The Creativity Paradox:

Soliciting Creative Ideas Undermines Ideation

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ABSTRACT

When developing product ideas and original marketing content, firms and marketers often organize ideation activities to harvest a rich set of new ideas. We explore a popular paradigm for guiding these activities—explicitly requesting *creative* ideas—in the context of consumer idea generation contests. We demonstrate that this common practice can paradoxically undermine ideation, decreasing the total number of novel ideas that contestants generate (i.e., ideas rated as surpassing the threshold of average novelty). A single paper meta-analysis across six incentive-compatible ideation contests on different products (toy, office supply, toiletry, and mobile app) involving close to 2,000 contestants estimated that soliciting creative ideas resulted in 1.49 fewer novel ideas per contestant, which amounted to a 20% decrease in productivity and a loss of 500 unique novel ideas in total. This productivity loss occurs because soliciting creative ideas prompts people to self-impose a high standard, which leads to a unique cognitive process that restrains (instead of expands) their thinking. This research also offers important solutions for marketers to ensure the productivity of ideation and fuel innovation.

Keywords: creativity, novelty, idea generation competition, expansive thinking, thought regulation

Ideas are at the heart of creativity and growth—every new innovation, large or small, began as an idea, and an innovation's success depends largely on the idea that underlies it (Dahl and Moreau 2002; Hauser, Tellis, and Griffin 2006; Kornish and Ulrich 2014). Recognizing the power of ideas, many firms fuel their innovation by organizing events, contests, and hackathons where consumers and employees participate in idea generation. During these activities, idea generators come up with as many new ideas as they can without much elaboration or development, facilitating creativity by providing a rich pool of novel ideas that build creative potential and feed later idea development for the company (Diehl and Stroebe 1987; Stroebe and Diehl 1994; Terwiesch and Ulrich 2009). Importantly, as the number of promising ideas generated in this early stage increases, so does the chance that subsequent elaboration and development will ultimately yield a successful outcome (Osborn 1953; Ward, Finke, and Smith 1995).

When structuring these idea generation activities, one of the fundamental decisions firms must make is what to instruct idea generators to do. Given that firms aim to feed innovation by collecting a rich set of ideas that possess sufficient creative potential, a frequently used paradigm for guiding ideation is to explicitly request *creative* ideas from idea generators. For example, Lego recently organized an online idea generation contest asking consumers for "your creative take on a LEGO Choose Your Own Adventure Video Series" (Tongal.com). Similarly, another recent ideation contest requested ideas for "a creative and innovative name, logo and tagline for a corporate chiropractic service" (Squadhelp.com).

In this research, we investigate this common practice and uncover a creativity paradox: that explicitly soliciting creative ideas can be counterproductive, decreasing the total number of novel ideas that the contestants generate (i.e., ideas rated, by outside judges, as surpassing the

threshold of average novelty[1]). We connect research on the cognitive process of idea generation (Nijstad and Stroebe 2006) with theories of self-regulation (Carver 1979; Carver and Scheier 1982; Vohs and Heatherton 2000) and hypothesize that this creativity paradox occurs because soliciting creative ideas prompts people to self-impose a high standard of creativity, which leads to a unique cognitive process that restrains (instead of expands) their thinking. Based on these findings, we identify process-driven solutions that can help firms and marketers ensure the productivity of ideation activities.

We test our theory in the context of consumer idea generation contests, an emerging and popular way for companies to jumpstart ideation both offline and online (e.g., through crowdsourcing platforms such as Tongal, IdeaConnection, Idea Bounty, SquadHelp; Bayus 2013; Howe 2006; Stephen, Zubcsek, and Goldenberg 2016; Terwiesch and Xu 2008). These contests are growing in popularity among marketers and brands (Olenski 2015), with 68% of all open crowdsourcing initiatives in 2016 being idea generation contests (up from 36% in 2014), the majority of which were run by companies in the 2016 Best Global Brands (Eyeka 2016). In two pilot tests, drawing from two different online pools, we asked a total of 161 sales and marketing managers (Pilot 1: $M_{age} = 36.95$, $SD_{age} = 10.14$; $M_{years\ in\ position} = 8.44$, $SD_{years\ in\ position} = 7.13$; 52 women; Pilot 2: $M_{age} = 42.74$, $SD_{age} = 9.96$; $M_{years\ in\ position} = 10.56$, $SD_{years\ in\ position} = 6.26$; 29 women) how they would instruct consumers in idea generation contests. The instruction most frequently chosen by these managers (56% and 58%, respectively) was indeed to explicitly ask contestants to submit multiple creative ideas, with the main objective of maximizing the number

[1] We defined the outcome variable as ideas surpassing the threshold of average novelty because novelty is considered the most relevant metric for evaluating the potential of ideas in early-stage idea generation (Dahl and Moreau 2002; Goldenberg, Lehmann, and Mazursky 2001). For validity and generalizability, we also tested various novelty thresholds (e.g., one point above average novelty, and one standard deviation above average novelty) and found consistent results; these robustness checks are summarized in the General Discussion.

of novel, high-potential ideas they could collect from these consumers (see Web Appendix A for details). For instance, one manager explained that requesting creative ideas should help "encourage people to think outside the box." Below, we review literature in idea generation and self-regulation research to theorize why this popular practice among firms and managers can paradoxically hinder their objective and undermine ideation.

THEORETICAL BACKGROUND

The Cognitive Process of Idea Generation

Idea generation, a component of the "fuzzy front end" of creativity (Dahl and Moreau 2002; Hauser, Tellis, and Griffin 2006), is the process of generating many initial ideas without extensive elaboration, evaluation, or implementation (Diehl and Stroebe 1987; Osborn 1953). The aim is to generate a rich pool of novel ideas to serve as fodder for later idea development (Diehl and Stroebe 1987; Hauser, Tellis, and Griffin 2006). This early-stage process is important and consequential—the eventual outcomes of the creative process are dependent on, and limited by, the input of ideas from this stage (Kornish and Ulrich 2014). For example, in new product development, the early-stage generation process alone is estimated to determine between 75% and 85% of the product's ultimate marketing and manufacturing costs (Dahl and Moreau 2002).

The process of idea generation oscillates between searching and retrieving relevant knowledge from long-term memory and then combining the activated knowledge in working memory to form new ideas (Burroughs, Moreau, and Mick 2008; Mednick 1962; Moreau and Dahl 2005; Nijstad and Stroebe 2006). For example, in an idea contest about alternative uses for a mug, one might start with "mug" as a search cue and retrieve relevant knowledge, like using a

mug to drink coffee along with a cookie. This knowledge on its own should not yield many ideas. Thus, to generate more ideas, one might return to long-term memory and expand the search process by using "cookie" as a new search cue, activating information related to the cookie baking process to yield new ideas—like using a mug as a rolling pin or a cookie cutter. This is an iterative process, as thoughts can build on one another, with prior thoughts serving as new search cues for further information activation and idea generation. Thus, factors that disrupt the natural flow of thoughts hinder idea generation (Nijstad, Stroebe, and Lodewijkx 2003). For example, the productivity loss observed in group brainstorming is due to team members having to wait for a gap in conversation to share an idea, which derails trains of thought (Diehl and Stroebe 1991).

Importantly, whether an idea generator successfully executes this process of *expansive thinking* is directly reflected by the number of novel ideas she generates: As the associative network expands via iterative thought streams, the amount of activated information increases, and more combinations are formed, resulting in a higher number of ideas (Nijstad and Stroebe 2006). Some of these ideas are promising and novel, achieving the purpose of idea generation by raising creative potential. As a byproduct of this process, many ideas that fall below the standard of novelty may also result; these ideas are necessary, however, as they serve as critical links in the expanding thought chains that can give rise to another set of novel ideas. Given that the process of expansive thinking is essential for yielding a rich set of novel ideas at the end, we next discuss how explicitly soliciting creative ideas can disrupt this process and reduce ideation productivity.

Productivity Loss When Soliciting Creative Ideas

When companies explicitly request creative ideas, they set a goal for consumers, which activates a unique set of cognitive activities (Locke and Latham 1990, 2002). Specifically, during goal pursuit, the cybernetic control process indicates that an individual engages in monitoring to help ensure goal attainment (Carver 1979; Scheier and Carver 1988). This monitoring process leads one to closely observe goal-relevant behaviors and compare current progress to the standard set by the goal; when that standard is not met, behaviors are modified, improving the likelihood that one will eventually succeed. For example, pursuing a time management goal makes one monitor goal-relevant behaviors such as logged hours and activities. When the current time log does not meet the standard one has in mind, this person will adjust her behavior accordingly, such as reducing the usage of social media during work hours. Comparing to a standard set by the goal and making adjustments serve as essential self-regulation processes for goal success (Baumeister and Vohs 2007; Myrseth and Fishbach 2009), as a recent meta-analysis showed in a variety of areas including weight loss, prophylaxis use, smoking cessation, fitness, and time management (Harkin et al. 2015).

While in most cases monitoring is beneficial, we argue that this process can be detrimental to idea generation because it constrains expansive thinking in response to the high standard of creativity. Creative thinking is not easy. Creative responses require multiple iterations, and initial attempts to produce them often end in failure (De Dreu, Baas, and Nijstad 2008; Eisenberger and Selbst 1994; Lucas and Nordgren 2015; Nijstad and Stroebe 2006). Thus, we posit that most people pursuing creative ideas naturally feel that the standard is high and that their current thought streams are not meeting this standard. As a result, they try to adjust their behavior to do better on this goal, just as a person rethinks behavior if her time log demonstrates inefficient time usage (Carver and Scheier 1982).

Importantly, whereas closely regulating procrastination behaviors can help one do better on a time management goal, we argue that closely regulating one's thoughts in idea generation will lead to the opposite—a productivity loss in ideation. This is because tighter regulation of thoughts—focusing on what one deems relevant to improving creative performance and ignoring anything that seems distracting or unhelpful at the moment (Carmody et al. 2009; Clore and Huntsinger 2007; Diehl, Semegon, and Schwarzer 2006; Förster et al. 2006)—leads to premature abandoment of thought streams that could eventually become productive for idea generation. For example, when an individual is encouraged to generate *creative* uses for a mug, she might first think of using a mug to drink coffee. This idea will likely not meet her high standard of creativity, and as a response, she might regulate her thinking by ignoring the "irrelevant" secondary thought about cookies (while drinking coffee), derailing the train of thought and precluding the generation of a downstream idea—using a mug as a cookie cutter.

In summary, although directly soliciting creative ideas seems like an intuitive paradigm and is prevalently used by firms and managers to guide ideation, we propose that it paradoxically reduces the number of novel ideas that people generate because it makes them compare their thoughts to a high standard and consequently engage in thought regulation that constrains (instead of expands) thinking. Testing these mechanisms provides valuable insights for the understanding of the ideation process and creative cognition, as well as for the development of theory-driven solutions to ensure the productivity of ideation. We delineate three hypotheses:

H1: Explicitly soliciting creative ideas decreases the total number of novel ideas generated (i.e., ideas rated as surpassing the threshold of average novelty).

H2: Explicitly soliciting creative ideas decreases the total number of novel ideas generated because it sets a high standard for idea generators.

H3: The high standard of creativity decreases the total number of novel ideas generated because it induces tighter thought regulation.

