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LEADING THROUGH CONSTRAINTS: INVESTIGATING THE EFFECTS OF LEADER CONSTRAINT FRAMING ON CREATIVE PROCESSES AND PERFORMANCE

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LEADING THROUGH CONSTRAINTS: INVESTIGATING THE EFFECTS OF LEADER CONSTRAINT FRAMING ON CREATIVE PROCESSES AND PERFORMANCE

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Abstract

An emerging body of research suggests constraints can either hinder or facilitate creativity and innovation in organizations depending on a variety of factors, including how the constraints are perceived by those engaged in creative work. When perceived as a source of creative challenge or opportunity, for example, constraints can motivate creative engagement and subsequently enhance creative performance. Despite the importance of perceptions like these, research examining the variables likely to influence perceptions of constraints is scarce. In fact, although leaders are often responsible for identifying and communicating constraints to those engaged in creative work, little research has examined communication strategies leaders might use to shape perceptions of constraints in a manner that drives creative engagement and performance. In this experimental study, we examined how a leader's use of two constraint *framing* strategies—convergent and divergent—might differentially influence performance on three creative processes—problem definition, idea generation, and idea evaluation. Additionally, we examined whether the effects of these framing strategies are contingent on participants' creative self-efficacy and the timing in which constraints are introduced throughout the creative process. The findings provide evidence for divergent constraint framing as an effective strategy by which leaders can promote engagement in creative processes and enhance creative performance, particularly when constraints are introduced during early stages of a creative effort. The theoretical and practical implications of these findings for organizational leaders are also discussed.

Keywords: leadership, framing, constraints, creativity, creative problem-solving

Leading Through Constraints: Investigating the Effects of Leader Constraint Framing on Creative Processes and Performance

The survival and success of modern organizations are increasingly dependent on the sustained implementation of innovative products, processes, and services (Baruah & Ward, 2015; Connelly & Zaccaro, 2017; Love et al., 2009; Zhang et al., 2018). Successful innovations, however, emerge in large part due to the creative problem-solving efforts of those asked to pursue innovative projects (Mumford et al., 2023). Although this point underscores the value of creativity to organizations, creative problem-solving is a highly complex endeavor requiring the execution of a series of dynamic and demanding cognitive processes (Mumford et al., 1991). Combined with the understanding that creativity is essential to organizational success, this point has recently led to more research on the factors that serve to facilitate or hinder creative problem-solving in organizations (Medeiros et al., 2014).

Of the various situational factors shown to influence creativity, a growing interest has centered around constraints (Medeiros et al., 2018). Constraints can be defined as any externally imposed factor within a problem domain that places limits, restrictions, or requirements on problem solutions (Acar et al., 2019). The growing interest in constraints is in part due to their prevalence in organizational settings (e.g., deadlines, resource scarcity), which makes research on the effective management of constraints critical to the success of creative efforts. However, interest in constraints has also grown due to their somewhat paradoxical and ambiguous role in creative problem-solving (Medeiros et al., 2018; Rosso, 2014). Initially, constraints were thought to inhibit creativity by reducing intrinsic motivation and impeding the free and unrestrained thought required to produce novel ideas (Amabile, 1979; Rosso, 2014; Ryan & Deci, 2000). However, as additional evidence accumulates on the subject, it has become clear that constraints

can also facilitate creativity through a variety of cognitive and motivational mechanisms (Acar et al., 2019; Baer & Oldham, 2006; Gilson et al., 2005; Medeiros et al., 2014). Given these diverging perspectives and findings, the literature on constraints has been somewhat inconsistent and disconnected, prompting Acar et al. (2019) to provide an integrated review of the moderators known to condition the effect of constraints on creativity. Although their review delineates a variety of individual, team, and organizational-level moderators, one variable receiving surprisingly limited attention is leadership.

Leaders may play an important role in determining the type of effect constraints will have on creativity. For example, some evidence suggests the facilitative effect of constraints depends on how the constraints are perceived (e.g., challenging vs. controlling) (Acar et al., 2019). Combined with the fact that leaders are often responsible for communicating constraints to those engaged in creative work (Mumford et al., 2019; Mumford et al., 2022), leaders may be uniquely positioned to use communication strategies that shape followers' perceptions of constraints in a manner that enhances creative engagement and performance. Thus, the goal of this study was to assess different constraint *framing* strategies leaders might use when introducing constraints to those engaged in creative work. Drawing on the conceptual overlap between the functional role of constraints and the processes of divergent and convergent thinking, we propose leaders can frame constraints either divergently or convergently, with each strategy having implications for how followers perceive and respond to constraints. Based on these propositions, we tested whether these framing strategies exert differential effects on three creative problem-solving processes—problem definition, idea generation, and idea evaluation. In addition, we tested how the effect of these framing strategies on creative processes and performance may depend on

followers' creative self-efficacy and the timing in which constraints are introduced throughout the creative process.

Constraints and Creative Problem-Solving

Creativity can be defined as the generation of high quality, original, and elegant solutions to novel, complex, and ill-defined problems (Besemer & O'Quin, 1999; O'Quin & Besemer, 2011; Christiaans, 2002; Mumford & Gustafson, 1988). Given the complex and ill-defined nature of creativity, many scholars have sought to identify the cognitive processes involved in the production of creative solutions (e.g., Treffinger & Isaksen, 1992). One of the most widely supported models of creative problem-solving was proposed by Mumford et al. (1991), who described creative problem-solving as the execution of eight processes: 1) problem definition, 2) information gathering, 3) concept selection 4) conceptual combination, 5) idea generation, 6) idea evaluation, 7) implementation planning, and 8) adaptive monitoring. Several studies across lab and organizational settings provide evidence for these processes in predicting creative performance (e.g., Mumford et al., 1997; Vincent et al., 2002). Thus, we primarily draw on this model in conceptualizing the role of constraints in creative problem-solving.

Constraints are common to organizational life (Acar et al., 2019; Medeiros et al., 2018). As such, constraints are likely to exert influence across the entire creative problem-solving process (Medeiros et al., 2018), making their consideration critical to the success of creative and innovative efforts. However, constraints have been theorized to influence creative problem-solving in a variety of ways. Early researchers argued constraints negatively impact creativity by hampering motivation and reducing perceptions of autonomy (Ryan & Deci, 2000; Shalley et al., 2004). Indeed, some studies support these propositions. For example, in a study of marketing professionals, Andrews and Smith (1996) found that perceived time pressure was negatively

related to the creativity of proposed marketing ideas. Other scholars have also suggested resource scarcity inhibits creativity, citing evidence that excess resources are critical for supporting innovations such as patent applications and new product designs (Pellegrino & Savona, 2017; Weiss et al., 2017; Yanadori & Cui, 2013).

Other researchers, however, have argued constraints can, in fact, facilitate creative problem-solving. For example, in a historical study of Benjamin Franklin, Mumford (2002) found that Franklin's capacity for developing a variety of social innovations (e.g., public universities, paper currencies) was driven by his analysis of social and environmental constraints. Moreover, these findings have been extended to organizational settings. Several studies of engineers show moderate levels of time pressure can enhance creativity by inducing perceptions of creative challenge (Andrews & Farris, 1972; Ohly & Fritz, 2010). Additionally, studies of entrepreneurial growth demonstrate that resource scarcity contributes to the identification of opportunities and the development of novel ideas regarding the use of extant resources (An et al., 2018; Gibbert et al., 2007; Vanacker et al., 2011).

To help explain these disparate findings, Acar et al. (2019) conducted a systematic and interdisciplinary review of the literature. They then proposed a conceptual framework for understanding the effect of constraints on creativity. This framework suggests constraints influence creativity through motivational, cognitive, and social mechanisms. It is important to note, however, that whether constraints facilitate or diminish these mechanisms (e.g., increase/decrease motivation) depends on a variety of individual and situational factors. For example, a series of studies suggest the motivating influence of constraints depends on how the constraints are *perceived* by those engaged in the creative effort (Acar et al., 2019; Adler & Borys, 1996; Berrone et al., 2013; Miron-Spektor et al., 2017; Rosso, 2014). For example, when

perceived as a source of creative challenge or opportunity, constraints increase motivation to take risks and experiment with novel ideas (Baer & Oldham, 2006; Ohly & Fritz, 2010; Rosso, 2014). However, when viewed as restrictive and controlling, constraints can discourage motivation and reduce creative engagement (Adler & Borys, 1996; Shalley et al., 2004). These findings are noteworthy given the complexity and difficulty of creative problem-solving necessitates a willingness to expend cognitive resources (Mumford et al., 2013).

