

Attention, Knowledge, and Organizational Learning

William Ocasio, Luke Rhee, and Daniel Milner

Abstract

In this chapter, we develop a theoretical framework of an attention-based view of organizational learning. Specifically, we explain how the three pillars of Ocasio's (1997, 2011) attention-based view—focus of attention (and its subnotions of executive attention and attentional vigilance), situated attention, and structural distribution of attention—are relevant for three main outcomes of organizational learning: knowledge creation, retention, and transfer. We also discuss how attention interacts with other well-known learning mechanisms, such as performance feedback, capabilities, trust, and experience, and when and how attention either amplifies or negates their effectiveness for learning. We conclude with an evaluation of the attention-based view of organizational learning and suggestions for future research.

Keywords attention, exploration, knowledge transfer, organizational learning, organizational memory, organizational structure, performance feedback, routines, sampling biases, social networks

How do organizations learn? Scholars have argued that organizations mainly learn from their past histories and situations rather than from anticipatory calculation and intention (Gavetti & Levinthal, 2000; Nelson & Winter, 1982). As Levitt and March (1988) have summarized, organizational learning is viewed as “routine-based, history-dependent and target-oriented” (p. 319). More recently, Argote and her colleagues have defined organizational learning as a change in the organization's knowledge that occurs as a function of experience (Argote, McEvily, & Reagans, 2003; Argote & Miron-Spektor, 2011). Organizations accumulate their own experience and gain experience or knowledge inputs from other individuals, units, or organizations. As a result of this experience, organizations create, retain, and transfer knowledge (Argote, McEvily, & Reagans, 2003). As this definition has been widely adopted in the literature, scholars have developed various perspectives to understand the link between experience and knowledge. The research has revealed numerous factors that affect learning processes by which organizational experience turns into knowledge,

including emotions and trust (Edmondson, 1999; Levin & Cross, 2004), social networks (Aral & Van Alstyne, 2011; Burt, 2004), resources and capabilities (Barney, 1991; Eisenhardt & Martin, 2000), absorptive capacity (Cohen & Levinthal, 1990), organizational hierarchies (Gaba & Joseph, 2013; Vuori & Huy, 2016), and interorganizational relationships (Beckman & Haunschild, 2002), to name a few. However, one concept that has received less investigation into its relationship with knowledge is attention.

The purpose of this chapter is to theorize the role of attention as another important factor for organizational learning. Attention is directly relevant for organizational learning in light of the fact that organizational experience does not always turn into knowledge (Gavetti, Greve, Levinthal, & Ocasio, 2012). Assuming organizational members are inherently limited in their attentional capacity, it stands to reason that they may not always pay attention to their colleagues' or their own past experiences to create, retain, and transfer knowledge. If they gain an amount of experience on their own or

access knowledge that is derived from the experience of others greater than they have the attentional resources to process, they wittingly or unwittingly choose to allocate their finite attention to particular experience and knowledge while ignoring others (Ocasio, 1997; Simon, 1947). Psychological studies on attention suggest that only experience and knowledge that gain one's attention become embedded in memory and are thought about more thoroughly than those that are not attended to (Fiske & Taylor, 2013; Kahneman, 1973). Therefore, having experience does not always guarantee creating knowledge in a domain where experience occurs, retaining it (although knowledge is created), and transferring it (although knowledge is created and retained somewhere in the organization). Attention may both amplify and limit returns on experience.

We strive toward a stronger connection between attention and organizational learning and develop an attention-based view of organizational learning. We believe that bringing the role of attention in organizational learning allows us to explicate several fundamental cognitive mechanisms by which organizational members learn through their own experience and the experience of others, and it also provides us with a valuable theoretical lens that can be used to enrich empirical studies. In doing so, we draw from Ocasio's (1997) attention-based view of the firm and build a theoretical framework to discuss how attention is directly associated with the key outcomes of organizational learning: knowledge creation, retention, and transfer. We conclude with an evaluation of the attention-based view of organizational learning and suggestions for further research.

What Is Attention?

Although attention is defined in a variety of ways, psychological studies on attention have tended to view attention as an information-processing mechanism through which individuals locate particular information in their consciousness and, with that information, often update their preexisting knowledge structures (Dijksterhuis & Aarts, 2010; Fiske & Taylor, 2013; Kahneman, 1973). People's attentional processes are often so automatic that people are not self-aware of information to which they attend (Bargh, 1982; Shiffrin & Schneider, 1977). But, regardless of whether their attention is paid either intentionally or passively, it seems that only information that captures their attention occupies their consciousness as an ingredient for learning.

Organizational scholars studying attention have implicitly and explicitly followed this psychological

approach to attention. Originally, scholars from the Carnegie School (Cyert & March, 1963; March & Simon, 1958; Simon, 1947) posited that through attention allocation, organizational members filter out some experience (and knowledge) and dedicate cognitive resources to learning only from a select few experiences. For example, Cyert and March (1963) have argued that while organizational members are exposed to multiple experience and knowledge inputs, they do not attend to all of them at the same time, but instead sequentially attend to one over others at any particular point in time. The authors have theorized that organizational learning is driven by sequential attention in the sense that organizational members learn only from experience and knowledge that capture their attention at a particular point in time. Consistent with the Carnegie School's original emphasis on attention for learning, recent studies have invoked attention-based explanations for organizational learning (e.g., Blettner, He, Hu, & Bettis, 2015; Chen & Miller, 2007; Greve, 2008; Seshadri & Shapira, 2001; Sullivan, 2010).

Despite such theoretical advances, however, little is still known about how attention affects learning processes by which experience turns into knowledge creation, retention, and transfer. If organizational members learn only from experience and knowledge inputs that capture their attention, how should they allocate finite attentional resources across different experience to facilitate new knowledge creation? If individuals do not embed knowledge in their memory without attending to it, how do attentional processes affect knowledge retention at their organization? If there is always more knowledge transferred to organizational members than they have attentional resources to process, when and how does their attention either hinder or enable knowledge transfer? Because organizational members with limited attention do not pay attention to all experience and knowledge available to them, their returns on experience should be significantly mediated by the role of attention. But, to our best knowledge, the relationship between attention and learning outcomes has remained less studied in research on attention and learning.

Attention-Based View of the Firm

To fill this theoretical gap, we develop a theoretical framework linking Ocasio's (1997, 2011) attention-based view of the firm and organizational learning. Among many other organizational studies on attention, Ocasio (1997) has explicitly defined attention,

with the psychological view on attention in mind, as cognitive efforts for learning. According to his definition, attention encompasses “noticing, encoding, interpreting and focusing of time and effort” (p. 189). Recently, Ocasio (2011) has developed and clarified the definition of attention with three varieties of attention: attentional perspective, attentional engagement, and attentional selection. In this recent work, he viewed the processes of noticing, encoding, interpreting, and focusing as key properties of attentional “engagement.” Attentional engagement is defined as “the process of intentional, sustained allocation of cognitive resources to guide problem solving, planning, sense making, and decision making” (p. 1288). Attentional “engagement” represents the cognitive effort spent for learning, which formed the basis for Ocasio’s original definition of attention in 1997. Given his precise notion of attention as a cognitive mechanism for learning, the original framework provides critical conceptual components that can explain the outcomes of organizational learning. In what follows, we briefly describe the three key pillars of Ocasio’s (1997, 2011) original attention-based view: focus of attention, situated attention, and structural distribution of attention.

