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Seeker Exemplars and Quantitative Ideation Outcomes in Crowdsourcing Contests

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Abstract. Idea seekers in crowdsourcing ideation contests often provide solution exemplars to guide solvers in developing ideas. Solvers can also use these exemplars to infer seekers' preferences when generating ideas. In this study, we delve into solvers' ideation process and examine how seeker exemplars affect the quantitative outcomes in solvers' scanning, shortlisting, and selection of ideas; these ideation activities relate to the search and evaluate stage of a previously published knowledge reuse for innovation model. We theorize that solvers' use of local (problem-related) and/or distant (problem-unrelated) seeker exemplars in the respective search and evaluation activities is affected by their belief and emphasis in contests as well as the influences of processing fluency and confirmation bias during idea generation. Consequently, local and distant seeker exemplars have different effects in different ideation activities. Consistent with our theorizing, the results from an ideation contest experiment show that, compared with not showing any seeker exemplars, providing these exemplars either does not affect or could even hurt the quantitative outcomes in the respective ideation activities. We find that solvers generally search for, shortlist, and/or submit fewer ideas when shown certain seeker exemplars. Moreover, solvers who submit fewer ideas tend to submit lower quality ideas on average. Thus, showing seeker exemplars, which contest platforms encourage and seekers often do, could negatively affect quantitative ideation outcomes and thereby impair idea quality. We discuss the theoretical and practical implications of this research.

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1. Introduction

Information technology (IT) is an important facilitator of idea sourcing, supporting channels such as electronic brainstorming among employees (Dennis et al. 1999, Potter and Balthazard 2004) and online user communities (Di Gangi et al. 2010, Hwang et al. 2019) through which organizations acquire ideas to address their problems. A proliferating form of IT-enabled idea sourcing is crowdsourcing ideation contests, in which idea seekers host competitions to solicit ideas from external solvers. Ideation contests begin with seekers posting project briefs that detail their problems and requirements, prizes for winning ideas, and contest deadlines. Seekers often also show examples of ideas that they like in the project briefs; we term these "seeker exemplars." (Online Appendix A shows a project brief and seeker exemplar in an image contest on Foap, a crowdsourcing platform for visual content.) Solvers then must generate and submit their ideas for seekers' consideration before the deadlines. At the end of the contests, seekers choose the ideas that they want and award prizes to the corresponding solvers.

Research shows that seekers can mobilize the crowd to develop valuable ideas (Bayus 2013, Franke et al. 2014), and solvers in ideation contests can come up with solutions for problems that firms could not solve (Jeppesen and Lakhani 2010) or generate ideas that outperform those by firms (Poetz and Schreier 2012, Nishikawa et al. 2013). One way to increase the likelihood of attaining good ideas is to encourage solvers to generate and submit more ideas; prior studies show that this strategy of achieving idea quality through idea quantity could be effective (Diehl and Stroebe 1987, Osborn 1993, Paulus et al. 2011, Zheng

et al. 2014, Wooten and Ulrich 2017). Although research discussing the eventual number of ideas that solvers submit in contests is extensive, there is little empirical attention on the intermediate quantitative outcomes of their ideation (see Table 1). In our context, intermediate outcomes refer to those that precede and impact the final ideas that emerge at the end of ideation. The importance of these outcomes cannot be overlooked, as the eventual ideas that one develops depend on and result from the ideation process that comprises a set of subactivities. For example, the number of ideas that solvers generate (i.e., eventual outcomes) can be impacted by the scope of their solution searches and the size of their consideration sets (i.e., intermediate outcomes).

Clearly, seekers need to understand their influences on solvers' ideation processes and resultant quantitative outcomes in contests. One key way that seekers exert their influences is through the information that they provide. For example, prior studies have investigated the in-process feedback that seekers give to solvers' ideas (Zheng et al. 2014, Wooten and Ulrich 2017, Jian et al. 2019, Jiang and Wang 2020). These studies show that in-process feedback affects how solvers ideate and the number of ideas that they generate. However, in-process feedback is only one type of information that seekers provide. To contribute to a fuller picture of seekers' influences in contests, we look at another type of information and examine the effects of showing seeker exemplars on solvers' behaviors. It is usually optional for seekers to provide exemplars, but contest platforms (e.g., 99designs and DesignCrowd) nonetheless encourage seekers to do so. For example, 99designs suggests that showing examples in project briefs can help direct the solvers, and DesignCrowd advises seekers to inspire solvers in logo design contests by providing examples of logos in their project briefs.[1] Seeker exemplars can also serve as implicit indicators of seeker preferences and thus help solvers develop ideas that suit the seekers' taste and likings. Thus, similar to in-process feedback, seeker exemplars play integral roles in solvers' ideation process. Yet the nature of these two types of information differs substantially. Specifically, seeker exemplars are shown to all solvers at the start of the contests, before they begin generating ideas, whereas in-process feedback is usually given to specific solvers for the specific ideas that they submit. Compared with the latter, the former has broader impacts on solvers and affects the ideation process earlier. We thus submit that examining the impacts of seeker exemplars in ideation contests is an important research focus.

With this in mind, this study aims to understand how showing seeker exemplars affects the intermediate and eventual ideation outcomes in terms of the number of ideas that solvers search for, shortlist, and submit. Seekers can show various types of exemplars in contests; we denote by *local exemplars* and *distant exemplars* those that are related and unrelated to the problem domain, respectively. For example, in an ideation contest pertaining to the beverage industry, a seeker exemplar involving, say, a soft drink is considered local, whereas one involving, say, stationery is considered distant.[2] We are interested in how providing specific configurations of exemplars, relative to the baseline situation where no exemplars are shown, impacts solvers' ideation. To keep the research scope manageable, we only compare the respective seeker exemplar configurations with the baseline situation, because whether to show exemplars is a primary decision for seekers when initiating contests, whereas the types of exemplars that they should provide is usually regarded as secondary. For example, 99designs emphasizes to seekers that showing examples is the best way to inspire designers in contests, but it does not offer guidelines on the types of examples to show.[3]

The ideation outcomes of interest in this study relate to the search and evaluate stage in the Knowledge

Table 1. Studies Involving Quantitative Ideation Outcomes in Crowdsourcing Contests

Study	Empirical context	Intermediate ideation outcomes	Eventual ideation outcomes
Füller et al. (2014)	Jewelry design contest	None examined	Quantity of ideas submitted
Hutter et al. (2015)	Train interior design contest	None examined	Quantity of designs submitted
Jian et al. (2019)	Logo and web page design contests	None examined	Quantity of entries submitted
Jiang and Wang (2020)	Logo design contests	None examined	Quantity of solutions submitted
Li and Hu (2017)	Website and logo design contests	None examined	Quantity of solutions submitted
Liu et al. (2014)	Translation and programming contests	None examined	Quantity of submissions
Wang et al. (2018)	TV advertisement idea contest	None examined	Quantity of ideas submitted
Wooten and Ulrich (2017)	Logo design contests	None examined	Quantity of entries submitted
Zheng et al. (2014)	Graphic website design contests	None examined	Quantity of solutions submitted
Present study	Photo contest	Quantity of images searched and shortlisted	Quantity of images submitted

Reuse for Innovation (KRI) model (Majchrzak et al. 2004), which we use as the theoretical framework for the solver ideation process. We argue that the solvers' use of local and/or distant seeker exemplars in the respective search and evaluation activities is affected by their belief and emphasis in contests as well as the influences of processing fluency and confirmation bias during idea generation. As a result, local and distant seeker exemplars have different effects in different ideation activities. Consistent with our theorizing, the results from an ideation contest experiment show that, compared with the baseline situation of no seeker exemplars, showing these exemplars either does not affect or could even hurt the quantitative outcomes in the respective ideation activities. In general, solvers search for, shortlist, and/or submit fewer ideas when shown certain seeker exemplars. We further find that idea quantity and idea quality are positively related, indicating that solvers who submit fewer ideas also tend to submit lower-quality ideas on average. In short, a key takeaway from this study is that showing seeker exemplars, which contest platforms encourage and seekers often do, could negatively affect quantitative ideation outcomes, thus impairing idea quality.

The novelty and contributions of this study are as follows. First, our focus on how different types of seeker exemplars affect various ideation activities and outcomes complements existing studies of other types of information that seekers provide (e.g., in-process feedback). This thus helps to advance the literature on seekers' influences in ideation contests. To our best knowledge, this is also the first study to theorize how solvers give different weights to different types of seeker exemplars in different ideation activities, thereby further enriching our understanding of solvers' dynamic behaviors in contests. Second, we not only consider the input (i.e., seekers' exemplars) and output (i.e., solvers' final ideas) in ideation contests but also examine the ideation process involved (i.e., solvers' searching and shortlisting of ideas prior to determining the ideas to submit). Doing so provides deeper insights into the factors of solvers' decisions and behaviors in different ideation activities. Moreover, by examining the intermediate ideation outcomes, we account for solvers' consideration of alternative ideas, a vital aspect that is absent in related prior works (see Table 1). Third, this study offers practical implications for contest platforms and seekers. To date, contest platforms tend to play a facilitating function, focusing on connecting seekers and solvers (e.g., disseminate problems and aggregate ideas). Given our findings, platforms should rethink their roles, and we propose areas in which they can be more actively involved in supporting the ideation process. We also discuss what seekers can do to minimize potential downsides from showing exemplars in their contests.

