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7 Organizational Coordination and Communication

A Critical Review and Integrative Model

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We identify, and then attempt to redress, four problematic issues in the organizational coordination literature. First, we distinguish *coordinating* as the overarching process, *coordinating mechanisms* as the structures that are brought to bear, and *coordination* as the in situ interaction. Second, we explicate and distinguish coordinating mechanism from coordination, and reframe the myriad mechanisms in past research into three levels of consciousness specified by structuration theory. Third, we propose a model relating structures (mechanisms) that affect practices (coordination) to outcomes—all within organizational members' ongoing streams of activity and interaction. Fourth, we theorize organizational coordination as a distinctly communication phenomenon.

Coordinated activity arguably is the defining characteristic of organizing and organizations. As McPhee and Iverson (2013) note, organizations' "signal power" derives from the coordinated work of members and stakeholders, the coordinated operations of many units, the coordinated delivery of resources and personnel to core processes, and the coordination of organizational products and services with markets and societies (p. 109). Yet we find both that organizational coordination concepts are somewhat muddled, and that the communication aspect is under-emphasized.

Therefore, we discuss, in turn: (a) four particularly problematic issues with the prodigious research on organizational coordination; (b) two prominent theoretical perspectives on coordination; (c) mechanisms of, underlying assumptions about, and influences on organizational coordination; (d) distinctions among coordinating, coordinating mechanisms, and coordination; (e) propositions and a model of organizational coordination; and (f) an agenda for additional organizational coordination research and contributions.

Our thesis, which underlies and unifies these efforts, is that organizational coordination is a distinctly communicative process that is essential to the understanding of how organizations function. In brief, our argument and analysis unfold as follows across the six sections noted above. We urge definitions of *coordinating* as the overarching process, *coordinating mechanisms* as the structures that are brought to bear, and *coordination* as the in situ interaction, thereby bringing

precision to constructs that have been conflated. We also seek to resolve problems related to the variety of coordinating mechanisms and types of organizational coordination in the extant literature we review by explicating what a mechanism is and what coordination is, and by reframing the myriad mechanisms in past research using three levels of consciousness specified by structuration theory. This approach clarifies how types of coordination and types of coordinating mechanisms proposed by others interrelate, and it enables a more parsimonious model. The model we introduce and discuss (formalized in propositions and a visual figure) spotlights coordinating in organizations, including initial interdependencies and uncertainty, organizational and knowledge mechanisms, and routines—all influencing coordination, with possible reproduction or reshaping of those mechanisms, as well as intended and unintended organizational outcomes. Hence, we place coordinating at the core of the process through viewing organizational coordination as influenced by and implemented through coordinating mechanisms, and through interaction (re)creating those mechanisms.

Furthermore, instead of confounding coordination with coordinating mechanisms, coordinating, and outcomes, we propose a parsimonious set of relationships from structures (mechanisms) that influence practices (coordination) that lead to outcomes, including reinforcement or reshaping of those mechanisms—all in organizational members' ongoing streams of activity, meaning, and interaction. In this way we theorize organizational coordination as a distinctly communication phenomenon. We provide several examples of opportunities for integrating coordination and communication in relevant communication-based theories, with the potential to benefit organizational coordination and communication scholarship. We end by summarizing our responses to the four problematic issues about conceptualizations of, and research on, organizational coordination and communication.

Problematic Issues in Organizational Coordination Research

Coordination in organizations has been a focus of study since the turn of the last century (Taylor, 1916) and still is today (Okhuysen & Bechky, 2009a). Studies of organizational coordination also can be found across many disciplines, including economics (Berninghaus & Ehrhart, 2001), computer information systems (Bardram, 2000), linguistics (Gazdar, 1980), management (Endstrom & Galbraith, 1977), organizational behavior (Okhuysen & Beckhy, 2009a), psychology (Kraut, Lewis, & Swezy, 1982), sociology (Sutton, 2008), and communication (Ballard & Seibold, 2003, 2004; McPhee & Iverson, 2009). Scholarship on coordination covers a broad range of contexts and levels of analysis. Micro-level interpersonal interactions include how individuals utilize material signals in an attempt to coordinate everyday actions (Clark, 2005), how individuals negotiate conversations in interpersonal interactions (Hubbard, 2000; Vallacher, Nowak, & Zochowski, 2005), role-coordination in teams (Bechky, 2006), and relational and organizing micro-dynamics in teamwork

(Humphrey & Aime, 2014). Increasingly complex meso-level contexts include urban planning (Tornberg, 2012), coordinating regional or international inter-agency relief networks (Miller, Scott, Stage, & Birkholt, 1995), and the coordination of crisis response (Topper & Carley, 1999). And broad macro-level contexts consider multinational and interorganizational coordination (Alter, 1990; Cray, 1984; Endstrom & Galbraith, 1977), as well as market, marketing, and supply chain coordination (Buvik & John, 2000; Celly & Frazier, 1996; Gerstner & Hess, 1995; Kim, Stump, & Oh, 2009; Raju & Zhang, 2005; Zhao, Liu, Yang, & Sadiq, 2009).

With this rich diversity, however, come four problematic issues: (a) much prior work lacks shared explicit conceptual or operational definitions, (b) types of coordination overlap and contradict each other, (c) coordination is often a secondary aspect rather than a central concern, and (d) coordination—as treated in the organizational literature—receives little attention by communication researchers. As we explicate these issues below, we limit our review to work that is specifically related to organizations and that advances our understanding of organizational coordination as distinctly communicative.

Much Prior Work Lacks Shared Explicit Conceptual or Operational Definitions

The first issue in organizational coordination research is a lack of a shared explicit definition. In general, theorists often assume an understanding of what coordination means and may not offer an explicit definition (Endstrom & Galbraith, 1977; Kellogg, Orlikowski, & Yates, 2006; Larsson & Bowen, 1989; Perrow, 1961; Sutton, 2008). Even some of the most prominent coordination scholars do not always explicitly offer a conceptual definition (Bechky, 2006; Gittell & Weiss, 2004).

Even when definitions are provided, they cover a wide range of conceptual definitions, reflecting disagreement in how to define coordination and disagreement about its constitutive elements and functions (as Table 7.1 shows). Definitions range from the very simple conception of Simon (1947) "The adoption of all members of a group of the same decision" (p. 8) to the more complex view of Rico, Sanchez-Manzanares, Gil, and Gibson (2008) that "Coordination in work teams is an emergent phenomenon involving the use of strategies and behavior patterns aimed at integrating and aligning the actions, knowledge, and objectives of interdependent members, with a view to attaining some common ground" (p. 163). There are differences in whether coordination is, as Bailetti, Callahan, and McClusky (1998) contend, a structure that is "a configuration of actors (individuals or groups of individuals—units in an organizational situation) who have interdependent responsibilities to create, modify and use an array of shared work objects" (p. 238), or a process, as Okhuysen and Bechky (2009a) argue, "coordination, the process of interaction that integrates a collective set of interdependent tasks, is a central purpose of the organization" (p. 463). More difficult to reconcile is whether coordination is necessarily