FOCUS OF ATTENTION

Focus of attention links attentional processing to individual cognition and behavior by focusing perception and action toward those actions being attended to, while limiting perception and action toward actions that are not being attended to (Kahneman, 1973). Ocasio’s premise (1997) on focus of attention proposes that organizational members’ behavior depends on the issues and answers on which they focus their attention. Because individuals are inherently limited in their attentional capacity, organizational members discern the relative importance of issues and answers in a given learning context; and following the selection of issues and answers to focus attention on typically prescribes the subsequent course of action to take (Ocasio, 1997). But, to the extent that focus of attention is a metatheoretical concept, psychological and organizational scholars have specified this notion in terms of timing and selectivity, specifically attentional vigilance and executive attention. We draw from these two subnotions of focus of attention to discuss the role of attention for organizational learning.

Attentional vigilance refers to the process of sustaining concentration on a particular stimulus over time (Ocasio, 2011). Attentional vigilance indicates

how persistently a stimulus is attended to over time. Because of organizational members’ limited ability to sustain attention, relative to tasks that do not demand a high degree of attentional vigilance, tasks that demand a high degree of vigilance are more cognitively taxing, resulting in decreasing quality of attention over uninterrupted periods of sustained attention (Weick & Sutcliffe, 2006). Executive attention involves allocating controlled cognitive resources to a particular focus of attention, independent of other stimuli that might present in a context or while dealing with interruptions (Cyert & March, 1963; Ocasio, 2011). Importantly, executive attention allows organizational members to switch attention flexibly among different experiences and knowledge while bringing them together in working memory, if necessary.

SITUATED ATTENTION

Whereas focus of attention links individual cognition and behavior, situated attention broadly follows the Lewinian principle of situationalism in social psychology, which posits that an individual’s attention is a product of the situation (Fiske & Taylor, 2013; Ross & Nisbett, 1991). Ocasio’s premise on situated attention (1997) suggests that what organizational members focus their attention on depends on the situation in which they find themselves. Ocasio (1997) links individuals’ situated attention with the ways an organization and its broader environment affect both the situations themselves and the ways individuals focus their attention and action toward them. In particular situations, some experience is likely to be more cognitively accessible to organizational members, thus receiving more attention from them (Audia & Greve, 2006; March & Shapira, 1992). Ultimately, immediate situations facing organizational members, such as task urgency (Seshadri & Shapira, 2001; Sullivan, 2010) and task routines (March & Simon, 1958), affect their focus of attention.

STRUCTURAL DISTRIBUTION OF ATTENTION

Structural distribution of attention considers that while an individual’s attention is situated, the situation depends on how an organization’s attention structure shapes specific communication and procedural channels (Ocasio, 1997). Attention structure, which is comprised of rules of the game, key players, structural positions, and resources, distributes the attention of organizational members across the activities, communications, and interactions (Ocasio, 1997). First, the rules of the game, as

defined by formal and informal principles of action, interaction, and interpretation that guide and constrain organizational members in accomplishing the firm's tasks, provide the criteria and common interests or identities that replace the idiosyncrasies of individual motives and serve as a common lens for guiding organizational members to attend to particular information inputs in the workplace. Key players influence the distribution of other members' attention through the specific skills, values, and beliefs that they bring to their organization. Moreover, structural positions, including relationships with other members in corporate hierarchies or communication networks, shape the distribution of attention by channeling particular experience for focal actors to attend to. The final attention structure is resources, which often serve as cognitive schemas for organization members to evaluate alternative organizational moves to solve an issue. Consistent with Maslow's hammer, popularly phrased as "If all you have is a hammer, everything looks like a nail," resources channel organizational attention toward particular experience or knowledge that corresponds most effectively to themselves (Greve, 2003).

Attention-Based View of Organizational Learning

As discussed earlier, if organizational members pay attention only to some experience and knowledge inputs while ignoring others, there is no guarantee that organizational experience always turns into knowledge as a result of learning (Simon, 1947). Attention may both amplify and limit returns on experience. In the following subsections, we draw from the three theoretical pillars on attention (Ocasio, 1997, 2011) and develop attention-based

explanations of knowledge creation, retention, and transfer, respectively. Our theoretical framework is presented in Figure 5.1. Note that the framework in Figure 5.1 is not a 3-by-3 matrix such that each pillar is not individually linked to each learning outcome. Instead, we explain each learning outcome by bringing together multiple pillars on attention as needed. In sum, the framework identifies points of integration between attention and learning. We undertake this integration in what follows.

Attention and Knowledge Creation

Knowledge creation occurs when a unit generates knowledge that is new to it (Argote, McEvily, & Reagans, 2003; Argote & Miron-Spektor, 2011). One popular framework to characterize knowledge creation is the exploration-exploitation dichotomy (March, 1991; O'Reilly & Tushman, 2013). To the extent that knowledge creation concerns knowledge new to the focal unit, prior research has benefited from connecting with the literature on exploration and exploitation. Exploration is normally described by whether the focal unit (e.g., individuals, subunits, or organizations) produces knowledge that has not been generated and used before (March, 1991). The returns associated with exploration are more variable and distant in time, whereas the outcomes related to exploitation are more certain and closer in time (He & Wong, 2004). Exploitation includes knowledge that is incrementally extended based on the existing experience and knowledge base (March, 1991). Empirical studies have also measured the exploration-exploitation dichotomy as the form of knowledge generation (Dahlander, O'Mahony, & Gann, 2016; Kaplan & Vakili, 2015; Karim & Kaul, 2014). For example, Benner and Tushman (2002)

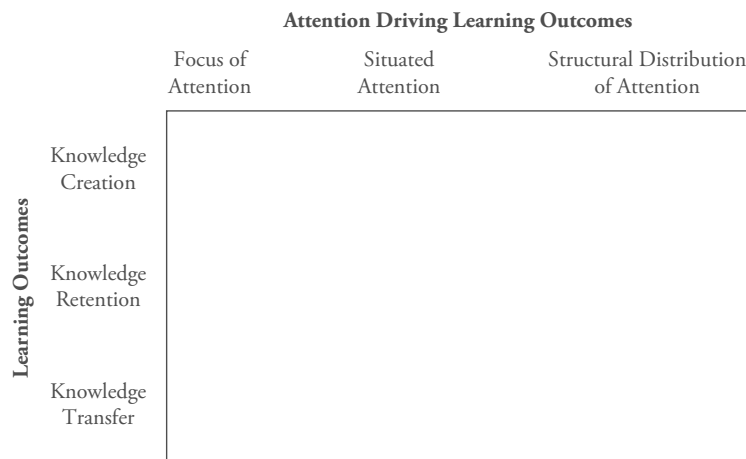


Figure 5.1 Theoretical framework for attention-based view of organizational learning.

have considered whether a firm generates patents that cite other patents that have not been used at the firm to measure the exploration-exploitation continuum. Consistent with prior studies, we also view exploration and exploitation as two main types of knowledge creation. Our attention-based view of knowledge creation explains how attention is linked to each of them.

