Abstract

Organizational learning has been an important topic for the journal, *Organization Science*, and for the field. We provide a theoretical framework for analyzing organizational learning. According to the framework, organizational experience interacts with the context to create knowledge. The context is conceived as having both a latent component and an active component through which learning occurs. We also discuss current and emerging research themes related to components of our framework. Promising future research directions are identified. We hope that our perspective will stimulate future work on organizational learning and knowledge.

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Since the publication of the special issue of *Organization Science* on “Organizational Learning” in 1991, the topic of organizational learning has been central to the journal and to the field. Cohen and Sproull (1991) edited the special issue, which included papers in honor of and by James G. March. Subsequent to the publication of the special issue, the interest in organizational learning broadened to include interest in the outcome of learning---knowledge. *Organization Science* also provided leadership in this area with the publication of a special issue on “Knowledge, Knowing and Organizations” edited by Grandori and Kogut (2002).

The journal, *Organization Science*, is well positioned to publish research on organizational learning. Organizational learning is inherently an interdisciplinary topic. Organizational learning research draws on and contributes to developments in a variety of fields including organizational behavior and theory, cognitive and social psychology, sociology, economics, information systems, strategic management, and engineering. This interdisciplinary orientation makes the topic of organizational learning an excellent fit for *Organization Science*, which aims to advance knowledge about organizations by bridging disciplines.

In addition to special issues on organizational learning and knowledge that appeared in *Organization Science*, special issues appeared in other leading journals. Numerous articles were written. They include the very influential pieces by March (1991) on exploration versus exploitation, by Huber (1991) on processes contributing to organizational learning, by Kogut and Zander (1992) on knowledge and the firm, and by Nonaka (1994) on knowledge creation. Many books were prepared (e.g., Argote, 1999; Argyris, 1990; Davenport & Prusak, 1998; Garvin, 2000; Gherardi, 2006; Greve, 2003; Lipshitz, Freedman, & Popper, 2007; Nonaka & Takeuchi, 1995; Senge, 1990); several handbooks were developed (e.g., see Easterby-Smith & Lyles, 2003; Starbuck & Holloway, 2008; Dierkis, Antal, Child, & Nonaka, 2001).

The increased interest in organizational learning and knowledge was stimulated by both practical concerns and research developments. At a practical level, the ability to learn and adapt is critical to the performance and long-term success of organizations. Understanding why some
organizations are better at learning than others has been an active research area (e.g., see Adler & Clark, 1991; Argote & Epple, 1990; Pisano, Bohmer & Edmondson, 2001). Further, as organizations anticipate the retirement of many employees, issues of knowledge retention loom large in organizations. Knowledge transfer is also very important in organizations due to distributed work arrangements, globalization, the multi-unit organizational form, and interorganizational relationships such as mergers, acquisitions and alliances.

In addition to these practical concerns, theoretical and methodological advances also contributed to the increased research activity. Because organizational learning occurs over time, studying organizational learning requires time series or longitudinal data. Further, because organizational learning can covary with other factors, techniques for ruling out alternative explanations to learning, such as selection, are needed. Methodological developments facilitated the analysis of longitudinal data collected from the field to study organizational learning (Miner & Mezias, 1996). In addition, researchers developed experimental platforms for investigating organizational learning (Cohen & Bacdayan, 1994) and knowledge transfer (Kane, Argote & Levine, 2005) in the laboratory. The field studies and experiments complement the simulations and case studies, which were historically used to study organizational learning. This richer set of methods enables the field to arrive at a robust understanding of organizational learning.

Although the promises of those who advocated creating “learning organizations” have not been fully realized, research on organizational learning has flourished. Significant progress has been made in our understanding of organizational learning. A goal of this Perspectives essay is to point out where progress has been made and where more research is needed to further our understanding of organizational learning.

This perspective essay provides a theoretical framework for analyzing organizational learning and its subprocesses of creating, retaining and transferring knowledge. Approaches to defining and measuring organizational learning are described. Current and emerging themes in research are identified. These themes include: characterizing experience at a fine-grained level;
understanding the role of the context in which learning occurs; characterizing organizational learning processes; and analyzing knowledge creation, retention and transfer. Each of these themes is discussed in turn.

Organizational Learning: Definitions

Although researchers have defined organizational learning in different ways, the core of most definitions is that organizational learning is a change in the organization that occurs as the organization acquires experience. The question then becomes changes in what. Although researchers have debated whether organizational learning should be defined as a change in cognitions or behavior, that debate has waned (Easterby-Smith, Crossan, Niccolini, 2000). Most researchers would agree with defining organizational learning as a change in the organization’s knowledge that occurs as a function of experience (e.g., Fiol & Lyles, 1985). This knowledge can manifest itself in changes in cognitions or behavior and include both explicit and tacit or difficult-to-articulate components. The knowledge could be embedded in a variety of repositories, including individuals, routines and transactive memory systems. Although we use the term knowledge, our intent is to include both knowledge in the sense of a stock and knowing in the sense of a process (Cook & Brown, 1999; Orlikowski, 2002).