Table 7.1 Conceptual Definitions of Coordination

Definition and Source	*Definition Attributes: Simple/complex Structure/process Accomplishment/attempt*
Coordination is a structure that is "a configuration of actors (individuals or groups of individuals—units in an organizational situation) who have interdependent responsibilities to create, modify and use an array of shared work objects" (Bailetti, Callahan, & McClusky, 1998, p. 238).	Simple Structure Accomplishment
"Coordination entails integrating or linking together different parts of an organization as they work together to accomplish organizational goals" (Bailetti, Calahan, & DiPietro, 1994, p. 395).	Simple Structure/ Process Accomplishment
"Coordination means the activities of work participants are related to one another in certain ways, according to certain organizing principles" (Cheng, 1984, p. 832).	Simple Structure Attempt
"Coordination refers to the extent to which subtasks allocated to different positions need to be sequenced by definite precedence relationships" (O'Brien, 1968, p. 427).	Simple Structure/ Process Attempt
"The integration or linking together of different parts of an organization to accomplish a collective set of tasks" (Van de ven, Delbecq, & Koenig, 1976, p. 322).	Simple Structure/ Process Attempt
"Coordination can be defined as the collective accomplishment of individual goals through a cooperative process" (Ballard & Seibold, 2003, p. 401).	Simple Process Accomplishment
"Coordination in a group of agents concerns maximizing the joint surplus of their productive activities" (Foss & Lorenzen, 2009, p. 1203).	Simple Process Accomplishment
Coordination is "synchronization of interdependent tasks and schedules" (Hoegl, Weinkauf, & Gemuenden, 2004, p. 39).	Simple Process Accomplishment
"Coordination can be seen as a process of managing resources in an organized manner so that a higher degree of operational efficiency can be achieved for a given project" (Hossain, 2009, p. 25).	Simple Process Accomplishment
"Coordinating (is) the process by which teams attempt to manage interdependencies among individuals" (p. 2); "Coordination (is) the degree to which interdependencies are managed well" (Kraut et al., 2005, p. 2).	Simple Process Accomplishment
"Coordination is managing dependencies between activities" (Malone & Crowston, 1994, p. 90).	Simple Process Accomplishment
"Coordination, the process of interaction (members implicit in interaction) that integrates a collective set of interdependent tasks, is a central purpose of the organization" (Okhuysen & Bechky, 2009a, p. 463).	Simple Process Accomplishment
Coordination is "the coming together of actions into a sequence or pattern, regardless of whether the producers of those actions agree on their meaning" (Salmon & Faris, 2006, pp. 285–286).	Simple Process Accomplishment
"The adoption of all members of a group of the same decision" (Simon, 1947, p. 8).	Simple Process Accomplishment
Coordination is "the act of working together harmoniously" (p. 358) and coordination is "the act of managing interdependencies between activities performed to achieve a goal" (Malone & Crowston, 1990, p. 361).	Simple Process Accomplishment/ Attempt
Coordination is ". . . the use of cooperative methods" and they "differentiated between those used by workers and administrators" (Alter, 1990, p. 483).	Simple Process Attempt
"Coordination involves adjusting the work of the group members to fit the goals of the group" (Cumming & Akari, 2005, p. 258).	Simple Process Attempt
"Coordination refers to the team-situated interactions aimed at managing resources and expertise dependencies" (Faraj & Xiao, 2006, p. 1157).	Simple Process Attempt
"Relational coordination is coordination—the management of task interdependencies—carried out in the context of relationships with other group members" (Gittell, 2001, p. 471).	Simple Process Attempt
Coordination is "the conscious activity of assembling and synchronizing differentiated work efforts so that they function harmoniously in the attainment of organizational objectives" (Young et al., 1998, p. 1215).	Simple Process Attempt
"The extent to which the work activities of organizational members are logically consistent and coherent . . . in role-system terms, coordination represents how well the organizational members as a whole perform in accordance with their roles in the system" (Cheng, 1983, pp. 156–157).	Complex Process Accomplishment
Temporal coordination is "an activity with the objective to ensure that the distributed actions realizing a collaborative activity takes place at an appropriate time, both in relation to that activity's other actions and in relation to other relevant sets of neighboring activities" (Bardram, 2000, p. 163).	Complex Process Attempt
"At its core coordination is about the integration of organizational work under conditions of task interdependencies and uncertainty. . . .Coordination is a temporally unfolding and contextualized process of input regulation and interaction articulation to realize collective performance" (Faraj & Sproull, 2000, p. 1155).	Complex Process Attempt
"Coordination in work teams is an emergent phenomenon involving the use of strategies and behavior patterns aimed at integrating and aligning the actions, knowledge, and objectives of interdependent members, with a view to attaining some common ground" (Rico, Sanchez-Manzanares, Gil, & Gibson, 2008, p. 163).	Complex Process Attempt

a measure of something that is successfully accomplished, as Malone and Crowston (1990) indicate: "the act of working together harmoniously" (p. 358), and as Ballard and Seibold (2003) propose—"coordination can be defined as the collective accomplishment of individual goals through a cooperative process" (p. 401)—or whether it is more generally an intention or attempt, as Rico et al. (2008) state: "with a view to attaining some common ground" (p. 163).

Types of Coordination Overlap and Contradict Each Other

A second problem (related to the first) is a conflation and vagueness of terms surrounding coordination. Such terms include integration (Lawrence & Lorsch, 1967), cooperation (O'Brien, 1968), collaboration (Salmon & Faris, 2006), and congruence (Cataldo, Wagstrom, Herbsleb, & Carley, 2006). Also, coordination, cooperation, and collaboration are used interchangeably (Vlaar, van den Bosch, & Volberda, 2007). A vast array of subcomponents also have been presented to deal with specific types of coordination or to present coordination in a particular way. For example, coordination is conceived of as either existing in some aspect of the organization before interaction or as being created in situ—for example, administrative coordination versus expertise or dialogic coordination (Faraj & Sproull, 2000; Faraj & Xiao, 2006). Another difference is whether coordination is considered as being either internal to or external to the group, like Bardram's (2000) intrinsic versus extrinsic coordination. Other conceptualizations examine whether coordination is based in knowledge, in interactions, in routines, or in some other construct. Knowledge-based conceptualizations include cognitive coordination (Foss & Lorenzen, 2009), expertise coordination (Faraj & Sproull, 2000), and the anticipation component of implicit coordination (Rico et al., 2008). Interactive conceptualizations include relational coordination (Gittell, 2001), communicative coordination (Bardram, 2000), the dynamic adjustment component of implicit coordination (Rico et al., 2008), discursive coordination (Minnsen, 2005), and activity coordination (McPhee & Zaug, 2000). Routines have long been understood to be a component of coordination and have a vast literature (see Becker, 2004 for a full review). Other conceptualizations include Bardram's (2000) temporal coordination that examines the role that perceptions of time have on coordination, an idea also addressed by Ballard and Seibold (2003, 2004), and in Bailetti et al.'s (1994) coordination ensembles, or how groups arrange themselves around objects.

Coordination Is Often a Secondary Aspect Rather Than a Central Concern

A third problematic issue in organizational coordination studies is a lack of focus on coordination as the primary concern. Instead, it is examined as a secondary variable, such as affecting leader member relations (Ilgen & O'Brien, 1974), as an intervening variable when examining leadership style on productivity (Hewett et al., 1974), or as control mechanism when analyzing the transfer of managers (Endstrom & Galbraith, 1977). Some of the second problem above, lack of consensus on its meaning, has been a byproduct of many definitions offered in studies in which coordination was of secondary interest.

Coordination Requires Greater Attention by Communication Researchers

Communication is acknowledged in the earliest organizational coordination work either explicitly, noting the importance of feedback and mutual adjustment, or implicitly, through plans and programming, which require communication to establish and maintain (March & Simon, 1993; Thompson, 1967). More recent organizational coordination work continues to recognize the importance of communication. For example, Okhuysen and Bechky (2009a) identify the role of communication in some coordinating mechanisms, such as the monitoring and updating component of roles, and in integrating conditions for coordination. But these works are external to communication and by non-communication researchers.

However, ironically, communication researchers have not paid much attention to coordination in the senses discussed above, nor have they emphasized the communicative aspects specific to organizational coordination. When organizational communication scholars have engaged coordination, their primary focus has been on communication and organizational constitution—that organizations emerge from and are maintained by communication processes. Emphasis in that vast literature is given to the coordination inherent in communication and, by extension but only secondarily, to organizational coordination (Cooren, Taylor, & Van Every, 2006; McPhee & Zaug, 2000). Work in communication also has examined collaboration (see Lewis's 2006 review), including commentary on organizational coordination. Other prominent communication scholarship on coordination has not been much concerned with organizational processes, but rather with coordinating language, interpersonal interaction, or social ties (Fusaroli & Tylen, 2012; Pearce & Pearce, 2000).

In the remaining sections, we respond to these four problematic issues by (a) reviewing relevant theoretical perspectives on organizational coordination with an eye to identifying problems and applying strengths, (b) identifying key assumptions (structuration, crucial related concepts, and conceptualization of coordinating, coordinating mechanisms, and coordination), (c) advancing arguments for three overarching coordinating mechanisms (routines, knowledge, and organizational) that help resolve problems in the literature, (d) emphasizing a communication perspective, and (e) proposing an integrative model and relevant testable propositions.

Two Prominent Theoretical Perspectives on Organizational Coordination

The scholarship on organizational coordination is prodigious. Thus, we selectively discuss two overarching theoretical perspectives—contingency models and organizational design; and coordination paradigms—followed by a detailed discussion of assumptions and definitions. Our intention is to provide the foundations for a framework and model that redresses limitations in, and integrates central concepts from, these previous theoretical approaches to organizational coordination.

Contingency Models and Organizational Design

The work of Malone and colleagues (Crowston, 1997; Crowston & Kammerer, 1998; Malone, 1987; Malone & Crowston, 1990; Malone and Crowston, 1994) and Bailetti, Callahan, and DiPietro (1994) figures prominently in the modern landscape of organizational coordination research. Extending the traditional design/contingency paradigm that was dominant for much of the last century (e.g., March & Simon, 1958; Thompson, 1967; van de Ven, Delbecq, & Koenig, 1976), these scholars develop a rich taxonomy of contingencies and mechanisms affecting coordination effectiveness (with some focus on information/communication technology). This research acknowledges the complexity of potential interdependencies, but emphasizes distinctions (Malone & Crowston, 1994) and categorizations (Bailetti, Callahan, & McClusky, 1998). Furthermore, much of the work is technology-centric and lacks much focus on the agency of organizational members. Finally, the coordination processes identified acknowledge a wide range of, and levels of, interdependencies but do not distinguish coordinating mechanisms from coordination, a distinction central to the analysis we develop in the assumptions and model sections later in this paper.

