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A recent meta-analysis has found that an increase in the size of an assortment has no reliable impact on choice difficulty. Building on a fundamental property of cognition, the authors investigate the link between mental representation and the choice overload effect based on the size of the assortment. They propose that the mental representation of a large assortment changes the perceived similarity of the assortment and consequently affects the degree of choice difficulty. Specifically, when choosing from a large assortment, consumers with an abstract representation perceive the options in the assortment as being more similar and accordingly experience less choice difficulty than those with a concrete representation of the assortment. The authors discuss theoretical and practical implications of the findings.

*Keywords:* assortment, mental representation, choice difficulty, trade-offs, perceived similarity

## Mental Representation and Perceived Similarity: How Abstract Mindset Aids Choice from Large Assortments

A visit to the supermarket attests to the large assortment of items in almost any product category. For example, choices can range from 275 varieties of cereal to 360 types of shampoo (Schwartz 2004). Although consumers are often *attracted* to these large assortments (Broniarczyk, Hoyer, and McAlister 1998), other research suggests a “choice overload” effect such that as the size of an assortment increases, consumers experience greater difficulty, regret, and dissatisfaction (Botti and Iyengar 2004; Chernev 2003; Iyengar and Lepper 2000). More recently, however, Scheibehenne, Greifeneder, and Todd (2010, p. 409) conducted a meta-analysis and found that the mean effect size of choice overload is “virtually zero.” Given the inconsistent findings in the literature stream, it is important to understand both the conditions under and the processes by which the adverse effects of large assortment are likely to occur in the marketplace.

Researchers studying choice overload have concluded that the negative effects of large assortment do not always occur but rather depend on certain conditions (Chernev, Böckenholt, and Goodman 2010; Scheibehenne, Greifeneder, and Todd 2010). A major driver of the negative impact of choice overload is the notion that as the assortment size increases, consumers need to make more trade-offs or comparisons among the options, which consequently leads them to experience greater conflict and choice difficulty. Because the way consumers mentally represent the information about the options can affect choice processes (Lynch and Srull 1982; Tversky and Kahneman 1981) and how conflict is handled (Hong and Lee 2010), we propose that different mental representations of an assortment can influence the perceived similarity of the options in an assortment and, consequently, the amount of trade-offs or comparisons consumers make and the choice difficulty they experience.

Recent research on mental construal posits that the same object can be represented at different levels of abstraction, ranging from lower-level, concrete representations to higher-level, abstract representations (Liberman, Trope, and Stephan 2007; Trope and Liberman 2003). From this research, we propose that consumers who represent the assortment at a more abstract level are likely to attend to higher-order goals and perceive the alternatives as similar and substitutable means of serving the same goal. In con-

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trast, consumers who represent the assortment at a more concrete level will focus on lower-level, feature-based differences and perceive the alternatives as different means of attaining lower-level goals. As a consequence, we predict that consumers who represent the large assortment at a more abstract level will perceive the options as more similar, engage in fewer trade-offs or comparisons, and consequently experience less choice difficulty or choice overload compared with those who represent the same large assortment at a more concrete level.

To illustrate how changes in perceived similarity influence choice overload under different mental representations, we show that for consumers who represent the assortment at an abstract level, an increase in the assortment size does not result in a corresponding decrease in the assortment's perceived similarity. In contrast, for consumers who represent the assortment at a concrete level, a focus on lower-level features results in a decrease in perceived similarity as the assortment size increases. We further show that a decrease in perceived similarity of an assortment leads consumers to make more comparisons among options, which in turn increases choice difficulty. To demonstrate that changes in perceived similarity form the core psychological process, we show that factors that decrease the perceived similarity of the assortment, independent of the number of options, also result in greater choice difficulty for a concrete representation but not for an abstract representation.

We organize the remainder of the article as follows: We begin with a review of the literature and develop our theoretical framework for the interplay of mental representation and assortment size on choice difficulty. We demonstrate how a shift in mental representations can change the perceived similarity of assortments and, consequently, the amount of trade-offs or comparisons when choosing from large assortments. Next, we report results from five experiments to test our propositions. Finally, we discuss theoretical and managerial implications of the findings.

### CONCEPTUAL BACKGROUND

Several research streams have examined the antecedents and consequences of assortment size on consumer choice processes and outcomes. Early research on assortment size focused on the positive value of large assortments for consumers. For example, prior research has identified a positive relationship between assortment size and consumer attitude toward and willingness to shop at that store (Louviere and Gaeth 1987). Consistent with these findings, retailers often provide large assortments to better satisfy consumers' varied needs and tastes (Broniarczyk, Hoyer, and McAlister 1998; Hoch, Bradlow, and Wansink 1999; Kahn 1998).

However, recent research rooted in the psychology of consumer choice has identified a negative impact of assortment size on choice and satisfaction. A general finding is that choosing from a large assortment can lead to decision difficulty, resulting in lower levels of satisfaction, lower choice incidence, and higher anticipated regret (Botti and Iyengar 2004; Chernev 2003; Gourville and Soman 2005; Iyengar and Lepper 2000; Sagi and Friedland 2007). Yet more recent evidence in assortment research has suggested that choice overload is not a general property of the assortment size per se but varies according to how consumers register and process information (Scheibehenne, Greifeneder,

and Todd 2010). In line with the finding that mental representation affects information processing to a large extent (Hong and Lee 2010; Lynch and Srull 1982; Tversky and Kahneman 1981), we posit that different mental representations of assortments will influence the degree of choice difficulty by changing the degree of perceived similarity among options and subsequently the amount of trade-offs or comparisons consumers make.

According to construal level theory, objects can be represented at different levels of abstraction: a lower level of mental representation construes objects in concrete terms that focus on local features and contextualized details, whereas a higher level of mental representation construes objects in abstract terms that are decontextualized and link attributes to higher-order purposes (Dhar and Kim 2007; Liberman, Trope, and Stephan 2007; Trope and Liberman 2003). Recent research has shown that a shift in mental representation can change attribute weights for central or peripheral features (Kim, Zhang, and Li 2008) and alter the decision process that focuses on the essence or details of the options (Förster, Friedman, and Liberman 2004).

We posit that the way people mentally represent options in the assortment has important implications for the perceived similarity of the assortment. Specifically, we hypothesize that consumers with an abstract representation of a large assortment will perceive the options as more similar to one another than those with a concrete representation. This is because a high-level representation processes information more inclusively and links different options to higher-order goals (Förster 2009; Hong and Lee 2010), whereas a concrete representation of the assortment focuses on feature-level differences, and the options are viewed as different means of serving competing lower-level goals or benefits. Therefore, we hypothesize the following:

H<sub>1a</sub>: When choosing from a large assortment, consumers who represent the assortment at an abstract level perceive options in the assortment as more similar than those who represent the same assortment at a concrete level.

Because a concrete representation of the assortment focuses on attribute-level differences among the options and an abstract representation attends to the commonality of the options, we predict that an increase in the assortment size would render choice options less similar for consumers with a concrete representation but not for those with an abstract representation.

H<sub>1b</sub>: For consumers who represent the assortment at a concrete level, an increase in the assortment size leads to a decrease in similarity perception of the assortment. In contrast, for consumers who represent the assortment at an abstract level, an increase in the number of options in an assortment does not change the degree of similarity perception.

As we discussed previously, a major driver of the negative impact of large assortment on choice difficulty is based on the notion that as the number of options increases, choice requires making trade-offs or comparisons among the competing features or benefits, thereby generating conflicts (Lipowski 1970; Timmermans 1993). Previous literature has shown that as the perceived similarity of options decreases, the choice process will require making a greater number of comparisons, leading to greater trade-off difficulty (Dhar 1997; Shugan 1980; Tyebjee 1979). On the one

hand, because consumers who represent the assortment at a concrete level will find options in the assortment to be less similar, they will engage in a greater number of trade-off comparisons as assortment size increases. On the other hand, people who represent the assortment at an abstract level will attend to higher-order goals and will view the same number of options in the assortment as more similar, thereby necessitating fewer trade-offs or comparisons. Consequently, consumers who represent the assortment at an abstract level make fewer trade-offs and experience less choice difficulty than those who represent it at a concrete level.

