

Improvisation and Innovative Performance in Teams

Dusya Vera

Department of Management, C.T. Bauer College of Business, University of Houston, 334 Melcher Hall,
Houston, Texas 77204, dvera@uh.edu

Mary Crossan

Strategic Management Group, Richard Ivey School of Business, University of Western Ontario,
London, Ontario, Canada N6A 3K7, mcrossan@ivey.ca

This paper builds on the principles and insights from improvisational theater to unpack the nature of collective improvisation and to consider what it takes to do it well and to innovate. Furthermore, we discuss the role of training in enhancing the incidence and effectiveness of improvisation. We propose that two common misconceptions about improvisation have hindered managers' understanding of how to develop the improvisational skill. First, the spontaneous facet of improvisation tends to be overemphasized, and second, there is a general assumption that improvisation always leads to positive performance. Our goal is to clear up the conceptual confusion about improvisation by laying out the various aspects of preparation that are required for effective improvisation. In our theoretical model, we delineate how the improvisational theater principles of "practice," "collaboration," "agree, accept, and add," "be present in the moment," and "draw on reincorporation and ready-mades" can be used to understand what it takes to improvise well in work teams and to create a context favoring these efforts. Our findings support a contingent view of the impact of improvisation on innovative performance. Improvisation is not inherently good or bad; however, improvisation has a positive effect on team innovation when combined with team and contextual moderating factors. We also provide initial evidence suggesting that the improvisational skill can be learned by organizational members through training. Our results shed light on the opportunities provided by training in improvisation and on the challenges of creating behavioral change going beyond the individual to the team and, ultimately, to the organization.

Key words: improvisation; creativity; spontaneity; performance; innovation; strategy; improvisational theater; teams

The ability to innovate is critical for organizational survival (Amabile 1988). As firms strive for faster cycle times and more innovative solutions, the spontaneous and creative facets of improvisation have been proposed as a pathway to understand and begin acting on what it takes to innovate (Crossan 1997a). In fact, the role of improvisation in innovation processes such as new product development has attracted growing attention (e.g., Eisenhardt and Tabrizi 1995, Moorman and Miner 1998b, Kamoche and Cunha 2001). Brown and Eisenhardt (1998, p. 33) argue that improvisation "enables managers to continuously and creatively adjust to change and to consistently move products and services out the door," and Poolton and Ismail (2000) identify improvisation as a key area of new development in the innovation field.

In an effort to understand how individuals work together in teams to innovate and adapt in real time, academics have turned to improvisational jazz and theater (e.g., Crossan 1998, Hatch 1998) and asked: If musicians and actors can learn to improvise and to be innovative in real time, can these skills also be learned by work teams in organizations? Despite the considerable attention given to the need for teams to be more nimble and to develop an improvisational capability, little is known about how team members can learn this skill

and successfully apply it in organizations. Furthermore, for training in improvisation to be successful, firms need to create a safe context for improvisation to not only happen, but to be effective (Crossan and Sorrenti 1997). Training interventions have been designed for business organizations based on exercises used by actors in the world of improvisational theater (e.g., Crossan 1997b), but limited theoretical work is available on what it takes to develop this skill. Also, there is a lack of empirical evidence supporting the success of any improvisational training effort.

We believe that two common misconceptions about improvisation have hindered managers' understanding of how to develop the improvisational skill in work teams. First, the spontaneous facet of improvisation tends to be overemphasized in the extant literature. When improvisation is restricted to the ability to "think on your feet," managers risk confusing improvisation with random moments of brilliance and conclude that either you have this ability or you do not. There is, however, much preparation and study behind effective improvisation (Weick 1998). Improvisation relies on rules and routines that are preestablished and rehearsed. In improvisation, it is possible to "prepare to be spontaneous" (Barrett 1998, p. 606) and to "rehearse spontaneity" (Mirvis 1998, p. 587). Second, there is a general assumption in

much of the literature that improvisation always leads to positive outcomes and better performance. This assumption is reinforced when improvisation is defined as “to cope or ingeniously adapt to a set of circumstances” (Preston 1991, p. 88) or as “devising resourceful solutions to intractable problems” (Meyer 1998, p. 572). When improvisation is positioned as a solution to all organizational problems, managers risk underestimating the need to create a context that supports improvisational processes in work teams. Improvisation is not inherently good or bad (Vera and Crossan 2004). Depending on the skill of the improvisers, improvisation may be highly innovative or chaotic; improvisation may solve a problem or worsen it. Efforts to train teams to improvise need to be based on a realistic understanding of what improvisation is, and what it is not.

The objective of this paper is to clear up the conceptual confusion about improvisation by laying out in detail the various aspects of preparation that are entailed in effective improvisation. We seek to advance understanding of the performance implications of improvisation by unpacking what collective improvisation is (descriptive view) and by examining team and contextual factors that help improvisational processes to be effective and positively impact innovation (prescriptive view). Furthermore, we discuss and test the role of training in enhancing the effectiveness of improvisation.

This paper focuses on collective improvisation occurring in firms, that is, improvisation by work teams. Research on the ability to learn the improvisational skill will not only contribute to the body of knowledge on improvisation, but also inform efforts to enhance training for team innovation. Recent reviews highlight that most innovation research has focused on individual employee innovation, noting the need to understand how teams within organizations can facilitate or inhibit innovation (e.g., Drach-Zahavy and Somech 2001, Caldwell and O’Reilly 2003, Shalley et al. 2004). West (1994) also stresses the importance of training in innovation and states that it is not sufficient to put a team together and expect it to function effectively and to innovate. Understanding what team improvisation entails will shed light on team innovation processes, in which the initiation and implementation phases overlap in time (West 1990). We begin by defining what collective improvisation is, and what it takes to do it well and to innovate. In doing so, we discuss the training effect on improvisation performance. We then describe our methods, site, and results. Finally, we summarize the contributions of this research.

The Skill and Context of Improvisation

Improvisation theory is largely based on insights obtained from jazz and theater improvisation (e.g., *Organization Science’s* Special Issue on Jazz Improvisation, 1998). There have been detailed expositions about the

similarities and differences between improvisation in jazz, theater, and other metaphors such as Indian music (see Hatch 1997, Kamoche et al. 2003). Although we build on theory arising from jazz improvisation, we rely more heavily on insights from improvisational theater for its value-added benefits of accessibility, transferability, and universality. The theater metaphor is transparent and accessible because the elements from which actors improvise are the same ones used by teams in their daily work. To understand jazz, we need specialized musical knowledge (e.g., concepts such as head, chords, melody, tones, and tempo), whereas theater improvisation is based on speech, gestures, and movement, which are the materials of everyday interaction (Lawrence 2001). Lessons from theater improvisation are transferable because the raw materials used in theater improvisation are words, posture, facial expressions, and tone of voice (in contrast to the musical notes of jazz improvisation). Therefore, anyone possesses a certain capability to experience and learn from theater improvisation. Furthermore, while jazz is rooted in specific cultural traditions, dramatic expression is a universal and timeless phenomenon. The form of theater may vary across time and culture, but theater always interprets real life. Because the focus of this study is on the ability to learn the improvisation skill, we take advantage of the accessibility and transferability that theater provides to shed new light on the factors that support improvisational actions.

Prior management research has examined the occurrence of improvisation at different levels of analysis. For example, Weick (1993) describes the individual actions of a firefighter improvising to save his life in the Mann Gulch disaster. Teams of individuals also improvise as shown by Hutchins’s (1991) description of how the crew of a ship whose navigational system had broken developed new routines in real time and made their way to harbor. In the process, no crew member understood the complete system they improvised, but their collective actions enabled them to achieve their goal. Evidence of team improvisation in the context of the arts, sports, and organizational life has led researchers to conclude that although collective improvisation builds on individual improvisation, team improvisation is more than the sum of individual improvisations because the joint activities of individuals create a collective system of improvisational action (Hatch 1997, Moorman and Miner 1998a, Weick 1998). While team improvisation is clearly a function of the improvisational capability of individuals in the team, team improvisation is also influenced by factors such as team characteristics (e.g., cohesiveness), team dynamics (e.g., communication), and contextual influences stemming from the team and the organization (e.g., culture). Some theorists have characterized organization-level improvisation as large-scale team improvisation (Moorman and Miner 1998a, Cunha et al. 1999), while

others build on the view of organizations as cultural entities (Cook and Yanow 1993) and relate organization improvisation to culture and strategy (Crossan 1997a). Our focus is on team-level improvisation as it presents qualities that are distinct from individual improvisation. However, the team level provides an essential building block for organizational improvisation.

Finally, there are different degrees of improvisation (Weick 1998, Zack 2000). Although much has been written about improvisation in crisis situations, where time is an obvious scarce resource and spontaneity is at a premium, improvisation has also been associated with everyday situations of discovery (Crossan et al. 2005). For example, Orlikowski (1996) describes how the everyday improvisations and slippages of customer support specialists adopting a new technology facilitated the slow transformation of their organizational practices. Teams improvise to incremental degrees when they make an adjustment to a standard operating procedure, while radical cases of improvisation have often been associated with crisis events. We examine improvisation as it occurs across the full spectrum of the continuum and do not differentiate between incremental and radical improvisation.

Collective Improvisation as “Making Do” and “Letting Go”

In the context of theater, Halpern et al. (1994, pp. 13–14) argue that “true improvisation is getting on-stage and performing without any preparation or planning,” and that “improvisation is making it up as you go along.” Frost and Yarrow (1990, p. 2) describe the essence of improvisation in drama:

Improvisation may be close to pure “creativity”—or perhaps more accurately to creative organization, the way in which we respond to and give shape to our world. The process is the same whenever we make a new arrangement of the information we have, and produce a recipe, a theory, or a poem. The difference with doing it *à l'improviste*, or *all'improvviso*, is that the attention is focused on the precise moment when things take shape.

Seham (2001) effectively captures the many definitions of theater improvisation when she states that improvisation is a mixture of “making do” and “letting go.” In applying theater or jazz improvisation to organizations, theorists have suggested a variety of definitions and dimensions (e.g., Preston 1991, Crossan and Sorrenti 1997, Hatch 1997, Moorman and Miner 1998a, Weick 1998, Cunha et al. 1999). For example, improvisation has been defined as “intuition guiding action in a spontaneous way” (Crossan and Sorrenti 1997, p. 156), “the degree to which composition and execution converge in time” (Moorman and Miner 1998a, p. 698), and “the conception of action as it unfolds...drawing on available material, cognitive, affective, and social resources” (Cunha et al. 1999, p. 302). Many definitions

tend to blend prescriptive and descriptive elements, largely because management theorists have borrowed so heavily from descriptions of improvisation in the arts in which “effectiveness” and “quality of performance” have been embedded in the phenomenon. We extract the descriptive elements of spontaneity and creativity, defining improvisation occurring in teams as the creative and spontaneous process of trying to achieve an objective in a new way. As a spontaneous process, improvisation is extemporaneous. In fact, Weick (1998, p. 552) suggests that “to do things spontaneously is to become more skilled at thinking on your feet.” The spontaneous—“letting go”—dimension incorporates a time orientation to the improvisation construct; individuals respond to situations on the spur of the moment, reacting in the moment rather than anticipating, or composing while executing (Moorman and Miner 1998b). In addition, the creative—“making do”—dimension incorporates the search for novelty and usefulness in improvisational actions, but acknowledges that a creative process does not always lead to creative outcomes (Drazin et al. 1999, Gilson and Shalley 2004). By defining improvisation as a creative process, the focus is not on the creative outcome that is novel and useful but on *how* teams “attempt to orient themselves to, and take creative action in, situations or events that are complex, ambiguous, and ill defined” (Drazin et al. 1999, p. 287). Finally, our definition also highlights improvisation as a conscious choice people make rather than as random behavior. The decision to improvise may be made on the spot or may be an option considered in advance, as when firms have formal or informal norms enabling people to depart from routines at certain times to come up with something new. Intentional improvisation can be observed, for example, in a research and development (R&D) team improvising to prototype a new product on time. In this case, team members knowingly decide to engage in an extemporaneous process and try to achieve an objective in a new way—new, at least, to them.