Knowledge is a challenging concept to define and measure, especially at the organizational level of analysis (Hargadon & Fanelli, 2002). Some researchers measure organizational knowledge by measuring cognitions of organizational members (e.g., see Huff & Jenkins, 2002; McGrath, 2001). Other researchers focus on knowledge embedded in practices or routines and view changes in them as reflective of changes in knowledge, and therefore indicative that organizational learning occurred (Levitt & March, 1988; Gherardi, 2006; Miner & Haunschild, 1995). Another approach is to measure changes in characteristics of performance, such as its accuracy or speed, as indicative that knowledge was acquired and organizational learning occurred (Dutton & Thomas, 1984; Argote & Epple, 1990). Acknowledging that an organization can acquire knowledge without a corresponding change in behavior, certain
researchers define organizational learning as a change in the range of potential behaviors (Huber, 1991). Researchers have also measured knowledge by assessing characteristics of organization’s products or services (Helfat & Raubitschek, 2000) or its patent stock (Alcacer & Gittleman, 2006).

Approaches to assessing knowledge by measuring changes in practices or performance have the advantage of capturing tacit as well as explicit knowledge. By contrast, current approaches to measuring knowledge by assessing changes in cognitions through questionnaires and verbal protocols are not able to capture tacit or difficult-to-articulate knowledge (Hodgkinson & Sparrow, 2002). Perhaps because of this difficulty, cognitive approaches, which were very popular in the 1990s, are increasingly being complemented by practice or performance-based approaches.

A Theoretical Framework

A framework for analyzing organizational learning is shown in Figure 1. The framework aims to parse organizational learning in order to make it more tractable analytically. Organizational learning is a process that occurs over time. Thus, the figure aims to depict an ongoing cycle through which task performance experience is converted into knowledge which in turn changes the organization’s context and affects future experience. Organizational learning occurs in a context (Glynn, Lant & Milliken, 1994), which includes the organization and the environment in which the organization is embedded.

Experience is what transpires in the organization as it performs its task. Experience can be measured in terms of the cumulative number of task performances. For example, in a medical device assembly plant, experience would be measured by the cumulative number of devices produced. In a hospital surgical team, experience would be measured by the cumulative number of surgical procedures performed. In a design firm, experience would be measured as the cumulative number of products or services designed. Experience can vary along many
dimensions, which are discussed in a later section. Experience interacts with the context to create knowledge.

The environmental context includes elements outside the boundaries of the organization such as competitors, clients, institutions, and regulators. It can vary along many dimensions, such as volatility, uncertainty, interconnectedness and munificence. The environmental context affects the experience the organization acquires. For example, orders for products or requests for services enter the organization from the environment. The organizational context includes characteristics of the organization, such as its structure, culture, technology, identity, memory, goals, incentives and strategy. The context also includes relationships with other organizations through alliances, joint ventures, and memberships in associations.

The context interacts with experience to create knowledge. Conceptually, we propose differentiating the organizational context into an active context through which learning occurs and a latent context that influences the active context. The active context includes the basic elements of organizations, members and tools, that interact with the organization’s task. The latent context affects which individuals are members of the organizations, what tools they have and which tasks they perform. Here tasks are subtasks members perform to accomplish the overall task of the organization. The difference between the active and the latent contexts is their capability for action. Members and tools perform tasks: they do things. By contrast, the latent context is not capable of action.

This conceptualization of the active context builds on a theoretical framework developed by McGrath and colleagues (Arrow, McGrath & Berdahl, 2000; McGrath & Argote, 2001). According to the framework, the basic elements of organizations are members, tools and tasks. The basic elements combine to form networks. The member-member network is the organization’s social network. The task-task and the tool-tool networks specify the interrelationships within tasks and tools, respectively. The member-task network, the division of labor, assigns members to tasks. The member-tool network maps members to tools. The task-tool
network identifies which tools are used to perform which tasks. Finally, the member-task-tool network specifies which members perform which tasks with which tools.

These elements of members, tools and tasks and their networks are the primary mechanisms in organizations through which organizational learning occurs and knowledge is created, retained and transferred. Members are the media through which learning generally occurs in organizations. Individual members also serve as knowledge repositories in organizations (Walsh & Ungson, 1991). Moving members from one organizational unit to another is also a mechanism for transferring knowledge (Kane et al., 2005). Similarly, knowledge can be embedded in tools and moving tools from one unit to another is a mechanism for transferring that knowledge. Tools can aid learning, for example, by helping to identify patterns in data. Tasks sequences or routines can also be knowledge repositories and serve as knowledge transfer mechanisms (Darr, Argote & Epple, 1995).

The latent context affects the active context through which learning occurs. For example, a context where members share a superordinate identity has been found to lead to greater knowledge transfer (Kane et al., 2005). Similarly, contexts where members trust each other (Levin & Cross, 2004) or feel psychologically safe (Edmondson, 1999) have been found to promote organizational learning.

