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LET'S DANCE! ELASTIC COORDINATION IN CREATIVE GROUP WORK: A QUALITATIVE STUDY OF MODERN DANCERS

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Coordination challenges are an inherent part of group work. They are perhaps more daunting for creative work because coordinating creative work requires allowing for dynamics that seem to "pull the group together," or integrate, while also fostering dynamics that "pull the group apart," or de-integrate. During an inductive study of modern dance group rehearsals, these interactions emerged as central to understanding how groups navigate coordinating creative work. Our emergent findings reveal how groups use autonomy and constraints to accomplish *elastic coordination* throughout a creative project.

The idea of "creative freedom" might seem banal, but the link between creativity and freedom has deep intellectual roots: Aristotle connected them; so, too, did Hobbes and Locke, and Epicurius and Kant (Albert & Runco, 1999; Rose, 1997). Creativity seems to require a sense of independence from rules, restrictions, and even close relationships (Perry-Smith & Shalley, 2003), since creative work seems to happen outside the "ordinary grooves of thought and action" (Jevons, 1877; cited by Becker, 1995). Given the association between creativity and freedom, it is not surprising that research shows that providing autonomy—individual discretion to carry out work tasks (Hackman, 1983)—to creative workers is one effective tactic for fostering creativity (Al-Beraidi & Rickards, 2006; Amabile, Conti, Coon, Lazenby, & Herron, 1996; Amabile & Gitomer, 1984; Amabile & Gryskiewicz, 1987; Grawitch, Munz, Elliott, & Mathis, 2003; Pelz, 1967; Shalley, 1991; Shalley, Gilson, & Blum, 2000; Unsworth & Clegg, 2010; Zhou, 1998).

Group work is another popular tactic for fostering creativity, guided by the assumption that bringing together unique perspectives and opinions can catalyze new insights and novel combinations of knowledge (Abelson, 1965; Baer, Leenders, Oldham, & Vadera, 2010; Cohen & Bailey, 1997; DeRue & Rosso, 2009; Farrell, 1982; Grawitch et al., 2003; Nijstad, Rietzschel, & Stroebe, 2006; Sutton & Hargadon, 1996; Taggar, 2002; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010). Group work always implies some form of coordination (Hackman, 1987). This is especially true in *creative* group work since, at the very least, creative group work requires that group members generate ideas, share their ideas with one another, listen and focus on one another's ideas, and then generate new associations, building on one another's ideas to integrate them into a truly novel solution (Baer et al., 2010; Brophy, 2006; Brown, Tumeo, Larey, & Paulus, 1998; Taggar, 2002; van Knippenberg, de Dreu, & Homan, 2004).

Considering autonomy and group work in tandem raises a puzzle: autonomy and group work are arguably two of the most potent tactics for generating creativity in organizations, but, when combined together, they might cancel each other out. That is, providing individuals within a group with too much freedom can ruin the group's ability to coordinate work, thereby canceling out the benefits of

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both tactics. This might explain why, to date, evidence about the role of autonomy, when specifically focused on creative group work, is mixed—some studies support the notion that autonomy facilitates creative group work (Grawitch et al., 2003; Nonaka, Toyama, & Konno, 2000; Paolillo & Brown, 1978), while other studies demonstrate that autonomy might hinder creative group work (Cohen & Bailey, 1997; Kim & Lee, 1995). This puzzle raises the fundamental question of how creative groups coordinate for creative work. Coordination is the "temporally unfolding and contextualized process of input regulation and interaction articulation to realize a collective performance" (Faraj & Xiao, 2006: 1157). Coordination requires that group members enable the "fitting together" of activities (Argote, 1982: 423) and the "organizing of individuals so that their actions are aligned" (Heath & Staudenmayer, 2000: 154) within an agreed upon "problem domain" (Bailetti, Caooahan, & DiPietro, 1994: 395). Okhuysen and Bechky (2009) label the sum of these activities "integration." Coordinating in the case of creative work requires integration, but it also requires allowing for independent work, which potentially enables "mis-fitting" interactions that can "mis-align actions" or push the group into unfamiliar "problem domains." We label these countervailing interactions *de-integration*,[1] which we define as interactions that allow group members to act individually, and, in so doing, violate group boundaries and introduce ideas that disrupt a sense of predictability and common understanding. Groups need to accommodate developing new ideas that threaten coordination and yet integrate these ideas and remain cohesive (George, 2007). To date, most theories of group creativity do not address the tensions from simultaneously needing to balance integration and de-integration.

[1] De-integration is a concept grounded in our data. Although related concepts do exist, it was not derived from theory. We define it here for clarity, in the spirit of the introduction provided by Nag, Corley, and Gioia (2007). That is, we "suspend" the qualitative hallmark of revealing our emergent theoretical dimensions only after the findings to help highlight the puzzle we are attempting to solve. It is worth noting that the definition of *integration* proposed by Okhuysen and Bechky (2009) includes predictability, common understanding, and accountability. Our definition of *de-integration* allows individuals to violate the first two these hallmarks of coordination, while still maintaining accountability.

Anticipating these issues, researchers have identified both a need for more theory on the role of autonomy in groups (Langfred, 2005) and for a richer conceptual understanding of coordinating mechanisms that "have sufficient flexibility" (Jarzabkowski, Lê, & Feldman, 2012: 908) to adapt to situations that require novelty. We were led to these openings for theory building during a study of modern dance groups. In our fieldwork, we were struck by the dynamic way in which autonomy was used. Instead of being a constant condition of group work, autonomy seemed to serve as a mechanism that the groups could re-shape. Most surprising to us was that this "re-shaping" often involved the use of self-imposed constraints, or boundaries "that promote or preclude a certain kind of response" (Stokes, 1999: 297), that seemed to accelerate, rather than hinder, creative work. What emerged from our data was the importance of these momentary interactions involving the interplay of autonomy and constraints that seemed to enable the elastic coordination of creative group work.

Our emergent theory of *elastic coordination*—the series of interactions through which groups manage integration and de-integration to arrive at a working creative solution—builds theory on coordination and creativity. By exploring autonomy and group work in tandem, our findings peel back assumptions about creative work. Taking the tension between integration and de-integration seriously, our findings point to the importance of coordinating as an ongoing cycle of activities. First, it reveals the unanticipated role of constraints. The broader literature on creativity describes constraints as roadblocks that must be removed to allow for groups to achieve their creative goals. Put simply, we find that something once thought to be detrimental for creative work actually enables creativity. Although a limited literature exists on the benefits of constraints, this literature does not provide insights into how groups might form constraints or how they might remove constraints. That is, constraints (and autonomy for that matter) are often described as stable, contextual factors that are "granted" or "bestowed" by a leader or the nature of the context. Our findings reveal, rather starkly, that autonomy and constraints are dynamic, that they ebb and flow over the course of creative work, and that members of creative groups negotiate both autonomy and constraints to enable their own work. Second, by revealing these dynamics, our findings call into question long-held paradigms about creativity as a relatively linear process, and reveal elastic coordi-

nation as at least one recurring, cyclical component of creative work. Finally, by attending to the emergent states underlying elastic coordination, our work follows calls to "breathe life" (Dutton, Worline, Frost, & Lilius, 2006: 87) into theories of coordination by highlighting the "dynamic" "member attitudes, values, cognitions, and motivations" (Marks, Mathieu, & Zaccaro, 2001: 357) that precipitate the interactions that undergird coordination, explaining not just how coordination occurs, but also why (Okhuysen & Bechky, 2009).

These contributions are significant because they establish a theoretical foundation for further exploring the nature of coordination in creative group work. Much of the research on group work and creative group work has relied on artificial groups in laboratory settings. Although important for their precision, these settings often remove the coordinative burden that groups face. Indeed, creative researchers have urged scholars to attend more to groups in the field (George, 2007; Shalley, Zhou, & Oldham, 2004). This is important, since the little field research we have reveals that collective efforts at creative work are often rare and ephemeral (Hargadon & Bechky, 2006), and even seemingly robust creative processes such as brainstorming or design thinking seem to succeed only in select circumstances (Sutton & Hargadon, 1996). By focusing on coordination, our study reveals that imposing a practice or process (like brainstorming or design thinking) is not enough, but that group members rely on flexible boundaries that they can adapt moment to moment to support working together or individually.

A related and perhaps more fundamental implication is that our theory highlights the benefits of interactions that run counter to popular management techniques focused on creative work. For example, many managerial books, student textbooks, and academic articles tie the creative ability of groups to their ability to generate a variety of ideas. This might lead group members to easily misread the generation of constraints as a failure of group work. Similarly, process models of creative work often identify problem finding or awareness of discontinuities as a spur for creative connections as the first step in creative work (Amabile, 1983; Wallas, 1926), whereas our model reveals that groups rely on the emergence of discontinuities throughout their creative work. The cumulative result is that our model can provide new guidance to enhance creative group work.

COORDINATING CREATIVE GROUP WORK

Our study of interactions during creative group work draws from the literature on creativity. Our emerging awareness of the importance of autonomy and constraints in organizing group interactions led us to enrich our understanding of these dynamics by incorporating insights from the literature on coordination. As in many inductive studies, our review serves as a set of "orienting points" that anchored our research questions, informed our methods, and provided direction for our analysis (Dutton et al., 2006; Nag, Corley, & Gioia, 2007).

Coordination and Creative Groups: Pulling Together and Pulling Apart

Although coordination has been defined in many ways, we follow Okhuysen and Bechky's (2009) lead and define coordination as the "temporally unfolding and contextualized process of input regulation and interaction articulation to realize a collective performance" (Faraj & Xiao, 2006: 1157). Their (Okhuysen & Bechky, 2009) review of the coordination literature emphasizes the integrative function of coordination wherein collectives intertwine the components of work to achieve a common goal. They note that a focus on coordination arises from the realization that many forces pull groups apart. However, this focus on integration obscures the fact that groups often need to proactively separate in order to achieve work goals. Creativity can require deviance (Warren, 2003), divergence (George, 2007), and dissensus (Nemeth, Personnaz, Personnaz, & Goncalo, 2004). All of these dynamics have the potential to pull a group apart or cause the group to regress to earlier, more chaotic stages of group development (Tuckman, 1965). In creative work, coordination may be more challenging since it needs to enable integration while also allow for "de"-integration, or individually disrupting a sense of predictability and common understanding in the pursuit of a new idea. In sum, the inherent difficulty of managing this coordinative challenge might help explain why conditions that generate group creativity are considered to be "fragile" (Ford, 1996: 1128), and raises the broad question of how groups coordinate for creative work.

Recent work on coordination hints at how groups might infuse flexibility into their coordination patterns. Research focusing on how organizations or groups respond to disasters, crises, or surprises emphasizes how collectives prepare or repurpose existing resources to coordinate for the unexpected.