H<sub>2a</sub>: When choosing from a large assortment, consumers who represent the assortment at an abstract level experience less choice difficulty than those who represent the assortment at a concrete level.

Because consumers who represent the assortment at an abstract level focus on their higher-level goals and commonalities among options, an increase in assortment size does not result in a corresponding decrease in the perceived similarity of the assortment. In contrast, because consumers who represent the assortment at a concrete level attend to lower-level features and differences among options, an increase in assortment size results in a decreased perception of similarity. In line with the argument that decreased similarity perception leads to more comparisons and consequently greater decision difficulty (Dhar 1997; Shugan 1980; Tyebjee 1979), we expect an increase in the assortment size to increase choice difficulty for consumers representing the assortment at a concrete level but not for those representing at an abstract level. Therefore, we hypothesize the following:

H<sub>2b</sub>: For consumers who represent the assortment at a concrete level, an increase in the number of options in the assortment leads to greater choice difficulty. In contrast, for consumers who represent the assortment at an abstract level, an increase in the number of options in an assortment does not change the degree of choice difficulty.

We test the preceding hypotheses in a series of experiments. Experiment 1 demonstrates that, compared with an abstract representation, a concrete representation of the large assortment leads to both greater choice difficulty and choice difficulty that is more sensitive to changes in the size of an assortment. Experiment 2 examines whether the proposed effect holds for chronic differences in people's tendencies to represent the assortment at an abstract or concrete level. Experiment 3 tests the proposed causal path, investigating whether (1) the influence of mental representation on choice difficulty is mediated by perceived similarity and (2) the effect of perceived similarity on choice difficulty is mediated by the amount of trade-off comparisons. Furthermore, by manipulating similarity independent of the assortment size, Experiments 4 and 5 reveal the process underlying the observation that a decrease in perceived similarity leads to an increase in choice difficulty when the assortment is represented concretely.

#### EXPERIMENT 1: ASSORTMENT SIZE, MENTAL REPRESENTATION, AND CHOICE DIFFICULTY

Experiment 1 demonstrates the effect of mental representation on choice difficulty in the context of a small versus a

large assortment for a real choice. We first primed participants to adopt an abstract or a concrete mental representation by performing an ostensibly unrelated task, after which they chose from 5 or 20 varieties of preserved plums.

#### Method

One hundred seven undergraduate students (42 men, 65 women; average age = 21.42 years) from a large public university in China participated in the experiment in return for monetary compensation. The experiment used a 2 (assortment size: small vs. large) × 2 (mental representation: abstract vs. concrete) between-subjects design. We randomly assigned participants to one of the four experimental conditions.

We presented the experiment as two unrelated studies. The first study manipulated participants' mental representation of objects and was based on a task adapted from Fujita et al. (2006). We asked participants to generate either superordinate category labels (abstract representation) or subordinate examples (concrete representation) for 16 words (e.g., "tree," "desk"). For the superordinate condition, the question was "[target word] is an example of what?" For the subordinate condition, the question was "An example of [target word] is what?" For example, we asked participants in the abstract representation conditions to indicate the category to which "automobile" belonged (e.g., transportation), whereas we asked participants in the concrete representation conditions to provide at least two examples of an automobile (e.g., car, truck).

After completing the task designed to manipulate mental representation, participants were guided to another room in which we had displayed either a small (5 options) or large (20 options) assortment of preserved plums. Preserved plums are one of the most popular snacks in China. College students and other young adults, in particular, are familiar with and frequent buyers of preserved plums. Participants were asked to choose their preferred preserved plums and were told they would receive a bag of the chosen plums as a thank-you gift at the end of the experiment.

After participants indicated their choices, they completed several questions related to their choice process on nine-point scales (1 = "not at all," and 9 = "very much"). We measured choice difficulty with three items (Iyengar and Lepper 2000): perceived difficulty ("How difficult was it for you to choose the plum you wanted?"), frustration ("How frustrated did you feel when making the choice?"), and hesitation ("How hesitant did you feel when making the choice?"). We measured perceived similarity by asking participants, "How similar did you find the options were to one another?" Finally, participants indicated their perceptions about the assortment size (1 = "the number of options is too few," 5 = "the number of options is about right," and 9 = "the number of options is too many"; Iyengar and Lepper 2000). After completing the questionnaire, participants were paid and received a small sample of their chosen plums. For further information about the instructions and stimuli we used, see the Web Appendix ([www.marketingpower.com/jmr\\_webappendix](http://www.marketingpower.com/jmr_webappendix)).

#### Results

*Manipulation checks.* Two participants failed to complete the survey and were excluded from the following analyses.



Two independent judges analyzed each participant's responses in the manipulation task. If a response was "an example of [target word]" (fit the criterion of exemplar), the response was coded as  $-1$ ; if the response was "[target word] is an example of" (fit the criterion of category), it was coded as  $+1$ ; if a response fit neither criterion, judges coded the response as  $0$ . Scores of 16 items were summed to create an index of mental representation, with a potential range of  $-16$  to  $+16$ ; higher scores represented higher degrees of abstractness (Fujita et al. 2006). The interrater agreement between the two judges was high ( $r = .92$ ); therefore, we averaged it to create a single index of mental representation. Participants who responded to category labels had significantly more abstract answers ( $M = 14.49$ ,  $SD = 2.22$ ) than those who generated examples of a category ( $M = -15.91$ ,  $SD = .26$ ;  $F(1, 103) = 9,784.88$ ,  $p < .001$ ).

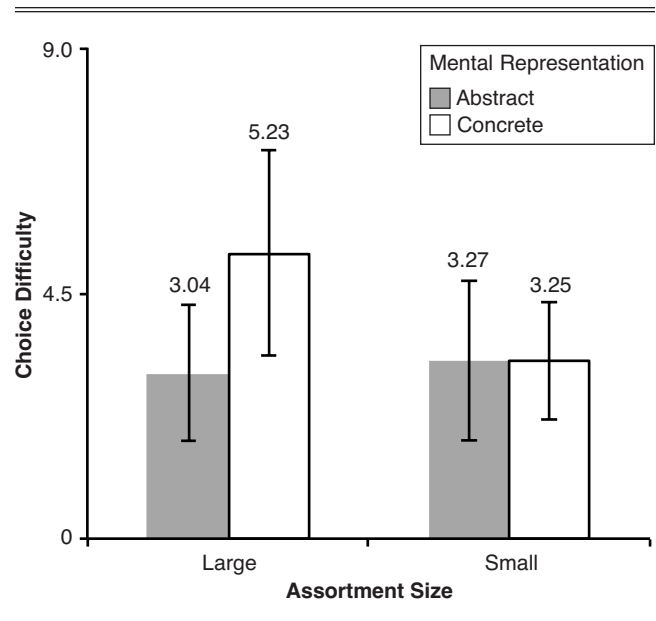
Participants' perceptions of assortment size differed significantly between large and small assortments ( $F(1, 101) = 20.94$ ,  $p < .001$ ). Consistent with Iyengar and Lepper (2000), participants encountering the large assortment reported the number of options available was "too many" ( $M = 6.16$ ,  $SD = 2.12$ ), whereas participants in the small assortment conditions reported the number of options was "about right" ( $M = 4.50$ ,  $SD = 1.56$ ). This result suggested our manipulation of assortment size was successful.