2. Related Literature

2.1. Crowdsourcing Ideation Contests

Seekers can engage the crowd through a variety of ideation contests. For example, start-ups and established companies such as Amazon, Procter & Gamble, and Starbucks held design contests on third-party platforms, and Muji and Swarovski initiated product ideation contests on their respective websites (Poetz and Schreier 2012, Füller et al. 2014). On the solver end, many ideation contests allow for a broad range of participants, including both domain experts and nonexperts (Jeppesen and Lakhani 2010). For example, in design contests, professionals can compete against those who join the contests as a hobby (Brabham 2010, Ye and Kankanhalli 2017). As IT facilitates a geographically dispersed crowd to take part in contests, solvers could also come from different economic and cultural backgrounds (Bockstedt et al. 2015).

The growing information systems (IS) research on ideation contests can be classified into three interrelated streams.[4] The first examines *aspects of contest platforms or contest tasks*. Mo et al. (2018) propose a framework to recommend contest tasks to solvers based on the solvers' winning probability or the expected payoff. Chen et al. (2020) investigate the mechanisms used to select winning ideas in contests, and they find that using crowd voting for winner selection can increase contest participation. Zheng et al. (2011) suggest that contests that need diverse skills and/or are autonomous, explicitly specified, and less complex tend to improve solvers' intrinsic motivation. O'Leary (2019) shows how contest rewards and duration could affect solvers' information search and sharing in the contests.

The second stream investigates *solvers' motivations to participate in contests*. Various studies show that a key motivator for contest participation is monetary reward (Leimeister et al. 2009, Zheng et al. 2011, Sun et al. 2012, Majchrzak and Malhotra 2013, Ye and Kankanhalli 2017). These studies also point out other intrinsic and extrinsic motivations, such as skill enhancement (through learning from experts and peers), social appreciation (from peers and seekers), self-marketing, and enjoyment.

The third IS research stream pertains to *solvers' behaviors and/or performance in contests*. Prior studies have examined these aspects in relation to individual traits and characteristics. Füller et al. (2014) identify different types of users in innovation-contest communities based on their communication and contribution activities. Hutter et al. (2015) show that solvers with stronger amorality and desire for status submit fewer ideas in an innovation contest, as they are likely to focus on a few excellent submissions to improve their chances of winning. However, Zhang et al. (2019) find that solvers with a greater preference for monetary reward tend to win fewer contests, as they seldom achieve the required level of skill.

Research in this third stream—which this present study fits into—also examines how solvers' behaviors are influenced by information that seekers provide in contests. Prior IS studies have examined solvers' use of in-process feedback from seekers. Jian et al. (2019) point out that solvers often make use of feedback (e.g., seekers' reviews and ratings) to generate ideas, particularly for creative or innovative tasks where the problems involved are usually not well structured. Lee et al. (2018) find that solvers tend to overemphasize feedback, even when they can accurately evaluate their solutions without it. Koh (2019) looks at a different type of information and shows that the quantity and variability of seeker exemplars influence the degree to which solvers incorporate seeker exemplars into their ideas, which, in turn, affects the effectiveness of the ideas; however, this said study only considers seeker exemplars that are related to the focal problem domain of the contests and does not investigate the quantitative impacts of the exemplars. A research gap that we address in this present research is how different types of seeker exemplars shape solvers' strategic behaviors in contests and affect the quantitative ideation outcomes.

2.2. Ideation Process and Activities

To better understand solvers' behaviors in ideation contests, we consider the stages and activities of ideation. According to the KRI model (Majchrzak et al. 2004), individuals begin by defining the focal problem in the *reconceptualization* stage. They could either narrowly interpret the problem or radically redefine it. Next, they move to our focus in this study, the three-layer *search and evaluate* stage. The first layer is *scan*, an initial search for possible ideas. The second is *brief evaluation*, where criteria are used to evaluate the initial ideas to decide whether they should progress for further consideration. The third is *in-depth analysis*, where promising ideas are examined to see whether they could be adapted for the focal problem. Thereafter, individuals commit to implementation of continued ideas during *full development*.

Apart from the KRI model, other frameworks also include aspects of the search and evaluate stage, albeit with different levels of granularity. In the models proposed by Amabile (1988) and Amabile and Pratt (2016), key activities during idea generation and validation include coming up with ideas for solving the problems and evaluating these ideas using task- and domain-related criteria, which are similar to our activities of interest. According to the framework by Goel and Singh (1998), the basic elements in developing new product ideas involve searching for alternative solutions (using techniques such as brainstorming) and evaluating concepts (using rules and objective and subjective measurements) to select the most appropriate ones. We also see glimpses of search and evaluation activities in practice. In advertising design, creative teams generate multiple preliminary ideas and shortlist some for further consideration, after which they select one idea to work on for the clients (Johar et al. 2001). In design projects, designers search and evaluate design examples and ideas that they can use in their creative outputs (Herring et al. 2009). Thus, although our theorizing is based on the search and evaluate stage in the KRI model, it is also relevant to and applicable in various ideation contexts.

This study builds on the layers in the search and evaluate stage of the KRI model in three ways. First, we expand beyond the context of knowledge reuse (where individuals purposefully consider and use others' ideas), which is the focus of the original KRI model. As new ideas are not created in a vacuum but involve combining available ideas (Nelson and Winter 1982), we posit that the search and evaluation activities can be generalized even to situations in which knowledge reuse is not an explicit objective. Second, although these KRI model layers focus mainly on radical innovation, they are also applicable for incremental (i.e., nonradical) innovation. Majchrzak et al. (2004) point out that idea scanning in radical innovation projects involves broader searches in nontraditional areas and for ideas that do not directly fit the primary functional requirements; the implication is that idea scanning in incremental innovation projects could be more narrowly focused on the immediate problem area. Similarly, brief evaluations and in-depth analyses of ideas should be part of the ideation process in nonradical innovation projects just as they are in radical ones, although the characteristics of these activities could vary across the two types of projects. Thus, our theorizing is more general and emphasizes the generic ideation process rather than focusing on specific types of innovation projects. Our perspective of a broad application of the search and evaluation activities across different types of innovation tasks mirrors that of Amabile and Pratt (2016), who write that the processes in their model "apply to all degrees of creativity and innovation, from very low to very high" (p. 164). Third, our application of the search and evaluation activities extends the KRI model by adopting a dynamic view of ideation in our theoretical model and proposing that solvers' focus and consideration sets of ideas evolve across the activities. Specifically, we argue that solvers in ideation contests switch and adapt their emphasis in different ideation activities: they focus more on certain aspects of ideas when scanning and shortlisting ideas but emphasize other aspects when selecting ideas to use.

2.3. Idea Quantity

The number of ideas generated during ideation is an important outcome, as it could associate positively

with the quality of ideas (Kudrowitz and Wallace 2013, Wooten and Ulrich 2017) and quantity of good ideas (Diehl and Stroebe 1987), perhaps because having more ideas offers individuals greater opportunities to build on them to develop better ideas. Osborn (1993, p. 124) points out that "quantity breeds quality" during idea finding and that initial ideas are unlikely to be the best but could lead to other, potentially better, ideas. In addition, because the later stage of innovation usually produces a greater number of good ideas than the earlier stage, building up a large set of ideas makes it more likely that quality ideas are generated and not missed (Osborn 1993). Interestingly, individuals who focus on generating as many ideas as possible can produce more high-quality ideas than those who focus on generating high-quality ideas (Paulus et al. 2011); one explanation is that generating more ideas could increase the likelihood of thinking up some that are good, whereas an idea-quality focus might cause some good ideas to be rejected too early during ideation. For seekers, another reason to increase idea quantity is that the odds of an idea being good can be very low; having a large number of ideas thus increases the likelihood of identifying and obtaining outstanding ideas (Stevens and Burley 1997, Girotra et al. 2010, Zheng et al. 2014).

In our research context, seekers have reported a positive effect of solution quantity on solution quality in ideation contests (Zheng et al. 2014), although there is also the finding of a nonsignificant positive association between idea quantity and quality after controlling for the number of solvers and their participation intensity (Camacho et al. 2019). Prior studies suggest that solvers who are highly engaged in crowdsourcing contest communities tend to generate more ideas (Füller et al. 2014). Solvers also generate more ideas when seekers offer attractive rewards (Liu et al. 2014, Zheng et al. 2014) or give feedback that is consistent with their quality function during the contests (Wooten and Ulrich 2017, Jian et al. 2019). By contrast, solvers might generate fewer ideas when they are exposed to an original (i.e., uncommon) prior idea for the focal problem (Wang et al. 2018). Although existing ideation contest research has examined factors of eventual ideation outcomes in terms of the quantity of submitted ideas, there is a lack of attention on intermediate ideation outcomes, such as the number of ideas that solvers search for and shortlist before submitting their eventual ideas (see Table 1). Yet because the final ideas are a subset of all ideas that solvers consider during idea generation (Amabile 1988, Goel and Singh 1998, Majchrzak et al. 2004, Amabile and Pratt 2016), the intermediate outcomes should also be important in ideation contests. We thus address another research gap in this study by examining both intermediate and eventual ideas in contests.

3. Theory and Hypotheses

Crowdsourcing ideation contest platforms often encourage seekers to provide solvers with examples of ideas and solutions that they like. Such exemplars could serve as references that help solvers frame the focal problems, evaluate the originality of their ideas, and determine potential flaws or limitations (Smith et al. 1993, Herring et al. 2009, Toh and Miller 2014). In ideation contests, seeker exemplars also relate to two factors pertaining to the environment in which solvers operate. One factor is solvers' *aim of satisfying seekers' preferences to increase their likelihood of winning*, which is important because of the typical winner-take-all contest outcome (Terwiesch and Xu 2008, Morgan and Wang 2010). According to Terwiesch and Xu (2008), seekers' tastes determine what makes good ideas in ideation projects. Solvers could thus use the seeker exemplars to infer seekers' preferences and strategize their ideation to improve their winning prospects (Koh 2019). For example, if the seeker exemplars indicate that the seekers like a specific type of idea, solvers can closely adhere their ideas to the exemplars so as to cater to the seekers' preferences.

