When Mental Simulation Hinders Behavior: The Effects of Process-Oriented Thinking on Decision Difficulty and Performance

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We investigate the effect of process- and outcome-oriented thinking on consumers’ subjective experiences when choosing among alternatives. In four studies, we show that because process-oriented thinking leads to a dual focus on both means and end benefits, it increases decision difficulty when consumers face substantive trade-offs between desirability and feasibility. This experienced difficulty results in negative consequences for consumers’ subsequent behavior, including greater willingness to postpone choice, lower commitment to the chosen option, and degraded task performance.

When making purchase decisions, consumers may imagine the process of using a product or the benefits of using a product (Escalas and Luce 2003, 2004; Pham and Taylor 1999; Zhao, Hoeffler, and Zauber 2007). Indeed, marketers often encourage mental simulation by engaging consumers in narrative stories, drama, or slice-of-life ads or by using direct appeals (e.g., recent appeals by Viking Range Corporation to “Imagine your life in a Viking kitchen”). The use of this strategy is supported by a number of studies suggesting that mentally simulating a product experience can have powerful effects on consumer behavior (Escalas and Luce 2003, 2004; Gregory, Cialdini, and Carpenter 1982; Keller and Block 1997; Petrova and Cialdini 2008). In this research, we examine the effects of process-oriented and outcome-oriented mental simulation on consumers’ decision-making processes and postchoice behavior.

Notably, research on mental simulation suggests that process-oriented thinking often has more favorable effects than outcome-oriented thinking. For example, process-oriented thinking can make consumers more discerning in their use of ad information (Escalas and Luce 2003) and facilitate goal achievement (Pham and Taylor 1999). Process-oriented thinking can also decrease the gap in consumer preferences resulting from indirect and direct experiences (Hamilton and Thompson 2007) or from considering near and distant future purchase situations (Zhao et al. 2007). However, one limitation of this stream of research is that it does not examine the effects of mental simulation on consumers’ subjective experiences when deciding between different options. The majority of previous studies are based on scenarios in which consumers evaluate a single goal or product. Moreover, in the studies in which participants actually made choices (Cohen, Belyavsky, and Silk 2008; Zhao et al. 2007), subjective experiences during choice were not assessed.

We believe this is an important gap in the literature because a different set of cognitive processes is likely to occur when consumers are choosing among alternatives versus evaluating a single product (Hsee and Zhang 2004). Process- versus outcome-oriented thinking tends to shift the relative importance of desirability (i.e., value of an end state) and feasibility (i.e., ease of reaching an end state) considerations (Cohen et al. 2008; Hamilton and Thompson 2007; Liberman and Trope 1998; Trope and Liberman 2000). Consumers who engage in outcome-oriented thinking tend to focus primarily on the end benefits associated with the product.

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CONCEPTUAL BACKGROUND

Process-Oriented and Outcome-Oriented Thinking

Research on mental simulation differentiates between two types of elaboration: process-oriented and outcome-oriented thinking (Pham and Taylor 1999). Process-oriented thinking involves elaboration on the step-by-step process that leads to a desired outcome (e.g., a student envisioning the activities she would perform to achieve a high grade). Process-oriented thinking generates a spontaneous planning process in which individuals link actions and outcomes into a step-by-step plan (Escalas and Luce 2004; Taylor et al. 1998). In contrast, outcome-oriented thinking encourages individuals to focus on the end state they want to achieve (e.g., a student envisioning getting a high grade; Taylor et al. 1998).

Previous research has suggested that process-oriented mental simulation is more effective than outcome-oriented simulation in terms of goal implementation, self-regulation, and performance (Taylor et al. 1998). Mentally rehearsing the steps to reach a goal leads to appropriate changes in behavior, increasing the likelihood that the goal will be obtained, as opposed to mentally simulating the end state or not engaging in mental simulation at all (Taylor et al. 1998). For example, students preparing for a midterm exam who were told to think about studying for the exam in a way that would lead them to get a high grade (i.e., sitting at their desks, going over lecture notes) spent more hours studying and outperformed students who were told to think about having gotten a high grade on the exam (i.e., learning that they had received a high grade, feeling confident and proud; Taylor et al. 1998). Thus, focusing individuals on the process of achieving a goal is often an important part of programs designed to motivate desirable behavior (Lusardi, Keller, and Keller 2009).

Supporting such practices, consumer research demonstrates several beneficial effects of process-oriented thinking. For example, process-oriented thinking increases the consistency of preferences across indirect experiences (e.g., reading product descriptions) and direct product experiences (e.g., product trial; Hamilton and Thompson 2007) and when imagining events in the distant and near future (Zhao et al. 2007). Process-oriented thinking also helps decrease uncertainty when estimating the usefulness of really new products (Hoeffler 2003). Finally, process-oriented thinking has been shown to make consumers more discerning when reacting to advertising than outcome-oriented thinking (Escalas and Luce 2003). Although these findings support the positive effects of process-oriented thinking on preferences, the effects of process and outcome mental simulation on subjective experiences that accompany the decision-making process have not been considered.

Effects of Process- and Outcome-Oriented Thinking on Decision Difficulty

While consumers who engage in outcome-oriented thinking tend to focus on end benefits, those who engage in...
process-oriented thinking focus on both ends and means (Escalas and Luce 2004; Vallacher and Wegner 1987; Wegner et al. 1986), making trade-offs between these two dimensions more salient. This asymmetry in focus is supported by empirical findings in both psychology and marketing. Research on action identification theory suggests that “people are always sensitive to the larger meanings, effects, and implications of what they are doing” (Vallacher and Wegner 1987), making individuals chronically more sensitive to end benefits (which have higher level identities) than to means (which have lower level identities). For example, when people have initially only a low-level identity of what they are doing (e.g., participating in an experiment), there is a readiness to accept cues of any higher-level identity (e.g., helping the experimenter or earning extra credit) provided by the context (Wegner et al. 1986). Similarly, Escalas and Luce (2004) found that consumers who received process instructions prior to ad exposure reported thinking both about the process and the outcome of using the advertised products, while consumers who received outcome instructions reported thinking primarily about the outcome of using the products. Liu (2008) also showed that low-level, concrete information processing makes salient both end states and means, while high-level, abstract information processing shifts individuals’ attention to end states.