By focusing on the creative process and not on the creative outcome, an advantage of our definition of improvisation is that it does not make any judgment about the performance implications of improvisational processes. Miner et al. (2001) differentiate improvisation from creativity and innovation by arguing that creativity may involve absolutely no improvisation and that innovation may be created through improvisation, but also through planning. It is the spontaneity and real-time nature of the action that differentiates creativity and innovation from improvisation. Furthermore, innovation is output oriented and defined as “the successful implementation of creative ideas within an organization” (Amabile 1996, p. 1). Given the process orientation of our improvisation construct, the basic premise of our theory is that *improvisation per se is not associated with innovative outcomes*. Consequently, we do

not hypothesize a main effect between improvisation and innovation. Rather, there are several dimensions that impact the effectiveness of improvisation and its link to innovative outcomes.

Team Skills for Effective Improvisation

Experienced actors make improvisation look easy and natural. However, many hours of practice and a repertoire of rules help improvisers to focus on the process of creation without becoming overwhelmed by the pressure of extemporaneous performance (Lawrence 2001). In fact, much discipline and practice stand behind a successful theater performance. As Halpern et al. (1994, p. 34) argue, “Anyone can improvise, but like any game, if the players don’t learn and obey the rules, no one will play with them.” Improvisation is in essence unpredictable, but that does not mean that it is without considerable human infrastructure; practice, expertise, and knowledge of the rules of collaboration enable team members, both in theater and in firms, to influence the quality of their improvisational processes. The following sections present the key dimensions of effective improvisation that lead to innovation.

Expertise. In improvisational theater, actors know in advance that when the time of the performance arrives, they will improvise. Consequently, actors “plan to improvise” and continuously work on improving their improvisational ability. Weick (1998) worries that, because of the emphasis on spontaneity, researchers may overlook the major investment in practice and study that precedes a stunning jazz performance. The observer may be unaware that jazz musicians have many years of experience learning the instrument, the standards, how to play together, how to blend a sound, etc. Similarly, improvisational actors learn exercises to develop the fundamental skills of listening and communication (Crossan 1998). They also need context-specific knowledge in diverse areas such as politics, history, and music, so that they can take on a variety of roles (Vera and Crossan 2004). Players do not know the suggestions that they will receive from the audience and from fellow actors; thus, the more expertise they develop in diverse topics, the more options they will have when accepting a new role.

As in theater, expertise also plays a positive role in improvisational processes in work teams. *Expertise* encompasses the specialized skills and knowledge that individuals bring to the team’s task (Faraj and Sproull 2000) and is defined as domain-relevant and task-related skills that depend on innate cognitive abilities, innate perceptual skills, experience, and formal and informal education (Amabile 1996). When discussing creative processes, Amabile (1996, p. 95) explains, “If the domain-relevant skills are already sufficiently rich to afford an ample set of possible pathways to explore during task engagement, the reactivation of this

already-stored set of information and algorithms may be almost instantaneous, occupying little real time.” Expertise has a positive impact on the quality of improvisational processes because with a larger and more diverse set of skills in a work team come more alternatives for developing new combinations of ideas (Vera and Crossan 2004).

HYPOTHESIS 1. *The greater the team’s expertise (domain- and task-relevant), the more positive the relationship between collective improvisation and innovation.*

Teamwork Quality. In addition to practice and expertise, the rule of collaboration between players is frequently taken for granted when describing collective improvisation. Team improvisation is not just a function of having the “right” expertise on the team. Expertise must be coordinated within the team; its interdependencies must be managed effectively (Faraj and Sproull 2000). The success of improvisational theater performances depends on healthy team relationships and dynamics because scenes evolve from the interdependent work of the improvisers (Spolin 1963). This is consistent with Frost and Yarrow’s (1990, p. 108) description of the first cardinal sin of improvisation: “The actors mustn’t be left stranded.” On the stage, every member of the team is responsible for the other; actors look after one another and take the pressure off of each other rather than increase it (Frost and Yarrow 1990). The emerging performance is a truly collaborative creation that cannot be understood by simply analyzing the members of the team individually (Sawyer 1999). Teamwork skills associated with quality improvisation include trust among players, a common goal, a shared responsibility, a common vocabulary, and the ability both to lead and to follow (Crossan 1998). Halpern et al. (1994, p. 92) summarize these team relationships:

When a team of improvisers pays close attention to each other, hearing and remembering everything, and respecting all that they hear, a group mind forms. The goal of this phenomenon is to connect the information created out of group ideas—and it’s easily capable of brilliance.

The collaboration needed for innovative team improvisation is based on both cognitive and affective factors. On the cognitive side, when improvisers share a collective mind or mental model, this enables better coordination when trying to come up with something new. Weick and Roberts (1993) conceptualize a collective mind as a pattern of heedful interrelations of actions in a social system, and Cannon-Bowers et al. (1993) describe a team mental model as including shared representations of tasks, equipment, working relationships, and situations. Shared mental models provide team members with a set of organized expectations for team performance. Under conditions of high workload or stress,

highly effective teams are able to adapt to and anticipate other members' information needs because of a shared understanding of the situation, the environment, and team interaction patterns (Cannon-Bowers and Salas 1998). Another concept that helps to explain the coordination among team members is that of transactive memory, defined by Wegner (1987) as the set of knowledge possessed by team members, coupled with an awareness of who knows what. In fact, transactive memory is an implicit part of the improvisational technique of *rotational leadership*, which means that actors let different people take the lead depending on the needs of the situation. Knowing who has what knowledge or skill in the team is instrumental when teams face new situations. As team members develop the ability to work together smoothly, they face less need for planning, greater cooperation, fewer misunderstandings, and less confusion (Liang et al. 1995).

In addition to the cognitive aspects of collaboration, effective improvisation builds on affective factors such as trust, respect, and mutual support. Although teams may improvise in the absence of trust and respect, improvisation thrives in their presence because team members know they can take risks and be supported by others (Crossan 1998). Given the unpredictable nature of improvisation, trust among team members reinforces the belief that the collective improvisational process will achieve its objective. Healthy and close team relationships are, however, not necessarily easy to develop because competition, power, and status are often important factors affecting team dynamics. Yet, the principle of collaboration has important implications for cooperation, teamwork quality, balance in member contributions in work teams, and the effectiveness of collective improvisation.

HYPOTHESIS 2. The greater the teamwork quality (e.g., cooperation and trust), the more positive the relationship between collective improvisation and innovation.

The Context for Effective Improvisation

Improvisational processes in teams require a context that supports their creative and spontaneous nature. Johnstone (1979, p. 118) refers to his experience in teaching theatrical improvisation: "If I want people to free-associate, then I have to create an environment in which they aren't going to be punished, or in any way held responsible for the things their imagination gives them." To ensure this environment, actors rely on the principle of "agree, accept, and add." Improvisers also learn to read the cues from their environment and to "make do" with whatever they have at hand (Weick 1993). This is captured in two rules: "be present in the moment," and "draw on reincorporation and readymades" (Johnstone 1979). In the next sections we build

on these theatrical principles to delineate the team context and resources supporting an improvisational capability that leads to innovation.

Experimental Culture: "Agree, Accept, and Add." Halpern et al. (1994, p. 35) state, "Anything can happen in improv. The only rule that can never be broken is the rule of agreement." This rule is captured in the popular technique of "yes-anding." To *yes-and* means that actors accept the offer made to them and build on it. This is consistent with Frost and Yarrow's (1990, p. 110) description of the second cardinal sin of improvisation: "Blocking is a denial of the possibility of encounter." The rule of agreement creates a context in which improvisers are required to accept, support, and enhance the ideas expressed by other actors on stage without denying a player's reality (Seham 2001). Blocking the ideas of others is considered a form of aggression (Johnstone 1979) because answering "yes, but" or "no" erases any scene being created (Halpern et al. 1994). Because of the principle of agreement, actors know that their context supports experimentation, that their actions are not being judged by fellow players, and that nothing is seen as a mistake. In this context, they can stretch a little further than they have before (Crossan 1998).

Firms interested in promoting innovation need to incorporate the rule of agreement as a norm of their organizational and team cultures. Team cultural norms are not isolated from the organizational culture, but are also not dominated by it. Although some organizational culture theory claims that culture is created by the firm's founder and its top executives (e.g., Schein 1992), authors such as Kunda (1992) have found that lower-level employees are not without agency and often question the authenticity of the beliefs and emotions promoted by the engineers of culture. The result is the creation of subcultures and countercultures (e.g., Martin and Siehl 1983). In addition, Gregory (1983) proposes that organizations are most accurately viewed as "multicultural," not only including subcultures such as departmental or project cultures, but also occupational cultures that cross-cut several firms.

The norm of agreement is critical for the creation of an experimental culture in teams, which is defined as a culture that provides room for experimentation and is tolerant of "competent" mistakes (Vera and Crossan 2004). Low levels of experimentation and low tolerance for mistakes represent cultures that pursue efficiency over effectiveness and exploitation over exploration (Crossan and Hurst 2003). In contrast, high levels of experimentation and tolerance for error are not associated with blind risk taking and lack of discipline, but represent a culture that promotes action as opposed to reflection as a way to understand and deal with reality (Cunha et al. 1999) and where boundaries and minimal constraints are defined so that experimentation can occur.

An experimental culture not only promotes the use of improvisation skills by motivating team members to risk the “four Cs” (the desire to be competent, comfortable, consistent, and confident, i.e., Claxton 1984, Crossan and Sorrenti 1997), but also provides them with the resources (e.g., time, people, and money) that enable improvisational efforts to be successful. This context is critical for innovation because, as stated by Caldwell and O’Reilly (2003, p. 500), “innovation is largely unpredictable and requires flexibility, opportunism, and adaptability. The fact that innovation demands creative, nonroutine responses makes it difficult to design a priori programmed actions that will lead to innovation.” Caldwell and O’Reilly (2003) found that support for risk taking and tolerance of mistakes were two cultural norms that promoted behaviors associated with innovation. When team members perceive their environment as interpersonally nonthreatening and tolerant of, or even supportive of, taking risks and trying new approaches, higher levels of psychological safety and engagement in innovative processes, such as improvisation, ensue (e.g., West 1990, Edmondson 1999, Gilson and Shalley 2004). The Post-It Note discovery at 3M is an example of a culture that offered people time to experiment and try new things. A mistake by a 3M researcher was “yes-anded” by another researcher, who considered the use of the “failed” adhesive in keeping pieces of scrap paper from falling out of his choir book (Fry 1987). Several iterations of “yes-anding” among 3M researchers led to the Post-It Notes we use today.

HYPOTHESIS 3. *The more experimental a team’s culture, the more positive the relationship between collective improvisation and innovation.*

Real-Time Information and Communication: “*Be Present in the Moment.*” A basic rule of improvisational theater requires players to be attentive to what is happening around them, to be “present” and alert (Spolin 1963, Johnstone 1979). When developing a common story in the moment, a lack of attention and alertness to the information coming from fellow players and the audience leads to contradictory actions, conflict, and frustration of both the actors and audience. If a player is planning ahead and thinking about the direction he or she wants the action to go, then the actor is not paying attention to what is going on in the moment and will miss opportunities for discovery (Halpern et al. 1994). Frost and Yarrow (1990, p. 100) summarize the principle of “presence” in improvising:

“Presence” means the performer is fully *there*, “present,” in the present tense, inside the moment. His attention is wholly on the task and yet, most important, his awareness extends beyond the immediate space around him to include the audience’s space.

Organizations and work teams that want to become more improvisational need to learn to be attentive and

alert to what is happening in the *now* of the firm. This requires an infrastructure that provides teams with relevant real-time information from their context—within their team and inside or outside of their firm. *Real-time information* is defined as information about a firm’s operations or environment for which there is little or no time lag between occurrence and reporting (Eisenhardt 1989, Eisenhardt and Tabrizi 1995); it enables *real-time communication*—that is, the interaction within and between teams based on timely information (Brown and Eisenhardt 1998). A low level in this variable means that real-time information and communication is infrequent and that teams primarily know about their specific step in the process, but are not well aware of what is happening in the environment or in the rest of the firm. High levels of real-time information and communication are not to be understood as random or chaotic; they mean that communication is fluid and flows are wide-ranging and focused on operating information.

Research on team innovation has mentioned open information sharing and communication as a critical aspect to achieve high levels of participation in innovation processes in teams (West 1990, Agrell and Gustafson 1996). When teams feel they lack updated information, the risks of engaging in the creative and spontaneous process of improvising seem too high. Being aware of what is happening facilitates improvisation because up-to-date information can replace the coordinating role of a plan and provide teams with immediate feedback about the consequences of their actions as they improvise (Moorman and Miner 1998b, Cunha et al. 1999). This is consistent with Eisenhardt’s (1989) findings concerning fast decision making; she argues that top managers attending to real-time information are actually developing their intuition, which enables executive teams to react quickly and accurately to changes in their environment.