The Importance of Capturing Idea Count

In this research, the main performance metric we are interested in is the total number of novel ideas generated during ideation (i.e., ideation productivity). Before the empirical section, we elaborate upon the relevance of this metric for practice and theory development in light of other performance metrics also used in creativity research.

In our pilot tests (see Web Appendix A), most managers identified maximizing the number of novel, high-potential ideas collected as the key objective for hosting idea generation activities. One manager justified this objective by saying, "The more to choose from the better!" This intuition is supported by ideation theories, which argue that the number of good ideas generated is the most appropriate measure for idea generation performance (Dennis et al. 1996; Diehl and Stroebe 1987, 1991; Mullen, Johnson, and Salas 1991; Stroebe and Diehl 1994). This is because the prospects of any one idea are uncertain at this early stage: the preferences of the idea's target audience are unclear, the downstream hurdles are unknown, and the idea still needs to be developed and successfully implemented within or outside the firm (Goldenberg, Lehmann, and Mazursky 2001). Therefore, as the total number of promising ideas generated increases, so does the probability of deriving a successful final outcome (Osborn 1953; Ward et al. 1995). To capture the creative potential of an idea generation activity, we thus follow both market practice and ideation theories to compute the total number of ideas that have sufficient potential for further development as our key performance measure, i.e., ideas rated as surpassing the threshold of average novelty (see Dahl and Moreau 2002 and Goldenberg, Lehmann, and Mazursky 2001

for the critical role of novelty when assessing the potential of raw ideas; further robustness checks using other novelty thresholds are reported in the General Discussion).

It is important to note that the performance metric we tested differs from, and nicely complements, another frequently used dependent measure of creativity—*average creativity*. These two measures differ on the relative value placed on quantity versus quality. The measure of average creativity summarizes the distribution of idea quality while disregarding quantity: bad ideas are penalized (reducing the score) and good ideas are rewarded (increasing the score) such that good performance manifests as having more good ideas *relative to* bad ideas. For example, with the measure of average creativity, having only one good idea is better than having two good ideas and one bad idea. In contrast, the count of novel ideas tries to take into account both quantity and initial quality. Here, quantity is key, and idea quality serves only as a threshold: any idea surpassing that threshold is equally valued as an idea with potential, and there is no penalty for bad ideas that are also generated during the process of expansive thinking. In this case, good performance manifests as having a larger number of ideas rated above the threshold, irrespective of bad or common ideas also generated. For example, having two good ideas and one bad idea is better than only having one good idea.

Both of these performance metrics are important for understanding creativity because they correspond to different stages of the creativity process. Specifically, in later stages, where the ideas will be selected for final implementation, idea quality is paramount. Here, the ideal measure of performance could be average creativity because a higher score means a higher chance that a good idea is implemented. On the other hand, in early-stage idea generation, the ideas are not in their final form and, instead, the aim is to generate a rich set of novel ideas that can serve as fodder for further development. This means that (1) quantity is a crucial component

of performance, (2) a rough approximation of novelty is sufficient, as ideas can significantly change when they are later developed, tweaked, or combined, and (3) the generation of bad or common ideas is irrelevant to the outcome, as these ideas can just be discarded in the early stage (following this logic, idea generation contests in practice do not punish bad/common ideas).

Because we are interested in the effectiveness of the early-stage ideation process, we focus on the total number of novel ideas and the corresponding process of expansive thinking in this research. By counting good ideas and not penalizing bad or common ideas, we further capture the unique cognitive process of expansive thinking (i.e., the number of novel combinations formed during associative search). Following prior work on ideation and expansive thinking, we expected that constraining expansive thinking would directly impact the total number of novel ideas generated, but not average creativity (e.g., Diehl and Stroebe 1991, p.1, disrupting expansive thinking through group brainstorming led to consistent effect on the count of good ideas, but not on the average quality of ideas). By isolating the unique factors that affect the total number of novel ideas in idea generation contests, we thus build on and contribute to the rich research on average creativity, bringing in another practically relevant metric rooted in ideation literature to shed light on the cognitive process of ideation.

Overview of Studies

We tested our hypotheses in six studies.[2] Mimicking real-world practices (e.g., crowdsourcing platforms like SquadHelp) and using similar methods as those in the prior literature (Duguid and Goncalo 2015; Lucas and Nordgren 2015; Mehta, Cheema, and Zhu 2012;

[2] The target sample size for all experiments was 100 participants per cell. Exclusions were based on attention checks for all studies and determined in advance of data collection. We reported all data exclusions, manipulations, and measures for each study.

Mehta, Dahl, and Zhu 2017; Zhu and Mehta 2009), in all studies we entered participants into an incentive-compatible idea generation contest for a product.

Study 1 provided initial support for H1, demonstrating that soliciting creative ideas in an idea generation contest ("generate as many *creative* ideas as possible," the most popular instruction chosen by managers in our pilot tests) reduced not only the number of ideas generated, but importantly the number of novel ideas generated, compared to the control condition that did not explicitly solicit creative ideas ("generate as many ideas as possible"). A follow-up to study 1 ruled out reporting bias as an alternative account for the observed effect. In addition, in case the creativity condition provided any additional information (e.g., a specific type of idea for the contest), we tested it against another comparison condition (to submit as many *unusual* ideas as possible) in study 2.

Studies 2 through 5 further enhanced the generalizability and validity of our finding (H1) through different pools of contestants and a variety of products; importantly, these studies assessed the proposed mechanisms (H2 and H3) using a moderation-of-process approach (Spencer, Zanna, and Fong 2005). Studies 2 and 3 tested H2, that this productivity loss resulted from the creativity instruction suggesting a high standard. Studies 4 and 5 captured the driving role of thought regulation as a result of this high standard of creativity (H3); we impeded thought regulation via ideation modality in study 4 and externally induced thought regulation via a mindfulness practice in study 5. These tests further offered possible solutions to ensure the productivity of idea generation. The General Discussion section provides a single paper meta-analysis (McShane and Böckenholt 2017) and a variety of robustness checks (Inman 2018) to further demonstrate the validity and the size of our hypothesized effect.

STUDY 1: THE CREATIVITY PARADOX

Contestants in study 1 competed in an idea generation contest to come up with alternative uses for a Frisbee. Contestants were either explicitly asked to generate creative ideas or were placed in the control condition, which did not mention creativity. We expected that soliciting creative ideas would result in fewer novel ideas generated by contestants (i.e., ideas rated, by outside judges, as surpassing the threshold of average novelty).

Method

Contestants. Two hundred one contestants (M_{age} = 34.80, SD_{age} = 12.80; 141 women) were recruited through a national online pool (SONA) and compensated $1.50 as a baseline participation prize. Three contestants failed the attention check, leaving 198 contestants in the final analysis (Goodman, Cryder, and Cheema 2012; Paolacci, Chandler, and Ipeirotis 2010).

Procedure. Contestants entered an idea generation contest to come up with uses for a Frisbee to a win prize of $50 (Lucas and Nordgren 2015; see Appendix A). They were randomly assigned to a creativity or a control condition. In the creativity condition, contestants were instructed to generate as many *creative* uses for a Frisbee as possible. In the control condition, contestants were instructed to generate as many uses for a Frisbee as possible, without any mention of creativity. These contests were incentive-compatible, such that in the control [creativity] condition, the top 10% of contestants who generated the highest number of [creative] ideas would win a raffle ticket for the $50 prize.

Contestants then began the contest, in which they were given five minutes to generate ideas. Their ideas were automatically submitted (and the page advanced) after five minutes.

Contestants were then asked to report their effort and the perceived difficulty of the contest (from 1 = *not very much* to 7 = *very much*). These measures were included in all studies and summarized in a single paper meta-analysis in the General Discussion. The contest ended with demographic information and probes of suspicion. Prizes were later sent to the winners.

Results and Discussion

Coding Procedure. We first followed the Consensual Assessment Technique (Amabile 1982; Dahl, Chattopadhyay, and Gorn 1999; Moreau and Dahl 2005) and utilized two different established protocols to code all the ideas that the contestants generated. Specifically, each unique idea was coded by two sets of outside judges: (1) a set of two undergraduate research assistants (Kray, Galinsky, Wong 2006; Oppezzo and Schwartz 2014; Vohs, Redden, Rahinel 2013), and (2) a set of 35+ judges from MTurk (Dahl et al. 1999; Mehta et al. 2012; Mehta et al. 2017). Ideas were coded from 1 = *not at all original/innovative/creative* to 7 = *very original/innovative/creative* (anchors adopted from Moreau and Dahl 2005).

Both sets of judges demonstrated high agreeability (URAs: $\alpha = .73$, MTurk judges: $\alpha = .82$) based on the intraclass correlation criteria delineated by Cicchetti and Sparrow (1981). For each set of judges, the scores were averaged to produce one novelty score for each idea. Because the results from these two sets of judges revealed consistent patterns (with MTurk judges producing an overall stronger SPM effect size), we reported the results from the set of two research assistants in-text for a conservative report and the summarized results from MTurk judges in Web Appendix D for readers' reference.

We computed the key measure of novel idea count by summing the number of ideas each contestant generated that surpassed the average novelty threshold of the contest (i.e., the grand

mean of the whole contest across the two conditions). To further enhance the robustness of our dependent measure, we also conducted the same analyses at a variety of thresholds (e.g., ideas that scored one point above the average novelty threshold of the contest, ideas that scored one standard deviation above the average novelty threshold of the contest). The results held across these different robustness checks and are reported in the General Discussion.

Number of Novel Ideas. We analyzed the dependent measure of novel idea count using a generalized linear model with a Poisson distribution. We found supportive evidence for H1, such that contestants in the creativity condition generated significantly fewer ideas that surpassed the threshold of novelty (M = 6.86, SD = 2.62) than contestants in the control condition (M = 7.98, SD = 2.82, b = −.15, z = −2.90, p = .003).

In addition, we calculated the average novelty for the ideas that made the cut to ensure that there was not an unexpected boost in idea quality in the creativity condition that our count measure failed to capture. Consistent with the proposed process of expansive thinking and prior ideation research (for summary, see Diehl and Stroebe 1991, p.1), the novelty level of the ideas that made the cut did not differ by condition ($M_{\text{creativity}}$ = 4.37, M_{control} = 4.33, b = .05, t(195) = 1.01, p = .315); those in the creativity condition did not come up with fewer but better ideas, compared to those in the control condition.

Study 1 provided initial support that soliciting creative ideas can be counterproductive, reducing the number of novel ideas contestants generated. However, it is possible that contestants *generated* the same amount of novel ideas in both conditions but chose not to *report* some ideas in the creativity condition. Although self-filtering is unlikely given that the contest did not penalize bad or common ideas, to further address this alternative account we conducted a follow-up study in which contestants were directly incentivized to report all ideas they generated.

One hundred eighty-five contestants (M_{age} = 35.35, SD_{age} = 10.10; 90 women) competed in a Frisbee idea generation contest. In the control condition, contestants earned one cent for every idea they generated. In the creativity condition, contestants earned 20 cents for every *creative* idea they generated and one cent for every other idea they generated. Thus, while contestants in the creativity condition were encouraged to generate creative ideas, they were incentivized to list all the ideas they generated during the contest.