These observations, in turn, emphasize the importance of examining the factors that might influence perceptions of constraints in a manner that promotes creativity. Some work has been done this area. For example, in a study of R&D project teams, Rosso (2014) found that differences in patterns of social dynamics (e.g., communication, task structure) were related to whether teams viewed constraints as opportunities or obstacles. In turn, these perceptions were shown to influence motivation and creative engagement. Additionally, Miron-Spektor et al. (2018) found individuals to be more innovative in the face of resource scarcity when they hold a "paradox mindset", a view allowing them to embrace and even be motivated by constraints. Despite these studies, research examining the factors influencing perceptions of constraints is scarce. In fact, although leaders are central to guiding creative and innovative efforts, little research has explored how leaders might directly shape perceptions of constraints in a manner that encourages creative engagement and performance.

Leadership and Constraints

Leadership is critical to the success of creative efforts (Mumford et al., 2002; Mumford et al., 2023; Shalley & Gilson, 2004). Robledo et al. (2012) proposed a model specifying three key functions that leaders must execute to ensure the success of these efforts—leading the people, leading the organization, and leading the work. Leading the people involves ensuring the

conditions required for teams to successfully work together in solving creative problems, such as recruiting team members and promoting collaborative social interactions (Paulus & Nijstad, 2003). Leading the organization involves aligning creative efforts with the broader organization, including garnering support from top management and organizing cross-functional teams (Keller, 2001; Markham & Smith, 2017). Of particular relevance to this study, however, is leading the work. Leading the work involves imposing structure and direction on those engaged in creative efforts. Creative problems are novel, complex, and ambiguous, and as such, often require leaders to provide the structure needed for followers to successfully navigate the problem space and execute creative processes (Mumford et al., 2022; Robledo et al., 2012). Indeed, several studies have shown positive relationships between leader structuring behavior and creativity and innovation (Barnowe, 1975; Keller, 2006).

This structuring behavior can take many forms. For example, leaders must scan the organizational and external environment to identify themes to guide project definition (Hounshell, 1992). Leaders must also engage in project planning to ensure the provision of resources and to account for various contingencies (Mumford et al., 2023). Most notably, however, leading the work involves identifying and communicating constraints to those engaged in creative work. In fact, Mumford et al. (2019) describe constraint imposition as a key mechanism by which leaders structure creative work. This central role of leaders in communicating constraints points to a key implication. Leaders, by virtue of their functional role, have the potential to influence, perhaps to a large extent, the way in which individuals perceive constraints. Thus, it is relevant to consider the communication strategies leaders might use to directly shape these perceptions when introducing constraints to those engaged in creative work.

Leader Constraint Framing: Convergent vs. Divergent

Although leaders must communicate constraints to followers, the way leaders *frame* these constraints may influence how they are perceived, and in turn, whether these perceptions promote creative problem-solving (Naidoo, 2016). Framing is a communication strategy that allows leaders to manage meaning and perception by guiding the sensemaking processes of followers (Bean & Hamilton, 2006; Smircich & Morgan, 1982; Weick, 1995). When leaders engage in framing, they emphasize certain message characteristics over others, which establishes boundaries to guide followers' interpretations of a situation, task, or circumstance (Bean & Hamilton, 2006). Whether intentional or inadvertent, framing is likely to influence the perceptions and behaviors of followers (Awamleh & Gardner, 1999). In fact, research by Naidoo (2016) has shown that a leader's use of opportunity and threat framing can influence the creative performance of followers under conditions of crisis.

The importance of framing in shaping perceptions begs a critical question—how might leaders frame constraints in a manner that enhances creative engagement and performance? Although one might consider opportunity and threat framing (Naidoo, 2016), a more constraint-oriented framework emerges when considering the functional role of constraints in facilitating creativity and its conceptual overlap with divergent and convergent thinking. Although divergent and convergent thinking are both critical to creative problem-solving, they are thought to serve distinct functions. While convergent thinking is a process oriented toward identifying a single or small number of best-fitting ideas, divergent thinking involves exploring and generating many diverse and novel ideas (Cropley, 2006; Runco & Acar, 2019). Along these same lines, scholars have proposed constraints facilitate creativity by 1) narrowing the problem space to place boundaries on the range of potential solutions (convergent), and 2) subsequently promoting a deeper search for novel and useful solutions within these boundaries (divergent) (Haught-Tromp,

2017). Taken together, these points suggest constraints facilitate creativity through both convergent and divergent mechanisms.

Given this conceptual overlap, we propose leaders can frame constraints either convergently or divergently. In convergent framing, the leader emphasizes the ideational restrictions imposed by constraints. For example, the leader may stress how constraints will restrict or limit one's capacity to explore ideas due to issues of feasibility and practicality. In divergent framing, however, the leader emphasizes the ideational possibilities *provided* by constraints. In this case, the leader might emphasize how constraints provide an opportunity to deeply explore a new and diverse set of ideas. We propose these framing strategies are likely to impact how constraints are perceived, in turn having implications for creative engagement and performance. For example, compared to convergent framing, divergent framing may be more likely to induce perceptions of creative challenge or opportunity, subsequently enhancing feelings of autonomy and promoting engagement in creative processes. In the following section, we discuss these potential benefits of divergent framing to creative process engagement, focusing specifically on problem definition, idea generation, and idea evaluation before turning to potential moderators and effects on overall creative performance.

Leader Constraint Framing and Creative Problem-Solving

Problem Definition

In addition to being novel and complex, creative problems are also ill-defined (Mumford et al., 1994). Thus, prior to generating or evaluating ideas, people must integrate information to define and conceptualize the problem at hand with respect to relevant procedures and constraints (Mumford et al., 1996; Mumford et al., 2017). Problem definitions are critical as they guide the effective execution of subsequent creative processes (e.g., idea generation; Arreola & Reiter-

Palmon, 2016; Redmond et al., 1993; Reiter-Palmon, 2017). This point was emphasized in a meta-analysis by Ma (2009), which showed that problem identification and definition exerted stronger effects on creativity than all other processes. Thus, identifying strategies to facilitate problem definition is critical.

Whether leaders frame constraints convergently or divergently may influence problem definition. Problem definition is often conceptualized as an initially divergent process in which individuals scan the environment and gather information to explore a variety of alternative problem representations (Reiter-Palmon, 2017). This exploration provides opportunities to identify novel and useful problem representations that, in turn, provide a basis for developing creative solutions (Arreola & Reiter-Palmon, 2016; Reiter-Palmon, 2017; Wigert et al., 2022). Combined with the cognitively demanding nature of problem definition (Mumford et al., 2017), these points suggest framing constraints divergently may provide the initial stimulus required for more effective problem definition. When leaders emphasize the ideational possibilities provided by constraints, people may feel more autonomous and be more likely to perceive constraints as a challenging opportunity to pursue a novel perspective. This, in turn, may motivate a deeper and more elaborate consideration of the information (e.g., constraints) bearing on the task at hand to define the problem more effectively (Liu et al., 2016; Mumford et al., 2017; Shalley et al., 2004). This leads to our first hypothesis:

H1*: Divergent constraint framing will result in higher quality problem definitions than convergent constraint framing.*

Idea Generation

Problem definition forms the foundation by which individuals activate, combine, and reorganize knowledge structures in order to generate new ideas (Mumford et al., 1991). Given

much of the research on constraints has been studied in relation to idea generation (Medeiros et al., 2018), scholars have offered explanations for how constraints facilitate idea generation. Some have argued unconstrained thought diminishes creativity by increasing the tendency to resort to known or conventional solutions (Stokes, 2001; Haught-Tromp, 2017). In other words, people take the "path of least resistance" because relying on easily retrievable solutions reduces cognitive demands (Ward, 1994; 2004). Constraints, however, are thought to circumvent this tendency by limiting one's capacity to rely on conventional solutions, instead prompting a deeper search for more novel solutions within the bounds of the constraints (Haught-Tromp, 2017; Medeiros et al., 2018; Moreau & Dahl, 2005).

