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Identifying Situated Cognition in Organizations

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Using the established definition of situated cognition in organizations as “the interaction of cognitive schemas and organizational context” (Lant 2002), we examine empirical case studies from the last 15 years to illustrate what situated cognitions in organizations might actually look like. Grounded in this research, we develop a framework that identifies how some specific forms of cognitive schemas (i.e., rule schemas, event schemas, person schemas) and specific contexts (e.g., physical contexts, institutional contexts) interact during sensemaking processes to give rise to momentary perceptions that we call situated cognitions. We present evidence that common patterns of interaction between schemas and context may occur during sensemaking in organizations. In terms of theoretical implications, our framework focuses attention on the specific interactions between context and cognition (rather than on context or cognition alone) that comprise situated cognitions, and helps to more concretely define situated cognitions as momentary or temporally bounded perceptions. We offer several practical implications of this framework for managers and suggest avenues for further elaboration on our ideas through research.

Key words: situated cognition; schemas; organizational context

Organizational theorists have suggested that individuals and groups in organizations use identifiable and stable cognitive templates or schemas for understanding and engaging in cognitive activity (Walsh 1995). Schemas are defined as relatively persistent knowledge structures for representing elements and the relationships between them (Schank and Abelson 1977, DiMaggio 1997). They serve as simplified representations of knowledge and, as such, as a means for simplifying cognition in conditions of incomplete information (Berger and Luckman 1967, DiMaggio 1997). Schemas both constitute and structure knowledge by identifying those elements of a situation that are salient, and by describing the causal relations between them. Schemas contain the knowledge to identify an object or objectified concept (what it is and what it is not), to make sense of it (what it does), and to know the relation between its components (how it works). Theorists argue that a given schema is applied in the same manner across time and cognitive context as long as the subject matter remains similar (making the usual accommodations for learning).

Schemas may be developed for any type of situation, but come in several common forms (Fiske and Taylor 1991), including person schemas (templates about how specific people behave and think), role schemas (templates about the behaviors of individuals occupying

formal roles), event schemas (templates about how sequences of common events proceed), and rule schemas (templates about the relationships between certain types of actions, events, or concepts). Schemas may range from the general (role schemas for police officers and professors) to the very specific (person schemas for one’s freshman chemistry professor), and from the concrete (rule schemas for how to ask a question in class) to the abstract (event schemas for how a tropical storm progresses over time from a Level-1 tropical depression to a Level-5 hurricane).

Given the apparent usefulness of stable schemas (e.g., they are easy to recall and maintain), cognitive organizational theorists have proposed that they are used in a top-down, theory-driven approach to information processing, “in all but the most novel situations” (Louis and Sutton 1991; quoted in Walsh 1995, p. 281). In support of this notion, researchers have provided substantial evidence that schemas have strong main effects on perceptual processes and outcomes in organizations (e.g., Carson et al. 2003, Boland et al. 2001, Heracleous and Barrett 2001). For example, Schminke et al. (1997) showed that the form of an evaluator’s ethical schema (i.e., his or her view of ethical behavior as that which follows acceptable rules or processes versus that which results in ethical outcomes) could be used to predict his

or her perceptions of organizational justice following a promotion decision for a hypothetical manager. Evaluators whose ethical schemas were rule based found promotion scenarios designed to be “procedurally just” as most fair, while evaluators whose ethical schemas were outcome based found promotion scenarios designed to be “distributively just” as most fair. In this case, the researchers argue that understanding the form of one’s ethical schema is important because it will have similar effects on justice perceptions across a variety of situations. As Schminke et al. (1997, p. 1,202) note, such ethical frameworks “color how individuals view the world and their subsequent reactions to that view.”

While the value of stable schemas has gained acceptance among organizational scholars, many researchers of managerial and organizational cognition have questioned the *primacy* of inside-the-head schemas in cognitive understanding and action. Specifically, recent research has identified organizational, process, and task contexts that influence the relationship between schema and behavior in organizations. For example, McNamara and Bromiley (1997) found that organizational contextual factors such as pressures for subunit profitability, process standardization, and industry “fads and fashions” mediated the effects of cognitive bias in the assessment of risk in evaluating loan applications. Likewise, Sharma (2000) found that organizational factors such as legitimation of environmental issues and the availability of discretionary slack for creative problem solving influenced the extent to which environmental issues were categorized as threats or as opportunities.

Task context has also been found to significantly mediate the effects of knowledge structures on task outcomes. Beyer et al. (1997) found that the effects of functionally based selective perception were eliminated when subjects were instructed to search broadly for problems. Tenbrunsel et al. (2000) found that framing a decision concerning environmental policy in terms of meeting standards (means) versus developing solutions (ends) influenced the environmental policy that was selected. Finally, Boland et al. (2001) found that how information is presented (as concrete and unambiguous versus more general knowledge) influenced performance on the professionalism and work process dimensions of decision outcomes, self-reports of satisfaction with the decision task, and levels of ethical sensitivity.

