Head versus Heart: The Effect of Objective versus Feelings-Based Mental Imagery on New Product Creativity

KELLY B. HERD
RAVI MEHTA

Imagination visual mental imagery, a mental simulation process that involves imagining an end user interacting with an end product, has been proposed as an efficient strategy to incorporate end-user experiences during new product ideation. Consumer research finds that this strategy enhances overall product usefulness, but does not resolve whether and how this process may impact outcome originality. The present work delineates the imagination visual mental imagery construct and argues that such mental imagery can take two different routes—one that is more feelings-based (i.e., feelings-imagination), and one that is more objective (i.e., objective-imagination). Further, we propose that although these two approaches will equally benefit outcome usefulness, they will have differential impact on outcome originality. Across five studies, we demonstrate that adopting a feelings-imagination versus an objective-imagination approach induces higher empathic concern, enhancing cognitive flexibility, which leads to higher outcome originality. Theoretical and managerial implications are discussed.

Keywords: creativity, innovation, new product ideation, empathic design, mental imagery, cognitive flexibility

Kelly B. Herd (kelly.herd@uconn.edu) is an assistant professor of marketing at the School of Business, University of Connecticut, 2100 Hillside Road, Storrs, CT 06269. Ravi Mehta (mehtar@illinois.edu) is an associate professor of business administration at the Gies College of Business, University of Illinois at Urbana-Champaign, 350 Wohlers Hall, Champaign, IL 61820. Please address correspondence to Kelly B. Herd. The authors thank Page Moreau and Tiffany White for valuable comments on an earlier version of this article, and Rebecca Walker Reczek, Selin Malkoc, and other participants at the Ohio State University research camp for their insightful comments. The authors also thank the editor, the associate editor, and the three anonymous reviewers for their guidance and constructive comments throughout the review process. This research is supported in part by the University of Connecticut School of Business Behavioral Research Grant awarded to the first author and the Junior Faculty Council Grant, College of Business, University of Illinois at Urbana-Champaign awarded to the second author. Both authors contributed equally to this research and are listed alphabetically. Supplementary materials are included in the web appendix accompanying the online version of this article.

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To develop creative and successful products, designers—both professional and consumer—can take one of many available strategies. They can survey potential or current end users and/or observe them interacting with a product; however, both options are time-consuming and costly (Andreasen 1983; Langan 2013). Alternatively, they can engage in another technique that is widely used and examined in literature: *imagination visual mental imagery*, a mental simulation process that involves imagining an end user interacting with an end product (Aromaa and Suomela 2003; Christensen and Schunn 2009a, 2009b; Dahl, Chattopadhyay, and Gorn 1999; Fulton Suri 2003; Koskinen and Battarbee 2003). Such mental imagery has been shown to provide designers with an understanding of end-user experiences, which are critical to the generation and development of new and creative products (Leonard and Rayport 1997).

Extant research demonstrates that end-user incorporation through imagination visual mental imagery during new product ideation enhances overall usefulness, but it does not clearly determine whether and how this process may

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impact product outcome originality (Aromaa and Suomela 2003; Christensen and Schunn 2009a; Dahl et al. 1999; Dahl, Chattopadhyay, and Gorn 2001; Fulton Suri 2003; Im and Workman 2004; Mattelmäki, Vaajakallio, and Koskinen 2014; McDonagh and Thomas 2010). Importantly, developing original and innovative products is critical to a firm's success and can offer a meaningful source of competitive advantage (Chandy and Tellis 1998). In fact, the degree of originality reflected in a company's product offerings can have large, positive, and long-lasting effects on a firm's revenue streams and profits (Geroski, Machin, and Van Reenen 1993). Thus, developing a better comprehension of how and why imagination visual mental imagery may impact outcome originality will not only advance our current understanding of the cognitive processes underlying new product ideation, but also offer important practical implications.

We argue that imagination visual mental imagery can take two different routes: one focused on an end user's feelings, and the other more objective in nature (Batson et al. 2007; Stotland 1969). In the context of new product ideation, we suggest, a feelings-imagination approach comprises imagining how a consumer may feel while using a product (Batson et al. 2007; Escalas and Stern 2003), whereas an objective-imagination approach entails visualizing how a consumer may objectively think about and interact with a product while using it (Batson et al. 2007; Dahl et al. 1999).

We propose that when a designer adopts one of these two approaches during new product ideation, the resulting cognitive process will equally benefit outcome usefulness, but differentially impact outcome originality. We argue that a feelings-imagination approach will induce higher empathic concern, which will then make individuals more receptive to considering issues from diverse perspectives and increase their ability to shift avenues of thought during new product ideation. This activated process, cognitive flexibility (Martin and Rubin 1995), will lead to the generation of new product ideas that are more original in nature (Grattan and Eslinger 1989; Ritter et al. 2012).

The present research offers several theoretical contributions. First, it advances the current understanding of user-centered ideation processes by demonstrating that the two mental imagery approaches to incorporating the end-user experiences in the new product ideation process (i.e., feelings-imagination and objective-imagination visual imagery) have differential implications for product originality. Further, the current work also illuminates the underlying cognitive process through which this difference occurs. We show that adopting a feelings-imagination versus an objective-imagination approach leads individuals to experience greater empathic concern, which enhances cognitive flexibility and in turn outcome originality.

THEORETICAL BACKGROUND

Imagination Visual Mental Imagery

Previous research acknowledges the benefits of considering end-user experiences in the new product ideation and design process (Dahl et al. 1999; Fulton Suri 2003; Leonard and Rayport 1997). Imagination visual mental imagery enables designers to better understand the challenges end users might face while using a product, thereby enabling them to develop creative solutions to those challenges (Dahl et al. 1999; Lorenz 1990; Roozenburg and Eekels 1995). Prior work in the consumer domain finds that utilizing this mental imagery strategy leads to more practical and useful, but not necessarily original, ideas and designs (Christensen and Schunn 2009a; Dahl et al. 1999; Im and Workman 2004). These findings contrast with results observed in the managerial literature showing that imagining end users and their experiences during new product ideation process leads to designs that are both practical and original (Aromaa and Suomela 2003; Fulton Suri 2003; Leonard and Rayport 1997; Mattelmäki et al. 2014; McDonagh and Thomas 2010). Hence, extant literature lacks a comprehensive understanding of how such end-user incorporation may influence outcome originality. Noting this shortcoming, researchers have called for further investigation to better understand this relationship (Dahl et al. 2001; Roozenburg and Eekels 1995).

Following this call, this research aims to advance current understanding of how end-user incorporation through imagination visual mental imagery during new product ideation can enhance outcome originality. Specifically, we propose that end-user incorporation through mental imagery can be attained through two different imagination-based (i.e., cognitive) approaches: feelings-imagination and objective-imagination. While both approaches involve imagining an end user using a product, they are fundamentally unique cognitive processes that differentially impact individuals' judgments and behaviors (Batson et al. 2007; Chartrand and Bargh 1999; Coke, Batson, and McDavis 1978; Davis 1983; Galinsky et al. 2008; Stotland 1969). Importantly and more relevant to the current research, adopting a feelings-imagination (vs. objective-imagination) approach induces higher empathic concern for the target (Batson et al. 2007; Coke et al. 1978; Davis et al. 1987; Stotland 1969). For example, Stotland (1969) demonstrated that individuals prompted to imagine a suffering person's feelings display higher empathic concern for the victim than those prompted to take a more objective approach. Similarly, Coke et al. (1978) showed that adopting a feelings-imagination approach toward a person in need induces higher empathic concern for that person. This difference in empathic concern, we argue, will have implications for cognitive flexibility.

Imagination Visual Mental Imagery and Cognitive Flexibility

Cognitive flexibility represents an ability to simultaneously consider issues from diverse perspectives and to shift avenues of thought while perceiving and processing information (Grattan and Eslinger 1989; Martin and Rubin 1995). Research has shown that heightened empathic concern can have a positive effect on cognitive flexibility. Literature in neuropsychology finds a significant correlation between empathic concern and cognitive flexibility, and further suggests that the two variables may share common neural and cognitive processes (Grattan and Eslinger 1989).

