, M. (2001). The Uncertain Relevance of Newness: Organizational Learning and Knowledge Flows. *The Academy of Management Journal*, *44*(4), 661–681.
Senge, P. M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. Doubleday.
Seo, M.-G., Barrett, L. F., & Bartunek, J. M. (2004). The Role of Affective Experience in Work Motivation. *Academy of Management Review*, *29*(3), 423–439.
Siemsen, E., Roth, A. V., Balasubramanian, S., & Anand, G. (2009). The Influence of Psychological Safety and Confidence in Knowledge on Employee Knowledge Sharing. *Manufacturing & Service Operations Management*, *11*(3), 429–447. doi:10.1287/msom.1080.0233
Simon, D. H., & Lieberman, M. B. (2010). Internal and external influences on adoption decisions in multi-unit firms: the moderating effect of experience. *Strategic Organization*, *8*(2), 132–154. doi:10.1177/1476127010366583
Simon, H. A. (1991). Bounded Rationality and Organizational Learning. *Organization Science*, *2*(1), 125–134.
Singer, S. J., & Edmondson, A. C. (2008). When Learning and Performance are at Odds: Confronting the Tension. In P. Kumar & P. Ramsey, *Learning and Performance Matter* (p. 36). Singapore.
Singh, J., Hansen, M. T., & Podolny, J. M. (2010). The World Is Not Small for Everyone: Inequity in Searching for Knowledge in Organizations. *Management Science*, *56*(9), 1415–1438. doi:10.1287/mnsc.1100.1201
Singleton, R., & Straits, B. C. (1993). *Approaches to Social Research* (2nd ed.). New York: Oxford University Press.
Sitkin, S. B., Sutcliffe, K. M., & Weick, K. E. (1998). Organizational Learning. In R. Dorf, *The Technology Management Handbook* (pp. 70–76). Boca Raton, FL: CRC Press.
Sole, D., & Edmondson, A. (2002). Situated Knowledge and Learning in Dispersed Teams. *British Journal of Management*, *13*(S2), S17–S34. doi:10.1111/1467-8551.13.s2.3
Sonenshein, S. (2010). We're Changing--Or Are We? Untangling the Role of Progressive, Regressive, and Stability Narratives During Strategic Change Implementation. *Academy of Management Journal*, *53*(3), 477–512. doi:10.5465/AMJ.2010.51467638
Sonenshein, S., Dutton, J. E., Grant, A. M., Spreitzer, G. M., & Sutcliffe, K. M. (2013). Growing at Work: Employees' Interpretations of Progressive Self-Change in Organizations. *Organization Science*, *24*(2), 552–570. doi:10.1287/orsc.1120.0749
Sorcher, M., & Goldstein, A. P. (1972). A behavior modeling approach in training. *Personnel Administration*, *35*(2), 35–41.
Squartini, T., Picciolo, F., Ruzzenenti, F., & Garlaschelli, D. (2013). Reciprocity of weighted networks. *Scientific Reports*, *3*, 1–9. doi:10.1038/srep02729
Stajkovic, A. D., & Luthans, F. (1998). Self-Efficacy and Work-Related Performance: A Meta-Analysis. *Psychological Bulletin*, *124*(2), 240–261.

Staw, B. M., Sandelands, L. E., Sandelands, L. E., & Dutton, J. E. (1981). Threat Rigidity Effects in Organizational Behavior: A Multilevel Analysis. *Administrative Science Quarterly*, *26*(4), 501–524.
Stewart, G. L., & Barrick, M. R. (2000). Team Structure and Performance: Assessing the Mediating Role of Intrateam Process and the Moderating Role of Task Type. *Academy of Management Journal*, *43*(2), 135–148.
Stork, D., & Richards, W. D. (1992). Nonrespondents in Communication Network Studies: Problems and Possibilities. *Group & Organization Management*, *17*(2), 193–209.
Strauss, A., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.
Styhre, A., Ollila, S., Roth, J., Williamson, D., & Berg, L. (2008). Heedful interrelating, knowledge sharing, and new drug development. *Journal of Knowledge Management*, *12*(3), 127–140. doi:10.1108/13673270810875912
Sullivan, S. E. (1999). The Changing Nature of Careers: A Review and Research Agenda. *Journal of Management*, *25*(3), 457–484. doi:10.1177/014920639902500308
Swap, W., Leonard, D., Shields, M., & Abrams, L. (2001). Using mentoring and storytelling to transfer knowledge in the workplace. *Journal of Management Information Systems*, *18*(1), 95–114.