Despite evidence that organizational context influences the effects of cognition on action, the role that it plays remains unclear. In some cases the authors attribute the decline in schema effects to the primacy of context *over* schema (e.g., McNamara and Bromiley 1997, Sharma 2000, Dollinger et al. 1997). However, their data and methods only reveal a decline in bias, which they attribute to a decrease in schema influence; they do not provide any insight into the relationship between context and knowledge structure. Other authors

(e.g., Beyer et al. 1997, Tenbrunsel et al. 2000) suggest that context triggers schema selection. This is the primary theory behind framing—the way that one presents a situation influences the cognitive schema that the perceiver applies to it. Framing something as a threat, for example, triggers a different evaluative schema than does framing something as an opportunity (Jackson and Dutton 1988). Thus, the authors argue that task, organization, and industry contexts may have similar framing effects, e.g., a greater emphasis on subunit profitability may trigger a “profitability” schema or the presence of discretionary slack may trigger a “high-resource” schema. Yet, these arguments do not account for variance across similar contexts, in which the same schemas appear to be applied to different degrees or different schema are applied in similar contexts (Dean and Sharfman 1993, Walsh et al. 1988). In such instances, there appears to be more going on than simple schema selection.

Taken together, much of this research suggests that a focus on either stable cognitive schemas *or* influential contexts may provide an incomplete picture of cognitive processes in organizations. As a result, scholars have suggested that our frameworks of important cognitive processes, such as decision making and problem interpretation, may be inaccurate in their predictions of real-life thought processes (Lant 2002).

A more productive approach, we suggest, may involve taking seriously the theoretical definitions of situated cognition (Lave and Wenger 1991, Cook and Brown 1999) and deliberately focusing research on the *interaction of schemas and context in situ*. That is, look at how schemas and contexts come together in specific instances to create “situated cognition,” i.e., understandings or perceptions that are the product of the interaction of a previously held schema and one’s context at a particular point in time. We propose that a careful examination of the interaction itself will more completely illustrate how cognition in organizations works. Specifically, we suggest that a better understanding of what situated cognitions actually look like in organizations should help organizational scholars to better predict how managers may interpret and understand organizational problems, as well as their solutions, in context. In the next section we introduce the notion of situated cognition, review its roots, and extend the concept to organizational research.

Defining Situated Cognition

Proponents of situated cognition (Lave and Wenger 1991, Cook and Brown 1999, Lant 2002) argue that cognition exists in the interaction of perceivers’ minds (schema) and their environment (context). That is, situated cognition is thinking that is embedded in the context in which it occurs. Because much organizational context is both social and dynamic—changing as the people involved act and interact with each other and their

physical surroundings—situated cognitions in organizational settings tend to be transitory, arising as the interactions of existing cognitive structures (i.e., schemas) and momentary context.

While, conceptually, schemas have arisen to explain how knowledge persists and shapes cognition across different situations, situated cognition has arisen in education research to explain why students have difficulty in retaining and generalizing knowledge for use across a range of seemingly appropriate situations (see Lave 1988, Lave and Wenger 1991). In other words, research in situated cognition that has been undertaken in the education literature seeks to explain why schemas fail to transfer across seemingly related situations when they should (e.g., classroom exercises on mathematics and the practical application of mathematics in nonclassroom contexts) and, equally problematic, why schemas transfer when they should not. Learning research suggests that knowledge is both learned and applied in context and, as such, it “is situated, being in part a product of the activity, context, and culture in which it is developed and used” (Brown et al. 1989, p. 32). Thus situated cognition resides in the duality—the recursive interaction—between how attributes of a situation evoke and shape *particular* schemas and how schemas make *particular* attributes of the situation salient.

Situated cognition represents both an ongoing process and a momentary or temporally bounded outcome. As an ongoing process, it describes the activities of sensemaking—environmental scanning, interpretation, understanding, and action—that construct a working and workable perceptual framework (Weick 1996). Yet while the process of sensemaking has received considerable attention, the momentary outcomes themselves have not. These transitory perceptual frameworks enable one “to comprehend, understand, explain, attribute, extrapolate, and predict” (Starbuck and Milliken 1998, p. 51) and, additionally (and crucially), to act within a very specific situational context. We envision these transitory or temporally bounded perceptual frameworks as mediating between an individual’s preexisting schemas and the situation’s concrete particulars. At times, this mediation results in a singularly dominant schema driving understanding and action—as, for example, in threat-rigidity responses. However, at other times this mediation results in, essentially, a *mélange* of existing schemas that like blended spices create a single experience containing complex flavors. In either case, perceptual frameworks determine which comprehensions, understandings, explanations, attributions, extrapolations, and predictions are generated and, ultimately, which actions result. As both individuals and contexts have history, we might ask how relatively typical contexts in organizations interact with relatively typical cognitive schemas—for example, how do individuals’ self-schemas interact within a context rich in organizationally related artifacts?

What is the resulting perceptual framework; how does it shape understanding and action in the moment; how does it revise the original schema?