In the organizational learning literature, there is increasing evidence that various kinds of experience, such as successful or unsuccessful (Audia & Goncalo, 2007), or deep or diverse ones (Kaplan & Vakili, 2015; Katila & Ahuja, 2002), directly contribute to exploration. It seems obvious that various experience increases the number of potential paths one can search and the number of potential new combinations of existing knowledge (Amabile, 1997; Hargadon & Sutton, 1997). In reality, however, organizational members with various experiences do not always succeed at exploration (Fleming, Mingo, & Chen, 2007). Although organizational members accumulate different experience as potential ingredients for exploration, some of the experience that does not capture their attention is not thought through thoroughly and does not occupy their consciousness (Fiske & Taylor, 2013; Ocasio, 1997). From this attentional perspective, there is no guarantee that all the experience earned is always used to pursue exploration.

One important question is then how organizational members should allocate their attention across multiple experiences to spur exploration. Organizational scholars have argued that organizational members can trigger exploration, that is, extract lessons from particular experience and recombine them with other experiences that are either distant from or specific to their task domains (Burt, 2004; Fleming, 2001; Kaplan & Vakili, 2015; Lingo & O'Mahony, 2010; Schumpeter, 1939). For example, Charlie Merrill was able to explore a new business, retail brokerage, in Merrill Lynch by bringing the retailing logic from his prior experience as a supermarket chain manager and applying it to his current banking business (Gavetti, Levinthal, & Rivkin, 2005). Product designers at IDEO explored novel product designs by applying prior experience in different industries to design problems they faced in other industries (Hargadon & Sutton, 1997). Taken together, these lines of evidence converge on the notion that recombination is a key cognitive vehicle to facilitate exploration.

A key argument in our attention-based view of knowledge creation is that a primary form of

attention for exploration is executive attention. Executive attention was originally considered in the setting of decision making to characterize the extent to which decision makers can modulate their focus of attention among multiple decision tasks to deal with interruptions (Cyert & March, 1963; Ocasio, 2011). In the context of learning, executive attention allows organizational members to go back and forth flexibly across multiple experiences to understand all of them as potential ingredients for recombination. By doing so, members might be able to identify feasible combinations among their experience. But, when only part of their experience is attended to, the number of potential combinations is reduced and, thus, their ability to create new knowledge is also limited. In sum, prior studies have suggested that organizational members should expose themselves to experience as much and as diverse as possible to gain a variety of perspectives and opinions that can facilitate exploration. However, if members do not go back and forth flexibly across different experience, it seems unlikely that they spur exploration as much as they need or desire. Executive attention is a cognitive act to turn experience into exploration. Of course, there must be a contingency on the positive relationship between executive attention and exploration. It will be detailed in the "Discussion" section.

In contrast to exploration, exploitation involves generating knowledge through refinement, routinization, and implementation of existing experience and knowledge base (Benner & Tushman, 2002; O'Reilly & Tushman, 2013). From an attentional perspective, exploitation is a natural organizational phenomenon in the sense that organizational members normally focus their attention on their existing knowledge and current work as opposed to new, unfamiliar experience and knowledge (Gavetti, 2012; Levinthal & March, 1993). As Mintzberg (1973) summarized, "[an organizational member] is overburdened with work...he is driven to focus on what is current and tangible in his work" (p. 173). If organizational members do not make any conscious effort to divert their attention from current to new knowledge domains or experience, their attention is directed in ways that reinforce exploitation (Eisenhardt, Furr, & Bingham, 2010). Empirical studies have also demonstrated such an exploitative nature of attention that organizations normally pay attention to satisfying their current customer demands (Christensen, 1997), sticking to their current business model (Tripsas & Gavetti, 2000), and exploiting their current technologies (Chesbrough, 2003), at the expense of exploration.

Although organizational attention is normally allocated to pursue exploitation, it does not mean that every organization automatically succeeds at exploitation. Exploitation involves focusing on the narrow section of all possible alternatives in the organization's current business domain and improving the performance of answers to existing or new organizational issues (Katila & Ahuja, 2002). As a result of specialization in their current business domain, exploitation occurs when organizations accrue experience and even expertise in these local alternatives. Exploitation requires search processes associated with local alternatives (Cyert & March, 1963; Greve, 2003). But local search might not succeed until members persistently sustain their attention to experience specific to their local domain and develop domain-specific insights that can improve their existing knowledge base (Kaplan & Vakili, 2015; Taylor & Greve, 2006). Therefore, successful exploitation needs "vigilant" attention to the current, local business domain. Vigilant attention prevents organizational members from dispersing cognitive efforts and distracting their attention from experience related to their current work (Ocasio, 2011; Weick & Sutcliffe, 2006).

Executive attention and attentional vigilance are crucial cognitive mechanisms for exploration and exploitation. However, the mechanisms are somewhat contradictory to each other in the sense that organizational members who vigilantly attend to particular knowledge domains or experience find it difficult to flexibly switch their focus of attention to others, or vice versa (Ocasio, 2011). These contradictory attention mechanisms imply that exploration-exploitation is viewed as ends of a continuum rather than separate dimensions. Notably, the tradeoff between executive attention and attentional vigilance is consistent with the traditional belief in organization theory and strategic management—that because exploration and exploitation require substantially different structures, capabilities, and cultures to pursue, organizations normally find it difficult to balance exploration and exploitation (March, 1991; O'Reilly & Tushman, 2013). But research has not seriously looked at the tension between exploration and exploitation from the attentional perspective. Our theoretical discussion here suggests that although organizations can (but are less likely to) configure their structures, capabilities, and cultures to balance exploration and exploitation, they might still struggle with achieving organizational ambidexterity—unless they flexibly alter the mode of attention between executive attention and

attentional vigilance. Simply put, if organizational members do not pay attention to how they allocate their attention, it seems unlikely that their efforts to identify solutions for ambidexterity in a domain other than attention fully come to fruition.

Attention and Knowledge Retention

Knowledge retention involves embedding knowledge created or transferred in organizational memory so that it exhibits some persistence over time (Argote, McEvily, & Reagans, 2003; Argote & Miron-Spektor, 2011). The creation of knowledge does not guarantee its continuity; should the information be lost before it can be stored in the organization, the organization cannot say it has learned that knowledge. Therefore, after knowledge is created, it needs to be embedded in reservoirs or repositories so that it can be retrieved later. Knowledge embedded in organizational memory permeates organizational members, tasks, routines, and the networks formed by crossing members, tools, and tasks (Argote & Ingram, 2000). Knowledge retention is normally affected by member turnover (Rao & Argote, 2006), the tacitness of knowledge (Haas & Hansen, 2007; Reagans & McEvily, 2003), and transactive memory systems (Lewis, Lange, & Gillis, 2005).