*Perceived similarity.* An analysis of variance (ANOVA) of perceived similarity yielded no main effect of assortment size ( $F(1, 101) = .10$ ,  $p > .1$ ) but did yield a predicted interaction of mental representation and assortment size ( $F(1, 101) = 6.50$ ,  $p < .05$ ). As we predicted in  $H_{1a}$ , when choosing from a large assortment, participants with an abstract representation perceived the options as more similar to one another than those with a concrete representation ( $M_{\text{abstract}} = 6.68$ ,  $SD = 1.28$  vs.  $M_{\text{concrete}} = 3.69$ ,  $SD = 2.11$ ;  $F(1, 101) = 34.69$ ,  $p < .01$ ). In support of  $H_{1b}$ , participants with a concrete representation found options to be less similar when choosing from a large rather than a small assortment ( $M_{\text{large}} = 3.69$ ,  $SD = 2.11$  vs.  $M_{\text{small}} = 4.70$ ,  $SD = 2.02$ ;  $F(1, 101) = 4.23$ ,  $p < .05$ ). Conversely, for participants with an abstract representation, similarity perceptions did not differ between large and small assortments ( $M_{\text{large}} = 6.68$ ,  $SD = 1.28$  vs.  $M_{\text{small}} = 5.89$ ,  $SD = 1.80$ ;  $F(1, 101) = 2.48$ ,  $p > .1$ ).

*Choice difficulty.* We averaged the three items (choice difficulty, hesitation, and frustration) to create an index for choice difficulty (Cronbach's  $\alpha = .81$ ). An ANOVA of this difficulty index yielded the predicted mental representation  $\times$  assortment size interaction ( $F(1, 101) = 15.00$ ,  $p < .01$ ). As we predicted in  $H_{2a}$ , when choosing from a large assortment, participants with an abstract representation experienced less choice difficulty than those with a concrete representation ( $M_{\text{abstract}} = 3.04$ ,  $SD = 1.26$  vs.  $M_{\text{concrete}} = 5.23$ ,  $SD = 1.89$ ;  $F(1, 101) = 28.83$ ,  $p < .01$ ). In support of  $H_{2b}$ , participants with a concrete representation experienced greater choice difficulty when assortment size increased from 5 to 20 ( $M_{\text{small}} = 3.25$ ,  $SD = 1.08$  vs.  $M_{\text{large}} = 5.23$ ,  $SD = 1.89$ ;  $F(1, 101) = 24.26$ ,  $p < .001$ ). However, we did not find such differences for participants with an abstract representation ( $M_{\text{small}} = 3.27$ ,  $SD = 1.47$  vs.  $M_{\text{large}} = 3.04$ ,  $SD = 1.26$ ;  $F(1, 101) = .33$ ,  $p > .1$ ). Figure 1 plots these results.

*Process testing.* Drawing on Baron and Kenny (1986) and Muller, Judd, and Yzerbyt (2005), we performed a set of analyses to test whether perceived similarity mediated

Figure 1  
CHOICE DIFFICULTY AS A FUNCTION OF MENTAL REPRESENTATION AND ASSORTMENT SIZE (EXPERIMENT 1)



the moderating effect of mental representation on assortment size and choice difficulty. In step 1 of the regression, the interaction of mental representation and assortment size significantly predicted relative choice difficulty, as we reported previously ( $\beta = -2.23$ ,  $t = -4.00$ ,  $p < .01$ ). In step 2, the interaction of mental representation and assortment size predicted the difference in perceived similarity ( $\beta = 1.32$ ,  $t = 2.08$ ,  $p < .05$ ). To this end, we regressed choice difficulty simultaneously on assortment size, mental representation, and their interaction as well as on perceived similarity and its interaction with mental representation. Step 3 required the mediator to affect the dependent variable significantly. The analyses of the full model showed a significant main effect of perceived similarity on choice difficulty ( $\beta = -.26$ ,  $t = -2.50$ ,  $p < .05$ ). Finally, step 4 further required the moderation effect found in step 1 to drop significantly in magnitude. Indeed, the interaction between mental representation and assortment size was no longer significant in the full model ( $\beta = -1.40$ ,  $t = -1.22$ ,  $p > .1$ ). In line with Zhao, Lynch, and Chen's (2010) suggestion, we also found that the mean indirect effect from the bootstrap analysis was negative and significant ( $a \times b = -.32$ ), with a 95% confidence interval excluding zero ( $-.65, -.02$ ). Together, these analyses indicate that perceived similarity fully mediated the interaction between mental representation and assortment size on choice difficulty.

Experiment 1 supports the notions that the representation of an assortment can systematically influence the choice difficulty consumers experience and that differences in choice difficulty are driven by changes in perceived similarity of the assortment options. In support of  $H_{1a}$  and  $H_{2a}$ , the results show that as the size of the assortment increases, consumers with an abstract representation perceive options as more similar and find making a choice to be easier than those with a concrete representation. In addition, the increase in assortment size has no influence on decision difficulty

when consumers form an abstract representation, because changes in similarity perception do not accompany an increase in the number of options. However, an increase in the size of the assortment leads to a significant increase in choice difficulty when consumers form a concrete representation, because a decrease in perceived similarity does accompany an increase in the size of the assortment. These results support  $H_{1b}$  and  $H_{2b}$ .

The aim of Experiment 2 is to replicate Experiment 1's findings by measuring rather than manipulating participants' tendency to represent information at the abstract versus concrete level. Although we posit that a decrease in similarity perception will drive consumers to make more comparisons and will consequently lead to more choice difficulty, we want to examine whether mental representation changes the propensity to engage in comparisons among assortment options for other reasons. Specifically, prior research has shown that a satisficing strategy, as opposed to a maximizing strategy, is associated with fewer comparisons and lower choice difficulty (Schwartz, Ward, and Monterosso 2002). Therefore, if a person's tendency to represent assortment at an abstract level is correlated with propensity to adopt a satisficing strategy, it is plausible that abstract representation reduces choice difficulty through a satisficing strategy. Thus, Experiment 2 includes measures to test whether the effect of mental representation on choice difficulty for large assortments operates through similarity or chronic propensity to maximize.

#### EXPERIMENT 2: ASSORTMENT SIZE AND CHRONIC MENTAL REPRESENTATION TENDENCY

The objective of Experiment 2 is to replicate Experiment 1's findings by measuring the individual differences in mental representation with the Behavior Identification Form (BIF; Vallacher and Wegner 1989). We also test whether a maximizing tendency is correlated with propensity to represent information at a more concrete level.

#### Method

One hundred thirty-nine students (61 men, 78 women; average age = 22.53 years) from a large university in China participated in the experiment. We displayed a small (5 options) and a large (20 options) assortment of Chinese tea types in two separate rooms. Participants were randomly guided into one of the two rooms and asked to choose from either the small or large assortment of teas. After participants indicated their choices, they reported choice difficulty ("How difficult was it for you to choose the tea type you wanted?") and perceived similarity as in Experiment 1. After completing the choice measure, participants worked on unrelated filler questionnaires for 15 minutes. We included this task to insulate any influence of the choice on subsequent measurements. Participants then filled out the 25-question BIF questionnaire (Vallacher and Wegner 1989). Each question asked participants to describe an action (e.g., reading) either in a more abstract way (e.g., gaining knowledge) or in a more concrete way (e.g., following lines of print). We coded each answer as 1 if participants chose the abstract representation or as 0 otherwise. A BIF score was summed for each participant; higher BIF scores indicate a greater chronic tendency to represent information at an abstract level.

Following the BIF, participants completed a scale measuring their chronic maximizing tendency. Participants provided their degree of agreement on nine-point scales for four items adapted from the Maximization Scale (Schwartz, Ward, and Monterosso 2002): "I would not settle for the second-best option I've seen," "It is important for me to get the best option among those I've seen," "While choosing, I try to figure out which option is the best," and "No matter how satisfied I am with my current choice, it's only right for me to be on the lookout for better alternatives." For further information on the instructions and stimuli used, see the Web Appendix ([www.marketingpower.com/jmr\\_webappendix](http://www.marketingpower.com/jmr_webappendix)).