More generally, there are three important criticisms of the contingency approach to organizational coordination. The first is that the number of possible interdependencies and contextual differences makes it nearly impossible to develop an exhaustive catalog of matched organizational situations and coordinating mechanisms. A second critique concerns the dearth of discussion about how organizational members might actually identify, access, and implement these mechanisms. For example, what happens when the mechanisms are not used well (van Fenema, Pentland, & Kumar, 2004) or even function counter to group and organizational goals (as analyzed by Rice & Cooper, 2010)? The third criticism focuses on a lack of specificity about how the coordination mechanisms work, especially for specific contexts. Without that knowledge, further theoretical development is hampered (Okhuysen & Bechky, 2009a).

However, the contingency/design approach also offers two benefits for the study of organizational coordination. It identifies possible coordinating

mechanisms from which a typology of matches between situation, coordinating mechanisms, and the attainment of positive coordination can be developed. Additionally, even though much of this work has focused on very specific instances and the ways to manage interdependencies, these still allow for broader theoretical implications in extrapolating from the instances studied to broader theoretical concerns. For example, Crowston (1997) examined coordination problems in software design and how specific organizations dealt with them. In interdependencies where task assignment to the proper engineer is important, utilizing a mechanism focused on identifying expertise is more important than other coordinating mechanisms. This benefit of the contingency/design perspective on organizational coordination informs the concept of knowledge mechanisms that are key to the assumptions and model we offer.

Coordination Paradigms

In a major review of the organizational coordination literature, van Fenema et al. (2004) identified three paradigms of coordination theory. The *contingency paradigm* views coordination as processes or structures that can and should be manipulated to increase organizational effectiveness within varying contexts. The *relatedness of structure and process paradigm* recognizes that process and structure are not necessarily mutually exclusive, and includes theories that focus on their interrelationships. These theories conceive of structure much more broadly than does contingency/design and are relevant for the structuration theory assumptions we make in the next section. Structure includes more than just procedures, plans, manuals, and control mechanisms; rules and resources, mental models, collections of knowledge, and shared meanings are included too. These are the internalized aspects of structure that organizational and group members draw on as generative of action. The *crafting inner and outer world paradigm* views coordination as beginning with the individual. Coordination is accomplished through coherence, or forming a unified whole, in the connection between individuals' outer worlds (structures and processes that exist outside the individual) and inner worlds (how individuals interpret and interact differently with those outer worlds).

Distinguishing among the three paradigms yields insights into how the conceptualization of organizational coordination has changed to accommodate deeper understandings than in early contingency/design work, especially the roles of agency and interaction in producing coordination. The relatedness and crafting paradigms identified by van Fenema et al. (2004) also supply a basis for our more communicative focus in coordination research and for a structurational approach. In particular, the relatedness coordination paradigm includes concern with how structures affect interaction and how interaction, discourse, and conversations create structure. The crafting paradigm concentrates heavily on the communicative nature of coordination and embraces the ways that organizations and coordination are created through interaction and communication.

The assumptions and model we offer in subsequent sections are consonant with these two paradigms.

Mechanisms of, Underlying Assumptions about, and Influences on Organizational Coordination

Coordinating Mechanisms and Integrating Conditions

Perhaps the most cogent analysis of the organizational coordination research literature to date is provided by Okhuysen and Bechky (2009a). We review their work in some detail. While we differ from them in important respects, portions of their analysis are extended in our own model as well as in the structuration theory tenets and other assumptions that underlie it.

Okhuysen and Bechky (2009a) first concentrate on five "coordinating mechanisms": *plans and rules, objects and representations, roles, routines,* and *proximity*. They subsequently identify three overarching "integrating conditions" that those coordinating mechanisms must accomplish to bring about coordination: *accountability, predictability,* and *common understanding*. We discuss the five coordinating mechanisms and the three integrating conditions in that order. Okhuysen and Beckhy's work moved the current understanding of coordination forward in several ways. First is their separation of the vast collection of mechanisms into several categories that helped inform our argument for organizational mechanisms and routines. Second, the presentation of the three integrating conditions allowed for a clearer understanding of the knowledge mechanisms we present as well as how the mechanisms might interact. Finally, they call attention to the communicative aspect of organizational coordination, even if only implicitly.

Plans and rules are aspects of the formal organization that are required for organizing. They contribute to coordination through defining responsibilities for tasks, allocating resources, and developing agreement. Objects and representations facilitate coordination though direct information sharing, scaffolding (structures established by a group to allow reference for future work), acknowledging and aligning work, and creating a common perspective. Roles are the expected behaviors associated with a social position in the group or organization, and help coordination through monitoring and updating, substituting (as members become more aware of each other's roles they can fill in for each other), and creating common perspective. Routines are established patterns of behavior that members rely on for action, without having to consciously process those behaviors. They help coordination by increasing task completion and stability, allowing for hand-off work, bringing groups together, and creating common perspective.

The final coordination mechanism identified by Okhuysen and Bechky (2009a), proximity, has two components, visibility and familiarity. Visibility depends on physical co-location and aids coordinating through monitoring (by supervisors, as well as of others' behaviors) and updating, which is the increased

ability to realign or gauge task progress in high visibility environments (for discussions of the effect of audio and visual co-location on knowledge and coordination, see Archea, 1977; Kraut, Fish, Root, & Chalfonte, 1990). (Clearly, in the contemporary context of ubiquitous organizational ICTs, the notion of visibility takes on a more general, and both more and less constrained, aspect; see Rice & Leonardi, 2013.) The concept of familiarity focuses on the knowledge one person has about another individual or situation. It aids coordination through an increase in the ability of members to anticipate others' actions and respond appropriately, by knowing where the stores of knowledge necessary for coordination lie, and by increasing the levels of trust among members. This conceptualization of familiarity is also central to the theory of transactive memory (Lewis & Herndon, 2011).

Okhuysen and Bechky (2009a) contend that each of the five coordinating mechanisms above can be accomplished through what they call three integrating conditions: accountability, predictability, and common understanding. Integrating conditions are the means through which organizational members jointly perform workplace tasks that are interdependent. Accountability directs members' attention to whomever has responsibility for particular aspects of an interdependent task, and functions to coordinate action formally and in emergent fashion through vertical authority (directives and reporting) as well as lateral structures that may be formal (e.g., status updates) and informal (e.g., interactions). Predictability facilitates coordination to the extent to which members are aware of task parts and timeline—and thus, can predict ensuing task activity. Predictability is enabled through formal mechanisms (scheduling) and emergent means (familiarity with others' knowledge and preferences, as acquired through interactions with them individually or collectively). Common understanding aids coordination by affording organizational members with shared perspectives on whole-part relationships (e.g., parameters for a task and how each member's work is part of it). Common understanding is reflected in task knowledge, knowledge of relevant members, and context knowledge. It can be enhanced through formal and planned methods (e.g., manuals, assembly drawings) and emergent interactions among members.

Okhuysen and Bechky (2009a) hint at the role of communication in some of the five coordinating mechanisms, such as the monitoring and updating component of roles. Curiously, they offer roles as the salient aspect rather than communication even though, as Bechky (2006) argued, communication is the actual process of enacting those roles. Bechky emphasizes that role structures cannot be taken as givens; they are evident in the streams of action of role occupants—actions that prominently include communication and interaction. Okhuysen and Bechky (2009a) more explicitly note the role of communication in the three integrating conditions for coordination, both in formal authority structures (e.g., directives, setting schedules, manuals) and in informal lateral structures (e.g., meetings and conversations). We extend those notions greatly in our model, and before that in the structuration theory tenets and other assumptions underlying it.

In the remainder of this section we explicate assumptions and key concepts in three areas that will be foundational to the model we propose in the following section. The first area incorporates a structuration theory premise concerning organization as constraining and being (re)created by interaction. The second involves the centrality of two key concepts commonly associated with organizational coordination (interdependencies and uncertainty). The third includes distinctions between coordinating, coordinating mechanisms, and coordination.

Underlying Assumptions

Structuration tenets concerning organizational coordination and communication. McPhee and colleagues (McPhee & Iverson, 2009, 2013; McPhee & Poole, 2001; McPhee & Zaug, 2000; Poole & McPhee, 2005; Poole, Seibold, & McPhee, 1985) argue for a conception of organization grounded firmly within Giddens's (1979) concept of structuration. Structuration is an outgrowth of a period of theory that embraced the role of human agency in the creation of our social realities, and was adopted and developed as a communication theory largely by the above group of researchers. Structuration identifies social systems, including organizations, as systems of human practice in which human activities are interrelated in various ways. This interaction is guided by structure that is composed of rules and resources. Rules are any principle or guide that tells people that draw on them the ways in which they can or should act; resources are anything that people use in action, including material like money or tools, or nonmaterial like skills and information.

A core concept of structuration is that as people draw on structural rules and resources in acting within a social system of practices, they perpetuate that system and reproduce the very structures that guide them. This can occur through perpetuating the system as is, or through transformation, which shifts the system, taking it in new directions. Every interaction within a system has two components: it produces the practices of which it is a component and it reproduces the system and structure.