Knowledge acquired by learning is embedded in the organization’s context and thereby changes the context. Knowledge can be embedded in the active context of members, tools and tasks and their networks. Knowledge can also be embedded in aspects of the organization’s latent context such as its culture (Weber & Camerer, 2003). Thus, knowledge acquired through learning is embedded in the context and affects future learning.

Some of the organization’s knowledge is embedded in its products or services which flow out of the organization into the environment (Mansfield, 1985). For example, a patient might receive a new treatment from which the medical staff of other hospitals could learn. Or a medical
devices firm might introduce a new product that other firms are able to “reverse engineer” and imitate.

Knowledge can be characterized along many dimensions. For example, knowledge can vary from explicit knowledge that can be articulated to tacit knowledge that is difficult to articulate (Polanyi, 1962; Kogut & Zander, 1992; Nonaka & von Krogh, 2009). A related dimension of knowledge is whether it is declarative or procedural (Singley & Anderson, 1989). Declarative knowledge is knowledge about facts—what researchers have termed “know what” (Edmondson, Winslow, Bohmer & Pisano, 2003; Lapre, Mukerjee & Van Wassenhove, 2000; Tucker, 2007). Procedural knowledge is knowledge of procedures or “know-how”.

Knowledge can also vary in its “causal ambiguity” or extent to which cause-effect relationships are understood (Szulanski, 1996). In addition, knowledge can vary in its “demonstrability” or ease of showing its correctness and appropriateness (Kane, 2010; Laughlin & Ellis, 1986). Further, knowledge can be codified or not (Vaast & Levina, 2006; Zander & Kogut, 1995; Zollo & Winter, 2002).

The learning cycle shown in Figure 1 occurs at different levels of analysis in organizations (Crossan, Lane, White, 1999)—individual, group (see Argote, Gruenfeld & Naquin, 2001; Argote & Ophir, 2002; Edmondson, Dillon & Roloff, 2007; Wilson, Goodman & Cronin, 2007 for reviews), organizational (see Schulz, 2002, for a review) and interorganizational (see Ingram, 2002, for a review). For example, Reagans, Argote and Brooks (2005) provided empirical evidence of learning at different levels of analysis in a hospital. Individual experience, team experience and organizational experience all contributed to the improved performance of surgical teams. Further, the relative importance of different types of experience can vary across levels of analysis. Research in software development has shown that specialized experience in a system improved individual productivity, while diverse experience in related systems improved group and organizational productivity (Boh, Slaughter, & Espinosa, 2007).
Although individual learning is necessary for group and organizational learning, individual learning is not sufficient for group or organizational learning. In order for learning to occur at these higher levels of analysis, the knowledge the individual acquired would have to be embedded in a supra-individual repository so that others can access it. For example, the knowledge the individual acquired could be embedded in a routine or transactive memory system.

We turn now to a discussion of current and emerging themes in research on organizational learning. These themes are organized according to the elements of the framework for analyzing organizational learning shown in Figure 1. We discuss current themes related to organizational experience, the context, organizational learning processes and organizational knowledge. The discussion of organization knowledge is organized according to the subprocesses of creating, retaining and transferring knowledge.

Organizational Experience

Learning begins with experience. The first current and emerging theme in organizational learning is characterizing experience at a fine-grained level along various dimensions (Argote, McEvily & Reagans, 2003). Argote and Todorova (2007) proposed dimensions of experience, including organizational, content, spatial and temporal ones. The most fundamental dimension of experience is whether it is acquired directly by the focal organizational unit or indirectly from other units (Levitt & March, 1988). Learning from the latter type of experience is referred to as vicarious learning (Bandura, 1977) or knowledge transfer (Argote & Ingram, 2000). The dimension of direct versus indirect experience can be crossed with other dimensions (Argote, in press).

Concerning the content dimension of experience, experience can be acquired about tasks or about organization members (Kim, 1997; Taylor & Greve, 2006). Experience can include successful or unsuccessful units of task performance (Denrell & March, 2001; Kim, Kim, & Miner, 2009; Sitkin, 1992). Experience can be acquired on novel tasks or on tasks that have been performed repeatedly in the past (Katila & Ahuja, 2002; March, 1991; Rosenkopf & McGrath,
this volume). Experience can range from ambiguous (Bohn, 1995; Repenning & Sterman, 2002) to easily interpretable. Concerning the spatial dimension of experience, an organization’s experience can be geographically concentrated or geographically dispersed (Cummings, 2004; Gibson & Gibbs, 2006).

Concerning the temporal dimension of experience, experience can vary in its frequency and its pace (Herriott, Levinthal & March, 1985; Levinthal & March, 1981) and be acquired before (Carillo & Gaimon, 2000; Pisano, 1994), during or after task performance. Learning through “after action” reviews would be an example of learning acquired after task performance (Ellis & Davidi, 2005). Similarly, learning though counterfactual thinking (Morris & Moore, 2000; Roese & Olson, 1995), which involves reconstruction of past events and consideration of alternatives that might have occurred, typically occurs after doing. To these dimensions, we add the dimension of whether the experience is naturally occurring or simulated through computational methods or experiments.