#### Results

*Perceived similarity.* We followed the spotlight analysis procedures (Aiken and West 1991; Irwin and McClelland 2001) to explore the impact of assortment size on perceived similarity, depending on mental representations. A regression on perceived similarity showed a nonsignificant main effect of assortment size ( $\beta = -.08, p > .2$ ) and a significant interaction between assortment size and mental representation tendency ( $\beta = .77, p < .01$ ). Among those who chose from the large assortment, participants with low BIF scores (1 SD below the mean) perceived the assortment as less similar than their counterparts with high BIF scores (1 SD above the mean;  $M_{\text{concrete}} = 2.62, SD = 1.04$  vs.  $M_{\text{abstract}} = 6.00, SD = 1.28$ ;  $\beta = .56, p < .01$ ), confirming  $H_{1a}$ . As  $H_{1b}$  predicted, participants with low BIF scores (1 SD below the mean) perceived the large assortment as less similar than the small assortment ( $M_{\text{large}} = 2.62, SD = 1.04$  vs.  $M_{\text{small}} = 4.45, SD = 1.86$ ;  $\beta = .48, p < .01$ ). In contrast, participants with high BIF scores (1 SD above the mean) reported the perceived similarity between the large and small assortment conditions to be comparable ( $M_{\text{large}} = 6.00, SD = 1.28$  vs.  $M_{\text{small}} = 5.18, SD = 1.34$ ;  $\beta = .05, p > .1$ ).

*Choice difficulty.* A regression with spotlight analysis on choice difficulty yielded a significant interaction between the assortment size and mental representation ( $\beta = -.69, p < .01$ ). To explore the interaction, a spotlight analysis showed that participants with high BIF scores (1 SD above the mean) experienced less choice difficulty than those with low BIF scores (1 SD below the mean) when choosing from the large assortment ( $M_{\text{abstract}} = 2.27, SD = 1.55$  vs.  $M_{\text{concrete}} = 6.08, SD = .64$ ;  $\beta = .67, p < .01$ ), in support of  $H_{2a}$ . Moreover, participants with low BIF scores (1 SD below the mean) experienced greater choice difficulty when choosing from the large assortment than from the small one ( $M_{\text{large}} = 6.08, SD = .64$  vs.  $M_{\text{small}} = 3.09, SD = 2.02$ ;  $\beta = .40, p < .01$ ), whereas participants with high BIF scores (1 SD above the mean) did not experience an increase in difficulty when the assortment size changed from small to large ( $M_{\text{small}} = 2.29, SD = 1.36$  vs.  $M_{\text{large}} = 3.24, SD = 2.27$ ;  $\beta = .02, p > .1$ ), in support of  $H_{2b}$ .

*Maximizing tendency.* We first created a maximizing index by averaging the four items (Cronbach's  $\alpha = .82$ ) and then conducted two separate regression analyses on perceived similarity and choice difficulty, with both maximizing tendency and BIF scores as independent variables. The results showed no effect of maximizing tendency on perceived similarity ( $\beta = -.05, p > .1$ ) or on choice difficulty ( $\beta = .09, p > .1$ ). In addition, we found no correlation between BIF

scores and maximizing index (Pearson correlation = .04,  $p > .1$ ).

By measuring consumers' chronic tendency to represent information at an abstract versus concrete level, the results of Experiment 2 provide further support for our proposition that the effect of assortment size on choice difficulty is moderated by consumers' mental representation. In particular, participants chronically representing information at a concrete level experienced more choice difficulty as the assortment size increased, whereas participants chronically representing information at an abstract level did not experience a corresponding increase in choice difficulty. In addition, our results suggest that the effect of mental representation on perceived similarity and choice difficulty is unrelated to maximizing tendency.

Although Experiment 1 establishes the mediating role of similarity perception on the effect of mental representation on choice difficulty, it did not directly test for the psychological process through which decreased similarity leads to increased choice difficulty when choosing from large assortments. In Experiment 3, we specifically test whether a decrease in similarity perception of assortment options results in more trade-offs or comparisons and consequently more choice difficulty. Specifically, we propose that when the number of choice options increases, consumers with a concrete representation of the assortment focus on the feature-level differences that require more trade-offs or comparisons between the options to make a choice. In contrast, consumers with an abstract representation of the assortment perceive options to be similar in serving the same goal and do not make an increasing number of trade-offs or comparisons as the assortment size increases.

Furthermore, Experiment 1 manipulated the mental representation of assortments by priming abstract versus concrete mental representation through unrelated categorization tasks, and Experiment 2 measured consumers' mental representations as an individual difference variable. Although previous research has shown that the priming mindset has a carryover effect and can change representation of the object in a subsequent task, it is critical to show that mental representation of the assortment itself influences the choice process and choice difficulty. Thus, Experiment 3 directly manipulates mental representation of a coffee assortment by asking participants to think about why versus how they drink coffee. This method has managerial advantages that advertising or other types of in-store communications can use to change consumers' mental representations by shifting customers' attention to either higher-level purposes or lower-level features.

### EXPERIMENT 3: MENTAL REPRESENTATION, PERCEIVED SIMILARITY, AND TRADE-OFFS

Participants in Experiment 3 were induced to form an abstract or concrete representation of coffee assortments by answering questions related to coffee consumption. Subsequently, they chose from either 5 or 20 coffee options and were asked to explain how they arrived at their choices.

#### Method

Ninety-one students (41 men, 50 women; average age = 22.57 years) from a large public Chinese university participated in the computer-based experiment in return for mone-

tary compensation. This experiment used a 2 (assortment size: small vs. large)  $\times$  2 (mental representation: abstract vs. concrete) between-subjects design.

Previous research has indicated that asking a person why he or she engages in an action activates a high-level representation, whereas asking how he or she engages in an action triggers a low-level representation (Freitas, Gollwitzer, and Trope 2004; Fujita et al. 2006). To manipulate the mental representation of coffee options, we drew on Freitas, Gollwitzer, and Trope (2004) and instructed participants in the abstract representation conditions to write why they drink coffee and what drinking coffee signals to them; we instructed those in the concrete representation conditions to write how and under what circumstances they drink coffee.

After completing the manipulation task, participants were presented with either a small (5 types) or a large (20 types) assortment of coffee options on the computer screen. Each option contained a picture, a name, and a short description of the taste and aroma. Participants were asked to choose one coffee and were told they had a 1 in 10 chance of receiving their choice of coffee at the end of the experiment. After they indicated their choices, participants were asked to write down how they arrived at their choice. Finally, they indicated choice difficulty and perceived similarity as in Experiment 2. For further information about the instructions and stimuli used, see the Web Appendix ([www.marketingpower.com/jmr\\_webappendix](http://www.marketingpower.com/jmr_webappendix)).

#### Results

*Manipulation checks.* To verify whether our manipulation affected the mental representation level as intended, we had a separate group of participants ( $n = 48$ ) from the same population complete the same manipulation task (why vs. how they drink coffee). Next, these participants completed the 25-item BIF (Vallacher and Wegner 1989), as in Experiment 2. The results confirmed the effectiveness of our manipulation: BIF scores showed that participants who considered why they drank coffee construed behaviors at significantly higher levels than those who considered how they drank coffee ( $M_{\text{why}} = 17.79$ ,  $SD = 4.28$  vs.  $M_{\text{how}} = 14.50$ ,  $SD = 5.92$ ;  $F(1, 46) = 4.87$ ,  $p < .05$ ).