In fact, psychologists suggest that heightened empathic concern, which entails accurately perceiving and comprehending the feelings of others, prompts people to simultaneously consider an issue from several diverse viewpoints (Gallo 1989). Gallo (1989) further suggests that this approach causes individuals to consider diverse views different from their own, and reduces the salience of one's own perspective while increasing the viability of others' views. We propose that this openness to diverse views and shift in perspective will enhance cognitive flexibility. Previous research findings support this proposition (Fulton Suri 2003; Maddux and Galinsky 2009; Van Oudenhoven and Van der Zee 2002). For example, Van Oudenhoven and Van der Zee (2002) demonstrate that cultural empathy (i.e., the ability to accurately sense and consider the feelings and experiences of people from different cultural groups) makes an individual more open to diverse cultural norms and values and better able to switch behaviors as required, suggesting higher cognitive flexibility.

Conversely, an objective-imagination approach induces a less affective evaluation of another's perspective (Borke 1971; Dymond 1949). Because of this objective and emotionally detached approach, one's own perspective remains highly salient and accessible (Davis, Hoch, and Ragsdale 1986); the effects include anchoring individuals' own preferences and insufficiently adjusting to accommodate another's perspective (Chambers and Davis 2012). Thus, we propose that when engaging in an objective-imagination approach during new product ideation, individuals simply project themselves onto the target, reducing their ability to shift thoughts to accommodate those of the target. Hence, an objective-imagination approach should not enhance cognitive flexibility.

Summarizing the above arguments, we propose that adopting a feelings-imagination versus an objective-imagination approach to incorporate an end user's experience during new product ideation will induce higher empathic concern for the end user, and thereby enhance cognitive flexibility. This in turn, we argue, will have implications for outcome creativity.

Cognitive Flexibility and Creativity

The creativity of an outcome can be assessed through two orthogonal dimensions: originality and usefulness (Burroughs et al. 2008; Goldenberg, Mazursky, and Solomon 1999; Mehta, Dahl, and Zhu 2017; Mehta, Zhu, and Cheema 2012;). A creative idea not only should differ from what already exists or is known (i.e., be novel and original), but also should be useful in solving the problem at hand (i.e., be practical and appropriate, Moreau and Dahl 2005; Sternberg and Lubart 1999).

Creating an original solution for a given problem requires an individual to recognize a relationship between diverse concepts and then to reassemble those elements in a novel way to generate a new idea, a process facilitated by cognitive flexibility (Amabile 1983; Dahl and Moreau 2002; Guilford 1950; Rietzschel, Nijstad, and Stroebe 2007; Ritter et al. 2012). For example, De Dreu, Nijstad, and Baas (2011) demonstrate that cognitive flexibility, as induced by behavioral activation, indeed leads to higher originality. In a series of studies, the authors find a positive effect of cognitive flexibility on outcome originality in various types of creativity tasks. Other researchers have similarly argued for cognitive flexibility as the mental process that facilitates creativity and originality (Barron and Harrington 1981; Beghetto and Kaufman 2007; Guilford 1964; Hennessey, Amabile, and Mueller 2011; Murray et al. 1990). For example, the dual-pathway model of creativity (De Dreu, Baas, and Nijstad 2008) suggests that individuals produce more creative outcomes when they engage in more flexible thinking. Additionally, Lin et al. (2014) demonstrate that higher cognitive flexibility enhances performance on creative problem-solving tasks.

Thus, we hypothesize that incorporating an end user through a feelings-imagination approach will induce higher empathic concern, enhancing one's cognitive flexibility and thereby leading to higher originality. Further, when people are not specifically asked to incorporate an end user's experiences during a new product ideation process, they are less likely to consider an end user's feelings and thus may not demonstrate enhanced empathic concern, cognitive flexibility, or increased outcome originality. As discussed previously, adopting an objective-imagination approach does not enhance one's empathic concern and, consequently, cognitive flexibility. Therefore, when an end user is not incorporated during the new product ideation process or is incorporated only through an objective-imagination approach, we do not expect an increase in outcome originality.

With respect to the usefulness of the generated ideas, incorporating an end user in the new product ideation process should ensure that the end user remains at the center of the ideation process irrespective of the approach adopted for such incorporation (Dahl et al. 1999; Fulton Suri 2003; Leonard and Rayport 1997; Mattelmäki et al. 2014;

McDonagh and Thomas 2010). In fact, research has shown that mental simulation, either feelings-based or objective, reduces uncertainty and enables a better understanding of end users' characteristics, preferences, and behaviors (Christensen and Schunn 2009b; Gentner 2002). This process provides appropriate boundaries that require the fulfillment of end-user requirements and creation of product ideas that are useful and practical (Bailetti and Litva 1995; Dahl et al. 1999). Hence, we predict that both feelings-imagination and objective-imagination approaches will lead to equally higher outcome usefulness as compared to when no such approach to incorporate the end user in the new product ideation process is adopted.

We test our hypotheses across five experiments. The first experiment examines and provides support for our basic proposition that a feelings-imagination (vs. an objective-imagination) approach leads to higher originality without undermining usefulness. Experiment 2 advances the findings from experiment 1 by comparing the two mental imagery approaches of end-user incorporation with a control group. Here, we demonstrate that a feelings-imagination approach enhances originality of the outcome as compared to both an objective-imagination approach and a control condition with no mental imagery strategy induced. Importantly, we demonstrate that both mental imagery approaches enhance outcome usefulness compared to the control condition. Experiment 3, utilizing a moderation model, provides evidence for cognitive flexibility as the underlying process driving the effect of mental imagery on outcome originality. Experiment 4 further explicates the underlying mechanism and demonstrates that a feelings-imagination approach to end-user incorporation induces higher empathic concern, in turn enhancing cognitive flexibility, and increases outcome originality. The final experiment further elucidates the observed effect and examines the joint effect of mental imagery and empathic concern on originality through measured cognitive flexibility. As in the previous experiments, we find that a feelings-imagination approach leads to higher cognitive flexibility and outcome originality. Interestingly, however, when empathic concern is externally induced, both cognitive flexibility and originality are high, irrespective of the prompted mental imagery approach. Taken together, these five experiments provide consistent support for our proposed conceptual framework.

EXPERIMENT 1

Experiment 1 was designed to test our focal proposition that a feelings-imagination approach to incorporate end-user experience in the new product ideation process will lead to higher originality without compromising the usefulness of the generated ideas. The experiment utilized a one-way between-subjects design in which mental imagery was manipulated at two levels (i.e., feelings-imagination vs. objective-imagination) as participants engaged in a new product ideation task.

Method

Fifty-eight undergraduate students (60% women; M_{age} = 20.58 years, SD = .96) at Indiana University participated in the study in exchange for partial course credit. Participants were randomly assigned to either feelings-imagination or objective-imagination conditions and completed the study using computers. Participants were told that the study was intended to test strategies that could be employed during the process of generating ideas for creative products, and that they would be asked to adopt the role of a product designer and follow a suggested strategy to generate ideas for a new product. The participants in the two mental imagery conditions were then presented with the manipulation instructions. Specifically, they were told that while generating ideas for a new product, one effective strategy is to incorporate an end user's experience in the development process. They were told that they could do this by imagining how an end user would feel while using the product (feelings-imagination condition) or by visualizing how an end user will objectively think about and interact with the product (objective-imagination condition).

Participants were then presented with a new product ideation task that required them to generate "creative ideas for a grocery shopping cart specifically designed for an elderly person (65+ years of age)." Before they listed their ideas, those in the feelings-imagination condition were instructed to close their eyes for a minute and imagine how an elderly person will feel while using the shopping cart they are going to design. Those in the objective-imagination condition were instructed to close their eyes and visualize how an elderly person will objectively think about and interact with the shopping cart they are going to design (see web appendix for exact manipulation instructions). The manipulation instructions for the feelings-imagination condition were adapted from Batson et al. (2007), while those for the objective-imagination condition were adapted from Dahl et al. (1999) to match the context of our study. The participants were free to come up with as many ideas as they could and take as much time as they wanted to list all their ideas.