A dimension of experience that has attracted much attention recently is its rarity. A special issue of Organization Science focused on “Learning from Rare Events” (Lampel, Shamsie & Shapira, 2009). Because rare events by definition occur infrequently, they pose challenges for interpretation. Because these rare events often have major consequences, such as the Challenger or Columbia accidents or recent financial disasters, interest in learning from them is high. There is also interest in learning from events that occur infrequently, although more frequently than rare disasters. For example, learning from alliances (Lavie & Miller, 2008; Zollo & Reuer, in press), learning from acquisition experience (Haleblian & Finkelsktein, 1999; Hayward, 2002), and learning from contracting experience (Mayer & Argyres, 2004; Vaneste & Puranam, in press) have received considerable attention.

Understanding the effects of experience on learning at a fine-grained level contributes to organizational learning theory in several ways. First, because experience with different properties can have different effects on learning outcomes, analyzing experience at a fine-grained level
advances theory. For example, heterogeneous experience has been found to increase learning outcomes more than homogeneous experience (Haunschild & Sullivan, 2002; Schilling, Vidal, Ployhart & Marangoni, 2003). Recent experience has been found to be more valuable for organizational learning than experience acquired farther in the past (Argote, Beckman & Epple, 1990; Baum & Ingram, 1998; Benkard, 2000).

Another advantage of the more fine-grained characterization of experience is that it permits examining relationships among different types of experience. For example, some researchers have found that direct experience and indirect experience are negatively related (Wong, 2004; Haas & Hansen, 2004; Schwab, 2007). That is, one form of experience seems to substitute for the other. By contrast, other researchers have found that direct and indirect experience relate positively to each other in complementary fashion (Bresman, 2010). Understanding when different types of experience are complements or substitutes for each other is an important topic for future research.

A third advantage of a more fine-grained analysis of experience is that it moves forward the specification of when experience has positive or negative effects on learning outcomes. Thus, the analysis enables us to determine when experience is a good “teacher” and when it is not (March, 2010). On the one hand, there is considerable evidence from the learning curve literature that performance improves with experience (Dutton & Thomas, 1984). On the other hand, experience can be difficult to interpret (March, 2010; March, Sproull & Tamuz, 1991) and may have little or even a negative effect on learning outcomes. Organizations can draw inappropriate inferences from experience and learn the wrong thing (Zollo, in press; Tripsas & Gavetti, 2000). Levitt and March (1988) develop the concept of “superstitious learning” to describe the inappropriate lessons organizations learn. Analyzing experience at a fine-grained level enables us to specify when experience has a positive or negative effect on learning outcomes. For example, certain types of experience such as rare or ambiguous experience may be harder to draw appropriate inferences from than experience that is frequent and less ambiguous. Organizations
with rare or ambiguous experience may benefit from different learning processes. Thus, a more fine-grained characterization of experience enables us to specify when experience is a good teacher and moves us towards a more unified theory of organizational learning.

A final advantage of a more fine-grained characterizations of experience is that is facilitates designing experience to promote organizational learning. That is, as we determine the kinds of experience that are most valuable in organizations and the contextual conditions that support the realization of the experience’s value, we can offer prescriptions about how to design organizations to promote organizational learning.

**Context**

Movement towards a more unified theory of organizational learning is also enhanced by research theme 2, the importance of the context. The strong form of this argument is the “situated cognition” research tradition which argues that cognition can only be understood in context (Brown & Dugid, 1991; Hutchins, 1991; Lave & Wenger, 1991). A weaker form of this argument is that context is a contingency that affects learning processes and moderates the relationship between experience and outcomes. For example, specialist organizations have been found to learn more from experience than generalist organizations (Ingram & Baum, 1997; Haunschild & Sullivan, 2002). A “learning” orientation has been shown to facilitate group learning up to a point (Bunderson & Sutcliff, 2003). A culture of psychological safety (Edmondson, 1999) that lacks defensive routines (Argyris & Schon, 1978) has been found to facilitate learning. The effect of alliance experience on acquisition performance has been found to be more beneficial when acquisitions are handled autonomously with high relational quality (Zollo & Reuer, in press).

Dimensions of the context that are receiving increasing attention and are ripe for further research include: properties of the organization’s structure (Bunderson & Boumgarden, 2010; Fang, Lee & Schilling, 2010) and its social network (Hansen, 2002; Reagans & McEvily, 2003), the extent to which organizational units share an identity (Kane, et al., 2005; Kogut & Zander, 1996), power differences within organizations (Contu & Willmott, 2003; Bunderson & Reagans,
in press), and whether members are co-located or interact virtually (Cummings, 2004). The feedback members receive (Greve, 2003; Denrell, Fang & Levinthal, 2004; Van der Vegt, de Jong, Bunderson & Molleman, 2010), their emotions (Davis, 2009) and their motivations (Higgins, 1997) are also ripe for future research.