HYPOTHESIS 4. *The greater the team’s level of real-time information and communication, the more positive the relationship between collective improvisation and innovation.*

Memory: “*Draw on Reincorporation and Ready-Mades.*” Johnstone (1979) emphasizes two narrative skills improvisers need to develop: free association and reincorporation. Frost and Yarrow (1990, p. 134) sum them up: “Free association takes care of invention and development; reincorporation takes care of structure.” That is, while free association reflects the basic nature of improvisation as creative and spontaneous, the skill of reincorporation reminds players that improvisation does not mean “anything goes,” and that creating a coherent scene requires them to remember and reincorporate what has already been introduced in the past. This principle refers to both the troupe’s memory of the current performance and the lessons from previous

performances. Indeed, all improvisers draw on ready-mades (e.g., short motifs or clichés) as they create their novel stories (Sawyer 2000). The improvisational troupe develops memory about scenes created in the past that actors can recombine in present improvisations (Vera and Crossan 2004). For example, improvisation groups such as Second City have planned sets that they know work, around which they build their spontaneous sets (Crossan 1998).

Work teams interested in improving their ability to improvise need to store ready-mades or routines, make them accessible, and learn to draw on them and reincorporate them while improvising. In firms, ready-mades and the principle of reincorporation are translated into the notion of organizational or team memory—“stored information from an organization’s history that can be brought to bear on present decisions” (Walsh and Rivera 1991, p. 61). Memory includes declarative and procedural knowledge stored in the systems, structure, strategy, culture, rules, and procedures (Crossan et al. 1999). These knowledge depositories exist not only at the organizational level, but also at the team level. Transactive memory, for example, acts as a storage device in which teams, based on their shared experiences, encode, store, and retrieve relevant information together (Liang et al. 1995).

The role of memory in improvising is paradoxical. Memory may impede the incidence of improvisation when team members deal with novel situations by simply replicating past routines. However, when teams actually engage in improvisation, memory becomes a helpful resource for them because improvisation is frequently the result of the creative recombination of previously successful routines of knowledge and action (Weick 1993, Moorman and Miner 1998a, Miner et al. 2001). Access to diverse memory resources helps teams to improvise more effective and innovative solutions than they would with a lack of, or a limited pool of, institutionalized knowledge (Vera and Crossan 2004). In the Honda case, for example, the management team could quickly improvise a novel strategy to introduce 50cc bikes into the U.S. market by creatively recombining Honda’s repertoire of routines with previous experiences in marketing and sales in different countries (Pascale 1984).

HYPOTHESIS 5. The greater the team’s level of memory (e.g., procedures and systems), the more positive the relationship between collective improvisation and innovation.

Training. Building on the practice of theater, our last hypothesis is that organizational members cannot only learn from the principles of theater and translate them to organizational life, but they can improve the effectiveness of their improvisational process through training that addresses the elements needed to improvise well

(creativity, spontaneity, expertise, and teamwork quality) and the creation of a context that supports improvisation (an experimental culture, real-time information and communication, and memory). Indeed, Spolin’s (1963, p. 1) motto was “Everyone can act. Everyone can improvise.” She exemplified this when teaching improvisational games not only to actors, but to children and to illiterate immigrants in community work. Much research supports the idea that individuals can learn to be more spontaneous and creative (e.g., De Bono 1973, Gardner 1982, Amabile 1996, Sternberg 1999). However, this is not an easy task because, as Johnstone (1979, p. 77) argues, “Most children can operate in a creative way until they’re 11 or 12, when suddenly they lose their spontaneity, and produce imitations of ‘adult art.’” Nevertheless, theater has shown that individual potentialities to be spontaneous and creative can be rediscovered and developed through exercises. Johnstone (1979, p. 10) summarizes this thinking:

You are not imaginatively impotent until you are dead; you are only frozen up. Switch off the no-saying intellect and welcome the unconscious as a friend; it will lead you to places you never dreamed of, and produce results more “original” than anything you could achieve by aiming at originality.

In organizational settings, training in improvisation needs to start by developing an understanding of what improvisation is and positioning it as a legitimate and even recommended choice when facing circumstances of urgency, ambiguity, and uncertainty (Crossan et al. 2005). Crossan and Sorrenti (1997, p. 174) emphasize this point when they mention that “without an awareness of the need for improvisation, or an understanding of what it entails, there will be little motivation to engage it.” As discussed earlier, in addition to developing awareness, training in improvisation includes exercises aimed to develop process skills such as listening and communication, context-specific knowledge, a perspective and a context enabling team members to go out of their comfort zone, and techniques to promote “yes-anding” and develop shared responsibility in teams (Crossan 1998). The goal of the training is to increase the ability of individuals and teams to improvise well and their motivation to rely more on spontaneous and creative actions, when required by the situation.

HYPOTHESIS 6. Training will increase the incidence of improvisation.

Methods

Research Setting and Data Collection

This study was conducted in a large municipal setting, which we refer to as the “City.” Top management was interested in an improvisation intervention, which involved 25 work teams (175 employees) and

was provided with an external training consultant. We obtained authorization from the City and the training consultant to invite the teams in the training to participate in this study. The City also authorized an additional 25 work teams (173 individuals) to be invited to take part in the research. Random assignment of the teams to the training was pursued with a few exceptions given the time restrictions of some of the teams (e.g., teams going through particular periods of high workload). The selection of all targeted teams was made in coordination with a panel of three senior City executives familiar with the work of the corporation. All targeted teams worked in an environment where improvisation was likely to occur—that is, in jobs with direct contact with external customers or jobs in which teams dealt with one or more of the following: unexpected or novel events, resource scarcity, and urgency. Our panel confirmed that, in all teams, members were interdependent in their tasks.

Pretest surveys (before the training) and follow-up surveys (two months after the training) were distributed through the City's internal mailing system to the potential respondents, who were instructed to put the completed questionnaire in a return envelope addressed to the researchers. The respondents were advised that the surveys were number coded because we needed to match the responses of the pretest and follow-up surveys, but that their responses would be revealed only to the researchers. The company received summary statistics of aggregated data. We collected data from two sources: the team members and their supervisors. Team members filled out a survey that included items measuring the independent variable (team improvisation), contextual variables, and demographics. On a separate rating form, each team's supervisor rated the dependent variable—team innovation.

Our unit of analysis was the work team. We sent the surveys to 50 work teams (348 individuals). Surveys from teams with at least 30% of their members having completed the follow-up survey (including the team supervisor and a minimum of two team members), were incorporated in the final data sets. Meeting this requirement were 38 teams (22 teams in the training group and 16 teams in the control group). Average response rate per team was 68%; in 82% of the teams the response rate was over 50%. The overall response rate of the pretest survey was 67% (232 individuals, 145 in the training group and 87 in the control group), and the response rate of the follow-up survey was 51% (177 individuals, 100 in the training group and 77 in the control group). Teams in the final sample represented all types of jobs, including auditors, marketing coordinators, and engineering inspectors, in all departments of the City (i.e., community services, works and transportation, planning and building, legal services, finance, management services, and business development and public relations). There was no significant difference between

teams in the training (T) and the control (C) groups in terms of average team size (T = 6.86 members; C = 7.63 members), average City tenure (T = 7.55 years; C = 8.28 years), average team tenure (T = 4.80 years; C = 6.01 years), average age (T = 42.20 years; C = 43.06 years), and gender composition (T = 62% males; C = 60% males).

Data collection also included 20 semistructured interviews with individuals coming from different work teams in our sample. Interviewees were invited to describe events in which their team had to “come up with something really fast” or “think on their feet.” The objective was to understand the circumstances in which City employees improvise and to examine the factors influencing the success of improvisational processes. Table 1 provides examples of the events reported.

Finally, we collected additional information from individuals participating in the training workshops. Because the training intervention was developed independently of this research, we examined its content to assess if it reflected the theory of improvisation developed in this study. Although the term “improvisation” was rarely used during the training workshops, the training emphasized the goal of being responsive and creative under pressure and the roles that spontaneity, flexibility, intuition, expertise, and teamwork play in this process. The training also discussed the need to create a culture that supports and rewards experimentation, and the need to continuously look at the internal and external environment to remain nimble. (For a detailed description of the training, see Rosenberg 1998.)

Each training workshop lasted two days and included between 10 and 20 people. Members of the same work team were not able to attend the training workshop together because of the requirement of top management that the training not disrupt the flow of the City's operations. However, an effort was made to train the members of the same team within a short time frame so they could start using the new skills as a team. Nevertheless, we expected that the short-term effects of the training workshops (e.g., period of approximately two months after the training) would be stronger in influencing individual behavior than they would be in influencing team behavior. This expectation was based on research arguing that team training is more helpful than individual training for tasks performed in teams, but team training is not more beneficial than individual training for tasks performed individually (Hollingshead 1998). In our case, we expected that the fact that team members were not trained together would not hurt the development of individual improvisational skills, but would delay the creation of shared mental models about the demands of collective improvisational processes. Cannon-Bowers and Salas (1998) propose that training strategies designed to foster development of shared mental models must develop in trainees a shared knowledge

Table 1 Examples of Improvisational Events

Context	Events
Fire services	We practice cutting cars with old models. On the scene, cars are different—for example, in terms of air bags. Car manufacturers do not tell firefighters about their new standards. Every time we have people trapped in cars, we have to make a decision in the moment and find a way to get them out of the car. In one of the fires, firefighters came up with an instrument to save the life of a heavy person that they were having trouble carrying. They saved him, but two other kids died. They lost some time trying to carry the heavy person. . . . This instrument is now a standard tool in other stations too.
Auditing	We did an audit of a facility center, and in the process of that audit we came across a huge control issue related to the approval of part-time labor. . . . We had a meeting with the commissioner, director, and manager of that area about what we found as weaknesses of control and what we felt they could do. It was a huge and real risk. . . . We came up with a new solution, and in half an hour we had some controls in place that satisfied our issue and did not impede their business process.
Facilities management	There was a mechanical breakdown of an air-conditioning system during a wedding reception in the summer. Everybody was sweating to death. It was so hot outside that the actual unit on the roof was overheating. We came up with the idea to set up a sprinkle system to cool the unit down so that it would actually run.
Strategic planning	In strategic planning, you use a process map and a charter. Oftentimes when you present them, it is not what someone else thinks they are going to get. Thinking on our feet, we were able to redefine the model and create a new model with a totally different look, a totally different visual. . . basically saying the same thing; it was just a different way of expressing it and explaining it.
Consulting services	The IT audit and consulting service is a new one. . . . When we were creating this service, we had to define the relationship between IT and audit. . . . There was a lot of trial and error, going back and forth. . . negotiating to make sure the end product filled the IT needs and the audit needs. . . . The process included plans and being flexible and trying things. . . . We had to try this, try that, see what worked and what did not, and develop the service.

of the task, and an understanding of the role of each team member in relation to all others and the characteristics of each of the other members of the team. This is consistent with the Liang et al. (1995) study, which showed that student teams trained as teams performed better than teams whose members were trained individually because of the development of transactive memory during the training. In our case, teams at the City would be able to start practicing the improvisational skills as a team and start developing shared mental models and transactive memory associated with improvisation only after all team members had been trained. To address this issue, we included measures for individual improvisation and innovation in the pretraining and follow-up surveys. In addition, six weeks after the training, training participants received a “transfer-to-work form” with questions about their ability to use the new knowledge and skills in their work, ways in which the training had impacted their levels of innovation, and barriers they had encountered in using the skills. We received 96 forms (61% response rate).

Measures

Measures for the dependent, independent, and moderating variables are outlined below; the appendix provides the scale items. Seven-point Likert scales with the anchors “strongly disagree” and “strongly agree” were used. Measures were refined through two pilot tests, one of them performed in the actual research site. The 13 divisions of the City participating in the pilot test did not participate in the main study.