We also measured the time participants spent on completing this task and assessed their level of involvement to rule it out as an alternative explanation for the observed effect. Specifically, we asked all participants to indicate, on seven-point scales (1 = not at all, 7 = very much), how much they were engaged during the study, how much effort they put in while completing the study, how important they thought the study task was, and how hard they worked to complete the task. The experiment concluded with

demographic (e.g., age, gender) measures, and participant debrief.

Results

Of the 58 students that participated in the study, 50 completed the study as directed and generated ideas for a grocery cart. The other eight participants generated ideas geared toward enhancing the overall grocery shopping experience for the elderly rather than ideas for a grocery cart. These ideas included solutions such as advertising (e.g., "Maybe try to help them refresh memory about their past, childhood"), product packaging (e.g., "Larger font size on the package of the product"), or others that did not meet the given instructions (e.g., "It reminds you of the good old memory!"; "Jello is an easy product for the elderly to eat and enjoy"; "Feeling of home and family"). Thus, the responses from these eight participants were omitted from the analyses.

Number of Ideas and Involvement. Fifty participants generated a total of 140 ideas ($M = 2.80$, SD = 1.11). A one-way ANOVA showed a nonsignificant effect of mental imagery strategy on the number of the ideas generated ($M_{\text{feelings-imagination}} = 2.75$, $M_{\text{objective-imagination}} = 2.85$; $F < 1$). Next, we assessed whether the mental imagery approach adopted during the ideation task influenced participants' task involvement. To do so, we averaged participants' responses to the four involvement measure items to create an involvement index ($\alpha = .85$). A one-way ANOVA conducted for this index did not reveal a significant effect of adopted mental imagery approach ($M_{\text{feelings-imagination}} = 4.77$, $M_{\text{objective-imagination}} = 4.99$; $F < 1$). Similarly, no difference was observed in the total time participants spent on the ideation task between the two conditions ($M_{\text{feelings-imagination}} = 122.19$ seconds, $M_{\text{objective-imagination}} = 115.71$ seconds; $F < 1$).

Next, we assessed the generated responses on the two dimensions of creativity: originality and usefulness.

Originality. We first screened the generated ideas for duplicates (Mehta et al. 2012). Two judges, both graduate students in the area of consumer behavior and creativity and blind to the hypothesis and conditions, independently completed the screening task. This process identified 70 distinct ideas. Next, we recruited 15 judges from the same population as the study participants to assess originality of the generated ideas (Dahl et al. 1999; Mehta et al. 2017). Each of the 15 judges was independently presented with the 70 distinct ideas and asked to use a seven-point scale (1 = not at all, 7 = very much) to rate each idea on three items: originality, innovativeness, and novelty. No duplicate ideas were presented to the judges in order to control for frequency effects (i.e., more frequently presented ideas might be judged as more or less creative; Mehta et al. 2012). Next, we calculated an overall originality score for all participants (Dahl et al. 1999; Moreau and Dahl 2005; Sellier and Dahl 2011) by first averaging each judge's three ratings (i.e., originality, innovativeness, and novelty) for each idea, giving us 15 average originality scores (i.e., one for each of 15 judges) for each idea. From there, we standardized each judge's average score to control for potential interjudge variance (Dahl and Moreau 2002) and then averaged these 15 standardized average originality scores to obtain a mean originality score for each idea ($\alpha = .80$). Finally, we calculated an overall originality score for each of 50 participants by adding the mean originality scores for all of the ideas each participant generated and dividing it by the total number of ideas that participant generated.

A one-way ANOVA revealed a significant main effect of the mental imagery approach on the originality of the generated ideas ($F(1, 48) = 4.07$, $p < .05$, $\eta_p^2 = .08$). The participants instructed to adopt a feelings-imagination approach ($M = .15$, SD = .56) generated ideas rated as more original than the ideas generated by participants who adopted an objective-imagination approach ($M = -.14$, SD = .44).

Usefulness. Another set of 15 judges was hired to assess usefulness of the generated ideas. Each judge was independently presented with the 70 distinct ideas and asked to rate each idea on the three items that captured usefulness (i.e., useful, practical, appropriate) of these ideas on seven-point scales. Using the same methodology as that for calculating an overall originality score, we obtained an overall usefulness score for each participant, which we then averaged with other participants' usefulness scores to create an overall usefulness score ($\alpha = .89$). As predicted, no difference was observed between the feelings-imagination ($M = -.02$, SD = .67) and the objective-imagination ($M = .02$, SD = .58) approach for the usefulness of the generated ideas ($F < 1$).

Discussion

The first experiment results support our focal prediction by demonstrating that when people adopt a feelings-imagination approach to incorporate end users in the new product ideation process, they develop more original solutions than those developed by individuals adopting an objective-imagination approach. Also, we found that the observed results were not driven by the differences in participants' level of involvement. No difference was observed in the number of ideas generated by the participants, the time they spent generating these ideas, or the self-rated involvement measures between the two treatment conditions. Also, no difference was observed in the usefulness of the generated ideas between the two conditions.

Following findings from extant research, we had theorized that simply incorporating the end user in the ideation

process through either of the imagination visual mental imagery approaches should enhance outcome usefulness. We directly test this in our next experiment with the inclusion of a control condition. This third condition enables us to determine whether both feelings-imagination and objective-imagination do, in fact, increase outcome usefulness when compared to a context with no directions related to end-user incorporation. Moreover, the originality of the ideas should still remain higher for the feelings-imagination approach than when either an objective-imagination approach is adopted or the end user is not incorporated through mental imagery in the new product ideation process. We test this proposition in the next experiment.

EXPERIMENT 2

Experiment 2 aimed to further the findings of experiment 1 by demonstrating that adopting a feelings-imagination approach enhances originality of the outcome more than adopting the objective-imagination approach or not incorporating the end user's experience in the new product ideation process. Notwithstanding, either end-user incorporation approach should lead to higher outcome usefulness than no end-user incorporation in the new product ideation process.

Method

One hundred one undergraduate students (49% women; $M_{age} = 20.75$ years, SD = 2.37) at Indiana University completed this experiment in exchange for partial course credit. The same cover story and procedure as used in experiment 1 were employed in this experiment, except that a control group was added to the design. To begin, the participants were told that the study was intended to test strategies that could be employed during the process of generating ideas for a new product, and that they would be assuming the role of a product designer and following a suggested strategy in the design process. The participants in the two mental imagery conditions were then presented with the manipulation instructions. Specifically, the groups were told that an effective strategy for new product idea generation is to incorporate the end user's experience in the development process—that is, to imagine how an end user would feel while using the product (feelings-imagination condition) or visualize how an end user would objectively think about and interact with the product while using it (objective-imagination condition). The participants in the control condition received no instructions related to end-user incorporation (see the web appendix for the exact instructions used).

Next, all participants were presented with a new product ideation problem adopted from Moreau and Dahl (2005). Specifically, all participants were given drawings of 20 different shapes and asked to design an original and appropriate toy for a child between the ages of five and seven using these shapes as components of their toy designs (see the web appendix for the used stimuli). The participants were free to use as many or as few parts as they liked. However, before the participants started designing their toy, those in the feelings-imagination condition were instructed to close their eyes for a minute and imagine how a five- to seven-year-old child would feel while playing with the toy they are going to design. Those in the objective-imagination condition were instructed to close their eyes and visualize how a five- to seven-year-old child would objectively think about and interact with the toy they are going to design while playing with it. Participants in the control condition were not provided with any such end-user-incorporation instructions and directly proceeded to design their toy. No time limit was imposed for producing the toy design. All participants drew their final toy designs on a sheet of paper, and provided titles and descriptions of their toy designs. Finally, all participants answered demographic questions (e.g., age, gender) and were then debriefed.