It is important to note, however, the deeper search for solutions thought to be induced by constraints may not occur automatically. As noted previously, this search increases cognitive demands, suggesting the effect of constraints on idea generation may depend on one's motivation to invest cognitive resources. Given the importance of perception in shaping motivational responses to constraints (Acar et al., 2019), a leader's use of divergent framing may, in fact, play an important role in idea generation. While convergent framing may inhibit motivation and by decreasing perceptions of autonomy (Zhang & Bartol, 2010) divergent framing is more likely to induce perceptions of creative challenge or opportunity, thus motivating individuals to deeply explore more ideas in an effort to identify creative solutions (Acar et al., 2019). Thus, we further hypothesize the following:

H2*: Divergent constraint framing will result in the production of more ideas (fluency) than convergent constraint framing.*

H3*: Divergent constraint framing will result in the production of higher quality and more original ideas than convergent constraint framing.*

Idea Evaluation

Problem definition and idea generation are considered early- to mid-stage creative processes involved mostly in the production of ideas (Mumford et al., 2001). Although much of the literature on constraints has focused on these generative processes, evidence shows that late-stage processes such as idea evaluation are critical to the success of creative and innovative efforts (Basadur et al., 2000; Lonergan et al., 2004). And, given constraints help to inform the standards by which ideas are evaluated (Damadzic & Medeiros, 2020), considering how leaders frame constraints may have important implications for idea evaluation.

Idea evaluation is a complex process that occurs through a combination of forecasting, appraisal, and revision (Lonergan et al., 2004), On one hand, this complexity suggests a leader's use of divergent framing may more effectively supply the motivation to invest the cognitive resources required for idea evaluation. On the other hand, the nature of divergent framing implies this motivation may be oriented more toward the generation rather than the evaluation of alternative ideas. Although idea evaluation is thought to involve divergent thought, evidenced, for example, by the need to extensively forecast alternative outcomes (Lonergan et al., 2004), idea evaluation is often viewed as relatively convergent process (Mumford et al., 1991). Indeed, idea evaluation focuses on the refinement and selection of a single or limited number of ideas worth pursuing (Lonergan et al., 2004; Mumford et al., 2020). Additionally, Gibson and Mumford (2013) show that rather than exploring a wide range of criticisms, effective evaluation typically involves a *limited* number of deep criticisms. These observations suggest a potentially ambiguous and somewhat weaker role of divergent framing in facilitating idea evaluation. Thus, we ask:

RQ1: *Will divergent constraint framing result in higher quality idea evaluations than convergent constraint framing?*

Constraint Timing as a Moderator

Although a leader's framing of constraints may influence creative processes, it is important to recognize these effects may largely depend on *when* these constraints are introduced during the creative process. Although research on constraint timing is somewhat limited (Acar et al., 2019), emphasis of its importance is critical as constraints on innovative efforts are likely to be complex and dynamic. As noted by Stenmark et al. (2011), each stage of an innovative effort can vary with respect to structure, success criteria, and requirements, implying that different constraints may be operating at different points throughout the creative process. Damadzic and Medeiros (2020) offered a similar argument, suggesting that combinations of constraints may fluctuate throughout the course of a project, likely producing different effects on different creative processes.

Some researchers have examined the influence of constraint timing on creative processes and performance. Medeiros et al. (2018) asked undergraduates to engage in a restaurant development task where constraints were introduced at different points throughout the creative process. They found that imposing constraints early, before problem definition, enhanced the quality of problem definitions and subsequently improved creative performance. Moreover, imposing constraints during later stages of the creative process (e.g., idea evaluation) seemed to hinder creative performance, a finding that was echoed in a study by Damadzic and Medeiros (2020).

The varying influence of constraints across the creative process has important implications for the effects of framing on creative engagement, especially for late-stage

processes such as idea evaluation. As noted previously, the dynamic nature of constraints suggests it may sometimes be necessary to introduce constraints at later stages (e.g., idea evaluation). Based on the findings discussed previously, however, scholars have suggested this may cause excessive reductions in motivation (Medeiros et al., 2018), in turn diminishing creative performance. Therefore, given the motivational implications of these leader framing strategies, it may be particularly important to consider their influence on idea evaluation under conditions of both early- and late-stage constraint imposition. Thus, we pose the following research question:

RQ2: *How might the timing of constraints interact with leader constraint framing to influence the quality of idea evaluations?*

The timing of constraints may be especially relevant to overall creative performance. When considering the creative process as a whole, a leader's use of divergent constraint framing may be a viable strategy for enhancing creative engagement and performance. However, given the negative effects of introducing constraints at later stages (Damadzic & Medeiros, 2020; Medeiros et al., 2018), the advantage of divergent framing in facilitating creative performance may depend on constraints being introduced early in the creative process. Under these conditions, perceptions of challenge and autonomy are likely to drive more effective engagement in the early-stage processes (e.g., problem definition, idea generation) that form the foundation to guide subsequent processes and the development of creative solutions. This leads to our final hypothesis:

H4: *The timing of constraints will moderate the effect of leader constraint framing on overall creative performance, such that divergent framing will enhance the quality, originality, and elegance of final solutions when constraints are introduced early.*

Creative Self-Efficacy as a Moderator

Another variable with potential to influence the effect of these framing strategies is creative self-efficacy. Derived from social-cognitive theory and earlier work on general self-efficacy (Bandura, 1997), creative self-efficacy refers to one's confidence in their ability to creatively perform a given task (Karwowski et al., 2019; Tierney & Farmer, 2002). Scholars have suggested creative self-efficacy is necessary to persist through the complex and demanding nature of creative work (Bandura & Locke, 2003). Accordingly, creative self-efficacy has shown to be an important motivational antecedent to creative performance (Gong et al., 2009; Liu et al., 2016; Tierney & Farmer, 2002). For example, a study by Tierney and Farmer (2002) found that creative self-efficacy accounts for additional variance in creative performance beyond that of general job self-efficacy. More recently, Liu et al. (2016) conducted a meta-analysis of the motivational antecedents of creative performance and found a strong relationship between creative-self efficacy and creative performance.

Although critical to creative engagement, creative self-efficacy is a highly malleable construct that is shaped by a variety of individual, social, and environmental factors (Bandura, 1997; Karwowski et al., 2019). As such, some research has examined the connection between constraints and creative self-efficacy. For example, studies have shown constraints that reduce perceptions of autonomy can diminish creative self-efficacy and subsequent creative performance (Liu et al., 2016; Oldham & Cummings, 1996; Shalley et al., 2004). Furthermore, Tierney and Farmer (2002) argued that when exposed to creative problems, people rely on assessments of constraints to make judgments of their creative self-efficacy. These findings and observations have important implications for leaders seeking to frame constraints in a manner that facilitates creativity. As just one example, perhaps divergent framing can serve as a buffer

for those low in creative self-efficacy by inducing the perceptions of autonomy needed to promote creative engagement. Despite this observation, research in this area is limited, leading us to pose our final research questions:

RQ5: *How might creative self-efficacy interact with leader constraint framing to influence performance during problem definition, idea generation, and idea evaluation?*

RQ6*: How might creative self-efficacy interact with leader constraint framing to influence the quality, originality, and elegance of final solutions?*

Method

Sample

The sample consisted of 263 undergraduate students from introductory psychology courses at large southwestern university. The sample came from a variety of majors and were predominantly freshmen (70%), followed by sophomores (19%), juniors (21%), seniors (2.70%), and graduate students (0.40%). Additionally, the sample was mostly female (68%), followed by male (31%) and non-binary (1%). The mean age of participants was 18.90 years. Students were recruited using an online platform. This platform presented students with a list of studies and allowed them to choose those in which they would like to participate. Students also received course credit for completing the study.

Design

This study employed a 2 x 2 x 2 between-subjects experimental design in which participants were randomized into one of eight conditions. The three manipulated independent variables included creative self-efficacy (low vs. high), constraint timing (early vs. late), and leader constraint framing (divergent vs. convergent).

General Procedure

Upon registering for the study, participants were provided with a link to access the online experiment. Participants were told to use a computer as some experimental materials could not be adequately viewed with a mobile phone. Participants were also told to set aside two hours in order to complete the study in one sitting. The study consisted of three phases. In the first phase, participants were asked to complete two timed covariate measures—divergent thinking and intelligence. After completing the timed covariate measures, participants were exposed to the creative self-efficacy manipulation, in which they were told the assessments they just completed were intended to measure their creative capacity. They were then randomly assigned to receive either positive or negative feedback about their performance on these assessments.