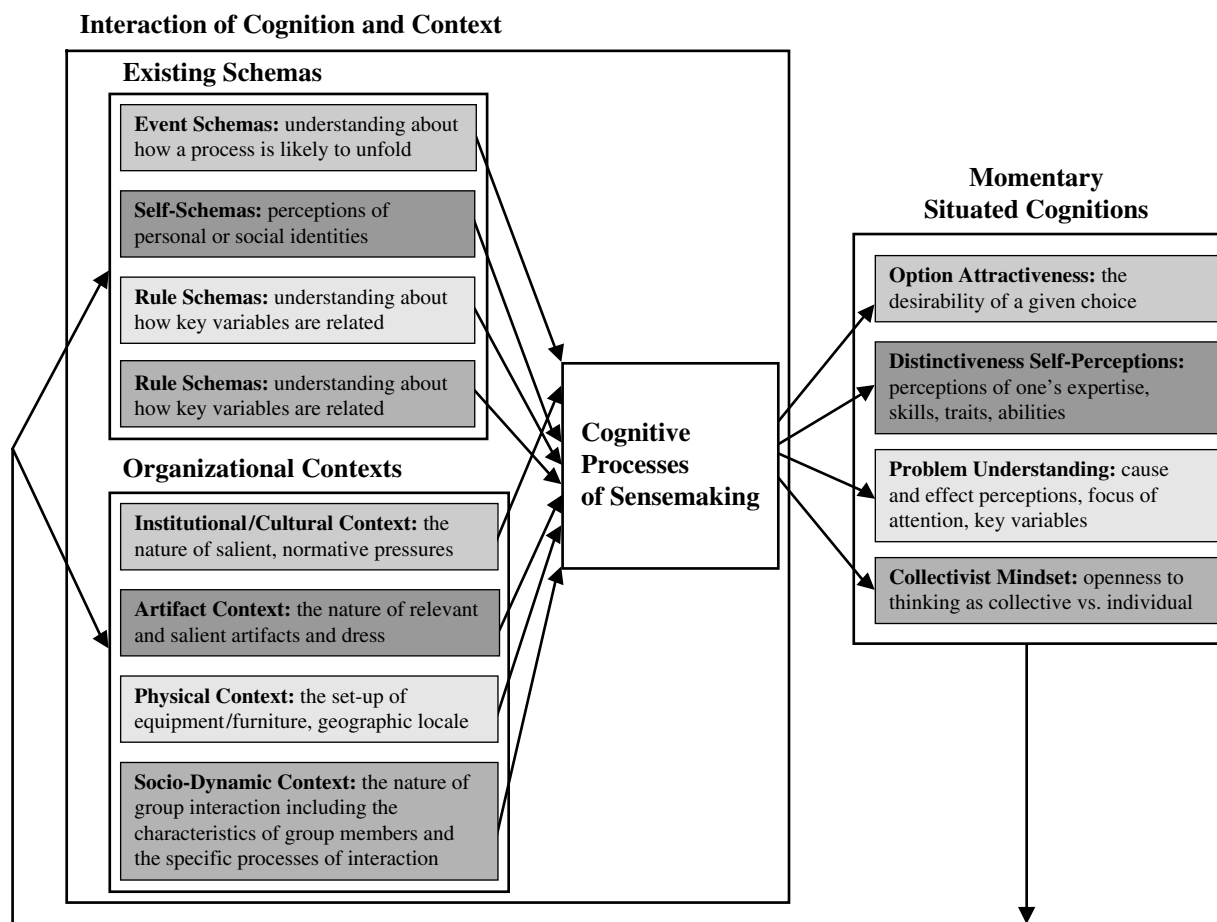
To move research on cognition in organizations forward, then, we suggest that researchers and theorists must go beyond merely providing evidence that activity within and by organizations is influenced by both context and schemas, and provide insight about specific interactions of schemas and organizational contexts. Such a focus may help to define what situated cognitions commonly look like in organizations, and may help organizations and their managers to build, sustain, and manage desired situated cognitions (and avoid undesired situated cognitions).

Situated Cognition in Organizations: Evidence of Patterns of Interaction

We present here a framework of the common situated cognitions described in empirical case-study research on managerial and organizational cognition from the past 15 years. In presenting this framework, our objective is to focus attention on some of the specific interactions between cognition and context that comprise situated cognitions in organizations, as well as more fully understand how situated cognitions (such as problem definitions, self-perceptions, or choice preferences) may be developed and sustained. This framework is grounded in a definition of situated cognitions as temporally bounded interactions of individuals or collectives engaged in specific cognitive processes, and specific organizational contexts at particular points in time. Thus, we identify situated cognitions as transitory perceptual frames that arise from the interactions of cognition and context and, in turn, direct individuals’ attention, interpretations, and actions.

As noted above, our insights about the existence of common patterns of interaction between cognitive schemas and organizational contexts is based on a review of 15 years of empirical case study research on cognition in organizations. We chose to focus on empirical case studies because these studies are most likely to provide rich and detailed description about both the context and preexisting schemas of organizational actors involved in situated cognition (Eisenhardt 1989). We chose to examine research from the past 15 years because this time period coincides with the rise in empirical research on situated cognition in organizations (Lant 2002). In all of these cases, thick description suggested that the schemas and contexts appeared to come together during the cognitive processes of sensemaking (Weick 1996). Although we did not perform rigorous statistical analysis of these findings (i.e., we did not engage in formal meta-analysis of the case study findings), our careful reading of the case studies led us to identify evidence of four common patterns of interaction between cognitive schemas and organizational contexts that lead to situated cognitions.

Figure 1 Framework of Common Situated Cognitions in Organizations



The framework developed from this evidence and illustrated in Figure 1 is not intended to represent a comprehensive or complete picture of all the ways in which situated cognitions may arise in organizations, but rather an illustration of what some commonly studied situated cognitions appear to look like. Our hope is that this illustration will encourage further study and identification of situated cognition in organizations, and that a more complete framework will emerge over time. Scholars wishing to empirically pursue the ideas we set forth do face challenges in attempting to capture these interactions. Because they are temporally bounded and emerge sub-consciously as part of the information-processing process, they would be difficult to capture with techniques such as surveys and interviews. However, we do not see these challenges as insurmountable. The patterns of interactions we identify in this manuscript emerged from detailed, field-based case studies that were not, in fact, aimed at attempting to capture situated cognition. This suggests that research undertaken to explicitly study situated cognition could effectively utilize qualitative methods such as the case study. In addition, experimental designs that require individuals and/or groups to make a decision or solve a problem under different situational

contexts could be utilized to better understand the interaction between schema and context and the effect that it has on information processing and its outcomes.