Results

Three participants did not draw the final toy designs and were therefore removed from the final analyses, leaving 98 data points.

Task Time. Replicating the findings from experiment 1, no significant difference was observed in the time participants spent across the three conditions on completing the toy design task ($F < 1$) ($M_{feelings\text{-}imagination} = 388.27$ seconds, $M_{objective\text{-}imagination} = 363.96$ seconds, $M_{control} = 340.90$ seconds; all ts < 1). We found similar results for the time participants took to complete the respective creativity tasks in all the following experiments, indicating no difference in their involvement across conditions; hence, we do not report this measure any further.

Originality. Four trained research assistants, experienced with five- to seven-year-olds (e.g., full-time nanny, preschool volunteer, soccer coach for younger kids, and children's day camp counselor), assessed the designs' originality in exchange for $25. The judges, blind to the hypothesis and conditions, were independently presented with the design sketches, descriptions, and titles, and asked to rate each toy design on its originality, innovativeness, and novelty on seven-point scales (1 = not at all, 7 = very much). We first averaged these three originality ratings for each judge to obtain a mean originality score for each design, resulting in 98 scores for each of four judges. We then standardized the four judge scores to control for inter-judge variance and averaged them ($\alpha = .63$) to obtain an overall originality score for each design. A one-way between-subjects ANOVA returned an overall significant

effect of the adopted mental imagery approach on the judged originality of the toy designs ($F(2, 95) = 3.98$, $p < .05$, $\eta_p^2 = .08$). Further planned contrasts showed that the toy designs generated by the feelings-imagination group were judged to be more original ($M = .22$, SD = .71) than those generated by the objective-imagination approach ($M = –.21$, SD = .51; $t(95) = –2.42$, $p < .05$, Cohen's $d = .70$) or the control group ($M = –.13$, SD = .68; $t(95) = –2.34$, $p < .05$, Cohen's $d = .50$). As hypothesized, and replicating the findings from prior research (Dahl et al. 1999), no significant difference was observed in the originality of the toy designs in the objective-imagination or control conditions ($t < 1$).

Usefulness. The same four judges who evaluated originality rated the designs on the three usefulness items (i.e., useful, practical, appropriate) on seven-point scales. Following the same methodology used to obtain an overall originality score, we calculated an overall usefulness score for each design ($\alpha = .75$). As hypothesized, a one-way between-subjects ANOVA revealed an overall significant effect of the adopted mental imagery approach on the judged usefulness of the designs ($F(2, 95) = 4.09$, $p < .05$, $\eta_p^2 = .08$). Again, planned contrasts found that consistent with prior research (Dahl et al. 1999), the objective-imagination approach resulted in toy designs deemed more useful ($M = .29$, SD = .78) than those in the control condition ($M = –.23$, SD = .69; $t(95) = –2.65$, $p < .01$, Cohen's $d = .71$). The feelings-imagination condition also led to the generation of more useful designs ($M = .11$, SD = .73) than the control condition ($t(95) = 2.08$, $p < .05$, Cohen's $d = .48$). No difference, however, was observed between the two treatment conditions ($t < 1$).

Discussion

The results of experiment 2 provide additional support for our central hypothesis and also replicate prior research findings (Dahl et al. 1999). Both feelings-imagination and objective-imagination approaches of incorporating end users in new product ideation led to higher outcome usefulness than when an end user was not explicitly considered. However, only those adopting a feelings-imagination approach demonstrated higher outcome originality. Also, as found in experiment 1, no significant difference was observed in the time participants spent completing the creative task, further suggesting that our treatments did not affect the participants' level of task involvement and therefore may not explain the relationship between the adopted mental imagery approach and originality of the design outcome.

In the next experiment, we employ a moderation model to examine the role of cognitive flexibility as the mechanism through which the adopted mental imagery approach may affect originality of the produced designs. In particular, we manipulate cognitive flexibility and examine its joint effect with a prompted mental imagery approach on design originality. Further, given that our theoretical framework primarily focuses on understanding the differential effects of the two mental imagery approaches (feelings-imagination and objective-imagination) and that nonincorporation of an end user in the new product ideation process did not influence either originality or the usefulness of the design outcome, we dropped the control condition from all of the following experiments.

EXPERIMENT 3

Experiment 3 examined the role of cognitive flexibility as the process mechanism driving the effect of the adopted mental imagery approach on outcome originality. The experiment employed a 2 (mental imagery approach: feelings-imagination vs. objective-imagination) × 2 (cognitive flexibility: induced vs. control) between-subjects design. Based on our theorizing, we expect that in the control condition, adopting a feelings-imagination approach should lead to higher originality than an objective-imagination approach. However, when participants are directed to think in a cognitively flexible manner, this should lead to higher originality irrespective of the adopted mental imagery approach. Further, as hypothesized and observed in previous experiments, we do not expect mental imagery approach to impact usefulness of the design ideas.

Method

We recruited 209 adult (50% women; M_{age} = 36.50 years, SD = 11.95) members of Amazon Mechanical Turk (MTurk) in exchange for a small fee. Participants were presented with a scenario in which they learn of a close family friend's pregnancy and were asked to imagine either how this person may be feeling in the given situation (feelings-imagination condition) or visualize how this person may be objectively thinking in the given situation (objective-imagination condition); see the web appendix for the exact instructions. Next, all participants were told that their task was to generate creative ideas for a specific product for her but before they did so, they would be asked to imagine another scenario that ostensibly either induced cognitive flexibility or was neutral. The manipulation task was adapted from previous literature (Ritter et al. 2012). In the cognitive flexibility condition, the participants read a scenario in which the presented events violated the laws of physics (perspective, velocity, and gravity), whereas participants in the control condition read a scenario in which the presented events followed the laws of physics. Specifically, the scenario read: "Imagine you are at a cafeteria, and are walking towards a table with a toy car in the middle of the table, and a bottle at its edge. While you are walking to the table, the toy car moves towards the bottle." Those in the cognitive flexibility condition further read,

"However, upon being hit by the car, the bottle does not fall on the ground, as naturally expected, but slowly moved upwards." Conversely, those in the control condition read, "Upon being hit by the car, the bottle falls on the ground, as naturally expected." By encouraging participants in the cognitive flexibility condition to imagine events that are different from the norm, this scenario shifts their thoughts away from an expected result.

To assess the effectiveness of the cognitive flexibility manipulation, we conducted a separate post-test with 101 MTurk participants. The participants were presented and asked to imagine the two scenarios (cognitive flexibility induced vs. control) as described previously. All participants then completed Martin and Rubin's (1995) 12-item cognitive flexibility scale, modified to capture participants' current level of cognitive flexibility (vs. trait level). The measure includes items like, "At this moment in time, if you asked me to communicate an idea I would be able to do it in many different ways" and "If I was faced with a new and an unusual situation right now, I would try to avoid it" (reverse-coded); $\alpha = .89$ (see the web appendix for all the items). As expected, the participants in the cognitive flexibility condition indicated higher scores on the subject scale ($M = 5.41$, SD = .75) than the control condition ($M = 5.05$, SD = 1.01; $F(1, 99) = 4.03$, $p < .05$, Cohen's $d = .40$).

Once all participants completed the cognitive flexibility manipulation task, they were presented with the focal creativity task. This task was developed based on Frito-Lay's successful "Do Us a Flavor" crowdsourcing campaign in which everyday customers were asked to suggest new potato chip flavors that could actually be produced and sold in the marketplace (Clifford 2012). Our participants were told that Frito-Lay was running a crowdsourcing campaign and inviting ideas for new potato chip flavors specifically for pregnant women (see the web appendix for the used stimuli). Hence, they were asked to think back to the first scenario about the pregnant friend and reminded to either imagine her feelings or visualize her in the given situation, and then generate an idea for a new potato chip flavor that Frito-Lay could produce specifically for pregnant women. As with the real contest, the participants then came up with a name for their flavor and also listed up to three ingredients for their suggested flavor. Participants finished the study by answering demographic questions.