After receiving the feedback, participants began phase two of the study, in which they assumed the role of a product development manager in a restaurant consulting firm who has been tasked with drafting a restaurant proposal for a new client known as Eaton Restaurants. Participants read and responded to a series of emails from their fictional manager, with each subsequent email prompting the participants to engage in one of three creative problem-solving processes—problem definition, idea generation, and idea evaluation. Constraints, framed either convergently or divergently, were introduced via email by their manager either before problem definition (i.e., early) or before idea evaluation (i.e., late). After engaging in each of the three creative problem-solving processes, participants were asked to develop their final proposal for the new restaurant, which provided the basis for assessing overall creative performance. After developing their final proposals, participants completed the third and final phase of the study. In this phase, participants were asked to complete a series of untimed covariate measures, including measures of demographics, personality, need for cognition, and domain expertise. Upon completion of the study, participants were also provided with a thorough debrief.

Experimental Task

In phase two of the study participants were asked to engage in an adapted version of restaurant proposal task developed by Peterson (2013). We chose this task for two reasons. First, this task been used in a prior study examining the effect of constraints on creative problem-solving processes (Medeiros et al., 2018). Second, as noted by Medeiros et al. (2018), this task involves solving a problem within an industry (restaurant) that is likely familiar to participants (Debevec et al., 2013; National Restaurant Association, 2013), thus ensuring they hold the basic knowledge required to engage in the task.

It is important to note the entire task was guided by the participant's fictional manager, Ryan Miller, which provided the basis for examining a leader's role in introducing and framing constraints. The task was administered to the participants using an email-based structure, in which their manager sent emails to participants prompting them to engage in creative processes. In some emails, the manager also "attached" documents for the participant to review. Participants were allowed to download these documents to ensure the information was accessible as they proceeded with the task. In the first email, the manager welcomed the participant to the firm and introduced themselves as the manager. The manager also asked the participant to review an attached document, which elaborated on the participant's position in the firm and their role as the Product Development Manager.

In the next email, the manager introduced the participant to the problem-solving task. The manager outlined a new project opportunity in which the participant will be asked to develop a restaurant proposal for a new client. The participant was informed that a wide range of proposals will be developed but only one will be chosen. To prepare for the task, the manager asked the participant to review an attached document, a report from the National Restaurant Association

providing information about key components of restaurant development (e.g., customer experience, service approach).

The next three emails from the manager prompted engagement in the creative problem-solving processes. In the *problem definition* email, the manager asked the participant to use the information they have been provided to "identify and thoroughly discuss all the key challenges and issues related to the project." In the *idea generation* email, the manager asked the participant to provide a "thorough discussion of the ideas they consider to be worth pursuing—ideas they think will lead to the most successful restaurant possible". In the *idea evaluation* email, the manager asked the participant to provide a "thorough discussion of both the strengths and weaknesses of their various ideas." In the final email, the manager asked the participant to "prepare their final restaurant proposal." They were told this proposal would be presented to the client. After each of these emails, participants were provided with a blank space to write their "reply" to the manager.

Manipulations

Creative Self-Efficacy

As noted previously, creative self-efficacy is a highly malleable construct that is influenced by a variety of factors, including past performance (Karwowski et al., 2019). Thus, creative self-efficacy was manipulated using a performance feedback procedure similar to the one used by Redmond et al. (1993). During phase one of the study, participants completed timed assessments of intelligence and divergent thinking. After completing these assessments, participants received a "performance report". In this report, they were told the assessments they just completed were intended to evaluate their creative ability. In the low efficacy condition, participants were told their "scores on these tasks indicate [their] creative ability is slightly below

average. However, in the high efficacy condition, participants were told their "scores on these tasks indicate [their] creative ability is highly above average" (See Table 1). It is important to note participants were provided with a thorough debrief at the end of study. This debrief made participants aware that they were randomly assigned to receive either positive or negative creative performance feedback after completing these assessments, and thus, they should not use this feedback to draw conclusions about their creative ability. Given this manipulation, participants were given the chance to exclude their data from the study.

Constraint Timing

In the constraint timing manipulation, the manager introduced the constraints either before problem definition (early) or before idea evaluation (late). The communication of these constraints was embedded in the emails used to prompt engagement in the creative processes. In these emails, the manager told participants that before they can proceed, there were "a few *critical* things they'll need to consider as they move forward with the project." The manager told participants that according to the client's goals and circumstances, the proposal must satisfy a few conditions.

The manager then presented the participants with three constraints—two input constraints and one output constraint (Acar et al., 2019). These constraints were fixed across all participants. For the first input constraint, the manager told participants the client has limited funding—less than half of what is typically required for the development of a restaurant. For the second input constraint, the manager told participants the client wishes to open the restaurant in the next three months, again about half of the time typically required to open a restaurant (6-12 months). For the final constraint—an output constraint—the manager told the participant the restaurant would be developed in a mid-sized city with a large university. Thus, the restaurant proposal must

orient toward a student target market. To make these constraints more salient to participants, the manager also provided additional detail regarding the implications of these constraints for the development of the restaurant proposal. Figure 1 shows an example message with the constraints.

Leader Constraint Framing

The framing manipulation was embedded in the same email in which the constraints were introduced. After introducing the constraints, the manager further discussed how the constraints will impact the restaurant proposal, where this discussion was framed either convergently or divergently. In the convergent framing condition, the manager emphasized how the client's new conditions may limit the number and variety of options they can potentially consider for the restaurant proposal. In the divergent framing condition, however, the manager emphasized how the client's new conditions provide an opportunity to explore a number and variety of ideas they may not have otherwise considered. The manager also made it clear to the participants that considering how the client's conditions limit/expand their options will be critical to the success of the restaurant. The full framing messages are shown in Table 1. To make this message available throughout the study, participants were also asked to download an attached document with both the constraints and the framing manipulation.

Dependent Variables

Dependent variables were rated by three judges who received training prior to providing their ratings. As part of this training, judges were given materials describing the variables to be rated and their operational definitions. These materials also included clear set of rating cues and anchors to guide their appraisal of participants' responses with respect to these variables. An example rating scale for final solution quality is shown in Figure 2. All but one of the dependent

variables were rated on a 5-point scale. The only exception was idea generation fluency, which was rated as a sum. Definitions for all variables other than fluency were based on O'Quin and Besemer's (2011) conceptualizations of quality, originality, and elegance—the three characteristics that define creative products. Judges also met frequently to discuss differences and clarify any misunderstandings with respect to the variables and rating scales.

Creative Processes

Problem Definition Quality. Problem definition quality was defined as the extent to which their problem definition was viable problem representation that serves as a useful foundation for developing problem solutions. Judges were told to consider whether the problem definition was logical, valuable/useful, and understandable (r_{wg} = .82).

Idea Generation Fluency. In accordance with traditional measures of divergent thinking (Reiter-Palmon et al., 2019), idea generation fluency was rated as the total number of distinct ideas discussed or listed in the response (*ICC* = .93).

Idea Generation Quality. Idea generation quality was defined as the extent to which the ideas are likely to be successful by meeting the demands of the problem situation and serving as effective and functional solutions. Judges were told to consider whether the ideas were logical, value/useful, and understandable (r_{wg} = .82).

Idea Generation Originality. Idea generation originality was defined as the extent of newness or originality in the proposed ideas, including new processes, strategies, concepts, or ideas. Judges were told to consider whether the initial ideas were surprising and novel/original (r_{wg} = .77).

Idea Evaluation Quality. Idea evaluation quality was defined as the extent to which the evaluation is logical and sensible and serves as a useful foundation for effectively revising or

finalizing ideas for the proposal. Judges were told to consider whether the idea evaluation was logical, valuable/useful, and understandable (r_{wg} = .82).

Creative Performance

Final Solution Quality. Final solution quality was defined as the extent to which the restaurant proposal is likely to be successful by meeting the demands of the problem situation and serving as an effective and functional solution. Judges were again told to consider whether the final proposal was logical, valuable/useful, and understandable (r_{wg} = .80).

Final Solution Originality. Final solution originality was defined as the extent of novelty or originality in the restaurant proposal, including novel processes, strategies, concepts, or ideas. Judges were told to consider whether the final proposal was surprising and novel/original (r_{wg} = .77).

Final Solution Elegance. Final solution elegance was defined as the extent to which the restaurant proposal is presented in an elegant manner that captures attention and induces a positive emotional reaction. Judges were asked to consider whether the final proposal was organic (e.g., sense of completeness, wholeness, and flow), well-crafted, and elegant (r_{wg} = .81).