Replicating the results of study 1, contestants in the creativity condition again generated significantly fewer novel ideas (M = 6.51, SD = 2.55) than contestants in the control condition (M = 7.74, SD = 2.78, b = −.17, z = −3.14, p = .002). More important, the effect size of soliciting creative ideas remained the same across these two studies ($d_{study\ 1}$ = .25 vs. $d_{follow\text{-}up}$ = .26). These findings suggest that the productivity loss observed in the creativity condition reflected differences in idea generation, not reporting bias. Even when contestants were directly incentivized to report every idea generated, soliciting creative ideas still significantly (and to the same extent) reduced the number of novel ideas that contestants generated. Additionally, the moderation effects captured in studies 4 and 5 (investigating the role of thought regulation) further ruled out reporting bias as a coherent alternative account for our first hypothesis.

The aim of the next study was to provide additional evidence for H1 through a different idea generation contest using a different contestant pool, and to test H2, that this counterproductive effect is due to a high standard of creativity. If the contest sets a more achievable standard, the productivity loss observed when soliciting creative ideas should be alleviated. To test this possibility, we included an additional, pretested condition to set a moderate standard. Testing this moderate-standard condition achieved two additional purposes: (1) it ruled out an alternative account that the observed effect in study 1 was a result of additional

information contestants received in the creativity condition (e.g., a specific type of idea for the contest); (2) this condition helps shed light on the key movements in the number of novel ideas generated in study 1 (i.e., whether the creativity condition inhibited performance or the control condition increased performance).

STUDY 2: LOWERING THE STANDARD

Contestants in study 2 competed in an idea generation contest to come up with names for a new smart phone app. Contestants were assigned to one of three conditions: the creativity condition, the control, or a condition that requested the generation of as many unusual names as possible (which was pretested to set a more moderate standard than the creativity condition; See Web Appendix B).

Method

Contestants. Two hundred ninety-nine contestants (M_{age} = 28.72, SD_{age} = 11.33; 145 women) were recruited through a national online pool (Prolific Academic) and compensated $1 as a baseline participation prize. Four contestants failed the attention check, leaving 295 contestants in the final sample for analysis (Goodman et al. 2012; Paolacci et al. 2010).

Procedure. Contestants entered an idea generation contest to come up with names for a mobile app that could help them locate free Wi-Fi hotspots in the area for a winning prize of $50 (see Appendix A). They were randomly assigned to one of three conditions. The creativity and control conditions used the same wordings as in study 1 (to list as many *creative* names as possible versus as many names as possible). Contestants assigned to the unusualness condition

were instructed to list as many *unusual* names as possible. Similar to study 1, these contests were incentive-compatible: in the control [creativity, unusualness] condition, for every name that a contestant generated [every name that was judged as creative, unusual], the contestant won a raffle ticket for the $50 prize.

Contestants then began the contest. Their names were automatically submitted (and the page advanced) after five minutes. Contestants reported their perceived effort and contest difficulty (summarized in the meta-analysis in the General Discussion). The contest ended with demographic information and probes of suspicion. Prizes were later sent to the winners.

Results and Discussion

We used the same coding procedures ($\alpha = .70$) and computation as in study 1 to calculate the number of ideas that surpassed the novelty threshold of the contest (i.e., the grand mean of the whole contest across the three conditions). To test H2, that the productivity loss of the creativity condition is driven by the high standard of creativity, we regressed the number of novel ideas on contest type using a generalized linear model with a Poisson distribution. Replicating study 1, soliciting creative ideas resulted in significantly fewer novel ideas (M = 4.81, SD = 2.19) compared to the control condition (M = 6.91, SD = 2.63, $b = -.36$, $z = -6.03$, $p < .0001$). Soliciting creative ideas also resulted in significantly fewer novel ideas than soliciting unusual ideas (M = 7.28, SD = 2.70, $b = -.41$, $z = -7.02$, $p < .0001$); the control and unusualness conditions did not significantly differ ($b = .05$, $z = .98$, $p = .33$, see figure 1).

Insert Figure 1 about here

In addition, consistent with study 1, the novelty level of the ideas that made the cut again did not differ between the creativity and control conditions ($t(271) = .50$, $p = .617$), meaning that

those in the creativity (vs. control) condition did not come up with fewer but better ideas. Although not central to our hypotheses, we also found that the unusualness condition showed higher average novelty than the creativity and control conditions ($M_{\text{diff}} = .33$, $t(271) = -4.51$, $p < .001$). We speculated that this may have occurred because the contestants in the unusualness condition had a standard that was not only moderate (vs. difficult, as in the creativity condition) but also specific (vs. nonspecific, as in the control condition; Locke and Latham 2002).

Study 2 replicated study 1 in a different contest using a different contestant pool, again showing that contestants produced fewer novel ideas when the contest requested creative ideas (H1). In addition, this study provided supportive evidence for H2, that soliciting creative ideas is counterproductive because it sets a high standard: productivity loss was alleviated for the contest that set a specific but more moderate standard to prompt creativity. These results also illuminated where the main movement occurred in study 1: soliciting creative ideas led to fewer novel ideas relative to both the control and the unusualness conditions, underscoring the reduction of productivity in the creativity condition. Interestingly, while the unusualness condition set a standard that was higher than the control, the contestants' novel idea count in these two conditions did not differ. We suspect that this occurred because both conditions set a sufficiently low standard; productivity loss was observed only when there was a relatively high standard set by the creativity condition.

To further test this mechanism (H2), study 3 manipulated the contest standard in a different way—keeping the creativity instructions constant and changing who the contestants were competing against (Fishbach and Dhar 2005; Gilbert, Giesler, and Morris 1995; Huang and Zhang 2011; Kivetz and Simonson 2003).

STUDY 3: COMPETING AGAINST CREATIVITY EXPERTS

Contestants in study 3 competed in an idea generation contest to come up with names for a new smartphone app. Contestants were assigned to a creativity or a control condition for the contest, and we further increased the standard of the creativity condition by telling contestants in both the creativity and the control conditions that they would be competing against either an advertising developer (a profession perceived as highly creative) or a regular person (which matched the setting of the first two studies). Advertising developers are known for their creative work producing marketing slogans and brand names; thus, competing against this person should increase the expected standard in the creativity condition, further hindering contestants' ideation productivity. On the other hand, because novelty (i.e., idea quality) was not key to the control condition or its reward, we did not expect the standard manipulation to affect the control condition (see Web Appendix C for the pretest of the standard manipulation: competing against an advertising developer raised the standard relative to competing against the regular person in the creativity conditions, but not in the control conditions).

Method

Contestants. Four hundred three contestants (M_{age} = 36.22, SD_{age} = 12.29; 197 women) were recruited through MTurk and compensated $.80 as a baseline participation prize. Twenty-three contestants failed the attention check, leaving 380 contestants in the final sample for analysis. The study used a 2 (Opponent: Ad Developer vs. Regular Person) × 2 (Contest: Creativity vs. Control) between-subjects design.

Procedure. All contestants read that they would take part in a contest to generate ideas

and that they would be randomly paired with an opponent who had already submitted their ideas for the contest. Contestants in the ad developer condition read that their opponent would be chosen from a group of "200 Advertising Developers (i.e., people whose job is to generate creative advertising content)," while contestants in the regular person condition read that their opponent would be chosen from a group of "200 people." As in the previous studies, these contests were incentive-compatible: contestants were informed that after they submitted ideas, linguistic software would compare their performance to their opponent's in real time and the winner would receive an additional 20 cents (one quarter of their earning).

Next, contestants began the contest and had five minutes to generate names for a smartphone weather application that provided users with current and predicted weather information (see Appendix A). Similar to previous studies, in the creativity conditions, contestants were instructed to generate as many *creative* names for the new app as possible, while in the control conditions, contestants were instructed to generate as many names for the new app as possible. Their ideas were automatically submitted after five minutes.

Contestants then reported on effort, difficulty, and perception of the contest and the opponent; all additional measures are reported in Web Appendix E and the repeated ones are summarized in the meta-analysis in the General Discussion. The contest ended with demographic information and probes of suspicion. Since there was no actual opponent in the contest, all contestants who generated more than three ideas were rewarded 20 cents upon exiting the study.

Results and Discussion

We followed the same procedures as in prior studies to compute the number of novel ideas generated ($\alpha = .74$). To test H2, that the productivity loss in the creativity condition is a

result of a high standard, we used a generalized linear model with a Poisson distribution on the dependent variable of number of novel ideas and with contest, opponent, and their interaction as predictors. We found the predicted Contest × Opponent interaction (b = .17, z = 2.15, p = .031). In further support of H1, soliciting creative ideas (vs. the control) backfired when competing against an unspecified person (in which people naturally inferred a high standard for creativity, as shown in studies 1 and 2, $M_{creative}$ = 6.64, $SD_{creative}$ = 2.58, $M_{control}$ = 7.74, $SD_{control}$ = 2.78, b = −.15, z = −2.87, p = .004). Importantly, the productivity loss in the creativity condition was significantly more pronounced in the ad developer conditions ($M_{creative}$ = 5.63, $SD_{creative}$ = 2.37, $M_{control}$ = 7.78, $SD_{control}$ = 2.79, b = −.32, z = −5.66, p < .0001).

Decomposing this interaction in another way, the effect of the opponent manipulation (ad developer vs. regular person) did not affect productivity in the control conditions (p = .93), where novelty was not key to performance (as verified in the pretest); among the contestants encouraged to generate creative ideas, however, the number of novel ideas significantly decreased when they were competing against an advertising developer, which set a higher bar for ideas (b = −.16, z = −2.82, p = .005, see figure 2). In addition, consistent with previous studies, the novelty level of the ideas that made the cut did not differ by contest (t(361) = −.40, p = .690).

Insert Figure 2 about here

In study 3 we again replicated the finding that soliciting creative ideas reduced the number of novel ideas generated (H1). Furthermore, this study provided additional evidence for the underlying mechanism of this creativity paradox (H2). By directly manipulating the perceived standard of the creativity condition through varying the type of opponent, we found that when the standard of creativity was even higher, such as when competing against a creativity

expert (e.g., an ad developer), requesting creative ideas was even more detrimental to ideation.

So far, we have demonstrated that soliciting creative ideas led to productivity loss in idea generation contests (H1); in addition, we captured the proposed mechanism of the high standard of creativity (H2) by lowering the standard through contest type (study 2) and increasing the standard through opponent perception (study 3). The aim of the next study was to test H3, which asserts that the high standard of the creativity instruction leads to the generation of fewer novel ideas because when people feel that they are not meeting this high standard, they respond by regulating thoughts (managing and adjusting thought streams), which inhibits expansive thinking. Given that people often have difficulty accurately introspecting and reporting their psychological processes (see Nisbett and Wilson 1977 for review), and specifically cognitive regulation (Nęcka et al. 2012), instead of self-reports, we employed moderation methods (Spencer, Zanna, and Fong 2005) to capture the driving role of thought regulation. Specifically, if our theorizing is valid, then impeding people's ability to regulate their thoughts should attenuate the negative effect of soliciting creative ideas on ideation productivity.

In study 4, we tested this possibility through altering ideation modality. Prior research demonstrates that oral behavior is less cognitively inhibited compared to motor responses because speaking activates the impulsive thinking system (Klein 1964; Klesse, Levav, and Goukens 2015; MacLeod 1991; Paus 2001; Paus et al. 1993). Consequently, people struggle to regulate their thinking when speaking a response compared to when manually making a response (e.g., typing, clicking, or pointing). For example, in a self-control dilemma, where people must engage in executive control to override their natural impulse, expressing a choice out loud (vs. clicking a button) results in more indulgent choices (Klesse et al. 2015). Drawing upon this research, we expected that contestants who ideate out loud (vs. ideate by typing the ideas) would

be less able to regulate their thoughts; if thought regulation indeed underlies the effects we have observed so far, ideating out loud should decrease or even completely prevent the creativity paradox, ensuring the productivity in idea generation contests. Testing this modality also provides an important solution for companies and marketers who aim to leverage idea generation contests to collect a rich set of novel ideas from consumers.