*Perceived similarity.* An ANOVA of perceived similarity indicated a significant mental representation by assortment size interaction ( $F(1, 87) = 5.03$ ,  $p < .05$ ). In support of  $H_{1a}$ , when facing a large assortment, participants with an abstract representation reported higher perceived similarity than those with a concrete representation ( $M_{\text{abstract}} = 5.50$ ,  $SD = 1.79$  vs.  $M_{\text{concrete}} = 3.43$ ,  $SD = 2.33$ ;  $F(1, 87) = 12.42$ ,  $p < .01$ ). Moreover, in support of  $H_{1b}$ , perceived similarity varied as a function of assortment size for participants with a concrete representation ( $M_{\text{large}} = 3.43$ ,  $SD = 2.33$  vs.  $M_{\text{small}} = 5.17$ ,  $SD = 1.40$ ;  $F(1, 87) = 9.00$ ,  $p < .05$ ) but not for those with an abstract representation ( $M_{\text{small}} = 5.39$ ,  $SD = 2.19$  vs.  $M_{\text{large}} = 5.50$ ,  $SD = 1.79$ ;  $F(1, 87) = .22$ ,  $p > .1$ ).

*Choice difficulty.* Consistent with Experiment 1's findings, an ANOVA of the choice difficulty yielded a significant mental representation by assortment size interaction ( $F(1, 87) = 5.58$ ,  $p < .01$ ). In support of  $H_{2a}$ , when facing a large assortment, participants with an abstract representation experienced less difficulty than those with a concrete representation ( $M_{\text{abstract}} = 3.82$ ,  $SD = 2.02$  vs.  $M_{\text{concrete}} = 5.70$ ,  $SD = 1.89$ ;  $F(1, 87) = 8.70$ ,  $p < .01$ ). In support of  $H_{2b}$ ,



participants with a concrete representation reported a higher level of choice difficulty when options increased from 5 to 20 ( $M_{\text{small}} = 3.70$ ,  $SD = 2.44$  vs.  $M_{\text{large}} = 5.70$ ,  $SD = 1.89$ ;  $F(1, 87) = 10.10$ ,  $p < .01$ ), but participants with an abstract representation were not influenced by the changes in the assortment size ( $M_{\text{small}} = 3.65$ ,  $SD = 2.15$  vs.  $M_{\text{large}} = 3.82$ ,  $SD = 2.02$ ;  $F(1, 87) = .07$ ,  $p > .1$ ).

**Protocol analysis.** All participants reported how they made their choices. Two independent judges, blind to our hypotheses, coded participants' thought content according to a coding scheme designed to capture whether participants made attribute-level trade-off comparisons during their choice processes (Khan, Zhu, and Kalra 2011). Specifically, the judges coded a thought as representing trade-offs or comparisons if (1) it mentioned more than one attribute for more than one alternative (e.g., "Cappuccino has a better taste but Mocha smells better") or (2) it mentioned comparisons between two or more attributes (e.g., "The flavor seems more important than the appearance of the coffee"). Furthermore, the judges coded a thought as involving no trade-off or comparison if (1) it used lexicographic rules to determine preference (e.g., "I based my choice primarily on flavor"), or (2) it specified a cutoff value for a certain attribute to eliminate alternatives (e.g., "I don't like coffee with cream on top"). Interjudge reliability was high ( $r = .90$ ), and disagreements were resolved through discussion.

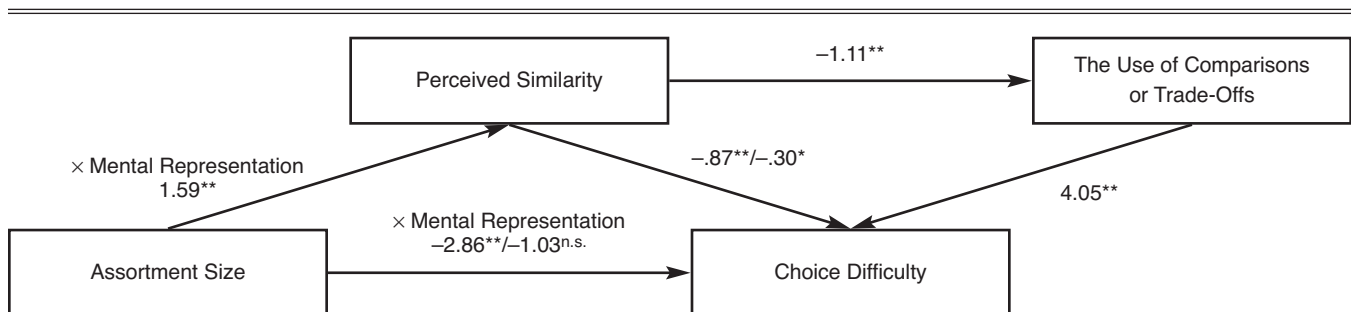
Of the 91 thoughts listed, the judges categorized 30 of them as ones that involved trade-offs or comparisons and 61 of them as ones that used noncompensatory decision strategies. A logistic regression on the use of trade-offs revealed a significant main effect of mental representation (Wald  $\chi^2 = 5.39$ ,  $\beta = -1.43$ ,  $p < .05$ ), suggesting that participants with an abstract representation were less likely to engage in trade-offs or comparisons than those with a concrete representation (abstract: 22.2% vs. concrete: 43.5%). This main effect was qualified by a significant interaction between mental representation and assortment size (Wald  $\chi^2 = 3.94$ ,  $\beta = -1.24$ ,  $p < .05$ ). Contrast comparisons showed that participants with a concrete representation mentioned significantly more trade-offs or comparisons when the assortment size increased from 5 to 20 (5 items: 26.1% vs. 20 items: 60.9%;  $\chi^2(1) = 5.67$ ,  $p < .01$ ). However, the change of assortment size did not influence the use of trade-offs or

comparisons for participants with an abstract representation (5 items: 21.7% vs. 20 items: 22.7%;  $\chi^2(1) = .94$ ,  $p > .1$ ).

**Process testing.** We performed two mediation analyses to test our hypothesized causal path regarding (1) whether perceived similarity mediated the moderating effect of mental representation on choice difficulty and (2) whether the use of trade-offs or comparisons mediated the impact of perceived similarity on choice difficulty. In our first set of analyses, all four conditions for mediated moderation were met (Baron and Kenny 1986; Muller, Judd, and Yzerbyt 2005). As Figure 2 illustrates, regression analyses revealed that the interaction between mental representation and assortment size had a significant effect on choice difficulty ( $\beta = -2.86$ ,  $t = -3.05$ ,  $p < .05$ ) and on perceived similarity ( $\beta = 1.59$ ,  $t = 2.17$ ,  $p < .05$ ). Because we included perceived similarity and its interaction with mental representation in the regression measuring the effect of mental representation, assortment size, and the interaction of the two on choice difficulty, the main effect of perceived similarity remained significant ( $\beta = -.84$ ,  $t = -8.25$ ,  $p < .05$ ), but the effect of interaction between mental representation and assortment size was no longer significant ( $\beta = -1.03$ ,  $t = -1.44$ ,  $p > .1$ ). Finally, the bootstrap analysis showed a significant mean indirect effect ( $a \times b = -1.33$ ), with a 95% confidence interval excluding zero ( $-2.52, -.11$ ; Zhao, Lynch, and Chen 2010), indicating that mental representation qualified the mediating role of perceived similarity on choice difficulty.