We describe our framework and the evidence in support of it below.

Perceptions of Option Attractiveness Arise in Interactions Between Event Schemas and Institutional/Cultural Contexts

Option attractiveness is the momentary preference for one or another option that one may choose to take. Our review suggests that option attractiveness may be commonly situated in the interaction between existing event schemas (i.e., scripts about how a process is likely to unfold) and immediate institutional or cultural contexts during sensemaking. Several interesting case studies illustrate this pattern of interaction (Garud and Rappa 1994, Mitchell et al. 2000, Labianca et al. 2000).

In one example, Garud and Rappa (1994) describe how two different researchers chose different paths for development of Cochlear implants (devices that allow profoundly deaf persons to hear). One researcher, William House, founder of the House Ear Institute, believed that the process of developing Cochlear implants should

proceed from first developing a simple device, which would have a fairly shallow electrode implant in the ear canal, to later developing implants with more complex and deeply implanted electrodes. As Garud and Rappa (1994, p. 350) note:

House reasoned that researchers should begin with a simple device, as it would present the least potential for neuro-physiological harm to patients while providing researchers valuable knowledge required for future improvements.

A second researcher, Graem Clark from the University of Melbourne, Australia, had a different event schema about the development of Cochlear implants. Clark believed that researchers should begin their development with a complex multichannel device and make improvements in the quality of sound produced in subsequent generations of this device. This event schema was supported by a different understanding of the risks to patients than was House's schema. For Clark, the danger to patients was not related to the deepness of the electrode (Clark argued that there was no scientific evidence to support such a risk). He believed that the risk to patients would come from using the inferior, simple device and then undergoing a second operation to implant a more complex device later.

As their work on the Cochlear implants proceeded, these two groups came under pressure from local regulatory agencies and funding agencies. In House's case, pressures came from their development partner, 3M, to quickly develop a safe device that would establish itself as a leader in the industry and give them time to develop a more complex, multichannel device in the future. House was also under pressure from the U.S. Food and Drug Administration that was strongly in favor of a safe device after early prototypes had been linked with neuro-physiological damage in animals. In the context of these institutional pressures for safe devices over devices that might be more efficacious (allow speech recognition instead of just environmental cues), and in the presence of House's existing event schema for the development of simple devices first and complex devices later, the option of single-channel device became, at least momentarily, most attractive.

By contrast, the Clark team was working under a different set of institutional pressures. In their case, their funding development partner Nucleus was pressuring Clark to develop a device that would allow speech recognition. Clark's group was also supported by the National Institutes of Health, which did not support development of single-channel devices and thus legitimated the multichannel device. Together, these institutional pressures temporally coupled with Clark's event schema about working on a more complex device from the beginning led to the momentary, situated cognition of preference for the multichannel Cochlear implant.

In another example of option attractiveness arising out of event schemas interacting with institutional/cultural pressures, Mitchell et al. (2000) describe how event schemas about how a new business venture proceeds (what they call "arrangement scripts") interacted with cultural norms for individualism versus collectivism, and low versus high power distance to produce situated cognition about the perceived attractiveness of a new venture. As they suggested:

Although cultural values are expected to have a direct effect on cognition within cultures, they might also be expected to influence the manner in which certain cognitions (by country) relate to the venture creation decision across cultures. . . . That is, the effect of specific [scripts] associated with the venture creation decision are expected to differ by culture (Mitchell et al. 2000, p. 980).

In line with this reasoning, Mitchell et al. (2000) found that arrangement scripts (i.e., schemas about how to use skills, resources, and assets to get a new venture underway) interacted with cultural pressures for individualism and power distance to affect the perceived attractiveness of the new venture. That is, the presence of both arrangement scripts and cultural values were important to understanding whether or not a specific new venture would be undertaken at any specific point in time. In particular, Mitchell et al. found that in countries with high (versus low) degrees of individualism and power distance, the presence of a new venture arrangement script was more likely to lead to the undertaking of a new venture. In these cases it appears that information in arrangement scripts related to personal contacts, personally appealing projects, and maximization of personal resources and wealth were viewed as useful and made the venture creation decision appear more attractive.

Together, these studies illustrate how event schemas and institutional or cultural norms come together to produce transitory, situated cognitions about the attractiveness of one or more choice options. In general, they suggest that immediate normative pressures that happen to fit with understandings about how a process should unfold are likely to make a normative option appear very attractive.

Problem Understandings Arise in Interactions Between Rule Schemas and Physical Contexts

A second common pattern of interaction between schemas and contexts apparent in the empirical findings is between rule schemas and physical contexts. In these cases, it appears that individuals' understandings about the relationships between key variables or constructs relevant to solving a current problem (i.e., a rule schema) interact with dimensions of the physical context of problem solving (e.g., spatial arrangements of workers, availability of tools or machines, functional layout of a work area) to give rise to transitory understandings of the problem to be solved (Cramton 2001, Tyre and

von Hippel 1997, Carlile 2002, Sole and Edmondson 2002).