Covariates

Several control measures were included to account for the influence of individual differences on the dependent variables. Given the importance of divergent thinking and intelligence to complex problem-solving (Vincent et al., 2002), we assessed these variables in phase one of the study. Divergent thinking was measured using the Consequences Test (Christensen et al., 1953). Each question in this five-item test presents participants with a unique and unlikely event (“what would happen if people could no longer read or write?”). After each question, they are given two minutes to list as many consequences of the event as possible. We

scored this test for fluency by averaging the number of ideas listed across all five events (α = .84). Intelligence was assessed using a verbal reasoning test derived from the Employee Aptitude Survey (Ruch & Ruch, 1980). This test has 30 items broken into six sections. In each section, participants are given a set of factual statements followed by a list of five conclusions. Participants are asked to indicate, based on the factual statements, whether each conclusion is true, false, or uncertain (α = .76).

After completing the restaurant development task, participants were asked to complete the remaining control measures. Research has demonstrated the role of domain-relevant expertise in creative performance (Vincent et al., 2002). Thus, we assessed expertise using an adapted version of a measure used in prior studies involving this task (Medeiros et al., 2018). Examples from this 7-item measure include, "how much experience do you have working in the restaurant industry" and "how likely are you to go into the restaurant industry for your career" (α = .78). We also assessed Need for Cognition (Cacioppo & Petty, 1982), a variable underlying one's preference for engaging in complex tasks. This measure includes 18 items, such as "I really enjoy a task that involves coming up with new solutions to problems" and "the notion of thinking abstractly is appealing to me" (α = .88). Finally, we assessed personality using 16-item measures developed by Gill and Hodgkinson (2007). These measures ask participants to indicate the extent to which a series of adjectives are descriptive of themselves. Specifically, we controlled for openness (α = .77) given its consistent relationship with creative performance (Batey & Furnham, 2006) and neuroticism (α = .74) given its ties to creative self-efficacy (Karwowski et al., 2013).

Analyses

Given the online nature of the experiment, we first employed multiple procedures to screen the data (e.g., attention checks, mobile phone usage), where cases were only excluded in egregious circumstances (e.g., missed all attention checks). Screening the data with these procedures resulted in the final sample of 263 participants. We then conducted univariate analyses of covariance (ANCOVA) to assess the effects of the manipulations on problem definition, idea generation, idea evaluation, and overall creative performance. Given our primary interest was to test the effects of leader constraint framing, the analyses for problem definition and idea generation only included participants in the early timing condition. Thus, the effect of timing was not analyzed for problem definition and idea generation. Finally, covariates were only retained when significant at the .05 level.

Results

Table 2 shows the means, standard deviations, and intercorrelations among all variables in this study. It is first relevant to note the correlations appear to support the construct validity of the measures and tasks used in this study. For example, there is a significantly positive relationship between intelligence and divergent thinking ($r = .17$, $p < .01$). Additionally, strong positive correlations are shown between creative process execution and overall creative performance, providing some evidence for the importance of these processes to creative performance.

Effects on Creative Processes

Table 3 shows the analysis of covariance results for problem definition quality. These results indicated the leader's use of divergent framing did not result in higher quality problem definitions than their use of convergent framing, $F(1, 129) = 0.23$, $p = .63$, $\eta^2 = .00$. Thus, hypothesis 1 was not supported. Table 4 shows the analysis of covariance results for the idea

generation outcomes. With respect to hypothesis 2, the results showed a near significant effect of leader constraint framing on idea generation fluency $F(1, 129) = 2.72$, $p = .10$, $\eta^2 = .02$. Although this hypothesis was not supported under conventional levels of significance, the partial eta-squared indicates the presence of a small effect, with the means showing the direction of this effect was as expected, with participants generating slightly more ideas on average when the leader framed constraints divergently ($M = 3.54$, $SE = 0.21$) rather than convergently ($M = 3.04$, $SE = 0.22$).

The results also yielded a significant main effect of leader constraint framing on idea generation quality, $F(1, 130) = 5.58$, $p < .05$, $\eta^2 = .04$. As shown in Table 5, the leader's use of divergent framing ($M = 2.73$, $SE = 0.11$) led to the generation of higher quality ideas than their use of convergent framing ($M = 2.35$, $SE = 0.12$). In contrast to idea generation quality, however, the results indicated a non-significant effect of leader constraint framing on idea generation originality, $F(1, 129) = 0.00$, $p = .98$, $\eta^2 = .00$. Together, these results indicate partial support for hypothesis 3.

Finally, Table 6 shows the analysis of covariance results for idea evaluation quality. These results yielded a non-significant main effect of leader constraint framing on idea evaluation quality, $F(1, 253) = 1.62$, $p = .20$, $\eta^2 = .01$. However, although not the primary focus of the present effort, the results showed a significant effect of constraint timing on idea evaluation quality, $F(1, 253) = 5.40$, $p < .05$, $\eta^2 = .02$, with those receiving constraints late ($M = 2.41$, $SE = 0.08$) producing lower quality evaluations than those receiving constraints early ($M = 2.68$, $SE = 0.08$). Lastly, the results yielded a near significant interaction effect of framing and timing on idea evaluation quality, $F(1, 253) = 3.04$, $p = .08$, $\eta^2 = .01$. Given the small effect indicated by the partial eta-squared, we further probed the interaction by exploring the simple

effects. These results indicated when leaders introduced constraints late, the effect of framing was not significant, $F(1, 253) = 0.11$, $p = .74$, $\eta^2 = .00$. However, when leaders introduced constraints early, divergent framing ($M = 2.85$, $SE = 0.11$) resulted in higher quality idea evaluations than convergent framing ($M = 2.51$, $SE = 0.12$), $F(1, 253) = 4.66$, $p < .05$, $\eta^2 = .02$. This marginal effect is plotted in Figure 3. Finally, it is important to note creative self-efficacy did not moderate the effect of leader constraint framing on any of these creative processes.

Effects on Creative Performance

Table 7 shows the analysis of covariance results for final solution quality, originality, and elegance. Leader constraint framing showed no main effect on the quality of final solutions, $F(1, 252) = 0.91$, $p = .34$, $\eta^2 = .00$. However, consistent with idea evaluation quality, the results showed a near significant interaction effect of framing and timing on the quality of final solutions, $F(1, 252) = 2.86$, $p = .09$, $\eta^2 = .01$). Again, although only marginally significant, the partial eta squared indicates the presence of a small effect. And, as shown in Figure 3, the nature of this effect was also similar to the effect on idea evaluation quality. When leaders introduced constraints late, the effect of framing was not significant, $F(1, 252) = 0.26$, $p = .61$, $\eta^2 = .00$. When leaders introduced constraints early, however, the effect of framing was marginally significant, $F(1, 252) = 3.58$, $p = .06$, $\eta^2 = .01$, with divergent framing ($M = 3.03$, $SE = 0.11$) resulting in final solutions of slightly higher quality than convergent framing ($M = 2.74$, $SE = 0.11$).

The analyses on creative performance also showed no significant effects of leader constraint framing on final solution originality, $F(1, 254) = 0.17$, $p = .68$, $\eta^2 = .00$, and final solution elegance, $F(1, 252) = 1.53$, $p = .22$, $\eta^2 = .01$. Additionally, the timing of constraints did not moderate the effect of framing on final solution originality, $F(1, 254) = 0.51$, $p = .48$, $\eta^2 =$

.00, or elegance, $F(1, 252) = 0.22$, $p = .64$, $\eta^2 = .00$. Taken together, the results of these three interactions provide only some support for hypothesis 4, which stated that a leader's use of divergent framing would enhance the quality, originality, and elegance of final solutions when the constraints were introduced early. Finally, consistent with the analyses on creative processes, creative self-efficacy did not moderate the effect of leader constraint framing on the quality, originality, and elegance of final solutions.

Discussion

Before discussing the broader conclusions to be drawn from this study, it is important to note a few limitations. First, a primary limitation of this study concerns the lack of external validity and generalizability. In addition to being a convenience-based sample, most all participants were undergraduate—mostly first year—students from introductory psychology courses at one university. Additionally, these participants were asked to engage in a low-fidelity task where they worked within the bounds of *simulated* constraints. Although we attempted to contextualize these constraints by detailing some of their implications for the restaurant proposal, they still lack some fidelity when compared to the impact of constraints on real-world creative efforts. Indeed, constraints on creative efforts in real organizational settings are likely to be much more tangible and salient. Finally, it is also important to note this low-fidelity task involved solving a problem specific to the restaurant domain. Taken together, these points suggest some caution when attempting to generalize these findings to leaders, teams, and individuals working within constraints on different types of creative projects in real organizational settings.

