

**THINKING ABOUT WHAT YOU DON'T THINK ABOUT: THE ROLE OF  
MENTAL SIMULATION IN PREFERENCE CONSISTENCY  
AND NEW PRODUCT EVALUATION**

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## **ABSTRACT**

MIN ZHAO: Thinking About What You Don't Think About: The Role of  
Mental Simulation in Preference Consistency and New Product Evaluation  
(Under the direction of Steve Hoeffler and Gal Zauberman)

According to the accessibility-diagnostics framework, momentarily more accessible aspects of a product can have a disproportionate influence over the evaluation of the product by blocking other aspects of the product that are less accessible, yet perhaps more diagnostic. In the three essays of my dissertation, I investigate how to use different types of mental simulation to enhance the accessibility of the naturally ignored information to overcome related negative consequences.

In essay 1, I combine research on choice over time and process vs. outcome-focused mental simulation. Choice over time research indicates that high-level desirability considerations are more accessible for the distant future and low-level feasibility considerations are more accessible for the near future, leading to preference inconsistency over time. I propose that preference consistency could be achieved through: 1) outcome simulation (which is focused on the desirability consideration of an event) for the near future, or 2) process simulation (which is focused on the feasibility consideration of an event) for the distant future, due to the complementary role of each type of mental simulation at each point in time. In addition, I propose that time is a key factor that could potentially explain the

conflicting findings in the mental simulation literature regarding the effectiveness of process vs. outcome simulation.

In essay 2, I investigate the domain of new products and find that while high-level desirability considerations appear more accessible than low-level feasibility considerations for incrementally new products (INPs), really new product (RNPs) are represented with both the desirability and feasibility considerations. As such, the traditional process and outcome simulation do not differ in terms of their impact on product evaluations for RNPs. However, when examining the specific information processing modes with a cognitive or affective focus, I find that outcome simulation is more effective at increasing the evaluation of RNPs than process simulation under a cognitive mode, whereas the reversal is true under an affective mode. Further, the degree of planning and level of uncertainty are found to partially mediate this interactive effect.

In essay 3, I switch to a different dimension of consumers' mental representations when evaluating new products: memory vs. imagination-focused representations. I demonstrate that people naturally rely on the more readily accessible images from their past memories while neglecting imaginative new activities. I propose and test the effect of the imaginative-focused visualization strategy which enhances the naturally neglected imaginative new uses of the RNPs and leads to higher evaluation for RNPs. In addition, essay 3 indicates that ease of imagination directly impacts product evaluation for RNPs such that higher ease leads to higher evaluations. In all three studies of essay 3, focus of visualization and ease of visualization have a limited role on the evaluation of INPs.

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## **CHAPTER 1 -- INTRODUCTION**

Human beings are thought to be “cognitive misers” who are reluctant to perform extensive thinking and take shortcuts whenever they can (Fiske and Taylor 1991). When making decisions, we rely on the pieces of information that are most easily accessible at the moment of the decision (Feldman and Lynch 1988; Schwarz et al. 1991; Tversky and Kahneman 1974). This momentarily activated cognition often has disproportionate influence over the judgment and blocks representations which could be more diagnostic (Feldman and Lynch 1988), especially when people are not motivated to invest high effort into a decision task and simply perceive the mere accessibility as diagnosticity (Menon and Raghubir 2003). As a result, inaccurate judgment follows (Feldman and Lynch 1988).

Although the accessibility-diagnosticity framework (Feldman and Lynch 1988) originated in measurement research, in the domain of consumer decision making, relying on one aspect of a product that is naturally more accessible to drive an evaluation while neglecting other aspects is a common phenomenon. This unidirectional reliance on a single aspect of a product which blocks other aspects could cause consequences such as preference inconsistency over time (e.g. Liberman and Trope 1998) or lowered evaluation for new products (e.g. Dahl and Hoeffler 2004; Mukherjee and Hoyer 2001). Those consequences are rather negative. For example, preference inconsistency leads to over-commitment in the distant future but regret or procrastination in the near future (Ariely and Wertenbroch 2002; Lynch and Zauberma, in press; Zauberma and Lynch 2005), or more specifically in the

consumer domain, consequences such as purchase of products with promising mail-in-rebates to be redeemed in the distant future but low redemption motivation in the near future (Soman 1998). Similarly, new products provide consumers with novel benefits which may ultimately improve a consumer's life. However, lower evaluation for novel benefits leads to low adoption and hinders consumers from appreciating and utilizing these new benefits. From the marketer's point of view, increasing new product adoption is important due to the costly product development, short life cycle and fierce competition (Herzenstein, Posavac and Brakus 2006).