Communication theorists who embrace structuration theory recognize that humans have agency and are not strictly guided by outside forces, and thus assume that humans have distinct levels of consciousness, they are knowledgeable, and they are reflexive (Poole & McPhee, 2005). *Consciousness* has three levels. The first is *discursive* consciousness, which we can put into words and explain to others. The second is *practical* consciousness, which—like riding a bike—is difficult to impart in words, although we can put it into action. The third is the *unconscious*, of which we are not aware but that nonetheless affects actions. This level includes the effects of our past actions, such as unrecognized fears, or attitudes, and beliefs. Knowledge represents the ability of people to know much about their environments and resources available within that environment, allowing them not only to go about their day-to-day existence, but to know who knows what and where needed resources are located. However, humans do not just go through their day-to-day activities; they also reflect on that activity, making adjustments as needed to current action and to future planned actions.

Communication flows in organizations. In a structuration approach, organizations as social systems are both constituted through communication and, in turn, provide contexts for creating communication. One structuration conception distinguishes four types of communication "flows" essential for the constitution of organization (McPhee & Zaug, 2000). First, organizations typically draw a distinction between members and nonmembers through continuous communicative *membership negotiation*. Second, organizations reflexively self-structure through communicative processes, distinguishing them from mobs or neighborhoods. Third, organizations also follow some manifest purpose(s) which guides communicative processes of activity coordination. This third flow is especially relevant for the present analysis. Activity coordination usually entails interactive episodes in which members who are aligned in an organizational unit and/or location adjust to germane acts of others and to situational constraints (McPhee & Iverson, 2013). Fourth, organizations are embedded within a larger context—another organization, community, industry, technological or legal trends, or society at large. Thus organizations generate and are regulated by communicative processes of institutional positioning, such as negotiating through interaction with stakeholders and other institutions to establish status.

It is from this perspective that the current conception of not only organization but organizational coordination is derived. The reconstituting process suggests that the coordinating mechanisms that engender the coordination process are also (re)created in that very process. It is only through looking at the process as continual and iterative that coordination can be fully explored. The three assumptions about humans in organizations (i.e., they are conscious on several levels, knowledgeable, and reflexive) underscore that coordination is a human activity. The levels of consciousness indicate that the coordination of organizational members involves not only discursive knowledge and practical knowledge of the task, but is influenced by aspects not fully recognized consciously by the members. They do not act as parts of a machine with no knowledge or reflexivity as the earliest coordination theorists imagined, but instead reflexively adjust their future behaviors based on current interactions. Finally, the four flows offer two implications. First, they allow us to define what is and is not organization and thus what is and is not organizational coordination. Second, they place organizational coordination within a larger context, whereby it is affected by and affects that context.

Concepts Influencing Organizational Coordination

As Okhuysen and Bechky (2009a) emphasize, interdependencies and uncertainty are central to conceptualizing the need for coordination in organizations.

Interdependencies. From a systems theory perspective, the actors, tasks, processes and organizations exhibit both weak and strong interdependencies (or tight and loose coupling) based on exchanges of various resources and outputs to accomplish particular goals or tasks (e.g., van de Ven et al., 1976). These resource interdependencies may be based on specific actor and organizational needs, goals, abilities, and processes. They include not only industrial resources like capital, parts, and time, but also less tangible resources such as emotional support, guidance, and information (Gittell, 2001). They also include responsibilities, linking group members with each other and with objects and actors outside the group, like design plans, customer needs, and test results (Bailetti, Callahan, & McClusky, 1998).

In the earliest coordination work, these interdependencies were a measure of the level of complexities of reliance in order to accomplish the goals of the organization. Thompson (1967) identified three types of interdependencies (in order of complexity from least to most): pooled, in which one person's contribution may move the group forward, but the rest of the group does not rely on that person's contribution per se (e.g., harvesting fruit); sequential, in which one member's actions are required for another's to take place (e.g., assembly line); and reciprocal, in which the members rely on each other in a give and take process (e.g., cooks in a kitchen rely on the dishwashers for clean dishes and the dishwashers rely on the cooks for dirty dishes). Van de Ven et al. (1976) added a fourth level, team, which does not include the temporal aspect of sequential or reciprocal interdependencies, but instead refers to those times when components work jointly and simultaneously (e.g., some kinds of sports teams). Crowston (1997) proposed three other kinds of interdependencies. Task to task interdependencies arise when one task is reliant on another being accomplished. Task to resource interdependencies include situations where a resource is required by a task, and resource to resource interdependencies are those situations where one resource depends on another. Other studies add different possibilities, including interdependencies specific to the construction industry (Hossain, 2009), to the customer service industry (Larsson & Bowen, 1989), interdependencies in groupware (Andriessen, 2003) or between components of a system (Crowston & Kammerer, 1998), and peer-to-peer interdependencies (Cumming & Akari, 2005).

Previous literature on coordination recognizes the alignment of interdependencies as a core property of coordination. Although some of this work is overly simplified or unnecessarily complicated, it is important to recognize that in the absence of interdependencies there is nothing to coordinate. Not only are interdependencies different across context, they may change throughout the life cycle of a project (Adler, 1995). Interdependencies also may be sufficiently complex, ambiguous, and temporally lagged to make it difficult to even know what to coordinate, or to coordinate at a large enough level, in order to avoid or resolve dysfunctional processes. Indeed, without appropriate feedback and coordination, these interdependencies and dysfunctionalities become embedded, routinized, and nearly invisible, into unusual routines (Rice & Cooper, 2010).

Uncertainty. With interdependencies comes uncertainty such as, in the communication sense, divergences in meanings, as well as, in the pragmatic sense, who is responsible for what task when. Coordination is necessary to avoid or resolve that uncertainty in order to accomplish goals. Much of the earliest work examining coordination drew its inspiration from finding ways to manage these uncertainties, such as those created by the introduction of large-scale railways by assuring proper time schedules and allowing for the planning of shipping and traveling (Beniger, 1986; Okhuysen & Bechky, 2009a). This interest grew as increased industrialization took hold. Much of this early work concentrated on design: first of work, then of management, and finally of the organization, in attempts to allow for increased management control (van Fenema, Pentland, & Kumar, 2004). Taylor's Scientific Management concentrated on ways that humans and their work actions could be more mechanized and efficient, thus reducing the uncertainty of production (March & Simon, 1993).

Developing at much the same time were theories of departmentalization (often called administrative management theory), including the work of Fayol, Gulick, and Urwick (March & Simon, 1993). This group differs from the scientific management school in their level of analysis. Rather than attempting to guide the specific worker through planning and training, they focused instead on the design of management systems that allowed for little uncertainty and near-complete coordination (or removal of the need for it). Building on early design theorists' attempts to plan formal elements to accomplish coordination, a substantial shift in focus began with March and Simon's book *Organizations* in 1958. Referred to by a number of names including contingency theory (Galbraith, 1973; van Fenema et al., 2004), organizational design theories (Okhuysen & Bechky, 2009a), and administrative theory (Thompson, 1967), this approach assumed that interdependent aspects of an organization could be planned and thus coordinated in order to reduce uncertainty. For example, Yates (1993) showed that new genres of communication, such as the memo, adapted from British Empire administration, were central in improving control and coordination of the rapidly developing form of corporations in the early 1900s.

Contemporary scholars acknowledge that early contingency theory and research was simplistic (in its assumption that all uncertainty within interdependencies could be eliminated, or that interdependencies could be designed down to simple, repeatable processes). However, scholars still focus on uncertainty as a primary concern for coordination research, and examine how levels of uncertainty require, and affect the use of and the effectiveness of, various coordinating mechanisms (e.g., Argote, 1982; Gittell, 2002; van de Ven et al., 1976).

Distinctions: Coordinating, Coordinating Mechanisms, and Coordination

As noted above, the coordination literature conflates similar terms such as collaboration, cooperation, integration, and congruence. The more difficult part of conceptualizing coordination is not the confounding of it with differing terms, but differentiating between words with the same linguistic root, such as coordination, coordinate, and coordinating. Once these conceptual issues are worked out, it becomes easier to establish coordination as conceptually different from other similar concepts.

The difficulty in conceptualizing coordinating and coordination stems in part from how each is defined in the English language. Merriam-Webster.com defines coordinating as the present participle of coordinate, so that coordinating is

> making arrangements so that two or more people or groups of people can work together properly and well, or as acting or working together properly or well, or as causing (two or more things) to be the same or to go together well.