These studies often draw from work on improvisation. Improvisation emphasizes the more simultaneous planning and action that allows groups to manage unexpected challenges (Moorman & Miner, 1998). This literature hints at the need for autonomy and constraints. For example, jazz musicians use improvisation to coordinate during a jam, because they use autonomy to riff or diverge from the group while working within the constraints imposed by the song's structure and a shared vocabulary of licks (Barrett, 1998). Similarly, SWAT teams are afforded the freedom to elaborate on tasks, but they also draft plans that constrain their actions (Bechky & Okhuysen, 2011). What is unclear from these examples is how groups might coordinate when work is not framed by an external crisis or a pre-set structure, and why groups engage in particular coordinating interactions. In the sections that follow, we build on this observation by highlighting the need to consider autonomy and constraints in tandem to lay a conceptual groundwork for exploring how creative groups coordinate.

Autonomy in Creative Groups

Though scholars argue that autonomy enables creative work, it has the potential to detract from coordination. Autonomy is often defined "as the amount of freedom and discretion an individual has in carrying out assigned tasks" (Hackman, 1983; cited by Langfred & Moye, 2004: 385). Although broader definitions exist, even Breaugh, the developer of a multifactor model of autonomy, noted that the purpose of understanding autonomy more generally was in the service of being able to focus on "facets of autonomy as opposed to measuring autonomy globally" (1999: 359). Our focus on task autonomy therefore aligns with Breaugh's statement, and with research on group creative work, for several reasons. First, tasks are considered a fundamental unit of group behavior (Hackman & Morris, 1975), and groups' focus on tasks often determines their interaction patterns and group outputs (Ericksen & Dyer, 2004; Gersick, 1988). Second, creativity researchers have consistently noted that autonomy is most important at the task level (Shalley, 1991; Zhou, 1998). Third, recent work shows that autonomy may vary from task to task (Druskat & Pescosolido, 2002; Langfred & Moye, 2004); indeed, autonomy has been labeled as an "emergent state" (Mathieu, Maynard, Rapp, & Gilson, 2008). A more global definition of autonomy would preclude attention to these variations, whereas focusing on task autonomy, which we do here, brings these variations into view. Finally, since coordination includes integrating interdependent tasks (Faraj & Xiao, 2006), it makes sense to focus on autonomy at the task level. For simplicity, for the remainder of the article, we refer to task autonomy as "autonomy."

Autonomy is important in creative work because it allows individuals to investigate ideas that are intrinsically motivating to them, leading to a more thorough exploration (Amabile, 1983, 1988). In doing so, autonomy facilitates the motivational–cognitive processes that generate raw materials for creativity. But, autonomy also has a social impact. By freeing individuals to work on tasks in a way they see fit, autonomy frees individuals from having to rely on one another's perspectives (Perry-Smith & Shalley, 2003), creating not just a sense of independence from observing group norms but also a willingness to transgress them. Thus, based on the current literature, one might expect autonomy to lead to an erosion of the integration activities of coordination, or a sense of de-integration.

Even so, researchers have consistently highlighted autonomy as an enabler of group creativity. Kurtzberg and Amabile suggest "it appears that creativity can be encouraged within work groups through autonomy in the work" (2001: 287). As evidence, in a study of R&D groups, Paolillo and Brown (1978) reported positive correlations between autonomy and creativity. Also, a study of more than 300 projects in a high-tech company found that autonomy was critical for highly creative projects, especially during the initial phases of a project (Amabile et al., 1996). This lends credence to the conclusion that "autonomy and perceived control on the job will facilitate positive forms of creativity" (James, Clark, & Cropanzano, 1999: 217). Yet, autonomy does not always have a positive relationship with creative work. Results from Kim and Lee's (1995) study of 80 R&D teams revealed that autonomy within the team had a negative relationship with team performance, which included measures of innovativeness. Broader reviews have generated similar conclusions (Cohen & Bailey, 1997; Stewart, 2006). Specifically, Stewart found a stronger relationship between autonomy and performance for physical rather than knowledge work, "which is opposite the theoretical prediction of autonomy being most beneficial for teams performing creative and dynamic work." He concluded that, "additional research is needed to understand the environmental conditions that in-

fluence the extent to which autonomy improves performance" (Stewart, 2006: 46). These equivocal results suggest other dynamics are likely at play. To further explore these issues, we follow two threads. First, work by Druskat and Pescosolido (2002) suggests that autonomy might be malleable, that groups' understanding of autonomy might change with the dynamics of their work situation. This suggests the need to attend to autonomy as a more dynamic element of group work, rather than as a static element of the situation. Second, Barker (1993) found that groups given autonomy chose to restrict their freedom, suggesting the need to attend to how groups use constraints in relation to autonomy.

Constraints in Creative Groups

In considering the role of autonomy and creativity, scholars often speak of the detrimental effects of constraints to suggest that the imposition of constraints reduces intrinsic motivation and creativity. We use Stokes' definition of constraints as boundaries "that promote or preclude a certain kind of response" (1999: 297). Glynn summarizes the dominant opinion of constraints as impediments to creativity: "situations in which constraints are absent and individuals have autonomy and control seem to favor the expression of intelligence and the generation of innovative ideas" (1996: 1098). This relationship has been most clearly explored for externally imposed constraints. For example, evidence suggests that having externally imposed restrictions (Amabile & Gitomer, 1984), expectations of evaluation (Amabile, 1979) or rewards (Amabile, Hennessey, & Grossman, 1986), or working within bureaucratic structures (Hirst, Knippenberg, Chen, & Sacramento, 2011) all negatively impact creativity.

Yet, some exceptions to the belief that constraints are innately detrimental to creative work exist. Constraints can serve an important coordinating function by supporting integration. For example, groups are sometimes described as imposing constraints during the initial phase of the creative process or problem finding and problem defining (Amabile, 1983; Getzels, 1975; Unsworth, 2001). Hackley's ethnographic study of "creatives" in an advertising agency found that client briefs that were "tight"—providing more direction and less freedom—were actually described as "liberating" because they created more team trust (2000: 249). The improvisation literature leads to similar conclusions. For instance, constraining routines can stimulate improvised plans (Miner, Bassoff, & Moorman, 2001), and SWAT teams rely on predrafted plans to reinforce and limit task assignments (Bechky & Okhuysen, 2011). These examples demonstrate that constraints help group members come together, focus on a common problem domain, and exchange information, thereby helping groups guard against coordination costs.

But, there is some research that suggests that constraints can also serve a destabilizing function that complements rather than limits autonomy. Constraints can motivate individuals to seek novel solutions by forcing them to avoid using techniques that led to previous creative outcomes (Stokes, 2006). Often, under conditions of complete freedom to explore, people revert to familiar, "tried and true" responses to alleviate the cognitive complexity of too many options (Elsbach & Hargadon, 2006). Supporting this notion, Finke and colleagues (Finke, 1990; Finke, Ward, & Smith, 1992) found that students given constraints in choosing parts and functions for an invention were more creative than those who were free to choose from more extensive lists (see also Moreau & Dahl, 2005, and Chua & Iyengar, 2008, for additional evidence). In this way, constraints might complement the deintegrative force of autonomy while simultaneously providing boundaries that preclude the sort of group chaos or dissensus that generally emerges when individuals disrupt group coordination patterns (Barker, 1993; Van Dyne & Saavedra, 1996).

In short, this review opens up new areas for theorizing around the role of autonomy and constraints in coordinating creative group work. First, while constraints are typically viewed as an impediment to creativity, this review suggests that autonomy and constraints might act in complementary ways that have been relatively ignored. Also, the review suggests that both autonomy and constraints have primarily been considered stable, contextual conditions granted by people outside the group, and scholars have failed to consider the dynamism around autonomy and constraints that occurs during group interactions. For example, research on problem definition as a constraint generally assumes problem definition as a one-time event in the creative process. Cronin, Weingart, and Todorova (2011: 592) have strongly urged researchers to study group work over time, noting that, "failing to account for the dynamic profile misspecifies the causes and effects of a phenomenon." Overall, this review suggests that coordinating creative group work is very difficult since it requires

both integration and de-integration, and it hints that autonomy and constraints might play important but previously under-theorized roles.

METHODS

Context: Modern Dance Groups

Given our interest in elaborating theory on coordination in creative group work, we conducted an inductive, qualitative study using grounded theory approaches (Charmaz, 2006; Strauss & Corbin, 1990). Inductive, qualitative research is appropriate when the research question focuses on developing theory, especially theory about process (Creswell, 1998; Strauss & Corbin, 1990). Aligning with this logic, we used purposeful sampling, which relies on transparency—finding a context that offers a less cluttered view of dynamics of theoretical interest (Yin, 2009). Given our core question, we were concerned with finding a context that placed a premium on creativity and enabled transparent observation of group interactions and communication. Our interest in modern dance as a potential context initially emerged from the second author's extensive experience (cumulatively, 11 years) prior to this project with dance, both as a professional dancer and also as a member of the board of a prominent dance company. This gave us insight into the notion that modern dance places a premium on creativity, that modern dance groups tend to have a relatively flat group structure, that collective work occurs over the course of rehearsals, and that the group process would be relatively transparent.

Modern dance provides a compelling context to observe creativity since, compared to traditional forms of dance which have canonized repertoires, modern dance tends to emphasize "the creative process of finding expressive and new movements" (Atler, 1999: 474). Even though choreographers act as the group leader, the dancers still provide input on the choreographer's decisions; the choreographer enters the rehearsal space with a rough idea about the choreography, but decisions about how to work and what to work on are determined through group interactions within rehearsals. In a series of rehearsals, or working meetings, dancers and choreographers (who also often perform) iterate between generating, practicing, and refining the piece. "Piece" is an in vivo term we use throughout the paper to refer to the choreographic composition the group is creating. Modern dance places a premium on coordination since the purpose of rehearsals is to collectively develop the choreographic material to be performed. Further, much of the work of choreographing a dance is carried out in relatively bare settings—empty rooms with mirrors on one wall and an electrical outlet for a stereo to play music—and most dance work is unpaid. In sum, the general absence of typical organizational features like reward or promotion systems, departmental allegiances, or political games allowed us a relatively unencumbered view of group interactions. Therefore, dance provided an extreme setting where the phenomenon of interest would be "transparently observable" (Pettigrew, 1990).

Access and sample. We gained access to the groups for this project by contacting a well-known dance center that sponsors a tri-annual concert to showcase new choreography. Groups vetted to perform in the concert follow the following timeline: submission of a letter of interest (week 1), first review for panel of judges (week 4), second review for panel of judges (week 8), and performance (week 10). After each review, judges select which groups advance. Upon submitting a letter of interest to the concert, we contacted the choreographers to see if they would be willing to participate in our study. This allowed us to capture nearly the entire creative process and the emergent moments thought to be critical in collective creative work (Hargadon & Bechky, 2006). We followed two rounds of this process. Of the 21 solos, duets, and groups that applied for the two concerts, 7 had at least 3 members (meeting the criteria of being a "group") and conducted their rehearsals locally. Of these 7, 4 successfully made it through the selection process to perform in the final concert. We were lucky enough to get access to all 4 of these groups: Dream, Molasses, Transportation, and Evolution (pseudonyms).