Future research on how the context affects organizational learning would benefit from theoretical developments in characterizing the context. We have proposed a new conception of the organizational context that includes active and latent components. This conception depicts how macro concepts such as culture can affect the micro activities of organization members. This conception is consistent with calls for research on “inhabited institutions” (Bechky, this volume). Further research is needed to determine the fruitfulness of this conception of the organizational context as consisting of active and latent components. Future research may also benefit from adopting a combinational approach (George, 2007; Fiss, 2007) to examine how different contextual conditions interact with each other and with experience to affect organizational learning.

Organizational Learning Processes

The third theme in research on organizational learning centers on organizational learning processes. The learning processes are represented by the curved arrows in Figure 1, which depicts a learning cycle. When knowledge is created from a unit’s own direct experience, we term the learning subprocess as knowledge creation. When knowledge is developed from the experience of another unit we term the learning subprocess as knowledge transfer. Thus, the curved arrow at the bottom of the figure depicts either the knowledge creation or knowledge transfer subprocess. A third subprocess, knowledge retention, is depicted by the curved arrow in the upper right quadrant of Figure 1 that flows from knowledge to the active context. It is through this process that knowledge is retained in the organization. Thus, we conceive of organizational learning processes as having three sub-processes: creating, retaining, and transferring knowledge. These
subprocesses are related. For example, new knowledge can be created through its transfer (Miller, Fern & Cardinal, 2007).

Several researchers have conceived of search (e.g., see Knudsen & Levinthal, 2007) as another organizational learning subprocess (Huber 1991). In our framework, search is represented by the curved arrow in the upper left quadrant of Figure 1. The arrow shows that the active context of members and tools affects task performance experience. This effect can occur through several processes, including search. For example, members can choose to search in local or distant areas and search for novel or known experience (Katila & Ahuja, 2002; Rosenkopf & Almedia, 2003; Sidhu, Commandeur & Volberda, 2007). It is debatable whether search processes are best conceived as part of organizational learning processes or antecedent to those processes. Reviewing the large literature on search is beyond the scope of this essay (see Gupta, Smith & Shalley, 2006; Raisch, Birkinshaw, Probst & Tushman, 2009, for reviews).

The subprocesses can be characterized along several dimensions. The dimension of learning processes that has received the most attention is their “mindfulness.” Learning processes can vary from mindful or attentive (Weick & Sutcliff, 2006) to less mindful or routine (Levinthal & Rerup, 2006). The former are what psychologists have termed controlled processes while the latter are more automatic (Shiffrin & Schneider, 1977). Mindful processes include dialogic practices (Tsoukas, 2009) and analogical reasoning, which involves the comparison of cases and the abstraction of common principles (Gick & Holyoak, 1980; Gentner, 1983). Less mindful processes include stimulus-response learning in which responses that are reinforced increase in frequency. Levinthal and Rerup (2006) described how mindful and less mindful processes can complement each other with mindful processes enabling the organization to shift between more automatic routines and routines embedding past experience and conserving cognitive capacity for greater mindfulness.

Most discussions of mindful processes have explicitly or implicitly focused on the learning subprocess of creating knowledge. The subprocess of retaining knowledge can also vary
in the extent of mindfulness. For example, Zollo and Winter (2002) studied deliberate approaches
to codifying knowledge, which would be examples of mindful retention processes. Similarly the
subprocess of transferring knowledge can also vary in mindfulness. “Copy exactly” approaches or
replications without understanding the underlying causal processes would be examples of less
mindful transfer processes while knowledge transfer attempts that adapt the knowledge to the
new context (Williams, 2007) would be examples of more mindful approaches.

A learning process dimension that is especially important in organizations is the extent to
which the learning processes are distributed across organizational members. For example,
organizations can develop a transactive memory or collective system for remembering, retrieving
and distributing information (Wegner, 1986; Brandon & Hollingshead, 2004). In organizations
with a well-developed transactive memory system, members specialize in learning different
pieces of information. Thus, learning processes would be distributed in organizations with well-
developed transactive memory systems. Similarly, learning processes would be distributed in
organizations that engage in “heedful interrelating” (Weick & Roberts, 1993).

Another dimension is whether learning is bottom-up (based primarily on experience) or
top-down (based on goals, task demands and social interactions). This distinction, which builds
on research on the psychology of attention, is similar to the comparison of forward- versus
backward-looking search in organizational research (Chen, 2008; Gavetti & Levinthal, 2000).

Further research is needed on the organizational learning processes and their
interrelationships. Our understanding of organizational learning processes is likely to be advanced
by developments in attention (Ocasio, this volume; Ocasio, 1997) as well as by cognitive
developments in neuroscience and physiology (Senior, Lee & Butler, in press). Ideally, a
parsimonious yet complete set of dimensions to characterize organizational learning processes
should be developed.