Thus, when consumers engage in process-oriented thinking, means become more salient, but end benefits also remain salient. Because of this dual focus on means and end benefits, process-oriented thinking should highlight trade-offs between means and end benefits and increase perceptions of decision difficulty relative to outcome-oriented thinking. However, because the negative effect of process-oriented thinking on decision difficulty is driven by the increased salience of means-end trade-offs, we expect this effect to be eliminated in cases where the alternatives do not involve such a conflict (e.g., when the attribute trade-offs involve only different end benefits or when the decisive difference among the alternatives comes from the means rather than from the end benefits).

Although previous research has not examined the effects of outcome- and process-oriented thinking on decision implementation, we know that greater decision difficulty is likely to lower consumers’ satisfaction with the decision process (Fitzsimons 2000), increase willingness to postpone choice (Dhar 1997), and increase the likelihood of switching to a compromise option (Novemsky et al. 2007). In addition, choice difficulty can hamper intrinsic motivation, lowering performance. For example, Iyengar and Lepper (2000) found that increasing the number of essay topics students could select for an assignment, which increased the difficulty of the decision-making process, led to lower completion rates and worse performance, as indicated by essay quality scores. As a result, we predict that the greater decision difficulty emerging from process-oriented thinking will have important implications for subsequent judgments and behavior: decreasing consumers’ satisfaction with the decision process, increasing their willingness to delay choice, decreasing their commitment to a chosen option, and degrading their performance when implementing their choices.

To test the effects of process- and outcome-oriented thinking on consumers’ decision difficulty and implementation, we conducted a series of four studies in which we presented participants with choices involving different types of trade-offs. We encouraged participants to engage in outcome-oriented or process-oriented thinking by either providing direct instructions (studies 1 and 4) or priming type of processing via an unrelated task (studies 2 and 3). Across products and choice contexts, process-oriented thinking systematically increased decision difficulty when participants faced substantial trade-offs between means and end benefits. To isolate the mechanism for this effect, we show that the negative effect of process-oriented thinking disappears when the trade-offs involve only end benefits (study 2) and when the decisive advantage among alternatives comes from the means (study 3). Importantly, we also explore the consequences of increased decision difficulty by examining its effects on consumers’ satisfaction with the decision process (study 1), willingness to postpone choice (studies 2 and 3), willingness to forgo an initial choice for a compromise option (study 2), and subsequent task performance (study 4).

STUDY 1

Design and Participants

In this study, we tested the effect of process- versus outcome-oriented thinking on decision difficulty and satisfaction with the decision process. Seventy-one undergraduate students were randomly assigned to conditions using a 2 (mental simulation: process vs. outcome-oriented thinking) × 2 (alternative: desirable vs. feasible) mixed design. Mental simulation instructions were varied between subjects, and alternatives were varied within subjects.

Stimuli and Procedures

Participants’ choice set was composed of two apartments, described in terms of square footage, distance to campus, and price. Although both options were priced equally ($700/month), they presented a trade-off in terms of square footage (end benefit) and distance to campus (means). Apartment A was smaller (500 square feet) but closer to campus (1 mile). Apartment B was larger (900 square feet), but the tenant would have to endure a longer commute to enjoy this benefit (9 miles from campus).

The study was administered using Media Lab software. Participants were asked to imagine that they were looking for an apartment to live in by themselves and that they had narrowed down their choices to two alternatives. Participants were given the descriptions of the two apartments, one at a time. Immediately after reading the description of Apartment A, participants in the process-oriented thinking con-
participants read the following instructions:

As you consider Apartment A, focus on how living in this apartment will affect your daily routine and habits. Imagine how you would feel living in this apartment every day. That is, focus on the steps you would take to follow your daily routine and how you would feel as you were taking them.

After reporting their thoughts regarding Apartment A, participants read a description of Apartment B and the same process-oriented instructions. In contrast, in the outcome-oriented thinking condition, participants were given the following instructions:

As you consider Apartment A (B), focus on the benefits of living in this apartment and what you would gain from it. Imagine how you would feel being a tenant of this apartment. That is, focus on the benefits of this apartment and what you would value about living there.

Measures

After reporting their thoughts about both apartments in an open-ended format, participants rated the difficulty of following the mental simulation instructions. In the process-oriented thinking condition, participants rated the difficulty of imagining the daily routine of living in the apartments (not difficult/very difficult). In the outcome-oriented thinking condition, participants rated the difficulty of imagining the outcome of living in the apartments (not difficult/very difficult). Next, participants chose between the two apartments. Decision difficulty was measured using two items: participants rated the difficulty of choosing between the apartments (not difficult/very difficult) and their confidence in their decision (not confident/very confident, reverse coded). Satisfaction with the decision process was measured by asking participants to rate their agreement with the following three items based on Fitzsimons (2000): “I found the process of deciding which apartment to choose frustrating,” “I would be happy to make a similar choice for my next choice of apartment to live,” and “I found the process of deciding which apartment to choose interesting.” Next, participants rated how much they thought about the square footage of the apartments and about the distance from campus while considering the two alternatives (not at all/very much). Finally, participants rated their mood state (bad/good). All items used 7-point scales.

Results

Manipulation Checks. Participants listed a similar number of thoughts in the process and outcome-oriented thinking conditions ($M_{process} = 7.0$, $M_{outcome} = 6.4$; $p > .35$), suggesting that the level of elaboration did not differ across conditions. Two independent judges content-analyzed participants’ thought protocols. Thoughts were coded as being relevant to the apartments’ size (e.g., “A large apartment is a nice luxury, but I would probably be frightened living by myself”), distance to campus (e.g., “Living closer to campus would definitely make my life easier when it comes to transportation”), or other unrelated thoughts (e.g., “I would focus on how reasonable the cost is”). The reliability indices ranged from $.87$ to $.89$ (Perreault and Leigh 1989).

As expected, participants in the process-oriented condition indicated a higher number of thoughts about distance to campus ($M_{process} = 4.4$, $M_{outcome} = 3.0$; $F(1,69) = 16.0$, $p < .001$) and a similar number of thoughts about square footage ($M_{process} = 1.7$, $M_{outcome} = 2.3$; $F(1,69) = 2.7$, $p > .10$) relative to participants in the outcome-oriented condition. There was no difference in unrelated thoughts across conditions ($M_{process} = .9$, $M_{outcome} = 1.2$; $F(1,69) = .6$, $p > .45$).