To avoid those negative consequences by helping consumers achieve consistent preferences and enhance evaluation of new product, it is important to understand which aspects of the products are naturally more accessible, and to find mental strategies to help consumers augment these natural representations with less accessible, but perhaps more diagnostic, information. Such is the main objective of this dissertation. At the same time, while drawing on research on mental simulation to seek appropriate mental strategies for the scenarios described above, this dissertation suggests a potential explanation to the present contradictory findings in the mental simulation literature regarding the effectiveness of different types of simulation, as well as unconfounds the interference between simulation type and cognitive vs. affective information processing mode in the traditional mental simulation literature (Escalas and Luce 2003, 2004; Taylor et al. 1998; Taylor and Pham 1999).

According to Feldman and Lynch (1988), which cognitions receive momentary activation is a function of the environmental cues directing attention to some aspects of the object's features. Thus, depending on the situation, people mentally focus on different aspects

of a product. There are many dimensions that could describe the different aspects of any product. “Using a photo book software” for example, could be identified in totally different ways such as “creating a photo book and preserving memories,” “downloading and installing the software package,” “something different from making a manual album like I used to do,” or “cool new technology I’ll try soon.” In any specific situation, one or several of these mental representations will become more accessible in one’s mind, be perceived as more diagnostic, block other aspects of consideration and influence the final decision of which software to choose. In the three essays of this dissertation, two important dimensions that influence consumers when they evaluate products will be discussed: level of mental representation (i.e. high level desirability representation vs. low level feasibility representation) and focus of mental representation (i.e. memory-focused or imagination focused), respectively. I investigate factors that impact the natural accessibility of different levels of those two dimensions. More importantly, I propose mental simulation strategies to alter the accessibility of different levels on each dimension while addressing the contradictory findings regarding the effectiveness of different types of simulation and the possible confounds in the traditional mental simulation literature.

### ***LEVEL OF MENTAL REPRESENTATION***

#### ***Level of Mental Representation***

Cognitive and social-cognitive research has proposed level of mental representation as a systematic difference in the representation of items: concepts that are more closely related to the perceived essence of things and have greater explanatory power are categorized as abstract representations whereas concepts that are peripheral are defined as concrete

representations (Medin 1989). More relevant to the current work, previous research on action identification suggests that actions may be represented in terms of superordinate or subordinate goals. Superordinate goals are related with the abstract “why” aspects of an action reflecting the end state, whereas the subordinate goals are related more with the specific “how” details of the action reflecting the means (Vallacher and Wegner 1987). Construal level theory incorporates this distinction between the end and means and differentiates between high-level desirability related representations which corresponds to the end state in the goal literature, vs. low-level feasibility related representations that refers to the means to achieve the goal (Liberman and Trope 1998; Trope and Liberman 2003). For example, a high-level desirability-related representation may represent “creating a photo book” as “preserving memories in a nice way” rather than as “downloading a software” or “editing the pictures” as examples of low-level feasibility-related representations.

#### *Factors Impacting Desirability vs. Feasibility Related Level*

Recent research has proposed that the natural mental representations of an event vary depending on the temporal distance (Liberman and Trope 1998). When people make a decision for the distant future, their decision is based more on the consideration of the high level desirability aspect of the product that emerges automatically and becomes more accessible. However, they underweigh feasibility considerations that may be more diagnostic. On the contrary, when people make a product choice for the near future, they rely more on the low level feasibility aspect of the product (e.g. ease of using) that is naturally evoked and more accessible. However, they neglect the desirability aspects (e.g. product benefits) that could have been more diagnostic (Liberman and Trope 1998; Trope and Liberman 2000,

2003). As a result, people would prefer higher-quality options for the distant future but easier options for the near future, which results in inconsistent preference over time. As noted earlier, this inconsistent preference would lead to negative consequences such as regret or low customer satisfaction from ordering a high-quality, but hard-to-use product, and ending up not using it at all. Essay 1 of this dissertation will examine this specific context where temporal distance impacts the mental representation of a product.