The rigors of this selection process match the logic of using expert judges to rate creative performance, also known as the consensual assessment technique (Amabile, 1982). In other words, the final choreography of the groups included in our sample was vetted by expert judges who affirmed the "creativity" of the groups' work. The first author primarily collected data from Dream and Evolution and the second author primarily collected data from Molasses and Transportation. Table 1 describes the groups and provides codes for the informants (e.g., Tran-Choreo-1 would be the choreographer of group Transportation) and Table 2 summarizes the data collection described in detail next.

TABLE 1
Group Names and Descriptions

Group Name	Piece Description	Group Member Identifier[a]	Group Members	Dancer Experience	Choreographer Experience
Dream	The piece used rhythmic, athletic movement to explore themes related to dreams. The music was percussive and up-tempo and the dancers were costumed in purple dresses.	Dream-Choreo-1 Dream-Dan-1 to Dream-Dan-3	4	8.0	12.0
Molasses	The piece used a combination of gesture-based and jazz movements to explore themes related to individual differences and acceptance. The music was a combination of popular songs, and the dancers were costumed in brown tank tops and pants.	Mol-Choreo-1 Mol-Choreo-2 Mol-Dan-1 to Mol-Dan-10	12	14.5	17.5
Transportation	The piece used lyrical contemporary and ballet movement to explore themes related to life changes and transitions. The music was an original electronic sound score, and the dancers were costumed in simple dance dresses.	Tran-Choreo-1 Tran-Dan-1 to Tran-Dan-4	5	12.8	10
Evolution	The piece used gestural movement to explore themes related to animal mating and evolution. The music was a sound score of minimalist tones, and the costumes were original designs that incorporated animal-like elements.	Evo-Choreo1 Evo-Dan-1 to Evo-Dan-3	4	11.4	10

[a] To provide clarity and identify group members, we created codes that combined the group name (a descriptive pseudonym loosely based on the content of the dance), the group member's role (e.g., Choreo = choreographer, Dan = dancer), and a number.

Analytical Process

Figure 1 outlines our research process, beginning with early themes that arose during the pilot interview and illustrating how we iteratively moved between data collection, analysis, and theory throughout our study.

Development of core puzzle. Initially, we were interested in *how* groups coordinate creative work. The literature suggested opportunities for new theorizing if we took seriously the notion of the dynamic nature of group interactions.

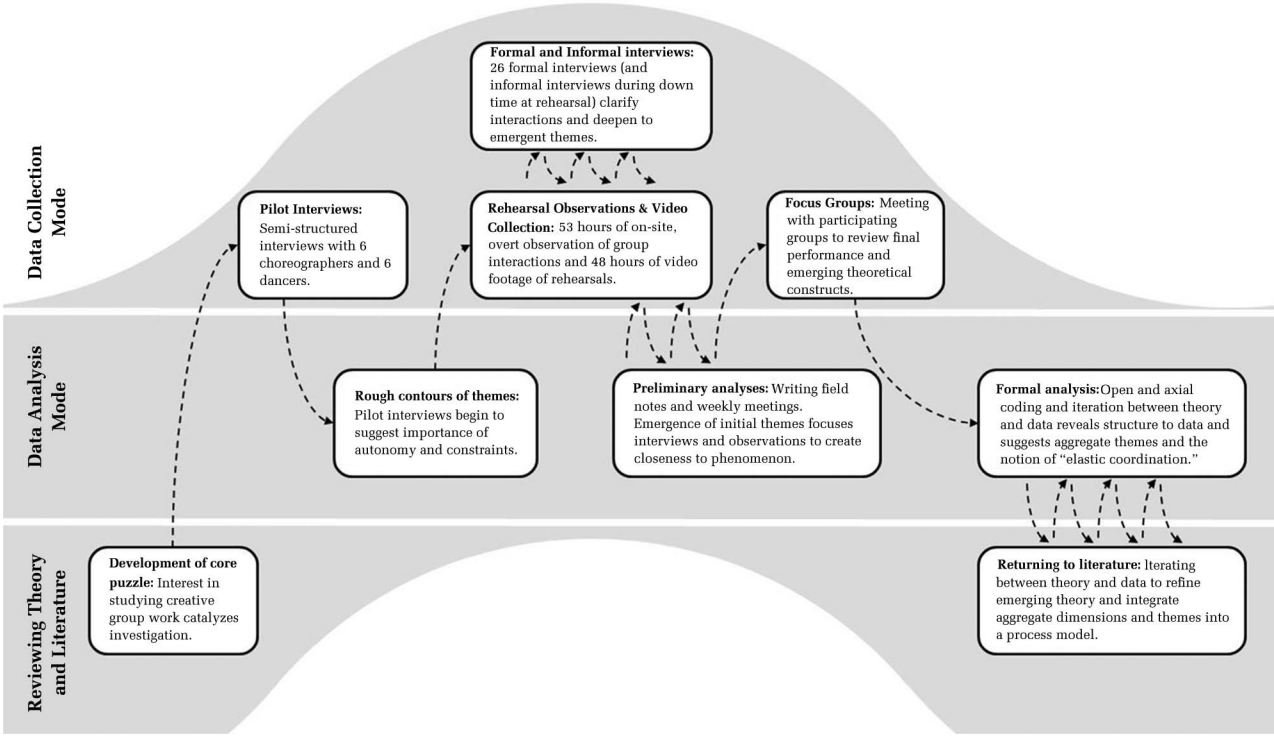
Pilot interviews. To more fully develop our intuition about our research question, we conducted exploratory pilot interviews to better understand group dynamics in modern dance groups. We interviewed 6 prominent choreographers in the city in which we intended to conduct the main study. We asked these choreographers to suggest a dancer

TABLE 2
Summary of Field Data Collection

	Group Name	Number of Formal Interviews	Hours of Rehearsal Observation	Rehearsals Attended/Total[a]	Video Footage (hr:min)	Focus Group (hr)
	Dream	6	20	9/11	15:22	2
	Molasses	9	15	6/8	10:37	2
	Transportation	6	6	5/9	12:23	2
	Evolution	4	12	6/9	9:46	2
Average		6.25	13.25	70%	12:02	2
Total	4 groups	25	53	26/37	48:08	8

[a] Because some groups started rehearsing before we had access to them, the total number of rehearsals represents a conservative approximation based on when we started collecting data and when the group starting rehearsing, as well as on our familiarity with the general rehearsal schedule of groups in this setting.

FIGURE 1
Data Collection and Analysis



with whom they worked to also complete an interview (so, 6 dancer interviews) to provide multiple perspectives. These interviews were purposely broad in scope and touched on topics such as motivation, working styles, structuring rehearsal time, and the creative process in general. None of the individuals from our pilot interviews were members of the groups that became the focus of this study.

Rough contours of themes. During these interviews, the notions of autonomy and constraints began to emerge. For example, one choreographer (Choreo01) noted how she liked to provide autonomy to her dancers, but some were more willing to explore that freedom than were others: "I didn't really give them very much direction; they had a lot of freedom in these 40 seconds. And some of them that I think were really curious used that rehearsal as time to explore and play [and] came up with the best stuff." Several interviews expressed the importance of providing clear boundaries or guidelines when giving people autonomy to create. One dancer claimed, "[T]o give somebody freedom, you actually have to give them really clear guidelines" (Dancer07). Taken together, our pilot interviews indicated that dynamics between autonomy and constraints might be critical for understanding the coordination of creative work, and that modern dance groups aligned nicely with our theoretical sampling needs, providing a strong sense of "methodological fit" (Edmondson & McManus, 2007).

Rehearsal observations and video collection. Hargadon and Bechky found that group creativity emerges in "spontaneous," "fleeting moments" that require "[research] approaches that focus on the social and continuous aspects of a creative solution" (2006: 498). To capture these moments, we relied on our observations as our primary sources of data. Typically, a group would meet 1 to 2 times per week for 1 to 3 hours, but each group determined their own rehearsal schedule. We did our best to document important interactions in real time and then follow up to understand the interactions. We attempted to attend all of the rehearsals, and also observed the 2 rounds of reviews by the expert judges as well as the final performance. To strengthen the trustworthiness (Lincoln & Guba, 1985) of our findings, we used video to document the majority of the groups' rehearsals, so that we could review their interactions later. This proved

invaluable during our analysis and during the review process, allowing us to enrich our theoretical memos and enlarge our understanding of the phenomena as we were challenged by reviewers. We administered a follow-up questionnaire to all of the participants with an open-ended question to understand the impact of the presence of a camera or researcher. A prototypical response was, "[W]e acted just the same as we would if there was no camera or researcher. Most of the time, we would forget the camera was even there."

Formal interviews and informal interviews. To enrich our understanding of the groups' interactions, we conducted formal interviews, which were recorded and transcribed. In these interviews, we set aside one-on-one time with the participants outside of rehearsals to ask a series of questions regarding the creative process. The choreographer of each group was interviewed at least twice during the process and several dancers were interviewed multiple times as well. We also informally interviewed the dancers and choreographers before and after rehearsals, as well as during breaks in the rehearsals. Typically, these shorter interviews were opportunistic and used to provide clarity on interactions we had just observed. We recorded the content of these informal conversations in our field notes.

Preliminary analyses. We met weekly throughout data collection to review our field notes and discuss similarities and differences between the groups. Because of the second author's experience in dance, we were able to leverage some of the benefits of insider/outsider research in these conversations (Bartunek & Louis, 1996); the second author was psychologically closer to the setting and offered a distinct perspective on the process from the first author, who had never occupied the role of dancer or choreographer. This difference in experience broadened the interpretative frame that we were able to bring to our theorizing (Bartunek & Louis, 1996). During this preliminary phase, initial themes began to emerge (Reay, Golden-Biddle, & Germann, 2006); we noticed that the groups seemed to coordinate by creating and relaxing boundaries and that certain types of interactions seemed to be at the core of coordinating the work.

Focus groups. In the focus groups, each group first watched a video of their performance. We then asked the group members to reflect on their performance and the rehearsal process leading up to it. During these discussions, we were able to test and expand our understanding of our emergent theory from our preliminary analyses.