Along similar lines, participants' engagement in creative processes (e.g., problem definition, idea generation) was largely sequential, with each task representing a subsequent stage of the creative problem-solving process. However, as noted by Mumford et al. (1991) and

Medeiros et al. (2018), application of these processes to real-world tasks is often highly dynamic and cyclical. For example, the process of defining the problem is likely not exclusive to a singular stretch of time, rather, problem definitions are likely to be refined and reshaped as new information (e.g., constraints) emerges throughout the creative effort. In turn, this suggests participants' engagement in distinct and sequential creative processes lacks some fidelity with respect to creative process engagement in real organizational settings.

As discussed in the results, several of the hypothesized effects in this study only approached significance. It appears the present study may have lacked the power to detect significant differences between the effects of divergent and convergent framing. With a larger sample size, it is reasonable to suggest these effects, although weak, may have crossed the conventional threshold of statistical significance. However, the somewhat weak effects found in this study point to another limitation worth noting. This experimental study was administered remotely and entirely online during the COVID-19 pandemic, making it difficult to control aspects of the experimental environment and to ensure participants fully engaged with the task material. Furthermore, although participants were told to set aside two hours, they were ultimately able to complete the study on their own time. This, in turn, made it difficult to ensure the exposure to, and salience of, the manipulations were consistent across all participants (e.g., participant decides to take a short break after framing manipulation).

There are also a few theoretical limitations. This study only included one configuration of constraints. As noted by Acar et al. (2019), there are many different types of constraints, including input, process, and output constraints. Research indicates these different types of constraints can exert differential effects on creativity (Acar et al., 2019). As such, the results of this study may have differed under the imposition of a different set of constraints. Finally, we

proposed that constraint framing is likely to influence creativity through motivational and cognitive mediators (e.g., perceptions of challenge vs. control). However, as we did not formally measure or test any mediators, this study is somewhat limited in its ability to speak to the mechanisms by which framing influenced the outcomes of interest.

Theoretical and Practical Implications

Despite these limitations, this study provides a novel and important contribution to the somewhat conflicting and ambiguous literature on constraints. Constraints are an inevitable and common aspect of creative efforts in organizations. Given their capacity to either hinder or facilitate creativity, it is critical to explore how leaders can more effectively manage the influence of constraints on the creative process. To our knowledge, this is the first study to examine how a leader's use of different framing strategies can shape the influence of constraints on followers' creative performance. Moreover, the findings suggest the manner in which leaders *frame* constraints can have an important influence on creative problem-solving. More specifically, the overall pattern of findings suggests divergent constraint framing may represent a viable strategy by which leaders can enhance the creative engagement and performance of those they lead, especially when these constraints are introduced during early stages of the creative effort.

Although divergent framing did not improve the quality of problem definitions, it appeared to exert a unique and positive effect on idea generation. When leaders framed constraints divergently, participants not only developed more ideas (fluency) but also developed ideas of higher quality. The consistent pattern of these effects provides some support for the idea that divergent framing can promote engagement in creative idea generation. Indeed, consistent with past research, perhaps those exposed to convergent framing viewed constraints as more

controlling or restrictive, thus reducing their motivation to invest cognitive effort (Liu et al., 2016). In contrast, those exposed to divergent framing may have viewed constraints as more of a challenge or opportunity, in turn inducing perceptions of autonomy and enhancing one's motivation to generate more and higher quality ideas (Adler & Borys, 1996; Liu et al., 2016; Miron-Spektor et al., 2017). These findings with respect to idea generation also extend current theories surrounding the role of constraints in facilitating creativity. Haught-Tromp (2017) argued constraints facilitate creativity by refining the problem space and prompting a deeper exploration of novel ideas within that space. However, in line with our earlier proposition, the positive effects of divergent framing on idea generation provide some evidence that this deeper exploration of ideas requires cognitive investment—an investment that is likely influenced by how the constraints are perceived.

Although creative self-efficacy had no impact in this study, the moderating effects of constraint timing on creative processes and performance represent an important pattern of findings. Although the findings indicate the relative advantage of divergent framing can also be extended to idea evaluation, this advantage was only observed when constraints were introduced early (before problem definition). Perhaps the simplest explanation for this finding is motivational. As noted previously, divergent framing may be more likely to lead individuals to perceive constraints as a challenge or opportunity. This, in turn, may enhance the feelings of autonomy and efficacy required for effective engagement in idea evaluation (Liu et al., 2016; Oldham & Cummings, 1996; Shalley et al., 2004). However, these motivational benefits may depend on constraints being introduced early in the creative cycle. Indeed, past research has shown introducing constraints late can disrupt creative problem-solving (Damadzic and Medeiros, 2020; Medeiros et al., 2018), perhaps by uniquely reducing perceptions of autonomy

and diminishing the motivation to engage in subsequent processes (Amabile, 1979; Medeiros et al., 2018). As such, the late imposition of constraints may negate any motivational benefits provided by a leader's use of divergent framing.

The leader's use of divergent framing may have also enhanced idea evaluation through cognitive mechanisms. For example, research has shown that errors during early-stage processes can negatively affect execution of subsequent processes (Friedrich & Mumford, 2009; Mumford et al., 2013). Thus, strategies (e.g., divergent constraint framing) that enhance the execution of early-stage processes such as idea generation may, in turn, lead to more effective idea evaluation. Put differently, given early- to mid-stage processes are often viewed as more divergent in nature, constraints presented both early and divergently may enhance performance on these processes, in turn providing the foundation for more effective idea evaluation.

Along somewhat different lines, these findings suggest divergent constraint framing may directly promote the divergent processes thought to underlie effective idea evaluation. Although conceptualized as a relatively convergent process, Lonergan et al. (2004) noted idea evaluation is an inherently creative and ideational activity requiring individuals to explore the various implications of ideas via forecasting. Combined with research suggesting the *extensiveness* of forecasting is positively related to creative performance (Byrne et al., 2010; Shipman et al., 2010), divergent framing may be more effective in promoting the forecasting and exploration required for the subsequent appraisal of ideas (Lonergan et al., 2004). Similarly, constraints viewed as overly limiting or restrictive (e.g., convergently framed) may restrict engagement in these operations (e.g., forecasting), resulting in lower quality idea evaluation.

Turning to the effects on creative performance, constraint timing was also found to moderate the effect of framing on final solution quality. This finding is notable given the pattern

of this interaction was consistent with that of idea evaluation quality. More specifically, the positive influence of divergent framing on final solution quality was also contingent on constraints being introduced early (before problem definition). Not only does this further support the idea that constraints should be introduced early (Damadzic & Medeiros, 2020; Medeiros et al., 2018), it also suggests leaders can add value by framing these constraints divergently. Overall, the consistently positive effects of divergent framing suggest its potential value as a communication strategy for organizational leaders.

These findings also demonstrate a few practical implications for organizational leaders seeking to enhance the creativity of those they lead. First, although not always possible (Damadzic & Medeiros, 2020; Stenmark et al., 2011), leaders should do their best to introduce constraints during early stages of creative and innovative efforts. Although this suggestion seems simple, the identification and analysis of constraints is a complex process (Medeiros et al., 2017; Mumford et al., 2017). The development of domain expertise and skill in constraint analysis may be critical for leaders to effectively identify the constraints to be introduced at early stages of the creative process (Medeiros et al., 2017; Mumford et al., 2017; Peterson et al., 2013). Second, in addition to the timing of constraints, it is important for leaders to understand framing, whether deliberate or inadvertent, is likely to shape the influence of constraints on creativity. Thus, the findings of this study are important as they suggest divergent constraint framing may be a more optimal strategy for leaders to promote deeper engagement in creative problem-solving. Finally, beyond framing, leaders should ultimately seek to understand how their patterns of behavior and communication might induce different perceptions of constraints. Indeed, these perceptions are likely to determine, at least in part, whether constraints serve to hinder or facilitate the creativity of those they lead.

Future Directions and Conclusion

Although divergent constraint framing may be useful, the novelty of this strategy along with the somewhat weak effects found in this study point to the need for more research. For example, future research should seek to replicate this study with a larger sample size. Along similar lines, researchers might consider an experimental paradigm higher in fidelity and control (e.g., in-person), where exposure to framing can be more salient and the tasks and constraints can have higher ecological validity. This would shed further light on the magnitude of these framing effects while also enhancing external validity.