All four requirements were also met in our second set of analyses, which indicates that the use of trade-offs or comparisons mediated the relationship between perceived similarity and choice difficulty (see Figure 2). Perceived similarity had a significant negative effect on whether participants based their decisions on trade-offs ( $\beta = -1.11$ , Wald  $\chi^2 = 18.97$ ,  $p < .001$ ) and a significant effect on choice difficulty ( $\beta = -.87$ ,  $t = -9.51$ ,  $p < .001$ ). In addition, whether participants made trade-offs affected their experienced choice difficulty ( $\beta = 4.05$ ,  $t = 12.79$ ,  $p < .01$ ). However, when we included both perceived similarity and trade-offs in a regression predicting choice difficulty, trade-offs remained a significant predictor ( $\beta = 3.15$ ,  $t = 9.82$ ,  $p < .05$ ), whereas the effect of perceived similarity dropped significantly ( $\beta = -.30$ ,  $t = -4.41$ ,  $p < .05$ ). The bootstrap analysis yielded

Figure 2  
MEDIATIONAL ANALYSIS (EXPERIMENT 3)



\*Significant at the .05 level.

\*\*Significant at the .01 level.

Notes: The first coefficient on a given path represents the direct effect without the mediator in the model. The second coefficient represents the direct effect when the mediator is included in the model.

a significant mean indirect effect ( $a \times b = -.51$ ), with a 95% confidence interval excluding zero ( $-.68, -.36$ ), confirming that the introduction of trade-off comparisons significantly decreased the effect of perceived similarity on choice difficulty.

By changing the mental representations of the product assortment, we again demonstrate that consumers' mental representations moderate the effect of assortment size on choice difficulty. Furthermore, the results support our proposed mechanism underlying these effects, indicating that perceived similarity mediates the impact of mental representation on choice difficulty and that the degree of trade-off comparisons mediates the impact of perceived similarity on choice difficulty. That is, a change in mental representation of the large assortment affects the perceived similarity between options and, consequently, the amount of trade-off comparisons and the degree of choice difficulty experienced.

### Discussion

The three experiments thus far demonstrate that the effect of assortment size on choice difficulty is mediated through changes in perceived similarity of the assortment. In general, an increase in assortment size can independently decrease perceived similarity, because the introduction of more options, in many instances, results in greater variance. However, our proposed effect results from how consumers perceive similarity among options and does not require an increase in the number of options in an assortment. Because our account is rooted in differences in an assortment's perceived similarity, it is important to manipulate the similarity of options independent of the assortment's size to isolate the effect of similarity on choice difficulty. Therefore, in Experiment 4, we deliberately constructed choice assortments in which a smaller assortment set would be perceived as less similar than a large assortment. Specifically, we constructed an assortment of 5 options to be less similar than an assortment of 20 options by making the range of the attribute values of the 20 options much narrower than those of the 5 options (see Figure 3). In Experiment 4, we thus expect that

for consumers with a concrete representation, choosing from a small but less similar assortment should result in more choice difficulty than choosing from a large but more similar assortment. For consumers with an abstract representation, however, the perceived similarity of the assortment should not affect the choice difficulty to the same extent, because they view these options to be similar and few trade-offs or comparisons are required.

### EXPERIMENT 4: MANIPULATING THE PERCEIVED SIMILARITY OF ASSORTMENT INDEPENDENT OF THE ASSORTMENT SIZE

Experiment 4 tests the effect of mental representation on choice difficulty independent of assortment size. We constructed the options such that the large assortment was more similar than the small assortment: the ranges of the attribute values in the large assortment were much smaller than the ranges used to design the small assortment options.

### Method

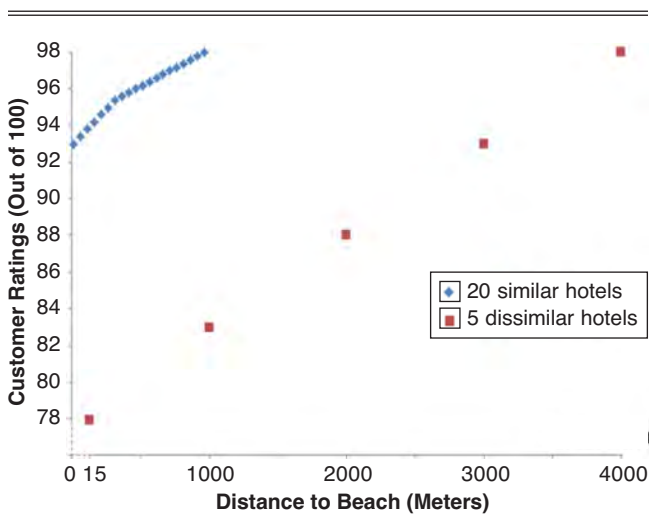
We randomly assigned 149 students (71 men, 78 women; average age = 22.58 years) to a 2 (mental representation: abstract vs. concrete)  $\times$  2 (assortment: small assortment with dissimilar options vs. large assortment with similar options) between-subjects design. We manipulated participants' levels of representation with an ostensibly unrelated task adapted from Freitas, Gollwitzer, and Trope (2004). Participants assigned to the abstract representation conditions were directed to consider why they would engage in particular activities (keeping healthy and being honest), and those assigned to the concrete representation conditions were instructed to consider how they would engage in the same activities. After the manipulation, participants were asked to imagine they were planning a beach vacation and needed to choose a hotel room for the trip. They were shown either 5 or 20 hotels. All the hotels were described on two attributes: distance to beach and customer satisfaction rating. We constructed the hotel options as trade-offs between the distance to beach and customer ratings such that those closer to the beach received lower customer ratings.

In the small assortment with dissimilar options conditions, participants saw 5 options, with distance to beach ranging from 15 to 4,000 meters and satisfaction ratings ranging from 78.0 to 98.0 of 100. In the large assortment with similar options conditions, participants were presented with 20 options, with distance ranging from 15 to 965 meters and ratings ranging from 93.0 to 98.0 of 100. The Appendix provides a list of the options, translated into English. We asked participants to select one hotel at which they would like to stay. After participants indicated their choices, they completed a series of dependent measures, including choice difficulty and perceived similarity as in Experiment 2. For further information about the instructions and stimuli used, see the Web Appendix ([www.marketingpower.com/jmr\\_webappendix](http://www.marketingpower.com/jmr_webappendix)).

### Results

*Perceived similarity.* We pretested the similarity manipulation with 89 participants that were separate from the main experiment. We randomly assigned participants to review 20 similar hotels or 5 dissimilar hotels and to report how similar the options were on a nine-point scale (1 = "not similar at all," and 9 = "very similar"). The results showed

Figure 3  
PERCEIVED SIMILARITY INVERSELY RELATED TO THE ATTRIBUTE DIFFERENCES AMONG OPTIONS (EXPERIMENT 4)





that participants perceived the 20-hotel grouping as more similar than the 5-hotel grouping ( $M_{20} = 4.98$ ,  $SD = 2.35$  vs.  $M_5 = 3.57$ ,  $SD = 1.80$ ;  $F(1, 87) = 6.47$ ,  $p < .01$ ).

*Choice difficulty.* The ANOVA revealed an interaction of assortment and mental representation ( $F(1, 144) = 5.34$ ,  $p < .05$ ). Follow-up comparisons showed that participants with an abstract representation experienced less choice difficulty than those with a concrete representation when choosing from the small assortment with dissimilar options ( $M_{\text{abstract}} = 3.84$ ,  $SD = 2.51$  vs.  $M_{\text{concrete}} = 6.35$ ,  $SD = 1.93$ ;  $F(1, 144) = 20.94$ ,  $p < .01$ ). However, for participants choosing from 20 similar options, the difference of choice difficulty was significantly smaller between those with an abstract representation and those with a concrete representation ( $M_{\text{abstract}} = 3.70$ ,  $SD = 2.60$  vs.  $M_{\text{concrete}} = 4.35$ ,  $SD = 2.34$ ;  $F(1, 144) = 1.40$ ,  $p > .1$ ). Furthermore, participants with a concrete representation reported greater choice difficulty for the small assortment with dissimilar options than for the large assortment with similar options ( $M_{\text{small, low-similar}} = 6.35$ ,  $SD = 1.93$  vs.  $M_{\text{large, high-similar}} = 4.35$ ,  $SD = 2.34$ ;  $F(1, 144) = 13.26$ ,  $p < .01$ ). In contrast, the change in assortment similarity did not affect participants with an abstract representation ( $M_{\text{small, low-similar}} = 3.84$ ,  $SD = 2.41$  vs.  $M_{\text{large, high-similar}} = 3.70$ ,  $SD = 2.60$ ;  $F(1, 144) = .06$ ,  $p > .1$ ).