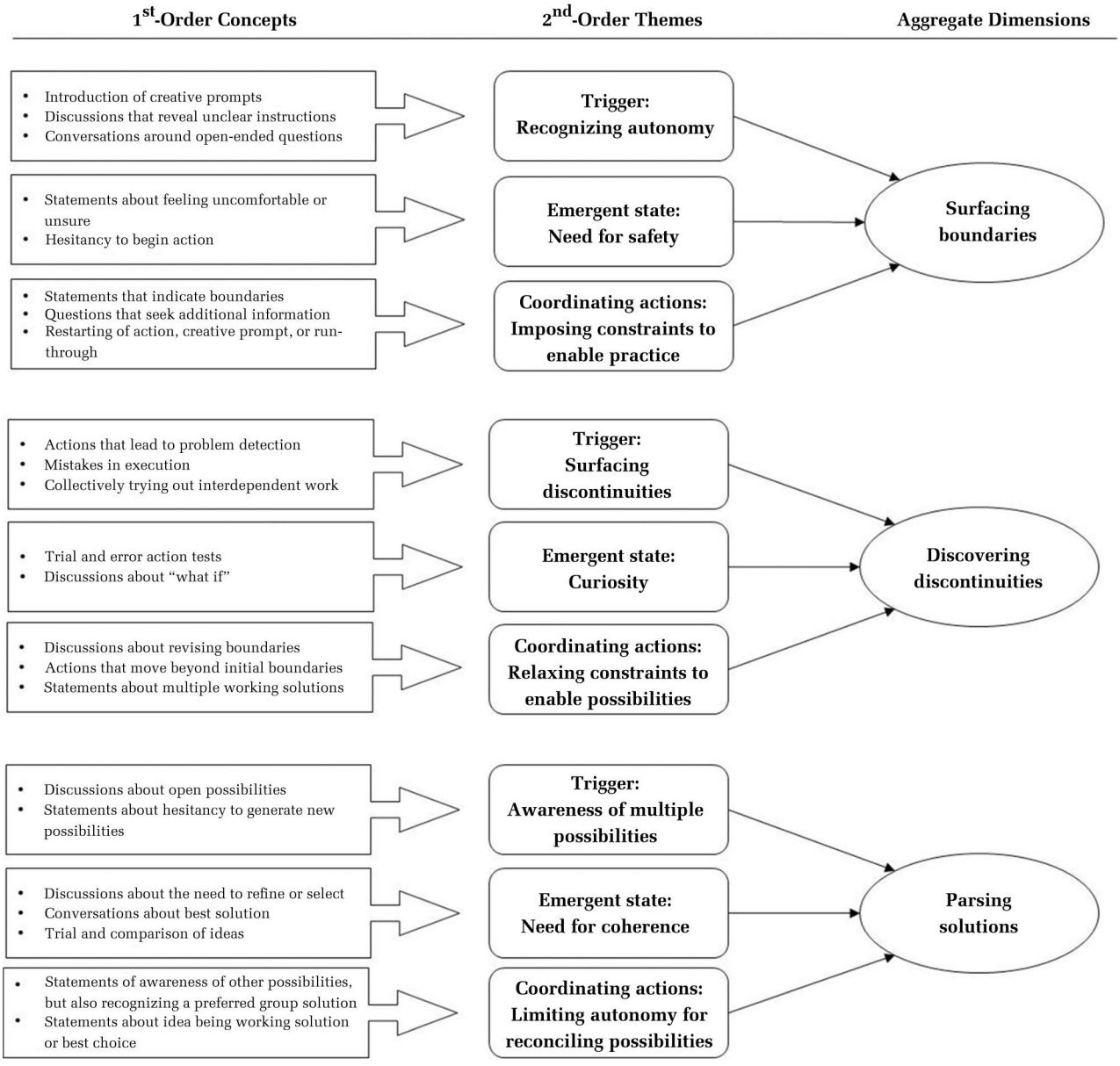
Formal analysis and returning to the literature. Similar to Reay et al. (2006), we began to read through our and field notes and discuss our preliminary ideas from the field. As the role of autonomy and constraints became more central to our understanding of coordination, we conducted more formalized coding of the field notes and transcripts using open coding (breaking down the data to understand the underlying dynamics) and then axial coding (coding across concepts to reveal more thematic relationships and contrasts) (Strauss & Corbin, 1990). Three key interaction patterns emerged—(1) *surfacing boundaries*, (2) *discovering discontinuities*, and (3) *parsing solutions*—each undergirded by a meta-structure. Specifically, during open coding, we stayed very close to the data to identify the different kinds of statements, questions, and actions that emerged in a given interaction to develop first-order concepts. For example, we noticed that some interactions were primarily driven by different participants asking a series of questions (surfacing boundaries), while others seemed to focus on physically trying ideas out and discussing what emerged (discovering discontinuities). We used axial coding to compare and contrast these first-order concepts. Through these comparisons, a structure for our second-order themes emerged around triggers, emergent states, and coordinating actions. For example, we noticed that the series of questions that were at the root of some interactions were triggered by recognizing autonomy, prompting a need for safety that led to imposing constraints (surfacing boundaries).

We further solidified our understanding of each interaction pattern by comparing the interactions to one another. Particularly with observational data, comparing interaction to interaction can allow a deeper understanding of the phenomenon than the coding of small units of analysis such as words or lines (Charmaz, 2006). During this period of analysis, we watched videos of the groups to deepen our conclusions from the analysis of our field notes. Finally, we found counterexamples, where the interactions broke down, to round out our understanding. We present our data structure in Figure 2.

FINDINGS

Our analysis of rehearsals of modern dance groups revealed that, over the course of a rehearsal, groups coordinated their work by using a set of three distinct interaction patterns: *surfacing boundaries*, *discovering discontinuities*, and *pars-*

FIGURE 2
Data Structure



ing solutions. In the sections that follow, we discuss each type of interaction pattern in turn and then describe how these interactions tend to occur in a specific pattern over the course of a rehearsal or group meeting.

Surfacing Boundaries

When we began observing modern dance rehearsals, we were surprised by what seemed to be a constant stream of questions near the beginning of each rehearsal. The interaction, below, at the beginning of a rehearsal from the group Transportation highlights this dynamic.

> TRAN-CHOREO-1: Okay, so let's talk themes before we run the piece. On Friday, we went through the poem. [Tran-Dan-1] had some questions so we talked about the relationships between the two of you. You have an obligation. You're distrustful. [Tran-Dan-2] comes around and falls. It's not this warm love-y dove-y thing. It is a little contradictory.

TRAN-DAN-1: So, at the very beginning, do we know each other?

TRAN-DAN-2: Also, at the beginning, the head is out?

TRAN-CHOREO-1: So, it is the same idea as before. You all come on as individuals. It is like you don't acknowledge until you're in a circle. I also want to set positions.

TRAN-DAN-1: I thought we did?

TRAN-CHOREO-1: Oh yeah.

TRAN-DAN-1: So, we don't know each other at the beginning, but we're all doing the same thing?

TRAN-DAN-3: What are our faces doing?

TRAN-DAN-1: Yeah, what are our faces doing?

TRAN-DAN-3: It seems weird but I don't want to look confused.

TRAN-CHOREO-1: Same as before. You are weary . . . then, from that, you start crawling, so here we acknowledge that we're a group and [Tran-Dan-2] said, "I want to do my own thing," so, so she splits off.

On the surface, the question "do we know each other?" seems to be simply a matter of clarifying expectations. Yet the communal raising of questions that follows indicates something more is happening. Tran-Dan-1 asks the initial question, but, in a matter of moments, all of the dancers have asked questions, and, in doing so, they have collectively minimized opportunities to autonomously make these decisions. A similar flurry of question asking emerged in the group Molasses when the choreographer gave the dancers directions to do "whatever you want to do," allowing open space for autonomy, for four counts within a larger phrase[2] of movement:

MOL-CHOREO-2: [Teaches first part of phrase] Then, you have two counts back and two counts front, whatever you want to do. [Teaches the rest of the phrase]

MOL-DAN-9: And we get to do whatever we want for those . . .?

MOL-CHOREO-2: Whatever you want, but travel back diagonal for two and front diagonal for two. However you want to do it. Ok, let's try it again [they go through the phrase] . . .

MOL-CHOREO-2: Ok, so I'm just going to try something with spacing.

MOL-DAN-2: I have a question. Should we do the same thing that we're doing or do different things?

MOL-CHOREO-2: No, you don't have to. You can but you don't have to. It is an open option every time you do it from now until the end of time. If you find something you like, you can do that every time. [Arranges dancers in space]. Whenever we are within two feet of you, then you start that phrase and you keep doing it until we are farther away from you. Does that make sense?

MOL-DAN-8: So, which way?

MOL-CHOREO-2: Two feet to the right or two feet to the left.

MOL-DAN-4: Oh, individually?

MOL-CHOREO-2: Yeah.

MOL-DAN-5: Then we stop in place wherever we are until you get further than two feet away?

MOL-CHOREO-2: You finish the phrase. So, if I'm traveling this way, you start and I keep traveling this way, then you finish the phrase and then stop. Make sense? Ok, let's try it.

[After running the phrase several times]

MOL-CHOREO-2: Check plus.

MOL-DAN-5: I have a question. Do you want this on the beat [shows movement from free counts] or anything during that time phrase?

MOL-CHOREO-2: I want it to be, like, two beats that are even. Like, one-two, one-two [shows some examples]. Like, it goes back back forward forward, but, within that, it's free. Does that make sense?

MOL-DAN-5: I think so.

MOL-CHOREO-2: So, it's two counts back and two counts front, but it doesn't have to be back-back. Yeah, back for two, front for two.

By the end of the interaction, five of the dancers have asked a question, each building on the last. More importantly, these questions have restricted the original "whatever you want" into a more limited sequence. The dancers still have some freedom within the newly prescribed boundaries, but far less than what was originally offered by the choreographer. It is also interesting to note that the original space offered to the dancers was only four counts—roughly four seconds or four beats of music—yet the dancers continued to impose their own constraints within that extremely limited space. By making these expectations explicit, the

[2] A "phrase" refers to a series of choreographed movements. Often, pieces of choreography are constructed by manipulating and combining phrases.

dancers are actively imposing constraints on their options to dance in different ways. Of note is the use of collective pronouns. By relying on the use of "we" and "our" in the questions ("What are *our* faces doing?" or "*We* get to do whatever *we* want for those?"), the group members acknowledge the shared nature of the constraints, foreshadowing the fact that, at some point in the future, the group members will need to integrate after they have separately explored the now-constrained space.

We were surprised at the frequency of these types of interactions, particularly given the fact that, on average, the dancers had 11.68 and the choreographers had 13.25 years of experience, respectively. Put simply, there was quite a wealth of expertise in each group, so these questions were not generated by the naiveté of the dancers or a lack of experience of managing a group on the part of the choreographers. Indeed, in the first meetings of our groups, the choreographers introduced the themes of the choreographic composition as well as logistical issues like regular rehearsal times and the expected date of the final performance. Hence, the group had already created a loosely standardized understanding of when they were working together, how they would be working, and the artistic vision of the piece on which they would be working. Even with this broad understanding, the dancers did not choose to leverage the inherent freedom in their instructions to explore different types of information (e.g., different movements, facial expressions, etc.) (Eisenberg, 1984); rather, they seemed to intentionally generate additional constraints.

In interviews and focus group conversations, participants provided insight into the need for these conversations. One dancer (Dream-Dan-2) attributed the need to a sense of confusion that comes with too much autonomy: "I think I have a hard time with sort of appreciating the freedom to create things but not really knowing what to create. . . . So sometimes I actually want almost, like, stricter direction, even though I appreciated the openness." Another dancer (Evo-Dan-2) observed, "I think you have a narrowing because you have so many possibilities [so] the structure got smaller and smaller." All of these descriptions of "stricter direction," "narrowing," and "structure" indicate that some of the interactions that take place in a group are focused on surfacing and defining boundaries. In focus groups, participants often noted the need for constraints as a necessary condition for generating a sense of safety within the group.