Analyzing Knowledge Creation, Retention and Transfer
The fourth research theme centers on the subprocesses and outcomes of knowledge creation, retention and transfer.

**Knowledge creation**

Knowledge creation occurs when a unit generates knowledge that is new to it. Research on knowledge creation could benefit from connecting with the literature on creativity (see Gupta, Tesluk & Taylor, 2007, for a review). Research on the influence of experience on creativity is relevant for understanding the organizational learning subprocess of knowledge creation. There is increasing evidence that a large, deep and diverse experience base contributes to creativity because it increases the number of potential paths one can search and the number of potential new combinations of knowledge (Amabile, 1997; Rietzschel, Nijstad & Stroebe, 2007; Shane, 2000). At the same time, prior experience can constrain creative thinking, because it can lead to drawing on familiar strategies and heuristics when solving a problem (Audia & Goncalo, 2007; Benner & Tushman, 2003).

Recent work is aimed at reconciling these seemingly inconsistent findings. Several studies have documented a nonlinear relationship between experience and creativity or innovation: increased experience contributes to creativity and innovation up to a certain point with diminishing returns at high levels of experience (Katila & Ahuja, 2002; Hirst, Knippenberg & Zhou, 2009). Other researchers distinguished between different types of experience such as direct or indirect (Gino, Miron-Spektor & Todorova, 2010), successful or unsuccessful (Audia & Goncalo, 2007), heterogeneous or homogeneous (Weigelt & Sarkar, 2009) and deep or diverse experience (Ahuja & Katila, 2004). A more fine-grained analysis of the experience-creativity link will help reveal underlying mechanisms and boundary conditions that explain how, when, and why prior experience affects knowledge creation in organizations.

The study of routines and practices as a context in which creativity occurs has attracted considerable attention recently. Traditionally, routines and managerial practices were perceived as detrimental to creativity, because they reduce variation and flexibility and impede an
organization’s ability to innovate and adapt to change (Benner & Tushman, 2003). More recently, researchers have argued that routines can be a resource for change (Feldman, 2004), and distinguished between specific routines that were favorable or less favorable to creativity or innovation (Miron, Erez, & Naveh, 2004; Naveh & Erez, 2005). Research stressed the importance of channeling the creative process and providing a structure that facilitates knowledge creation and implementation (Miron-Spektor, Erez & Naveh, in press, Miron-Spektor, Gino & Argote, 2008). Another contextual characteristic that has received considerable research attention over the years is the degree of “slack” or excess resources (Cyert & March, 1963; Nohria & Gulati, 1996; Greve, 2003). An exciting new line of research on the context and creativity examines knowledge creation in the context of online communities (Faraj, Jarvenpaa & Majchrzak, in press).

Research has shown that personal characteristics of members affect team creativity (Baer, Oldham, Jacobsohn, & Hollingshead 2008; Miron et al. in press). Research on the role of emotions in creativity has also increased in recent years. Positive and negative moods have been shown to increase creativity through different mechanisms (Davis, 2009; De Dreu, Baas & Nijstad, 2008; Grawitch, Munz, & Kramer, 2003). Emotional ambivalence or the co-occurrence of negative and positive emotions has also been shown to enhance knowledge creation (Amabile, Barsade, Mueller, & Staw, 2005; George & Zhou, 2007; Fong, 2006). Yet despite this growing interest, research on team affective tone and creativity is rare and the few studies on this topic have yielded inconsistent results (George & King, 2007; Grawitch, Munz, & Kramer, 2003).

Research also examines how motivation affects creativity. Research has examined how aspiration levels affect search and innovation (Lant, 1992; Bromiley, 1991; Cyert & March, 1963). Intrinsic rewards have long been considered to be essential for creativity (Amabile, 1997). It was found, for example, that task-oriented teams that are intrinsically motivated to excel in their task, are highly innovative (Hulsheger, Anderson & Salgado, 2009). Extrinsic rewards can also enhance creativity, because they orient recipients towards the generation and selection of novel solutions (Eisenberger & Rhoades, 2001). Researchers have also examined how regulatory
focus (Higgins, 1997) influences creativity. Motivation to attain rewards (i.e., promotion focus) has been found to enhance individual creativity, while motivation to avoid punishments (i.e., prevention focus) hindered it (Friedman & Forster, 2001; Kark & Van Dijk, 2007). Research is needed on whether these findings on motivational orientation and creativity at the individual level generalize to the group and organizational levels.

Another exciting research direction examines how social networks affect knowledge creation. Strong network ties can constrain creativity when they are formed with similar others, and thus limit the exposure to new information (Perry-Smith & Shalley, 2003; Perry-Smith, 2006). Studying both network density and tie strength, McFayden, Samadeni and Cannella (2009) found, however, that members who maintain strong ties with members who comprise a sparse network have the greatest creativity. Ties that bridge “structural holes” or otherwise unconnected parts of a network have been found to increase creativity (Burt, 2004). Further, bridging ties that span structural holes are especially conducive to creativity when individuals who bridge boundaries share common third-party ties (Tortoriello & Krackhardt, 2010).