For example, in her study of 45 geographically dispersed teams engaged in a student project to develop an internet business, Cramton (2001) found that the physical work context (i.e., working remotely through e-mail versus face to face) interacted with local rule schemas regarding the evaluation criteria and time scheduling for the project to create situated cognitions about the understanding of problems that arose. In one instance, a conflict arose when students at George Mason University (GMU) did not want to use online chat sessions to discuss the project because they believed that a phone conversation would be more efficient, while their teammates at Texas Christian University (TCU) were strongly pushing to use the chat format for project discussions. At TCU students were working on the project as a part of a management information systems course and were required to use the chat medium as a part of the course. These students' rule schemas about the requirements of the group project included the notion that all of the types of electronic communications should be experimented with. By contrast, at GMU students were working on the project as a part of an organizational behavior course and were not required to use any particular form of communication medium. These students' rule schemas about the requirements of the group project did not include the notion that particular electronic mediums should be used for communication.

Unfortunately, as Cramton (2001) describes, in the geographically dispersed team context, these nuances of course requirements were not communicated between the teams and team members assumed that course requirements were the same across locations because the project coordinators had indicated that they hoped to make requirements equivalent. Cramton notes that dispersed work contexts that rely on mediated (versus face to face) communication are prone to such deficiencies of knowledge about location-specific rule schemas because those specific rules are not as likely to be discussed or remembered by team members in other locations. As she summarizes:

Information about one's own location and context may be uniquely held information. According to the principle of group discussion based on sampling from the information pool, such information is less likely to be mentioned and heeded in group discussion than is commonly held information [e.g. information understood by all group members because it arose from common experience] (Cramton 2001, p. 348).

Further, Cramton (2001, p. 356) notes that, in the context of mediated communication, it becomes "difficult for teammates to create a mental map of their distant partners' situation and to update that map when new information arises."

As teams engaged in sensemaking about the "chat meeting" problem, their rule schemas interacted with their dispersed work context to create distinct, temporally bounded situated cognitions about the nature of that problem. Students on the GMU team perceived the problem as the result of meeting "preferences" by the TCU students and suggested in their e-mails to each other that the TCU students did not understand the difficulties in scheduling a chat meeting. By contrast, the students on the TCU team perceived the problem as resulting from GMU students not caring about the course requirements and just wanting to follow the easiest possible path.

In another example of rule schemas interacting with physical context to produce problem understanding, Tyre and von Hippel (1997) describe how the developers (i.e., engineers) and users (i.e., operators) of a new circuit board assembly machine developed distinct situated cognitions about the nature of problems that arose during testing of the machine. In one instance, the component placer machine (which places electronic components in desired places on the circuit board) was experiencing "drift" in its component placement and was gradually wandering out of tolerance. Users who were viewing the problem in the manufacturing plant tried to explain the problem to engineers who were working in a remote lab. Diverging perceptions of the nature of the drift problem arose as the rule schemas each of these groups possessed about how "normal" operation of the machine was supposed to look interacted with contextual cues from their unique physical locations.

In the case of the machine users, the rule schema about how normal production was to look centered on "the smooth processing of high-quality parts" (Tyre and von Hippel 1997, p. 77). So, in the manufacturing facility, users looked at how the parts were coming out and noticed misplacement of components. When this information was communicated to the engineers working in the lab, they surmised that the machine must be improperly programmed and asked the users to make sure they were following instructions. At this moment, the engineers' understanding of the problem was that it was a programming problem.

After being assured by the users that they had programmed the machine correctly, the engineers visited the manufacturing plant. Once there, one engineer immediately noticed a loose screw on the camera that guides placement. Thus, the problem was actually a machine problem, not a programming problem. This understanding of the problem arose because the engineers' unique schema about how normal production was to look interacted with the local context of the manufacturing plant (an interaction that was different than that of users). Unlike users, engineers' rule schemas about normal production centered on "very specific expectations about how the machines ought to look during operations" (Tyre and von Hippel 1997, p. 77). Thus, when making sense

of a problem, engineers used a rule schema that focused on the machine, not its output. When they were in the lab, they could not see the machine so their perception of the problem was based on users' description of the problem. However because users' rule schema for normal operation centered on output, not the machine, the users provided no information about the machine operating abnormally to the engineers. Only when the engineers brought their rule schema to the context in which they could view the machine was their perception of the problem accurate.

Together, these examples suggest that accurate problem understanding evolves from the interaction of schema and context. In both examples, differences in both rule schema and physical context across two groups interfered with effective communication between the groups and delayed problem solution. In both cases communication and problem understanding were enhanced by the temporally bounded perceptual frames created through the interaction of schemas with new contexts (e.g., when the engineer schema interacted with the factory context).

Distinctive Self-Perceptions Arise in Interactions Between Self-Schemas and Artifact Contexts

In a third pattern of interaction between schemas and context, we found that a person's self-perceptions of distinctive traits (e.g., one's perceptions of his/her expertise at work) become salient when preexisting self-schemas (e.g., workplace or professional identities) are brought to mind in the presence of personally meaningful physical artifacts (e.g., work-related tools or equipment, personal mementoes) during the sensemaking process (Weick 1993, 1996; Rafaeli et al. 1997; Elsbach 2004).