Szulanski, G. (1996). Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm. *Strategic Management Journal*, *17*, 27.
Szulanski, G. (2000). The Process of Knowledge Transfer: A Diachronic Analysis of Stickiness. *Organizational Behavior and Human Decision Processes*, *82*(1), 9–27.
Taylor, P. J., Russ-Eft, D. F., & Chan, D. W. L. (2005). A Meta-Analytic Review of Behavior Modeling Training. *Journal of Applied Psychology*, *90*(4), 692–709. doi:10.1037/0021-9010.90.4.692
Thomas-Hunt, M. C., Ogden, T. Y., & Neale, M. A. (2003). Who's really sharing? Effects of social and expert status on knowledge exchange within groups. *Management Science*, *49*(4), 464–477.
Thompson, M. (2005). Structural and Epistemic Parameters in Communities of Practice. *Organization Science*, *16*(2), 151–164. doi:10.1287/orsc.1050.0120
Tsai, W. (2001). Knowledge transfer in intraorganizational networks: effects of network position and absorptive capacity on business unit innovation and performance. *Academy of Management Journal*, *44*(5), 996–1004.
Tsoukas, H. (2009). A Dialogical Approach to the Creation of New Knowledge in Organizations. *Organization Science*, *20*(6), 941–957. doi:10.1287/orsc.1090.0435
Tucker, A. L. (2011). Deliberate Learning to Improve Performance in Dynamic Service Settings: Evidence from Hospital Intensive Care Units. *Organization Science*, *22*(4), 907–922.
Tucker, A. L., & Edmondson, A. C. (2003). Why hospitals don't learn from failures. *California Management Review*.
Tucker, A. L., & Edmondson, A. C. (2007). Implementing New Practices: An Empirical Study of Organizational Learning in Hospital Intensive Care Units. *Management Science*, *53*(6), 894–907. doi:10.1287/mnsc.1060.0692
US Department of Health and Human Services. (2008). *The Effect of Health Care Cost Growth on the U.S. Economy* (No. HP-06-12) (pp. 1–57). Retrieved from aspe.hhs.gov/health/reports/08/healthcarecost/report.pdf
Useem, M., Cook, J. R., & Sutton, L. (2005). Developing Leaders for Decision Making Under

Stress: Wildland Firefighters in the South Canyon Fire and Its Aftermath. *Academy of Management Learning and Education*, *4*(4), 461–485. doi:10.5465/AMLE.2005.19086788
Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, *42*(1), 35–67.
Uzzi, B., & Lancaster, R. (2003). Relational embeddedness and learning: The case of bank loan managers and their clients. *Management Science*, *49*(4), 383–399.
van der Vegt, G. S., & Bunderson, J. S. (2005). Learning and Performance in Multidisciplinary Teams: The Importance of Collective Team Identification. *Academy of Management Journal*, *48*(3), 532–547.
Van Wijk, R., van den Bosch, F. A. J., Volderba, H. W., & Heinhuis, S. M. (2005). Knowledge reciprocity as a managerial competence: The determinants of reciprocity of knowledge flows in internal network forms of organizing. In R. Sanchez & A. Heene, *Research in competence based management. A focused issue on managing knowledge assets and organizational learning* (pp. 117–140). Amsterdam, NL.
VandeWalle, D. M. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement*, *57*, 995–1015.
VandeWalle, D. M., Cron, W., & Slocum, J. (2001). The role of goal orientation following performance feedback. *Journal of Applied Psychology*, *86*, 629–640.
Vashdi, D., Bamberger, P., & Erez, M. (2013). Can Surgical Teams Ever Learn?Towards a Theory of Transitive Team Learning in Action Teams. *Academy of Management Journal*, *56*(4), 945–971. doi:10.5465/amj.2010.0501
Vogus, T. J., Sutcliffe, K. M., & Weick, K. E. (2010). Doing No Harm:: Enabling, Enacting, and Elaborating a Culture of Safety in Health Care. *Academy of Management Persepcitves*, *24*(4), 60–77. doi:10.5465/AMP.2010.24.4.3652485.a
Vroom, V. H. (1964). *Work and motivation*. New York: Wiley.
Vygotsky, L. (1978). Interaction Between Learning and Development. In *Mind and Society* (pp. 79–91). Cambridge, MA: Harvard University Press.
Wageman, R. (1995). Interdependence and Group Effectiveness. *Administrative Science Quarterly*, *40*(1), 145. doi:10.2307/2393703
Walsh, J. P. (1988). Selectivity and selective perception: An investigation of managers' belief structures and information processing. *Academy of Management Journal*.