Thus coordinating can be conceived of as both an act done to something else (i.e., making arrangements or causing . . .) or as an in situ process (i.e., acting or working together properly). This definition of coordinate/coordinating does not bring much clarity. Merriam-Webster.com defines coordination as "either the act or state of coordinating or of being coordinated or as a harmonious combination or interaction, as of functions or parts." Again, coordination, like coordinating, can be conceived of as something done to a group, as something a group does, or as something attained; as an act, a process, or a state. This is exacerbated in the literature as the two terms are so often misused and underconceptualized. So we propose the following definitions, which will be further explored below:

- *Coordinating* is the organizational process of applying coordinating mechanisms to attain higher extents of coordination, resulting in outcomes (expected and unexpected, intentional and unintentional, positive and negative).
- *Coordinating mechanisms* are those processes, structures, artifacts, or interactions that exist to facilitate coordination of a group, or of the organization, that generally exist "before" coordination, and that are either intentionally brought to bear or stored for use in situ.
- *Coordination* is the extent to which the in situ interactive integration of group(s) and/or organizational members' work activities is logical and coherent in managing interdependencies towards some goal.

To support these definitions, two key problems in previous literature must be addressed: coordinating and coordination are distinct concepts, and the process

of coordination is conceptually, if not always empirically, distinct from outcomes. We also argue against (a) conceiving of coordination as a dichotomous variable (either attained or not attained), (b) assuming that the use of coordinating mechanisms is automatically successful in attaining appropriate extent and types of coordination, or (c) assuming that coordination necessarily achieves successful or intended outcomes. In other words, no aspect of coordinating, or the internal relationships, is fully deterministic.

Coordinating and Coordination Are Distinct

As noted, the literature is rife with confusion between the meanings of coordination and coordinating. Other than definitional difficulties, there are two additional issues in delineating between coordinating and coordination. First, we need to distinguish between coordinating as external to a group (i.e., the manager is coordinating that group by giving it direction on an upcoming task) or as internal to the group (i.e., the group has a high extent of coordination towards completing a task). This blending of external and internal was a constant issue in the earliest coordination research (e.g., design contingency, Thompson, 1967), and is an error in recent work as evidenced by the identification of both plans and mutual adjustment as coordinating mechanisms (Grote et al., 2008).

Second, we need to distinguish the boundary between the coordinating mechanisms and coordination (i.e., are instructions from supervisors a mechanism even when accessed by group members during a project?). Cheng (1983, 1984) brings some lucidity to this difficulty when he delineates between coordination, which he identifies as a measure of the articulation of unity of effort between contingent parts of an organization or group, and coordinating, which is the process of utilizing coordinating mechanisms to align those divergent parts of the organization or group around a particular task. Cray (1984) recognizes the same differentiation in concepts (though he still confounds the terms) when he writes that "the issue is not so much the type of coordination (coordinating) used, but the amount or degree of coordination. The primary consideration . . . is that the subunits be successfully integrated" (p. 87). Though Cheng called for researchers to more clearly distinguish between coordinating and coordination, the issue has remained (see, for example, Cumming & Akari, 2005; Janick & Bartel, 2003; and Vlaar, van den Bosch, & Volberda, 2007). More recently, Kraut et al. (2005) make the same call for clarification, identifying coordinating as the attempt to manage interdependencies, and coordination as the resultant state of well-managed interdependencies (although note again here the confounding between whether coordination is a state or not). This manifests in the literature in the common use of both coordinating and coordinating mechanisms to mean the application of some structure to attempt to align interdependencies. To reduce this confounding we call for the term coordinating to be used to describe the overarching process and coordinating mechanisms to represent those structures that exist to facilitate the coordination of group and organizational members'

interdependencies. (The use of the term "mechanisms" carries some risk of being associated with technological determinism and Taylorism. However, it has been so ingrained in the coordination literature that it is more fitting than alternatives such as processes or structures, which have structurational theory connotations.)

Coordination and Outcomes Are Distinct

The literature often construes coordination and outcomes as the same (Cheng, 1983, 1984). One possible reason is the difficulty in measuring coordination directly. Instead of coordination being measured as a manifest variable, it often has been measured as a latent variable, including such varied concepts as mutual respect, the timeliness of communication, and the frequency of communication (Gittell, 2002). The common conception of coordination as accomplishing some output logically leads scholars to include some aspect of goal achievement into the measure of coordination—such as including the success of the group in attaining some organizationally desired outputs (Cheng, 1984). These outputs can be measured as a level of quality (e.g., customers report Y level of satisfaction) and/or quantity (e.g., the group serviced X number of customers) (Argote, 1982).

A possible second reason for misconstruing outcomes as part (and thus an indicator) of coordination is the common assumption that the only valid goals for a group are the official organizational goals. Yet the success or failure of a coordinative action is in many instances and contexts a subjective perception (Martinez & Jarillo, 1989). The goals of the organization are not always as clearly defined as group goals. Perrow (1961) notes that whose goals take precedence changes over the life course of an organization, including administrative goals, organization goals, specific group goals, or some other goal. Depending on whose goals are being measured, the success or failure of a coordinated effort could vary drastically (Lehr & Rice, 2002).

Propositions and Model of Organizational Coordination

In the previous section we reconceptualized coordinating, coordinating mechanisms, and coordination as system, structures, and practice. We distinguished between coordinating, coordinating mechanisms, coordination, and outcomes to show how mechanisms (structures) affect coordination (practices) that lead to outcomes within organizational members' ongoing streams of activity and interaction.

As we note below, each of these types of mechanism works to align organizational members' meanings and practices, but this only occurs through the interaction of the members and the alignment of their interdependencies. As structuration theory argues, these structures both enable and constrain the actions and interactions of the organizational members. Moreover, those very coordinating mechanisms are themselves either reproduced or transformed through the ways that the members enact them in the actual coordination.

Further, we simplify the five mechanisms identified by Okhuysen and Bechky (2009a) and the myriad mechanisms identified by Malone and colleagues into the three structuration theory levels of consciousness: discursive, practical, and unconscious. This allows for a comprehensive yet parsimonious categorization of coordinating mechanisms—and in a manner that enables us to understand their impact on coordination. The discursive level of consciousness aligns with organizational coordinating mechanisms, which are those mechanisms that are consciously created and/or brought to bear to attempt coordination. Practical consciousness aligns with knowledge mechanisms that facilitate coordination that organizational members are conscious of, but may not be able to fully explain how they are brought to bear. The final type of coordinating mechanism, unconscious, aligns with routines, as it occurs when the above mechanisms become embedded in organizational members' practices and allows for action without thought or negotiation.

Thus we explicate our proposed model through five components: 1) coordination itself, 2) organizational coordinating as both mechanism and outcome of coordination, 3) knowledge as both mechanism and outcome of coordination, 4) routines as both mechanism and outcome of coordination, and 5) organizational outcomes of coordination. Each is treated in turn next.

Coordination

We see at least five common errors when coordination is defined or operationalized. First, and typical of the older contingency approach, it is conceived of simply as a mathematical representation of the allocation and sequencing of tasks within a group (O'Brien, 1968). Second, coordination is operationalized as an outcome, such as measuring it as attaining quality of product, quantity of product, or efficiency of delivering product (e.g., Argote, 1982; Faraj & Sproull, 2000). Third, coordination is operationalized as a coordinating mechanism, such as asking if planning was wellconceived, schedules were clear and adequate, or if members have a shared cognition (e.g., Cheng, 1983; Gittell, 2002; Kraut et al., 2005).

The next two errors confound conceptions that are peripheral with the coordinating process itself. Fourth, variables that are more descriptive of the context are included rather than those specifically coordinative in nature. For example, Cray (1984) includes how many functions a task group shares with another and how many other tasks the group must interact with. While these certainly influence the coordination process, they do so by increased interdependencies and uncertainties, which are already accounted for in the proposed model. Fifth, other moderators may exist, but there is too little evidence to support them as needing to be included here. These include Gittell's (2001, 2002) concept of mutual respect and Hoegl et al.'s (2004) project commitment; although both may lead to coordination, a group need not like each other or be highly committed to the task to accomplish it.

The operationalizations that seem to best measure coordination as it is conceived here include variables that measure in situ interaction, and the alignment of work. In situ interaction includes variables such as information that is exchanged in a timely manner, differences negotiated quickly, lack of disagreement, helping, and problem solving capabilities (Faraj & Sproull, 2000; Gittell, 2002). Alignment of work includes coherence of work, lack of duplication of work, everyone in the group doing the tasks they were supposed to do, people able to do their jobs without getting in each other's way, no delays in the process, subtasks closely harmonized, and goals understood by the members (Cheng, 1983, 1984; Gittell, 2001, 2002; Hoegl et al., 2004; Kraut et al., 2005).

Organizational Coordinating as Both Mechanism and Outcome of Coordination

Organizational coordinating mechanisms are the broadest category, but are easier to observe than the other mechanisms. They are created based on specific actions of an organization in an attempt to increase coordination. Three categories of such mechanisms include: structural coordinating mechanisms, conscious interaction mechanisms, and stored organizational coordinating mechanisms.