Our attention-based view of knowledge retention primarily concerns why some knowledge becomes embedded in organizational memory (e.g., document archives, routines, or transactive memory systems) while others does not. If not all knowledge generated is retained in an organization, what additional efforts should organizational members make to locate knowledge in organizational memory? We answer those questions using the notion of attentional vigilance. Attentional vigilance shapes what issues and solutions persistently gain organizational attention, thus ultimately choosing knowledge to embed in organizational memory (Ocasio, 2011). As discussed in the relationship between attentional vigilance and exploitation, organizational members who vigilantly attend to existing knowledge sets properly update and transform them in response to any change in their task environments. For example, as Zollo and Winter (2002) have argued, organizational routines are not indeed maintained and updated until members sustain their attention to how those routines operate and identify areas of improvement. Although routines are established, they become easily outmoded and unused unless they receive consistent attention from organizational members

(Feldman & Pentland, 2003). Using quasi-natural experiments, Leonardi (2015) has demonstrated that task groups who adopted enterprise social networking technologies could increase the accuracy of members' metaknowledge (knowledge of "who knows what" and "who knows whom") at work as opposed to other groups who did not. According to his observation, enterprise social networking technologies enabled group members to maintain their attention to what their colleagues talked about and whom they talked to without any interruption, thus improving transactive memory systems.

If attentional vigilance enables knowledge retention, knowledge is likely to be outmoded and forgotten over time when it does not gain consistent attention from organizational members. Organizational forgetting is important particularly when organizations face market and technological changes that can undermine the usefulness of embedded knowledge (Henderson & Clark, 1990; Leonard-Barton, 1992). Organizations that easily empty old knowledge (that has contributed to their market success) in their memory and refill it with new knowledge are more likely to survive in the face of environmental changes (de Holan & Philips, 2004).¹ But there is an important attention bias problem that often hinders organizational forgetting: Organizational members are normally driven to focus their attention to existing knowledge sets and find it hard to divert their attention to new, unfamiliar knowledge domains (Haas, Criscuolo, & George, 2015; Piezunka & Dahlander, 2015).

Organizational studies have shown that many incumbents fail to respond to dramatic shifts in market environments due to their structural inertia and core capabilities (Hannan & Freeman, 1984; Leonard-Barton, 1992). But, if their attention bias is also a constraint, it is important that organizational members should be able to alter their attentional focus as much as they need (Christensen, 1997; cf. Tripsas & Gavetti, 2000). If organizational members (across all hierarchical levels) are not aware of how they allocate their attention, they might not even notice whether it is their attention that hinders their effort to forget deeply embedded knowledge in the memory. But, as behavioral scholars have argued, organizational members are ordinary human beings with inertial cognition and thus do not overcome their attention bias as easily as they wish (Thaler & Sunstein, 2008). Then, another alternative to facilitate organizational forgetting is that members should work to reconfigure other organizational devices that

can lead to changes in their attentional process, including a shift in their hierarchical and function position (Gaba & Joseph, 2013; Vuori & Huy, 2016), setting goals (Greve, 2008), or demanding new work situations (Stanko & Beckman, 2015).

Attention and Knowledge Transfer

Although organizational members learn directly from their own experience, learning also occurs indirectly from the experience of others (Levitt & March, 1988). The latter is referred to as vicarious learning (Bandura, 1977) and is often called knowledge transfer (Argote & Ingram, 2000; Reagans & McEvily, 2003). Knowledge transfer involves disseminating knowledge learned or created and retained in one part of an organization to another, or, more simply, when the experiences in one unit affect another; indeed, the transfer of knowledge can result in the creation of new knowledge (Argote, McEvily, & Reagans, 2003; Hansen, 1999). Knowledge transfer occurs actively, for example, at a workshop or memo where information is shared (Hargadon & Sutton, 1997); or passively, where new information is not directly sought out but still manages to reach a new unit.

It seems that learning scholars have implicitly assumed that organizational members are rational such that they are able to attend to knowledge inputs coming from other members, units, or firms as much as they need or wish to. For this reason, scholars have argued that the success at knowledge transfer is improved by altering structural elements, such as personnel movement (Corredoira & Rosenkopf, 2010), boundary objects (Bechky, 2003), and the strength of network ties (Hansen, 1999; Reagans & McEvily, 2003). But, if organizational members are limited in their attentional capacity and access a greater amount of knowledge from other individuals, units, or organizations than they have attentional resources to process, members allocate their attention to control information overload and filter out some knowledge inputs.² Consequently, the transfer of knowledge may not truly occur until that knowledge receives attention from recipients (Ocasio, 1997; Simon, 1947).

If organizational members pay attention to some knowledge inputs while ignoring others, one important question is whether their attention allocation pattern is systematic or random. If they allocate their attention to knowledge coming from others with any particular rules, can we theorize and predict their behavior? Although this topic has not been actively advanced in organizational research,

recent empirical studies have demonstrated that an organizational member's attention allocation to knowledge inputs is driven by such patterns as their fit with his or her expertise (Haas et al., 2015), the amount of other knowledge inputs around him or her (Piezunka & Dahlander, 2015), their saliency relative to others (Bouquet & Birkinshaw, 2008), and knowledge demonstrability (Kane, 2010).

Although the types of knowledge inputs are important factors driving the attention of knowledge recipients, knowledge transfer is also affected by the structural and situational attributes of knowledge senders. Both knowledge senders and recipients do not often pay attention to knowledge coming from each other due to their idiosyncratic structural positions and situations. Recent empirical studies suggest that the situational and structural information of knowledge senders can serve as clues to inform us of whether knowledge transfer can occur. For example, Kane (2010) has shown that organizational groups pay more attention to knowledge coming from others who share a superordinate identity than from those who do not share their identity. By bringing structural holes theory in attention, Rhee (2016) has reported that people do not normally pay as much attention to information from brokers (who bridge structural holes) as they do to that from local communication partners in the workplace because information from brokers is not perceived to be relevant to their immediate tasks. In sum, it seems that attention is a rule-governed behavior. Therefore, if the transfer of knowledge does not occur until that knowledge gains attention, future research could advance our understanding for knowledge transfer by identifying and theorizing one's attention allocation pattern.

Knowledge transfer normally happens in the context of horizontal boundaries between different individuals, units, or organizations (Hansen, 2009; Hargadon & Sutton, 1997; Schilling & Phelps, 2007). Organizational members sitting at different hierarchical levels also transfer their knowledge to each other. In corporate hierarchies, different hierarchical positions impose different situational demands, which in turn render one's attentional focus idiosyncratic (Ocasio, 1997; Simon, 1947). For this reason, attention is also directly relevant for the success of vertical knowledge transfer. For example, Joseph and Ocasio (2012) have shown that the lack of integration of top manager attention with business unit attention (i.e., differences in structural positions) negatively impacted General Electric's ability to adapt strategically in those

unintegrated business units. Similarly, Vuori and Huy (2016) have found how lack of integration in the distribution of attention of top managers and middle managers at Nokia led to managers having overly optimistic long-term views of Nokia's technological resources, leading to a focus in short-term gains at the expense of long-term investment in R&D capabilities.