Walsh, J. P., & Ungson, G. R. (1991). Organizational Memory. *Academy of Management Review*, *16*(1), 57–91. doi:10.2307/258607
Wang, S., & Noe, R. A. (2010). Knowledge sharing: A review and directions for future research. *Human Resource Management Review*, *20*(2), 115–131. doi:10.1016/j.hrmr.2009.10.001
Wasserman, S., & Faust, K. (1994). *Social Network Analysis: Methods and Applications*. Cambridge University Press.
Wei, W., Pfeffer, J., Reminga, J., & Carley, K. (2011). *Handling Weighted, Asymmetric, Self-Looped, and Disconnected Networks in ORA* (No. CMU-ISR-11-113). *CASOS Technical Report* (pp. 1–35).
Weick, K. E. (1979). *The social psychology of organizing* (2nd ed.). Reading, Mass.: Addison-Wesley Pub. Co.
Weick, K. E. (1987). Organizational culture as a source of high reliability. *California Management Review*, *29*(2), 112–127.
Weick, K. E. (1990). The vulnerable system: An analysis of the Tenerife air disaster. *Journal of Management*, *16*(3), 571–593.

Weick, K. E. (1995). *Sensemaking in Organizations*. *Sage Publications*. Thousands Oaks, CA: Sage Publications.
Weick, K. E., & Ashford, S. J. (2001). Learning in Organizations. In F. M. Jablin & L. L. Putnam, *The New Handbook of Organizational Communication* (pp. 704–732). doi:10.4135/9781412986243.n18
Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly*, *38*(3), 357.
Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the Unexpected: Resilient Performance in an Age of Uncertainty* (2nd ed.). San Francisco, CA: John Wiley & Sons.
Weick, K. E., & Westley, F. (1996). Organizational Learning: Affirming an Oxymoron. In S. R. Clegg, C. Hardy, & W. R. Nord, *Handbook of Organization Studies* (p. 190). 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom : SAGE Publications Ltd.
Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the Process of Sensemaking. *Organization Science*, *16*(4), 409–421. doi:10.1287/orsc.1050.0133
Westphal, J. D., & Zajac, E. J. (1997). Defections from the Inner Circle: Social Exchange, Reciprocity, and the Diffusion of Board Independence in U.S. Corporations. *Administrative Science Quarterly*, *42*(1), 161. doi:10.2307/2393812
Westphal, J. D., & Zajac, E. J. (2013). A Behavioral Theory of Corporate Governance: Explicating the Mechanisms of Socially Situated and Socially Constituted Agency. *The Academy of Management Annals*, *7*(1), 607–661. doi:10.1080/19416520.2013.783669
Westphal, J. D., Seidel, M.-D. L., & Stewart, K. J. (2001). Second-Order Imitation: Uncovering Latent Effects of Board Network Ties. *Administrative Science Quarterly*, *46*(4), 717. doi:10.2307/3094829
Williams, K. Y., & O'Reilly, C. A., III. (1998). The Complexity of Diversity: A Review of Forty Years of Research. In R. L. Sutton, *Research in Organizational Behavior* (Vol. 21, pp. 77–140). Greenwich, CT: JAI Press.
Wilson, J. M., Goodman, P. S., & Cronin, M. A. (2007). Group Learning. *Academy of Management Review*, *32*(4), 1041–1059. doi:10.5465/AMR.2007.26585724
Wittenbaum, G. M. (2000). The Bias Toward Discussing Shared Information: Why Are High-Status Group Members Immune. *Communication Research*, *27*(3), 379–401. doi:10.1177/009365000027003005
Wittenbaum, G. M., Hubbell, A. P., & Zuckerman, C. (1999). Mutual enhancement: Toward an understanding of the collective preference for shared information. *Journal of Personality and Social Psychology*, *77*(5), 967.
Wong, S.-S. (2004). Distal and Local Group Learning: Performance Trade-offs and Tensions. *Organization Science*, *15*(6), 645–656. doi:10.1287/orsc.1040.0080
Yin, R. K. (1989). *Case Study Research: Design and Method*. Newbury Park, CA: Sage.
Zander, U., & Kogut, B. (1995). Knowledge and the Speed of the Transfer and Imitation of Organizational Capabilities: An Empirical Test. *Organization Science*, *6*(1), 76–92.
Zimmerman, M. B. (1982). Learning effects and the commercialization of new energy technologies: The case of nuclear power. *The Bell Journal of Economics*, *13*(2), 297–310.
Zucker, L. G. (1986). Production of trust: Institutional sources of economic structure, 1840–1920. *Research in Organizational Behavior*.