In essay 2, I move to the context of new product learning and explore how incrementally new products (INPs) and really new products (RNPs) differ in term of the natural mental representations when consumers evaluate them. Recent research has suggested that similar to temporal distance, there are three other dimensions of psychological distances – spatial distance, social distance and hypotheticality, following the general rule that the more distal entities (which are more remote from direct experience) have a mental construal that is naturally more accessible at a higher level (Liberman, Trope and Stephan, 2006). Intuitively, one would think that for INPs which are closer to people's direct experiences, the feasibility considerations at a lower level will be more accessible, whereas for RNPs which are more remote from people's experiences, the desirability related aspects at a higher level will be more accessible. However, a comparison between the INPs and RNPs indicates that these products differ on other important dimensions as well. For example, an essential difference is product complexity (the extent to which people can figure out how to use the product) and the related degree of uncertainty (Hoeffler 2003): For INPs, people understand the link between features and benefits and have low uncertainty, whereas for RNPs, people have difficulty in understanding how to use the product have higher uncertainty, which might prevent them from ignoring the low-level product usage related thoughts. Therefore, I believe

that the natural representations of INPs vs. RNPs are more impacted by these different learning mechanisms due to product complexity, rather than just the general psychological distance mechanism.

Past research in product learning demonstrated that higher prior knowledge leads to higher confidence and lowered motivation of information processing (Wood and Lynch 2001). In addition, studies showed that for products with lower complexity, people pay more attention to the product benefits and ignore the usage process, whereas for products with higher complexity, people would consider both the benefits and the usage process (Mukherjee and Hoyer 2001). Thus, I argue that for INPs, desirability focused considerations about the salient benefits will be naturally more accessible than the feasibility focused considerations about the usage process. However, for RNPs, consumers have a high motivation to pay attention to different aspects of the products including the product benefits and specific usage situations. This is, RNPs are naturally represented with both desirability and feasibility considerations. This specific context where product complexity impacts to level of mental representation of a product will be examined in essay 2.

### *Augmenting the Naturally Neglected Mental Representation*

Elaboration or rehearsal of an information item increases its accessibility and related diagnosticity (Feldman and Lynch 1988; Gollwitzer 1999; Sherman et al. 1978). Thus, I expect that in the contexts described above, with varying temporal distance and product complexity, encouraging people to engage in extensive thinking by activating the mental construal that is naturally neglected and less accessible, will lead to more accurate product appraisals, inducing preference consistency over time and higher evaluation of RNPs.



Research in mental simulation has identified two distinctive types of simulation: outcome simulation that is focused on the desirable outcome of achieving the goal (i.e. the desirability aspect) versus process simulation that is focused on the process of going through the steps of reaching a goal (i.e., the feasibility aspect) (Taylor et al. 1998). This is consistent with the differentiation in the goal striving literature between the pre-decisional deliberate mindset as of “why” to pursue a certain goal vs. the post-decisional implemental mindset as of “how” to implement the goal (Armor and Taylor 2003; Taylor and Gollwitzer 1995). The majority of the research has indicated that process simulation is more effective for goal attainment than outcome simulation (Taylor et al. 1998). Or in the language of goal striving literature, when people have implementation intentions and specify the when, where, and how responses which leads to goal attainment, these situations will become mentally activated and thus more easily accessible, which leads to more effective goal attainment (Gollwitzer 1999). However, other studies found that outcome simulation could also lead to higher performance than process simulation (Taylor and Pham 1999). Drawing on research in mental simulation in essay 1 and essay 2, I identify the unique effectiveness of process or outcome simulation in terms of achieving preference consistency over time and higher RNP evaluations by altering the accessibility of different aspects of a product.

At the same time, essay 1 and essay 2 seek to contribute to the mental simulation literature by solving two major problems in mental simulation research:

1) As illustrated above, there are contradictory findings in terms of whether process or outcome simulation is more effective (Taylor et al. 1998; Taylor and Pham 1999). So far, the proposed explanations for the opposite findings such as task complexity remain only conjectures, as Taylor and Pham (1999) conclude that it is unclear which factor is responsible

for the different findings. Essay 1 will take the temporal perspective and offer a time-based explanation for the contradictory findings.

2) A closer look at the traditional mental simulation manipulations reveals a confound in mental simulation research: Process simulation in the psychology literature puts more emphasis on the cognitive components by directing people to think about the step-by-step process of doing something, while outcome simulation focuses on the affective components by instructing people to imagine the feeling or the joy of achieving something (Pham and Taylor 1999; Taylor et al. 1998). Although research in marketing tries to incorporate both cognitive and affective components into the process and outcome simulation instructions (Escalas and Luce 2003, 2004), it is likely that both components will interfere with each other and cancel out the unique effect of each type of mental simulation. Essay 2 will tease apart the cognitive and affective processing mode and investigate the unique effect of process and outcome simulation on the evaluation of RNPs under each processing mode.