In addition to further exploring the effects of constraint framing, it may be important to invest more research into structuring creative work more broadly. There is currently a lot of literature on the functional responsibilities of leaders in structuring creative work. Put differently, we know a lot about *what* leaders must do to structure creative work, and much of these observations are illuminated in the functional model of creative leadership proposed by Robledo et al. (2012). However, less is known about the factors that condition the effectiveness of these structuring behaviors on the success of creative efforts. Put differently, the literature could benefit from examinations of *when* and *how* certain structuring behaviors should be employed.

Future research should also address different configurations of constraints. As noted in the limitations, different types of constraints exert different effects on creative performance. Moreover, constraints not only vary with respect to type, but also in other characteristics such as flexibility and mission alignment (Medeiros et al., 2017; Onarheim, 2012). Thus, it is likely critical to understand how the effects of constraint framing might differ under various configurations of constraints. Finally, research examining how perceptions of constraints influence creative engagement and performance more broadly is somewhat scarce. For example,

more research is needed to understand the different types of constraint perceptions that explain the effects of constraints on creativity. Along similar lines, research could consider other methods by which leaders might shape these perceptions (e.g., climate) (Hunter et al., 2007; Isaksen & Akkermans, 2011). Ultimately, we hope this study provides a foundation for researchers seeking to understand how leaders might more effectively manage the constraints that will inevitably bear on the success of creative efforts.

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Table 1

Manipulated Messages for Creative Self-Efficacy and Leader Constraint Framing

Condition	Message
Low Creative Self-Efficacy	"The tasks you just completed were used to evaluate your creative ability. Moreover, your scores on these tasks indicate your creative ability is **slightly below average**. Because your performance indicates that you have a slightly below average level of creative ability, you are worse than most people at developing creative solutions to complex problems."
High Creative Self-Efficacy	"The tasks you just completed were used to evaluate your creative ability. Moreover, your scores on these tasks indicate your creative ability is **highly above average**. Because your performance indicates that you have a highly above average level of creative ability, you are better than most people at developing creative solutions to complex problems."
Convergent Framing	"It is important to note these conditions may limit some of our possibilities for the restaurant proposal. However, if we thoroughly understand these conditions and how they help us reduce the number and variety of ideas worth pursuing, we will develop a successful restaurant proposal. In other words, these considerations will help us narrow our ideas and will ensure our proposal ultimately accounts for our client's needs while providing them with the best chance to develop a successful restaurant."
Divergent Framing	"It is important to note, however, that these conditions can allow us to explore a broad range of new possibilities for the restaurant proposal. If we understand that these conditions provide us with an opportunity to explore an increased number and variety of ideas we might otherwise have not pursued, we will develop a successful restaurant proposal. In other words, consideration of this variety of new possibilities will ensure our proposal ultimately accounts for our client's needs and provides them with the best chance to develop a successful restaurant."

Table 2

Descriptive Statistics and Correlations

Variable		M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Divergent Thinking	5.99	2.23																
2.	Intelligence	25.56	6.93	.17**															
3.	Expertise	2.11	0.69	-.04	-.19**														
4.	Need for Cognition	3.13	0.56	.05	.10	.06													
5.	Openness	3.32	0.48	.04	-.00	.15*	.37**												
6.	Neuroticism	3.00	0.50	.16*	.05	-.12*	-.18**	-.04											
7.	Framing Condition[a]	0.52	0.50	.05	.06	-.05	-.04	-.00	.05										
8.	CSE Condition	0.54	0.50	.02	.02	.07	.08	.12	-.09	.09									
9.	Timing Condition	0.49	0.50	-.01	.04	-.03	.12*	.13*	-.10	.01	-.02								
10.	Problem Definition Quality	2.65	1.03	.17**	.17**	.06	.07	-.08	-.03	.06	-.00	-.30**							
11.	Idea Generation Fluency	3.23	1.75	.04	.16**	.07	.10	.00	-.18**	.11	.05	-.04	.48**						
12.	Idea Generation Quality	2.43	0.92	.11	.19**	.06	.13*	-.02	-.08	.19*	-.02	-.12*	.63**	.77**					
13.	Idea Generation Originality	2.36	1.00	.19**	.07	.01	.17**	.10	-.00	.00	-.01	-.11	.48**	.62**	.73**				
14.	Idea Evaluation Quality	2.55	0.96	.08	.19**	.14*	.04	.01	.04	.07	-.07	-.14*	.55**	.39**	.56**	.43**			
15.	Final Proposal Quality	2.86	0.90	.14*	.24**	.08	.13*	-.01	.03	.06	-.01	-.01	.50**	.43**	.58**	.46**	.56**		
16.	Final Proposal Originality	2.55	0.90	.15*	.12	.02	.16*	.09	.07	-.04	-.03	-.04	.33**	.28**	.38**	.49**	.33**	.64**	
17.	Final Proposal Elegance	2.72	0.97	.18**	.20**	.06	.14*	.03	.04	.09	-.02	-.01	.46**	.40**	.55**	.51**	.49**	.89**	.69**

Note. CSE = Creative Self-Efficacy; 0 = Low CSE, 1 = High CSE; 0 = Convergent Framing, 1 = Divergent Framing; 0 = Early Timing, 1 = Late Timing.
[a] Correlations between constraint framing and early/mid-stage process outcomes (problem definition and idea generation) only include those in the early timing condition.
$^{**}p < .01$, $^{*}p < .05$.

Table 3

Analysis of Covariance for Problem Definition Quality

Variable	*F*	*df*	*p*	η^2
Covariates				
Intelligence	7.52	1, 129	.01**	.06
Main Effects				
Constraint Framing	0.23	1, 129	.63	.00
Creative Self-Efficacy	0.01	1, 129	.92	.00
Interactions				
Framing × CSE	1.15	1, 129	.29	.01

Note. $n = 134$.
** $p < .01$; * $p < .05$.

Table 4

Analyses of Covariance for Idea Generation Outcomes

	Fluency				Quality				Originality			
Variable	*F*	*df*	*p*	η^2	*F*	*df*	*p*	η^2	*F*	*df*	*p*	η^2
Covariates												
Neuroticism	8.81	1, 129	.00**	.06								
Divergent Thinking									5.90	1, 129	.02*	.04
Main Effects												
Constraint Framing	2.72	1, 129	.10	.02	5.58	1, 130	.02**	.04	0.00	1, 129	.98	.00
Creative Self-Efficacy	0.12	1, 129	.73	.00	0.08	1, 130	.77	.00	0.45	1, 129	.50	.00
Interactions												
Framing × CSE	1.12	1, 129	.29	.01	2.44	1, 130	.12	.02	0.35	1, 129	.56	.00

Note. $n = 134$.
** $p < .01$; * $p < .05$.

Table 5

Means and Standard Errors for Idea Generation Fluency and Quality

	Idea Generation			
	Fluency		Quality	
Frame	*M*	*SE*	*M*	*SE*
Convergent Framing	3.04	0.22	2.35	0.12
Divergent Framing	3.54	0.21	2.73	0.11

Note. Effects on fluency were near significant ($p = .10$).

Table 6

Analysis of Covariance for Idea Evaluation Quality

Variable	*F*	*df*	*p*	η^2
Covariates				
Intelligence	13.35	1, 253	.00**	.05
Expertise	9.67	1, 253	.00**	.04
Main Effects				
Constraint Framing	1.62	1, 253	.20	.01
Creative Self-Efficacy	2.00	1, 253	.16	.01
Constraint Timing	5.40	1, 253	.02*	.02
Interactions				
Framing × CSE	0.36	1, 253	.55	.00
Framing × Timing	3.04	1, 253	.08	.01
CSE × Timing	0.06	1, 253	.80	.00
Framing × CSE × Timing	1.16	1, 253	.28	.01

Note. $n = 263$; CSE = Creative Self-Efficacy.
** $p < .01$; *$p < .05$.