The dependent variable, *innovation*, was measured with a two-item scale adapted from Roth’s (1993) innovation scale developed for a service context. The two items were averaged for an overall score (correlation between items = 0.74). We developed a seven-item scale to measure the independent variable, *improvisation*, including both its creative and spontaneous facets. Four items were adapted from the Tierney et al. (1999) employee-creativity scale, and three items were created for this study building on Unger and Kernan’s (1983) measure of spontaneity and Moorman and Miner’s (1998b) measure of improvisation. We averaged the seven items ($\alpha = 0.91$). We used confirmatory factor analysis (CFA) with maximum likelihood estimation to evaluate the validity of the multi-item measures (Gerbing and Anderson 1988). We conducted a CFA of the improvisation and innovation variables. Results indicated a better fit for a two-factor model (GFI = 0.96, Jöreskog and Sörbom 1986; CFI = 0.99, Bentler 1990; TLI = 0.98, Tucker and Lewis 1973; $\chi^2 = 38.44$ ($df = 23$, $p = 0.02$); and $\chi^2/df = 1.67$) relative to a one-factor model (GFI = 0.89, CFI = 0.92, TLI = 0.88, $\chi^2 = 136.66$ ($df = 24$, $p = 0.00$), and $\chi^2/df = 5.69$). The difference in Chi-squares between the two models was significant ($\Delta\chi^2 = 98.22$ ($df = 1$, $p < 0.001$)).

The measurement scale for the teams’ *expertise* was based on three items adapted from the knowledge measures included in the Strategic Learning Assessment Map (Bontis et al. 2002); items were averaged to create an overall score ($\alpha = 0.85$). The scale assessing

teamwork quality consists of five items adapted from the teamwork scale included in the “Getting Back to Business” questionnaire of the “Improvise to Innovate” training program (Crossan 1997b); items were averaged for an overall score ($\alpha = 0.90$). Four items adapted from the culture scale included in the “Getting Back to Business” questionnaire of the “Improvise to Innovate” training program (Crossan 1997b) were averaged to create a measure of *experimental culture* ($\alpha = 0.81$). The four-item scale measuring *real-time information and communication* was partly based on Hanlon and Taylor’s (1991) measure of organizational communication behaviors. We averaged the four items ($\alpha = 0.80$). Finally, the measurement scale for team *memory* consisted of four items adapted from Moorman and Miner’s (1997) organizational memory scale and the knowledge measures developed by Bontis et al. (2002) ($\alpha = 0.80$). In a CFA of the moderating variables the five-factor model provided a better fit (GFI = 0.90, CFI = 0.96, TLI = 0.96, $\chi^2 = 223.54$ ($df = 141$, $p = 0.00$), and $\chi^2/df = 1.58$) than the one-factor model did (GFI = 0.64, CFI = 0.67, TLI = 0.62, $\chi^2 = 894.90$ ($df = 151$, $p = 0.00$), and $\chi^2/df = 5.92$). The difference in Chi-squares between the two models was significant ($\Delta\chi^2 = 672.36$ ($df = 1$, $p < 0.001$)).

To isolate the impact of improvisation, a number of variables that are considered drivers of team innovation and effectiveness (Hackman and Morris 1975, Cohen and Bailey 1997) were included as controls: job characteristics, team size, team tenure, company tenure, and participation in training. A five-item scale for job characteristics was newly developed. To measure team size, a listing of the City’s personnel was obtained. Team tenure and City tenure were based on individual-level data provided by team members who completed the survey. Participation in training was measured through a dummy variable—“1” indicated that the team had participated in the training, and “0” indicated that it had not.

Results

We present our results in two sections. First, we discuss the testing of Hypotheses 1 through 5, which predict the factors that enhance a team’s ability to improvise and, ultimately, innovate. Second, we discuss the testing of Hypothesis 6, which evaluates the role of training in influencing the incidence of improvisation.

The Role of Team and Contextual Factors

To test Hypotheses 1 through 5 concerning the factors contributing to effective improvisation, we used a data set including the team members’ responses to the follow-up surveys aggregated into team scores ($N = 38$ teams, including training and control groups). To justify the aggregation, a within-team correlation (r_{wg}) was computed for the improvisation and moderating variables (James et al. 1984). Mean r_{wg} values ranged from

0.71 to 0.77, which indicated good agreement. For the innovation variable we used the scores reported by the teams’ supervisors. Because of the training manipulation performed, we expected more variance in improvisation in the posttraining sample than in the pretraining sample, so that the moderating effects of the factors would be more pronounced in the posttraining sample. Table 2 displays means, standard deviations, and correlations among all variables using the posttraining sample.

We tested our hypotheses with hierarchical models estimated using ordinary least squares. Independent variables were mean centered to reduce multicollinearity among the interaction terms and their individual components (Aiken and West 1991). Given the limited number of teams, we utilized separate regression models for each of the moderating factors hypothesized to influence the innovative outcomes of improvisation. To maintain good power and validity of a multiple regression analysis, Cohen et al. (2003) recommend that only the central independent variables be included. Hence, the control variables, none of which had a significant correlation with the innovation variable, were removed from the regression analyses. Also, when we ran stepwise regression analyses that included the block of control variables, none of the controls was significant, which confirmed the decision to drop them. The results of the final hierarchical regression analyses are shown in Table 3 and illustrated in Figure 1. Variables were included in the regression models in the following order: (1) improvisation, (2) the moderating factor, and (3) the interaction effect between improvisation and the moderating factor. Collinearity statistics calculated for all regression analyses did not indicate distortions of results due to correlations among regressors. We considered 10%, 5%, and 1% significance levels.

In Model 1 the impact of improvisation on innovation was not significant ($\beta = 0.33$, $p > 0.10$), consistent with the underlying premise of the theory about the equivocal relationship between improvisation and innovation when moderating variables were not considered. Given no clear positive or negative relationship between improvisation and innovation, it made sense to look at the roles played by the moderating factors.

The first hypothesis suggested that expertise had a positive moderating effect on the link between improvisation and innovation. Model 2 shows support for this hypothesis. In Step 3, the interaction effect between improvisation and expertise was positive and significant ($\beta = 1.79$, $p < 0.01$; $\Delta R^2 = 0.18$, $p < 0.01$). This result, depicted in Figure 1, is consistent with comments from our interviewees. The role of experience and knowledge was frequently mentioned as part of the description of successful improvisational events, as shown in the following example in the auditing unit:

[Regarding] a new situation with an account that needs to be reconciled, because of my experience, I can think quickly and find ways of doing it. This ability comes

Table 2 Descriptive Statistics and Correlation Matrix

Constructs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Innovation																
2. Improvisation	0.16															
3. Expertise	-0.04	0.48**														
4. Teamwork quality	0.14	0.65**	0.59**													
5. Experimental culture	0.26	0.58**	0.52**	0.69**												
6. Real-time information and comm.	0.06	0.22	0.25	0.26	0.47**											
7. Memory	0.43**	0.33*	0.17	0.24	0.21	0.47**										
8. Training (dummy)	-0.15	-0.10	-0.10	-0.03	0.04	-0.01	0.07									
9. Team size	-0.00	-0.08	0.02	-0.10	0.13	0.03	0.07	-0.11								
10. City tenure	0.02	0.11	0.10	0.07	-0.02	0.12	-0.03	-0.18	-0.35*							
11. Team tenure	0.12	0.10	-0.00	-0.13	-0.19	-0.21	-0.13	-0.25	-0.21	0.67**						
12. Job Ch.—unexpected events	-0.03	0.06	0.43**	0.15	0.18	0.17	0.18	0.20	-0.02	0.15	0.07					
13. Job Ch.—new ways of doing things	0.16	0.32*	0.12	0.23	0.23	0.15	0.01	-0.11	-0.13	0.32*	0.31+	0.37*				
14. Job Ch.—repetitive duties	0.05	-0.02	-0.31+	-0.14	-0.22	-0.50**	-0.37**	0.07	-0.02	-0.16	0.26	-0.24	0.29+			
15. Job Ch.—ambiguous assignments	-0.15	-0.07	0.11	-0.01	-0.13	0.13	0.21	-0.17	-0.02	0.30+	0.29+	0.22	0.21	-0.07		
16. Job Ch.—structured tasks	0.10	0.28+	0.20	0.18	-0.01	0.08	0.53**	-0.23	0.35*	0.01	-0.01	0.11	0.12	-0.06	0.46**	
Mean	4.44	4.84	5.44	5.02	4.44	4.00	4.77	0.58	7.18	7.86	5.31	5.63	4.88	4.37	5.10	4.67
Standard deviation	1.06	0.50	0.51	0.55	0.56	0.83	0.65	0.50	3.60	1.99	2.42	0.92	0.66	0.79	1.00	0.87

Notes. $N = 38$ teams.
 ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

naturally, while when you have no experience, it is harder . . . Gut feeling helps and is related to your experience. When I am doing audits, I can deal with situations and eliminate things to look at or not to look at, because I just know.

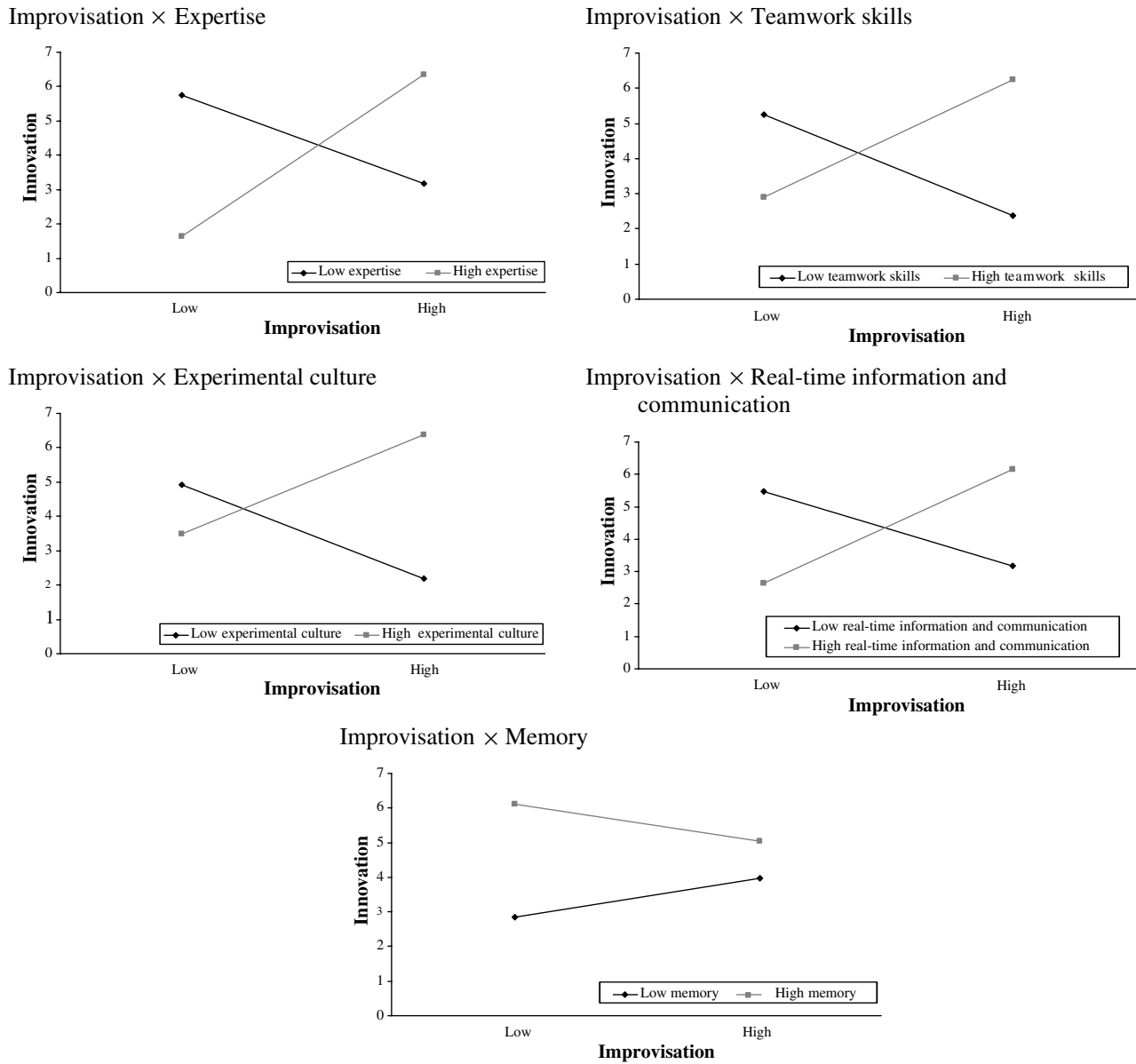
The second hypothesis argued that the better the teamwork quality in a team, the greater the likelihood that improvisation leads to innovation. Model 3 shows support for this hypothesis. In Step 3, the interaction between improvisation and teamwork was positive and