Participants’ beliefs about their thoughts were consistent with our content analysis of their protocols. Although participants in the process-oriented condition reported that they thought about the size of the apartment as much as those in the outcome-oriented condition ($M_{process} = 4.6$, $M_{outcome} = 5.2$; $F(1,69) = 1.6$, $p > .21$), they reported that they thought more about distance to campus ($M_{process} = 6.8$, $M_{outcome} = 5.4$; $F(1,69) = 6.1$, $p < .05$). Both measures suggest that process-oriented thinking tends to elicit similar elaboration on end benefits, but greater elaboration on means than outcome-oriented thinking.

Choice and Decision Process. As expected, process-oriented instructions increased preferences for the closer apartment ($M = 91\%$) relative to outcome-oriented instructions ($M = 70\%$; $\chi^2(1) = 4.64$, $p < .05$). Importantly, consistent with our prediction, process-oriented participants rated the decision-making process as more difficult than outcome-oriented participants ($M_{process} = 3.1$, $M_{outcome} = 2.3$; $F(1,69) = 5.87$, $p < .05$). Relative to outcome-oriented thinking instructions, process-oriented thinking instructions also significantly lowered satisfaction with the decision-making process ($M_{process} = 4.6$, $M_{outcome} = 5.5$; $F(1,69) = 9.4$, $p < .01$). Finally, process-oriented participants reported a more negative mood ($M = 5.00$) than outcome-oriented participants ($M = 5.74$, $F(1,69) = 5.04$, $p < .05$). Participants’ mood ratings were negatively correlated with perceived choice difficulty ($r = -.42$, $p < .001$) and positively correlated with satisfaction with the decision process ($r = .38$, $p < .01$).

Alternative Explanations. One possible explanation for greater decision difficulty in the process-oriented thinking condition is that imagining the daily routine of living in the target apartment was more difficult than imagining the end benefits. However, participants reported that engaging in these two types of mental simulation was equally challenging ($M_{process} = 2.15$, $M_{outcome} = 2.13$; $p > .95$), so differences in the difficulty of mental simulation across conditions do not seem to explain the results.

Another possible explanation for lower satisfaction and a more negative mood in the process-oriented thinking condition is that when participants focus more on process, they
are focusing more on a negative attribute (i.e., length of commute may be viewed more negatively than the size of the apartment). To check this, we had two judges code the valence of each thought reported by our participants, assigning -1 to negative thoughts, 0 to neutral thoughts, and +1 to positive thoughts. The overall valence score was the number of positive thoughts minus the number of negative thoughts. Indeed, process-oriented participants indicated more negative thoughts about the apartments than outcome-oriented participants (\( M_{\text{process}} = .67, M_{\text{outcome}} = 2.7; F(1, 69) = 14.4, p < .001 \)). However, the valence score was not correlated with our dependent variables (\( p's > .67 \)), and including valence as a covariate in the analysis of our dependent variables produced almost identical results. Thus, the valence of participants’ thoughts does not seem to explain our results.

As a further check on the role of valence, we ran a follow-up study in which we described the desirability dimension of the apartments negatively (small and cramped vs. moderately convenient location). One hundred thirty-six participants were randomly assigned to conditions using a 2 (mental simulation: process- vs. outcome-oriented thinking) \( \times \) 2 (alternative: desirable vs. feasible) mixed design.

As expected, process-oriented instructions marginally increased preferences for the closer, more feasible apartment (\( M = 70\% \)) relative to outcome-oriented instructions (\( M = 55\%; \chi^2(1) = 2.98, p < .10 \)). Consistent with study 1, participants reported thinking significantly more about the feasibility dimension in the process-oriented condition (\( M = 6.01 \)) than in the outcome-oriented condition (\( M = 5.55; F(1, 134) = 4.02, p < .05 \)) but were equally focused on the desirability dimension across conditions (\( M = 4.68 \) vs. \( M = 4.93; p > .44 \)). However, in contrast to study 1, participants rated the apartments’ feasibility dimension more positively (\( M = 4.57 \)) than the apartments’ desirability dimension (\( M = 3.43; F(1, 134) = 117.82, p < .001 \)).

Ruling out valence as an alternative explanation, process-oriented participants again rated the decision-making process as more difficult than outcome-oriented participants (\( M_{\text{process}} = 3.2, M_{\text{outcome}} = 2.3; F(1, 134) = 19.72, p < .001 \)). Relative to outcome-oriented thinking instructions, process-oriented thinking instructions also significantly lowered satisfaction with the decision-making process (\( M_{\text{process}} = 4.3, M_{\text{outcome}} = 4.8; F(1, 134) = 4.45, \ p < .05 \)).

Discussion

The results of study 1 show that outcome-oriented and process-oriented thinking not only influenced consumers’ preferences but also affected their subjective experiences during decision making. Relative to outcome-oriented thinking, process-oriented thinking led to an equal focus on end benefits but a heightened focus on the means of the alternatives, increasing decision difficulty and lowering decision satisfaction. Moreover, the effects of process-oriented thinking on decision difficulty could not be attributed to greater difficulty imagining the daily routine of living in the apartment or to the valence of the feasibility and desirability attributes.

STUDY 2

Study 2 extends the findings of study 1 in several important ways. First, instead of explicitly instructing participants to use either outcome- or process-focused thinking, we manipulated mental simulation indirectly, priming participants to induce either an outcome-focused or a process-focused mind-set (Freitas, Gollwitzer, and Trope 2004). Second, to further explore the mechanism responsible for the negative effect of process thinking on decision difficulty, we manipulated the type of attribute trade-off participants faced in their choice. If our assumption that end benefits are equally salient to both process- and outcome-oriented participants is correct, we should not observe a differential effect of mental simulation on decision difficulty when the trade-off involves only end benefits, as opposed to a means-end conflict.

In addition, in study 2 we expanded our dependent measures to include participants’ willingness to postpone choice and their tendency to switch to a compromise alternative, two measures that indicate difficulty in choosing among alternatives. Finally, for generality, we tested our proposed effects using a different product category and different attribute trade-offs.