Table 7

Analyses of Covariance for Creative Performance Outcomes

	Quality				Originality				Elegance			
Variable	*F*	*df*	*p*	η^2	*F*	*df*	*p*	η^2	*F*	*df*	*p*	η^2
Covariates												
Divergent Thinking									5.76	1, 252	.02*	.02
Intelligence	15.56	1, 252	.00**	.06					6.75	1, 252	.01*	.03
Expertise	4.37	1, 252	.04*	.02								
Need for Cognition	3.15	1, 252	.08	.01	7.24	1, 254	.01**	.03	4.71	1, 252	.03*	.02
Main Effects												
Constraint Framing	0.91	1, 252	.34	.00	0.17	1, 254	.68	.00	1.53	1, 252	.22	.01
Creative Self-Efficacy	0.30	1, 252	.59	.00	0.57	1, 254	.45	.00	0.55	1, 252	.46	.00
Constraint Timing	0.22	1, 252	.64	.00	0.81	1, 254	.37	.00	0.52	1, 252	.47	.00
Interactions												
Framing × CSE	0.21	1, 252	.65	.00	0.05	1, 254	.82	.00	0.18	1, 252	.67	.00
Framing × Timing	2.86	1, 252	.09	.01	0.51	1, 254	.48	.00	0.22	1, 252	.64	.00
CSE × Timing	0.02	1, 252	.89	.00	0.64	1, 254	.42	.00	0.09	1, 252	.76	.00
Framing × CSE × Timing	0.52	1, 252	.47	.00	0.01	1, 254	.92	.00	2.51	1, 252	.12	.01

Note. $n = 263$. CSE = Creative Self-Efficacy
** $p < .01$; * $p < .05$.

Figure 1

Excerpt of message showing introduction of constraints under divergent framing

Conditions for Proposal

There are a few **critical** things you need to consider as you move through each stage of this project. Eaton has emphasized that the proposal must meet certain conditions based on their goals and circumstances. These three conditions include:

1. **Limited funding**: Eaton has a limited budget for the initial development of the restaurant. Although most restaurant developers typically start with a budget of at least $175,000, Eaton has secured $80,000 for initial restaurant development, and your proposal must account for the ways in which this limited budget influences your restaurant plan. More specifically, this budget is likely to result in a smaller restaurant (e.g., 50 or less seats), initially understaffed shifts (e.g., only a few servers and cooks per shift), and a lack of the newest technologies and resources (e.g., touchscreen purchasing systems/kiosks, online ordering or delivery services, automated inventory systems).
2. **Student target market**: Given Eaton's plan to open this restaurant in a mid-sized city with a large population of local university students, the restaurant must focus on attracting this large student market (18-24 years old). However, given the importance of the university to the local economy, the market is already saturated with restaurants targeted at this student population. Thus, we must develop our proposal in consideration of how we can separate ourselves from the large number of existing competitors.
3. **Short timeframe to opening**: Given Eaton's limited budget and the range of time often required to turn a profit, Eaton's timeframe to open the restaurant is relatively short**.** Although most restaurants may take between 6-12 months before opening day, Eaton wants the restaurant to open within 3 months. As such, any ideas (e.g., style, food, marketing, construction/renovation) in our proposal must have the capacity to be feasibly developed within 3 months.

It is important to note, however, that these conditions can allow us to explore a broad range of new possibilities for the restaurant proposal. If we understand that these conditions provide us with an opportunity to explore an increased number and variety of ideas we might otherwise have not pursued, we will develop a successful restaurant proposal. In other words, consideration of this variety of new possibilities will ensure our proposal ultimately accounts for our client's needs and provides them with the best chance to develop a successful restaurant.

Figure 2

Example ratings scale for final proposal quality

Final Proposal - Quality

Definition: The extent to which the plan presented in the proposal is likely to be successful by meeting the demands of the problem situation and serving as an effective and functional solution.

Aspects of Plan Quality:

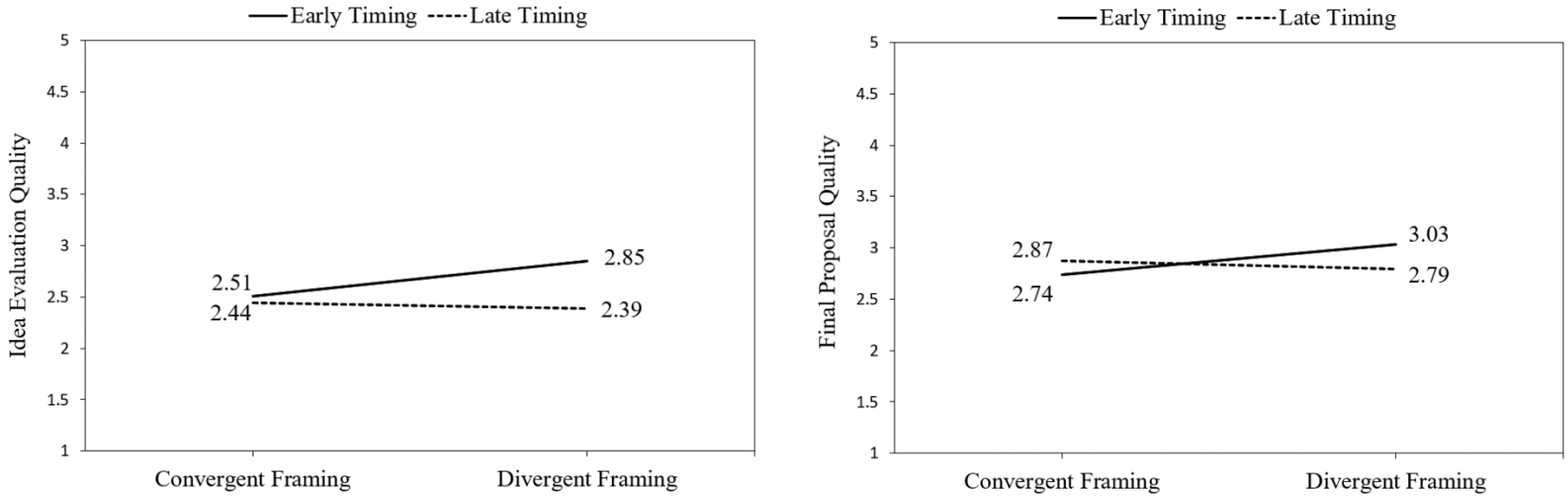
Logical -	Does the plan seem sensible and viable? Is it realistic in the context of the task? Is it well thought out? Is it logical and consistent?
Valuable/Useful -	Is the plan likely to work? Will the plan lead to the desired outcomes? Is it practical? Would the plan effectively address all the critical elements of the task, including the task constraints?
Understandable -	Is it presented in an understandable manner? Does it make sense?

Anchors and Examples:

1 Low Quality	The final proposal is of low quality. The plan likely won't meet the demands of the problem situation as it lacks in addressing the critical elements of the task. The plan serves as a logical and effective solution to the problem. *Example: This business would be located on campus corner by Logies is because it is not right on the main road which is not attractive to customers but is also in a location with a lot of foot traffic. It would be a homemade Italian restaurant because that is what Norman is lacking. The catch is they have to speak in their best Italian voice to make it funnier making customers want to return.*
3 Moderate Quality	The final proposal is of moderate quality. The plan may somewhat meet the demands of the problem situation by addressing some critical elements of the task. But overall, the plan is average in its ability to logically and effectively solve the problem. *Example: My proposal for a restaurant is a local home-style cooking place. This restaurant would be designed as you are eating in a family dining room and you will be served by a waiter only for drinks and then for your course other than that you wouldn't see them much. Customers could eat as a "family" and have a quiet room or maybe spilt the restaurant into sections to make it more private. The menu would have multiple options such as fried o grilled chicken, meatloaf, spaghetti, mac and cheese, burgers, pizza, soups, and salads. the name would be "Aunti's- home away from home".*
5 High Quality	The final proposal is of high quality. The plan is likely to effectively meet all the demands of the problem situation by addressing the critical elements of the task. The plan serves and highly effective solution to the problem. *Example: Our restaurant proposal is Happy Bowls. This is a quick-service smoothie bowl restaurant. We will have a variety of locally grown fruit and everything we use will be locally sourced. College students will love being able to come by for a quick healthy meal when they are in a rush or to come and get a bowl and take pictures with friends. We will have a few tables and chairs but will have themed walls perfect for taking pictures with your delicious bowl. Our theme is going to be very bright and colorful with neon signs and a welcoming environment. Due to the low budget I feel this is perfect because we won't need to spend a lot of money on seating and the newest technology. The short staffing issue will be resolved by not need waitresses or waiters for tables and we can just have a couple people making the bowls. Customers will pick what smoothie and then go to pick their toppings before they get to the register.*

Figure 3

Plots showing marginal interaction effects between framing and timing on the quality of idea evaluations and final solutions.



Note. Interaction effects on idea evaluation quality (p = .08) and final solution quality (p = .09) were near significant.