### ***FOCUS OF MENTAL REPRESENTATION***

Since new product learning is an important area in marketing, I discuss another dimension in the new product domain that is associated with different types of information that are naturally more accessible: memory vs. imagination focused mental representation (Dahl, Chattopadhyay and Gorn 1999; Childers and Houston 1983; Perky 1910). Memory images refer to events or occasions that have been personally experienced or observed whereas imagination images refer to a new, never-before-experienced event (Perky 1910). Past research has found that differentiating between memory and imagination focused images

is important in learning, mood and affect, problem-solving (Adeyemo 1990, 1994) and new product design (Dahl, Chattopadhyay and Gorn 1999).

I believe the distinction between memory and imagination-focused considerations is important for the evaluation of RNPs which offer novel features and benefits. By definition, memory images are more accessible since they are related with past experiences that are stored somewhere in the memory and are retrievable. Imagination images, on the other hand, can not be directly retrieved from the memory and need to be constructed (Bettman, Luce and Payne 1998). Cognitive miser theory and accessibility-diagnostics framework would predict that consumers would rely on the more accessible and thus seemingly more diagnostic images based on past activities when they evaluate a new product (Fiske and Taylor 1991; Feldman and Lynch 1988; Menon and Raghurir 2003). However, research has shown that it is the naturally less accessible imagination-focused thoughts that facilitated innovative problem solving or new product design (Adeyemo 1990; Dahl, Chattopadhyay and Gorn 1999). Accordingly, one would expect that when consumers focus on the imaginative aspect of RNPs, product evaluation would be higher. On the other hand, memory images that are confined to previous experiences would limit the full appreciation of the novel benefits that RNPs provide.

Thus, in essay 3, I examine the impact of imaginative-focused imagery vs. memory-based imagery on the evaluation of really new products (RNPs). In previous research the critical finding for my purpose is that when evaluating a RNP, people naturally use the more accessible images which are biased towards product usage from their existing memories (while neglecting the imaginative usages). In a similar fashion to the prior two essays, I enhance imaginative-focused visualization and demonstrate that enhancing the naturally

neglected imaginative aspects of an RNP leads to higher evaluations. Further, the role of perceived ease/difficulty of the visualization is examined on the efficacy of the imaginative focused visualization, which is beyond the traditional focus on retrieval from past memories in the existing ease of accessibility literature (Schwarz et al. 1991; Schwarz 1998). The results demonstrate that making the imaginative visualization more difficult or easier directly impacted the evaluation of the RNP. Finally, the effects of type of visualization strategy and difficulty of the visualization task are shown to have a limited impact on a more incremental product.

In summary, in three essays I am going to investigate circumstances where consumers tend to use the most accessible mental representation of the product and neglect other possibly more diagnostic dimensions. I propose and show how mental simulation is used to activate the naturally less accessible and seemingly less diagnostic representations to optimize consumer decisions. Two important dimensions of consumers' representations when they evaluate a product are examined: level of mental representations (high level desirability vs. low level feasibility) and the focus of mental representations (memory vs. imagination focus). Using process vs. outcome simulation to alter the accessibility of representation levels in near and distant future in order to achieve preference consistency over time is the objective of essay 1. Using process vs. outcome simulation to alter the accessibility of levels of mental representation for RNPs vs. INPs in order to increase product evaluation is the focus of essay 2. Using imaginative-focused visualization to encourage the naturally ignored imagination-focused product usage consideration for RNPs in order to enhance product evaluation is studied in essay 3.

In addition, as a contribution to the simulation literature, essay 1 provides a temporal-based explanation to the conflicting findings in the mental simulation literature regarding the effectiveness of each type of simulation. Essay 2 investigates the confound between simulation type (outcome vs. process) and information processing mode (cognitive vs. affective) by demonstrating the unique effect of each type of simulation under a specific processing mode. Essay 3 also extends research on ease of retrieval by showing that ease of visualization has a similar role when applied to constructing imaginative new uses.

## **CHAPTER 2 -- ESSAY 1**

### **MENTAL SIMULATION AND PREFERENCE CONSISTENCY OVER TIME: THE ROLE OF PROCESS- VERSUS OUTCOME-FOCUSED THOUGHTS**

Consider the following scenario: A person has just returned from a wonderful trip in which she took a lot of digital pictures. She is planning to create a digital photo album for this trip and decides to wait for the next three-day weekend to complete the album (which occurs next month). After reading a review of various software packages, she selects a software package with a high-quality rating, numerous designed themes, and advanced layout tools that should take a moderate amount of time and effort to learn and complete the album. However, four weeks later, when the time to create the photo album arrives, she focuses on the effort associated with installing and learning this software and, ultimately, opts for a simpler software package that can be installed and learned more easily but has relatively limited functionality.