Design and Participants

One hundred fifty-one undergraduate students were randomly assigned to a 2 (mental simulation: process vs. outcome-oriented thinking) \( \times \) 2 (type of trade-off: end benefits trade-off vs. means-end trade-off) between-subjects design. Each participant was exposed to two product alternatives, and we counterbalanced the order in which the alternatives were presented.

Stimuli and Procedures

Participants chose between two digital cameras described in terms of their functionality and ease of use. In the means-end trade-off condition, the two alternatives presented a trade-off between functionality (end benefit) and ease of use (means). Camera A offered fewer capabilities (six basic features) but was easier to use (ease of use rating = 5 out of 5). Camera B offered more capabilities (six basic features and six additional features) but was more difficult to use (ease of use rating = 1 out of 5). In the end benefits trade-off condition, ease of use was identical across the two alternatives (ease of use rating = 3 out of 5), and the two digital cameras presented a trade-off in terms of functionality. Each camera offered the same set of six basic features plus a unique set of six additional features.

Participants were given a booklet divided into two parts. The first part contained an outcome versus process mind-set induction, which has been shown to transfer to subse-
sequent tasks (Freitas et al. 2004). This manipulation was an elaboration task designed to encourage either an abstract, outcome-focused mind-set (i.e., why do we do the things we do) or a concrete, process-focused mind-set (i.e., how we do the things we do). Participants were asked to consider the goal of learning a new language. In the outcome condition, they were prompted to think increasingly abstractly, thinking about why they would learn a new language. In the process condition, participants were asked to think increasingly concretely, considering how they would learn a new language. After spending approximately 5 minutes on this mental exercise, participants were asked to describe the activity of learning a new language. Next, they took part in an ostensibly unrelated study about digital cameras. Participants were asked to imagine that they were considering the purchase of a digital camera and were given a description of two alternatives.

Measures

After reading about the two alternatives, participants were asked to rate their relative preference between the two cameras (definitely prefer Camera A/definitely prefer Camera B) and choose their preferred model. Following choice, participants rated decision difficulty (not difficult at all/very difficult, not confident at all/very confident [reverse coded]). Next, participants reported their willingness to postpone choice using two items: how ready are you to make a choice (not ready at all/very ready, reverse coded) and how much would you like to postpone making a choice (not at all/very much). Then they rated the importance of the capabilities and ease of use of a digital camera (not important at all/very important) and their familiarity with digital cameras (not familiar at all/very familiar). At the end, to capture participants’ commitment to their initial choices, we followed a procedure suggested by Muthukrishnan and Wathieu (2007). We described a compromise alternative (Camera C) and asked participants which digital camera (Camera A, B, or C) they would most likely choose if this new alternative was added to the choice set. All items used 7-point scales.

Results

Product functionality and ease of use were rated as equally important ($M_{\text{capability}} = 5.22$ and $M_{\text{ease of use}} = 5.13$; $t(150) = .48$, $p > .63$), and these ratings were unaffected by our manipulated factors ($p’s > .20$). In the means-end trade-off condition, participants’ familiarity with digital cameras was positively correlated with preferences for ($r = .19$, $p < .05$) and choice of ($r = .23$, $p < .05$) the camera with greater functionality. However, including familiarity as a covariate in our analyses did not change any of the results.

Initial Choice and Decision Process. A 2 (mental simulation) × 2 (type of trade-off) × 2 (presentation order) ANOVA on participants’ relative preference between the products indicated no significant effects ($p’s > .16$). Similarly, we did not find a significant effect of mental simulation on initial choice across the different trade-off conditions ($p’s > .49$). However, as predicted, we found systematic differences in terms of decision difficulty. A 2 × 2 × 2 ANOVA revealed a significant main effect of mental simulation ($F(1, 143) = 6.19$, $p < .05$) and a significant main effect of trade-off ($F(1, 143) = 30.5, p < .001$). Specifically, process-oriented thinking increased decision difficulty ($M = 3.46$) relative to outcome-oriented thinking ($M = 2.93$). Moreover, the end-benefits trade-off was perceived to be more difficult ($M = 3.79$) than the means-end trade-off ($M = 2.60$).

These main effects were qualified by a significant mental simulation by type of trade-off interaction ($F(1, 143) = 8.85, p < .01$). Consistent with our prediction, this two-way interaction shows that process-oriented thinking significantly increased decision difficulty relative to outcome-oriented thinking when the alternatives entailed a means-end conflict ($M_{\text{process}} = 3.2$ vs. $M_{\text{outcome}} = 2.0$; $F(1, 74) = 18.3, p < .001$). However, when the two alternatives presented a trade-off involving only end benefits, the differences in decision difficulty across outcome- and process-oriented thinking disappeared ($M_{\text{process}} = 3.7$ vs. $M_{\text{outcome}} = 3.8$; $F(1, 69) = .10, p > .75$).

Willingness to Postpone Choice and Select a Compromise Option. A 2 × 2 × 2 ANOVA on willingness to delay choice revealed a significant mental simulation by type of trade-off interaction ($F(1, 143) = 6.49, p < .05$). As expected, when the decision task involved a means-end trade-off, participants primed with process-oriented thinking reported greater desire to postpone choice ($M_{\text{process}} = 3.84$) than participants primed with outcome-oriented thinking ($M_{\text{outcome}} = 2.53$; $F(1, 74) = 12.1, p < .01$). This effect disappeared when the task involved trading off only end benefits ($M_{\text{process}} = 4.42$ vs. $M_{\text{outcome}} = 4.50; p < .84$).