STUDY 4: IDEATING OUT LOUD

Contestants in study 4 competed in an idea generation contest for alternative uses for deodorant and were assigned to either the creativity condition or the control for the contest. Then, contestants either generated their ideas by typing them into boxes (replicating past studies' procedures) or by speaking them out loud.

Method

Contestants. Four hundred nine contestants (M_{age} = 33.60, SD_{age} = 10.04; 205 women) were recruited through MTurk and compensated $1 as a baseline participation prize. Ten contestants failed the attention check and six contestants disregarded instructions, leaving 393 contestants in the final sample for analysis. The study used a 2 (Modality: Speaking vs. Typing) × 2 (Contest: Creativity vs. Control) between-subjects design.

Procedure. All contestants were informed that the study was investigating the impact of ambient noise on task performance and that they would record themselves as they participated in the task. Then, contestants in the typing modality conditions were given the same instructions as in past studies (i.e., to type their ideas into boxes on the screen). Contestants in the speaking

modality conditions were asked instead to list their ideas out loud using words or short phrases—to speak their first idea, then their second idea, and so on. The speaking condition thus mimics the typing condition of sequentially listing ideas (i.e., it was *not* a stream of consciousness task, in which people are instructed to report their thoughts in real time. Please listen to example audio file from the speaking modality condition in Web Appendix F). The contests were incentive-compatible with the same reward structure as in prior studies.

Contestants then had five minutes to generate ideas for alternative uses for deodorant (see Appendix A). All contestants uploaded their audio files for the whole task and then reported on effort, difficulty, perception of the contest, and exploratory measures; all additional measures are reported in Web Appendix E, and the repeated ones are summarized in the meta-analysis in the General Discussion. The contest ended with demographic information and probes of suspicion. Prizes were later sent to the winners.

Results and Discussion

We followed the same procedures as in prior studies to compute the number of novel ideas generated by contestants ($\alpha = .67$). To test H3, we conducted a regression using a generalized linear model with a Poisson distribution on the dependent variable of novel idea count and with contest type, modality, and their interaction as predictors. Results revealed a significant Contest × Modality interaction ($b = -.21$, $z = -2.62$, $p = .009$, see figure 3). Replicating previous studies, contestants in the typing conditions were negatively affected by the creativity instruction, such that soliciting creative ideas ($M = 5.66$, SD = 2.37) resulted in fewer ideas that surpassed the novelty threshold of the whole contest (i.e., the grand mean across all conditions) than the control condition ($M = 7.02$, SD = 2.64, $b = -.21$, $z = -2.62$, $p < .001$).

Supporting our proposed mechanism of tighter thought regulation when trying to generate creative ideas, this creativity paradox was alleviated among contestants who spoke their ideas out loud ($M_{creativity}$ = 7.15, SD = 2.67 vs. $M_{control}$ = 7.22, SD = 2.69, b = −.01, z = −.20, p = .844).

Decomposing this interaction the other way, modality only affected contestants in the creativity conditions, where we argued that thought regulation naturally occurred due to its high standard (b = −.23, z = −4.05, p < .001); it did not have an effect among those in the control conditions (b = −.01, z = −.20, p = .843). Consistent with previous studies, the novelty level of the ideas that made the cut again did not differ by contest (t(384) = .01, p = .929).

Insert Figure 3 about here

Study 4 provided support for H3, that the high standard of the creativity condition is counterproductive for the generation of novel ideas because it induces thought regulation and constrains expansive thinking. When contestants spoke their ideas out loud and thus were less able to regulate their thoughts (e.g., Klein 1964; Klesse et al. 2015; MacLeod 1991; Paus 2001; Paus et al. 1993), the productivity loss of the creativity condition was attenuated. This study hence provided important evidence for the driving role of thought regulation, and an interesting and viable solution for companies hosting ideation contests to harvest consumers' creativity.

To fully test the unique driving role of thought regulation (H3) that naturally occurs when people pursue creative ideas, in the next study we examined the opposite of the effect documented in study 4—whether an externally induced increase in thought regulation could reduce productivity for those in the control condition. Based on our theorizing, soliciting creative ideas backfires because it sets a high standard that leads to tighter thought regulation, which constrains expansive thinking. If this is true, a direct increase in thought regulation among those

in the control condition could mimic the effect of the creativity condition, decreasing the number of novel ideas generated. To test this, we directly induced thought regulation through a mindfulness practice in study 5 (Van De Veer, Van Herpen, and Van Trijp 2016). Previous research demonstrates that mindfulness meditation, a practice that emphasizes attention in the present moment, prompts cognitive monitoring (e.g., filtering out of irrelevant stimuli) and increases focus and undivided attention (Jha, Krompinger, and Baime 2007; Semple 2010; Valentine and Sweet 1999; Wenk-Sormaz 2005). Based on these findings, we predicted that exposure to a mindfulness practice would induce tighter thought regulation, leading to productivity loss in ideation, even without a creativity instruction (i.e., in control conditions).

STUDY 5: INDUCING THOUGHT REGULATION THROUGH MINDFULNESS

Contestants in study 5 listened to an audio file that either provided instructions for a mindfulness practice or served as a control. Then, contestants competed in an idea generation contest to come up with uses for a binder clip. As in prior studies, contestants were assigned to either a creativity or a control condition for the contest.

Method

Contestants. We aimed to recruit 400 contestants and successfully recruited 363 contestants (M_{age} = 26.18, SD_{age} = 8.65; 243 women) through an online university student and staff pool. We compensated each contestant $5 as a baseline participation prize. Five contestants failed the attention check, leaving 358 contestants in the final analysis. The study used a 2 (Mindfulness: Yes vs. No) × 2 (Contest: Creativity vs. Control) between-subjects design.

Procedure. In the beginning of the study, contestants listened to an audio file for six minutes. Contestants in the mindfulness conditions listened to mindfulness practice instructions (adapted from materials used in Cropley, Ussher, and Charitou 2007), where they were instructed to focus their attention on their breath and body (audio files are available in Web Appendix G). This mindfulness manipulation has been specifically tied to increased self-regulation (Cropley et al. 2007), making it particularly appropriate for our test. Contestants in the no-mindfulness control conditions simply listened to a voice counting from one to 175, without any additional instruction.

Contestants then began the contest to generate ideas for alternative uses for a binder clip for five minutes (see Appendix A). The contests were incentive-compatible, with the same reward structure as in prior studies. Afterward, contestants completed a mindfulness manipulation check consisting of two items (adapted from the trait mindfulness scale, Brown and Ryan 2003), from 1 = *Not at all* to 7 = *Very much*: "While listening to the audio recording, I was focused on what was happening at the present moment" and "While listening to the audio recording, I was 'running on automatic' without much awareness of what I was doing (reverse-coded)." We also measured experienced boredom; controlling for boredom did not change the results. All other additional measures are reported in Web Appendix E and the repeated ones are summarized in the meta-analysis in the General Discussion. The contest ended with demographic information and probes of suspicion. Prizes were later sent to the winners.

Results and Discussion

Manipulation Check. We averaged the two manipulation check items (r = .59) to form a composite measure of mindfulness. As expected and in line with past research (Cropley et al.

2007), contestants reported that the mindfulness practice (M = 4.75, SD = 1.24) involved more mindful thinking than the control task (M = 2.77, SD = 1.42, b = 1.98, $t(356) = 14.09$, $p < .001$). Analysis of individual items revealed consistent results.

Number of Novel Ideas. We followed the same procedures as in prior studies to compute the number of novel ideas generated ($\alpha = .67$). To test H3, we conducted a regression using a generalized linear model with a Poisson distribution on the dependent variable of novel idea count and with contest type, mindfulness, and their interaction as predictors. Results revealed a significant Contest × Mindfulness interaction ($b = .20$, $z = 2.31$, $p = .021$, see figure 4). Replicating previous studies, contestants in the no-mindfulness conditions were negatively affected by the creativity instruction: those who were encouraged to generate creative ideas (M = 5.26, SD = 2.30) generated fewer novel ideas than those in the control condition (M = 6.90, SD = 2.63, $b = -.27$, $z = -4.41$, $p < .001$). This effect was not significant among contestants in the mindfulness conditions ($M_{creativity}$ = 5.72, SD = 2.39 vs. $M_{control}$ = 6.13, SD = 2.48, $b = -.07$, $z = -1.13$, $p = .261$).

Decomposing the interaction another way, supporting our proposed mechanism that the creativity instruction naturally induces thought regulation, among contestants trying to generate creative ideas (and thus already engaged in thought regulation), there was no effect of mindfulness ($b = .08$, $z = 1.32$, $p = .189$). In contrast, mindfulness practice significantly hindered productivity in the control conditions ($b = -.12$, $z = -1.98$, $p = .047$). As in all previous studies, the novelty level of the ideas that made the cut did not differ by contest; those in the creativity conditions and control-mindfulness condition did not come up with fewer but better ideas ($t(357) = -.01$, $p = .922$).

Insert Figure 4 about here

Study 5 provided final support for H3, that soliciting creative ideas results in productivity loss because it induces thought regulation: when contestants were directly induced to regulate their thoughts through a mindfulness practice, the number of novel ideas generated by those in the control condition significantly decreased (and matched the productivity of those trying to generate creative ideas).

Of note, prior research has found that mindfulness practice can sometimes increase creativity (Capurso, Fabbro, and Crescentini 2014). We speculate that this is due to the multidimensionality of mindfulness practice. When a mindfulness practice emphasizes acceptance of all thoughts, this openness can promote creative (expansive) thinking (Colzato, Szapora, and Hommel 2012). In contrast, in our mindfulness instruction, we emphasized another key aspect of mindfulness practice—the management and direction of attention (Cropley et al. 2007), which leads to tighter thought regulation that hinders expansive thinking. The multidimensionality of mindfulness practices makes it an interesting area for further exploration.

GENERAL DISCUSSION

Idea generation is an important step in reaching creative success. To drive innovation, companies and marketers organize ideation activities, like crowdsourced consumer idea generation contests. Through six idea generation contests on different products (toy, office supply, toiletry, and mobile app) involving close to 2,000 contestants across various demographic segments and four subject pools, we found that soliciting creative ideas

paradoxically decreased the total number of novel ideas that the contestants generated. We further showed that soliciting creative ideas resulted in productivity loss because it set a high standard that induced tighter thought regulation. By isolating the unique cognitive process of ideation, we also identified multiple solutions to this creativity paradox: (a) requesting the generation of ideas instead of *creative* ideas (studies 1–5), (b) reducing the contest standard by soliciting unusual ideas (study 2) and (c) incorporating elements that temporarily reduce contestants' thought regulation ability (study 4).