Table 3 Results of Regression Analyses

	Effects of improvisation on innovation by moderating condition					
	Model 1	Model 2 A = Expertise	Model 3 A = Teamwork quality	Model 4 A = Exp. culture	Model 5 A = Real-time info. and comm.	Model 6 A = Memory
Improvisation	0.33 (0.35)	0.33 (0.35)	0.33 (0.35)	0.33 (0.35)	0.33 (0.35)	0.33 (0.35)
R^2	0.03	0.03	0.03	0.03	0.03	0.03
Improvisation		0.49 (0.40)	0.25 (0.46)	0.02 (0.42)	0.32 (0.36)	0.03 (0.34)
Moderating factor A		-0.32 (0.40)	0.12 (0.42)	0.48 (0.38)	0.04 (0.22)	0.70* (0.27)
ΔR^2		0.02	0.02	0.04	0.00	0.16*
Improvisation		0.54 (0.36)	0.12 (0.44)	0.05 (0.40)	0.31 (0.34)	0.02 (0.34)
Moderating factor A		-0.23 (0.36)	0.34 (0.42)	0.62+ (0.36)	0.02 (0.21)	0.84* (0.31)
Interaction effect: (improvisation \times A)		1.79** (0.63)	1.42* (0.66)	1.26* (0.53)	0.88* (0.40)	-0.42 (0.51)
ΔR^2		0.18**	0.12*	0.13*	0.12*	0.02
Overall R^2	0.03	0.23	0.14	0.20	0.15	0.20
F	0.92	3.31	1.91	2.84	1.93	2.88
p	0.35	0.03	0.14	0.05	0.14	0.05

Notes. $N = 38$ teams.
 Nonstandardized coefficients are reported with standard errors below in parentheses.
 ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Figure 1 Effects of Improvisation on Innovation by Moderating Condition



Note. $N = 38$ teams.

significant ($\beta = 1.42, p < 0.05; \Delta R^2 = 0.12, p < 0.05$). This interaction is plotted in Figure 1. To further inform this result, we examined our interview data. Participants expressed diverse levels of satisfaction about the way their teams worked together. Although the existence of trust among team members was only one of the items in the scale measuring teamwork skills, trust was frequently emphasized in conversations about improvisational events and seemed to be a critical factor when team members tried to work together to find a new solution to a problem. For example, in one successful incident an interviewee mentioned: “We know that we rely on each other to get things done. They know that they can trust me with information, and I know

I can trust them with information.” In contrast, as part of an unsuccessful incident another participant commented: “At times there isn’t a lot of trust between and within teams. People don’t entrust each other with the right information on time.” Overall, the comments about the role of teamwork dynamics in improvising were consistent with our hypothesis, as summarized by one interviewee:

In this project we were all willing to achieve a common goal. We knew what the goal was... We all worked together and we all succeeded together. But when you see that decisions are not made by the right people, that success is individualized, and that only one person takes the credit, or that somebody doesn’t want to cooperate for

any reason, then it is very difficult to think creatively and create something new. It doesn't become a team concept. It becomes an individualistic environment. It becomes competition.

In the third hypothesis we predicted that the more experimental a team culture, the more positive the effect of improvisation on innovation would be. Model 4 shows support for this hypothesis. In Step 3, the interaction effect between improvisation and experimental culture was positive and significant ($\beta = 1.26, p < 0.05; \Delta R^2 = 0.13, p < 0.05$). This result, illustrated in Figure 1, is consistent with the comments of our interviewees. The role of culture was often mentioned when describing successful improvisational events, as shown in this example (also in the auditing unit):

In this new project, these guys had the freedom to work and to make their own mistakes so that they learn from them... without being so close-minded or difficult so that they don't want to come and ask for advice or help. It's a balance, a very tricky balance, giving that comfortable feeling that it's OK to mess up—we will fix it, and we are going to learn from it.

The fourth hypothesis suggested that real-time information and communication had a positive moderating effect on the relationship between improvisation and innovation. Model 5 shows support for this hypothesis. In Step 3, the interaction effect between improvisation and real-time information and communication was positive and significant ($\beta = 0.88, p < 0.05; \Delta R^2 = 0.12, p < 0.05$). This interaction is plotted in Figure 1. To further understand how the availability of timely and diverse information supported improvisation effectiveness, we examined our interview data. There was great variance in the degree to which teams felt informed about what was happening in their teams and in other teams in the City. Consistent with our hypothesis, although some interviewees were positive about the timeliness and relevance of the information they received, others recognized the challenges they experienced when dealing with unexpected events without knowing what was going on in the team or the firm. For example, a manager in a team with high levels of information and communication commented: "There is open communication in the team; we have regular meetings. The door is always open for staff... We can talk about problems while they are happening." In contrast, the team in charge of the City's switchboard and information desk commented on some of the difficulties faced when responding to unexpected requests:

We try to be updated about what is happening, for example by reading the newspaper early in the morning... Whatever happens in the environment with an [City-related] issue, we take the impact through the calls we get... Sometimes there are problems of communication with other departments. We don't know about all

the meetings happening. People come and ask us where the meeting is... or there are changes of location in the building, and we are not updated.

Finally, in the fifth hypothesis, we predicted that the more memory available to a team, the more positive the effect of improvisation on innovation would be. As Model 6 shows, this hypothesis was not supported. In Step 3, the interaction effect between improvisation and memory was not significant ($\beta = -0.42, p > 0.10; \Delta R^2 = 0.02, p > 0.10$). Figure 1 illustrates this result. This lack of support is informed by comments from our interviews, in which participants frequently stressed the sometimes "constraining" role that procedures may play when improvising in the City. For example, one interviewee explained:

All departments have specific rules and guidelines... You can't not deal, not worry, about legal liability and health and safety issues with the public... unless you go by policies and procedures... We have hundreds of rules and procedures in order to ensure the delivery of services and the safety of citizens.

These comments suggested that participants believed that following rules, standards, and procedures was the "right" and "safe" thing to do in the City. We hypothesized that a great amount of memory would enable teams to richly recombine routines when needed. However, if teams saw institutionalized practices as restrictive, they might be less likely to creatively work with routines when dealing with novel situations. Still, several interviewees mentioned the tension between working in the framework of rules and at the same time being ready to react to situations for which no procedure is available. For example:

As firefighters, every situation we face is different. We have tools that we can use in different situations, but you never know what you are going to get... When we are trained, we are told to "go by the book."... But, at the same time, we are trained to react, and rules get you to some point. After years of experience, you know that the book is not that smart.

Interview data also suggested that it was easier for some teams to recombine informal procedural memory when dealing with new events than it was to recombine formal declarative and procedural memory. One facility manager provided an example:

There are tricks we have picked up through observation of how people dealt with situations in the past, of how your supervisors dealt with situations in a crisis... It is a matter of drawing on this wealth of knowledge that the team has secured over the years to be able to come up with a new solution.

In this example, the subject referred to anecdotal knowledge obtained through observation and practice, transferred through conversations, and not likely to be

stored in manuals but in the team culture. This suggested that, in contexts where strong value is assigned to respecting policies and procedures, informal procedural memory and, in particular, informal practices and generally accepted norms may be the most beneficial ones when improvising.

The Role of Training

To test Hypothesis 6 concerning the effects of improvisation training, we used a data set with individual-level data from respondents who completed both the pretest and follow-up surveys (113 individuals, 73 in the training condition and 60 in the control condition). The data set included perceptions of individual improvisation, individual innovation, and moderating factors prior to and after the training.

We performed between-group comparisons of the pretraining and posttraining responses for the training and control subsamples to isolate the effects of the training. In the pretraining condition, the training and control subsamples were homogeneous in their improvisation levels ($\text{improvisation}_{\text{training}} = 5.19$, $\text{improvisation}_{\text{control}} = 5.24$, $t = 0.38$, $p > 0.10$). Prior to the training, innovation was marginally higher in the control subsample than in the training subsample ($\text{innovation}_{\text{training}} = 4.04$, $\text{innovation}_{\text{control}} = 4.40$, $t = 1.81$, $p < 0.10$). This characteristic of our sample constituted a tougher test of the theory. In the posttraining condition, the level of improvisation in the training group increased (as expected); however, the difference in improvisation between the training and control subsamples was not significant ($\text{improvisation}_{\text{training}} = 5.36$, $\text{improvisation}_{\text{control}} = 5.19$, $t = -1.35$, $p > 0.10$). After the training, there was no difference in innovation between the training and control subsamples ($\text{innovation}_{\text{training}} = 4.24$, $\text{innovation}_{\text{control}} = 4.48$, $t = 1.35$, $p > 0.10$).

We also performed within-group comparisons of all variables in the pretraining and posttraining conditions. In the training subsample the only variable that showed a significant difference was improvisation. The posttraining level of improvisation (mean = 5.36) was larger than the pretraining level (mean = 5.19). This difference was statistically significant ($t = 2.60$, $p \leq 0.01$). In contrast, there was no significant difference in the pretraining (mean = 5.24) and posttraining levels of improvisation (mean = 5.19) in the control subsample ($t = 0.63$, $p > 0.10$). Overall, the results of the between-group and within-group tests provide partial support for Hypothesis 6, which predicted that the training would increase the incidence of improvisation.

To get further insight into the impact of the training on improvisation, we performed a post-hoc analysis of correspondence between the team-level effects (tested in Hypothesis 1 to 5) and individual perceptions. In doing so, we explored how the training impacted

the ability of individuals to improvise well by running a series of regression analyses of the effects of improvisation on innovation for each of the moderating factors and the pretraining and posttraining conditions. Because the individuals included in our data set worked in teams, prior to performing the regressions we tested for violations of the interdependence assumption. A residual plot showed a random pattern of residuals, which implied independent errors; thus, the assumption of independence was not violated. In addition, independent variables were mean centered prior to the regression analysis. Results of these follow-up tests for the training subsample are shown in Table 4 while results for the control subsample are shown in Table 5.

Our expectation in the post-hoc analysis was that during the training workshops participants would learn to make use of the factors that help them to improvise better (expertise, teamwork quality, experimental culture, real-time information and communication, and memory), so that in the training subsample the interaction effect between improvisation and the moderating factors would be stronger in the posttraining condition than in the pretraining condition. In contrast, in the case of the control subsample, we expected no difference in the interaction effects between improvisation and the moderating factors in the pretraining and posttraining conditions.

Table 4 shows that for expertise, teamwork quality, and experimental culture, while the interaction effects were not significant in the pretraining condition ($\beta_{\text{improv} \times \text{expertise}} = 0.21$, $p > 0.10$; $\beta_{\text{improv} \times \text{teamwork}} = -0.09$, $p > 0.10$; $\beta_{\text{improv} \times \text{exp. culture}} = 0.08$, $p > 0.10$), they were positive and significant in the posttraining condition ($\beta_{\text{improv} \times \text{expertise}} = 0.34$, $p < 0.01$; $\beta_{\text{improv} \times \text{teamwork}} = 0.35$, $p < 0.01$; $\beta_{\text{improv} \times \text{exp. culture}} = 0.37$, $p < 0.01$). In the case of real-time information and communication, the interaction effect was marginally significant prior to the training ($\beta = 0.23$, $p < 0.10$) and significant after the training ($\beta = 0.40$, $p < 0.01$). Finally, no difference was observed in the interaction effect between improvisation and memory, which was significant in the pretraining ($\beta = 0.27$, $p < 0.05$) and posttraining conditions ($\beta = 0.29$, $p < 0.05$). This pattern of results clearly differed from that found in the control subsample. Table 5 shows that for experimental culture, real-time information and communication, and memory, no difference was observed in the interaction effects, which were not significant in both the pretraining ($\beta_{\text{improv} \times \text{exp. culture}} = 0.02$, $p > 0.10$; $\beta_{\text{improv} \times \text{RT info}} = 0.21$, $p > 0.10$; $\beta_{\text{improv} \times \text{memory}} = 0.13$, $p > 0.10$) and posttraining condition ($\beta_{\text{improv} \times \text{exp. culture}} = -0.01$, $p > 0.10$; $\beta_{\text{improv} \times \text{RT info}} = -0.04$, $p > 0.10$; $\beta_{\text{improv} \times \text{memory}} = 0.14$, $p > 0.10$). In the case of teamwork quality, the interaction effect was marginally significant prior to the training ($\beta = 0.26$, $p < 0.10$) and not significant after