Although participants’ preferences were not initially affected by our manipulation of process versus outcome mind-set, we observed a significant effect on their commitment to these choices. Table 1 displays preferences for the two initial alternatives in the choice set, A and B, as well as the compromise option, C, which was presented to participants at the end of the experiment. Consistent with our prediction, in the means-end trade-off condition, process-oriented participants were significantly more likely to switch to a compromise alternative than outcome-oriented participants (56.4% vs. 33.3%; $Z = 2.04, p < .05$). In contrast, in the

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**TABLE 1**

<table>
<thead>
<tr>
<th>Trade-off condition</th>
<th>Mental simulation</th>
<th>Camera A</th>
<th>Camera B</th>
<th>Camera C (compromise option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means-end</td>
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<td>26</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Outcome</td>
<td>26</td>
<td>41</td>
<td>33</td>
</tr>
<tr>
<td>End benefits</td>
<td>Process</td>
<td>16</td>
<td>21</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Outcome</td>
<td>17</td>
<td>17</td>
<td>66</td>
</tr>
</tbody>
</table>

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**Mean differences (vs. means-end)**

- Process: 16 vs. 21, $F(1, 143) = .19, p > .63$
- Outcome: 17 vs. 26, $F(1, 143) = 3.19, p < .05$
- End benefits: 16 vs. 21, $F(1, 143) = 3.19, p < .05$
- Means-end: 16 vs. 26, $F(1, 143) = 3.19, p < .05$

**Main effects**

- Process: $F(1, 143) = 3.73, p < .05$
- Outcome: $F(1, 143) = 30.5, p < .001$
- Trade-off: $F(1, 143) = 30.5, p < .001$

**Interaction effects**

- Process × Outcome: $F(1, 143) = 30.5, p < .001$
- Process × Trade-off: $F(1, 143) = 3.73, p < .05$
- Outcome × Trade-off: $F(1, 143) = 3.73, p < .05$
- Process × Outcome × Trade-off: $F(1, 143) = 30.5, p < .001$
end benefits trade-off condition, process- and outcome-oriented participants were equally likely to select a compromise alternative (63.2% vs. 65.7%, Z = .28, p > .81).

Discussion

Study 2 shows that, when faced with the same means-end trade-off, participants primed to use process-oriented thinking experienced significantly more decision difficulty than participants primed to use outcome-oriented thinking, and they expressed greater willingness to postpone choice and switch to a compromise option that was offered later. Thus, process-oriented thinking seems to affect both consumers’ readiness to make decisions and their subsequent choices, reinforcing the importance of considering the decision maker’s subjective experiences even when initial choices are not affected by the type of mental simulation.

By examining a boundary condition for the effect, study 2 also provides insights about why and when process-oriented thinking leads to greater decision difficulty. The lack of significant differences in decision difficulty when the choice set presented a trade-off involving only end benefits is consistent with the notion that process and outcome mental simulations are equally focused on the end benefits of a target action. Thus, it seems that differential effects of process and outcome thinking on decision making occur when participants must decide between alternatives offering either better means or better end benefits.

STUDY 3

In study 2, we showed that the type of attribute trade-off is an important boundary condition influencing whether process-oriented thinking increases decision difficulty relative to outcome-oriented thinking. Study 3 extends our previous findings by showing that the magnitude of the attribute conflict also matters. Specifically, we predicted that the detrimental effect of process-oriented thinking would be reversed when the choice alternatives were similar in terms of end benefits (i.e., trivial differentiation; Brown and Carpenter 2000) and the decisive advantage emerged from a means-related attribute. We expected that in this situation, process-oriented thinking would facilitate decision making relative to outcome-oriented thinking by focusing attention on the attribute that more clearly sets the alternatives apart.

Design and Participants

One hundred fifty-three undergraduate students were randomly assigned to a 2 (mental simulation: process- vs. outcome-oriented thinking) × 2 (type of trade-off: trivial difference in end benefits vs. substantive difference in end benefits) between-subjects design. Each participant was given a description of two product alternatives, presented side by side.

Stimuli and Procedures

Study 3 followed the same procedures used in study 2. First, participants were given a booklet containing the outcome versus process mind-set manipulation (Freitas et al. 2004). After spending approximately 5 minutes on this mental exercise, participants took part in an ostensibly unrelated computer-based study in which they evaluated two digital cameras. The alternatives were described in terms of their functionality (end benefits) and ease of use (means).

We conducted a pretest (N = 73) to evaluate two choice sets that varied the differences in the end benefits of the products. In the substantive trade-off condition, Camera A offered six basic features plus six additional features, while Camera B offered only the six basic features. In the trivial trade-off condition, Camera A offered six basic features plus one unimportant feature, while Camera B offered only the six basic features. In both conditions, the model with greater functionality (Camera A) was more difficult to use (ease of rating = 1 out of 5) than the model with less functionality (Camera B, ease of use rating = 5 out of 5). Thus, participants compared either six additional features or one additional unimportant feature against the same difference in ease of use ratings. All digital camera features were perceived to be at least moderately important (means above the scale midpoint, ranging from 4.1 to 5.9) with the exception of the additional feature used in the trivial trade-off condition (M = 3.15), which was perceived to be significantly less important than the average of the other features (p < .05). As expected, participants in the trivial trade-off condition perceived the two digital cameras to be significantly more similar in terms of end benefits than participants in the substantive trade-off condition (M_trivial = 4.4, M_substantive = 6.2; F(1, 71) = 44.3, p < .001). In contrast, the perceived similarity of the digital cameras in terms of ease of use (means) did not differ across conditions (p > .51). Thus, the two choice sets met our criteria for the trivial versus substantive difference in end benefits manipulation.

Measures

After reading about the two alternatives, participants were asked to rate their relative preference between the two cameras (definitely prefer Camera A/definitely prefer Camera B) and choose their preferred model. Following choice, participants rated decision difficulty using three items (not difficult at all/very difficult, not confident at all/very confident [reverse coded], not conflicted at all/very conflicted). Next, participants reported their willingness to postpone choice using two items: how ready are you to make a choice (not ready at all/very ready [reverse coded]) and how much would you like to postpone making a choice (not at all/very much). Then, they rated the importance of the capabilities and ease of use of a digital camera (not important at all/very important), and their familiarity with digital cameras (not familiar at all/very familiar). At the end, before collecting demographic variables, participants rated the im-
portance of each of the 12 features used in our stimuli. All items used 7-point scales.

Results

Relative Preference and Choice. A 2 (mental simulation) × 2 (type of trade-off) ANOVA on relative preference ratings indicated significant main effects of mental simulation and type of trade-off. As expected, process-oriented thinking increased preferences for the camera that was easier to use, relative to outcome-oriented thinking ($M_{\text{process}} = 4.9$, $M_{\text{outcome}} = 4.1$; $F(1, 149) = 6.5$, $p < .05$). Moreover, preference for the easy to use camera was higher when the difference in end benefits was trivial rather than substantive ($M_{\text{trivial}} = 5.4$, $M_{\text{substantive}} = 3.6$; $F(1, 149) = 30.8$, $p < .001$). No other effects were significant ($p > .05$).