Meta-Analysis and Robustness Checks

A single paper meta-analysis (SPM; McShane and Böckenholt 2017) estimated that soliciting creative ideas resulted in 1.49 fewer novel ideas generated per contestant (95% CI: [−1.12, −1.86]), which amounted to a 20% decrease in productivity relative to the control (see figure 5).[3] In addition, this effect remained significant and sizable when only analyzing unique (non-redundant) novel ideas in each contest ($b = -.13$, $z = 5.43$, $p < .0001$). Across all contests, soliciting creative ideas resulted in 500 fewer unique (non-redundant) novel ideas harvested ($\text{Total}_{\text{creativity}} = 2{,}997$ $\text{Total}_{\text{control}} = 3{,}579$).

Insert Figure 5 about here

Importantly, the observed results were robust to a variety of cut-off points classifying an idea as novel: ideas that scored above the rounded grand novelty mean across all conditions (e.g., if the mean was 3.7, scoring above 4), ideas that scored one point above the grand mean, and

[3] We conducted the SPM analysis using both standard deviations calculated from a Poisson distribution (as reported in the individual studies) and standard deviations calculated from simple linear regression. Both estimates were significant.

ideas that scored over one standard deviation above the grand mean. Across these different novelty thresholds, soliciting creative ideas resulted in significantly fewer novel ideas than those in the control (see figure 6).

Insert Figure 6 about here

In addition, we tested the possibility that the productivity loss of the creativity condition was driven by a few "high performers" (i.e., outliers) in the control condition; we found that the effect of the creativity condition remained significant when removing contestants who scored one standard deviation (or more) above the average number of novel ideas generated in each competition (which turned out to be the top 14% of contestants), providing evidence that the observed effect was not due to outliers ($b = -.06$, $z = 2.16$, $p = .03$, see figure 7).

Insert Figure 7 about here

In addition, we also coded for functionality (i.e., how feasible, implementable, and useful the ideas were) in studies 1, 2, 3 and 5. In these studies, the average functionality of the novel ideas that passed the threshold did not significantly differ by contest (SPM: 95% CI: [−.13, .13]); thus, our effect was not driven by the creativity instruction producing ideas that were more functional.

Last, across all studies, a SPM revealed that contestant effort (95% CI: [−.29, .05]) and perceived difficulty (95% CI: [−.06, .28]) did not vary by contest type. In addition, the observed creativity paradox remained significant when including difficulty and effort in the regression model ($b = -.20$, $z = -8.79$, $p < .0001$). This finding helps to further rule out the alternative accounts that increased motivation, a general feeling of difficulty, or "choking under pressure"

(Baumeister 1984) caused the difference between the creativity and the control conditions.

Contribution to Creativity and Self-Regulation Research

Creativity. Our findings add to the literature in consumer creativity by (a) documenting the paradoxical effect of soliciting creative ideas, (b) drawing from self-regulation literature to provide a cognitive account (self-monitoring) for this productivity loss, (c) identifying process-driven solutions to this productivity loss (e.g., requesting the generation of all ideas, reducing the standard of the contest, inhibiting thought regulation by having contestants ideate out loud), and (d) introducing a new performance metric that is rooted in the ideation literature and that is highly relevant for firms and idea generation activities.

At first blush, the productivity loss observed when soliciting creative ideas in this research might seem inconsistent with findings in prior literature that demonstrate that having a creativity goal can, in many situations, increase creative output (Baumeister et al. 2007; Chen et al. 2002, 2005; Christensen, Guilford, and Wilson 1957; Harrington 1975; Niu and Liu 2009; O'Hara and Sternberg 2001; Runco, Illies, and Eisenman 2005; Shalley 1991, 1995). However, a closer look at these findings suggests that these prior studies focused on how goals can increase the motivation to think creatively and thus used a condition that had no goal/incentive at all as a control. For instance, Shalley (1991) gave participants multiple memos to solve. When instructed to be creative, the solutions that participants provided were more creative than those of participants who were not given any goal (not even a goal to generate as many ideas as they could). However, in the context of company-hosted idea generation, participants are already motivated to engage in creative thinking for the reward. Thus, our work complements prior work by elucidating how, when holding motivation and effort constant, soliciting creative ideas can

inhibit the cognitive process of ideation and hinder productivity.

Interestingly, our proposed process of monitoring one's current thoughts and ideas against a high creativity standard explains several provocative findings in creativity research as well. For example, intoxication has been found to facilitate creative performance (Jarosz, Colflesh, and Wiley 2012), nonoptimal times of day yield higher creativity (Wieth and Zacks 2011), and spontaneous eye blinks, a proxy of disinhibition, are associated with better performance in an idea generation task (Chermahini and Hommel 2010; see Amer, Campbell, and Hasher 2016 for a review). In addition, a recent fMRI study found that activation in the brain's executive control centers is inversely related to creative output (Saggar et al. 2015). We believe that these findings can be understood through one coherent mechanism of self-monitoring, or the lack thereof: when people are less able to monitor and subsequently regulate their thoughts, expansive thinking (and thus, the generation of novel ideas) is facilitated.

Goals Gone Wild. This research also adds to the growing body of work on the backfire effect of goal pursuit, which demonstrates that goal pursuit can cause unintended side effects (Gruber et al. 2011; Ordóñez et al. 2009; Uziel and Baumeister 2017; Wegner 1994). For example, setting a challenging sales goal for employees can encourage the unethical treatment of consumers (Ordóñez et al. 2009). The current work extends this research by showing that goal pursuit can backfire not only through inducing harmful side effects like unethical behavior or biased information processing (e.g., Gruber et al. 2011), but also through the cognitive process of goal pursuit (i.e., monitoring and regulating thoughts, as documented in studies 4 and 5).

Human Motivation. Last, our findings add to the extensive work on self-regulation, human motivation, and, particularly, cognitive control. Recent research has cast doubt on the notion that impulsive, uncontrolled behavior is always harmful. For instance, Lisjak and Lee

(2014) found that depleted individuals engaged in more self-protective behaviors due to feelings of vulnerability. Adding to this nascent research stream, we found that conditions that normally would impede self-regulation (e.g., speaking out loud, study 4; Klesse et al. 2015) can also enhance goal attainment in the context of idea generation, and states that are associated with positive self-regulatory outcomes (e.g., mindfulness, study 5) can paradoxically hurt ideation. This provides interesting possibilities for future research. For example, how would individuals' dispositional tendency to engage in attention regulation, a trait that has been shown to aid in self-regulation and goal attainment (Diehl et al. 2006), influence ideation productivity? We conducted an exploratory study (401 contestants, M_{age} = 29.39, SD_{age} = 9.80; 202 women) and measured people's trait attention regulation and found that at the mean level of dispositional attention regulation, soliciting creative ideas was indeed counterproductive (as shown in all studies). However, productivity loss was observed in both the creativity and control conditions among contestants who were dispositionally prone to engage in attention regulation. This finding opens the possibility that firms can leverage environments that disrupt idea generators' natural tendency to cognitively regulate when pursuing ideas, such as hosting a high-pressure hackathon in a brewery.

Practical Implications and Future Directions

Our findings have important practical implications for designing ideation activities. Companies should be aware that hackathons and creativity contests can implicitly set a high standard for contestants, which could reduce the number of novel ideas they can harvest. In addition to sounding a cautionary bell to this prevalent marketing practice, our studies provide helpful solutions for encouraging creative effort and boosting ideation output. For instance,

companies can frame the contest as seeking unusual ideas (study 2), avoid explicitly soliciting creative ideas ("to generate as many ideas as possible," studies 1 through 5), and incorporate elements such as speaking aloud that could temporarily reduce contestants' thought regulation ability (study 4).

While this research focuses on idea generation contests where creative ideas were externally solicited, our framework can extend to individualistic pursuit of creative ideas in noncompetitive contexts as well (e.g., Moreau and Herd 2010; Youn, Shin, and Lee 2015). When consumers engage in creativity, they often generate ideas (e.g., coming up with a list of creative activities for a bachelorette party). If consumers focus on generating creative ideas in the early stage of ideation, they could again face a high standard, regulate their thoughts, and end up with fewer novel ideas for further development and implementation. Future research could investigate this possibility and explore other ways to help circumvent the creativity paradox in individualistic, noncompetitive ideation.

Collaborative group-based idea generation constitutes another exciting area for future research. Prior research has found that banning criticism can at times hamper creative responses in groups, as criticism enables group members with alternative points of view to express their ideas (Nemeth et al. 2004). However, our findings suggest that criticism could backfire via thought regulation. Perhaps the hindering effect of thought regulation manifests only in intrapersonal thought regulation, but not in interpersonal, collaborative situations? Or, it is possible that in a group setting, the standard for creativity lacks consensus, which reduces the possibility of monitoring and comparing? Inquiries along these lines can significantly add to the literature of creativity and ideation and shed light on the unique cognitive processes that may underlie collaborative idea generation.

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FIGURE 1

THE EFFECT OF CONTEST TYPE ON NUMBER OF NOVEL IDEAS (+/− 1 SE)

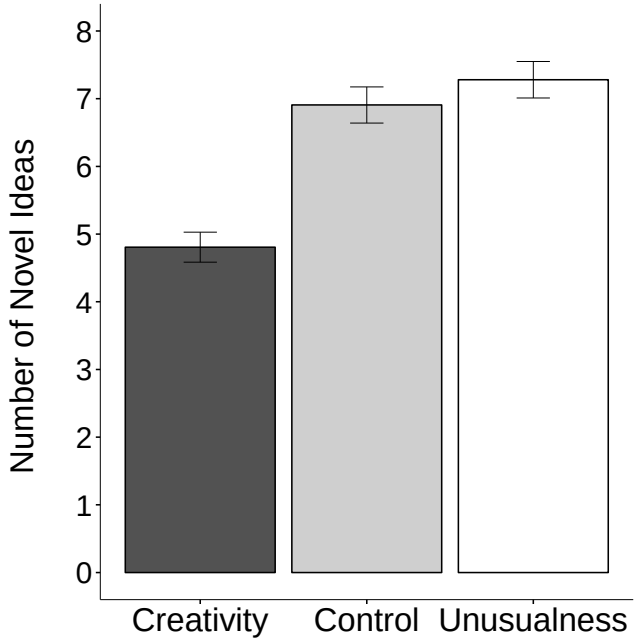


FIGURE 2

THE EFFECT OF CONTEST TYPE AND OPPONENT ON NUMBER OF NOVEL IDEAS (+/− 1 SE)

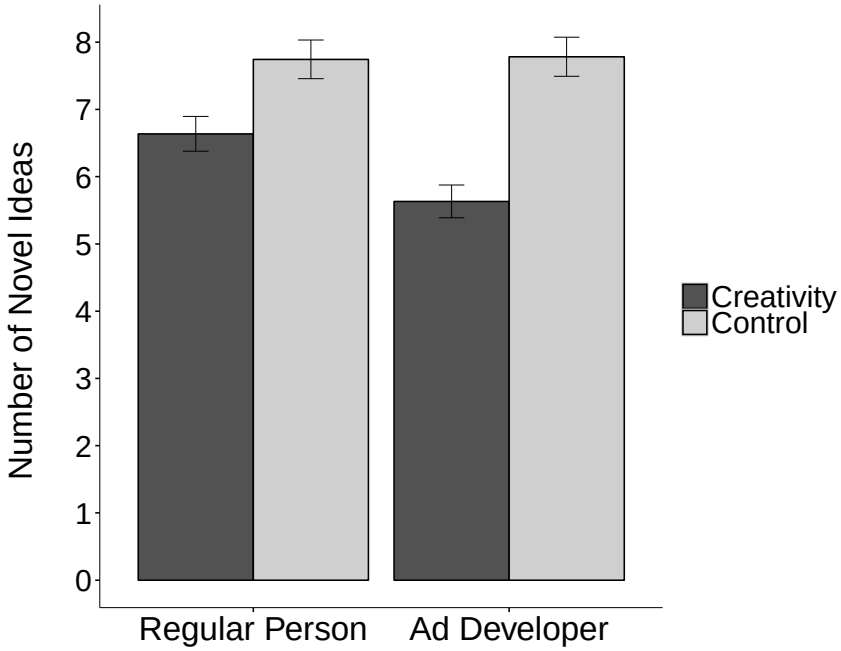


FIGURE 3

THE EFFECT OF CONTEST TYPE AND IDEATION MODALITY ON NUMBER OF NOVEL IDEAS (+/− 1 SE)