The other factor is solvers' *effort and time considerations* in ideation contests. Given the proliferation of online platforms for crowdsourcing, solvers can participate in a large number of ideation contests. For example, there can be more than 1,000 concurrent contests in certain categories on 99designs (Mo et al. 2018). Moreover, solvers can use multiple contest platforms simultaneously, which further increases the range of contests that they can join. Although a wide selection of contests offers more opportunities for solvers, it also causes them to be strategic with their effort and time. Specifically, solvers strive to economize effort by minimizing or avoiding unnecessary activities in individual contests (Koh 2019). In addition, to have a chance of winning the contest prizes, solvers must submit their ideas by the deadlines; failure to do so means their effort is uncompensated financially, even if the unsubmitted ideas are excellent. These effort and time considerations imply that solvers would not invest an indefinite amount of resources in search and evaluation activities. Instead, there is an upper bound on the extent to which solvers engage in the individual ideation activities; once they obtain "good enough" information to work with and/or satisficing results, they move to the next activity. This is consistent with Majchrzak and Malhotra's (2013) observation that individuals tend to spend minimal time on crowdsourcing innovation. In this regard, seeker exemplars can reduce solvers' effort and costs to identify references that they need during ideation, because these exemplars require no search or acquisition costs (Koh 2019). Thus, solvers can conserve the time that

they would otherwise spend on looking for external references and use it in other areas.

Although it is intuitive that seekers show exemplars that pertain to the focal problems, seekers might also provide unrelated exemplars. Some seekers want solvers to consider concepts or approaches from unrelated domains that they like or think are appropriate for the focal problems. Seekers might also unintentionally show distant exemplars, as they do not know what solution examples are best suited for their problems. Thus, the possible configurations of seeker exemplars are (1) local (problem-related) exemplars only, (2) distant (problem-unrelated) exemplars only, and (3) mixed (problem-related and problem-unrelated) exemplars. Given the strategic influences of seeker exemplars in ideation contests (Koh 2019), it is necessary to know how the exemplar configurations affect the ideation process, particularly in terms of the ideas that the solvers look for, consider, and eventually submit. We thus examine solvers' idea scanning, shortlisting, and selection in ideation contests by mapping these activities to the scan, brief evaluation, and in-depth analysis layers in the search and evaluate stage of the KRI model.

3.1. Activity 1: Idea Scanning

Idea scanning refers to the exploring of ideas with potential relevance to the focal problems (Majchrzak et al. 2004). It is from among the ideas identified in this activity that solvers shortlist those with good prospects (Activity 2) and further analyze and select specific ones to use (Activity 3). When scanning for ideas, individuals are predisposed to those related to the domain of the focal problems and/or in other domains that can be applied to the problems (Majchrzak et al. 2004). Thus, they tend to consider existing solutions and examples that are related to the active problems (Ward 1994, Moreau and Dahl 2005, Herring et al. 2009). This inclination toward problem relevance during idea scanning can be salient in ideation contests. According to Jeppesen and Lakhani (2010), solvers self-select into contests based on details of the problems that seekers disclose in their project briefs; given solvers' effort and time considerations, they are likely to join the contests that they feel they can successfully address the problems. The centrality of focal problems in the early stages of contest participation would cause solvers to internalize a starting hypothesis or belief that their ideas should be problem related and emphasize problem fit during idea scanning.

Although exploring ideas that match seekers' exemplars can be crucial, the dominance of solvers' starting hypothesis and problem-fit emphasis in idea scanning can affect their use of seeker exemplars in this activity. First, as seeker exemplars are not considered in isolation but in relation to the focal problems, exemplars that are congruent (respectively, incongruent) with solvers' belief and emphasis in ideation should have higher (respectively, lower) processing fluency (i.e., the ease of processing the exemplars) (Schwarz 2004, Alter and Oppenheimer 2009). Processing fluency has been shown to affect individuals' evaluations of cognitive stimuli (Lee and Labroo 2004, Schwarz 2004) and behaviors in ideation tasks (Vaughn et al. 2013, So and Joo 2017). Lower processing fluency, in particular, could increase individuals' cognitive effort or reduce their engagement in activities (Dreisbach and Fischer 2011). Second, solvers might use exemplars selectively as a result of confirmation bias, which is a common cognitive bias during idea generation (Potts 2010, Liedtka 2015). This bias causes individuals to (1) seek or give undue weight to information that is consistent with their prior beliefs and (2) attend less to or ignore belief-inconsistent information or interpret it in ways that reinforce their existing beliefs (Nickerson 1998, Jonas et al. 2001). Loch (2017, p. 595; emphasis added) points out that during idea generation, individuals tend to "*seek confirmation of starting hypotheses* rather than looking for novel ideas that disconfirm their starting point," which affects the ideas that they come up with.

3.1.1. Local-Only Exemplars. Solvers are likely to actively refer to local exemplars during idea scanning. First, in the context of the focal problems, local exemplars are prototypical stimuli, which have higher processing fluency than nonprototypical ones (Reber et al. 2004). By sharing overlapping cognitive elements with the focal problems, these exemplars should not substantially increase the cognitive load that solvers face when they are scanning for ideas. Second, local exemplars are consistent with and thus confirm solvers' starting hypothesis and problem-fit emphasis. For these reasons, we do not expect local exemplars to give solvers causes to significantly deviate their idea scanning behavior from that in the baseline situation where there are no seeker exemplars. Consequently, the number of ideas that solvers scan when shown only local exemplars should be similar to that in the baseline situation.

Hypothesis 1a (Local). *The number of ideas scanned when seekers provide only local exemplars is not significantly different from that when seekers do not provide exemplars.*

3.1.2. Distant-Only Exemplars. Distant exemplars are nonprototypical in relation to the focal problems. The low fluency of these exemplars can impose a high cognitive load on solvers, as synthesizing the properties of the focal problem domains with those of distant exemplars involves greater complexities and demands more effort. Distant exemplars also contradict solvers'

starting hypothesis and problem-fit emphasis in idea scanning, compounding their challenges in processing belief-inconsistent stimuli (Wyer and Srull 1989, Kardes et al. 2004). Moreover, ideas that are appropriate for multiple but unrelated domains are fewer and more difficult to come by, as ideas that fit the problems may not match the distant exemplars (and vice versa). Because solvers are bounded by effort and time considerations and thus might not be willing and/or able to put in enough extra resources, we expect them to scan fewer ideas when shown only distant exemplars than in the baseline situation.

Hypothesis 1b (Distant). *The number of ideas scanned when seekers provide only local exemplars is lower than that when seekers do not provide exemplars.*

3.1.3. Mixed Exemplars. The presence of mixed exemplars could lead to ambiguity and confuse solvers about the "ideal" ideas for the focal problems. Facing such confusions in contests, solvers have a strong need to quickly reach a closure regarding the types of ideas that they should focus on during idea scanning. For one, solvers' aim to economize effort requires them to achieve a reasonable but quick closure instead of trying to perfectly reconcile the mixed exemplars. The contest deadlines further increase their need for closure during idea scanning so that they can move on and submit ideas on time (Kruglanski and Webster 1996). Because heightened need for closure triggers confirmation bias and causes individuals to attend less to belief-inconsistent cues (Kardes et al. 2004), solvers shown mixed seeker exemplars would attend more to local than to distant exemplars when scanning for ideas as a result of their starting hypothesis and problem-fit emphasis. Their effort and time considerations might also cause them to favor the local exemplars over the distant ones because of the higher fluency of the former. Because solvers who are shown mixed exemplars would refer mainly to the local ones, which trigger somewhat similar idea scanning behavior as in the baseline situation (as we explain for Hypothesis 1a), we expect the following.

Hypothesis 1c (Mixed). *The number of ideas scanned when seekers provide mixed exemplars is not significantly different from that when seekers do not provide exemplars.*

3.2. Activity 2: Idea Shortlisting

During idea scanning, solvers briefly evaluate the ideas to identify and shortlist the promising ones for further consideration (Majchrzak et al. 2004). To determine which ideas should undergo a more thorough subsequent analysis, solvers would assess the ideas against a set of criteria and shortlist those that qualify. Majchrzak et al. (2004) list three criteria—credibility, relevance, and adaptability—for assessing whether an identified idea during idea scanning should be discarded or retained for in-depth analysis. Criteria such as feasibility, market potential, and creativity have also been used to shortlist ideas in crowdsourcing contests (Merz et al. 2016). Shortlisting criteria essentially allow solvers to narrow down the list from their idea scanning to a more manageable consideration set, which is particularly important to solvers in ideation contests because of their effort and time considerations. Generally speaking, *the more criteria that are used to evaluate ideas, the smaller the resulting idea set would be.* For instance, for a given set of initial ideas, fewer ideas are likely to measure up to all three of the Majchrzak et al. (2004) criteria—and thus be shortlisted—than if only one of the three criteria was used.

The extent that solvers use seeker exemplars as shortlisting criteria could thus affect the number of ideas that they shortlist. *Because solvers make their shortlisting decisions as they scan for ideas, we expect their dominant belief and emphasis during idea scanning to persist to idea shortlisting*. Hence, solvers' starting hypothesis and problem-fit emphasis during idea scanning, together with processing fluency and confirmation bias considerations, could influence their use of different seeker exemplars to shortlist ideas.