Results

Originality. As in previous experiments, we hired external judges to assess the originality of the generated ideas. However, to increase external validity of this study we hired actual target consumers to judge the subject ideas. In particular, we invited three pregnant women from the local community to complete the rating task in exchange for $25 each. All three judges (i.e., pregnant women) were blind to the hypothesis and conditions and completed the rating task independently using an online survey link in which all ideas were randomly presented. The survey presented the potato chip flavor names and ingredients and asked the judges to rate each idea on each of three originality items (i.e., original, innovative, and novel) on seven-point scales (1 = not at all, 7 = very much). We averaged each judge's ratings on these three items for each flavor to obtain three average judge scores, which we then standardized to control for interjudge variance and averaged across three judges ($\alpha = .76$) to obtain an overall originality score for each suggested potato chip flavor.

A two-way between-subjects ANOVA conducted for the originality score returned a significant two-way interaction between the adopted mental imagery approach and cognitive flexibility ($F(1, 205) = 6.49$, $p < .05$, $\eta_p^2 = .03$; see figure 1). Replicating our findings from previous experiments, we found that under the control condition (i.e., when cognitive flexibility was not externally induced), the participants who adopted a feelings-imagination approach ($M = .13$, SD = .88) generated more original potato chip flavors than those who adopted an objective-imagination approach ($M = -.29$, SD = .68; $F(1, 205) = 7.25$, $p < .01$, $\eta_p^2 = .04$). However, as hypothesized, when cognitive flexibility was externally induced, no significant difference emerged between the two mental imagery approaches ($M_{\text{feelings-imagination}} = .01$, SD = .76; $M_{\text{objective-imagination}} = .15$, SD = .89; $F < 1$).

Analysis of the other contrasts revealed no difference in the originality of the generated flavors under the feelings-imagination condition whether or not cognitive flexibility was externally induced ($F < 1$). Interestingly, and in line with our proposition, when participants adopted an objective-imagination approach, they generated more original potato chip flavors when cognitive flexibility was externally induced ($F(1, 205) = 7.70$, $p < .01$, $\eta_p^2 = .04$).

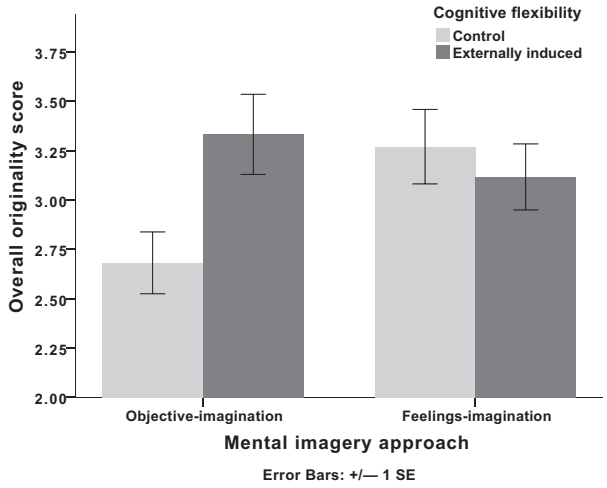
Usefulness. As in previous experiments, we also captured usefulness of the generated potato chip flavors. Another set of three consumer judges (i.e., pregnant women) were paid $25 each to rate each idea on the three usefulness items (i.e., useful, practical, appropriate) on seven-point scales (1 = not at all, 7 = very much). Following the same procedure used to calculate the overall originality of the ideas, we calculated an overall usefulness score for each idea ($\alpha = .69$). A two-way ANOVA revealed a nonsignificant main effect of both adopted mental imagery approach and cognitive flexibility along with a nonsignificant interaction between the two variables (all Fs < 1).

Discussion

The results from experiment 3 replicate the findings of experiments 1 and 2 and also provide initial support for the proposed underlying cognitive process driving the

FIGURE 1

JOINT EFFECT OF ADOPTED MENTAL IMAGERY APPROACH (FEELINGS-IMAGINATION VS. OBJECTIVE-IMAGINATION) AND COGNITIVE FLEXIBILITY ON ORIGINALITY OF THE IDEAS (EXPERIMENT 3)



NOTE.—Analysis was conducted with standardized values; however, for ease of illustration, raw means are presented in this figure.

observed effect. Supporting our hypothesis, we found that under the control condition (i.e., when cognitive flexibility was not externally induced), adopting a feelings-imagination approach led to more original outcomes than when an objective-imagination approach was adopted. However, when cognitive flexibility was externally induced, no difference was observed in originality between the mental imagery approaches. Importantly, inducing cognitive flexibility led to higher originality of the outcomes irrespective of the mental imagery approach adopted, thereby indicating that cognitive flexibility, as induced by adopting a feelings-imagination approach, may drive originality of the generated ideas.

Notably, we have argued that the observed effect appears because adopting a feelings-imagination approach induces higher empathic concern, which in turn leads to higher cognitive flexibility and higher originality. In the next study, we adopt a sequential mediation model to test this chain of underlying process.

EXPERIMENT 4

Experiment 4 examined the sequential role of empathic concern and cognitive flexibility in the relationship between the adopted mental imagery approach during ideation and the originality of the outcome. The experiment employed a one-way between-subjects design where mental imagery approach was manipulated at two levels—feelings-imagination and objective-imagination—and both empathic concern and cognitive flexibility were measured. Also, in all previous experiments, we adapted instructions from previous literature to manipulate a feelings-imagination versus an objective-imagination approach. That is, participants in the feelings-imagination condition were asked to "imagine" how an end user might feel while using the product (Batson et al. 2007; Stotland 1969), while those in the objective-imagination condition were asked to "visualize" how an end user might objectively think and interact with the product while using it (Dahl et al. 1999). Although these two core manipulations are in line with previous literature, it is possible that the use of the words "imagine" versus "visualize" may impact the observed effect. Therefore, in this experiment (and the next one), we standardized our manipulation instructions and asked all participants to "imagine" the end user's feelings or objective interaction with the product.

Method

One hundred one MTurk participants (49% women; $M_{age} = 35.81$ years, SD = 11.71) completed this experiment in exchange for a small fee. The study employed a one-way between-subjects design and participants were randomly assigned to either the feelings-imagination or the objective-imagination condition. As in previous experiments, all participants were told that the study was intended to test strategies that could be employed during new product development. Here, they would be asked to adopt the role of an interior designer and recommend creative ideas to design a new space following a suggested strategy. Participants were then apprised of the design strategy that also served as our focal manipulation. Specifically, participants were told, "A useful strategy that most designers follow involves thinking about a potential user and imagining how s/he will feel while using the space (or imagining how s/he will objectively think about and interact with the space while using it). Such a strategy can assist in the development of creative ideas and solutions. Hence, as you take on the role of an interior designer, please use this feelings (objective) strategy."

Next, all participants were presented with the focal creativity task in which they were told that their company had just finished constructing a new building that will house a kindergarten for five- to seven-year-old children, and their task as the interior designer is to plan and develop creative design and décor for this kindergarten. They were then asked to close their eyes for about a minute and imagine how a five- to seven-year-old would feel while using the space they were going to design (would interact with the space they were going to design while using it), before being asked to generate and report their ideas.

After participants completed the creativity task, they were presented with seven-item empathic concern scale (Davis 1983) modified to measure state empathic concern. Specifically, all participants were directed to recall when they were asked to follow the given design strategy and to indicate their state of mind at that moment on the given seven items (e.g., "At that moment, I had tender feelings towards the children I was going to design the kindergarten space for"; see the web appendix for items). Next, they were presented the modified items of the cognitive flexibility scale (Martin and Rubin 1995) as used in the experiment 3 post-test. Finally, all participants answered the same demographic questions as used in the previous experiments.