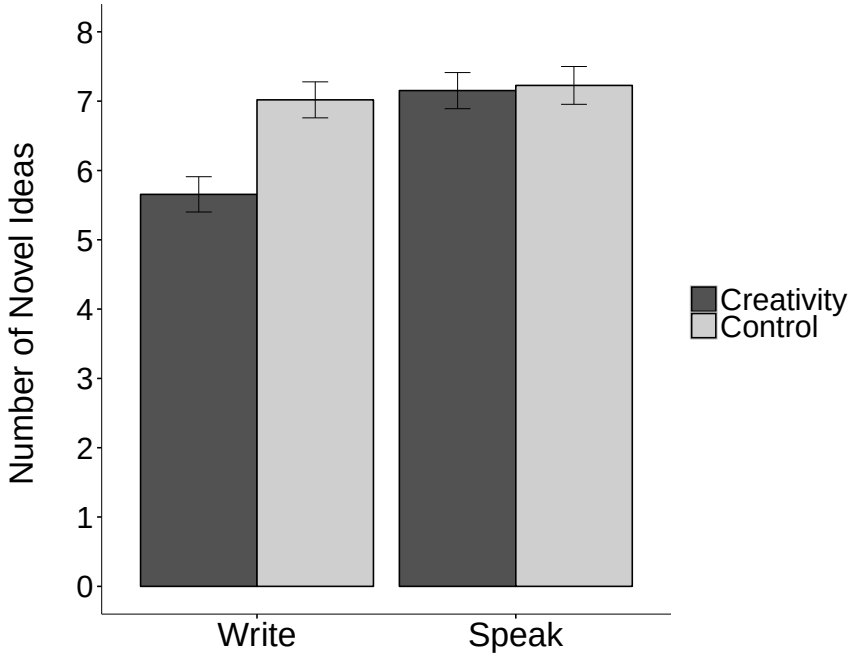


FIGURE 4

THE EFFECT OF CONTEST TYPE AND MINDFULNESS ON NUMBER OF NOVEL IDEAS (+/− 1 SE)

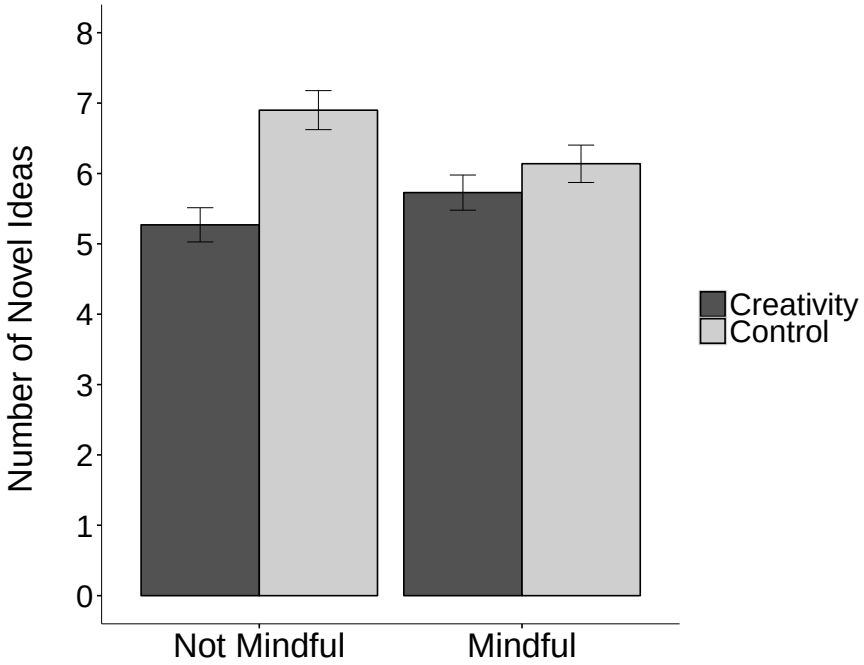


FIGURE 5

SINGLE PAPER META-ANALYSIS

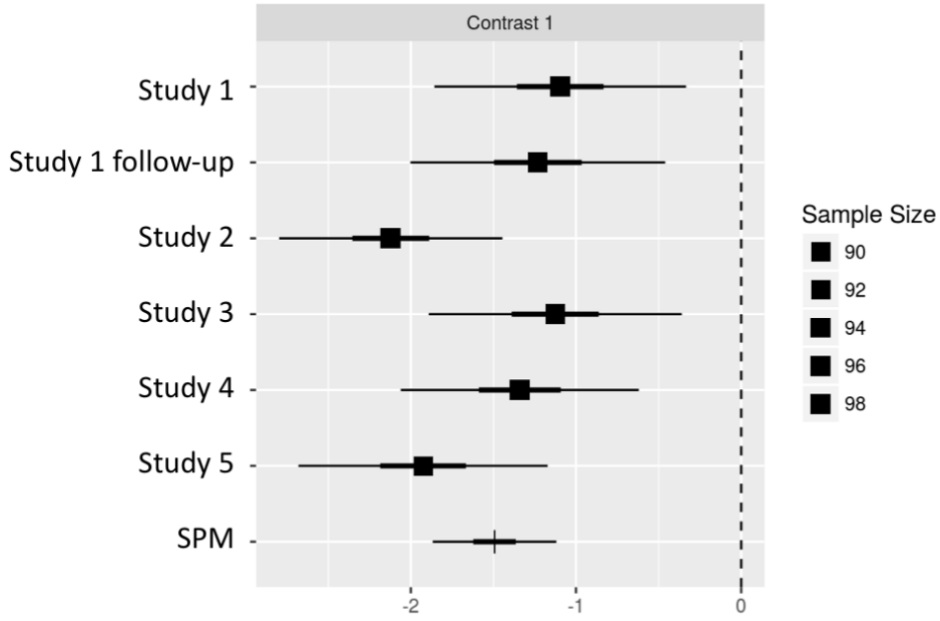


FIGURE 6

ROBUSTNESS CHECK—THRESHOLD ANAYSIS (95% CIs)

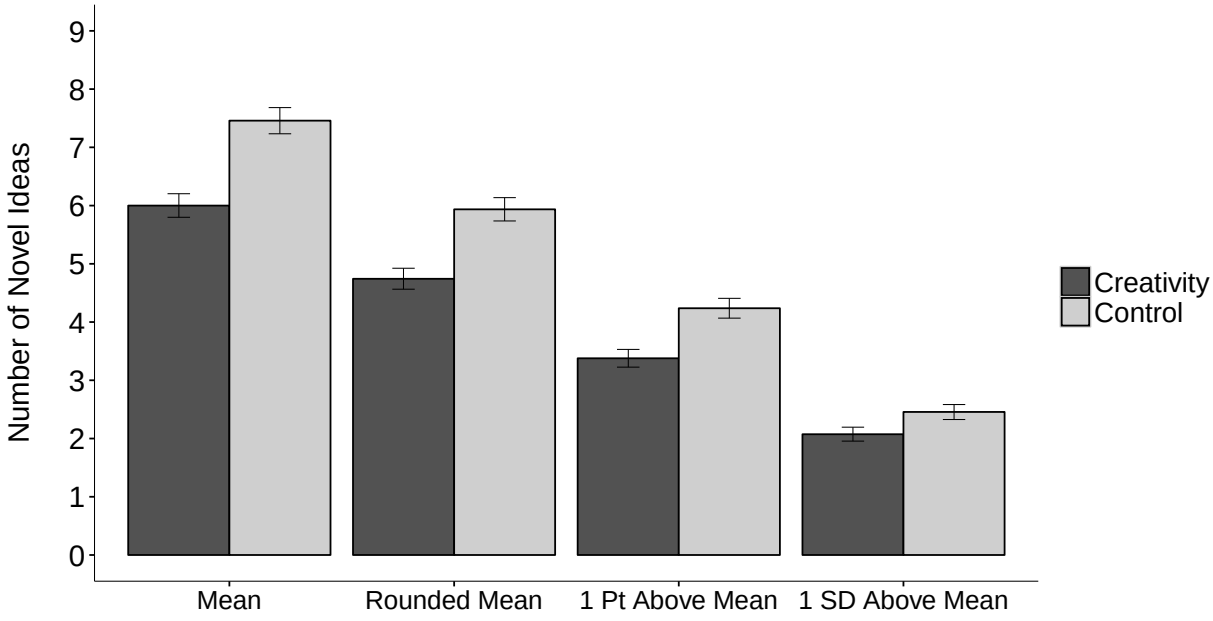
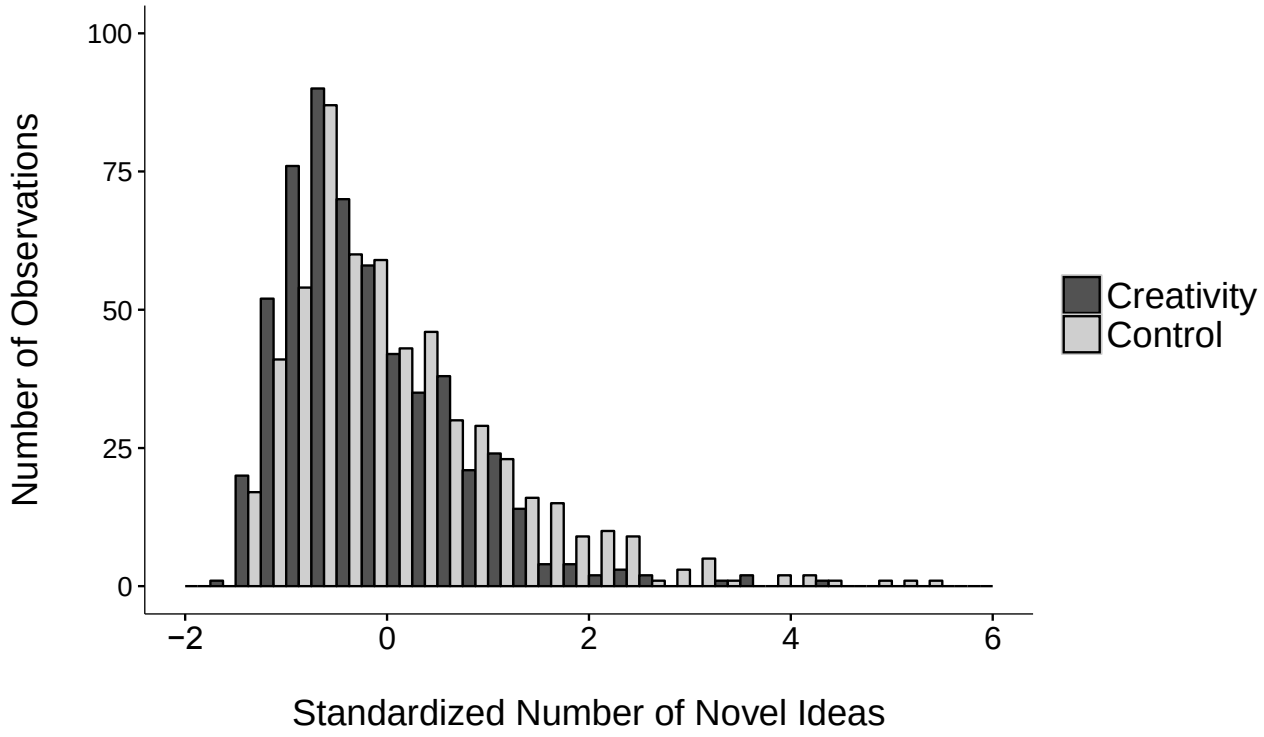


FIGURE 7

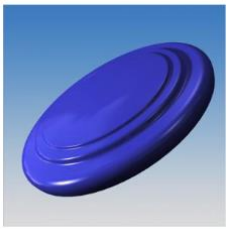
DISTRIBUTION OF NUMBER OF NOVEL IDEAS BY CONDITION ACROSS STUDIES



APPENDIX A

Idea generation contest in study 1 (and the follow-up to study 1)

You have entered an **idea contest** involving coming up with **alternative uses** for a **frisbee**!