Research on how tools affect knowledge creation and organizational learning is in its infancy. Boland, Tenkasi, and Te'eni, (1994) described an information system that facilitated idea exchange and thereby increased knowledge creation. Ashworth, Mukhopadhyay, and Argote (2004) found that the introduction of an information system in a bank increased organizational learning. Kane and Alavi (2007) used a simulation to examine the effect of knowledge management tools, such as electronic communities of practice or knowledge repositories, on organizational learning. The researchers found that the performance of electronic communities of practice was low initially but subsequently surpassed the performance of other tools. Further research is needed to understand the effect of tools on knowledge creation.

Knowledge retention

Research on knowledge retention focuses on both the stock and flow of knowledge in the organization’s memory. Research examines the effect of organizational memory on
organizational performance (Moorman & Miner, 1997) and how organizations “reuse” the knowledge in their memory (Majchrzak, Cooper & Neece, 2004). Research also examines whether organizations “forget” the knowledge they learn (De Holan & Philips, 2004). That is, research examines whether knowledge acquired through organizational learning persists through time or whether it decays or depreciates. Considerable evidence of knowledge decay or depreciation has been found (Argote, Beckman & Epple, 1990; Darr, Argote & Epple, 1995; Benkard, 2000; Thompson, 2007). Organizations, however, vary in the extent to which their knowledge depreciates.

Current work is aimed at understanding factors that explain the variation in knowledge depreciation (Argote, 1999). A promising direction is analyzing whether knowledge acquired from different types of experience decays at different rates (Madsen & Desai, 2010) or whether knowledge embedded in different repositories decays at different rates. At a more macro level, current work on knowledge retention examines the implications of organizational learning and forgetting for industry structure (Besanko, Doraszelski, Kryukov & Satterthwaite, 2010).

Research is also aimed at characterizing the organization’s memory --the various reservoirs or repositories in which knowledge is embedded (Levitt & March, 1988; Walsh & Ungson, 1991). Building on the previously discussed theoretical framework of McGrath and colleagues, Argote and Ingram (2000) conceived of organizational memory as being embedded in organizational members, tools and tasks and the networks formed by crossing members, tools and tasks. Research on three knowledge repositories or reservoirs is particularly active: members, routines or the task-task network and transactive memory systems or the member-task network.

Research on the effect of member turnover on organizations provides information about the extent to which knowledge is embedded in individual members. A recent trend in this area is to examine how turnover interacts with characteristics of the organization. Network research has shown, for example, that the loss of employees with many redundant communication links in a network is less detrimental to organizational performance than the loss of employees who bridge
structural holes (Burt, 1992), or otherwise open communication links in the network (Shaw, Duffy, Johnson, & Lockhart, 2005). Further, turnover has a less deleterious effect in organizations that are hierarchical (Carley, 1992) or highly structured (Rao & Argote, 2006) and where members conform to organizational processes (Ton & Huckman, 2008). Finally, results of a simulation suggest that turnover affects the performance of electronic communities of practice more than it affects knowledge repositories (Kane & Alavi, 2007). Knowledge embedded in organizational structures, tools, and processes can buffer the organizations from the negative effects of member turnover.

Research on routines aims to understand how recurring patterns of activities develop (Cohen & Bacdayan, 1994) and change (Feldman & Pentland, 2003). For example, Rerup and Feldman (in press) articulated how routines develop through trial and error learning. Routines can be explicit such as the standard operating procedures of an organization. Routines can also be tacit such as the ones that emerge implicitly through mutual adjustments members make (Birnholtz, Cohen & Hoch, 2007; Nelson & Winter, 1982). Research also examines the consequences of embedding knowledge in routines for its retention and transfer.

The other knowledge reservoir that is receiving considerable attention is transactive memory. In organizations with well-developed transactive memory systems (Wegner, 1986), members possess meta-knowledge of who knows and does what. This meta-knowledge improves task assignment because members are matched with the tasks they do best as well as enhances problem solving and coordination because members know whom to go to for advice. Research has shown that units with well-developed transactive memory systems perform better than units lacking such memory systems (Austin, 2003; Hollingshead, 1998; Liang, Moreland & Argote, 1995).

Recent research is aimed at understanding the conditions under which transactive memory systems are most valuable (Ren, Carley & Argote, 2006). For example, research examines how changing membership (Lewis, Lange & Gillis, 2005), changing tasks (Lewis,
Belliveau, Herndon & Kelly, 2007), or disasters (Majchrzak, Jarvenpaa, & Hollingshead, 2007) affect the usefulness of transactive memory systems. Further research on conditions under which transactive memory systems improve organizational performance is needed.