The question of whether choosing the simpler software package is a better or worse decision is not the focus of this research. Rather, my interest lies in understanding the mental processes that are associated with selecting an option (simpler software package) that is inconsistent with the original preference (advanced software package). Furthermore, I propose and test a method for reducing this preference inconsistency by changing consumers' mental representation of an event using mental simulation. I use these findings to better understand preference formation over time and the relationship between two types of mental simulation: process-focused and outcome-focused simulation.

As the preceding scenario illustrates and research on choice over time demonstrates (e.g., Soman 1998; Trope and Liberman 2003), temporal distance influences consumers' preferences. Specifically, Trope and Liberman (2003) show that people tend to focus on concrete aspects of near-future events and abstract aspects of distant-future events. When making a decision that has immediate consequences, people think in more concrete terms, putting more weight on low-level components of an option (i.e., how feasible the option is). However, when people make a decision about something that is in the more distant future, they tend to think in more abstract terms, focusing on the high-level components of an option (i.e., how desirable a certain option is). This shift in consideration has been shown to lead to temporally inconsistent preferences (Trope and Liberman 2003).

What might moderate such temporally inconsistent preferences? Suppose that counter to the natural (default) consideration pattern, people are encouraged to think about the concrete, step-by-step feasibility-related aspects of the software packages (e.g., imagining the steps involved to download, install, and learn the software packages) when they make their choice for the distant future. Would this change their preference such that their distant-future choice is consistent with what they would prefer when the choice is imminent? Conversely, what if people are encouraged to think about the more abstract desirability-related aspects of the software packages (e.g., imagining how they would feel after their digital photo album is created) when they make their choice for the immediate future? Could this lead to changes in their preference such that their current choice would be consistent with the choice they had indicated when the decision was in the distant future? These questions are important because consumers (firms) are interested in maximizing long-term happiness (customer satisfaction). Emerging research on the differences between process-focused and outcome-focused

simulation (e.g., Escalas and Luce 2003, 2004; Taylor, Pham, Rivkin and Armor 1998) may shed some light on ways to prevent inconsistent preferences.

In the current research, the main objective is to integrate theory from the mental simulation literature with the processes that lead to time inconsistent preferences and to propose systematic mental strategies to achieve preference consistency. I propose and demonstrate that outcome timing can help understand when each type of mental simulation, outcome or process, will be more effective in achieving preference consistency.

### ***TIME AND MENTAL REPRESENTATION***

#### ***Time Inconsistent Preferences and Mental Representation***

Time-dependent changes in preferences have been investigated across different areas in the behavioral and social sciences, including behavioral decision-making (e.g., Thaler 1981), delay of gratification (e.g., Mischel, Shoda, and Rodriguez 1989) and self-control (e.g., Rachlin 1995). Although research on preference inconsistency has offered mostly affective mechanisms to explain temporal shifts (e.g., Ainslie and Haslam 1992; Loewenstein 1996), recent theories have focused more on cognitive processes (e.g., Malkoc and Zauberaman, forthcoming; Trope and Liberman 2003; Zauberaman and Lynch 2005). In particular, construal level theory (Liberman and Trope 1998; Trope and Liberman 2000, 2003) proposes that temporal distance changes people's responses to future events by changing the way people mentally represent those events. Events in the distant future are more likely to be represented in terms of abstract and central features (high-level construals). However, events in the near future are more likely to be represented in terms of concrete and peripheral features (low-level construals). This shift in mental representation can change attribute



weights over time (Liberman and Trope 1998; Soman 1998) as well as alter the decision process (Förster, Friedman, and Liberman 2004; Malkoc, Zauberan, and Ulu 2005).

The temporal shift in how people represent events and process information has important implications for the consistency of preferences over time. For the purpose of our current work, an important difference between high-level and low-level mental representations is the resulting relative importance of desirability versus feasibility considerations (Liberman and Trope 1998). Desirability refers to the value of an action's end state, whereas feasibility refers to the ease or difficulty of the means to reach the end state. Construal level theory then predicts that temporal distance increases desirability-related mental representations and decreases feasibility-related mental representations (Liberman and Trope 1998; Trope and Liberman 2000, 2003). As a result of this shift between desirability and feasibility, people may have temporally inconsistent preferences, preferring more desirable options for the distant future but more feasible options for the near future. For example, Liberman and Trope (1998) find that when asking students to choose a distant-future research assignment, the decision is dominated by the positive outcome of completing a project on an interesting topic and students are willing to sacrifice ease for the sake of interest. However, when the assignment is due in the near future, the mental representation of the assignment is dominated by the amount of time and effort required to finish the project and students choose an easy but uninteresting assignment.