Idea generation contest in study 2

You have entered an **idea contest** involving coming up with **names for a new mobile phone app**!

This app enables users to find free or paid WiFi hotspots nearby using a search function that works online or offline. It can filter based on location, price, and availability (days and hours the hotspot is open).

Idea generation contest in study 3

You have entered an **idea contest** involving coming up with **names for a new mobile phone app!**

This App provides users with the current temperature, current air quality, the predicted weather trend by hour, and a 10-day forecast.

Idea generation contest in study 4

You have entered an idea generation contest involving coming up with alternative uses for **deodorant**!

Idea generation contest in study 5

Task 2

For the second task, you will generate ideas for **alternative uses** for a **binder clip**!

WEB APPENDIX

This Web Appendix includes: (A) the manager pilot studies mentioned in the introduction, (B) the pre-test for study 2, (C) the pre-test for study 3, (D) the results when using MTurk judges to code the ideas, as mentioned in the method section in study 1, (E) all exploratory items measured in each study, (F) an example audio file from a participant in the speaking condition for study 4, (G) the audio stimuli for study 5.

WEB APPENDIX A: MANAGER PILOT STUDY

Participants. We recruited sales and marketing managers in two pilot studies using two different online pools. Eighty managers were recruited through Qualtrics and eighty-one managers were recruited through Sample Strategies (Pilot 1, Qualtrics: M_{age} = 36.95, SD_{age} = 10.14; $M_{years\ in\ position}$ = 8.44, $SD_{years\ in\ position}$= 7.13; 52 women; Pilot 2, Sample Strategies: M_{age} = 42.74, SD_{age} = 9.96; $M_{years\ in\ position}$ = 10.56, $SD_{years\ in\ position}$= 6.26; 29 women). Across these two samples, these managers oversaw a median of 15 employees (M = 109.01 employees, SD = 451.84), were predominantly based in organizations with an annual budget over $1,000,000 (see figure 1), and spanned across 20 different industries (see figure 2 for breakdown). Additionally, 48% of managers worked for a company that had used idea generation contests to crowdsource ideas from consumers.

Figure 1: Distribution of Managers' Annual Operation Budget

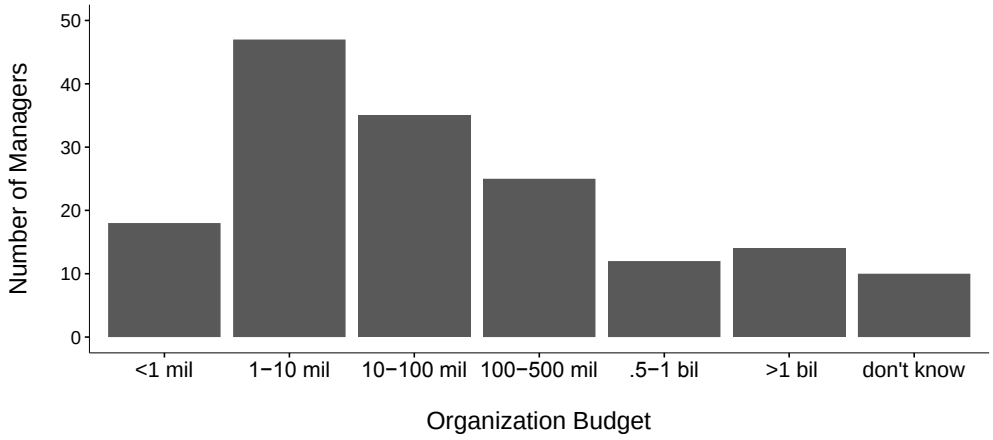
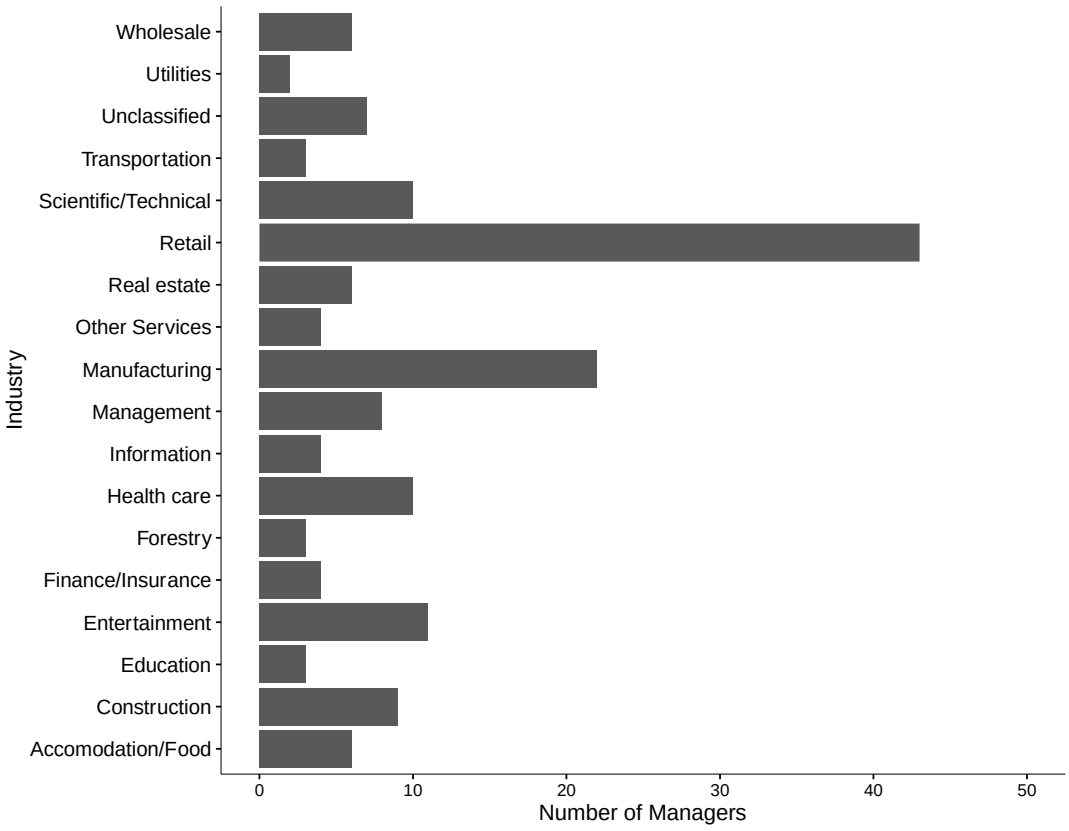


Figure 2: Distribution of Managers' Industries



Procedure and Results. Managers were asked to reflect on how they would host an idea generation contest to collect logo, naming, and/or product ideas from target consumers for their company/brand. Managers first indicated what their main objective would be when using

crowdsourced idea generation contests. The most popular objective for consumer-based idea generation contests (selected by 49% and 56% of managers, respectively) was "to collect as many novel/high-potential ideas as possible from target consumers," compared to 34% and 33% of managers choosing "to collect a few novel/high-potential ideas," and 18% and 11% of managers choosing "to collect one winning/high-potential idea," $\chi^2(2) = 11.73$, $p = .003$ and $\chi^2(2) = 24.00$, $p < .001$, respectively. Then, managers were asked to select an instruction they would use for the idea generation contest. The majority of managers (56% and 58%, respectively) indicated that they would explicitly request that contestants submit multiple creative ideas (e.g., "Please submit as many creative ideas as possible!"), compared to 29% and 33% requesting only one top idea from each contestant (e.g., "Please submit one (your most) creative idea!") and 15% and 10% requesting ideas without any mention of creativity (e.g., "Please submit as many ideas as possible!"), $\chi^2(2) = 21.18$, $p < .001$ and $\chi^2(2) = 28.22$, $p < .001$, respectively.

WEB APPENDIX B: STUDY 2 PRE-TEST

In a pretest, 100 online participants (Prolific Academic, $M_{age} = 23.92$, $SD_{age} = 7.13$; 44 women) rated the perceived standard for the creativity, control, and unusualness conditions by answering "What quality of ideas is expected from the contestants?" 1= *very poor quality* to 7 = *very high quality*, and "Does the contest set a high bar for the ideas contestants will have to generate to meet the goal?" 1 = *not at all* to 7 = *very much* ($r = .86$). Participants perceived the creativity condition to set a higher standard ($M = 5.47$, SD = 1.39) than the unusualness ($M = 4.35$, SD = 1.71, $b = 1.12$, $t(198) = 5.92$, $p < .0001$) and control ($M = 3.02$, SD = 2.04, $b = 2.45$, $t(198) = 12.91$, $p < .0001$) conditions. The unusualness condition also set a higher standard than

the control (b = 1.33, $t(198) = 7.00$, $p < .0001$), and thus represented a moderate standard.

WEB APPENDIX C: STUDY 3 PRE-TEST

In a pretest, 395 online participants (Prolific Academic, M_{age} = 33.23, SD_{age} = 10.98; 193 women) read a list of 30 ideas ostensibly generated by a contestant in the competition (ideas varied in novelty and repetitiveness, see below). Participants were asked to act as a judge and select the ideas that they believed would meet the bar for the contest. We used the same 2 (Opponent: Ad Developer vs. Regular Person) × 2 (Contest: Creativity vs. Control) between-subjects design, such that participants served as a judge for one of these four contests. As expected, competing against an advertising developer raised the perceived standard for ideas in the creativity contest: judges selected fewer ideas as meeting the bar for the contest (i.e., fewer ideas were judged as being novel) when the opponent was an ad developer rather than a regular person ($M_{\text{ad developer}}$ = 7.55, SD = 2.74, M_{regular} = 8.32, SD = 2.88, z = 1.93, p = .054). Importantly, in the control conditions, where novelty was not central to the contest (i.e., contestants' objective was to generate as many ideas as possible), the opponent manipulation (ad developer vs. regular person) did not influence the number of ideas selected as meeting the bar for the contest ($M_{\text{ad developer}}$ = 23.45, SD = 4.84, M_{regular} = 23.41, SD = 4.84, $z = -.063$, p = .950). Hence, competing against an ad developer further heightened the perceived standard for ideas in the creativity conditions, but not in the control conditions.