3.2.1. Local-Only Exemplars. As seen in Majchrzak et al. (2004) and Merz et al. (2016), shortlisting criteria mainly concern the degree that candidate ideas can address the focal problems. Because local exemplars are problem related and consistent with solvers' starting hypothesis and problem-fit emphasis, solvers are likely to readily use these exemplars during idea shortlisting—just as they would actively refer to local exemplars during idea scanning. Factoring in local exemplars when shortlisting ideas can be relatively straightforward, because identifying aspects in seeker exemplars that promising ideas for the problems should exhibit is easier when the exemplars and focal problem domains are more closely related. As showing local exemplars could lead to more evaluation criteria than in the baseline situation, ceteris paribus, we expect the following.

Hypothesis 2a (Local). *The number of ideas shortlisted when seekers provide only local exemplars is lower than that when seekers do not provide exemplars.*

3.2.2. Distant-Only Exemplars. During idea scanning, solvers find distant seeker exemplars to be of low fluency and contradict their starting hypothesis and problem-fit emphasis; this attitude toward distant exemplars is likely to be carried over to idea shortlisting. Moreover, it is taxing to identify attributes in distant exemplars that promising ideas should possess for the focal problems. Thus, given solvers' effort and

time considerations, those who are shown only distant exemplars are not likely to keenly develop additional shortlisting criteria using these exemplars. As such, the major factor that these solvers consider when making shortlisting decisions would be candidate ideas' potential in addressing the focal problems—this is similar to solvers' approach in the baseline situation where no exemplars are shown. All else being equal, compared with the baseline situation, showing only distant exemplars should not affect the number of ideas that solvers shortlist.

Hypothesis 2b (Distant). *The number of ideas shortlisted when seekers provide only distant exemplars is not significantly different from that when seekers do not provide exemplars.*

3.2.3. Mixed Exemplars. Because solvers attend more to local exemplars during idea scanning when mixed exemplars are provided (because of processing fluency and confirmation bias), they would also do so when shortlisting ideas. Ceteris paribus, because these solvers would refer to some of the provided exemplars (particularly the local ones) during idea shortlisting, resulting in more evaluation criteria, they are likely to shortlist fewer ideas than in the baseline situation.

Hypothesis 2c (Mixed). *The number of ideas shortlisted when seekers provide mixed exemplars is lower than that when seekers do not provide exemplars.*

3.3. Activity 3: Idea Selection

In the final layer of the search and evaluate stage, in-depth analyses are conducted to determine whether the shortlisted ideas continue to show promise and could be used to address the focal problems (Majchrzak et al. 2004). Selection decisions (i.e., which ideas to use and submit) are particularly important, as they impact whether solvers achieve their goal of winning. We posit a change in solvers' emphasis as they progress from scanning and shortlisting (Activities 1 and 2) to selecting (Activity 3). Specifically, problem fit may not be as critical and dominating a decision criterion in idea selection as it has been earlier because, after the first two activities, solvers' consideration set of shortlisted ideas should generally be compatible with the focal problems. By contrast, because of the importance of seekers' tastes in determining winning solutions (Terwiesch and Xu 2008), preference fit is an influential criterion during idea selection. This implies the emphasis of the ideation could shift from "problem" to "preference" as solvers scrutinize their shortlist to select and submit ideas with better prospects. Prior research suggests that solvers' emphasis on seekers' preferences is especially salient during idea submission. For example, solvers' subsequent ideas are influenced by feedback that seekers give to their earlier ideas (Wooten and Ulrich 2017, Lee et al. 2018, Jian et al. 2019), indicating that solvers take into serious account seekers' preferences as perceived in the feedback when finalizing ideas. In our context, solvers could use seeker exemplars to infer seekers' preferences (Koh 2019) and select ideas for the contests. In addition, as it is unnecessary to submit ideas that do not fit seekers' preferences and thus have weak winning prospects, referring to seeker exemplars during idea selection allows solvers to work efficiently within their effort and time constraints.

3.3.1. Local-Only Exemplars. Not only are local exemplars of high processing fluency and consistent with solvers' starting hypothesis, but these exemplars also indicate what seekers might like. Hence, although solvers who are shown only local exemplars would have shortlisted ideas based on the exemplars, they are likely to continue referring to these exemplars during idea selection. Specifically, when deciding which ideas to use and submit for the contests, these solvers can further narrow down the ideas in their shortlist to those that they regard as highly matching the seekers' preferences as reflected by the local exemplars; doing so improves their winning prospects and allows them to better economize their effort and time. As such a selective selection of shortlisted ideas based on seeker exemplars is not possible when no exemplars are shown, ceteris paribus, we expect the following.

Hypothesis 3a (Local). *The number of ideas selected when seekers provide only local exemplars is lower than that when seekers do not provide exemplars.*

3.3.2. Distant-Only Exemplars. The dominating role of preference fit in idea selection has critical implications on solvers' attention to distant exemplars. As solvers strive to precisely discern seekers' preferences when deciding which ideas to submit, they would attend to distant exemplars to a greater extent during idea selection than in the preceding activities. This is because forming accurate judgements of seekers' preferences based on the exemplars involves deliberate reasoning and broader and less selective information processing (Kahneman 2003, Huang and Kuo 2011). Moreover, although individuals typically focus on belief-consistent information (i.e., local exemplars in our context) (Nickerson 1998, Jonas et al. 2001), they do pay attention to belief-inconsistent information (i.e., distant exemplars) when it is expected to materially affect future outcomes (i.e., selecting ideas that satisfy seekers' preferences) (Erber and Fiske 1984). Thus, during idea selection, confirmation bias should be less pronounced, and solvers would actively consider and use distant exemplars as criteria in selection decisions. In addition, as solvers who are shown only distant exemplars do not actively refer to these

exemplars in the preceding ideation activities but focus more on the focal problem domain, their shortlists are likely to consist of relatively few ideas that highly match the exemplars. Because ideas that do not satisfy seekers' preferences (as indicated by the distant exemplars) are not expected to contribute to the solvers' winning prospects, ceteris paribus, these solvers would select fewer ideas than those in the baseline situation.

Hypothesis 3b (Distant). *The number of ideas selected when seekers provide only distant exemplars is lower than that when seekers do not provide exemplars.*

3.3.3. Mixed Exemplars. The aforementioned arguments indicate that solvers would refer to both local and distant exemplars during idea selection. Thus, regardless of whether solvers who are shown mixed exemplars (1) use local and distant exemplars separately as selection criteria or (2) try to find shared features between local and distant exemplars to evaluate ideas, they tend to use more criteria and be more selective when selecting ideas than those who are not shown any seeker exemplars. Thus, all else being equal, we expect the following.

Hypothesis 3c (Mixed). *The number of ideas selected when seekers provide mixed exemplars is lower than that when seekers do not provide exemplars.*

4. Method and Data

4.1. Experiment

4.1.1. Overview. We designed an online ideation contest experiment where we could examine the ideation process (i.e., what solvers do) and not just the outcome (i.e., what solvers submit). We based our ideation contest on the photo contests in Foap and launched it on an online platform that we developed for this study (see Online Appendix A). In our experiment, the seeker was a (hypothetical) beverage-related company ("Ake Co."), and solvers were tasked to search and submit images for the seeker to use in its corporate articles. A key difference between our contest and those on Foap was in the image repository that solvers could use; instead of searching and shortlisting from their own image sources (e.g., their photo library), all solvers had to use Getty Images, a supplier of stock images and editorial photography. We mandated Getty Images to remove heterogeneity in the solvers' idea source, which could confound our results; as solvers with access to a larger (respectively, smaller) image repository might search for and submit more (respectively, fewer) ideas, using the same image source for all solvers eliminated this issue and improved the internal validity of our experiment. Moreover, Getty Images tends to provide high-quality professional images, which (1) increased the realism of our experiment and (2) negated the need for solvers to perform additional image processing, which could bias our results because of extraneous factors (e.g., solvers' ability). Nonetheless, we assumed that the ideation process and considerations of seeker exemplars would largely be similar regardless of the image sources.

We launched the contest in Amazon Mechanical Turk (MTurk) in March 2016. Prior research shows that MTurk experiments can be as valid as laboratory and field experiments (Paolacci et al. 2010, Horton et al. 2011). Previous ideation contest experiments also used MTurk as a solver pool, and MTurk workers should exhibit the two aspects of solver behaviors that we theorize. First, Wang et al. (2018) point out that in their contest experiment task, MTurk workers were likely motivated by the desire to win; MTurk workers in our experiment similarly reported that winning the contest was important (see Section 4.2). Koh (2019) finds that MTurk workers submitted more ideas when they regarded the prizes to be attractive or winning to be important, which is consistent with expectations of solver behaviors in field settings (Bockstedt et al. 2016). Second, MTurk workers would likely face effort and time considerations when working on tasks. Specifically, they would not want to spend unnecessary effort in a given task so that they could move on to other tasks. They also would need to complete the tasks on time to qualify for the payments.