Discussion

We have discussed the role of attention for the three key outcomes of organizational learning: knowledge creation, retention, and transfer. By bringing Ocasio's (1997, 2011) attention-based view of the firm in organizational learning, we have developed a theoretical framework to explicate attentional processes by which knowledge is created, retained, and transferred. Notably, our framework theoretically treats attention as a "mediator" for the relationship between experience and knowledge. This theoretical approach is premised on the assumption that organizational members are inherently limited in their attentional capacity and they do not attend to direct or indirect experience as much as they can (or need to). If only experience receiving organizational attention turns into knowledge, it seems obvious that attention becomes an important mediator for organizational learning. In this regard, our attention-based view of learning could provide a more parsimonious explanation for the relationship between experience and knowledge.

Attention, as a mediator, has a number of important implications for knowledge creation, retention, and transfer. But we acknowledge that the mediation approach is not sufficient to enrich the attention-based view of learning. If the attention-based view is to directly speak to the current body of literature on organizational learning, it is important to shed light on how attention interacts with other well-known learning mechanisms, such as performance feedback, capabilities, trust, and various kinds of experience, and when and how attention either amplifies or negates the effectiveness of those mechanisms. In this section, we add some theoretical discussions about the role of attention as a moderator. We believe that our discussions here provide a theoretical lens that can enrich future empirical studies.

Performance Feedback and Attention

Scholars have argued that performance plays a significant role in organizational learning (Argote & Greve, 2007). It is important because not every organization interprets its performance in the same

way. Depending on how organizations perceive their experience, their learning approach differs (Levitt & March, 1988). In this regard, it is not surprising that scholars have examined performance feedback as an important learning mechanism (Cyert & March, 1963; Greve, 2003). According to performance feedback theory, organizations form their aspiration level to simplify their performance evaluation process based on their past performance and that of comparable organizations. Once performance falls below the aspiration level, organizations perceive their performance as a failure. Then, they trigger search for solutions to remedy the problem, in a variety of solution domains, including investments in R&D and advertisement (Chen & Miller 2007; Vissa et al., 2010), firm growth (Greve, 2008), and expansion (Audia & Greve, 2006). This problemistic search normally starts near the apparent problem or in areas that organizations have recently experienced. When a proper solution is not discovered, organizations trigger distant search beyond local domains (Gavetti & Levinthal, 2000; Rosenkopf & Almeida, 2003). When search happens, organizations learn from their experience (Greve, 2003).

Performance feedback-based learning is moderated by attention. The traditional view on problemistic search is that organizations engage in search when their performance is below aspiration level (Cyert & March, 1963). However, several studies have demonstrated that this is not always the case (March & Shapira, 1992; Ocasio, 1995). For example, performance below aspiration levels can render the concern of survival, rather than short-term financial performance shortfalls, salient to organizational members. Organizations whose attention is oriented toward survival avoid any significant change that may be caused by problemistic search and protect themselves from the threat of bankruptcy, thus minimizing search behavior (Audia & Greve, 2006; Chen & Miller, 2007; Greve, 2011).

In addition, problemistic search is often driven by solution domains to which organizational members pay attention. For example, Vissa, Greve, and Chen (2010) have demonstrated that business group-affiliated firms in India directed their attention to marketing domains and increased advertising expenditures in response to performance below aspiration level. Underperforming companies independent of Indian business groups focused their attention on technology domains, thus intensifying R&D search. In sum, attention moderates the relationship between performance feedback and learn-

ing such that the effect of performance feedback on learning becomes pronounced or diluted depending on where organizational attention is oriented.

In this regard, one way to advance empirical approaches to performance feedback research is to capture issues and solutions to which organizations attend and identify what issues and solutions moderate learning based on performance feedback. For example, future empirical studies could examine the role of attention for the problemistic search of subunits within a large multilevel hierarchical organization—such as multidivisional firms in the United States and business groups prevalent outside the United States. In large hierarchical organizations, many corporate-level issues and solutions always compete for the attention of decision makers at the top of a hierarchy (Bouquet & Birkinshaw, 2008; Gaba & Joseph, 2013). In a normal situation, because the problemistic search of subunits is not on top decision makers' radar, subunits are delegated to trigger problemistic search autonomously. But when the underperformance of subunits becomes a significant issue for their entire organization, their search is upgraded from a unit-level to a corporate-level agenda. The attention of top decision makers will either reinforce or weaken the problemistic search of subunits. However, critics claim that the original behavioral theory of the firm does not offer a theoretical account to capture the cross-level effect of top decision makers on subunits' search in a large hierarchical organization (Gavetti, Levinthal, & Ocasio, 2007). We propose that managerial attention is one important mechanism driving the cross-level hierarchical influence on subunits' learning based on performance feedback.

Capabilities and Attention

The role of attention for learning also needs to be considered in conjunction with capabilities-based theory in strategy (Barney, 1991; Eisenhardt & Martin, 2000; Nelson & Winter, 1982). The theory of attention argues that an organization's ability to learn depends on whether and how it attends to direct or indirect experience organizational members gain and accumulate (Gavetti et al., 2012; Ocasio, 1997). On the other hand, the theory of capabilities posits that organizational learning is often affected by capabilities (that are afforded by resources). The juxtaposition of both theories suggests that attention and capabilities interact with each other to result in learning. For example, Eggers and Kaplan (2009) have shown that although top

decision makers pay attention to particular business opportunities, their ultimate success at new product introductions depends on whether they have resources and capabilities to implement those opportunities into new products. That is, the role of attention for learning is limited by the lack of capabilities. On the contrary, attention also offsets the advantage of capabilities for learning. For example, Chesbrough (2003) has observed that although Xerox possessed sufficient levels of resources (e.g., patents and engineers) to commercialize breakthrough technologies, such as graphical user interfaces and word processors, top decision makers did not pay attention to new business opportunities for which those resources could be deployed but instead focused their attention on improving the current copy machine business.

If attention either reinforces or negates the benefit of capabilities for learning, organizational learning may not occur when attention and capabilities are not aligned with each other. For some organizations who focus on new business opportunities, the lack of capabilities to implement them can serve as a bottleneck that stifles organizational learning (Eggers & Kaplan, 2009; Gerstner, König, Enders, & Hambrick, 2013). For others who pay attention to their current businesses, exploration may not occur although the organizations possess novel technological resources and capabilities (Chesbrough, 2003; Tripsas & Gavetti, 2000). Setting up the right attention strategy (that fits existing capabilities and resources) is important particularly because it allows an organization to improve its learning ability even without obtaining resources and cultivating particular capabilities. Although resource acquisition and capability building are costly and time-consuming vehicles to facilitate learning, organizations may be able to strategically set up their attention strategies in a way that amplifies the value of capabilities and resources available to them. Future research could develop a more fine-grained framework to identify the profiles of attention that can maximize the potential of an organization's existing capabilities and resources for learning. For example, for organizations that wish to pursue exploration successfully, they should be able to freely allocate their attention to new customers (Christensen, 1997) and technological segments (Chesbrough, 2003) that can be supported by their existing capabilities and resources, as well as to business models that do not dramatically require the reconfiguration of their existing capabilities and resources (Tripsas & Gavetti, 2000).