Experiment 4 demonstrates that the impact of perceived similarity on choice difficulty is qualified by mental representation of the assortment. As predicted, consumers who represented the small assortment with dissimilar options at an abstract level experienced less difficulty than those who represented the same assortment at a concrete level. Furthermore, this difference in choice difficulty between two mental representations was much smaller when participants chose from the larger but more similar assortment.

To provide additional evidence that abstract representation reduces choice difficulty independent of the assortment size, the next study uses a contextual factor to manipulate perceived similarity of the assortment. Mishra (2009) demonstrates that products are perceived as less similar when they are presented with different-colored packages than when presented with same-colored packages. Therefore, we expect that by keeping the size of the assortment fixed, the changes in similarity that are induced by contextual factors will have an analogous effect on how mental representation influences choice difficulty. Experiment 5 tests this proposition and manipulates similarity by placing 20 flavors of gummy candies either in identical plates (corresponding to high similarity) or in plates that vary in colors only (corresponding to low similarity). This extension is also important managerially, because displaying the same assortment in different packages can potentially alter perceived similarity of the assortment and consequently influence choice difficulty and outcome satisfaction.

Furthermore, Experiment 5 investigates whether the effect of mental representation can affect choice outcome: namely, the satisfaction with the chosen option. If, as hypothesized, a change in the mental representation of the assortment systematically influences the degree of choice difficulty, this subjective experience of difficulty can directly affect outcome satisfaction (Lieberman and Förster 2006; Novemsky et al. 2007). Given that when the perceived similarity of the assortment is low, a concrete representation results in a higher degree of choice difficulty than

an abstract representation, we expect that the same pattern will occur for outcome satisfaction.

#### EXPERIMENT 5: MENTAL REPRESENTATION AND PERCEIVED SIMILARITY

Similar to Experiment 4, Experiment 5 initially induced participants to adopt an abstract or concrete representation using a separate procedure. Subsequently, participants chose from 20 flavors of gummy candies, each placed on either same-colored or different-colored plates.

#### Method

We randomly assigned 140 undergraduate students (65 men, 75 women; average age = 22.65 years) from a large public Chinese university to a 2 (mental representation: abstract vs. concrete)  $\times$  2 (perceived similarity: high vs. low) between-subjects design. We first manipulated participants' levels of representation with an ostensibly unrelated task adapted from Freitas, Gollwitzer, and Trope (2004), the same task used in Experiment 4. After completing the manipulation task, participants were guided to another room and saw 20 options of gummy candies that varied in flavor. In the high-perceived similarity conditions, 20 options were placed on 20 identical pink plates. In the low-perceived similarity conditions, the same 20 options were placed on 20 different-printed plates that varied only in color patterns (Experiment 2, Mishra 2009). Participants were asked to choose one favorite type of candy and told that they would receive their choice as a thank-you gift at the end of the experiment. For further information about the stimuli used, see the Web Appendix ([www.marketingpower.com/jmr\\_webappendix](http://www.marketingpower.com/jmr_webappendix)).

After participants indicated their choices, we asked them to complete several dependent measures that were identical to those used in Experiment 4. Finally, we asked participants to indicate how satisfied they were with the chosen option on a nine-point scale (1 = "not at all satisfied," and 9 = "very much satisfied").

#### Results

*Perceived similarity.* We conducted a pretest separate from the main experiment involving the difference in perceived similarity when the candies were displayed on different-colored and same-colored plates, using 46 participants. The pretest's results showed that participants perceived the candy assortment as more similar when the candies were displayed on same-colored plates than on different-colored plates ( $M_{\text{same color}} = 5.47$ ,  $SD = 2.06$  vs.  $M_{\text{different color}} = 4.03$ ,  $SD = 2.34$ ;  $F(1, 44) = 6.30$ ,  $p < .05$ ), which suggests that our manipulation of perceived similarity was successful.

An ANOVA of the main experiment's data revealed a significant interaction between mental representation and plate color ( $F(1, 136) = 6.10$ ,  $p < .05$ ). When the candies were displayed on the same-colored plates, participants with a concrete representation perceived the assortment as less similar than those with an abstract representation ( $M_{\text{concrete}} = 4.37$ ,  $SD = 2.06$  vs.  $M_{\text{abstract}} = 6.11$ ,  $SD = 1.85$ ;  $F(1, 136) = 21.11$ ,  $p < .01$ ), for an average perceived similarity difference of 1.74. However, when the candies were displayed on different-colored plates, participants with a concrete representation perceived the assortment to be much less similar

than those with an abstract representation ( $M_{\text{concrete}} = 2.56$ ,  $SD = 1.00$  vs.  $M_{\text{abstract}} = 5.97$ ,  $SD = 1.61$ ;  $F(1, 136) = 43.15$ ,  $p < .01$ ), for an average perceived similarity difference of 3.41. Specifically, the difference in perceived similarity between two mental representations was larger when the candies were displayed on different-colored plates than on same-colored plates (mean difference<sub>different color</sub> = 3.41 vs. mean difference<sub>same color</sub> = 1.74;  $t(68) = 2.84$ ,  $p < .01$ ).

**Choice difficulty and satisfaction.** An ANOVA on choice difficulty yielded a significant interaction between mental representation and plate color ( $F(1, 136) = 6.61$ ,  $p < .05$ ). We predicted that a concrete representation would increase choice difficulty more when the candies were displayed on different-colored than on same-colored plates. The results are consistent with our predictions. In particular, in the same-colored plates conditions, participants with a concrete representation reported lower choice difficulty than those with an abstract representation ( $M_{\text{concrete}} = 4.91$ ,  $SD = 2.02$  vs.  $M_{\text{abstract}} = 3.58$ ,  $SD = 1.38$ ;  $F(1, 136) = 27.56$ ,  $p < .01$ ), for an average choice difficulty difference of 1.33. In contrast, in the different-colored plates conditions, participants with an abstract representation reported much lower choice difficulty than those with a concrete representation ( $M_{\text{abstract}} = 3.47$ ,  $SD = 1.35$  vs.  $M_{\text{concrete}} = 6.66$ ,  $SD = 1.70$ ;  $F(1, 136) = 63.62$ ,  $p < .01$ ), for an average choice difficulty difference of 3.19. The difference in choice difficulty between the two mental representations was indeed larger when the candies were displayed on different-colored than on same-colored plates (mean difference<sub>different color</sub> = 3.19 vs. mean difference<sub>same color</sub> = 1.33;  $t(68) = 2.99$ ,  $p < .01$ ).