Table 4 Post-Hoc Tests: Results of Regression Analyses in Training Group

Effects of improvisation on innovation by moderating condition and pretraining and posttraining conditions						
	A = Expertise	A = Teamwork quality	A = Exp. culture	A = Real-time info. and comm.	A = Memory	
Pretraining						
Improvisation	0.36*	0.36*	0.36*	0.36*	0.36*	0.36*
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
R^2	0.06*	0.06*	0.06*	0.06*	0.06*	0.06*
Improvisation		0.34+	0.21	0.05	0.27	0.38*
		(0.18)	(0.17)	(0.18)	(0.16)	(0.17)
Moderating factor A		0.06	0.37**	0.39**	0.32**	0.16
		(0.13)	(0.11)	(0.11)	(0.10)	(0.11)
ΔR^2		0.00	0.13**	0.15**	0.13**	0.03
Improvisation		0.39*	0.19	0.07	0.32+	0.32+
		(0.18)	(0.17)	(0.18)	(0.16)	(0.17)
Moderating factor A		0.07	0.38**	0.41**	0.31**	0.09
		(0.13)	(0.11)	(0.11)	(0.10)	(0.11)
Interaction effect: (improvisation \times A)		0.21	-0.09	0.08	0.23+	0.27*
		(0.15)	(0.14)	(0.10)	(0.14)	(0.12)
ΔR^2		0.03	0.05	0.01	0.03+	0.06*
Overall R^2	0.06	0.09	0.19	0.22	0.22	0.15
F	4.56	2.23	5.47	6.33	6.46	4.14
p	0.04	0.09	0.00	0.00	0.00	0.01
Posttraining						
Improvisation	0.02	0.02	0.02	0.02	0.02	0.02
	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
R^2	0.00	0.00	0.00	0.00	0.00	0.00
Improvisation		-0.03	0.03	-0.12	-0.09	0.02
		(0.14)	(0.13)	(0.14)	(0.14)	(0.15)
Moderating factor A		0.57**	0.49**	0.50**	0.43**	0.31**
		(0.10)	(0.09)	(0.09)	(0.08)	(0.09)
ΔR^2		0.32**	0.32**	0.32**	0.31**	0.14**
Improvisation		-0.02	0.04	-0.07	-0.10	0.04
		(0.13)	(0.13)	(0.13)	(0.13)	(0.15)
Moderating factor A		0.49**	0.43**	0.42**	0.39**	0.25**
		(0.10)	(0.08)	(0.09)	(0.07)	(0.09)
Interaction effect: (improvisation \times A)		0.34**	0.35**	0.37**	0.40**	0.29*
		(0.15)	(0.11)	(0.13)	(0.12)	(0.13)
ΔR^2		0.05*	0.08**	0.07**	0.10**	0.06*
Overall R^2	0.00	0.37	0.40	0.40	0.41	0.19
F	0.01	13.54	15.44	15.19	15.83	5.45
p	0.91	0.00	0.00	0.00	0.00	0.00

Notes. $N = 73$ individuals.

Nonstandardized coefficients are reported with standard errors below in parentheses.

** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

the training ($\beta = 0.17$, $p > 0.10$). Finally, the interaction effect for expertise was marginally significant in the pretraining condition ($\beta = 0.32$, $p < 0.10$) and significant in the posttraining condition ($\beta = 0.39$, $p < 0.01$).

We also performed Chow tests (Chow 1960) to test the difference between the pretraining and posttraining regression lines in the training subsample. We obtained significant differences for the models including expertise ($F = 2.11$, $p < 0.1$) and teamwork quality ($F = 2.51$, $p < 0.05$). As a whole, the pattern of results in our post-hoc analysis shows correspondence between team-level effects and individual perceptions. Furthermore, the post-hoc analysis offers new insights into Hypothesis 6 by suggesting that the training increased not only the incidence, but also the quality of improvisation by

improving the individual ability to rely on expertise and teamwork while improvising. Although the Chow tests for the experimental culture and real-time information and communication models were not significant, the direction of the results was suggestive. With the exception of the memory variable, the role of the influencing factors tended to be more pronounced in the posttraining sample, suggesting that after the training individuals made better use of these factors while improvising. In contrast, in the control subsample, the pattern of results suggested nonsignificant effects of most of the moderating factors in both the pretraining and posttraining conditions.

Finally, to further understand the effects of the training on the improvisational behavior of the participants,

Table 5 Post-Hoc Tests: Results of Regression Analyses in Control Group

Effects of improvisation on innovation by moderating condition and pretraining and posttraining conditions						
	A = Expertise	A = Teamwork quality	A = Exp. culture	A = Real-time info. and comm.	A = Memory	
Pretraining						
Improvisation	0.12 (0.18)	0.12 (0.18)	0.12 (0.18)	0.12 (0.18)	0.12 (0.18)	0.12 (0.18)
R^2	0.01	0.01	0.01	0.01	0.01	0.01
Improvisation		-0.03 (0.19)	-0.06 (0.19)	0.01 (0.18)	0.05 (0.20)	0.04 (0.20)
Moderating factor A		0.29* (0.15)	0.28* (0.12)	0.28* (0.12)	0.13 (0.12)	0.16 (0.14)
ΔR^2		0.07*	0.09*	0.09*	0.02	0.02
Improvisation		0.03 (0.19)	-0.03 (0.19)	0.00 (0.19)	0.06 (0.19)	0.07 (0.20)
Moderating factor A		0.27+ (0.14)	0.27* (0.11)	0.28* (0.12)	0.12 (0.12)	0.14 (0.14)
Interaction effect: (improvisation \times A)		0.32+ (0.16)	0.26+ (0.13)	0.02 (0.15)	0.21 (0.15)	0.13 (0.18)
ΔR^2		0.06+	0.06+	0.00	0.03	0.01
Overall R^2	0.01	0.13	0.16	0.09	0.06	0.04
F	0.41	2.89	3.56	1.90	1.14	0.76
p	0.52	0.04	0.02	0.14	0.34	0.52
Posttraining						
Improvisation	0.28 (0.17)	0.28 (0.17)	0.28 (0.17)	0.28 (0.17)	0.28 (0.17)	0.28 (0.17)
R^2	0.04	0.04	0.04	0.04	0.04	0.04
Improvisation		0.15 (0.17)	0.06 (0.17)	-0.01 (1.61)	0.19 (0.16)	0.18 (0.17)
Moderating factor A		0.37** (0.12)	0.44** (0.12)	0.58** (0.12)	0.34** (0.10)	0.32* (0.13)
ΔR^2		0.13**	0.19**	0.27**	0.17**	0.10*
Improvisation		0.16 (0.16)	0.04 (0.17)	-0.01 (0.16)	0.18 (0.17)	0.20 (0.17)
Moderating factor A		0.44** (0.12)	0.45** (0.12)	0.58** (0.12)	0.34** (0.10)	0.31* (0.13)
Interaction effect: (improvisation \times A)		0.39** (0.13)	0.17 (0.13)	-0.01 (0.13)	-0.04 (0.11)	0.14 (0.14)
ΔR^2		0.12**	0.03	0.00	0.00	0.02
Overall R^2	0.04	0.30	0.25	0.31	0.21	0.16
F	2.60	7.96	6.33	8.45	5.00	3.54
p	0.11	0.00	0.00	0.00	0.00	0.02

Notes. $N = 60$ individuals.

Nonstandardized coefficients are reported with standard errors below in parentheses.

** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

we examined the information from the transfer-to-work forms ($N = 96$, 61% response rate). When asked the open-ended question, “What changes have you noticed in yourself?” the most frequent responses were, “I am more open-minded,” “I look for more innovative options,” or “I look at things from different perspectives” (35 people). Participants reported that after the training they had been “eager” to change their behavior and that they had been able to apply the skills in their job “to some extent.” They were asked about barriers to using the skills. The two barriers most frequently mentioned were, “It was not practical to my situation,” and “Our culture does not support these behaviors.” When asked about “other barriers” to using the skills, participants mentioned factors such as “high workload,”

“lack of time,” or “have not encountered the situation yet.” The most frequent suggestions for improving the training were, “All employees, management, and council members should attend training” (15 people), and “refresher courses with team members,” or “some type of follow-up” (6 people).

Discussion

The three main findings of this study are (1) the improvisation-innovation main effect is equivocal, (2) the magnitude of the improvisation-innovation main effect is contingent on the positive influencing effects of four of the five predicted moderators, and (3) training in improvisation increases the incidence and the quality of improvisation. In other words, improvisation is on

average valueless but has a clear positive effect on innovation when combined with team and contextual moderating factors. These findings offer support to the view that improvisational processes are not inherently good or bad, and suggest that the same theater principles helping improvisers to master this skill (e.g., “practice,” “collaboration,” “agreement,” and “presence”) are not only applicable in business settings, but can be learned and effectively applied by organizational members through training.

The only theater principle showing no effect in improving the innovative outcomes of improvisation was that of “draw on reincorporation and ready-mades,” which we translated into the notion of team memory. We concluded that the lack of strong support for this effect could be associated with the specific characteristics of the research site, a municipality in which multiple guidelines, bylaws, and policies guide the work. The view that standard operating procedures are the rule in government organizations seemed to prevail in our sample—this line of thinking follows the traditional Weberian bureaucracy model. Nevertheless, we hypothesized that norms and procedures would enable teams to richly recombine routines when needed, which was consistent with Lipsky’s (1980) proposition that street-level bureaucrats (e.g., police officers, public lawyers, and other public officials) frequently find themselves in circumstances in which they have to make sense of the rules and procedures, interpret them, and use their discretion to adapt laws and procedures to specific cases. From this perspective, the work of street-level bureaucracies is rule saturated but not rule bound (Maynard-Moody and Musheno 2003). In this respect, our interview data suggest that informal norms and practices, and rules of thumb accepted by the team, were useful pieces of memory when people improvised in the City. The idea that informal procedural memory may be more helpful than declarative memory while improvising differs from previous conceptual work associating high declarative memory with the quality of improvisation (Cunha et al. 1999) and the generation of coherent and novel improvisational actions (Moorman and Miner 1998a). It may be that this relationship differs in the public and private sectors and that, in the former context, employees find that informal stories about past successes or failures are easier to adapt and recombine when facing a new situation because they are not part of a rigid manual, but rather knowledge transmitted through practice, observation, and conversation. Future research will be needed to further explore the idea that when memory is preserved in stories, it is more open to adaptation, innovation, and change.

When assessing the success of the training, we observed a small increase in the incidence of improvisation in the training group. More apparent was the effect

of the training on the innovative outcomes of improvisation. In our post-hoc analysis, comparisons between pretraining and posttraining conditions showed the effect of the training in teaching individuals to take advantage of expertise and teamwork dynamics to improve the effectiveness of improvisational processes. In contrast, the effect of the training was weak in influencing the individual ability to leverage contextual variables such as culture and real-time information. Our findings are focused, however, on individual-level training effects, not team-level ones. In the open-ended questions included in the transfer-to-work form, participants reported that they observed a larger change in behavior in themselves than they did in their teams. Their comments suggested several reasons for this effect. First, the objective to train all members of the team, including its supervisor, could not be achieved for all of the teams (10% of individuals in the training group cancelled their attendance for personal or work-related reasons). Furthermore, top management of the City received only a three-hour version of the training. Creating a culture and a context that supports collective improvisation is difficult if not all team supervisors and members are trained, and if top management’s commitment to the training is not highly visible to employees. Second, to avoid disrupting the City’s operations, teams were not trained together. However, training a team is more than individually training the members of a team. It is easier for a team to develop and practice skills together if those skills have been learned together. As mentioned previously, team training develops shared mental models and transactive memory, which enhance team performance. Individuals trained together develop complex beliefs about one another’s skills, specialize in remembering different aspects of the task, coordinate behaviors more effectively, and display greater trust in each other’s expertise (Moreland and Myaskovsky 2000, Mohammed and Dumville 2001). Third, a few participants reported that their job was independent from the rest of their team. These individuals may not report behavioral change at the team level because they do not work in constant coordination with others. Finally, we evaluated the training with information collected two months after the training. This might have been enough time for individual improvisation skills to become internalized, but not enough time for team improvisation skills to develop. Furthermore, this time period may be too short for individuals to act on the contextual variables (culture, real-time information, memory) that support the improvisational skill. In summary, our training data shed initial light on the opportunities for firms provided by training in improvisation, but at the same time it points out the challenges of developing skills and creating behavioral change in individuals and teams.