We labeled these interactions *surfacing boundaries* or *interactions that delimit or frame the types of information and amount of independence preferred by the group*. In our data, surfacing boundaries were typically triggered by ambiguous instruction, open creative prompts, or an explicit invitation to "generate movement" vis-à-vis improvisation, where the group recognized the autonomy they had in completing the particular task in front of them. As demonstrated in the quotes above, the emergent state that precipitated these interactions tended to focus on generating a sense of psychological safety, or "the belief that the team is safe for interpersonal risk-taking" (Edmondson, 1999: 354). Establishing psychological safety may be particularly important in the context of group creativity, as individuals are asked to share, respond to, and build on ideas (Edmondson & Mogelof, 2006). In other words, in defining constraints around acceptable ideas or exercising their autonomy to establish constraints, group members generated a sense of safety, which then allowed them to later feel safe taking creative risks within those bounds.

Choreographers and dancers both recognized the importance of this first step in establishing constraints. As one dancer (Evo-Dan-02) noted, "If I'm given a lot of freedom, I feel paralyzed, but if I'm given something to start with, it opens up possibilities." Another choreographer (Tran-Choreo-1) explained that the constraints generated provided a new resource. She observed, "If you have something to work off of, you get a lot of other ideas, but, if you have absolutely nothing to work off of, you say to yourself, 'I don't understand what you want me to do in terms of anything.'" Our data suggest that surfacing boundaries enabled the dance groups to venture into forms of discussions that seemed more innately creative. Further, in generating constraints, the group generated commonality that allowed the groups to continue to rehearse and to engage in practice, as well as allowing for integration in future group work. But, in creative work, groups not only need to integrate but also to deintegrate to generate ideas. We discuss these deintegrating interactions next.

Discovering Discontinuities

Surfacing boundaries provided parameters for exploration, setting the stage for discovering discontinuities or interactions that investigate mistakes, emergent errors, or surprises, using these sources of novelty as opportunities for independent

inquiry and exploration. For example, the conversation below emerged as the group Evolution was attempting to run through a large section of the choreography. At one point, Evo-Dan-1, sensing something was amiss, stopped dancing and began to question what was happening:

> EVO-DAN-1 [to EVO-DAN-2]: I feel like I'm in front of you now.
>
> EVO-CHOREO-1: Okay, you two do it first and we'll see how you maneuver.
>
> [The dancers practice doing the move.]
>
> EVO-DAN-2: We're not moving at the same pace.
>
> EVO-CHOREO-1: Well, we can't because you're just pivoting.
>
> EVO-DAN-2: But you two [the choreographer and Evo-Dan-1] aren't turning at the same pace.
>
> [Field note: Evo-Dan-2 demonstrates a rhythm she prefers. Evo-Dan-3 attempts it too.]
>
> EVO-CHOREO-1: Sounds great. [Evo-Dan-1], how do you feel about the timing about that?
>
> EVO-DAN-1: I think it's fine, but I don't think I should be circling you guys because I think it takes away from you.

In a similar sequence, Tran-Dan-4 notices a puzzle during a run-through involving a planned fall:

> TRAN-CHOREO-1: Let's try the fall first [the dancers attempt the move with the choreographer watching].
>
> TRAN-DAN-4: Maybe that and that, and when I feel you. I think it's also getting there in time. If I have more time to prepare my arms.
>
> TRAN-DAN-3: You want more time? Yeah, I can give you more time.
>
> TRAN-DAN-4: If I have more time, that works better. Otherwise, I'm just going up and being like [waving arms].
>
> TRAN-DAN-3: OK. Is that really as low as you can go [trying another movement]?
>
> TRAN-DAN-4: Yeah, without losing my [pointing to elbows].
>
> TRAN-CHOREO-1: Try it from the fall.
>
> TRAN-DAN-3: Actually, if we time it right I think it looks better if you turn first and then I get you. [Dancers try the fall] That way, also I know exactly what angle.

In both of these interactions, group members rely more on singular first-person pronouns (i.e., "*I* feel like *I* am in front of you" and "*I* think it looks better"). Rather than focusing on constraints that apply to the group, in these interactions, group members notice novelty based on their own individualized activities in the context of the group. Notably, the dancers are the ones suggesting new directions to the choreographer, exercising their autonomy.

These interactions also help illustrate the differences between discovering discontinuities and surfacing boundaries in several ways. First, the examples above emerged from dancing, whereas surfacing boundaries generally emerged from instructions before dancing would begin. In other words, the impetus for a discovering discontinuities interaction was generally a sense of a discontinuity: an error, a disconnect between expectations (when the dancer does something different than what is expected), or the detection of something novel (when the choreography and group movement raises possibilities that could not have been anticipated before), whereas surfacing boundaries was more about creating those expectations in the first place. Another distinguishing feature is that the dancers are no longer asking "what is right," but they are providing new options for "what *may* be right" emerging from dancers working alone. For example, as our field notes from another interaction in the group Evolution describe:

> Evo-Choreo-1 is offering a lot of hypotheticals, a lot "mights." During what feels like a lull, Evo-Dan-2 has moved to a corner and is playing with different versions of the recent sequence. Evo-Dan-1 is trying on pants and playing with ways to configure the costume. Evo-Choreo-1 is taking notes. They talk intermittently. Again, lots of "mights" and "maybes."

In other words, whereas surfacing boundaries establishes constraints, or, at least, makes them more explicit, in interactions of discovering discontinuities, the group uses the constraints established in surfacing boundaries to surface discontinuities: new puzzles, problems, or options. Then, by interacting with these discontinuities, the group pushes against the constraints, stretching and relaxing them by suggesting new ideas and previously unconsidered alternatives.

As these interactions demonstrate, one similarity between discovering discontinuities and surfacing boundaries is the spiraling nature of the communication that seems to pull all the members of the group into the dialogue. In discovering discontinuities interactions, this spiraling dynamic allowed for an initial problem to quickly multiply into a broad-ranging discussion of an array of options that

moved beyond the initial constraints. For example, during the course of a run-through in the group Evolution, the dance stopped as the group began talking about a simple set of props arranged in a circle. Originally, the conversation was about the placement of the props, which then led to a discussion of lighting and different lighting effects, which then led to the idea of taking objects from the audience, which, in turn, led to a discussion of using completely different props. Although not every discovering discontinuities interaction was so expansive, the small errors that might trigger discovering discontinuities could quickly lead to ideas that touched every portion of the final composition.

The precipitating emergent state seems to provide another contrast between surfacing boundaries and discovering discontinuities. Whereas surfacing boundaries seemed to be about creating a sense of safety or comfort with the expectations of the choreography, discovering discontinuities seemed to be driven by an inquisitive and, at times, fearless sense of playfulness. In interviews, dancers and choreographers often excitedly spoke of this dynamic. For example, Dream-Choreo-1 described the group conversations as a sort of laboratory fed by curiosity:

> I think that being a curious choreographer is, for me, key in the creation of a piece. I have been building this piece week by week. I have also edited a lot, which is the result of exploration. I like to be able to explore ideas, see if they work, and, if they don't, not being afraid to scratch. In the past, I have been apprentice to many choreographers that worked like that, and I found that it was very interesting and dynamic. I come from that school, and so I really enjoy being "in the lab" with my dancers.

Later on, the same choreographer noted that "curiosity" and a willingness to explore were characteristics she looked for when deciding which dancers to work with. The same sentiment was echoed by a dancer (Evo-Dan-3): "I really like to understand what goes on, so, if I run into something I don't understand, I ask . . . It's like an experiment . . . I think a lot of dancers are curious [in this way]." This example illustrated the social nature of the emergent state; both choreographer and dancer identify themselves as curious yet both of them indicate that they need others around for that curiosity to flourish. Our data show that these moments of curiosity often emerge as pushing against previously established boundaries, generating new ideas that catalyze even more new ideas. These interactions provide sources of variation that could be drawn upon for other aspects of the choreography, but, generally, they surfaced a set of possible solutions to the original problem.

Parsing Solutions

The third type of interaction that emerged from our data was *parsing solutions*: *interactions in which group members attempt to steer the group from a multiplicity of options to a solution*. Our data indicate that these interactions tend to emerge from the realization that there are multiple correct solutions available, or from a hesitancy to suggest one solution. For instance, in the following conversation, the choreographer is trying to get the group to consider a fairly large change in the foundation of the choreography.

> [Field note: The choreographer is doing a lot of "what if-ing" right now, bringing up new options for this series of moves. She really pushes it here by completely moving away from the foundation of the movement—which is built on mimicking animal movements—and explores adding a lot of human-centric movement. Two of the dancers seem hesitant, the third doesn't say much. The choreographer keeps pushing the idea.]
>
> Evo-Choreo-1: I don't know.
>
> Evo-Dan-3: It's a totally different concept.
>
> Evo-Choreo-1: I know? I'm sorry to be doing so much talking at rehearsal but I think it's important. What do we do about the mating dance? Do you see what I'm saying? When we pick things up [she bends down and demonstrates] and give them to you, it's weird and then you change your movement from human to animal.
>
> Evo-Dan-2: I just think the whole thing should be vague. It should all be half human, half animal, so that it doesn't read as "oh, this is human," it reads as "this is a universal concept."
>
> Evo-Choreo-1: So then I think that, when you pick up things, you do whatever a human would do with it. [She makes the bending movement again].
>
> Evo-Dan-3: I think that's a good point about being both all the time. I think if we get too human, uh, it is getting pretty heady.
>
> Evo-Choreo-1: This will also solve our problem of how we pick up our objects. Then the question being, the only time when you guys really act like guys or girls is when you are in your circles, when

you're displaying to us because we will never behave like humans.

Evo-Dan-2: Or we could make it more animal. There's a level of human already integrated here [Evo-Dan-3 and Evo-Dan-2 start playing with bent leg movements].

Evo-Choreo-1: Okay, I think I was getting a little too excited about the human situation.

The conversation begins with the realization that there are multiple options that could work, but everyone seems hesitant. The choreographer is the first to verbalize this hesitancy when she says, "I don't know"—indicating her vacillation between competing choices. As the conversation unfolds, the choreographer seems more intent on steering the group to decide on adding more human-centric movement, which leads to at least three options: alternating between human- and animal-centric movement, a hybrid of human and animal movements, or a fully animal-centric movement. Through the conversation, these options are discussed. The choreographer sees the shift toward more human-centric movement as a potential solution for interacting with their props ("objects"). The dancers feel that this disrupts the overall message of the dance and point out how the solution creates new problems. In noting, "I think I was getting a little too excited," the choreographer recognizes that it is important for her to limit her autonomy, not freely expressing new ideas, so that the group can begin to cohere around an idea. While talking, the dancers and choreographers are moving, using their movement to punctuate the points they are making, providing a rapid prototype of the solution they are suggesting. In the end, the dancers guide the choreographer away from the new proposal and back to the original concept.