#### *Implications of Shifts in Mental Representations for Preference Consistency*

Research on choice over time suggests that intertemporal patterns of evaluation and preference could be altered if temporal construal is controlled (Trope and Liberman 2003).

To prevent the negative consequences of neglecting the low-level aspects of an action in the distant future, one could focus on the concrete details of distant-future events by requiring individuals to rehearse, practice, or plan distant-future tasks in full detail (Gollwitzer 1999; Trope and Liberman 2003). Alternatively, the self-control literature has indicated that one could turn attention away from the concrete qualities of immediate temptation and focus on its abstract qualities (Baumeister and Heatherton 1996; Hoch and Lowenstein 1991; Mischel, Shoda and Rodriguez 1989).

To date, however, the idea of altering construal levels using mental control mechanisms has not received much attention in the literature on choice over time and self-regulation. Furthermore, theories of mental simulation focus mostly on goal attainment rather than preferences over time. I use the notion of differing levels of representation to systematically examine the effect of different types of mental simulation on preferences.

### ***PROCESS- VERSUS OUTCOME-FOCUSED MENTAL SIMULATION***

Mental simulation is the imitative mental representation of an event or series of events (Taylor and Schneider 1989). Prior research distinguishes between process simulation, which encourages people to imagine the step-by-step process of reaching a certain goal, and outcome simulation, which encourages people to think about the desirable outcome of fulfilling the goal (Taylor et al. 1998). Similar to the effect of implementation intentions which include the when, where and how aspects of goal attainment (Gollwitzer 1999), multiple studies have shown that when people engage in process-focused simulation, their performance is superior to those who engage in outcome-focused simulation (Oettingen and Mayer 2002; Pham and Taylor 1999; Rivkin and Taylor 1999; Taylor et al. 1998). For

example, Pham and Taylor (1999) find that participants who engage in process simulation (i.e., visualizing themselves studying for the exam in a way that would lead them to obtain an “A”) spend more time studying for the midterm and achieve a higher grade than participants who engage in outcome simulation (i.e., visualizing themselves receiving an “A” on the exam). In the consumer domain, Escalas and Luce (2003, 2004) show that process-focused advertisements facilitate behavioral intentions due to a spontaneous planning process, with argument strength playing a moderating role.

Thus, the classic mental simulation research focuses more directly on performance (with the notable recent work of Escalas and Luce 2003, 2004) and the dominant finding has demonstrated superior performance under process simulation. Yet I conjecture that when each type of mental simulation is implemented in research on choice over time, where people need to make trade-offs between high-level desirability and low-level feasibility considerations, each type of mental simulation (process-focused and outcome-focused) might be more effective at a different point in time.

#### *Simulation Type and Preference Consistency over Time*

Combining ideas of process versus outcome simulation with ideas of levels of mental representation in the research on choice over time, I propose that process simulation encourages a low-level mental representation, highlighting the concrete feasibility-related aspects of an event. In contrast, outcome simulation encourages a high-level mental representation, highlighting the abstract desirability-related aspects of an event. With this association between these two theories in mind, I argue that the pattern of preference inconsistency over time could be attenuated by regulating the levels of mental representations

with either process simulation or outcome simulation, depending on the temporal distance. In formulating our hypotheses, I compared the two types of simulation with the natural preference (i.e., no simulation) at different points in time (i.e., distant versus near future).

### *Near Future*

For events in the immediate future, concrete feasibility-focused mental representations are naturally evoked, and abstract desirability-related representations are neglected. As a result, process simulation, which redundantly focuses on concrete thoughts, may not be effective in shifting preferences to be consistent with those naturally occurring in a distant-future setting. However, an outcome simulation that focuses on the favorability of the event could activate the high-level representations and increase desirability-related considerations. As a result, outcome simulation for near-future events may lead to a change in people's preferences, making them more consistent with preferences that naturally arise when making decisions for the more distant-future.

H<sub>1a</sub>: Compared with the natural near-future preference, outcome simulation for near-future events/options causes a greater change in preference than does process simulation.