Structural coordinating mechanisms (SCM) include those components of an organization such as rules, roles, and power structures that constrain and enable any interaction, including coordination. SCM are established at two points, through planning by the organization and through the interaction of organizational members. The first, planning, is well established in the coordination literature as both non-physical though observable (e.g., hierarchical arrangements, rules, and departmentalization) as well as physical (e.g., formal information systems, physical space design; see Andriessen, 2003; Archea, 1977; Kraut, Fish, Root, & Chalfonte 1990; March & Simon, 1993; Tushman & Nadler, 1978). These are conscious decisions on the part of the organization to increase the coordination of its members. The second interaction of members, follows from our discussion above of the centrality of communication in both coordinating mechanisms and integrating conditions as well as the structuration of coordination. Through the interaction of members as they enact and experience the planning of the organization, these mechanisms are (re)created—a concept that will be further explored below in outcomes.

Proposition 1a: Uncertainty is positively associated with SCM.
Proposition 1b: Interdependencies are positively associated with SCM.
Proposition 2: SCM are enacted through communication.
Proposition 3: SCM are positively associated with extent of coordination.

Conscious interaction mechanisms (CIM) involve direct interpersonal or group communication to any member of a group by an organizational

member external to the group, with the intent to facilitate coordination of the group. Conscious interaction coordinating mechanisms are similar to what March and Simon (1993) called feedback, or what van de Ven et al. (1976) referred to as group or personal mechanisms. However, it is not the same as the concept of mutual adjustment, which is identified by Thompson (1967) as occurring in the process of action. The difference is that mutual adjustment is something that occurs during group interaction or during coordination, whereas feedback, or personal and group mechanisms, like conscious interaction mechanisms, originate externally from the group. This measure is somewhat muddled in the literature as so much of the literature confounds this with either what is being conceived here as coordination, or adds measures that make it difficult to tell what is really involved. This latter is evident in Gittell's (2001, 2002) investigations of relational coordination. Her relational coordination measure includes aspects of interaction between organizational members external to the group, but it also includes the timeliness and frequency of group interaction, which by the present conceptualization mixes coordinating mechanism with coordination. The same issue occurs in work by Grote et al. (2010) and others (e.g., Hewett, O'Brien, & Hornik, 1974). Though research shows the effectiveness of face-to-face interaction in improving coordination and output (Kraut et al., 2005; Okhuysen & Bechky, 2009b; Young et al., 1998), organizational communication has been increasingly well supported with mediated technologies (Rice & Leonardi, 2013), for example in customer support teams (Rathnam, Mahajan, & Whinston, 1995) and construction projects (Hossain, 2009). These organizational structures (as coordinating mechanisms) often function, or are intended, to reduce uncertainty. They have been found not only to be more common, but also more effective, in high uncertainty environments (March & Simon, 1993; van de Ven et al., 1976).

Proposition 4a: Uncertainty is positively associated with CIM.
Proposition 4b: Interdependencies are positively associated with CIM.
Proposition 5: CIM are positively associated with the extent of coordination.

Stored organizational coordinating mechanisms (SOCM) are artifacts created by organizations that do not require direct interpersonal interaction in the facilitation of coordination, but that still exist for that purpose. These include training manuals, budgets, memos, plans, databases, programming, or other mechanistic, formal, or impersonal artifacts (March & Simon, 1993; Thompson, 1967; van de Ven et al., 1976), as well as any information (physical, digital) that the organization has created and stored to increase coordination. These require some agency to access on the part of the group or organizational member, and may have at one point been part of CIM (e.g., during training employees are given an orientation manual), but now there is only interaction with the object if the organizational member seeks it out. These mechanisms interact directly

with resource knowledge mechanisms (see below) and are only as effective as organizational members' ability to access, understand, and use them.

Proposition 6a: Uncertainty is positively associated with SOCM.
Proposition 6b: Interdependencies are positively associated with SOCM.
Proposition 7: SOCM are positively associated with the extent of coordination.

Organizational coordination mechanisms as outcomes of coordination. Early work assumed that these organizational mechanisms were set forth by management, implemented, accepted, and endured until later organizational changes in procedures. It is now understood that these structural components may be more or less appropriated through the organizational members' interactions, and be more or less adjusted in alignment with the intentions of the organization (DeSanctis & Poole, 1994). A prime example is Bechky's (2006) investigation of roles in temporary organizations such as film crews. Members attained a high extent of coordination quickly through the use of roles that were (re)established through the use of joking and other interactions. Other work supporting this conception of organizational mechanisms as created through interaction found that these structural components can be influenced by network relationships, which are more readily established in collocated teams as opposed to distributed teams (Hinds & McGrath, 2006), or conceptions of time that emerge differently depending on group experience and make-up (Ballard & Seibold, 2003), among others.

Proposition 8a: Extent of coordination may reproduce or reshape structural coordinating mechanisms.
Proposition 8b: Extent of coordination may reproduce or reshape conscious interaction mechanisms.
Proposition 8c: Extent of coordination may reproduce or reshape stored organizational coordinating mechanisms.

Knowledge as Both Mechanism and Outcome of Coordination

Based on such diverse concepts as tacit knowledge (Brockman & Anthony, 2007), transactive memory (Hollingshead & Brandon, 2003; Lewis & Herndon, 2011; Ren, Carley, & Argote, 2006), expertise (Stewart, Walker, Hutt, & Kumar, 2010), and implicit coordination (Rico et al., 2008), knowledge as a coordination mechanism includes facets of coordination for which actors utilize modes that are neither completely without thought and based on repeated patterns, such as routines (explained below), nor are fully conscious (like organizational coordination mechanisms). We emphasize two of those knowledge mechanisms, resource knowledge and relational knowledge, as both involve communication.

Resource knowledge includes information, skills, and materials. When group members know who knows what, and how to get that information, they are able to perform better (Faraj & Sproull, 2000; Olivera, 2000). Knowledge about resources

allows members of the group to identify the location of needed resources, whether that means knowing whom to approach in order to obtain materials, in what database information is shared, or which group member has information about a given task or decision. This is not only true about knowledge internal to the group but also knowledge of the environment. For example, boundary spanners in a group have knowledge about where to access external resources (Tushman, 1977).

Relational knowledge allows members to better access those resources that require interaction. Knowledge does not have to be about facts, but can be about how others in a team interact (a central aspect of transactive memory; Hollingshead, 1998). As groups interact, they learn more about each other. In subsequent interactions they have a better idea about not only who knows what, but also how others in the group might react. For example, Faraj and Sproull (2000) and Kraut et al. (2005) found evidence for increased performance and increased knowledge as teams spent more time together. This second form of knowledge mechanism functions through either being able to predict the needs of group members in a situation (implicit coordination; Rico et al., 2008), or having awareness of the how group and organizational members will react in a situation (Ren et al., 2006; Weick & Roberts, 1993). Both kinds of relational knowledge reduce task interaction time and errors. Relational knowledge also includes understanding how to "read" and interpret the other group members during interaction (i.e., interpreting nonverbal behaviors, paralinguistics, politics, network roles, and so forth), resulting in better understanding of each other and, ideally, better performance (Hollingshead, 1998). Even in groups with negative dynamics, knowledge of how others will react and interact can improve performance (Xia, Yuan, & Gay, 2009).

Proposition 9a: Interdependencies are positively associated with use of knowledge mechanisms.
Proposition 9a: Uncertainty is positively associated with greater use of knowledge mechanisms.
Proposition 10a: More resource knowledge is positively associated with greater extent of coordination.
Proposition 10b: More relational knowledge is positively associated with greater extent of coordination.
Proposition 11: Stored organizational coordinating mechanisms interact with resource knowledge such that higher levels of both lead to even higher extent of coordination.

Routines as Both Mechanism and Outcome of Coordination

Conceptualizations of routines are well established (see Becker, 2004). Routines are those patterns of action that emerge from interaction and that allow us to act with little to no conscious thought (Becker, 2004). They develop over time and become more deeply ingrained in minds and unconscious practice, to the point that actors not only enact them without much thought but also implicitly believe that other actors also are enacting them (Becker, 2004). Successful

routines embed the knowledge and organizational coordinating mechanisms necessary to accomplish tasks across individuals and organizational units.

Investigations have found that routines are more complex than originally thought, on several levels. Routines act as grammars for action rather than as a concrete guide (Pentland & Rueter, 1994). They function as grammars by specifying a broad range of possible actions within a context from which we unconsciously select parts that work together to enact the routine. In this way the routine enables and constrains action, but by its selection and use in interaction it is further established as routine. Routines also have been found to function at larger organizational levels than just the individual interaction or group interactions. Entire organizations enact routines without conscious member knowledge (Feldman & Pentland, 2003); once established they can promote stability, but also reduce organizational flexibility and innovativeness. Even at the organizational level, routines are (re)established through interaction and formalization into procedures and policies. As small changes occur to routines, they are adjusted and then retained for future enactment (Feldman, 2000). Routines, however, do not always function to improve processes and outcomes; sometimes the routines that are (re)established and reinforced through interaction end up working against some individual, group, or organizational goals, whether intentionally or not. Routines may both embed and reinforce dysfunctional interdependencies and coordination strategies, thus becoming *unusual routines*, leading to short- and long-term group and organizational negative consequences (Rice & Cooper, 2010). Further, unusual routines reinforce the original problem or biases, eventually routinizing those situations and processes. In general, unusual routines can be prevented or resolved by increased feedback, and feedback about the feedback (e.g., double-loop learning; see Rice & Cooper, 2010), involving both organizational mechanisms and knowledge mechanisms. However, CIM and relational knowledge may both be localized within the group generating the unusual routine, thus making it more difficult to identify and resolve the unusual routines. The routine seems locally beneficial, while being dysfunctional for or harming other groups' or the organization's processes and goals, yet without being identified or explained in SCM, SOCM, or resource knowledge.