Results

Originality and Usefulness. To assess the originality of the kindergarten space designs, we hired three people from the local community with experience working with five- to seven-year-olds in various capacities (a student teacher in a kindergarten classroom, and two experienced camp counselors who had worked with students in the target age group) for $25 each. As in the previous experiments, the judges were blind to the hypothesis and conditions, and completed the rating task independently using an online survey link in which all ideas were randomly presented. Specifically, the judges were asked to rate each idea on the three originality items (i.e., original, innovative, and novel) on seven-point scales (1 = not at all, 7 = very much). We averaged each judge's ratings on these three items for each idea to obtain three average judge scores, which we then standardized to control for interjudge variance and averaged across three judges ($\alpha = .83$) to obtain an overall originality score for each participant. The same judges were also asked to rate the ideas on the three usefulness items (i.e., useful, practical, appropriate) on seven-point scales (1 = not at all, 7 = very much). Replicating the procedure used to calculate the overall originality score, we then used these ratings to calculate an overall usefulness score for each participant ($\alpha = .77$).

A one-way ANOVA conducted for the originality index returned a significant main effect of the adopted mental imagery approach ($F(1, 99) = 4.85$, $p < .05$, $\eta_p^2 = .05$), such that the ideas generated by the participants using the feelings-imagination approach ($M = .19$, SD = .92) were rated as more original than those generated by participants in the objective-imagination condition ($M = -.18$, SD = .78). However, and replicating results from previous experiments, no significant effect of mental imagery was found for the usefulness of the generated ideas ($M_{\text{feelings-imagination}} = -.08$, SD = .85; $M_{\text{objective-imagination}} = .06$, SD = .87; $F < 1$).

Empathic Concern and Cognitive Flexibility. We first averaged the participants' responses to the empathic concern scale items to obtain the empathic concern index ($\alpha = .85$). A one-way ANOVA conducted for this index indicated that adopting a feelings-imagination approach indeed led to significantly higher empathic concern ($M = 4.45$, SD = .96) than an objective-imagination approach ($M = 3.94$, SD = 1.27; $F(1, 99) = 5.08$, $p < .05$, $\eta_p^2 = .05$). Similarly, we averaged the cognitive flexibility scale items to obtain the cognitive flexibility index ($\alpha = .93$), and a one-way ANOVA conducted for this index also revealed a significant effect of adopted imagery approach on cognitive flexibility ($F(1, 99) = 5.82$, $p < .05$, $\eta_p^2 = .06$). As hypothesized, those in the feelings-imagination condition ($M = 5.50$, SD = .85) indicated higher cognitive flexibility than those in the objective-imagination condition ($M = 5.04$, SD = 1.08).

Mediation Analysis. Finally, we conducted a mediation analysis to examine the proposed underlying process. Because we hypothesized a causal relationship between empathic concern and cognitive flexibility, we conducted a test of serial multiple mediation, with mental imagery used as the predictor and originality score as the dependent variable in the regression model, while the empathic concern and cognitive flexibility indexes, in that order, were kept as the two mediators. A 10,000-resamples bootstrap approach generated a bias-corrected 95% CI that did not include zero, indicating a presence of a significant indirect (i.e., multiple mediation) effect of mental imagery on originality through empathic concern and cognitive flexibility ($\beta = .05$, SE = .04, bias-corrected 95% CI = [.008, .157]). In particular, adopting a feelings-imagination approach (vs. an objective approach) led to higher empathic concern, which in turn enhanced cognitive flexibility and led to higher originality of the generated ideas.

Discussion

The results from this experiment reinforce experiment 3's findings by demonstrating the chain of underlying processes through which adopted mental imagery impacts originality. Supporting our hypothesis, we found that feelings-imagination (vs. objective-imagination) induced greater empathic concern, which prompted a higher degree of cognitive flexibility, in turn leading to greater outcome originality. However, we found no effect of the two mental imagery approaches on usefulness of the generated ideas. This experiment thus illuminated the role empathic concern plays in our model and, importantly, demonstrated the relationship between empathic concern and cognitive flexibility. These findings further raise an interesting question. If, indeed, our theorizing is correct and empathic concern plays an important role in linking mental imagery and cognitive flexibility, then individuals externally induced with

higher empathic concern should demonstrate higher cognitive flexibility and higher originality, irrespective of the mental imagery approach adopted. We test this proposition in the final experiment.

EXPERIMENT 5

Experiment 5 aims to advance the findings from the previous experiments by examining the moderating role of empathic concern on the relationship between mental imagery and originality through cognitive flexibility. Specifically, we manipulated the mental imagery approach and either externally induced higher empathic concern, or not (control condition). Subsequently, we measured participants' cognitive flexibility and assessed its impact on the originality of their outcomes.

Method

One hundred eighty-nine undergraduate students (47% women; $M_{age} = 20.69$ years, SD = 3.61) at the University of Illinois at Urbana Champaign participated in this experiment in exchange for partial course credit. The experiment adopted a 2 (mental imagery approach: feelings-imagination vs. objective-imagination) by 2 (empathic concern: externally induced vs. control) between-participants design and the participants were randomly assigned to one of the four conditions. To begin, all participants were told that the study was intended to test strategies that could be employed during new product development. As in the previous study, they were asked to adopt the role of an interior designer and suggest creative ideas to design a new space following a suggested strategy. Participants were then presented with the same design strategy instructions that also served as mental imagery manipulation in experiment 4.

Next, participants were presented with the focal creativity task instructions, which were designed to either induce higher empathic concern (empathic concern condition) or not (control condition). The focal creativity task required participants to imagine that they had been hired by the government to create and design the interior of an elderly (ages 70+) day care center. We induced empathic concern through the description of the elderly target consumers. In the empathic concern condition, participants were told that the center was being developed to provide "care and companionship for those who need assistance or supervision during the day" and that these individuals "although they had been well-to-do at one point, were victims of the system and now need external help." In the control condition, participants were told that the center was being developed "in a wealthy neighborhood to provide a space for well-to-do older adults who are looking for some company and social interaction during the day" (see the web appendix for details).

Prior to being used in the main study, these instructions were pretested for their effectiveness with 100 MTurk members (56% women; $M_{age} = 35.13$, SD = 10.60). The participants were told that they would be asked to imagine a scenario and then answer a few questions related to the scenario. Participants were then randomly presented with either the empathic concern or the control scenario as detailed above. They were then asked to close their eyes and imagine the given scenario for about a minute. Next, they responded to the same modified seven-item empathic concern scale used in experiment 4 (Davis 1983; $\alpha = .92$) to indicate their current level of empathic concern toward the end users in the given scenario. Confirming the effectiveness of our manipulation instructions, the results showed that the scenario instructions used in the empathic concern condition did induce higher empathic concern ($M = 5.21$, SD = 1.04) than the scenario instructions used in the control condition ($M = 4.43$, SD = 1.31; $F(1, 98) = 10.30$, $p < .01$, $\eta_p^2 = .10$).

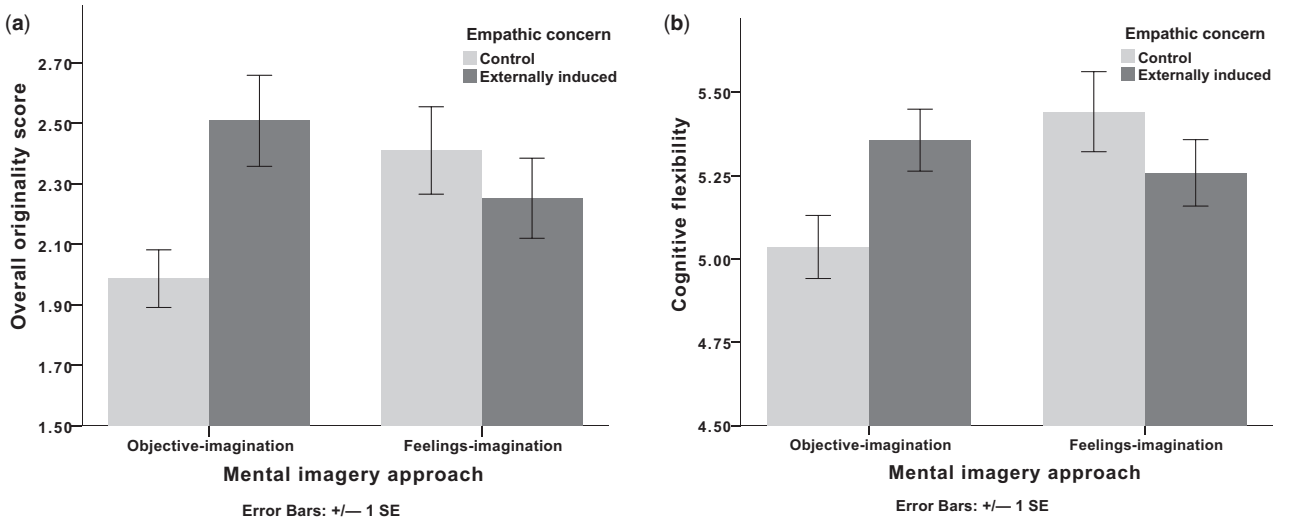
All participants were then asked to close their eyes for about a minute and imagine either how the end user would feel while using the space they were going to design (feelings-imagination condition) or how the end user would interact with the space while using it (objective-imagination condition), before being asked to generate and report their ideas. Next, all participants were asked to recall the scenario they had imagined earlier and indicate how it may have impacted their thought process on the modified 12 items of the cognitive flexibility scale (Martin and Rubin 1995) used in experiment 4. Finally, all participants answered the same demographic questions as in the previous experiments.