H<sub>1b</sub>: Outcome simulation for the near future leads to greater preference consistency over time (i.e., making near-future preferences after outcome simulation more consistent with natural distant-future preferences).

### *Distant Future*

For events in the distant future, abstract desirability-focused mental representations naturally play a dominant role, and the concrete feasibility-focused representations are neglected. Thus, process simulation could activate concrete representations and increase the weight given to feasibility-related considerations of the event. As a result, process simulation

for distant-future events may bring consumers' preferences closer to their preferences in the near future when the event is imminent. However, outcome simulation, which focuses on abstract desirability-related considerations, may not be effective in changing consumers' preferences, because it redundantly focuses on the naturally evoked high-level desirability-related thoughts about the distant-future event.

- H<sub>2a</sub>: Compared with the natural distant-future preference, process simulation for distant-future events/options causes a greater change in preference than does outcome simulation.
- H<sub>2b</sub>: Process simulation for the distant future leads to greater preference consistency over time (i.e., making distant-future preferences after process simulation more consistent with natural near-future preferences).

### ***EMPIRICAL APPROACH***

The hypotheses were tested in two experiments that examine the ability of outcome and process simulation to overcome preference inconsistency over time. In Experiment 1, I adapted a basic assignment choice scenario used in prior research on temporal construal (Liberman and Trope 1998). This allows me to replicate the existing findings and then isolate the impact of simulation type. In Experiment 2, I use a multiattribute consumer product (photo album software package) to test the impact of mental simulation type in an environment that requires consumers to trade off their effort against product performance. The general task in both experiments involves evaluating two options that are associated with different levels of feasibility and desirability. In addition, consistent with prior research (e.g., Liberman and Trope 1998; Trope and Liberman 2000), the timing manipulation had participants making the evaluation either in the near future (today or in a couple of days, depending on the task) or in the distant future (two or three months later).

Importantly, in both experiments, before evaluating the options, participants in the simulation conditions performed mental simulation that focused on either the process or the outcome associated with each option. In the mental simulation literature, process simulation has focused on a series of steps, or tasks, that are aimed to aid the completion of the focal goal (Taylor et al. 1998). Conversely, participants in the outcome simulation condition focused on experiencing the feelings associated with achieving a positive outcome (Taylor et al. 1998).

In the consumer domain, Escalas and Luce (2004) adapted the traditional process and outcome simulation manipulations toward preference in an advertising context. In their process simulation conditions, participants were asked to “focus on how you would incorporate this shampoo (vitamins) into your daily routine” (Escalas and Luce 2004, p. 282-3). Whereas, in the outcome simulation conditions participants were asked to “Imagine how you would feel if your looks improved (health improved) as a result of the shampoo (vitamins),” (Escalas and Luce 2004, p. 283). Our manipulations of process and outcome simulation mirrored the language used in these prior manipulations.

The primary dependent variable in both experiments is the relative preference between the two options (choice was also included in Experiment 2). To test the hypotheses associated with change of preference, I first computed a series of planned contrasts. To examine the impact of timing and simulation type further, I performed an additional analysis that combined theoretically similar conditions (control and process simulation in the near future conditions or control and outcome simulation in the distant future conditions). These converging sets of analyses allow me to test the relative effects of simulation type at different

points in time. In Experiment 2, I supplement the preference data with choice, as well as analysis of the coding of participants' written simulation protocols.

## ***EXPERIMENT 1***

### ***Method***

*Participants and design.* A total of 189 students at a major southeastern university completed the experiment to fulfill a research requirement for an introductory marketing course. The experiment was a 2 (time: near future, distant future) x 3 (simulation: control, outcome simulation, process simulation) between-subjects design.

*Procedure.* Participants were randomly assigned to one of six experimental conditions. In all conditions, participants were asked to imagine that they needed to turn in a class assignment that required reading a chapter and discussing several questions about it (Liberman and Trope 1998). There were two topics from which they could choose: Topic A was very interesting but required a great deal of effort. Topic B was less interesting but did not require as much effort. Each topic was described in general terms and no specific information about the topics was given (See Appendix A). The order of the two topics was counterbalanced.

Participants in the simulation conditions were asked to perform process or outcome simulation. Consistent with prior research (Escalas and Luce 2003, 2004), process simulation instructions focused on the activities associated with completing the assignment, whereas outcome simulation instructions focused on the benefits associated with completing the assignment (see the Appendix A for the exact wording).