Trust and Attention

Attention may also moderate the role of trust for learning. Social network scholars have presented empirical evidence that knowledge is better transferred on strong ties (Hansen, 1999; Reagans & McEvily, 2003). For example, by directly analyzing contents from email communications, Aral and Van Alstyne (2011) have shown that information coming from strong ties is larger in quantity and more diverse than that on weak ties. Strong ties are normally governed by the social norm of reciprocity and reputation. Thus, uncooperative behaviors are unlikely to occur and trust for their colleagues is formed (Coleman, 1990). Organizational members are more willing to transfer knowledge from strong ties and other colleagues in their closed network because they believe their colleague's knowledge is more reliable than a weak tie's knowledge (Levin & Cross, 2004; Uzzi, 1997).

Although organizational members have strong ties with each other and trust information coming from each other, they do not necessarily pay attention to the information from strong ties. Psychological studies have revealed that individual attention is normally driven by the extent to which knowledge inputs are perceived to be relevant for his or her immediate work (Dijksterhuis & Aarts, 2010; Fiske & Taylor, 2013; Kahneman, 1973). The perception of relevance is affected by the extent to which organizational members cognitively engage in their current task. For example, Reyt and Wiesenfeld (2015) have drawn from construal-level theory in social psychology and studied the role of psychological distance for learning. They have found that people who maintain psychological distance for their work think of it in an abstract way and thus are receptive to seemingly irrelevant information inputs, consequently engaging in explorative learning activities. Seeing the forest, instead of the trees, might mitigate an attention bias against information coming from outside a focal task domain.³

This insight about attention and relevance suggests that even if people believe that their (strongly tied) colleague's information is reliable, they still may not allocate attention toward the information when that information is not perceived to be relevant to their task. Trust is defined as one's belief that his or her partner would not act in self-interest at his or her expense and would assume the best when interpreting his or her motives and actions (Levin & Cross, 2004; Uzzi, 1997). People often assume that a partner whom they trust will not share distorted, false information that hurts their learning and

performance. Thus, it seems that their information is viewed as reliable in the content. But the benefit of trust for learning can be diminished by a lack of attention because reliable information from strong ties can be perceived differently depending on the extent to which focal individuals immerse themselves in tasks at hand. Although we develop a theoretical argument that both attention and trust enable learning, empirical research is needed to test how attention moderates the role of trust for learning, in particular in the form of knowledge transfer.

Experience and Attention

Our attention-based view of learning posits that experience serves as key inputs to be processed at the conscious level before it turns into knowledge. But not all experience benefits learning in the same way because experience varies in its characteristics. However, our framework has remained agnostic with respect to the type of experience. One important attribute of experience to consider is whether or not organizational members gain diverse experience. Scholars have normally viewed the diversity of experience as positive because organizational members having diverse experience accumulate different knowledge or perspectives from different experience and generate a variety of paths that can trigger recombination (Fleming, 2001; Hargadon & Sutton, 1997; Lingo & O'Mahony, 2010; Schumpeter, 1939). But the diversity of experience does not always benefit learning—if organizational members do not allocate their attention in ways that maximize the value of their experience. For example, in the context of communication networks among engineers at a software company, Rhee and Leonardi (2014) have shown that software engineers, who bridge structural holes and thus access diverse knowledge inputs from otherwise disconnected colleagues, fail to produce good ideas when they focus their attention only on a subset of knowledge inputs from their colleagues without broadly considering inputs from all of their colleagues. That is, narrowing their attention limits the benefit of diverse experience shared by their communication partners.

In a similar vein, attention can curtail the role of new experience for learning—because organizational members do not always pay attention to new experience. For example, Piezunka and Dahlander (2015) have demonstrated that as organizational members are surrounded by a larger amount of knowledge inputs, they become less likely to pay attention to new experience shared by others. In

addition, the invisible gorilla experiment suggests that new experience does not necessarily capture one's attention when he or she pays attention to his or her current task (Simons & Chabris, 1999). Organizational members are often encouraged to expose themselves to new experience to improve learning. If they wish to maximize the value hidden in new experience for learning, they should pay attention to whether or not they allocate their attention to new experience.

Another dimension of experience that matters for learning is its tacitness (Von Hippel, 1994; Szulanski, 1996). Prior studies have argued that the transfer of tacit knowledge from one to another requires building a strong relationship and developing relationship heuristics and specialized languages (Reagans & McEvily, 2003; Uzzi, 1997). But we posit that although organizational members receive tacit knowledge from their colleagues through strong ties, they do not learn it until vigilantly maintaining attention to it. Tacit knowledge is not easily codifiable, is deeply embedded in organizational routines and norms, and is dependent on other knowledge components in one's task domain (Hansen, 1999; Reagans & McEvily, 2003; Zollo & Winter, 2002). Thus, tacit knowledge requires persistent attentional effort to fully understand it. Only organizational members who are vigilant in focusing their attention on tacit knowledge will learn enough contextual and historical information about a domain in which that tacit knowledge is created (Kaplan & Vakili, 2015; Taylor & Greve, 2006). In sum, learning from tacit knowledge will be moderated by vigilant attentional effort.

In sum, experience does not always facilitate learning because organizational members do not often pay attention in ways that fully take advantage of their experience for learning. As briefly discussed earlier, recent empirical studies have begun to show that inadequate attention limits the benefit of having experience for learning. However, little is still known about how attention can overcome the lack of experience to improve learning. The latter question indicates another way by which attention moderates the experience–learning link. Future research that addresses this question might suggest that attention enables organizational members to learn even without additionally gaining diverse, new experience and acquiring new tacit knowledge.

Conclusion

In this chapter, we have argued that attention is central to conceptions of organizational learning. With

some observations regarding the relevance of the attention-based view of the firm for research on organizational learning, we have delineated the difference of three types of attention—focus of attention, situated attention, and distributed attention—and their joint effects on knowledge creation, retention, and transfer. By doing so, we have asserted the need for scholars to rediscover the underused concepts of attention for organizational learning. Lastly, we have pointed out several potential issues for future research to enrich the attention-based view of organizational learning.