4.1.2. Procedure. Online Appendix B shows the step-by-step visual of our experiment. Before joining the contest (step 1), solvers were given information about the task (e.g., contest objective and winning prize). After entering the contest (step 2), solvers were shown the project brief and seeker exemplars (if any; see the next section). To conduct their image searches, solvers entered words or phrases ("keywords") of concepts into a Getty Images search engine that we integrated into our contest platform using Getty Images API. For every concept search that the solvers performed, the search engine returned an initial result set of up to 30 images that were based on the keyword. At this point, solvers could shortlist particular images from the results. They could also load more images (30 images at a time) based on the same keyword by scrolling to the bottom of the web page to click a Show More button; this workflow ensured that solvers scanned the displayed images during their concept searches. After performing the concept searches that they wanted, solvers proceeded to their shortlist and selected up to 15 images for submission (step 3); we limited the number of images so that solvers would be selective rather than submit all search returns. While viewing their shortlist and selecting images to submit, solvers

could conduct more concept searches if they wished to do so. However, they could not perform additional searches once they had submitted their chosen images. After submitting their images, solvers completed a postcontest survey (step 4).[5]

To eliminate biases that arise from interactions and learning among solvers, we used a blind contest where solvers could not communicate with other solvers or see others' submissions. Apart from that, we did not impose any time, keyword, search, or shortlist limits or restrictions. We tracked the time that solvers spent on various activities, such as searching for images and selecting shortlisted images for submission. We also recorded the keywords that solvers used and the images that they saw, shortlisted, and submitted.

4.1.3. Manipulations. We randomly assigned solvers to experimental conditions, which varied in the seeker exemplars shown in the project brief. As the contest involved images for beverage-related articles, we used images of a soda container and a penholder as local and distant exemplars, respectively. A research assistant, blinded to the experiment, photographed the objects in several settings (see Online Appendix C); our pretests indicated higher perceived relatedness of exemplars to the beverage industry for the local exemplars than for the distant ones. We implemented three treatment conditions: (1) local exemplars (two images of a soda can), (2) distant exemplars (two images of a penholder), and (3) mixed exemplars (an image of a soda can and one of a penholder). A fourth condition with no exemplars served as the baseline control group. Similar to many ideation contests in practice, we did not label or explain the exemplars to solvers.[6]

4.2. Sample

Two hundred and fourteen solvers with a task approval rate of at least 99% on MTurk took part in the contest. As MTurk required all workers to be compensated, we paid US$0.75 for participation and awarded a US$10 prize to the winner. There were no duplicate IP addresses among the solvers, thereby minimizing the concern that some solvers participated multiple times. We checked various online communities for MTurk workers for the presence of discussions about the contest, which would have contaminated the solver pool. There were no mentions of our contest on these communities, thus minimizing this concern.

In the postcontest survey (step 4), we asked solvers to recall the seeker's company name, industry, and contest objectives to check the extent that they attended to the project brief. One hundred and fifty-seven (73.4%) solvers correctly answered all the questions and were included in the sample. These solvers had an average age of 34.8 years, and 84 (53.5%) were female. Forty-eight (30.6%) solvers had participated in crowdsourcing contests before the experiment. On average, solvers took 7.79 minutes (std. dev. = 6.68) to scan, shortlist, and select images for the contest (*Effort*). Solvers also rated the attractiveness of the US$10 prize for the winner (*Prize Attractiveness*) and reported the importance of winning the contest (*Winning Importance*) on seven-point Likert scales in the survey. In general, solvers regarded the prize to be attractive (mean = 6.63, std. dev. = 0.74) and had a strong desire to win (mean = 5.96, std. dev. = 1.32).

4.3. Manipulation Checks

Solvers who were assigned seeker exemplars evaluated the extent that the exemplars (as a pair) were related to the context of the contest. Analysis of variance (ANOVA) results showed that the relatedness of exemplars to beverage industry differed across experimental conditions as we intended ($F = 247.65$, $p < 0.001$). Local exemplars were perceived to be the most related to the beverage industry (mean = 6.85, std. dev. = 0.43), followed by mixed exemplars (mean = 4.92, std. dev. = 1.16) and distant exemplars (mean = 1.70, std. dev. = 1.30).

4.4. Measures

4.4.1. Dependent Variables. The outcomes of interest relate to solvers' scanning, shortlisting, and selection of ideas. We used the quantity of images that appeared in the concept searches to operationalize idea scanning. As a particular image might show up multiple times in all of a solver's searches (e.g., when the solver used similar keywords for different searches), we considered the number of distinct images that appeared across all the solver's search results (*Scan*) to avoid double counting. We used solvers' numbers of shortlisted images (*Shortlist*) and submitted images (*Select*) as measures for the other two dependent variables.

4.4.2. Control Variables. Solvers' behaviors are influenced by intrinsic and extrinsic factors, such as the importance of winning, their perceptions of the attractiveness of the prizes, and their willingness to exert effort (Leimeister et al. 2009, Zheng et al. 2014, Ye and Kankanhalli 2017, Mo et al. 2018, Koh 2019). Therefore, we included relevant control variables to account for individual differences in these aspects. We controlled for solvers' desire to win (*Winning Importance*) and perception of the prize (*Prize Attractiveness*) using their responses in the postcontest survey (see Section 4.2). We accounted for solvers' ideation cost using the total time (in minutes) that they spent on scanning, shortlisting, and selecting images (*Effort*).

Table 2 shows the descriptive statistics and Table 3 the correlation matrix.

Table 2. Descriptive Statistics

Variable	Condition				
	No exemplars (n = 39)	Local exemplars (n = 39)	Distant exemplars (n = 40)	Mixed exemplars (n = 39)	All conditions (N = 157)
Scan (no. of images)	304.41 (284.10)	266.62 (185.20)	233.35 (247.23)	277.41 (283.99)	270.21 (252.19)
Shortlist (no. of images)	16.62 (8.12)	12.13 (7.62)	13.33 (9.44)	13.85 (6.96)	13.97 (8.19)
Select (no. of images)	12.62 (4.03)	9.62 (4.31)	9.08 (5.27)	11.26 (4.04)	10.63 (4.62)
Winning Importance (7-point scale)	6.00 (1.54)	5.87 (1.32)	5.75 (1.41)	6.21 (1.00)	5.96 (1.33)
Prize Attractiveness (7-point scale)	6.51 (0.82)	6.79 (0.52)	6.55 (0.81)	6.67 (0.77)	6.63 (0.74)
Effort (Minutes)	7.46 (5.44)	8.58 (8.43)	6.96 (5.24)	8.16 (7.27)	7.79 (6.68)

Note. Standard deviations are in parentheses.

5. Analyses and Results

5.1. Main Results

Following research that examines different stages in a given process (Qi and Teng 2008, Li et al. 2019), we conducted regression analyses for each activity in the ideation process. As our dependent variables were count data, we considered either Poisson regression or negative binomial regression (Cohen et al. 2003).[7] Poisson regression is appropriate when the conditional mean and variance of the Poisson distribution are equal in the sample, whereas negative binomial regression is appropriate when overdispersion occurs. On the basis of the likelihood ratio test of overdispersion, we used negative binomial regression for the *Scan* and *Shortlist* models and Poisson regression for the *Select* model. We estimated two models for each dependent variable: the first consisted of only the control variables, whereas the second included the independent variables (with no exemplars as the reference group). In addition, we used zero-truncated models as all solvers searched, shortlisted, and selected at least one idea. Table 4 presents the results.

We examined idea scanning in Models 1A and 1B. Compared with the baseline condition, solvers who were shown only distant exemplars scanned 26.7% fewer images ($\beta = -0.31$, $p < 0.05$), supporting Hypothesis 1b.[8] By contrast, the effects for showing only local exemplars ($\beta = -0.06$, $p > 0.10$) or mixed exemplars ($\beta = -0.15$, $p > 0.10$) were not significant. However, we cannot conclude a null effect for these two conditions based solely on these results, as to affirm a null hypothesis requires the hypothesized effect to be trivial (Cohen 1988). Thus, to test the null effect hypotheses, we examined the 95% confidence interval (CI) for the respective estimate's standardized mean difference (SMD) effect size; if the CI contains zero, there is no evidence to support that the effect exists.[9] As shown in Table 5, the 95% CIs of SMD effect size for only local exemplars and mixed exemplars include zero, indicating that Hypotheses 1a and 1c are not rejected.

Next, we examined idea shortlisting in Models 2A and 2B. As the solvers' consideration set when shortlisting ideas consisted of the ideas from their concept search, we also control for the number of images that they scanned (*Scan*) in Model 2B. Compared with the baseline condition, solvers shortlisted 29.5% fewer images when shown only local exemplars ($\beta = -0.35$, $p < 0.01$), supporting Hypothesis 2a. Hypothesis 2c is marginally supported, as solvers shortlisted 19.7% fewer images when mixed exemplars were shown ($\beta = -0.22$, $p = 0.052$). However, the effect of showing only distant exemplars was not significant ($\beta = -0.19$,

Table 3. Correlation Matrix

No.	Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
[1]	*Scan*	1.00								
[2]	*Shortlist*	0.36***	1.00							
[3]	*Select*	0.42***	0.71***	1.00						
[4]	*Winning Importance*	0.12	0.27***	0.36***	1.00					
[5]	*Prize Attractiveness*	0.13	0.20*	0.21**	0.47***	1.00				
[6]	*Effort*	0.53***	0.31***	0.35***	0.14^{+}	0.10	1.00			
[7]	*Local Exemplars*	−0.01	−0.13	−0.13	−0.04	0.13	0.07	1.00		
[8]	*Distant Exemplars*	−0.09	−0.05	−0.20*	−0.09	−0.06	−0.07	−0.34***	1.00	
[9]	*Mixed Exemplars*	0.02	−0.01	0.08	0.11	0.03	0.03	−0.33***	−0.34***	1.00

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; $^{+}p < 0.10$.