Results

Originality and Usefulness. We hired external judges to assess the originality and usefulness of the ideas generated for interior design of the elderly day care center. In particular, we hired four people from the local community with experience working with elderly people, either in a paid position or as a volunteer (a premedical student who currently volunteers at an elderly day care center, two former day care center professionals, and a former Meals on Wheels volunteer who delivered food to the elderly), in exchange for $25 each. The judges were blind to the hypothesis and the conditions, and rated the ideas on the three originality items (i.e., original, innovative, and novel) on seven-point scales (1 = not at all, 7 = very much), using an online survey link in which all ideas were presented in random order. We averaged each judge's ratings on these three items for each idea to obtain three average judge scores, which we then standardized to control for inter-judge variance and averaged across three judges ($\alpha = .82$) to obtain an overall originality score for each participant. The same four judges were then asked to rate the ideas on

FIGURE 2

(A) JOINT EFFECT OF ADOPTED MENTAL IMAGERY APPROACH (FEELINGS-IMAGINATION VS. OBJECTIVE-IMAGINATION) AND EMPATHIC CONCERN ON ORIGINALITY OF THE GENERATED IDEAS (EXPERIMENT 5) (B) JOINT EFFECT OF ADOPTED MENTAL IMAGERY APPROACH (FEELINGS-IMAGINATION VS. OBJECTIVE-IMAGINATION) AND EMPATHIC CONCERN ON COGNITIVE FLEXIBILITY (EXPERIMENT 5)



NOTE.—Analysis was conducted with standardized values; however, for ease of illustration, raw means are presented in this figure.

the three usefulness items (i.e., useful, practical, appropriate) on seven-point scales (1 = not at all, 7 = very much). Three judges agreed to complete the ratings this time, which were then used to calculate the overall standardized usefulness score for each participant ($\alpha = .66$).

As in previous experiments, no effect emerged for the usefulness of the generated ideas (all Fs < 1). However, a two-way ANOVA conducted for the standardized originality score indicated a significant interaction between mental imagery and the empathic concern manipulation ($F(1, 185) = 6.07$, $p < .05$, $\eta_p^2 = .03$; see figure 2a). Providing support for our focal argument, the ideas generated under the control condition (i.e., when empathic concern was not externally induced) were judged to be more creative when participants adopted a feelings-imagination approach ($M = .10$, SD = .85) than the objective-imagination approach ($M = –.26$, SD = .54; $F(1, 185) = 4.55$, $p < .05$, $\eta_p^2 = .02$). However, when empathic concern was externally induced, no difference between conditions was observed in the originality of the generated ideas ($M_{\text{feelings-imagination}} = –.04$, SD = .80; $M_{\text{objective-imagination}} = .18$, SD = .91; $F(1, 185) = 1.77$, $p > .18$). Examination of the other two contrasts indicated that when participants adopted a feelings-imagination approach, the originality of the generated ideas did not differ whether the empathic concern was externally induced or not ($F < 1$). However, when participants adopted the objective-imagination approach, the generated ideas were judged to be more original when the empathic concern was externally induced versus when it was not ($F(1, 185) = 7.09$, $p < .01$, $\eta_p^2 = .04$).

Cognitive Flexibility. A significant two-way interaction between mental imagery and empathic concern was found on participants' responses to the cognitive flexibility scale ($\alpha = .82$; $F(1, 185) = 6.06$, $p < .05$, $\eta_p^2 = .03$; see figure 2b). In the control condition, when empathic concern was not externally induced, feelings-imagination ($M = 5.44$, SD = .81) led to higher cognitive flexibility than objective-imagination ($M = 5.04$, SD = .63; $F(1, 185) = 7.51$, $p < .01$, $\eta_p^2 = .04$). However, when empathic concern was externally induced, both feelings-imagination ($M = 5.26$, SD = .70) and objective-imagination ($M = 5.36$, SD = .66) led to similar levels of cognitive flexibility ($F < 1$). The other two contrasts showed that for objective-imagination, the presence of the empathic concern enhanced cognitive flexibility ($F(1, 185) = 4.87$, $p < .05$, $\eta_p^2 = .03$). However, for feelings-imagination, no difference was observed in cognitive flexibility whether empathic concern was externally induced or not ($F(1, 185) = 1.62$, $p > .20$).

Moderated Mediation Analysis. Finally, we conducted a test of moderated mediation in which mental imagery

was kept as the predictor, empathic concern as the moderator, cognitive flexibility as the mediator, and originality of designs as the dependent variable in the model. A 10,000 resample bootstrap analysis returned an overall significant conditional indirect (i.e., moderated mediation) effect ($\beta = -.09$, SE = .05, bias-corrected 95% CI = [–.237, –.014]). We found that for objective-imagination, the presence of empathic concern induced higher cognitive flexibility, which then led to higher originality of the generated ideas ($\beta = .06$, SE = .04, bias-corrected 95% CI = [.007, .159]). However, this indirect effect of cognitive flexibility was absent for the feelings-imagination condition. An examination of the other two contrasts demonstrated that the mediation effect of cognitive flexibility emerged only under the control condition, such that the feelings-imagination induced higher cognitive flexibility than the objective-imagination, which then enhanced originality of the generated ideas ($\beta = .07$, SE = .04, bias-corrected 95% CI = [.013, .186]).

Discussion

Results from our final experiment provide clear support for the proposed focal effect and the underlying process through which this effect occurs. We show that when higher empathic concern is prompted, an objective-imagination approach can lead to higher originality. Importantly, this study also provides additional evidence that higher empathic concern leads to enhanced cognitive flexibility. Finally, the observed findings also bolster our focal argument that adopting a feelings-imagination approach to incorporate end users during the design process will enhance originality of the outcome, as it makes individuals more cognitively flexible.

GENERAL DISCUSSION

In this research, we demonstrate that imagining an end user's feelings while designing a new product leads to more original outcomes than taking a more objective approach. Across five studies, we differentiate between the two distinct mental imagery approaches of incorporating an end user during the new product ideation process: feelings-imagination (i.e., imagining how an end user may feel while using a product) and objective-imagination (i.e., visualizing how an end user may objectively think about and interact with a product while using it). We demonstrate that in terms of outcome originality, a feelings-imagination approach is superior to the more commonly adopted objective-imagination tactic or nonincorporation of the end user in the new product ideation process. Importantly, we show that a feelings-imagination approach, but not an objective-imagination approach, leads individuals to experience greater empathic concern, which makes them more receptive to multiple perspectives; this is reflected in higher levels of cognitive flexibility (Grattan and Eslinger 1989; Ritter et al. 2012). This higher cognitive flexibility, we find, leads to higher outcome originality.