In another example, group Molasses is trying to figure out how dancers should enter and exit the stage. A dancer is hesitant about how all of the pieces of choreography will be integrated and the following interaction ensues:

Mol-Dan-5: So, should I stay over there [points to stage right] after this?

Mol-Choreo-1: Do you enter [that section] from over there?

Mol-Dan-10: [Mol-Dan-3] is over there.

Mol-Choreo-1: For [that section]? You exit this way, remember?

Mol-Dan-5: I'm talking about how we enter.

Mol-Choreo-1: Ooh.

Mol-Dan-5: We end like that and we can just walk over there.

Mol-Choreo-1: Well, the only weird thing is that . . . I can circle behind the other two [dancers].

Mol-Dan-10: Yeah, and I might just change to go that way.

Mol-Choreo-1: Yeah, OK.

Here, the group needs to resolve the transitions between the pieces in order to make the pieces of choreography flow together. The choreographer expresses how difficult it is to make what seems like a simple decision, in part because that decision has effects on previous decisions. Here, again, the choreographer begins to raise additional options ("Well, the only weird thing is that . . ."), but quickly chooses to go along with the current working solution, rather than taking the conversation in a new direction.

What is interesting is the negotiated order that emerges from these conversations around how to work in an integrated way. The conversations rarely included direct confrontation, or someone directly negating an idea; rather, they often necessitated indirect rebuttals, brief demonstrations, and gentle negotiation. One choreographer (Evo-Choreo-1) reflected: "It was really helpful to me to have dancers who actually would do things and then it was up to me to figure out if it made sense or not. Then, of course, once I made a decision about that, [the dancers] gave me feedback on that decision . . . we have to run it a few times." The choreographer takes responsibility for the decisions ("it was up to me to figure out"), but quickly notes that the process was ultimately collective, including feedback ("[the dancers] gave me feedback") paired with demonstration ("we have to run it a few times").

The interactions also suggest that the motivational underpinnings of parsing solutions interactions center around a need for coherence. For example, in reflecting on these types of interactions, Evo-Choreo-1 noted:

There is a time when we needed to stop trying new vocabulary, and I really went into it—and looking at it like vocabulary because we were creating this creature that moved in a specific way—and we had to make the movements work together somewhat. And, as a crew, we stopped creating that and started just working with what we had.

What is revealing here is that, at some threshold, too much novelty becomes problematic, which means that all the individual decisions made about choreography need to coalesce into a coherent, intelligible whole and the group needs to work more interdependently after a certain amount of independence (Ford & Sullivan, 2004). Thus, the emergent state of finding a solution seems to be the need for coherence.

In sum, these interactions seem especially crucial in sifting through the options that arise from attempting multiple permutations of a dance sequence and collectively attempting to understand which options work best. In doing so, the groups limit their autonomy to arrive at an agreed-upon solution. Although choreographers often viewed themselves as leading these conversations—and, indeed, the choreographer was ultimately responsible for these decisions—we observed that the groups interacted in a respectful, tactful way during parsing solutions, and that this interaction was generally a form of collective negotiation in an effort to agree in which group members tended to limit their autonomy, rather than pure, individual decision making.

Relationships between Interaction Types: An Emergent Model of Elastic Coordination

In describing each of the interaction patterns that emerged from our data, we have also attempted to trace some of the conceptual edges of each type, such that, in much the same way that the edges of fitting puzzle pieces suggests one another, each type of interaction tends to set the stage for the next step. Specifically, our data suggest that surfacing boundaries often create a context for discovering discontinuities, which, in turn, create a context for parsing solutions. These relationships are illustrated in Figure 3, which depicts the triggers that initiate the interaction pattern, the emergent states that transpire, and the coordinating actions for each interaction pattern. Also, as shown in Figure 3, the relationship between autonomy and constraints enables the interaction patterns of elastic coordination. Although our method preempts us from making definitive statements about the level of autonomy or constraints, we were able to observe the trajectory (the increasing or decreasing influence) of these mechanisms (trajectories depicted by "upward," to note increasing, or "downward," to note decreasing, arrows in Figure 3). At the start of the cycle, the groups have increasing autonomy as the choreographers often explicitly provide them freedom to work as they wish on the given task. They also have few, if any, constraints around an appropriate working idea. In surfacing boundaries, the recognition of this autonomy prompts questioning, which results in the group exercising their autonomy to increase constraints. In discovering discontinuities, groups continue to exercise their autonomy to push against and relax constraints, thereby decreasing constraints from the start of the interaction. Finally, in parsing solutions, the groups decrease their autonomy to reduce the pool of possibilities to one preferred solution. Over the course of this interaction, autonomy decreases and constraints increase so much that only one solution fits within the bounds.

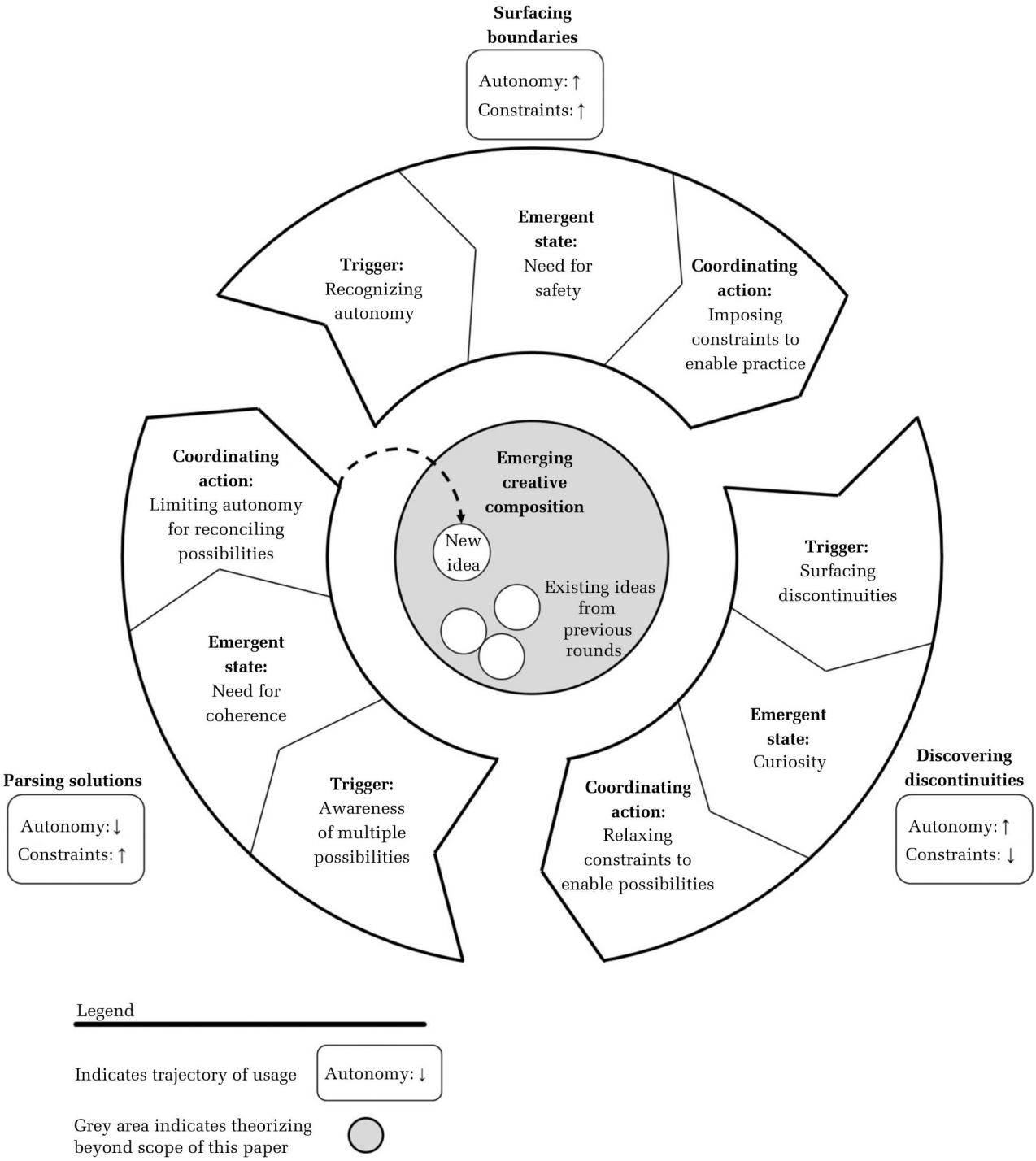
The white space between the interactions implies a loose sense of sequence (Pentland & Rueter, 1994), indicating that the preceding interaction sets the stage for the next. That is, over the course of a rehearsal, the interactions tend to play out in this order—not in one seamless process, but as a series of interactions interspersed with the work of developing and rehearsing dance movement. In sum, in the dance groups we observed, groups relied on subtle interactions, sometimes increasing their autonomy and sometimes limiting it, during rehearsals to create a rhythmic ebb and flow, effectively generating enough constraints to guide action but also allowing enough flexibility for pushing against these constraints to recognize and refine novelty. Cumulatively, each cycle of interactions results in a working solution or new idea.

While we focused primarily on interactions that occurred within rehearsals in service of arriving at a working solution or idea, we also noticed that, throughout the rehearsal process, creative groups engaged in interactions specifically focused on working with several ideas, or phrases that had been produced through elastic coordination. In other words, groups combined and manipulated working ideas and solution to arrive at an aggregate product or an *emerging creative composition*, as our model indicates. These interactions were less frequent and were scattered throughout the rehearsal process as ideas accumulated. One choreographer (Mol-Choreo-1) described this type of work as a puzzle:

> I feel like it's like a puzzle. We have the puzzle pieces now, and it's, like, kind of like when you start puzzling it. You do the outline first—that's, like, very first—and then everything else is just kind of, jump it around . . . So it's kind of random. We have enough chunks to just kind of rearrange them, trying different ways.

These interactions typically involved playing with the timing of when particular dancers executed vari-

FIGURE 3
A Model of Elastic Coordination in Creative Work



ous ideas, the placement or formations of the dancers as they executed the ideas, or the order or sequence of ideas. For example, in one rehearsal, the group Dream played with the ordering of the ideas:

Dream-Choreo-1: We're going to play today with those four movements [referring to the movements they just practiced]. At any moment, you can sit and add and go back down. It doesn't have to look

sequenced at this point. Can we try that? Let's just try that?

DREAM-DAN-2: Are we doing them in any order, the movements?

DREAM-CHOREO-1: No.

In another interaction, a choreographer in the group Molasses asked different dancers to execute the movement to determine who would perform the idea in a particular section of the choreography:

MOL-CHOREO-2: So, let's try Mol-Dan-3, Mol-Dan-7, and Mol-Dan-4 [all the other dancers leave the stage. Music starts. The three do the movement]. Let's try Mol-Dan-1, Mol-Dan-4, and Mol-Dan-2 [different dancers come on, the other dancers go off]. At the end, you don't have to pose, just keep it moving [music starts, new three do movement]. Let's try Mol-Dan-5, Mol-Dan-6, and Mol-Dan-1. Ready? [Start music, new three do movement, dancers wait around]. OK, I don't want this to feel like an audition. I'm just trying to find the three people who do it the most differently, just so you know, looking for different movers.