Current research is also aimed at understanding what leads to the development of transactive memory systems. Many studies have found that experience leads to the development of transactive memory systems (e.g., Liang et al., 1995; Hollingshead, 1998). Communication (Kanawattanachai & Yoo, 2007), task characteristics (Zhang, Hempel, Han & Tjosvold, 2007) and stress (Pearsall, Ellis, & Stein, 2009) have also been shown to affect the development of transactive memory systems. More research is needed on factors predicting the development of transactive memory systems.

Knowledge transfer

Theoretical work posited that organizations learn indirectly from the experience of other units as well as directly from their own experience (Levitt & March, 1988). Learning indirectly from the experience of others, or vicarious learning (Bandura, 1977), is also referred to as knowledge transfer (Argote & Ingram, 2000). This transfer can be “congenital” and occur at the organization’s birth (Huber, 1991) or after the organization has been established. Empirical work has provided evidence of knowledge transfer –both when an organization first beings operation (Argote, Beckman & Epple, 1900) and on an ongoing basis after the organization has been established (Darr, Argote & Epple 1995; Epple, Argote & Devadas, 1991; Zander & Kogut, 1995; Baum & Ingram, 1998; Bresman, 2010). Considerable variation has been observed, however, in the extent of transfer (Szulanski, 1996).

A current theme in research on knowledge transfer is identifying factors that facilitate or inhibit knowledge transfer and thereby explain the variation observed in the extent of transfer. These factors include: characteristics of the knowledge such as its causal ambiguity (Szulanski, 1996); characteristics of the units involved in the transfer such as their absorptive capacity (Cohen & Levinthal, 1990), expertise (Cross & Sproull, 2004), similarity (Darr & Kurtzberg,
2000), or location (Gittleman, 2007; Jaffe, Trajtenberg & Henderson, 1993), and characteristics of the relationships among the units such as the quality of their relationship (Szulanski, 1996; Zollo & Reuer, in press). Although work on knowledge transfer in the 1990’s emphasized cognitive and social factors, more recent work also emphasizes motivational (Quigley, Tesluk, Locke & Bartol, 2007; Osterloh & Frey, 2000) and emotional (Levin, Kurtzberg, Phillips, & Lant, 2010) factors as predictors of knowledge transfer.

Knowledge transfer typically occurs across a boundary. The boundary could be between occupational groups (Bechky, 2003), between organizational units (Darr, Argote & Epple, 1995) or between geographic areas (Tallman & Phene, 2007). Understanding the translations that happen at the boundary is an important area of current research (Carlile & Rebentisch, 2003; Carlile, 2004; Tallman & Phene, 2007). Another current theme in this area of knowledge transfer is aimed at understanding the effectiveness of various knowledge transfer mechanisms (Rosenkopf & Almeida, 2003), such as personnel movement (Almeida & Kogut, 1999; Song, Almeida & Wu, 2003), technology (Kane & Alavi, 2007), templates (Jensen & Szulanski, 2007), social networks (Owen-Smith & Powell, 2004; Reagans & McEvily, 2003), routines (Darr et al., 1995; Knott, 2001), and alliances (Gulati, 1999).

An important research question in the area of knowledge transfer is how to manage the tension between facilitating the internal transfer of knowledge within organizations while preventing is external leakage or spillover outside the organization (Kogut & Zander, 1992). Organizations, especially for-profit firms, need to balance transferring knowledge internally with keeping the knowledge in a form that it is hard for other organizations to imitate (Rivkin, 2001). Argote and Ingram (2000) argued that embedding knowledge in the networks involving members was an effective strategy for managing this tension. Empirical research is needed to test hypotheses about how to balance the tension between facilitating knowledge transfer within organizations while impeding knowledge transfer to other organizations.
Another exciting research question pertains to the transfer of capabilities from existing to new ventures—either within an existing firm (Cattani, 2005) or to new entrepreneurial firms (Carroll, Bigelow, Seidel & Tsai, 1996). For example, research examines how the experience of the founding team affects the performance of new entrepreneurial firms (Beckman & Burton, 2008; Dencker, Gruber & Shah, 2009). There is considerable evidence that spin-offs from existing firms, or de alio firms, perform better than new or de novo entrants to an industry (Klepper & Sleeper, 2005). Research, however, has not established what is being transferred to the new firm from previous experience at the parent firm. Understanding what is being transferred from the parent firm that provides its offspring a competitive advantage is an important issue that would benefit from future research.

Conclusion

This essay provides a new theoretical framework for analyzing organizational learning and knowledge. We hope that the framework will stimulate future research on organizational learning. We have also identified current and emerging themes in research on organizational learning and knowledge. Further research on these themes will greatly enrich our understanding of organizational learning and knowledge creation, retention and transfer. Because organizational learning is so central to organizations and their prosperity, a greater understanding of organizational learning promises both to advance organization theory and contribute to improved organizational practice.
Figure 1

A Theoretical Framework for Analyzing Organizational Learning
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