Table 4. Main Results

	Model 1A	Model 1B	Model 2A	Model 2B	Model 3A	Model 3B
Variable	DV: *Scan*		DV: *Shortlist*		DV: *Select*	
Constant	3.61***	3.85***	1.15*	1.23**	1.36***	1.51***
	(0.43)	(0.44)	(0.46)	(0.45)	(0.37)	(0.30)
Winning Importance	0.003	−0.004	0.10*	0.08*	0.11**	0.07*
	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Prize Attractiveness	0.16*	0.15*	0.10	0.12^{+}	0.03	0.01
	(0.07)	(0.07)	(0.07)	(0.06)	(0.05)	(0.04)
Effort	0.10***	0.10***	0.03**	0.02^{+}	0.02**	0.01*
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.003)
Local Exemplars		−0.06		−0.35**		−0.15^{+}
		(0.14)		(0.11)		(0.08)
Distant Exemplars		−0.31*		−0.19		−0.22**
		(0.14)		(0.12)		(0.08)
Mixed Exemplars		−0.15		−0.22^{+}		−0.04
		(0.15)		(0.11)		(0.06)
Scan				0.001*		0.0002**
				(0.0002)		(0.00009)
Shortlist						0.03***
						(0.005)
Wald χ^2	38.39***	41.69***	19.33***	39.63***	23.16***	111.78***
Pseudo R^2	0.04	0.04	0.03	0.04	0.07	0.18
Observations	157	157	157	157	157	157
Regression	Zero-truncated negative binominal	Zero-truncated negative binominal	Zero-truncated negative binominal	Zero-truncated negative binominal	Zero-truncated Poisson	Zero-truncated Poisson

Notes. Robustness standard errors are in parentheses. DV, dependent variable.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; $^{+}p < 0.10$.

$p > 0.10$). As the 95% CI for distant exemplars SMD effect size contains zero, Hypothesis 2b is not rejected.

Finally, we examined idea selection in Models 3A and 3B. As solvers selected ideas from their shortlist, we also accounted for the number of shortlisted images (*Shortlist*) in addition to using *Scan* as a control variable in Model 3B. Compared with the baseline condition, solvers who were shown only local exemplars selected 13.9% fewer images ($\beta = -0.15$, $p = 0.07$), marginally supporting Hypothesis 3a. Solvers selected 19.7% fewer images when shown only distant exemplars ($\beta = -0.22$, $p < 0.01$), supporting Hypothesis 3b. However, Hypothesis 3c was not supported, as solvers did not submit significantly fewer images when shown mixed exemplars ($\beta = -0.04$, $p > 0.10$). A possible explanation is that showing mixed exemplars could have given solvers the impression that the seeker was open to different ideas (Koh 2019), thus causing them to submit more ideas to improve the odds that one of their ideas would satisfy the seeker. This might have weakened the negative impact of mixed exemplars during idea selection that we theorized.

Table 5. 95% CI of SMD Effect Size

Condition	*Scan* (H1)	*Shortlist* (H2)	*Select* (H3)
Local exemplars	−0.41, 0.34	−0.68, −0.18	−0.60, 0.00
Distant exemplars	−0.62, −0.05	−0.53, 0.05	−0.74, −0.13
Mixed exemplars	−0.48, 0.22	−0.54, −0.02	−0.32, 0.17

5.2. Robustness Checks

Solvers in our contest received a participation fee even if they did not win. Thus, although solvers reported that winning the contest was important, some might be very satisfied with the participation fee and thus were not highly committed in the contest. A concern is whether the results would hold if we restricted our analyses to the more committed solvers. For example, regardless of the types of seeker exemplars that were shown, solvers who were more committed might search for, shortlist, and select as many images as they could to increase their chances of winning. If this were the case, it would be more difficult to observe treatment effects among such solvers in our contest. To alleviate this concern, we used solvers' search behaviors to identify those who might have low commitments and excluded them from our analyses. Because the least solvers could do in our contest was to perform one concept search and scan the initial list of up to 30 images, we assumed less committed solvers were more likely to behave in this manner and excluded six such solvers from our first robustness analysis (RA1). We used a stricter criterion in the second robustness analysis and excluded the 28 solvers who conducted only one concept search, including even those who had scanned more than 30 images (RA2). Despite using smaller samples consisting of solvers who were likely to be more committed, the results from the robustness analyses were similar to those in

the main analysis; see Online Appendix D for details. Moreover, although Hypotheses 2c and 3a were marginally supported in the main analysis, the former was supported at the 0.05 level in RA2 and the latter in RA1 and RA2. Thus, our results hold even for solvers who showed greater commitments (as proxied by their search behaviors).

5.3. Additional Analyses

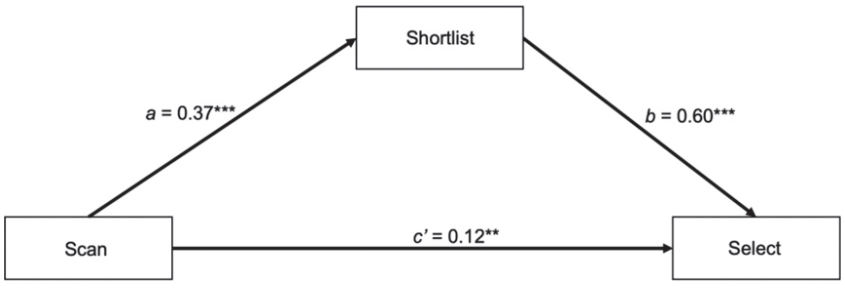
5.3.1. Mediation Analysis. To justify our research emphasis on both intermediate and eventual ideation outcomes in crowdsourcing contests, we checked whether idea scanning and shortlisting influenced idea selection. Without such influences, theorizing the intermediate ideation activities would be unnecessary, and focusing solely on the eventual ideation outcomes would suffice. We thus conducted a mediation analysis to examine the indirect effect of *Scan* on *Select* through *Shortlist*, where a significant indirect effect would imply that *Shortlist* was a mediator and support our focus on the intermediate ideation outcomes.

For the analysis, the three ideation outcome variables were log-transformed, as they were count data.[10] We used indicator coding for the multicategorical seeker exemplars variable with the no exemplars condition as the reference group and included the control variables as in our main estimations. We first obtained the regression coefficients for (1) *Shortlist* on *Scan* and (2) *Select* on *Shortlist* and *Scan*. We then computed the coefficients and standard errors of the direct and indirect effects. We used asymmetric bootstrap CI with 10,000 bootstrap samples to address potential nonnormality of the sampling distribution of the indirect effect, which was considered significant if the bootstrap CI excluded zero (Preacher and Hayes 2004, Hayes and Preacher 2014). As shown in Figure 1, the indirect effect of *Scan* (ab = $0.37 \times 0.60 = 0.22$, 95% CI: [0.14, 0.31]) was significant, implying that *Shortlist* mediated the effect of *Scan* on *Select*. The direct effect of *Scan* was also significant (c' = 0.12, $p < 0.01$), and the proportion of the total effect of *Scan* that was mediated was 0.64. These results support our multistage ideation process framework (Hayes 2013) and research emphasis in this study.

5.3.2. Idea Quality. Our emphasis on quantitative outcomes is due much to prior research, which implicitly asserts a positive quantity-quality relationship of a given set of ideas (Diehl and Stroebe 1987, Osborn 1993, Paulus et al. 2011, Wooten and Ulrich 2017). To validate this assertion in our contest, we examine the relationship between the quantity and quality of images that solvers selected. From extant literature, we identified two measures of image quality. The first is a single-item measure of the overall quality of each image (Zheng et al. 2014). The second is a composite measure using the average of three relevant dimensions in our context: novelty, feasibility, and attractiveness (Kudrowitz and Wallace 2013, Aydınoğlu and Cian 2014, Blohm et al. 2016). We recruited MTurk workers to rate the images on these four items; see Online Appendix E for details. Our results show that solvers who submitted more (respectively, fewer) images tended to submit higher (respectively, lower) quality images on average, implying a positive association between quantity and quality; this occurred even though all solvers submitted images from the same repository without doing any image processing. This finding further justifies our focus on quantitative outcomes in ideation contests.

5.3.3. Keyword Analyses. We performed more analyses to ascertain the salient mechanism that shaped solvers' ideation processes and rule out alternative explanations. One concern is that the priming effect could have been the driving factor behind solvers' use of seeker exemplars—that is, the solvers could have focused mainly on the seeker exemplars, which primed them to search and evaluate ideas in certain ways. Prior studies have discussed the priming effect in ideation contests. For example, solvers who are primed with uncommon existing ideas might access knowledge that is otherwise inaccessible, leading to more original ideas (Wang et al. 2018). Solvers also tend to emphasize in-process seeker feedback when generating solutions (Lee et al. 2018), indicating that such feedback could prime solvers' ideation to some degree.

Figure 1. Mediation Model of Ideation Process



Note. ***$p < 0.001$; **$p < 0.01$.

To investigate the possibility of the priming effect, we examine the cognitive process of solver in the distant exemplars and mixed exemplars conditions by analyzing the concepts that they searched for, as these solvers were shown at least one seeker exemplar that was inconsistent with the problem domain. If the priming effect were the sole or main factor, solvers in the mixed exemplars condition would conduct both local and distant search, whereas those in the distant exemplars condition would perform mostly distant rather than local search. If this were indeed the case, the proportion of local search should be higher in the mixed exemplars condition than in the distant exemplars. Similarly, although solvers in both the mixed exemplars and distant exemplars conditions would search for stationery-related concepts, those in the former condition should also search for beverage-related concepts, resulting in a higher diversity of concept searches. By contrast, we theorize that solvers would focus on the problem domain despite having been shown distant exemplars in the two conditions of interest. Consequently, according to our theorizing, the proportion of local search should be high and the diversity of search low in both conditions. As solvers in the no exemplars condition were not shown exemplars and those in the local exemplars condition were shown only problem-related exemplars (making it challenging to distinguish their focus on the exemplars from that on the problem domain), we could not test the priming effect for these solvers. For brevity, we do not discuss these two conditions in this section.