A similar pattern was observed for choice. Both mental simulation and type of trade-off affected participants’ choices between the alternatives. Process-oriented thinking increased the share of the easy to use camera ($M = 67\%$) relative to outcome-oriented thinking ($52\%$, $\chi^2(1) = 3.6$, $p < .05$). Similarly, the share of the easy to use camera was higher when the difference in end benefits was trivial ($M = 74\%$) than when it was substantive ($43\%$, $\chi^2(1) = 14.8$, $p < .001$).

Decision Process. A 2 × 2 ANOVA on participants’ ratings of decision difficulty revealed a significant main effect of type of trade-off ($F(1, 149) = 9.1$, $p < .01$) qualified by a two-way interaction between mental simulation and type of trade-off ($F(1, 149) = 11.3$, $p = .001$). Replicating our previous results, process-oriented thinking increased decision difficulty in the substantive trade-off condition ($M_{\text{process}} = 3.4$, $M_{\text{outcome}} = 2.7$; $F(1, 68) = 6.8$, $p < .05$). In contrast, in the trivial trade-off condition, process-oriented thinking decreased decision difficulty relative to outcome-oriented thinking ($M_{\text{process}} = 2.2$, $M_{\text{outcome}} = 2.7$; $F(1, 81) = 4.8$, $p < .05$).

A 2 × 2 ANOVA on participants’ willingness to delay choice showed similar effects. A significant main effect of type of trade-off ($F(1, 149) = 12.4$, $p = .001$) was qualified by a two-way interaction between mental simulation and type of trade-off ($F(1, 149) = 16.0$, $p < .001$). Process-oriented thinking significantly increased participants’ willingness to postpone choice in the substantive trade-off condition ($M_{\text{process}} = 3.3$, $M_{\text{outcome}} = 2.6$; $F(1, 68) = 9.2$, $p < .05$). Process-oriented thinking significantly increased decision difficulty and resulted in greater desires to postpone the decision relative to outcome-oriented thinking. However, when the attribute conflict was trivial, such as when differences in end benefits were much less important than differences in means, process-oriented thinking had the opposite effect, facilitating decision making and decreasing intentions to postpone choice.

Given that consumers often encounter decisions that require clear means-end trade-offs, an interesting question that arises is whether process-oriented thinking influences post-choice behavior. After experiencing a difficult decision, will process-oriented consumers be less motivated to spend effort implementing their choices than outcome-oriented consumers? In our next study, we test whether encouraging process-oriented thinking during the predecisional stage can hinder performance during the decision-implementation stage.

STUDY 4

Previous research shows that encouraging students to adopt process- versus outcome-oriented thinking while preparing for a class exam significantly improved performance by reducing anxiety and facilitating planning (Pham and Taylor 1999). Notably, in Pham and Taylor’s research, participants did not have a choice about whether to take the exam or among different types of assignments. However, if choice difficulty is demotivating, as shown by Iyengar and Lepper (2000), then our initial findings suggest that process-oriented thinking may in fact hinder implementation behavior when individuals choose between options that vary in their desirability and feasibility.

In this study, we investigated whether the opportunity to choose a preferred alternative would moderate the effect of process- and outcome-oriented thinking on subsequent performance. We manipulated type of mental simulation and whether participants chose between two alternatives or were randomly assigned to one of the alternatives. We expected to find a significant interaction between mental simulation and choice on subsequent performance. When participants did not make a choice, we expected to replicate previous findings that process-oriented thinking improves performance relative to outcome-oriented thinking (Pham and Taylor 1999). However, when participants chose between desirable and feasible options, we expected that process-oriented thinking would increase decision difficulty relative to outcome-oriented thinking and hinder participants’ subsequent task performance.

Design and Participants

One hundred sixty-nine undergraduate students were assigned to a 2 (mental simulation instructions: process- vs. outcome-oriented thinking) × 2 (choice: choice vs. no choice) between-subjects design. Participants in the choice condition selected one of two articles to review, which entailed a means-end trade-off. Those in the no-choice condition were randomly assigned an article. Four participants did not complete the task and were removed from the analyses.
Stimuli, Procedures, and Measures

Participants were told that they would read an article and write a short essay summarizing the main idea and their thoughts in response to the article. Although the underlying theme of both articles was similar (i.e., how the mind works), the two articles were selected to create a trade-off between interest (end benefit) and length (means). The feasible article, “How Memory Works,” was short (three-quarters of a page, 363 words) but relatively uninteresting, describing the process of creating, storing, and retrieving memories. The desirable article, “The Eureka Moment,” was longer (one and one-half pages, 790 words) but more interesting, describing methods for improving the likelihood that the mind will generate sudden, smart insights.

Participants in the choice condition were given a short description of both articles as well as information about the length of both articles. They rated how interesting and effortful reading each of the articles would be (not interesting at all/very interesting, not much effort at all/a lot of effort). Printed copies of both articles were available to the participants during the choice process. Participants in the no choice condition were randomly assigned to either the feasible or the desirable article and read a short description of the assigned article as well as information about its length. They rated how interesting and effortful reading their assigned article would be.

Before reading and summarizing the article, participants received either process- or outcome-oriented thinking instructions. In the process-oriented condition, they were instructed to spend a few moments thinking about the process of completing the task, such as reading the article from beginning to end and reflecting on its main points. They were asked to write down their thoughts about how they would complete the task. In the outcome-oriented condition, participants were instructed to think about the end result of completing the task, such as learning new information and enhancing their mental skills. Instead of writing about how they would complete the task, participants in this condition wrote down their thoughts about the outcomes of completing the task.

After completing the mental simulation, participants in the choice condition selected their preferred article and answered three items about the difficulty of making the decision (not difficult/very difficult, not confident at all/very confident [reverse coded], not conflicted at all/very conflicted). All participants responded to items about the extent to which they had figured out how they would complete the task (I have no idea/I have figured out exactly, I have not planned/I have an exact plan) and how well they would do in the task (not well at all/very well). After reading the article, all participants wrote a short essay summarizing the main ideas of the article and their thoughts in response to it. We gathered two measures of participants’ performance on the target task: essay quality and essay length. To assess essay quality, two independent judges rated the essays on content and form (Iyengar and Lepper 2000). Essay length was measured by counting the number of words in the essay.