These examples show how groups worked with ideas and solutions that were generated through a process of elastic coordination. They also hint at the importance of having ideas that are somewhat bounded, like puzzle pieces, so they can be easily mixed and matched in service of generating an aggregated creative product. One of the important assumptions that these interactions reveal is that a larger creative product cannot be envisioned until the creative workers have a sense of the pieces, and that the product emerges as these pieces are rearranged in new ways.

The groups, however, did not always effectively use these interaction patterns to arrive at these bounded ideas. For example, we noticed that sometimes groups failed to establish constraints, which led to a lack of clarity that prevented the group from continuing to create. For example, in the group Transport, the following interaction occurred:

TRANS-CHOREO-1: So, we're going with original music for the sake of tempo. Let's play around, and start walking with the music.

[Music starts. Dancers begin moving. Dancers stop and look at one another.]

TRANS-DAN-2 [to another dancer]: Was that it?

TRANS-CHOREO-1: Don't worry about it. It is just for tempo.

[The dancers try again and stop because they are confused.]

Without clear constraints, the dancers were unable to "play" effectively. There is too much ambiguity and confusion, which stops creativity rather than propelling it forward. In speaking about the piece more generally in an interview, one of the dancers [Tran-Dan-1] commented, "I do kind of feel real lost." In some cases, we noticed interactions in which ideas were presented and constraints established, but group members failed to surface discontinuities to push against or to question the constraints and failed to generate new possibilities. In these situations, the first idea would often end up as the working solution, short-circuiting the groups' ability to generate multiple options from which to select the best idea. Finally, we noticed that, at times, groups failed to cohere around a single solution, and, instead, kept several options open. For example, in the group Evolution, a dancer (Evo-Dan-2) asked, "So wait, how many counts do we circle?" and the choreographer replied, "So this is maybe six, maybe eight, maybe ten for you." Afterwards, the group started working on another piece of the dance and the solution was not finalized. In these situations, rather than agreeing on a working solution, the groups either returned to the idea at a later time or never reached a finalized solution upon which everyone in the group agreed. These interactions suggest that working with the three interaction patterns of surfacing boundaries, discovering discontinuities, and parsing solutions facilitate a creative group's ability to establish clear constraints, generate possibilities, and reconcile possibilities to arrive at ideas and solutions that are the foundation of emerging creative compositions.

DISCUSSION

By considering the interactions of modern dance groups over the course of a creative project, we have described a model of elastic coordination that illustrates how groups are able to repeatedly deintegrate so individuals can develop divergent ideas from unique insights, and how groups are able to (re)integrate by collectively building on individual work to synthesize ideas into a final solution. Our theory of elastic coordination builds theory on how and why groups coordinate for creative work, challenges assumptions about the role of autonomy and constraints in creative work by dem-

onstrating how the two dynamically complement each other to facilitate coordination, and provides an alternative perspective to creative stage models by emphasizing cyclical group interactions.

Managing Integration and De-Integration

How elastic coordination happens. Our findings both affirm and extend research on coordination. Recent research on coordination has emphasized the importance of integration—the ability of groups to create a sense of mutual accountability, task predictability, and generating a common understanding of their work (Okhuysen & Bechky, 2009). For example, groups under duress use narratives to create a sense of mutual accountability and generate new actions (Quinn & Worline, 2008), SWAT teams develop a sense of predictability for coordinating in the face of surprise (Bechky & Okhuysen, 2011), and groups responding to disasters like Hurricane Katrina create a common understanding out of diverse pools of expertise (Majchrzak, Jarvenpaa, & Hollingshead, 2007). Weick (1979) observed that collectives keep "falling apart," that processes and routines are always open ended to some degree, and that there is the possibility that they might unfold in incoherent, problematic, or otherwise unpredictable ways. Focusing on coordination as integration helps to stave off this falling apart by highlighting forces that hold groups together, and the groups we followed showed this ability. However, many of these examples highlight how groups coordinate as a response to external pressures toward falling apart. We know relatively less about groups that might need to proactively fall apart or de-integrate as a way of enabling creative work by embracing the complexity of the incoherent, problematic, and unpredictable. Festinger foreshadowed the relative difficulty of simultaneously managing integration and de-integration. In an early review of the groups literature, quoting Cohen, he observed:

> [I] would like to mention a very stimulating theoretical discussion by Cohen . . . in which he raises the question as to when, if ever, one may expect groups to be creative or original in their functioning . . . [Cohen] discusses the interesting hypothesis that pressures toward agreement in groups may serve as an effective deterrent to creativity and originality.
>
> (Festinger, 1955: 207)

Our emergent theory of elastic coordination extends theorizing on coordination by suggesting a complement to integration—de-integration—that helps override the "pressures toward agreement" by a group's proactively infusing unpredictability and new understandings (that might challenge "common understandings").

Understanding how de-integration might occur is pivotal, because, without it, a host of literatures on group behavior—for example, work on groupthink, the common information effective, dissensus within groups and minority dissent, and violating group norms—all suggest that offering new ideas that violate existing coordinative patterns creates the risk of serious penalty for the individual(s) involved (see reviews by Esser, 1998; Hinsz, Tindale, & Vollrath, 1997; Mesmer-Magnus & DeChurch, 2009; Stasser & Titus, 1985). Even studies of creative groups show that group members often spend more effort trying to maintain a sense of agreement than they do considering new ideas (Brophy, 2006). In one telling example, Van Dyne and Saavedra (1996) conducted a field experiment in which they assessed the creative work of study groups. They included confederates in some of the groups. The confederates were selected based on a natural inclination toward dissension, and were subsequently trained and instructed to "exercise dissenting influence" within their groups (Van Dyne & Saavedra, 1996: 157). Even though the groups with the confederates outperformed control groups in terms of divergent thinking and originality of solutions, the confederates described the difficulty of enacting their role. For example, one confederate stated, "[T]he role was stressful and I felt the pressure of my role." Another noted, "I was angry at three out of five group members. Sometimes I hated the group." Finally, another revealed, "It was hard because others didn't appreciate my influence" (Van Dyne & Saavedra, 1996: 162). Even when individuals were naturally predisposed to dissent and provided with training, they found the process difficult, leading to depleting relationships and a sense of futility. Although our study cannot address the individual differences that are important in creative work, it does shine a spotlight on the interactions that seem to provide a more tenable solution: groups can coordinate in ways that allow them to reap the benefits of dissent, divergent thinking, and individual exploration without creating the substantial social costs.

Why elastic coordination happens. Studies of coordinating often explain "how" while ignoring "why" groups engage in certain coordinative interactions (Okhuysen & Bechky, 2009). Here, we also

make a contribution by surfacing "why" group members engage in specific coordinative interactions at various points within creative work. Specifically, our data highlighted three emergent states that motivated group behavior: psychological safety, curiosity, and coherence. The notion that safety is important is not unique to our paper; previous research has shown that psychological safety promotes group learning and experimentation (Edmondson, 1999). However, a recent meta-analysis showed that psychological safety had a weak positive but non-significant relationship with innovative outcomes such as creativity (Hülsheger, Anderson, & Salgado, 2009). Our theory may help to explain this discrepancy by highlighting the importance of psychological safety as a foundation that establishes a climate for other important states that move the group's efforts forward—in surfacing boundaries. As such, our work underscores that creative groups likely need to draw on diverse types of motivation, given the equally diverse array of tasks they need to accomplish (George, 2007). For example, psychological safety provides an appreciation of existing group norms, curiosity motivates group members to transgress those norms or explore outside of them, and coherence allows groups to bring ideas back into a comprehensible pattern.

While curiosity has been hinted at as an important precursor to creative work, little scholarship has established a connection or explained the role of curiosity. Unsworth (2001) notes that curiosity may be particularly important in understanding "proactive creativity," or creativity that involves discovering problems through internal volition (rather than an external request, such as a manager assigning a new task or project), and in understanding why individuals engage in problem finding and the subsequent activities that emerge from it. Yet, very little scholarly work has explicitly looked at groups engaging in proactive creativity, as we do in this study. For example, brainstorming research tends to focus on problems that are assigned or closed (Nijstad et al., 2006). This focus on more responsive creativity might explain why this connection between curiosity and creativity remains under-theorized. Recent work brings attention to the role of curiosity in social interactions by highlighting the contagious nature of curiosity to suggest that curiosity produces social "ripples" that influence collective behavior (Harrison, 2011: 113). Further, Harrison (2011) argues that curiosity can be a force that enables organizing around collective action. Here, we find that curiosity drives communication spirals that organize the group to push against the boundaries of their idea space. As other members become aware of one another's experimentation, as new ideas emerge on the boundaries of constraints, they are drawn into similar forms of experimentation. Hence, psychological safety, generated by the construction of constraints, actually enables curiosity, which, ultimately, generates new ideas—much like the mythical edict to "keep the box closed" motivated Pandora to open it.

Coherence also served as an important emergent state for coordinating interactions. Although most creativity research has examined issues of new idea generation, understanding the entirety of creative work requires understanding how these generated ideas are selected. Studies have shown that individuals prefer a sense of coherence in such varied domains as fashion (Bianchi, 2002), cuisine (Bäckström, Pirttilä-Backman, & Tuorila, 2003), and even academic writing (Kaufer & Geisler, 1989). Chua, quoting Adorno (1999), notes that the coherence needed to generate something truly creative is often the result of "an infinitely sensitive and fragile logic, one that points to tendencies rather than fixed norms governing what should be done or not done" (2007: 62). This "logic" emerges as group members suggest an array of solutions. Choosing a solution creates a sense of finality for the current problem at hand, but also generates a "tendency" for future solutions since these solutions will eventually have to fit together. This hints at an underexamined aspect of group creativity: the need to create coherence out of the creative raw materials generated by the group and the realization that the final creative product is generally a compilation of creative ideas. More research can be done exploring this issue.

Autonomy and Constraints as Dynamic Complements

Creativity scholars have long lauded the importance of autonomy. Our work both affirms the importance of autonomy while revealing important complementarities between autonomy and constraints. One of the more surprising dynamics that emerged in our data concerned the way that autonomy and constraints worked in tandem—and, especially, the benefits groups received by using constraints. Constraints are generally assumed to impede creative group work. This assumption has been questioned in recent work examining work standardization (Gilson, Mathieu, Shalley, &

Ruddy, 2005), routinization (Ohly, Sonnentag, & Pluntke, 2006), and customer innovation (Moreau & Dahl, 2005). Each of these settings has shown that constraints can have some positive impact on creative work; for example, standardization improves the impact of creativity on customer satisfaction (Gilson et al., 2005). However, none of these studies examined constraints that emerged from within groups themselves. Moreover, in all of these studies, workers experienced constraints as a fairly fixed element of the work environment. Extant research, then, pays scant attention to how groups impose their own constraints, where the constraints come from, and how groups outgrow their constraints.