For example, in his case study of the 1949 Mann Gulch fire in which 13 firefighters died, Weick (1993, 1996) describes how many of the firefighters did not drop their heavy tool packs, shovels, and chainsaws in their attempts to escape from the fire, even though having done so would have most certainly increased their ability to reach the top of the ridge and escape the fire. In this situation, Weick (1996) argues that one reason that the firefighters did not drop their tools was because of those tools' role in supporting and signaling a firefighter's identity. As Weick (1996, p. 308) remarks:

Firefighting tools define the firefighter's group membership, they are the firefighter's reason for being deployed in the first place, they create capability, they are given the same care that the firefighters themselves get (e.g., tools are collected and sharpened after every shift), and they are meaningful artifacts that define culture. . . . The fusion of tools with identities means that under conditions of threat, it makes no more sense to drop one's tools than to drop one's pride.

This discussion suggests that a firefighter's self-schema or identity interacted with the presence of his firefighting

tools (a dimension of the physical context) during the sensemaking process. The outcome of this sensemaking process was a transitory, situated cognition related to the firefighter's distinctive skills. In this case, that meant perceiving oneself, at that particular point in time and in that particular context, as a firefighter (who would hang on to his tools) rather than, say, a hiker (who would drop them and run).

In a second illustration of this pattern of interaction, Rafaeli et al. (1997) describe how several types of self-schema of female administrative employees interacted with the presence of personal artifacts (in this case, dress) to make salient distinctive role identities at work. In their study of dress and self-schemas in a business school of a large U.S. university, Rafaeli et al. (1997) found that administrative employees (i.e., staff) held a number of different self-schemas that defined them at work and that included definitions of appropriate dress. As Rafaeli et al. (1997, p. 17) note:

Dress appeared to be a component of the schemata that organized participants' ideas about performing various functional roles—schemata for organizational membership, functional area membership, and hierarchical level membership, and for participation in organizational events.

In their study Rafaeli et al. (1997) found that when female administrators were at work in the business school environment, their self-schemas would interact with their observations of their own dress to make salient distinctive role perceptions (and their fit with those distinctive perceptions). For example, several administrators noted that their membership schema implied that they should wear professional clothes and that, while more casual clothes may have been physically comfortable, wearing them made administrators psychologically uncomfortable because it caused them to focus on their distinctive role perceptions and how they were dressed inappropriately for these role perceptions. By contrast, wearing appropriate professional clothes fit with their schemas of business school membership and helped to make salient, at that point in time, distinctive role perceptions as forms of transitory situated cognition. As Rafaeli et al. (1997, p. 27) note:

Individuals saw the wearing of dress that fit their membership schema as one important signal (to themselves) that they were not acting out their "work selves" and temporarily making other selves less salient. In this way, dress facilitated the process of identity compartmentalization (Turner 1987). Organizational dress closed off some identities while opening up others. By opening up the role of organizational member or employee, dress made that social identity salient.

Together, these findings suggest that artifact contexts that make salient traits that are consistent with a person's self-schema are likely to highlight and affirm personal distinctiveness perceptions in the moment, while

those contexts that make salient traits that are inconsistent with a person's self-schema are likely to result in transitory perceptions that their personal distinctiveness is threatened.

Collectivist Mindsets Arise in Interactions Between Rule Schemas and Socio-Dynamic Contexts

Work on collective cognition has emerged over the past decade as both complement and counterpoint to the concept of shared cognition. Shared cognition researchers (Thompson et al. 1999) study the overlapping knowledge structures and content of individuals in groups, organizations, and industries, i.e., how individuals in groups come to represent the world in similar ways. By contrast, collective cognition (also described as collective mind or transactive memory) is concerned with supra-individual cognition, i.e., how individuals in groups come to think *together* in a shared process within a specific context. As such, collective cognition represents a form of situated cognition (i.e., cognition embedded in the context of group activity). This perspective requires a focus that is “at once on individuals and the collective, since only individuals can contribute to a collective mind, but a collective mind is distinct from an individual because it inheres in the pattern of interrelated activities among many people” (Weick and Roberts 1993, p. 360). In the same vein, Rulke and Rau (2000, p. 373) describe transactive memory as “. . . not traceable to any of the individuals alone, nor can it be found somewhere ‘between’ individuals. Rather, it is a property of the group” (Wenger 1987, p. 191). Importantly, the notion of collective cognition does not require the homogeneity of shared representations—what Eisenberg (1990, p. 160) calls the “alignment of cognitions” in organizations. Rather, it requires just the opposite. In the case of high-reliability organizations, for instance, collective cognition preserves the complexity of multiple individual cognitive structures “and it is this divergence, not the commonalities, that holds the key to detecting anomalies [in the environment that require attention]” (Weick et al. 1999, p. 96).

While empirical investigation of collective cognition in organizations is just beginning, there is evidence to suggest that it may have important effects. For example, findings suggest that collective cognition may provide a means for overcoming undesirable routinization. In this vein, Weick and Roberts's (1993) study of the flight deck of an aircraft carrier examined the collective processes that enabled this organization to maintain high reliability despite the necessity of repetitively cycling through routines. Specifically, Weick and Roberts (1993) identified the critical role of heedful interrelating, i.e., the mindful engagement of individuals in the social interrelations of the organization (e.g., determining who is in charge of navigating the ship versus navigating the airplane) during the routine process of landing an airplane on an

aircraft carrier. Other studies suggest that collective cognition, in the form of transactive memory, may improve work group performance by providing group-level memories of learning experiences. Researchers (Liang et al. 1995, Moreland 1999, Moreland and Myaskovsky 2000) have conducted a series of experiments in which teams of individuals were trained either individually or in groups to assemble radios. Even after controlling for alternative explanations such as enhanced opportunities for communication in the collectively trained groups (Moreland and Myaskovsky 2000), these experiments showed that transactive memory significantly improved a work group's ability to accomplish its task (build radios).