Limitations

A limitation of this study impacting the statistical power of our tests was our access to data from a limited pool of teams in one firm. Lack of power increases the probability of making Type II errors, that is, reaching the wrong conclusion by accepting the null hypothesis when it should be rejected (Lindsay 1993). Post-hoc analysis of power in regression showed that, with a sample size of 38 teams, our test had an 84% chance of detecting a large effect ($p = 0.05$), a 45% chance of detecting a medium effect, and a 10% chance of detecting a small effect. In addition, because the study was performed in only one firm (a public-sector organization), the external validity of the results was affected. Nevertheless, we suggest that our findings can also provide valuable insights to private-sector organizations because public-sector management has become increasingly results and customer focused, with great attention being given to targets and to productivity gains (Van Wart and Berman 1999, Moon and DeLeon 2001). The context of public bureaucracies has been described as one of uncertainty, resource scarcity, ill-defined goals, and high expectations (Pressman and Wildavsky 1973, Lipsky 1980), which is consistent with the challenges faced by many private-sector firms. In addition, the City represented a wide range of business services.

Implications and Future Directions

This study contributes to research on improvisation in four ways. First, we build on the insights from improvisational theater to parse the descriptive elements of improvisation (spontaneity and creativity) and its prescriptive elements (what it takes to do it well and innovate—expertise, teamwork quality, experimental culture, real-time information and communication, and memory). In doing this, we sought to help clarify the conceptual confusion about the value of improvisation, to provide a detailed description of what improvisation entails, and to inform efforts to measure and observe improvisation. We encourage researchers to shift the discussion from “idealizing” the role of improvisation in firms, or “warning” about its dangers, to the detection of factors associated with its effectiveness.

Second, this is one of the few studies that attempts measurement of improvisation and, to our knowledge, the first empirical study to test arguments based on the improvisational theater metaphor. With our improvisation scale we sought to help fill the gap in quantitative work in the improvisation field, in which measures of improvisation are scarce and existing scales only partially represent the phenomenon. Although there is a shortage of both field studies and empirical studies on improvisation, prior research has largely been qualitative. In our study, we took advantage of the benefits of both methods. While surveys enabled the systematization of data coming from 38 teams and the testing of hypotheses, interview data

was useful in validating the results, interpreting the statistical relationships, and clarifying the nonfindings.

Third, we provided empirical evidence of the incidence and innovative outcomes of improvisation in the municipal context and showed that new insights about the relationship between improvisation and innovation could be obtained by moving from contexts where improvisation is expected (such as product development and crisis situations) to more counterintuitive settings (such as a public-sector organization). Finally, we offered initial evidence that the improvisational skill can be learned by organizational members. Because improvisation has been advocated as a means to reconcile basic tensions in teams and in firms such as those between flexibility and structure (Kamoche and Cunha 2001), and exploration and exploitation (Crossan and Hurst 2003), acknowledging that the skill can be developed is extremely important for our understanding of team innovation and team training.

Although our focus in both theory development and testing was on the construct of improvisation, improvisation itself has important implications for other fields of study. Obvious connections have been made to innovation, creativity, and the literature on teams. Here we see improvisation as a complex process that serves to reveal some of the key challenges, tensions, and obstacles associated with innovation, creativity, and teamwork. To further investigate the factors that support improvisation in firms, future research will need to take an in-depth look at each of the teamwork dynamics that constitute an improvisation capability. For example, we incorporated trust among team members as an aspect of teamwork quality. We see great potential for future research on the specific role of trust in collective improvisation given the tight link between trust and the conditions of risk and interdependence (Rousseau et al. 1998) that characterize improvisation.

Although not explicit, there are implicit connections to the fields of organizational learning and strategic management. Indeed we arrived at the study of improvisation from these fields as we sought to gain a better understanding of how organizations learn and adapt under time pressure. Initially, we viewed improvisation as the exploration (March 1991) or feed-forward (Crossan et al. 1999) processes of organizational learning, but we soon came to realize that improvisation was a mechanism to manage the tensions between exploration and exploitation. The tension is revealed quite clearly in this study in terms of memory and routines. Routines, systems, structure, and strategy are elements of organizational learning that have become institutionalized. The intent is for the firm to leverage and exploit prior learning. However, institutionalized learning may impede new learning when it no longer serves the situation. As mentioned by one of the respondents, “when we are trained, we are told to go by the book But, at the same time, we are trained to react, and rules get you to some point” It appears that in the municipal context this

tension is quite pronounced, with respondents suggesting that following standard procedures was the “right” and “safe” thing to do and simultaneously providing examples of cases when they used their discretion to deal with novel events. This supports Maynard-Moody and Musheno’s (2003) observation that when the rules and procedures fit, street-level judgment is not problematic—there is no conflict, no dilemma. In contrast, discretion is used when dealing with ambiguous and nonroutine situations. Improvisation calls for identifying the minimal constraints or rules that must be adhered to, rather than building layers of routines and systems that become ossified and are eventually tagged as “red tape.” The process of improvisation and the training exercises serve to magnify what we see as the thorny problems of teamwork, creativity, innovation, and organizational learning. In doing so, it is our hope that researchers and managers will be able to delve more deeply in the black box of process to advance theory and practice in each of these areas.

Ultimately, we are interested in one particular aspect of organizational learning, which is the strategic renewal of the organization. The institutionalized learning in the form of systems, structures, processes, and routines are aligned with the strategy and all take on a dynamic characteristic as adjustments are made based on the constant learning about the environment (e.g., customers, suppliers, competitors, general trends). We view improvisation as a critical element of strategic renewal for the same reasons outlined for teamwork and organizational learning in general; improvisation is a process that helps reveal and enables researchers and managers to deal with the tension between exploration and exploitation. The improvisation of teams within organizations is the raw material that either supports or impedes the strategic renewal of the entire organization. Therefore, while we view the study of improvisation in teams as a critical area of research, we do not see it as the end point. In fact, an important research stream is the development of a multilevel theory of improvisation that defines improvisational processes at different levels and links them to each other in a business context. The theory developed in this paper focused on the team level, where team improvisation is the function of the improvisational capability of individual members and team and contextual factors. An extrapolation of our work to the organizational level would suggest that an organizational capability to improvise is more than the sum of the teams’ competence in improvisation; it results from the interaction of team competences in improvisation with contextual influences such as organizational routines, reward systems, structure, culture, and strategic priorities.

The foregoing discussion of improvisation as it relates to teamwork, creativity, innovation, organizational learning, and strategic renewal points to a common theme—the dialectical nature of improvisation. Weick (1998,

p. 551) proposes that improvisation helps to reconcile organizational tensions because “it is a mixture of the pre-composed and the spontaneous, just as organizational action mixes together some proportion of control with innovation, exploitation with exploration, routine with non-routine, automatic with controlled.” Given the training effects arising from this study, important implications arise for future research in examining the possibilities improvisation might hold for dealing with some of the more vexing issues in the various fields we have noted. If effective improvisation can be learned, research can move from the description of the difficulties of managing organizational tensions or paradoxes to the prescription of how the development of effective improvisational skills helps individuals to overcome the natural tendency toward polarization, and can reconcile these tensions.

As well as academic contributions, this study presents findings of interest to managers. Our results show that improvisation can positively impact team innovation if certain conditions are present. Managers can manage factors such as the degree of experimentation in a culture, the frequency and diversity of real-time information and communication, and the quality of teamwork dynamics. In the case of culture, managers can leverage improvisation by establishing the boundaries and minimal constraints within which people are free to experiment and take controlled risks. In the case of real-time information and communication, managers could motivate work teams to reflect on the kind of information they need to be responsive in their jobs, and promote mechanisms to establish fluid communication flows. It is also important for managers to recognize that effective improvisational dynamics in teams may need some time and practice to be developed, in particular because trust grows out of the experience of working together. Additionally, the effective improvisation of a whole division should be linked to training and promotion systems that reward initiative and experimentation. Finally, this study provides senior managers initial evidence about the ability to develop the improvisational skill in individuals and teams, and shows that this requires more than attendance in training workshops; it requires the development of a culture and a context that supports spontaneous and creative processes in firms.

Acknowledgments

The authors would like to thank Henrich Greve, Senior Editor, and the three anonymous reviewers for their very helpful comments and suggestions during the review process. They also want to acknowledge Chris Higgins, Amy Hillman, John Hulland, Anne Miner, Charlene Nicholls-Nixon, Rod White, and Margaret Ann Wilkinson for their insightful input on earlier versions. This research received funding from the Social Sciences and Humanities Research Council of Canada and the Richard Ivey School of Business.

Appendix. Questionnaire Items

Variable	Items
Innovation	The team frequently introduces new product/service innovations. The team is fast in introducing new product/service innovations.
Improvisation	The team deals with unanticipated events on the spot. Team members think on their feet when carrying out actions. The team responds in the moment to unexpected problems. The team tries new approaches to problems. The team identifies opportunities for new work processes. The team takes risks in terms of producing new ideas in doing its job. The team demonstrates originality in its work.
Expertise	Team members are aware of the critical issues that affect their work. Team members are current and knowledgeable about their field of work. Team members have knowledge in diverse fields.
Teamwork quality	Team members accept ideas coming from others and build on them. Team members trust each other. Team members encourage different points of view. Team members are alert to the opportunities presented by the situation and help to move the action forward. Team members take the lead at different times depending on the needs of the situation.
Experimental culture	In the team, errors are considered a source of learning. In the team, there is room for initiative. In the team, there is freedom to experiment. In the team, we are encouraged to take risks when trying new ideas.
Real-time information and communication	In the team, our meetings are a good source of up-to-date information. Information about what is going on within the organization is readily shared at all levels. In the team, we regularly receive information about other departments' activities. In the team, we have the necessary information about our external environment.
Memory	The team has well-defined procedures. The team keeps records of past projects. The team has information systems to support the work. The team has files and databases that are up to date.
Job characteristics	The job requires team members to deal with unexpected events. The job requires team members to come up with new ways of doing things. The job requires team members to deal with ambiguous assignments, for which no previously established procedures exist. The job requires team members to perform repetitive duties. The job requires team members to perform structured tasks (the steps to perform the task are clear).

Note. In the scales for individual innovation and improvisation, "the team" was replaced with "I."

References

- Agrell, A., R. Gustafson. 1996. Innovation and creativity in work groups. M. A. West, ed. *Handbook of Work Group Psychology*. Wiley & Sons, Chichester, UK, 317–343.
- Aiken, L. S., S. G. West. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Sage, Newbury Park, CA.
- Amabile, T. M. 1988. A model of creativity and innovation in organizations. *Res. Organ. Behavior* **10** 123–167.
- Amabile, T. M. 1996. *Creativity in Context*. Westview Press, Boulder, CO.
- Barrett, F. 1998. Creativity and improvisation in jazz and organizations: Implications for organizational learning. *Organ. Sci.* **9**(5) 543–555.
- Bentler, P. 1990. Comparative fit indexes in structural models. *Psych. Bull.* **107** 238–246.
- Bontis, N., M. Crossan, J. Hulland. 2002. Managing an organizational learning system by aligning stocks and flows. *J. Management Stud.* **39**(4) 437–469.
- Brown, S. L., K. M. Eisenhardt. 1998. *Competing on the Edge: Strategy as Structured Chaos*. Harvard Business School Press, Boston, MA.
- Caldwell, D. F., C. A. O'Reilly. 2003. The determinants of team-based innovation in organizations. *Small Group Res.* **34** 497–517.
- Cannon-Bowers, J. A., E. Salas. 1998. *Making Decisions Under Stress: Implications for Individual and Team Training*. American Psychological Association, Washington, D.C.
- Cannon-Bowers, J. A., E. Salas, S. Converse. 1993. Shared mental models in expert team decision making. N. J. Castellan, ed. *Individual and Group Decision Making*. Lawrence Erlbaum Associates, Hillsdale, NJ, 221–246.
- Chow, G. C. 1960. Tests of equality between sets of coefficients in two linear regressions. *Econometrica* **28**(3) 591–605.
- Claxton, G. 1984. *Live and Learn: An Introduction to the Psychology of Growth and Change in Everyday Life*. Harper and Row Publishers, London, UK.
- Cohen, S. G., D. E. Bailey. 1997. What makes teams work: Group effectiveness research from the shop floor to the executive suite. *J. Management* **23**(3) 239–290.
- Cohen, J., P. Cohen, S. G. West, L. S. Aiken. 2003. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Erlbaum, Mahwah, NJ.
- Cook, S. D. N., D. Yanow. 1993. Culture and organizational learning. *J. Management Inquiry* **2**(4) 373–390.
- Crossan, M. 1997a. *Improvise to Innovate*. *Ivey Bus. J.* **62**(1) 36–42.
- Crossan, M. 1997b. *Improvise to Innovate Training Program*. Ivey Business School, London, Ontario, Canada.
- Crossan, M. 1998. Improvisation in action. *Organ. Sci.* **9**(5) 593–599.
- Crossan, M., D. Hurst. 2003. Strategic renewal as improvisation: Reconciling the tension between exploration and exploitation. Working paper, Ivey Business School, London, Ontario, Canada.
- Crossan, M., M. Sorrenti. 1997. Making sense of improvisation. J. Walsh, A. Huff, eds. *Advances in Strategic Management*, Vol. 14. JAI Press, Greenwich, CT, 155–180.
- Crossan, M., H. Lane, R. White. 1999. An organizational learning framework: From intuition to institution. *Acad. Management Rev.* **24**(3) 522–538.
- Crossan, M., M. Cunha, D. Vera, J. Cunha. 2005. Time and organizational improvisation. *Acad. Management Rev.* **30**(1) 129–145.