Notes

1. Of course, we do not posit that forgetting always benefits organizational learning. It often hurts learning, particularly if organizations need to relearn what they have forgotten. If an organization fails to retain some knowledge, then to relearn it, the organization must deploy the cognitive resources involved with knowledge creation that might otherwise be used to exploit existing knowledge or explore higher priority new knowledge. For example, Mena and colleagues (2016, p. 720) theorize on “forgetting work” following corporate irresponsibility, wherein a firm modifies the focus of attention and situated attention through “manipulating short-term conditions of the event, silencing vocal ‘rememberers,’ and undermining collective mnemonic traces that sustain a version of the past.” The authors suggest that this deliberate forgetting of past malfeasance may increase the likelihood of repeated offenses.
2. In the context of knowledge transfer, attention should be conceptually distinguished from absorptive capacity, which is defined as the ability to recognize the value of particular knowledge, assimilate it, and apply it to commercial ends (Cohen & Levinthal, 1990). Attention and absorptive capacity are complementary to each other with respect to knowledge transfer. Although organizational members pay attention to knowledge coming from other individuals, units, or organizations, the role of their attention for learning is either amplified or limited by their absorptive capacity. Absorptive capacity does not also directly affect organizational learning until organizational members pay attention to experiences or knowledge inputs for which their absorptive capacity is subsequently utilized.
3. People who focus their attention too much on a current task at hand may recognize the degree of relevance in a narrow manner. This argument is clearly illustrated by the “invisible gorilla experiment” (Simons & Chabris, 1999). In this famous experiment, a subject is instructed to count the number of times group members pass a ball to one another. As the people in the group pass the ball, a person dressed in a gorilla suit walks through the group. Because subjects are primed to allocate their attention to the people passing the ball, more than half of the subjects in the experiment routinely fail to perceive the presence of the gorilla. Despite the visual saliency of the gorilla costume, it did not capture the attention of people who focused their attention on the immediate task of counting the ball passes. This experiment demonstrates that people focus their attention on information relevant to performing their tasks and neglect irrelevant information.

References

- Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *California Management Review*, 40, 39–58.
- Aral, S., & Van Alstyne, M. (2011). The diversity-bandwidth trade-off. *American Journal of Sociology*, 117(1), 90–171.
- Argote, L., & Greve, H. R. (2007). A behavioral theory of the firm—40 years and counting: Introduction and impact. *Organization Science*, 18, 337–349.
- Argote, L., & Ingram, P. (2000). Knowledge transfer in organizations: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, 82, 150–169.
- Argote, L., McEvily, B., & Reagans, R. (2003). Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science*, 49, 571–582.
- Argote, L., & Miron-Spektor, E. (2011). Organizational learning: From experience to knowledge. *Organization Science*, 22, 1123–1137.
- Audia, P., & Goncalo, J. A. (2007). Past success and creativity over time: A study of inventors in the hard disk drive industry. *Management Science*, 53, 1–15.
- Audia, P. G., & Greve, H. R. (2006). Less likely to fail: Low performance, firm size, and factor expansion in the shipbuilding industry. *Management Science*, 52, 83–94.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bargh, J. A. (1982). Attention and automaticity in the processing of self-relevant information. *Journal of Personality and Social Psychology*, 43(3), 425.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Bechky, B. A. (2003). Sharing meaning across occupational communities: The transformation of understanding on a production floor. *Organization Science*, 14, 312–330.
- 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.
- Benner, M. J., & Tushman, M. (2002). Process management and technological innovation: A longitudinal study of the photography and paint industries. *Administrative Science Quarterly*, 47(4), 676–707.
- Blettner, D. P., He, Z. L., Hu, S., & Bettis, R. A. (2015). Adaptive aspirations and performance heterogeneity: Attention allocation among multiple reference points. *Strategic Management Journal*, 36(7), 987–1005.
- Bouquet, C., & Birkinshaw, J. (2008). Weight versus voice: How foreign subsidiaries gain attention from corporate headquarters. *Academy of Management Journal*, 51, 577–601.
- Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, 110(2), 349–399.
- Chen, W.-R., & Miller, K. D. (2007). Situational and institutional determinants of firms’ R&D search intensity. *Strategic Management Journal*, 28, 369–381.
- Chesbrough, H. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Cambridge, MA: Harvard Business School Press.
- Christensen, C. (1997). *The innovator’s dilemma: When new technologies cause great firms to fail*. Cambridge, MA: Harvard Business School Press.
- Cohen, W. M., & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128–152.

- Coleman, J. S. (1990). *Foundations of social theory*. Cambridge, Massachusetts: Belknap Press.
- Corredoira, R. A., & Rosenkopf, L. (2010). Should auld acquaintance be forgot? The reverse transfer of knowledge through mobility ties. *Strategic Management Journal*, *31*, 159–181.
- Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Dahlander, L., O'Mahony, S., & Gann, D. M. (2016). One foot in, one foot out: How does individuals' external search breadth affect innovation outcomes?. *Strategic Management Journal*, *37*(2), 280–302.
- Dijksterhuis, A., & Aarts, H. (2010). Goals, attention, and (un)consciousness. *Annual Review of Psychology*, *61*, 467–490.
- Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, *44*, 350–383.
- Eggers, J. P., & Kaplan, S. (2009). Cognition and renewal: Comparing CEO and organizational effects on incumbent adaptation to technical change. *Organization Science*, *20*, 461–477.
- Eisenhardt, K. M., Furr, N. R., & Bingham, C. B. (2010). Microfoundations of performance: Balancing efficiency and flexibility in dynamic environments. *Organization Science*, *21*(6), 1263–1273.
- Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they?. *Strategic Management Journal*, 1105–1121.
- Feldman, M. S., & Pentland, B. T. (2003). Reconceptualizing organizational routines as a source of flexibility and change. *Administrative Science Quarterly*, *48*, 94–118.
- Fiske, S. T., & Taylor, S. (2013). *Social cognition: From brains to culture*. Thousand Oaks, CA: Sage.
- Fleming, L. (2001). Recombinant uncertainty in technological search. *Management Science*, *47*, 117–132.
- Fleming, L., Mingo, S., & Chen, D. (2007). Collaborative brokerage, generative creativity, and creative success. *Administrative Science Quarterly*, *52*(3), 443–475.
- Gaba, V., & Joseph, J. (2013). Corporate structure and performance feedback: Aspirations and adaptation in M-form firms. *Organization Science*, *24*, 1102–1119.
- Gavetti, G. (2012). Toward a behavioral theory of strategy. *Organization Science*, *23*, 267–285.
- Gavetti, G., Greve, H. R., Levinthal, D., & Ocasio, W. (2012). The behavioral theory of the firm: Assessment and prospects. *Academy of Management Annals*, *6*, 1–40.
- Gavetti, G., & Levinthal, D. (2000). Looking forward and looking backward: Cognitive and experiential search. *Administrative Science Quarterly*, *45*(1), 113–137.
- Gavetti, G., Levinthal, D., & Ocasio, W. (2007). Neo-Carnegie: The Carnegie School's past, present, and restructuring for the future. *Organization Science*, *18*, 523–536.
- Gavetti, G., Levinthal, D. A., & Rivkin, J. W. (2005). Strategy making in novel and complex worlds: The power of analogy. *Strategic Management Journal*, *26*(8), 691–712.
- Gerstner, W. C., König, A., Enders, A., & Hambrick, D. C. (2013). CEO narcissism, audience engagement, and organizational adoption of technological discontinuities. *Administrative Science Quarterly*, *58*(2), 257–291.
- Greve, H. R. (2003). *Organizational learning from performance feedback: A behavioral perspective on innovation and change*. Cambridge, UK: Cambridge University Press.
- Greve, H. R. (2008). A behavioral theory of firm growth: Sequential attention to size and performance goals. *Academy of Management Journal*, *51*, 476–494.
- Greve, H. R. (2011). Positional rigidity: Low performance and resource acquisition in large and small firms. *Strategic Management Journal*, *32*, 103–114.
- Haas, M. R., Criscuolo, P., & George, G. (2015). Which problems to solve? Online knowledge sharing and attention allocation in organizations. *Academy of Management Journal*, *58*(3), 680–711.
- Haas, M. R., & Hansen, M. T. (2007). Different knowledge, different benefits: Toward a productivity perspective on knowledge sharing in organizations. *Strategic Management Journal*, *28*(11), 1133–1153.
- Hannan, M. T., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, 149–164.
- Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*, *44*, 82–111.
- Hansen, M. (2009). *Collaboration: How leaders avoid the traps, create unity, and reap big results*. Cambridge, MA: Harvard Business School Press.
- Hargadon, A., & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly*, *42*, 716–749.
- He, Z. L., & Wong, P. K. (2004). Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organization Science*, *15*(4), 481–494.
- Henderson, R. M., & Clark, K. B. (1990). Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly*, 9–30.
- Holan, P. M., & Philips, N. (2004). Remembrance of things past? The dynamics of organizational forgetting. *Management Science*, *50*, 1603–1613.
- Joseph, J., & Ocasio, W. (2012). Architecture, attention, and adaptation in the multibusiness firm: General Electric from 1951 to 2001. *Strategic Management Journal*, *33*, 633–660.
- Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, NJ: Prentice-Hall.
- Kane, A. A. (2010). Unlocking knowledge transfer potential: Knowledge demonstrability and superordinate social identity. *Organization Science*, *21*, 643–660.
- Kaplan, S., & Vakili, K. (2015). The double-edged sword of recombination in breakthrough innovation. *Strategic Management Journal*, *36*, 1435–1457.
- Karim, S., & Kaul, A. (2014). Structural recombination and innovation: Unlocking intraorganizational knowledge synergy through structural change. *Organization Science*, *26*(2), 439–455.
- Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal*, *45*, 1183–1194.
- Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal*, *13*(S1), 111–125.
- Leonardi, P. (2015). Ambient awareness and knowledge acquisition: Using social media to learn “who knows what” and “who knows whom.” *Management Information Systems Quarterly*, *39*, 747–762.
- 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.
- Levinthal, D., & March, J. (1993). The myopia of learning. *Strategic Management Journal*, *14*, 95–112.

- Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology, 14*, 319–340.
- Lewis, K., Lange, D., & Gillis, L. (2005). Transactive memory systems, learning, and learning transfer. *Organization Science, 16*, 581–598.
- Lingo, E. L., & O'Mahony, S. (2010). Nexus work: Brokerage on creative projects. *Administrative Science Quarterly, 55*(1), 47–81.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science, 2*, 71–87.
- March, J. G., & Shapira, Z. (1992). Variable risk preferences and the focus of attention. *Psychology Review, 99*, 172–183.
- March, J. G., & Simon, H. A. (1958). *Organizations*. New York, NY: John Wiley & Sons.
- Mena, S., Rintamäki, J., Fleming, P., & Spicer, A. (2016). On the forgetting of corporate irresponsibility. *Academy of Management Review, 41*(4), 720–738.
- Mintzberg, H. (1973). *The nature of managerial work*. New York, NY: Harper & Row.
- Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change*. Cambridge, MA: Harvard University Press.
- Ocasio, W. (1995). The enactment of economic adversity: A reconciliation of theories of failure-induced change and threat-rigidity. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 17, pp. 287–331). Greenwich, CT: JAI Press.
- Ocasio, W. (1997). Towards an attention-based view of the firm. *Strategic Management Journal, 18*, 187–206.
- Ocasio, W. (2011). Attention to attention. *Organization Science, 22*, 1286–1296.
- O'Reilly, C. A., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present, and future. *The Academy of Management Perspectives, 27*(4), 324–338.
- Piezunka, H., & Dahlander, L. (2015). Distant search, narrow attention: How crowding alters organizations' filtering of suggestions in crowdsourcing. *Academy of Management Journal, 58*, 856–880.
- Rao, R., & Argote, L. (2006). Organizational learning and forgetting: The effects of turnover and structure. *European Management Review, 3*, 77–85.
- Reagans, R., & McEvily, B. (2003). Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly, 48*(2), 240–267.
- Reyt, J., & Wiesenfeld, B. (2015). Seeing the forest for the trees: Explorative learning, mobile technology, and knowledge workers' role integration behaviors. *Academy of Management Journal, 58*, 739–762.
- Rhee, S.-H. (2016). *Cognitive advantage for innovation: A theoretical formulation and empirical application in the software industry*. PhD dissertation, Kellogg School of Management, Northwestern University.
- Rhee, S.-H., & Leonardi, P. (2014). Networks, attention and good ideas: Taking advantage of social structure. Best Paper Proceedings at Academy of Management Annual Meeting, Philadelphia, PA.
- Rosenkopf, L., & Almeida, P. (2003). Overcoming local search through alliances and mobility. *Management Science, 49*(6), 751–766.
- Ross, L., & Nisbett, R. E. (1991). *The person and the situation: Perspectives of social psychology*. New York, NY: McGraw-Hill.
- Schumpeter, J. (1939). *Business cycles*. New York, NY: McGraw-Hill.
- Schilling, M. A., & Phelps, C. C. (2007). Interfirm collaboration networks: The impact of large-scale network structure on firm innovation. *Management Science, 53*(7), 1113–1126.
- Seshadri, S., & Shapira, Z. (2001). Managerial allocation of time and effort: The effects of interruptions. *Management Science, 47*, 647–662.
- Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending and a general theory. *Psychological Review, 84*(2), 127.
- Simon, H. A. (1947). *Administrative behavior: A study of decision-making processes in administrative organizations*. Chicago, IL: Macmillan.
- Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattention blindness for dynamic events. *Perception, 28*(9), 1059–1074.
- Stanko, T. L., & Beckman, C. M. (2015). Watching you watching me: Boundary control and capturing attention in the context of ubiquitous technology use. *Academy of Management Journal, 58*, 712–738.
- Sullivan, B. N. (2010). Competition and beyond: Problems and attention allocation in the organizational rulemaking process. *Organization Science, 21*, 432–450.
- Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal, 17*(S2), 27–43.
- Taylor, A., & Greve, H. (2006). Superman or the Fantastic Four? Knowledge combination and experience in innovative teams. *Academy of Management Journal, 49*, 723–740.
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven, Conn: Yale University Press.
- Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal, 21*, 1147–1161.
- Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly, 35*–67.
- Vissa, B., Greve, H., & Chen, W.-R. (2010). Business group affiliation and firm search behavior in India: responsiveness and focus of attention. *Organization Science, 21*, 696–712.
- Von Hippel, E. (1994). "Sticky information" and the locus of problem solving: Implications for innovation. *Management Science, 40*(4), 429–439.
- Vuori, T. O., & Huy, Q. N. (2016). Distributed attention and shared emotions in the innovation process: How Nokia lost the smartphone battle. *Administrative Science Quarterly, 61*(1), 9–51.
- Weick, K., & Sutcliffe, K. M. (2006). Mindfulness and the quality of organizational attention. *Organization Science, 17*, 514–524.
- Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science, 13*, 339–351.