Because the extra credit given in exchange for study participation was not dependent on their performance and participants were assured that their responses would not be analyzed in conjunction with any information that could identify them individually, essay quality and length should reveal participants’ intrinsic motivation in writing the essays (Iyengar and Lepper 2000).

After participants finished writing their essays, we asked them to rate the quality of their essays, how well they summarized the article, their satisfaction with their performance and how enjoyable the task was. Those in the choice condition also rated how enjoyable they thought the task would have been if they had selected the other article. At the end, participants reported the extent to which they thought about the steps they would follow to summarize the article and the end result of doing this task. All items used 7-point scales.

Results

Manipulation Checks. As expected, choosing between the two articles presented a means-end trade-off. Participants in the choice condition rated the desirable article as more interesting ($M_{desirable} = 5.02, M_{feasible} = 4.66; F(1, 77) = 3.83, p < .05$) but more effortful ($M_{desirable} = 4.08, M_{feasible} = 3.13; F(1, 77) = 38.6, p < .001$) than the feasible article. Mental simulation instructions did not affect these ratings ($p's > .15$).

As predicted, process-oriented thinking elicited greater elaboration on means relative to outcome-oriented thinking, but similar elaboration on end benefits. Participants who received process-oriented thinking instructions reported being more focused on the steps they would follow to perform the task ($M_{process} = 3.38$) than participants who received outcome-oriented thinking instructions ($M_{outcome} = 2.62; F(1, 161) = 11.05, p = .001$). Replicating our previous results, participants in the process- and outcome-oriented thinking conditions were equally focused on the end result of performing the target task ($M_{process} = 3.30, M_{outcome} = 2.94; p > .13$). The presence versus absence of choice did not influence these ratings ($p's > .21$).

Choice and Decision Process. Mental simulation instructions significantly influenced participants’ choices. Process-oriented thinking participants were more likely to select the shorter but less interesting article ($M = 86.5\%$) compared to outcome-oriented thinking participants ($M = 47.6\%$; $\chi^2(1) = 13.21, p < .001$). Moreover, replicating our previous findings, process-oriented thinking significantly increased decision difficulty relative to outcome-oriented thinking ($M_{process} = 3.60, M_{outcome} = 2.64; F(1, 77) = 9.02, p < .01$).

Implementation Behavior. Because participants wrote about two different articles, we controlled for the effects of article in all analyses regarding implementation behavior. A 2 (mental simulation) × 2 (choice) × 2 (article) ANOVA on task planning revealed that consistent with previous research (Pham and Taylor 1999), process-oriented thinking facilitated planning relative to outcome-oriented thinking.
(M_{process} = 4.40, M_{outcome} = 3.16; F(1, 157) = 24.22, p < .001), reinforcing the effectiveness of our mental simulation manipulation. In addition, there was a marginally significant main effect of choice on planning (F(1, 157) = 3.83, p = .052). Participants who chose their preferred article (M = 3.54) indicated less planning than those who did not choose the article (M = 4.03). No other effects reached significance (p’s > .34).

A 2 (mental simulation) × 2 (choice) × 2 (article) ANOVA on task enjoyment indicated only a main effect of mental simulation. Process-oriented thinking participants reported enjoying the task more (M = 3.67) than outcome-oriented thinking participants (M = 2.78; F(1, 157) = 9.70, p < .01). No other effects were significant (p’s > .13). However, for those in the choice condition, we observed a significant effect of mental simulation on regret. Compared to outcome-oriented participants, process-oriented participants were more likely to report that they would have enjoyed the target task more if they had chosen the other article (M_{outcome} = 2.60, M_{process} = 3.68; F(1, 75) = 8.22, p < .01). This suggests that the nonchosen alternatives were evaluated more favorably in the process condition than in the outcome condition.

Participants’ subjective assessments of how well they performed the target task did not vary significantly across conditions (p’s > .20). However, significant effects were observed on the actual quality (content and form) and length (i.e., number of words) of the essays that participants wrote. Two independent judges, unaware of participants’ conditions, rated essay content in terms of breadth and depth (intrarater correlation r = .79) and essay form in terms of structure and grammar (r = .79), using 10-point scales (extremely poor/excellent). We averaged the judges’ ratings to create one content and one form score for each participant. The final essay quality score was the average of each participant’s content and form scores (r = .70). A 2 (mental simulation) × 2 (choice) × 2 (article) ANOVA on essay quality scores showed significant main effects of mental simulation (M_{process} = 6.1, M_{outcome} = 7.6; F(1, 157) = 19.25, p < .001) and article (M_{feasible} = 7.3, M_{desirable} = 6.4; F(1, 157) = 6.86, p = .01) and a significant two-way interaction between mental simulation and choice (F(1, 157) = 12.36, p = .001). No other effects were significant (p’s > .12). In the choice condition, eliciting process-oriented thinking (vs. outcome-oriented thinking) significantly decreased the quality of participants’ essays (M_{process} = 5.3, M_{outcome} = 7.9; p < .001). However, in the no choice condition, the detrimental effect of process-oriented thinking on essay quality disappeared, and there was no difference in essay quality scores across conditions (M_{process} = 7.0, M_{outcome} = 7.2; p > .52). The two-way interaction between mental simulation and choice on essay quality was also present when each article was analyzed individually (p’s < .06). Moreover, the essay quality scores of those participants who chose which article to summarize were negatively correlated with perceived conflict during the choice process (r = -.23, p < .05) and experienced regret (r = -.26, p < .05).

The results for essay length (i.e., number of words) followed a similar pattern. A 2 (mental simulation) × 2 (choice) × 2 (article) ANOVA on essay length revealed a significant main effect of mental simulation (M_{process} = 76, M_{outcome} = 106; F(1, 157) = 14.64, p < .001) and a marginal effect of choice (M_{no-choice} = 99, M_{choice} = 84; F(1, 157) = 3.64, p < .06) qualified by a significant two-way interaction between mental simulation and choice (F(1, 157) = 12.85, p < .001). No other effects were significant (p’s > .17).