At the same time, there is evidence that the value of collective cognition for improving organizational performance may depend on individuals assuming a collectivist approach or mindset to problem definition or problem solving (i.e., a perceptual framework that allows them to participate in the action of collective cognition, rather than individual cognition). Interestingly, a few case studies suggest that such a collectivist mindset may arise when individual rule schemas interact with the socio-dynamic contexts (e.g., Cohen and Bacdayan 1994, Sutton and Hargadon 1996, Okhuysen 2005). For example, research on improvisation (or “jamming”) has discussed the role of collective mindsets, as well as suggested how collective mindsets might arise. Eisenberg suggests that “jamming experiences are highly rule-governed, structured activities in which little or no personal information is exchanged, yet important goals may be accomplished, and a strong, ecstatic bond is formed among participants” (1990, p. 146). In this way, the interaction of rule schemas for participation in collective processes interacts with the social dynamics of the group to create a temporally bounded perceptual framework that “provide[s] an opportunity to transcend the autonomy-interdependence dialectic, simultaneously allowing for the possibility of both” (p. 146). Eisenberg posits four necessary conditions for “jamming”: high levels of skill, a significant degree of structure, a contained setting, and a surrendering to the game. Within these conditions, one sees the interaction of individually based schemas and environmental conditions giving rise to a “surrendering to the game.” Such a collectivist mindset emerges from the interaction of rule or event schemas, that describe how particular tasks are done, where, and by whom, and social situations that require pooled interdependence.

Cohen and Bacdayan's (1994) study of collective memory illustrates the importance of having a collectivist mindset to the emergence of situated cognition at the supra-individual level. Their laboratory study demonstrated how organizationally interdependent routines—in this case the emergent and complementary routines of two individuals involved in sorting cards—became stored as collective procedural memories. An example

of these collective memories can be illustrated by the case of two people learning a game of solitaire in which they are not allowed to speak to one another. Over time, these players can develop individual rule schemas that they believe lead to effective card playing, and these rule schemas can be shown to be effective during the course of the game. If the actual rules of the game are changed, however (e.g., a novel situation is introduced), these rule schemas can actually impede adaptation of the card-playing process. Cohen and Bacdayan's card-playing pairs, with their development of collective procedural memories, may have failed to maintain a collective mindset capable of responding to a changing environment because the conditions of the experiment in its early stages both cued and allowed for sequential rather than pooled interdependence. Okhuysen (2005), on the other hand, described how SWAT team members engaged in specific team training and debriefing that allowed individual rule schemas for working together to interact with the socio-dynamic context of interacting in rehearsals for SWAT exercises. This scenario enabled individuals to acquire a collective mindset and to ultimately act collectively in response to novel and unforeseen circumstances that arise in carrying out real life SWAT raids.

Discussion

Our framework of situated cognition in organizations focuses attention on both context and schema, rather than on either of these components alone. This viewpoint has a number of implications for extending our understanding of managerial and organizational cognition. First, it suggests that *situated cognitions in organizations are transitory or temporally bounded outcomes*. This notion contrasts with the predominant view that cognitions based on existing schemas are relatively predictable. For instance, in studying rational decision making in organizations, theorists have spent a great deal of time developing formal decision protocols that are designed to ensure a rational and comprehensive approach to decision making and predictable outcomes of these decision processes (Russo and Shoemaker 1989, Dixit and Nalebuff 1991). Protocols such as decision trees and expected-value analysis were developed with the assumption that once individual decision makers had learned a decision rule schema, they could apply it consistently across situations to ensure the rationality of their decisions (Dean and Sharfman 1996). Yet, our framework suggests that the decision-making process that is applied in any given situation will be the result of interaction between the actors' various schemas concerning decision making and the decision context for that given situation at that particular point in time. This perspective implies that in some situational contexts, the "proper" rule schema may not be utilized or may not

be applied in the manner it was intended. As a result, the situated cognition that results may be far from that predicted by formal decision protocols.

In this way, our framework helps to explain why researchers have found that context appears to alter the manner in which structured decision protocols are developed and applied (Langley 1989). For example, Walsh et al. (1988) examined how political influences in group decision making affected how a collective decision schema was constructed (i.e., negotiated) and employed. In a study involving group decision making by graduate students during a two week simulation game, Walsh et al. (1988) found that groups that performed well in complex decision tasks did not necessarily employ decision schemas that were widely held in common, or that drew on diverse expertise (as might be expected based on the well-established notion that more complex decisions require more, rather than less, input and decision makers who held a broad understanding of the problem (Kiesler and Sproull 1982)). Rather, these researchers found evidence that "successful groups may have recognized that certain individuals' schemata were better suited to a problem and allowed them a good deal of decision making influence, while they silenced those with more irrelevant schemata" (Walsh et al. 1988, p. 206). Walsh et al. explain these findings as an outcome of the political processes that occurred during decision making (i.e., a contextual influence), rather than as an outcome of a purely rational use of all available information inputs.