We operationalized local and distant search by the keywords that solvers used in the concept searches during idea scanning. On the basis of our interest in local and distant search, a research assistant, blinded to the experiment, classified every keyword into one of the following six categories in terms of the subject matter therein; the examples in the respective categories are actual keywords that solvers used in the contest.

I. Beverage related (e.g., "soda can falling" and "beverage production")

II. Stationery related (e.g., "jar of pens" and "pen and pencil holder")

III. Both beverage and stationery related (e.g., "martini glass with pens")

IV. Neither beverage nor stationery related (e.g., "product development")

V. Company name related (e.g., "Ake Co.")

VI. Company name and beverage related (e.g.,"Ake Co. drink")

Using the keyword classification, we calculated the proportion of local search (i.e., keywords in either category I, III, or VI) that solvers conducted. We operationalized solvers' search diversity using the Simpson index $\sum_{i=1}^{R} p_i^2$, where R is the total number of categories and p_i is the proportion of search of category i. The value of the Simpson index ranges from $1/R$ to 1, and a higher value implies a less diverse search. As shown in Table 6, the proportion of local search was relatively high for the distant exemplars and mixed exemplars conditions, whereas the search diversity was relatively low. Two-tailed t-tests showed that the differences in proportion of local search (diff. = −0.07, $p > 0.10$) and search diversity (diff. = −0.02, $p > 0.10$) between the distant exemplars and mixed exemplars conditions were not significant.[11] That solvers in these conditions predominantly performed local search (despite being shown distant exemplars) also suggests that they focused relatively little on distant exemplars in the earlier layers of the search and evaluate stage; however, had the priming effect been strong, distant search should have (1) dominated in the distant exemplars condition and/or (2) been conducted more frequently in the mixed exemplars condition. All in all, there is greater support for our theorizing than for the priming effect.

Table 6. Solvers' Search Behaviors in Idea Scanning

Condition	Mean of proportion of local search	Mean of search diversity[a]
No exemplars	0.96 (0.10)	0.93 (0.17)
Local exemplars	0.99 (0.03)	0.99 (0.05)
Distant exemplars	0.86 (0.29)	0.89 (0.22)
Mixed exemplars	0.93 (0.18)	0.91 (0.20)

Note. Standard deviations are in parentheses.
[a]Based on the Simpson index, where a larger value implies lower diversity.

5.3.4. Solvers' Underlying Motivation. We examined the motivations of solvers' ideation behaviors in light of our results—particularly whether the lower quantitative ideation outcomes in the presence of seeker exemplars occurred because the exemplars weakened the solvers' motivations. Using the solvers' time spent in ideation activities (Table 2), we find that their effort did not differ significantly across conditions. This implies that showing exemplars did not systematically cause solvers to work less hard. More important, in the postcontest survey, solvers reported a high importance of winning, and their desire to win also did not differ substantially across conditions (Table 2). This strong motivation is consistent with our expectations, and there is no evidence that the seeker exemplars weakened solvers' motivation. Thus, we can reasonably infer that solvers generally did strive to win the contest by exerting efforts—this was so even for those who were shown seeker exemplars, despite their lower quantitative ideation outcomes. From the solvers' perspective, they could be ideating strategically with winning in mind, even though and when their

ideation process and outcomes were shaped by the presence of seeker exemplars.

6. Discussion and Conclusion

Existing research has examined various factors that drive the eventual number of ideas that solvers generate in ideation contests, such as prizes and seekers' feedback (Liu et al. 2014, Zheng et al. 2014, Wooten and Ulrich 2017, Jian et al. 2019). In this study, we are interested in the influences of another factor and examine the impacts of providing seeker exemplars in contests. A related study, albeit with some contextual differences, investigates the effect of showing a prior ad idea to solvers in an ideation contest for a TV ad (Wang et al. 2018); as the prior idea is based on the ad that the solvers are tasked to generate ideas for, it is analogous to the local seeker exemplars in our case.[12] The results in that study show that solvers generally generate fewer ideas when they are exposed to a prior idea, although the difference is statistically significant when the prior idea is uncommon but not when it is common. This finding is somewhat similar to that in our study, where the number of eventual ideas that solvers submit is lower when seekers show only local exemplars. Hence, there is a certain degree of generalizability for this particular aspect of our results.

Yet our study goes further than existing works, as we show that providing only distant seeker exemplars also reduces the number of eventual ideas generated in contests. We also examine the impacts of seeker exemplars on intermediate ideation outcomes, which we believe have not been empirically studied in prior research on ideation contests. We find that showing only distant seeker exemplars reduces the number of ideas that solvers scan, whereas providing local seeker exemplars lowers the number of ideas that solvers shortlist. Our analyses of solvers' search behavior during the contest further reveal that they gravitate to local search, even when distant exemplars are shown.

6.1. Theoretical Contributions

The quantity of ideas that solvers generate, which relates to the idea selection activity that we look at in this research, is an outcome of interest in various studies (see Table 1). By examining idea scanning and shortlisting in this research as well, we unravel the ideation process and place the spotlight also on the important but often unobserved solvers' search space and consideration set during ideation. Our mediation and additional analyses suggest that the sizes of the search space and consideration set affect the quantity and, in turn, quality of ideas that solvers submit in contests. These findings have vital implications for practice (see the next section) and research. We suggest that researchers should pay attention to both intermediate and eventual ideation activities and outcomes. In fact, as the intermediate ideation activities affect the eventual outcomes, it is critical to intervene early in the ideation process. Thus, when examining how certain factors affect solvers' selection of ideas that they submit (which tend to be easily observable), we should also consider how these factors could shape the solvers' search and evaluation of ideas (even if these activities are challenging to observe). Moreover, by delving into the ideation process, this study shows the necessity of accounting for intermediate ideation outcomes when investigating the factors of eventual outcomes. Failure to do so could lead to model misspecifications and bias the estimated effects. To illustrate, we reran Model 3B in Table 4 to estimate the effects of seeker exemplars on *Select* but without controlling for *Scan* and *Shortlist*; this would be the (alternative) model specification had we not examined the intermediate ideation outcomes. Results from the alternative specification show that all configurations of seeker exemplars had a significant negative effect on *Select*; specifically, the coefficient estimates are $\beta_{\text{Local}} = -0.30$ ($p < 0.01$), $\beta_{\text{Distant}} = -0.30$ ($p < 0.01$), and $\beta_{\text{Mixed}} = -0.15$ ($p < 0.05$). These results differ from those in the main analyses, where $\beta_{\text{Mixed}} = -0.04$ was not statistically significant ($p > 0.10$).

Many platforms encourage seekers to show exemplars in contests, and prior research points out that solution exemplars can facilitate idea generation (Smith et al. 1993, Herring et al. 2009, Toh and Miller 2014). These exemplars can also help solvers infer seekers' preferences (Koh 2019), which is a critical factor in ideation contests (Terwiesch and Xu 2008). In this regard, this study provides a nuanced understanding of and surprising insights into solvers' behaviors in relation to seeker exemplars. Although the extant literature would suggest that solvers are likely to anchor their ideation to seeker exemplars to better satisfy seekers' revealed preferences and improve their winning prospects, we find that this may not always occur. In particular, our keyword analyses indicate that solvers would predominantly conduct local searches, even when shown distant exemplars. Our explanation is that the solvers' use of seeker exemplars is affected by the consistency between the exemplars and their starting hypothesis and emphasis, especially in the earlier ideation activities. We also find that the number of ideas scanned, shortlisted, and selected are generally lower when seeker exemplars are shown. Thus, an interesting takeaway from this study is that the benefits that seeker exemplars bring to ideation contests might come at the expense of a smaller and less diverse search space explored and fewer ideas submitted by solvers. This research thus expands the current perspective of the pros and cons of the common practice of showing seeker exemplars in ideation contests.

Our theorizing suggests that solvers adopt a multipronged strategy whereby they not only seek to tactically improve their winning prospects but also economize the resources that they expend in contests. Yet, although winning is important, it may not fully dominate solvers' ideation, as one might expect. Instead, from the perspective of solvers' cost-benefit considerations, the need to economize effort and time can have significant bearings on their actions. This is because solvers can have a high level of control over the actual costs that they incur in contests but not as much control over winning and other benefits, such as gaining recognition, improving skills, or learning from peers (Leimeister et al. 2009, Zheng et al. 2011, Ye and Kankanhalli 2017). Although solvers can choose how much effort and time to devote to particular contests, whether they win and gain reputational benefits depends on seekers' decisions and whether they can learn and enhance their skills depends to some extent on the guidance from more capable solvers. Because individuals' behaviors are driven more by factors over which they have better control (Ajzen 2002), solvers' strategies in certain ideation activities could be more strongly influenced by their effort and time concerns.