- Cunha, M., J. Cunha, K. Kamoche. 1999. Organizational improvisation: What, when, how, and why. *Internat. J. Management* **1**(3) 299–341.
- De Bono, E. 1973. *Lateral Thinking: Creativity Step By Step*. Harper and Row, New York.
- Drach-Zahavy, A., E. Somech. 2001. Understanding team innovation: The role of team processes and structure. *Group Dynam.* **5** 111–123.
- Drazin, R., M. A. Glynn, R. K. Kazanjian. 1999. Multilevel theorizing about creativity in organizations: A sensemaking perspective. *Acad. Management Rev.* **24**(2) 286–307.
- Edmonson, A. 1999. Psychological safety and learning behavior in work teams. *Admin. Sci. Quart.* **44** 350–383.
- Eisenhardt, K. M. 1989. Making fast strategic decisions in high-velocity environments. *Acad. Management J.* **32**(3) 543–576.
- Eisenhardt, K. M., B. N. Tabrizi. 1995. Accelerating adaptive processes: Product innovation in the global computer industry. *Admin. Sci. Quart.* **40**(1) 84–110.
- Faraj, S., L. Sproull. 2000. Coordinating expertise in software development teams. *Management Sci.* **46** 1554–1568.
- Frost, A., R. Yarrow. 1990. *Improvisation in Drama*. St. Martin's Press, New York.
- Fry, A. 1987. The Post-It Note: An intrapreneurial success. *SAM Adv. Management J.* **52** 4–9.
- Gardner, H. 1982. *Art, Mind, and Brain: A Cognitive Approach to Creativity*. Basic Books, New York.
- Gerbing, D. W., J. C. Anderson. 1988. An updated paradigm for scale development incorporating unidimensionality and its assessment. *J. Marketing Res.* **25** 186–192.
- Gilson, L. L., C. E. Shalley. 2004. A little creativity goes a long way: An examination of teams' engagement in creative processes. *J. Management* **30** 453–470.
- Gregory, K. L. 1983. Native-view paradigms: Multiple cultures and culture conflicts in organizations. *Admin. Sci. Quart.* **28** 359–376.
- Hackman, J. R., C. G. Morris. 1975. Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. L. Berkowitz, ed. *Advances in Experimental Social Psychology*, Vol. 8. Academic Press, New York, 45–99.
- Halpern, C., D. Close, K. Johnson. 1994. *Truth in Comedy*. Meriwether Publishing Ltd., Colorado Springs, CO.
- Hanlon, S. C., R. R. Taylor. 1991. An examination of changes in work group communication behaviors following installation of a gain-sharing plan. *Group Organ. Stud.* **16**(3) 238–267.
- Hatch, M. J. 1997. Jazzing up the theory of organizational improvisation. J. Walsh, A. Huff, eds. *Advances in Strategic Management*, Vol. 14. JAI Press, Greenwich, CT, 181–191.
- Hatch, M. J. 1998. Jazz as a metaphor for organizing in the 21st century. *Organ. Sci.* **9** 556–557.
- Hollingshead, A. B. 1998. Group and individual training: The impact of practice on performance. *Small Group Res.* **29** 254–280.
- Hutchins, E. 1991. Organizing work by adaptation. *Organ. Sci.* **2** 14–39.
- James, L. R., R. G. Demaree, G. Wolf. 1984. From micro to meso: Critical steps in conceptualizing and conducting multi-level research. *Organ. Res. Methods* **3**(3) 211–236.
- Johnstone, K. 1979. *Improv: Improvisation and the Theatre*. Theatre Arts Books, New York.
- Jöreskog, K. G., Sörbom. 1986. *Lisrel VI: Analysis of Linear Structural Relationships by Maximum Likelihood and Least Square Methods*. Scientific Software, Inc., Mooresville, IN.
- Kamoche, K., M. Cunha. 2001. Minimal structures: From jazz improvisation to product innovation. *Organ. Stud.* **22**(5) 733–764.
- Kamoche, K., M. Cunha, J. Cunha. 2003. Towards a theory of organizational improvisation: Looking beyond the jazz metaphor. *J. Management Stud.* **40** 2023–2051.
- Kunda, G. 1992. *Engineering Culture*. Temple University Press, Philadelphia, PA.
- Lawrence, K. 2001. Playing by the rules: A role for improvisation in groups. Working paper, University of Michigan Business School, Ann Arbor, MI.
- Liang, D. W., R. Moreland, L. Argote. 1995. Group versus individual training and group performance: The mediating role of transactive memory. *Personality Soc. Psych. Bull.* **21** 384–393.
- Lindsay, R. M. 1993. Incorporating statistical power into the test of significance procedure: A methodological and empirical inquiry. *Behavioral Res. Accounting* **5** 211–236.
- Lipsky, M. 1980. *Street-Level Bureaucracy*. Russel Sage, New York.
- March, J. G. 1991. Exploration and exploitation in organizational learning. *Organ. Sci.* **2** 71–87.
- Martin, J., C. Siehl. 1983. Organizational culture and counterculture: An uneasy symbiosis. *Organ. Dynam.* **12**(2) 52–65.
- Maynard-Moody, S., M. Musheno. 2003. *Cops, Teachers, Counselors: Stories from the Front Lines of Public Service*. University of Michigan Press, Ann Arbor, MI.
- Meyer, A. 1998. Organizing for improvisation: The backstage story of the Vancouver jazz concert and symposium. *Organ. Sci.* **18** 511–522.
- Miner, A., P. Bassoff, C. Moorman. 2001. Organizational improvisation and learning: A field study. *Admin. Sci. Quart.* **46** 304–337.
- Mirvis, P. H. 1998. Practice improvisation. *Organ. Sci.* **9** 586–592.
- Mohammed, S., B. C. Dumville. 2001. Team mental models in a team knowledge framework: Expanding theory and measurement across disciplinary boundaries. *J. Organ. Behavior* **22** 89–106.
- Moon, J., P. DeLeon. 2001. Municipal reinvention: Managerial values and diffusion among municipalities. *J. Public Admin. Res. Theory* **11**(3) 327–351.
- Moorman, C., A. Miner. 1997. The impact of organizational memory on new product performance and creativity. *J. Marketing Res.* **34** 91–106.
- Moorman, C., A. Miner. 1998a. Organizational improvisation and organizational memory. *Acad. Management Rev.* **23**(4) 698–724.
- Moorman, C., A. Miner. 1998b. The convergence of planning and execution: Improvisation in new product development. *J. Marketing* **62**(3) 1–20.
- Moreland, R. A., L. Myaskovsky. 2000. Exploring the performance benefits of group training: Transactive memory or improved communication? *Organ. Behavior Human Decision Processes* **82** 117–133.
- Orlikowski, W. J. 1996. Improvising organizational transformation over time: A situated change perspective. *Inform. Systems Res.* **7** 63–92.
- Pascale, R. T. 1984. Perspectives on strategy: The real story behind Honda's success. *California Management Rev.* **26**(3) 47–72.

- Poolton, J., H. Ismail. 2000. New developments in innovation. *J. Managerial Psych.* **13** 795–811.
- Pressman, J. L., A. Wildavsky. 1973. *Implementation*. University of California Press, Berkeley, CA.
- Preston, A. 1991. Improvising order. I. L. Mangham, ed. *Organization Analysis and Development*, Vol. 22. John Wiley & Sons, New York, 308–325.
- Rosenberg, M. 1998. *The Flexible Thinker*. Orange You Glad Inc., Brampton, Canada.
- Roth, A. 1993. Performance dimensions in services: An empirical investigation of strategic performance. T. A. Swartz, D. E. Bowen, S. W. Brown, eds. *Advances in Services Marketing and Management*, Vol. 2. JAI Press Inc., Greenwich, CT, 1–47.
- Rousseau, D., S. Sitkin, R. Burt, C. Camerer. 1998. Not so different after all: A cross-discipline view of trust. *Acad. Management Rev.* **23**(3) 393–404.
- Sawyer, K. 1999. The emergence of creativity. *Philos. Psych.* **12**(4) 447–469.
- Sawyer, K. 2000. Improvisation and the creative process: Dewey, Collingwood, and the aesthetics of spontaneity. *J. Aesthetics Art Criticism* **58**(2) 149–161.
- Schein, E. H. 1992. *Organizational Culture and Leadership*. Jossey-Bass, San Francisco, CA.
- Seham, A. 2001. *Whose Improv is it Anyway? Beyond Second City*. University Press of Mississippi, Jackson, MS.
- Shalley, C. E., J. Zhou, G. R. Oldham. 2004. The effects of personal and contextual characteristics on creativity: Where should we go from here? *J. Management* **30** 933–958.
- Spolin, V. 1963. *Improvisation for the Theatre*. Northwestern University Press, Evanston, IL.
- Sternberg, R. 1999. *Handbook of Creativity*. Cambridge University Press, Cambridge, UK.
- Tierney, P., S. M. Farmer, G. B. Graen. 1999. An examination of leadership and employee creativity: The relevance of traits and relationships. *Personnel Psych.* **52**(3) 591–620.
- Tucker, L., C. Lewis. 1973. The reliability coefficient for maximum likelihood factor analysis. *Psychometrika* **38** 1–10.
- Unger, L. S., J. B. Kernan. 1983. On the meaning of leisure: An investigation of some determinants of the subjective experience. *J. Consumer Res.* **9**(March) 381–392.
- Van Wart, M., E. Berman. 1999. Contemporary public sector productivity values. *Public Productivity Management Rev.* **22**(3) 326–347.
- Vera, D., M. Crossan. 2004. Theatrical improvisation: Lessons for organizations. *Organ. Stud.* **25**(5) 727–749.
- Walsh, J. P., G. Rivera. 1991. Organizational memory. *Acad. Management Rev.* **16**(1) 57–91.
- Wegner, D. J. 1987. Transactive memory: A contemporary analysis of the group mind. B. Mullen, G. R. Goethals, eds. *Theories of Group Behavior*. Springer-Verlag, New York, 185–208.
- Weick, K. E. 1993. The collapse of sensemaking in organizations: The Mann Gulch disaster. *Admin. Sci. Quart.* **38**(4) 628–652.
- Weick, K. E. 1998. Improvisation as a mindset for organizational analysis. *Organ. Sci.* **9**(5) 543–555.
- Weick, K. E., K. H. Roberts. 1993. Collective mind in organizations: Heedful interrelating on flight decks. *Admin. Sci. Quart.* **38** 357–381.
- West, M. A. 1990. The social psychology of innovation in groups. M. A. West, J. L. Farr, eds. *Innovation and Creativity at Work: Psychological and Organizational Strategies*. Wiley, Chichester, UK, 309–333.
- West, M. A. 1994. *Effective Teamwork*. British Psychological Society, London, UK.
- Zack, M. H. 2000. Jazz improvisation and organizing: Once more from the top. *Organ. Sci.* **11**(2) 227–234.