Our research offers several important theoretical contributions. First, we demonstrate that imagining an end user's feelings enhances originality of the design solutions, but both approaches lead to equally useful outcomes. In doing so, we reconcile previous research that has produced inconclusive arguments regarding the effect of end-user incorporation through mental imagery on creativity of the produced outcome (Christensen and Schunn 2009a; Dahl et al. 1999, 2001; Fulton Suri 2003). In addition, we document an important antecedent of consumer creativity, mental imagery, thereby advancing consumer literature that has examined various factors impacting consumer innovativeness (Burroughs and Mick 2004; Dahl and Moreau 2002; Mehta et al. 2012; Moreau and Dahl 2005). We also uncover cognitive flexibility as the underlying process through which an adopted mental imagery approach affects outcome originality. Specifically, we find that a feelings-imagination approach enhances empathic concern, resulting in greater cognitive flexibility.

Second, the current work articulates the importance of imagining another person's (i.e., the end user's) feelings within the domain of new product ideation and development. We do not explicitly test this, but our findings suggest that imagining the feelings of end users while designing new products or even improving current products may help designers (both professional and consumer) to identify additional and less obvious problems with current products. This enhanced cognitive flexibility may lay the groundwork for subsequently developing more original and innovative products via employing different strategies for identifying problems in the marketplace. For example, when imagining an older person pushing a shopping cart, all individuals might think about how the cart must be lighter for stereotypically weaker elderly consumers. But, when additionally imagining the feelings of embarrassment an older consumer may experience when pushing a cart into people or displays and looking "out of control," individuals might also think of making the cart narrower and shorter—a less obvious but equally important innovation. We thank one member of the review team for highlighting this interesting point.

Third, this research offers implications for the design literature. Although this literature has frequently studied end-user incorporation, it has solely focused on consumer needs, without fully addressing the aspects of consumer cognitions and behaviors (McDonagh and Thomas 2010) or affective approaches (Dahl et al. 1999; Forlizzi and Battarbee 2004; Leonard and Rayport 1997). Our findings contribute by testing affective imagery approaches and demonstrating that encouraging designers to focus on consumer feelings may create more original outcomes.

The current work also offers valuable practical implications for marketers and designers entrusted with developing innovative ideas for new product designs. These designers traditionally integrate consumers into the design process through a more objective approach, failing to recognize the value of a feelings-imagination approach (Fulton Suri 2003). Our work illustrates that consideration of end users' feelings is a potent tool for developing original and innovative new product ideas. Importantly, the implications of our findings extend to everyday consumers who play a role in companies' innovative processes. As reported previously, experiment 3 demonstrated a positive effect of adopting a feelings-imagination approach even in the context of everyday consumers generating ideas in response to a crowdsourcing campaign. Indeed, marketers are increasingly employing everyday consumers like our experiment 3 participants for new product ideation purposes through crowdsourcing campaigns (Dahl, Fuchs, and Schreier 2015; Nishikawa et al. 2017; Poetz and Schreier 2012; Schreier, Fuchs, and Dahl 2012), and Gartner Inc. estimates that soon more than half of consumer goods manufacturers will get 75% of their innovation and research and development capabilities from this type of crowdsourcing (Knipp 2014). Our research suggests that these consumers, particularly given their potential lack of access to resources and opportunities to actually *observe* end users, may benefit from *imagining* end users' feelings when developing original ideas for products and services to appeal to the masses. Importantly, the companies utilizing crowdsourcing techniques can easily adopt this process and prompt feelings-imagination processes through their websites (e.g., "When developing a new potato chip flavor, take a moment to think about how consumers might feel when eating the flavor you create").

Our findings also contain some limitations and present several avenues for future research. First, although we propose that our effects will hold broadly, our experiments employ only consumer designers; thus, our research is limited in its lack of examination with real design experts. It may be argued that because experts have well-developed preexisting knowledge schemas (Baird 2003; Castel et al. 2007; Mehta, Hoegg, and Chakravarti 2011), they may focus too much on their existing perspectives, which could impair their ability to develop original outcomes. However, we conjecture that professional designers, like our consumer participants, should benefit from following a feelings-imagination approach, as it will induce higher empathic concern, making them less fixated on their preexisting notions and more open to diverse perspectives. Such cognitive flexibility should enhance the originality of their design outcomes. In fact, we do find preliminary support for our proposition in the design literature, which suggests that when professional designers adopt an empathic approach, they produce more creative outcomes (Fulton Suri 2003; Leonard and Rayport 1997; McDonagh and Thomas 2010).

Another interesting question that is not addressed by the current research and may deserve a dedicated inquiry pertains to the role of designers' motivation. Notably, we propose and demonstrate the cognitive processes that drive the impact of feelings-imagination on originality. An additional understanding of the role of motivation in our framework may further enrich the explanation of the observed effect. For example, Grant and Berry (2011) find that a higher level of prosocial motivation (i.e., the desire to expend effort to benefit other people; Grant 2008) enhances perspective taking leading to higher creativity. It is plausible that the effect observed in our studies may be contingent upon designers' level of motivation in general or prosocial motivation in particular.

Additionally, while we consistently demonstrated the process through which feelings-imagination leads to higher originality, it may be worthwhile to examine the potential role of other cognitive processes that have been shown to be related to imagining consumers or empathizing with them. For example, on the surface level it may appear that construal level could have a role to play, as it has been shown to be positively related to perspective taking and creativity (Förster, Friedman, and Liberman 2004; Polman and Emich 2011). Although more in-depth work is needed to explicate the role of construal level, we conjecture that because both feelings and objective imagination entail incorporating an end user in one's thought, the two approaches should induce equivalent perception of psychological distance and, hence, construal level. Also, it may be of value to further consider the role of cognitive flexibility in the imagery–originality relationship. For example, it is possible that simultaneously adopting multiple diverse perspectives may affect outcome originality. In fact, Hoever et al. (2012), while studying team creativity, find that urging the team to take others' perspectives leads to higher creativity, as team members engage in higher information elaboration. Hence, it is likely that more original ideas will be generated when individuals are able to take diverse perspectives rather than when they focus only on one perspective (Csikszentmihalyi and Sawyer 2014).

Similarly, future research could consider how a feelings-imagination prompt influences not only how individuals develop creative ideas, but also how they pick and support ideas. It is possible that the judges in our studies may be responding positively to emotions implicitly communicated, which may suggest one interesting extension of our work—namely, how feelings-based versus objective approaches may influence consumers' propensity to pick various alternatives as "winners." This extension of our works offers valuable managerial implications, as many crowdsourcing contexts use these winners when deciding which products and ideas to bring to fruition and actually offer to the marketplace.

In a similar vein, future research may examine if such mental imagery approaches could extend to other domains beyond new product ideation. For example, during gift giving, does adopting a feelings- versus objective-imagination of the receiver lead to more creative and effective gift choices? Indeed, extant research recognizes the challenges consumers face when picking or creating gifts for others (e.g., customization; Moreau, Bonney, and Herd 2011). Our research suggests that adopting a mental imagery approach may help reduce the challenges inherent to quality gift giving as well. Also, there may be implications for managers in other fields of marketing, such as market research and sales. For example, some previous research has considered how a salesperson's flexibility in responding to customer needs may influence the salesperson's success (Spiro and Weitz 1990). Considering the feelings of target consumers may induce flexibility and ultimate success in the domain.

DATA COLLECTION INFORMATION

The data for experiments 1 and 2 were collected under the supervision of the first author at Indiana University during spring 2013 and spring 2016, respectively. Data for experiments 3 and 4 were collected under the supervision of the first author on Amazon Mechanical Turk during spring 2015 and spring 2017, respectively. Data for experiment 5 were collected under the supervision of the second author at the University of Illinois during fall 2017. The first author also supervised the collection of data for the post-test study presented in experiment 3, which was conducted through Amazon Mechanical Turk in summer 2016, and for the pretest presented in experiment 5, which was conducted through Amazon Mechanical Turk in fall 2017. All data were jointly analyzed by the two authors.

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