The list of 30 ideas provided to participants

10-perature
pocket zeus
weather or not to go outside
forefast
forseecast
app-mosphere
backyard
blimpey
atmoawar
barometer
climate
cliMATE
cloud trend
cloud trender
do I need an umbrella?
do we need an umbrella?
is it cloudy?
easycast
hot and cold
is it beautiful?
mycast
myclimate
storm watch
weatheradvisor
Weather Advisor
what's it like outside
worldweather
24 hours 10 days
10 day now
weather forecaster

WEB APPENDIX D: MTURK JUDGES

To further enhance the robustness of our results, in addition to using two undergraduate judges to code ideas, we also analyzed the results using MTurker-coded ideas.

Coding Procedure. Across all studies, to prepare the ideas for coding, we removed all duplicated ideas, randomized the ideas, and then split the ideas up into four different files (to reduce the workload of each coder). To recruit judges, we had MTurkers participate in a basic "consumer survey" with attention check items interspersed within the survey questions. MTurkers who passed the attention checks were notified that they had the opportunity to code some ideas. Of the MTurkers that accepted the opportunity, we assigned 12 MTurkers to each of the four files, amounting to 48 total MTurk judges recruited to code the data for each study. This was based on the assumption that around two judges for each file would be dropped due to poor coding quality. MTurkers were instructed to code each idea in their file on three dimensions: how innovative, novel, and original the idea is on 7-point scales (Mehta and Zhu 2016).

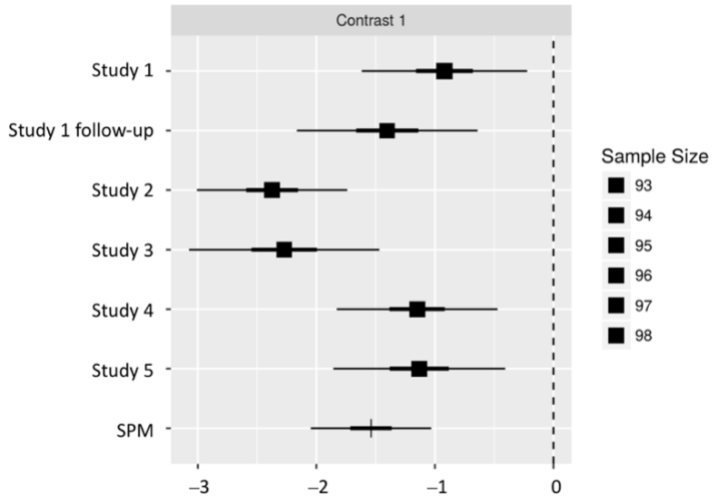
Once the results were collected, we assessed the quality of each judge's work using preregistered quality guidelines to determine whether an MTurk judge's code would be included in our analysis (https://osf.io/c29tq/?view_only=1a857269037344f38e540b1218521dd9). When the number of high-quality judges dropped below five per file, we recruited additional judges.

We averaged the three items (innovativeness, novelty, and originality) to form a composite novelty score for each idea for each judge (interitem α's > .95). Then, we combined the codes from the four files and calculated the interrater reliability. Across all studies, MTurk judges demonstrated satisfactory agreeability (all α's > .75) based on the intraclass correlation criteria delineated by Cicchetti and Sparrow (1981). For final analysis, scores of all judges were averaged, forming a single novelty score for each idea.

As reported in the main text, for each study, we computed the key measure of novel idea count by summing the number of ideas each contestant generated that surpassed the threshold of average novelty of the contest (i.e., the grand mean of the whole contest across all conditions in each study). To enhance the robustness of our dependent measure, we also conducted the same analyses at a variety of stricter thresholds (e.g., ideas that scored one point above the average novelty score of the contest, ideas that scored one standard deviation above the average novelty score of the contest).

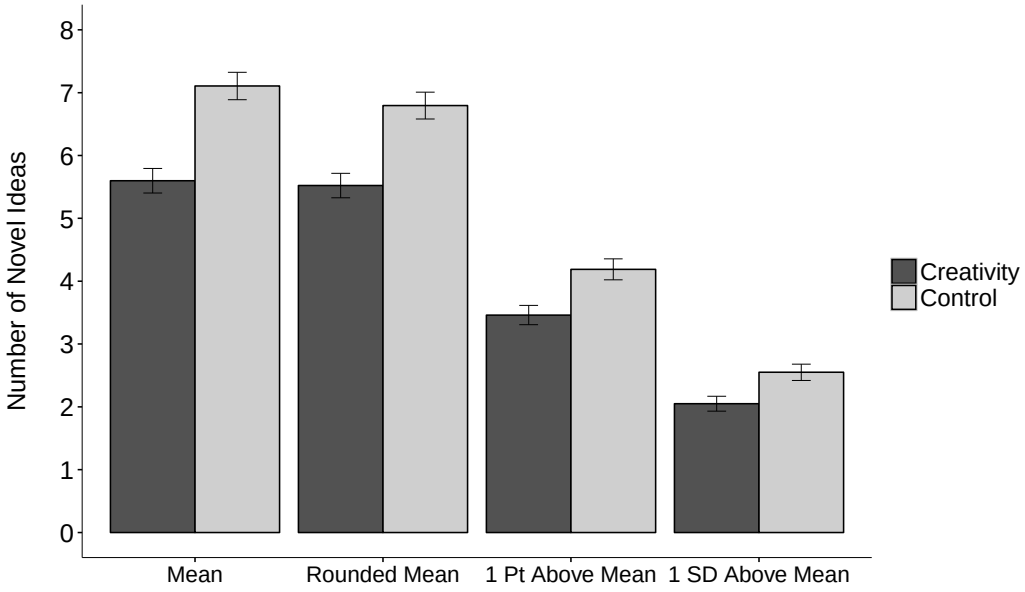
Results. Replicating the results found when using undergraduate judges, the analyses of data coded by 35+ online MTurk judges revealed that contestants in the creativity condition generated significantly fewer novel ideas compared to the control condition. Specifically, a single paper meta-analysis (SPM; McShane and Böckenholt 2017) estimated that soliciting creative ideas resulted in 1.54 fewer novel ideas generated per contestant (95% CI: [−1.03, −2.04]), which amounted to a 22% decrease in productivity relative to the control (see figure 3).

Figure 3: Single Paper Meta-Analysis using MTurk Judges



Moreover, the paradoxical effect of soliciting creative ideas was again robust to a variety of cut-off points: ideas that scored above the rounded grand novelty mean across all conditions (e.g., if the mean was 3.7, scoring above 4), ideas that scored one point above the grand mean, and ideas that scored over one standard deviation above the grand mean. Across these different thresholds, soliciting creative ideas resulted in significantly fewer novel ideas than those in the control (see figure 4).

Figure 4: Threshold Analysis using MTurk Judges (95% CIs)



Lastly, we again found that the effect of the creativity condition remained significant when removing outliers, such as contestants who scored one standard deviation (or more) above the average number of novel ideas generated in each contest (which turned out to be the top 11% of contestants), providing evidence that the observed effect was not due to extreme outliers ($b = -.06$, $z = 2.02$, $p = .042$).

Thus, our results are robust to different sets of judges. Across both MTurk and undergraduate judges, we observe a significant paradoxical effect of soliciting creative ideas.

WEB APPENDIX E: EXPLORATORY MEASURES

Study 1

Motivation

1. How motivated were you to win this contest?

Study 2

Enjoyment

1. How much did you enjoy generating ideas in this task?

Motivation

1. Throughout idea generation, how motivated were you to win the competition?

Study 3

Post-Contest Impression

1. Do you feel that the criteria for receiving the raffle ticket was clear?
2. How close do you think you were to reaching the goal of the contest?
3. What quality of ideas did you think was expected from you?

4. Do you feel that the contest set a clear standard for the ideas you had to generate (to meet the goal)?
5. Do you feel that the contest set a high bar for the ideas you had to generate (to meet the goal)?

Monitoring Self-Report

1. How closely were you monitoring the quality of ideas that you had already generated?
2. How closely were you monitoring the quality of ideas as you were generating them?
3. How closely were you monitoring your performance during the contest?
4. As you were coming up with ideas, how often would you go back to re-evaluate the ideas you had generated so far?

Focus Self-Report

1. I found myself working hard to concentrate on thoughts that were relevant to the goal of the contest.
2. I found myself working hard to suppress thoughts that interfered with the goal of the contest.
3. I tried hard to control my thoughts from wandering away from the goal at hand.
4. I did not mind if my thoughts sometimes went off track from the goal of the contest.

Pressure/Anxiety

1. How much pressure did you feel to do well in this contest?
2. Do you think the pressure you felt during the contest harmed or helped your performance?
3. How anxious did you feel about your performance throughout the contest?
4. Do you think the anxiety you felt during the contest harmed or helped your performance?

Post-Contest Opponent Impression

1. How creative do you think this person is?
2. How good at idea generation do you think this person is?
3. As you were coming up with ideas, how often did you think about how your ideas will compare to this person's ideas?

Study 4

Reporting Bias

1. It is possible that, during the competition, you didn't speak out loud [write down] some ideas that you generated because you thought they wouldn't earn you a raffle ticket/meet the goal of the competition. How often did that happen?
2. Please list any ideas you remember having but not writing down [speaking out loud] during the competition.

Familiarity and Expertise

1. How familiar are you with deodorant?
2. How often do you use deodorant?
3. How familiar are you with brainstorming/idea generation?
4. How often do you participate in idea generation contests on mturk or elsewhere?

Dispositional Creativity

1. I'm the type of person who thinks outside the box.
2. I think about things in unconventional ways.
3. I have difficulty generating new ideas. (R)
4. I'm the type of person who sees alternative approaches to problems.

Study 5

Self-Reflection on Idea Generation Process

1. While generating ideas, my mind at times wandered off and was distracted.
2. While generating ideas, I was only focused on the task, nothing else.
3. When I was generating ideas, part of my mind was occupied with other topics, such as what I would be doing later, or things I'd rather be doing.
4. When I was generating ideas, I got completely absorbed in what I was doing, so that all my attention was focused on it.
5. When I was generating ideas, at times I didn't pay attention to what I was doing because I was daydreaming, worrying, or otherwise distracted.
6. When I was generating ideas, I got totally wrapped up in the task and didn't think about anything else.

Audio Recording

1. How boring was it listening to the audio recording?
2. How effortful was it to listen to the audio recording?
3. How much did you enjoy listening to the audio recording?
4. How much did you concentrate while listening to the audio recording?
5. How much did your mind wander while listening to the audio recording?

Motivation

1. Throughout idea generation (task 2), how motivated were you to win the raffle ticket?

Enjoyment

1. How much did you enjoy generating ideas during task 2?

WEB APPENDIX F: SAMPLE PARTICIPANT AUDIO (STUDY 4)

https://www.dropbox.com/s/0sipadp8ryxjc6o/sample%20participant%20audio%20clip.m4a?dl=0

WEB APPENDIX G: AUDIO STIMULI (STUDY 5)

Control: https://www.dropbox.com/s/vi1lmzslkfj6cac/control%20audio.m4a?dl=0

Mindfulness: https://www.dropbox.com/s/r9wfl59u10ao6ln/mindfulness%20audio.m4a?dl=0