A similar pattern emerged for reported satisfaction with the choice outcome (see Figure 4). An ANOVA on satisfaction revealed a significant interaction ( $F(1, 136) = 8.56$ ,  $p <$

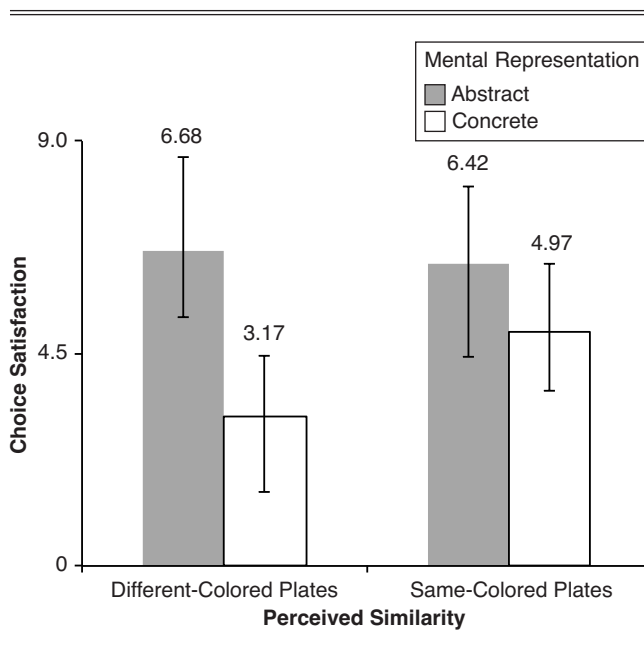
.05). When choosing from the candies displayed on same-colored plates, participants with a concrete representation reported a lower satisfaction level with their choice than did their abstract counterparts ( $M_{\text{concrete}} = 4.97$ ,  $SD = 1.27$  vs.  $M_{\text{abstract}} = 6.42$ ,  $SD = 1.99$ ;  $F(1, 136) = 18.03$ ,  $p < .01$ ). However, the changes in mental representation affected the satisfaction level to a larger extent when the candies were displayed on different-colored plates ( $M_{\text{concrete}} = 3.17$ ,  $SD = 1.42$  vs.  $M_{\text{abstract}} = 6.68$ ,  $SD = 1.61$ ;  $F(1, 136) = 43.47$ ,  $p < .01$ ). The difference in satisfaction level between the two mental representations was greater when the candies were displayed on different-colored than on same-colored plates (mean difference<sub>different color</sub> = 3.51 vs. mean difference<sub>same color</sub> = 1.45;  $t(68) = 3.16$ ,  $p < .01$ ).

Experiment 5 illustrates that compared with an abstract representation, a concrete representation of the assortment leads to a greater increase in choice difficulty and a greater decrease in outcome satisfaction when consumers choose from an assortment of low-perceived similarity (different-colored plates) than from an assortment of high similarity (same-colored plates). Notably, decreasing similarity perceptions through contextual changes (i.e., plate color) greatly affected the consumers representing options at a concrete level, thus making the choice more difficult and their chosen options less satisfactory. However, consumers who represented the assortment at an abstract level were hardly influenced by the contextual changes to the assortment. This finding provides additional support for the assertion that contextual factors of the choice environment can easily influence a concrete representation, even when the underlying assortment is unchanged.

#### GENERAL DISCUSSION

Consumers face a large array of product options in their daily shopping environment. Although some research demonstrates a negative effect of assortment size on choice, a recent meta-analysis by Scheibehenne, Greifeneder, and Todd (2010) indicates a null effect of assortment size on choice difficulty. These inconsistent findings call for a closer investigation of the choice process associated with large assortment and a better understanding of the conditions under which a large assortment's negative effect takes place. The present research demonstrates how a shift in mental representation can change the choice process and consequently influence decision difficulty. Experiments 1 and 2 show that a large assortment represented at a concrete level results in greater choice difficulty than when it is represented at an abstract level. Experiment 3 demonstrates that the abstract representation of an assortment does not decrease its perceived similarity compared with a concrete representation, which in turn leads to fewer trade-offs or comparisons between options and results in a lesser increase in choice difficulty. Experiments 4 and 5 further reveal that the core psychological process occurs through changes in perceived similarity and not through assortment size. That is, by manipulating the perceived similarity of an assortment, independent of assortment size (through attribute ranges in Experiment 4 and a contextual factor in Experiment 5), a concrete representation of low-similarity assortments makes the choice more difficult and results in less satisfaction with the chosen option than does an abstract representation. Our findings enrich the understanding of the

Figure 4  
CHOICE SATISFACTION AS A FUNCTION OF MENTAL REPRESENTATION AND PERCEIVED SIMILARITY (EXPERIMENT 5)



antecedents of choice overload effect by providing one possible way of reconciling the inconsistency: by changing the way participants represent large assortments.

Our findings contribute to recent research that examines how mental representations of choice information affect choice process. For example, Khan, Zhu, and Kalra (2011) find that high-level construal renders consumers less likely to engage in trade-offs and systematically influences context effects. In addition, Hong and Lee (2010) suggest that people who process information at a superordinate level process conflicting ideas more inclusively and thus experience less discomfort and develop more positive responses toward an ad with mixed emotional appeal. The current research details our effort to understand the conditions under which consumers make trade-offs when facing a choice. We show that a decreased similarity perception of assortment options under a concrete representation necessitates more trade-offs or comparisons between the options and thus results in increased choice difficulty. This research provides new insights into the role of similarity perception in the context of large assortments.

Our findings also have important managerial implications. Currently, retailers face the major challenge of balancing between the benefits of presenting a large assortment in a category and its potentially negative consequences. Therefore, it is important to understand the impact of assortment size on consumer choice processes and how to reduce the choice difficulty associated with a large assortment. Our research provides insights into what marketers can do to decrease choice difficulty and increase purchase behavior. Specifically, marketers can improve both the consumer pur-

chase experience and sales with large assortments by altering the level at which consumers represent assortment options. For example, marketers might trigger a more abstract representation by providing cues in the marketing environment that aid consumers in the choice-making process. In general, highlighting products' high-level benefits promotes abstract representation, whereas detailing product features or usages induces concrete representations.

Marketers can also organize assortments in specific ways to promote a more abstract representation. For example, grouping various products in the oral care aisle by subcategories (e.g., toothpaste, mouthwash, floss in distinct shelves) rather than by brands (e.g., Crest, Colgate) would likely result in a more abstract representation and consequently less choice difficulty and greater satisfaction.

In summary, the present research offers deeper insight into the conditions under which the negative effect of increasing assortment size is likely to occur. In particular, we delineate the roles of mental representation and perceived similarity in choice process associated with large assortments. More studies are needed to further explore other factors related to choice overload effect.

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## Appendix

### EXPERIMENT 4: STIMULI OPTIONS

A: 5 Dissimilar Hotels		
	Distance to Beach	Customer Rating
Astwood Hotel	4,000 meters to beach	98.0 of 100
Granaway Hotel	3,000 meters to beach	93.0 of 100
Rosedon Hotel	2,000 meters to beach	88.0 of 100
Sandpiper Hotel	1,000 meters to beach	83.0 of 100
Sonesta Hotel	15 meters to beach	78.0 of 100
B: 20 Similar Hotels		
	Distance to Beach	Customer Rating
Astwood Hotel	965 meters to beach	98.0 of 100
Granaway Hotel	915 meters to beach	97.8 of 100
Rosedon Hotel	865 meters to beach	97.6 of 100
Sandpiper Hotel	815 meters to beach	97.4 of 100
Sonesta Hotel	765 meters to beach	97.2 of 100
Clearview Hotel	715 meters to beach	97.0 of 100
Tucker's Hotel	665 meters to beach	96.8 of 100
Cedarbrook Hotel	615 meters to beach	96.6 of 100
The Reefs Hotel	565 meters to beach	96.4 of 100
Elbow Hotel	515 meters to beach	96.2 of 100
Davanzati Hotel	465 meters to beach	96.0 of 100
Casa Mar Hotel	415 meters to beach	95.8 of 100
Banyan Tree Hotel	365 meters to beach	95.6 of 100
Las Casitas Hotel	315 meters to beach	95.4 of 100
Acacia Hotel	265 meters to beach	95.0 of 100
Dorset Hotel	215 meters to beach	94.6 of 100
Britania Hotel	165 meters to beach	94.2 of 100
Coral Princess Hotel	115 meters to beach	93.8 of 100
Montana Hotel	65 meters to beach	93.4 of 100
Grotto Hotel	15 meters to beach	93.0 of 100



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