Our perspective about the transitory nature of situated cognition also has implications at the group level of analysis. For example, our framework suggests that the momentary interaction of group members and the schemas they bring to bear during that moment are what matter in decision processes. This viewpoint addresses the debate implicit in much of the work on team decision making regarding whether decision-making benefits that follow from the variety of perspectives afforded by a diverse decision-making team are offset by the procedural complexities required to bring a diverse team to some sort of decision consensus (Knight et al. 1999). Our perspective suggests that nonoverlapping schemas among group decision makers may be beneficial to decision processes, and that managers should focus on creating moments in which disparate and nonoverlapping schemas come together in a context conducive to the creation of collective mindsets that are critical to the development of effective transitory perceptual frameworks.

Finally, the notion that situated cognition exists as a transitory perceptual frame has implications for research at the organizational level of analysis. For example, research on organizational learning and memory has focused on how knowledge becomes stored in institutional norms, rules, and routines (Shulz 1998).

This focus suggests that organizations learn by developing stable schemas or knowledge structures at the collective level by accumulating similar experiences in similar situations over time. It also centers attention on the content or outcomes of cognitive processes, not the cognitive processes themselves. For example, through sustained interactions with the marketplace, Polaroid learned that a successful business model focused on high profit margin software (film) and not the lower margin hardware (cameras) (Tripsas and Gavetti 2000). By contrast our framework suggests that organizational learning should focus less on retaining the outcomes of cognitive processes (a successful business model) than on the structure or nature of the process itself (the nature of the interactions with the marketplace). By learning what types of interactions of schema and context lead to the most effective outcomes, the focus of learning shifts from overly rigid models and routines that are unresponsive to change (the focus on the film versus camera business model led to Polaroid's decision not to exploit their early lead in digital photograph technology) toward routines that encourage the development of the transitory perceptual frames that are relevant to the current context. That is, learning must occur in the moment because the moment is what is essential to defining what is learned. This perspective helps to explain divergent findings about breakthroughs in problem solving, which may occur immediately or after long periods of work (Hargadon and Fanelli 2002). Our framework suggests that the right combination of schema and context is what is necessary to produce a given situated cognition, and that these combinations may occur early or late in a project's life.

A second implication of our framework is that it suggests that *cognition important to explaining activity in or by organizations is created through action*, rather than resulting from the simple application of schema that reside inside the heads of individuals or groups. This notion takes us back to some of the original definitions of situated cognition and early research that suggested that actions are what theorists should look at if we are to understand cognition (Weick and Roberts 1993). In this vein, our framework suggests that research linking cognition to organizational outcomes should broaden its focus to include the actions and interactions of people in context, rather than focusing solely on the schemas or on the contexts. For example, much of the extant work on the cognitive aspects of strategic action suggests that the schemas of managers determine what they focus on in the environment and shape strategic choice (Barr et al. 1992, Barr 1998). Our framework suggests that a focus on the interactions of managers with others and with the competitive environment may be a fruitful avenue to explore in our search for greater understanding of the link between managerial cognition and strategic choice.

For example, while Barr's (1998) work shows a correlation between changes in mental models (schema) and strategic change in pharmaceutical companies, it does not explain the origin of those shifts in schema. Perhaps the new understandings of the environment reflected in company documents were generated through the activities firm strategists undertook to better understand their environment. These activities would include interactions with others in their organization and with other industry participants within the context of a shifting regulatory and competitive environment.

Similarly, at the individual level, research on group work has shown that intense shared interactions between group members, such as working out problems or dealing with conflict, constitute the primary content of shared cognition in organizations. For example, in a study of 62 software development teams, Levesque et al. (2001) found that many teams that had higher role definition among members at the beginning of a project reported less interaction among members a month later, and consequently revealed less shared mental models after three months working together. However, Levesque et al. also found that without the mediating role of group member interaction, high role definition did not decrease shared mental models (and was, in fact, positively related to shared mental models) at the end of the project. As a result, Levesque et al. concluded that it was the act of group interaction that was essential to developing shared mental models, and these mental models were essentially built around the intense shared experiences of members.

A third implication of our framework is that *there may be identifiable patterns of interaction that give rise to situated cognition in organizations*. Our observation of these patterns suggests that there may be specific combinations of context and schema that would provide relatively common yet fruitful testing grounds for our perspective of cognition in organizations as transitory and contextually situated. Further investigation of these patterns may reveal new insights that further our ability to understand and manage cognitive processes in organizations. For example, one pattern we identified suggests that perceptions of option attractiveness arise through the interaction of event schemas and institutional or cultural contexts (e.g., Garud and Rappa 1994, Mitchell et al. 2000). This finding suggests that choice in organizations is influenced not simply by the schema an individual manager holds about a specific decision or event, such as the optimal technological trajectory for the development of a new product (like the cochlear implant), but also the perspectives or pressures that exist in the institutional context in which the work is being done. Thus, managers who wish to encourage true innovation in their organizations may find that they need to embed the product development team within a context that differs significantly from the institutional context that typifies their current product market (Christensen 1997).

In the end, our framework suggests that a primary task of managers and management scholars is to be mindful of the momentary interactions between schemas and contexts that we may create and/or manage in organizational contexts. By paying attention to what happens in these momentary interactions, we may better understand and recreate conditions that lead to effective and desired cognitive processes such as creativity, innovation, decision processes, learning, and strategic thinking. Our platform going forward, then, is that it is not the context or the schema, but the interaction that matters.

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