When participants chose which article to summarize, process-oriented thinking (vs. outcome-oriented thinking) cut essay length by more than half (M_{process} = 55 words, M_{outcome} = 113 words; p < .001). Conversely, when participants were assigned an article to summarize, mental simulation did not affect essay length (M_{process} = 98 words, M_{outcome} = 99 words; p > .87). This mental simulation by choice interaction effect was also significant when results for each essay were analyzed individually (p’s < .05).suggesting a mechanism for the effect, essay length was significantly negatively correlated with participants’ perceived conflict about which article to summarize (r = -.27, p < .05; see table 2).

### Discussion

Study 4 replicated our previous findings about the effect of process-oriented thinking on decision difficulty in a different setting. When choosing between writing assignments that varied in both their degree of interest and the level of effort required, process-oriented thinking led to a similar consideration of end benefits and greater focus on means (the steps required to write the essay) than outcome-oriented thinking, increasing the perceived difficulty of the decision.

Importantly, study 4 also extended our previous findings by showing that in the presence of a means-end trade-off, process mental simulation can be demotivating, hindering subsequent performance. Consistent with the negative effect of increasing the number of choice options on individuals’ performance (Iyengar and Lepper 2000), we found that pro-
process-oriented thinking led to significantly shorter and lower-quality essays when participants were allowed to choose their preferred assignment. Notably, the negative effect of choice difficulty on essay quality seems to have occurred outside participants’ awareness, because we did not find significant differences in subjective assessments of performance.

Although our finding that process-oriented thinking led to greater planning than outcome-oriented thinking is consistent with Pham and Taylor (1999), we did not replicate their finding that process mental simulation improved participants’ performance in the no choice condition. This null result is interesting because it suggests that in the absence of a means-end conflict, some of the differences between our task and Pham and Taylor’s may moderate the beneficial effect of process mental simulation on performance. In particular, two characteristics of our study may explain this discrepancy. First, the target task in study 4, writing an article summary, may be easier than the tasks used in previous research (e.g., taking a midterm exam). Differences in task difficulty may moderate the positive effects of process simulation on performance. For example, previous research shows that forming implementation intentions (“I intend to perform X when I encounter situation Y”) improves goal completion for difficult goals but not for easy goals, perhaps because the implementation of easy goals is more habitual than the implementation of difficult goals (Gollwitzer and Brandstätter 1997). Thus, mentally rehearsing how to complete a target task may have only negligible effects for less difficult tasks such as writing an article summary. Second, study 4 participants engaged in process mental simulation for only a few minutes on one occasion, whereas Pham and Taylor’s (1999) participants engaged in process mental simulation for an extended period of time (5 minutes a day for a week). We believe the amount of time dedicated to mental simulation may contribute to the strength of its effect, giving participants more opportunities for linking actions and outcomes into a step-by-step plan (Escalas and Luce 2004; Taylor et al. 1998).

GENERAL DISCUSSION

This research examined the effect of process-oriented and outcome-oriented mental simulation on consumers’ subjective experiences during the decision process, as well as on their subsequent judgments and behavior. In four studies using different choice contexts and different manipulations of process- versus outcome-oriented thinking, we showed that when participants faced identical substantive means-end trade-offs, process-oriented thinking systematically increased decision difficulty relative to outcome-oriented thinking. As a result, process-oriented thinking lowered satisfaction with the decision process, increased willingness to postpone choice, reduced commitment to the initial choice when a new option was presented, and hindered subsequent task performance.

Examining the boundary conditions for this effect allowed us to highlight the underlying process mechanism. Specifi-
(Gollwitzer, Heckhausen, and Ratajczak 1990). Although previous research indicates that process-oriented thinking can aid the postdecisional stage (i.e., goal implementation) by increasing planning and performance (e.g., Pham and Taylor 1999), our findings show that it can increase the difficulty of the predecisional stage when individuals are comparing means and end benefits. Specifically, we find that process mental simulation can decrease readiness to make a decision and actually inhibit performance. Moreover, our failure to replicate the positive effect of process mental simulation on performance in the absence of a choice conflict suggests that other key moderators, such as task difficulty and time dedicated to mental simulation, may play a role in the extent to which process mental simulation aids implementation behavior. We believe that further examining the conditions under which process-oriented thinking helps versus hinders postchoice behavior will allow psychologists and marketers to prescribe and use mental simulation more effectively.

Second, our findings add to the growing body of literature on consequential level theory (CLT). Empirical research on CLT has demonstrated the effects of abstract and concrete construals on preferences and choices (Liberman and Trope 1998), creative insight (Forster, Friedman, and Liberman 2004), and causal attributions (Nussbaum, Trope, and Liberman 2003). Our results suggest that abstract (outcome-oriented) and concrete (process-oriented) mental representations also may influence the subjective experiences that accompany the act of choosing. In future research, it would be interesting to explore the extent to which manipulations of psychological distance (i.e., temporal, spatial, social distance) known to influence the abstractness/concreteness of thoughts produce similar effects on decision difficulty.

Third, we contribute to recent research on attitude certainty (Rucker and Petty 2004) by suggesting that different types of mental simulation (process vs. outcome) may facilitate or inhibit attitude change. Rucker and Petty (2004) show that even if attitude valence and extremity do not change, a decrease in attitude certainty (i.e., confidence) is consequential because it makes it more likely that attitudes can be changed later. Our findings suggest that process-oriented thinking may decrease consumer confidence. As a result, process-oriented thinking may lead to more malleable attitudes, which are easier to change in the future. Indeed, our finding that process-oriented mental simulation increased the likelihood that participants would forgo their initial choice in favor of a subsequently presented compromise option supports this link between mental simulation and attitude certainty.

Finally, our findings have both positive and negative implications for consumers. On the positive side, process-oriented thinking might attenuate overconfidence and help control impulsive purchase behavior during the predecisional stage, leading to better choices. On the negative side, however, process-oriented thinking might delay important decisions, such as those related to health (e.g., selecting among weight loss programs) or savings (e.g., selecting among retirement investments), and decrease consumers’ motivation to subsequently act on their choices.

REFERENCES


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