Although various innovation models describe individuals' objectives and tasks in the respective ideation activities, we take a deeper look into the activities and theorize the dynamic orientation of individuals' behaviors therein. Although solvers may be assumed to hold a consistent focus across various ideation activities, a key point in our theorizing is that they might actually switch focus and emphasis as they progress from idea scanning to idea selection as a result of changes in (1) the consideration set of ideas and (2) the salient decision-making criteria. Future research can and should account for such dynamism to better understand solvers' behaviors and uncover issues pertinent to ideation contests. In the context of showing seeker exemplars in ideation contests, we see that solvers generally focus on the problem fit of ideas during idea scanning and shortlisting, but they pay greater attention to preference fit during idea selection. Local seeker exemplars are thus major factors in solvers' decisions as they search and shortlist ideas, whereas both local and distant seeker exemplars are salient when they select ideas. An implication of a strong emphasis on the focal problem domains in the earlier ideation activities is that solvers could systematically overlook potentially good ideas in distant domains, because they are less likely to actively explore and consider such ideas when scanning and shortlisting. This could be a general limitation of ideation contests and a particular issue in contests where addressing the focal problems requires nontraditional ideas and concepts.

6.2. Practical Implications

Providing seeker exemplars can help solvers generate ideas, but it could also be counterproductive in terms of certain ideation outcomes. We find that showing seeker exemplars leads to smaller consideration sets during idea scanning and idea shortlisting, and fewer ideas being submitted. We also find that the quality of ideas is lower for solvers who submit fewer ideas, which corroborates prior findings that having fewer ideas reduces the odds of finding good ideas. As our theorizing suggests that solvers' time and resource constraints affect their use of seeker exemplars during idea generation, we propose ways for contest platforms to address these constraints to potentially mitigate some of the adverse ideation outcomes. First, platforms can use text and image analytics to generate relevant keywords based on seekers' project briefs and exemplars. Using artificial intelligence techniques, platforms can also display keywords of related but somewhat distant domains for the respective contests. Providing such system-generated keywords can lower solvers' cognitive load during idea scanning, which is helpful, given the constraints that they face.

Second, platforms should directly support solvers in idea scanning and shortlisting activities, which are usually conducted outside the contests. Platforms can integrate relevant external resources and repositories with their systems so that solvers can more easily conduct idea scanning. Platforms can also develop tools to lower solvers' ideation effort. For example, design contest platforms can implement tools for solvers to organize design ideas and concepts during idea scanning, because storing, retrieving, and managing such references is a critical but laborious task in design projects (Herring et al. 2009). Being involved in solvers' scanning and shortlisting activities also allows platforms to compare solvers' preliminary ideas with seekers' project brief and exemplars (e.g., by evaluating similarities between solvers' scanned/shortlisted ideas and seekers' cues) and point solvers to other domains to scan for more ideas.

Third, platforms can refine their recommendation systems to help solvers identify ideation contests to join. Mo et al. (2018) propose using predictors such as the solvers' ability and experience when recommending specific contests. However, as solvers' time considerations in the contests drive their ideation behaviors, platforms can also consider the fit between the solvers' time constraint and seekers' time requirement when making recommendations. Platforms can examine a solver's activities in ongoing contests to estimate time availability and see whether a new contest with a particular deadline is suitable. For example, new contests with urgent deadlines may not be ideal for solvers who are heavily involved in existing contests. This is particularly true for contests that would benefit from ideas from distant

domains, as solvers who are tight on time are likely to have a high need for closure that causes them to focus on the focal problem domains.

Our results show that regardless of the configurations of seeker exemplars, showing these cues generally has negative effects on quantitative ideation outcomes. Nonetheless, seekers might still want to provide exemplars to guide solvers' ideations (partly as a result of platforms' suggestions). To help seekers make informed decisions, we compared the ideation outcomes among the different exemplar configurations; we highlight the findings here and provide the details in Online Appendix F. Our post hoc analyses suggest that seekers should avoid showing only distant exemplars. This is because solvers in the distant exemplars condition scanned marginally fewer images than those in the local exemplars condition; the difference between the local exemplars and mixed exemplars conditions was not significant. Solvers in the distant exemplars condition also submitted significantly fewer images than those in the mixed exemplars condition; the difference between the local exemplars and mixed exemplars conditions was not significant. Thus, seekers who intend to show exemplars should not provide only distant exemplars, especially if the key objective is getting solvers to scan and/or submit more ideas. Moreover, to minimize or counter the negative impacts of showing exemplars on quantitative ideation outcomes, we suggest seekers set a longer contest duration to reduce solvers' time constraints and give them more time to generate ideas. Seekers can also offer more attractive contest prizes to motivate solvers to put in greater effort and submit more ideas (Bockstedt et al. 2016, Koh 2019).

6.3. Suggestions for Future Research

Future studies can investigate other aspects of seeker exemplars in ideation contests. For one, although we adopt the solvers' perspective and examine their use of seeker exemplars, new research can consider the seekers' position and look at why they show certain exemplars, such as the distant ones. This can improve our understanding of the seeker-solver dynamics in contests. Another research extension is to compare solvers' processing of different types of exemplars. In this study, we did not do that because of space limitations, as such comparisons could involve other theoretical lenses. This line of extension could give additional guidance to seekers in terms of the exemplars to show. In addition, new studies of the solvers' search and evaluation process can consider potential interactions of seeker exemplars and in-process feedback, as both are common cues in contests, to better capture the ideation environment that solvers operate in. Future research can also examine solvers' considerations of diverse ideas, particularly given their tendency to focus on the focal problem domains. A specific research question arising from this study is how seekers can better use distant exemplars to trigger solvers to scan for diverse ideas. Besides these suggestions, a more important extension is to develop an integrative theory that examines the relationship among idea quantity, quality, and diversity in contests, not just with regard to the eventual outcomes but also with regard to the intermediate ones. This endeavor can help us better learn the dynamics in contests and mobilize the crowd to achieve optimal outcomes.

Finally, there are certain limitations in our experiment that future research can address. Given our interest in the impacts of seeker exemplars on solver behaviors in the search and evaluation activities, solvers in our experiment used a common idea repository (Getty Images) and submitted their selected ideas as is. Future research on seeker exemplars can design the experimental tasks to examine how solvers tap into their own sources of ideas and develop their ideas during ideation. Our findings are also based on one experiment involving a specific contest type (photo contest) and solver pool (MTurk). As is typical of experimental studies, there are concerns about the external validity of our findings. Although certain aspects of our results are consistent with existing work, future work can test our theory in related contexts. Another concern is that we did not measure solvers' ability, which could have affected their ideation effort. Although we controlled for solvers' effort using the time that they spent on ideation, and our random assignment of solvers in the experiment mitigated any possible confounding effect of the solvers' ability, future studies can control for this factor to account for its impacts in the respective ideation activities.

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Endnotes

[1] See https://support.99designs.com/hc/articles/204108469 and https://blog.designcrowd.com/article/469/crowdsourcing-logo-design (accessed July 28, 2021).

[2] See https://99designs.com/contests/910937 (the contest was for a restaurant logo, but one exemplar was a real estate professional service logo) and https://99designs.com/contests/910808 (accessed July 28, 2021; the contest was for a medical/pharmaceutical company logo, but the exemplars included logos for wineries and a football club).

[3] See https://support.99designs.com/hc/articles/360000503263 (accessed July 28, 2021). We are unaware of any platforms that guide seekers on the exemplars to show.

[4] In the interest of space, we present publications in IS journals only. Admittedly, the research streams are not mutually exclusive, and some studies relate to multiple streams. Our classification is based on the main research questions and objectives in the studies. If we consider other publication outlets, the first stream could include Camacho et al. (2019), Jiang et al. (2021), Korpeoglu et al. (2021), Liu et al. (2014),

Mihm and Schlapp (2019), Pollok et al. (2019), and Wooten and Ulrich (2017); the second stream Brabham (2010) and Roth et al. (2015); and the third stream Bockstedt et al. (2016), Jiang and Wang (2020), Menon et al. (2020), Riedl and Seidel (2018), and Schemmann et al. (2016).

[5] The scan-shortlist-select process in our experiment also occurs in practice. According to Herring et al. (2009), designers actively *search* on the web for ideas in product or graphic design projects; these online searches are keyword based, as in our experiment. As they search, they *shortlist* ideas by bookmarking web pages or saving images. Finally, they *select* ideas in their shortlist to use in the projects.

[6] See https://99designs.com/logo-design/contests/910937 and https://99designs.com/logo-design/contests/910808 (mentioned in Endnote 2), where seekers do not label or explain their exemplars (even the distant ones).

[7] We considered using ANOVA. However, the Shapiro–Wilk normality test showed that the data were not normally distributed, which is a key assumption for ANOVA.

[8] The coefficient of *distant exemplars* in Model 1B, $\beta = -0.31$, implies that the expected number of images in idea scanning in this condition is $\exp(-0.31) = 0.733$ times that in the baseline (no exemplars) condition. Hence, the difference in *Scan* between the two conditions is $1 - 0.733 = 26.7\%$.

[9] We used the tool on https://stefany.shinyapps.io/RcountD/ (accessed July 28, 2021) to compute the SMD effect size CI.

[10] We followed the procedure described in https://stats.idre.ucla.edu/how-can-i-do-mediation-analysis-with-a-categorical-iv-in-stata (accessed July 28, 2021). As the procedure uses linear regressions, we log-transformed the ideation outcomes for the dependent variables to be continuous.

[11] As keywords in category III could be classified as either local or distant, we excluded such keywords in an alternative calculation of the proportion of local search. Using the alternative measure yielded qualitatively similar results.

[12] The experiments in Wang et al. (2018) and this study differ as follows. In Wang et al. (2018), the stimulus idea was not explicitly indicated as a seeker exemplar, and solvers had to summarize the prior idea in a sentence. In this study (and actual contests), the exemplars were clearly shown as being provided by seeker, and solvers did not have to summarize or comment on the exemplars.

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