Contingency/design theorists present routines as facilitating coordinated action by pre-specifying the sequences of tasks and who should perform them, thus reducing the need for workers to interact, and the cost of coordinating work (Tushman & Nadler, 1978). Grote et al. (2008) found that routines function as coordinating mechanisms by reducing the need for interaction (especially interaction about the interactions).

Proposition 12: Routines are established through consistent use of other mechanisms.

However, routines function as a coordinating mechanism through the subsequent reduced need for other coordinating mechanisms; thus:

Proposition 13a: Routines are positively associated with decreased group access to stored organizational coordinating mechanisms.

Proposition 13b: Routines function as a coordinating mechanism through the reduced need for interaction in situ.

Proposition 14: More cross-group interaction is positively associated with fewer unusual routines (presuming the unusual routine does not involve the group interaction itself).

Organizational Outcomes of Coordination

Beyond the three (re)produced outcomes of coordination (organizational mechanisms, knowledge mechanisms, and routines), the general and primary goal of coordination is to accomplish organization outcomes. These actual outcomes may be more or less expected, more or less intentional, and more or less positive. Expected, intentional, and positive goals are often confounded with coordination, with the logical understanding that a higher extent of coordination should result in more successful attainment of organizational goals. Organizational goals and thus expected outcomes can be either official, which are the understood purposes (from the perspective of the organization), or operative, which more closely represents the actual operating policies of the organization (Perrow, 1961). Operative goals do not necessarily align with official goals and may even run counter to them (a central assumption of agency theory; Eisenhardt, 1989). This is particularly salient when operative goals are examined on the group level or individual level. In these cases there may seem to be a high extent of coordination that manifests as alignment towards attaining an unofficial operative goal, but the net result would be unintended or unwanted outcomes (from the perspective of the organization; Perrow, 1961). Organizational goal outcomes also can be conceived of in terms of quality or quantity (Argote, 1982; Cheng, 1983, 1984). In his examination of Belgian academic departments, Cheng (1983) found that coordination was positively correlated with increases in both quality and quantity of outputs, but those correlations were moderated by uncertainty differently for the quality than the quantity relationships. As uncertainty increased, the correlation between coordination and quality became more positive, but the correlation between coordination and quantity became less positive. Finally, as discussed above, unusual routines may be an organizational outcome differentially desired, intended, or positive, depending on the organizational location and actors involved.

Proposition 15a: Extent of coordination may be associated with both quality and quantity of expected, intended, or positive organizational output.

Proposition 15b: Extent of coordination may also be associated with both quality and quantity of unexpected, unintended, or negative organizational output.

Figure 7.1 portrays the broad relationships among interdependencies, uncertainty, coordinating, coordinating mechanisms, coordination, and coordination outcomes, associated with these propositions.

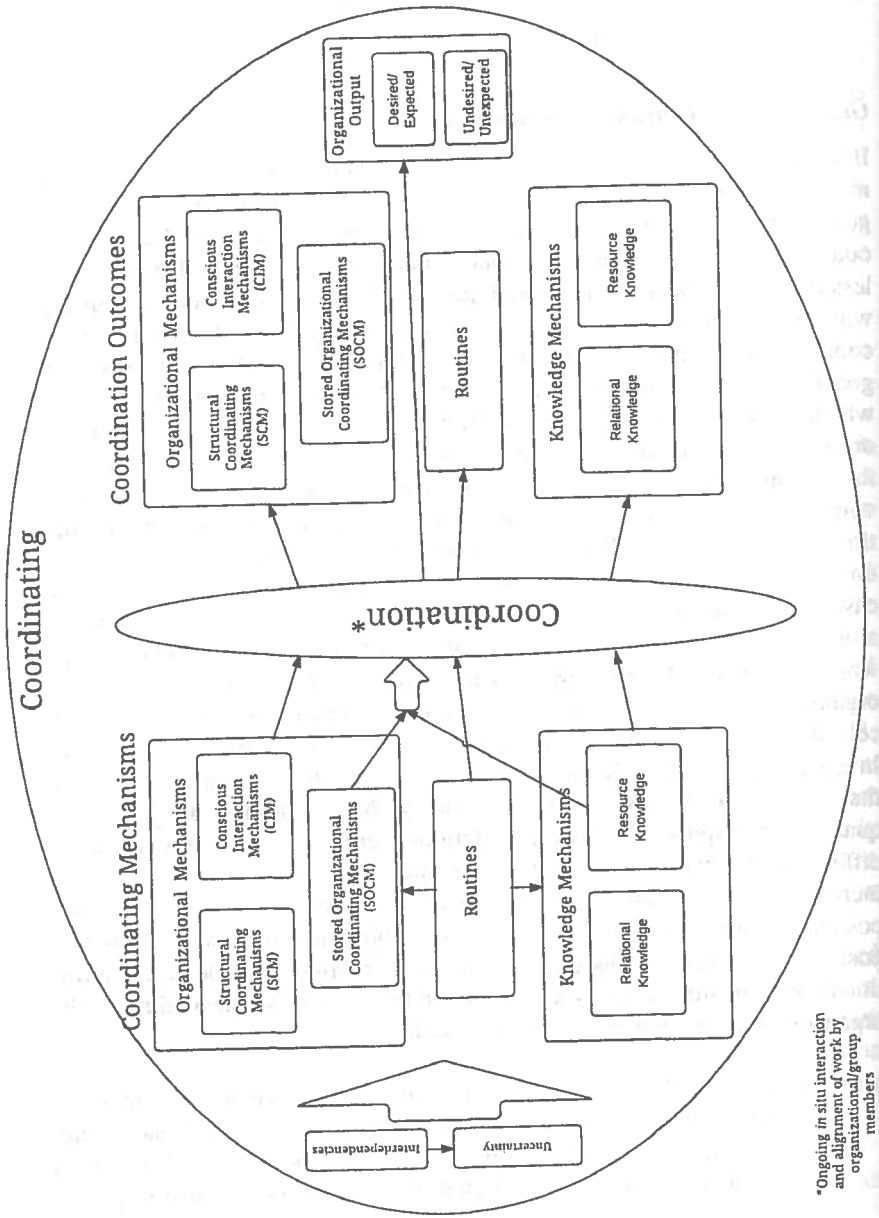

Figure 7.1 The relationships between the coordinating mechanisms and outcomes

Discussion

Agenda for Additional Organizational Coordination Research

Although there is an abundance of literature on organizational coordination, we have shown there is still much work to do. An obvious research goal at this time could be testing the current model in Figure 7.1 (a) to determine if the proposed overarching coordinating mechanisms are as inclusive as suggested, (b) to ascertain if the recursive nature of coordinating mechanism to coordination back to coordinating mechanisms is as strong as proposed, and (c) to more fully develop potential mediating variables as well as testing interaction effects.

Beyond testing the proposed model, opportunities abound for utilizing our perspective on organizational communication in other areas of interest to communication scholars in general and to organizational communication researchers in particular. These applications have the potential to advance, for example, coordination as energy-in-conversation (CEC) theory, coordinated management of meaning (CMM) theory, and the high reliability organizations (HRO) perspective. Each of these theories explicitly focuses on the importance, and nature, of coordination, communication, and meaning-making in organizations. Space constraints limit us to only going into detail on these few, but there are many others that could be informed by the current theoretical model, including speech act theories, uncertainty reduction theory, systems theory, and network theories, among others.

Coordination as energy-in-conversation (CEC). Quinn and Dutton (2005) develop a theory of coordination as energy-in-conversation. They identify conversations as the location of coordination in an organization and determine that conversations take energy, so the effort that people invest in a conversation towards coordination depends in part on the amount of energy that they either gain or spend from those conversations. Quinn and Dutton (2005) conceive of energy as texts in that "a person can read his or her own energy as a bodily signal that summarizes how desirable he or she perceives the situation to be and that people can read another person's expressions to interpret how much energy that person feels" (p. 43). With this in mind, they identify energy-in-conversation as a person's energy level (representative of their situational desirability), the interpretation of the energy level of the other participant (represented nonverbally), and a feeling of wanting to act and being capable of acting, all of which leads to the level of effort the person will invest in the conversation and its subsequent coordinative results.