Whereas the creativity literature has focused almost exclusively on the cognitive function that constraints serve and the improvisation literature has focused almost exclusively on the social function that constraints serve, we integrate these two perspectives to show that constraints serve a powerful dual role in group creative work. In our data, we found that dancers used constraints as a cognitive resource by using them as a standard against which to detect discontinuities, which provided avenues for new exploration and new ideas. Perhaps more importantly, constraints acted as a mechanism that enabled the group to set the stage for stretching their sense of integration, and, ultimately, reintegrating. Specifically, the freedom of autonomy, often suggested by the choreographer, served as a catalyst for the dancers to build boundaries that closed off some opportunities for individual work. However, these constraints allowed individual dancers to explore ideas without going radically far afield from one another, smoothing the later return to interdependent work. The constraints imposed by the dancers were able to facilitate the stretching between independent and interdependent work because the constraints were an emergent coordinative mechanism from within the group. The imposition of constraints can be tricky because constraints can easily act like norms, as, like group norms, constraints are somewhat arbitrary social arrangements that can persist silently cloaked in assumptions (Jacobs & Campbell, 1961), and creativity often requires deviating from these types of assumptions (Warren, 2003). However, when the entire group is involved in the generation of constraints vis-à-vis surfacing boundaries, then the constraints are made explicit and therefore more easily contestable. This helps to remove the normative danger associated with de-integration. In sum, autonomy alone is not enough for creativity to flourish: the autonomy needs to be managed dynamically. That is, one of the biggest benefits of autonomy is that group members exercise their autonomy by first actively choosing how to constrain it and then, subsequently, by pushing against their self-selected rules.

Finally, autonomy is often characterized as "good" and constraints are characterized as "bad," positioning these two constructs in opposition or opposite poles along the same dimension. The definition of autonomy focuses on having *freedom, discretion, or control* to carry out tasks as desired. In comparison, the definition of constraints focuses on anything that promotes or precludes particular types of responses; the definition does not speak to an experience, but, rather, a condition around the appropriateness of particular responses or solutions. Certainly, there are types of constraints that may diminish freedom or control, as is the case with external constraints. In our research, however, constraints are leveraged as a tool to help generate solutions. Rather than being perceived as controlling, in our data, constraints were more often experienced as liberating—a useful device to facilitate the generation of ideas and coordinate the group. Our research suggests that autonomy and constraints can coexist and act as "separate, but linked" dimensions (Lewicki, McAllister, & Bies, 1998: 439). High autonomy need not be the same as low constraints. Indeed, work by Sawyer (2007) suggests that improvisational groups that correctly balance autonomy and constraints can achieve a sense of "group flow" that enhances creative performance. Hence, understanding the appropriate balance between autonomy and constraints offers new conceptual levers for exploring group creativity.

Moving from a Linear Creative Process to Cycles

Our model also extends our current understanding of creativity by challenging the dominant view of creativity as a linear process and, instead, suggesting the importance of cyclical group interactions that, over time, produce a creative composition. While stage models offer one view of the creative process, recent research in collective creativity has emphasized the importance of momentary interactions (Hargadon & Bechky, 2006). Yet, it is possible that, over the course of a creative project, these interactions occur in a sort of rhythm. Marks et al. (2001) observe that group interactions often compose a "recurring phase model" where

the outputs of previous group interactions become the input for the next phase of work, the next set of group interactions. A focus on interactions helps to explain both the overlap and differences between our findings and other models. For example, Anderson and West's (1998) measure of innovative climate describes working groups as having a sense of vision, participative safety, support for innovation, task orientation, and interaction frequency. Our findings affirm and extend their work, identifying the importance of safety and interaction frequency, and it is arguable that our findings imply some of the other dimensions, too. However, Anderson and West note that their factor structure is variable (some samples produce a four-factor structure, others a five-factor structure) and that within group agreement can often be low. This raises the possibility that understanding creative group work is less about understanding the overall creative climate or coarse stages models and more about understanding the interaction patterns that enable group members to build on one another's ideas and, ultimately, integrate them into a synthetic solution that has a sense of coherence.

Our findings also open new avenues for research by suggesting the importance of viewing creativity as compositional rather than a unitary idea. Our emphasis on composition is, in part, tied to our context. That said, a compositional view of creativity seems to generalize to a host of settings, such as science (articles are generally bundles of good ideas rather than one good idea) (Simonton, 2003) or product and service development (most products or services require the artful integration of many ideas) (Im & Workman, 2004). Viewing creativity as a composition is an important departure from many creativity studies that simply look at the generation of ideas without acknowledging that, to create a truly creative solution, creative groups likely need to work together to integrate those ideas into a coherent whole. Importantly, our focus on composition dovetails with and extends work by Campbell (1960) and Simonton (1998, 2010) on creativity as a process of variation and selective retention in group work. Specifically, our work extends theory by emphasizing that groups will have to go through the process of generating and integrating new ideas multiple times, and, more fundamentally, this means that groups have to manage coordinating integration and de-integration continually throughout the process.

The sort of dynamism evoked in our findings is echoed in work that describes "design thinking," or processes used by industrial design firms (Brown, 2008). However, these design models fail to describe the coordinative difficulty of these interactions. Famously, IDEO used this type of design process to develop a novel shopping cart for ABC's television news magazine *Nightline*. At one point in the segment, a subgroup forms that self-classifies as a "group of adults" and finally has to guide the group to shift between activities because the process itself does not provide enough coordinative guidance. Not surprisingly, in a review that compared 23 design thinking models with 19 creativity processes, the authors concluded that both types of models were useful in teaching "novices," but did not capture the complexity of doing creative work (Howard, Culley, & Dekoninck, 2008). Hence, whereas these design models speak to a similar sense of iteration between activities, like the sequence we identified, by failing to acknowledge the emergent states that might cause these types of interactions to emerge or the reasons why one interaction generates the next, these models fail to fully tackle the coordinative challenges that they are at least implicitly designed to solve.

Broader Implications and Directions for Future Research

We selected the context of modern dance because it allowed us a degree of transparency in viewing how creative groups manage coordination. Given the physical nature of dance, and that the medium of knowledge work is the physical body, we were able to easily view how thoughts and ideas were being developed within the group. Also, the fact that physical movement is the primary medium effectively enabled groups to "mock up" or "prototype" a new movement in a matter of seconds, and thereby provide instant evidence to inform an emerging conversation. This ease of visibility allowed us to "[tap into] phenomena that are uniquely or most easily observed in nonbusiness or nonmanagerial settings but nonetheless have critical implications for management theory" (Bamberger & Pratt, 2010: 668). Another advantage was that our groups were participating in a program that allowed their final work, their choreography, to be vetted by experts. Hence, we were able to study groups that were successfully creative (the counterpoint to this advantage is that we did not compare our groups with non-creative groups, which might reveal different coordinative patterns).

Despite these strengths, it is important to consider how our findings and theorizing transfer and compare to other work contexts. Given our qualitative field methods, we focus on describing how our context is similar to others in order to allow for "transferability." As Lincoln and Guba suggest, "transference can take place between contexts A and B if B is sufficiently like A on those elements or factors or circumstances that the A inquiry found to be significant" (2002: 207), or when there exists "congruence between sending and receiving contexts" (1985: 124). Our groups had individuals with a lot of experience, a relatively flat group structure, used rapid prototyping, and worked together for a temporary period. Therefore, our insights are likely most useful in considering groups with similar structures, including a variety of professions in which outputs can be mocked up rather quickly such as computer coding, graphic design, or even traditional product design that might utilize 3-D printing. That might seem to exclude extremely technical, long-duration projects (such as designing a Mars rover), but, even in these longer projects, these cycles might still surface as groups work on the subcomponents. How elastic coordination evolves over longer projects presents an area for additional inquiry. It might be that these groups rely on some interaction patterns more heavily at different points in their process. For example, it could be that surfacing boundaries interactions occur more frequently at the outset of group work or during points of disruption, whereas parsing solutions interactions occur more readily during important decision points on a project. Future research could begin to apply elastic coordination to longer projects to observe these variations. Also, the importance of group experience merits further exploration as experienced individuals might be most able to help foster the sort of collective coordination we witnessed. In sum, our context has important similarities with creative project groups in more traditional organizational settings, and such groups are becoming increasingly important since much of knowledge creation now takes place in the context of project groups (Wuchty, Jones, & Uzzi, 2007).

While we believe that our findings have implications for project groups within organizations, particularly those with the characteristics described above, exploring the unique aspects of our sample and context also opens up possibilities for future research. For example, our sample is almost 100% female, which raises the question of how groups with different gender compositions might work with autonomy and constraints differently. Research suggests that men and women differ in their communication, which may affect group dynamics around autonomy. For example, Hall's (1978) meta-analysis shows that females generally demonstrate a stronger ability to decode nonverbal cues, and a recent study found that groups with a greater percentage of female members demonstrate a greater social sensitivity, which was the strongest predictor of collective intelligence (Woolley et al., 2010). The homogeneity of our sample raises broader questions about individual differences in general. One could imagine a thought experiment in which there are two groups and the average individual attributes conducive to creativity (creative personality, experience in creative work, etc.) of one team is greater than the other; another, similar sort of question might concern whether groups starting out with a more creative initial "working idea" require even more adherence to these coordinative interactions. We think these differences would matter in our model, but perhaps in a counterintuitive way. While we agree that the highly creative group is more likely to produce a creative outcome, we also suggest that, to be effective over time, the more highly creative group will rely even more strongly on elastic coordination dynamics since their individual creative experiences will provide them even more fodder for introducing ideas that threaten to pull the group apart. This sort of thought experiment further illustrates the need for more studies of group creativity, since it is unclear that more of a good thing at one level of analysis (in this case, individual creativity) necessarily produces more of a good thing at another level of analysis (group creativity). Future research can extend our findings by testing them in more traditional organizational contexts with greater attention to individual differences in group membership.

Beyond future research suggestions born out of the limitations of the study, we also feel that the strengths of the study suggest opportunities for future work. Specifically, the notion of elastic coordination and the dynamics of surfacing boundaries–discovering discontinuities–parsing solutions might provide a powerful framework for designing interventions in group work that could be tested and refined in lab settings and then used in organizations to help improve the productivity of group meetings that aim to be creative.

CONCLUSION

Working collectively often seems like an effective tactic in creative work since group work confers the benefits of a broader pool of ideas, greater information processing power, and the opportunity to build on and refine one another's suggestions. What is often ignored is the added challenge that group work presents: the need to coordinate individuals as a cohesive group. Creative group work requires people to interact in ways that leverage the strengths of collective work while avoiding the pitfalls—fearing evaluation, focusing on common information, and deleterious conflict. Our emergent model of elastic coordination provides a new theoretical basis for exploring how groups manage these dynamics that we hope will stimulate a more nuanced appreciation of group dynamics and generate future research.

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