Two obvious aspects of our model of coordination and communication relevant to CEC are *discursive consciousness* (organizational mechanisms) and *practical consciousness* (knowledge mechanisms). Existing SCM such as rules, roles and power structures affect possibilities for conversation and may

inhibit or foster appropriate energy-in-conversation, influencing the extent and nature of coordination. In turn, the extent to which people have appropriate energy-in-conversation and share interpretations of that help to create stored organizational coordinating mechanisms and conscious interaction mechanisms through interaction. The relational knowledge mechanism clearly would include organizational members' ability to interpret others' energy levels and whether certain individuals will be accessible for and committed to coordination interaction.

Coordinated management of meaning (CMM). The premise of CMM is that in interaction people may not have the same intentions for interaction or understandings of how they are attempting to create meaning, but that as "persons-in-conversation" they create bonds of union that co-construct a reality (whether that reality is helpful or not; Pearce & Pearce, 2000). Salmon and Faris (2006) examined professionals from a child and adolescent mental health service as they met with other agencies to coordinate on cases. They utilized a CMM frame to understand the complexity of the discourse involved and discover an understanding or at least work towards a common goal.

CMM can serve a dual role in consideration of our model of coordination and communication. First, CMM can be conceptualized as one of the forms of in-situ interaction that constitute and enable coordination. For example, mis-matched contextual levels or discourse assumptions during coordination interaction may create or reinforce subsequent unusual routines, such as treating certainty as uncertainty or vice versa. This has the effect of disfiguring structural coordinating mechanisms, allowing (un)conscious interaction mechanisms, and inappropriately applying stored organizational coordinating mechanisms, in turn activating inappropriate responses to uncertainties (or masking or creating difficult-to-identify interdependencies), thus weakening or misdirecting conscious interaction mechanisms efforts, and making subsequent successful coordination less likely. Hence, second, CMM itself is one kind of coordination activity (whether conscious or not) influenced by existing organizational and structural resources. Accessibility and relevance of structural coordinating mechanism relational knowledge resources would influence how participants coordinate and shape meaning during coordination.

High reliability organizations (HRO). Weick and Roberts (1993) offered a conception of the collective mind and heedful interrelating in a study of aircraft carrier flight deck crews. Typical construals of interdependencies and coordination did not seem to fit the context of these types of groups. The standard coordination literature examined groups that were concerned with productivity or efficiency, but did not examine reliability (Weick & Roberts, 1993). Groups such as deck flight crews, nuclear power plant operators, and shuttle crews have as their primary drive not just a task, but an incredibly

precise task that requires highly reliable interactions or the consequences could be catastrophic (Weick, Sutcliffe, & Obstfeld, 1999). Weick and Robert's (1993) examination of aircraft carrier flight crews and other high reliability organizations (HRO) unpacked these interactions. They determined that these groups utilize a different type of coordination that they identified as *collective mindfulness*. When a group of individuals working towards common goals enacts mindfulness, their individual interpretations and personal mindfulness combine into a collective mind that allows for a more precise awareness of situations and the environment (Weick & Roberts, 1993). Collective mindfulness includes five processes; a preoccupation with failure, a reluctance to simplify interpretations, sensitivity to operations, a commitment to resilience, and under-specification of structure (Weick et al., 1999).

A preoccupation with failure is unusual, particularly for these types of organizations, because failure is so rarely seen. Alternatively we may argue that it is exactly this preoccupation that generates and maintains a form of coordination that reduces the likelihood of failure. Possibility of failure is attended to in three ways in HROs. First, the expanded emphasis on failures increases the centrality of the maintenance departments of HROs as compared to other organizations, so that they become stronger and more salient structural coordinating mechanisms. The maintenance department has contact with the highest number of failures and maintains a database for learning, increasing stored organizational coordinating mechanisms. Second, HROs encourage the reporting of errors, thus reflexively self-structuring by creating a routine as a resource knowledge mechanism. They note a study by Landau and Chisholm (1995) that refers to a seaman on a nuclear aircraft carrier who loses a tool on deck and reports it. This reporting results in all airborne aircraft being redirected to ground landings until the tool can be located and the commendation of the seaman for reporting it, rather than condemnation. Finally, this preoccupation with failure leads to an attention to the failures inherent in continued success such as complacency, risk aversion, and inattention.

From our perspective, what may be considered as an undesired or unexpected organizational output (the identification and reporting of errors) becomes restructured, through aligning individual communication with HRO goals, and routinization, into a desired/expected output. What is typically seen as a source and form of uncertainty—error—is reconceptualized as a source of reducing future error by understanding interdependencies better. The crucial question here, then, is how both organizational mechanisms and knowledge mechanisms should be restructured to shape interactions and alignments within coordination to accomplish this transformation. For example, Weick et al. (1999) show that HROs redefine coordination through layered systems of checks and balances, adversarial reviews, job re-training and rotation, structural redundancies, and diverse views on their teams. Another approach identified by Weick et al. (1999) is attending to latent epistemic networks that only emerge when

expected interdependencies are disrupted or unwanted interdependences are revealed, and then dissipate once the problem has been solved. Before routines are reconstituted, these typically unknown relational knowledge mechanisms should be understood and routinized into conscious interaction mechanisms and stored organizational coordinating mechanisms.

Contributions

We began by identifying four issues in the organizational coordination literature: (a) coordination is typically not explicitly defined, conceptually or operationally, (b) proposed types of coordination overlap or contradict each other, (c) coordination is treated as a secondary aspect rather than as a central concern; and (d) what is arguably a distinctive communicative phenomenon requires more attention by communication researchers. Here we summarize our proposed resolutions of these issues, providing the foundation for our model and propositions.

Coordinating, coordinating mechanisms, and coordination are distinct concepts. Our conceptual definitions of coordinating as the overarching process, coordinating mechanisms as the structures that are brought to bear, and coordination as the in situ interaction, allow for a more precise and distinct view of components of organizational coordinating. In clearly distinguishing between coordinating mechanisms and coordination, many of the terms that were identified as coordination have been reframed as coordinating mechanisms (e.g., expertise, tacit knowledge, implicit coordination).

Distinct coordinating mechanisms represent structurational levels of consciousness. Coordinating mechanisms in the literature were reframed using structuration levels of consciousness as organizational (discursive level), knowledge (practical level), and routines (unconscious level). The conceptual distinctions between coordinating, coordinating mechanisms, and coordination, and among types of coordinating mechanisms enable a specific view of how types of coordination and mechanisms proposed by others interrelate, and provide the basis for a more parsimonious model of organizational coordination and communication.

Coordination is a central concern. Our third task was to highlight the central role of coordination in organizational structuration. By applying a structurational approach toward coordination as influenced both by coordinating mechanisms and through interaction (re)creating those very mechanisms, we place coordination at the core of the process. The proposed model does so in four ways. First, it highlights the distinct levels of consciousness as mechanisms, allows a reframing of them as possessing distinct aspects of organizational

structure, and enables tests of the ways that they might interpenetrate in interaction (coordination). Second, it informs our understanding of structuration via the proposed recursive nature of organizational coordinating. By placing specific mechanisms as the structure (coordinating mechanisms), and offering a conceptual context in which to examine the ways in which practice (re)creates those structures, it encourages further investigation of structuration. Third, it proposes rules and resources as being closely aligned with the distinct levels of consciousness. Fourth, it proposes how coordinating, coordinating mechanisms, coordination, and outcomes are interrelated.

Coordination is a communicative phenomenon. We theorize coordination as a fundamentally communicative phenomenon. Without communication, no shared meaning could emerge and no coordinating mechanisms could be created or applied. At the micro level, activity coordination, the third communication flow identified by McPhee and Zaug (2000), underscores the interactive nature of coordination. Activity coordination specifically identifies the interactive nature of organizational members as they adjust to germane acts of others and to the constraints of the situation. At the macro level, a structuration lens underscores the whole of organizational coordination as communicative. As proposed in McPhee and Zaug's (2008) fourth communication flow, institutional positioning, organizations are positioned within a larger context and the relationships between the organization and its context are managed through communication. This framing within a larger context occurs with coordination, but it is nested within the organization, so that coordination occurs as part of the negotiation of positioning. The final point at which organizational coordination is better elucidated by utilizing an organizational communication lens is at the connection of structure and practice. Much previous work has focused on structures, process, or outcomes. However, by utilizing the concept of the duality of structure we note not only specific aspects of organizational coordination—structures, coordination, or outputs—but also see the ways they interconnect through communication. Coordinating mechanisms (structures) are brought to bear on coordination (practice/process) through communication, and through communicative interaction those very structures can be (re)created.

Conclusion

This work is intended to enrich our understanding of coordination, to expand organizational communication research into an area that is rich with possibilities, and to illuminate structuration. Though there has been significant research on organizational coordination, we conceptualize organizational coordination in more concrete and simple ways that should make further progress and

understanding easier. And there is a dearth of organizational coordination research from a communication perspective. Our model elucidates not only the ways that the study of coordination can benefit from a communicative lens, but also the depth of material that communication scholars have available to mine. Finally, in linking communication, coordination, and structuration, we have shown ways that our understanding of structuration theory is strengthened through the investigation of coordination.

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