To ensure that participants performed the mental simulations, they were asked to write down a detailed list of their thoughts following the simulation exercise. After reading the

scenario and performing the mental simulation exercise or just reading the scenario (in the control conditions), all participants were asked to indicate their likelihood of choosing that topic on a ten-point scale, anchored at 1 (“extremely unlikely”) and 10 (“extremely likely”). Subsequently, participants were asked to indicate their relative preference between these two topics on a scale anchored at 1 (“definitely topic A”) and 10 (“definitely topic B”). In the near-future conditions, the assignment was due a week later, whereas in the distant-future conditions, the assignment was due at the beginning of next semester, which was about three months from the time participants were completing the questionnaires.

### *Results*

The main dependent measure was the relative preference between the high-feasibility and high-desirability options. Note that higher scores represent greater preference for the higher-feasibility/lower-desirability option (the less interesting but easy topic). In addition, note that a key feature of the design is that (1) the control conditions are hypothesized to change over time in accordance with prior research and (2) mental simulations are hypothesized to change preference at different points in time – outcome simulation in the near future and process simulation in the distant future. Thus, to test the theoretical predictions, I present two sets of analyses.

The first analysis consists of a series of planned contrasts that match the hypotheses. The second analysis is a modified omnibus test that looks directly at the moderating effect of timing on the effectiveness of process versus outcome simulation by simultaneously testing changes in preference by combining theoretically similar conditions. Complete details are provided below.



*Replicating prior findings (control conditions).* The pattern of results for the control conditions replicated prior findings (e.g., Liberman and Trope 1998) with a marginally significant difference between near- and distant-future preferences ( $F(1, 183) = 3.00, p = .08, \omega^2 = .032$ ).<sup>1</sup> As expected, participants in the near-future condition preferred the easier but less interesting topic ( $M = 6.87$ ) more than those in the distant-future condition ( $M = 5.83$ ); see figure 1.

*Near future.* Planned contrasts demonstrate that for the near future, outcome simulation causes a change in preferences and leads to temporal preference consistency with the natural distant-future preference: Participants who engaged in outcome simulation indicated a significantly greater preference toward the interesting but difficult topic ( $M = 5.60$ ) compared with participants in the control condition ( $M = 6.87$ ;  $F(1, 183) = 4.71, p < .05, \omega^2 = .055$ ). However, there was no significant difference regarding the relative preference between the process simulation condition ( $M = 6.73$ ) and the control condition ( $M = 6.87$ ;  $F(1, 183) = .06, p = .81$ ). These results support  $H_{1a}$ . As a result of outcome simulation for the near future, the natural intertemporal preference inconsistency is eliminated. Preferences associated with outcome simulation for the near future ( $M = 5.60$ ) were not significantly different from the control preference for the distant future ( $M = 5.83$ ;  $F(1, 183) = .14, p = .71$ ), in support of  $H_{1b}$ .

*Distant future.* For the distant future, process simulation causes a change in preferences and leads to preference consistency over time with the natural near-future preference: In the distant-future conditions, participants in the process simulation condition indicated a marginally significant greater preference toward the less interesting but easier topic ( $M =$

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<sup>1</sup> Throughout the analyses sections in all three essays, I used overall error terms and adjusted degrees of freedom for all statistical tests (Winer, Brown, and Michels 1991). In addition, all  $\omega^2$  values cited in this article are partial  $\omega^2$  (Keren and Lewis 1979), excluding variance due to analysis of variance terms unrelated to the tested effect. Partial  $\omega^2 = \sigma^2_{\text{effect}} / (\sigma^2_{\text{effect}} + \sigma^2_{\text{error}})$ .

6.93) compared with those in the control condition ( $M = 5.83$ ;  $F(1, 183) = 3.32, p < .07, \omega^2 = .038$ ).<sup>2</sup> However, the preferences associated with the outcome simulation condition ( $M = 5.73$ ) were not significantly different from the control condition ( $M = 5.83$ ;  $F(1, 183) = .07, p = .79$ ). These results provide initial support for  $H_{2a}$ . As a result of process simulation for the distant future, the natural intertemporal preference inconsistency is eliminated. The preferences associated with process simulation for the distant future ( $M = 6.93$ ) were not significantly different from the natural preference of the near future ( $M = 6.87$ ;  $F(1, 183) = .01, p = .92$ ), which provides support for  $H_{2b}$ .

Because the hypotheses are about a series of planned contrasts with the control condition shifting with time (near vs. distant future), the 2-df omnibus interaction is not the appropriate test. However, since process simulation for near future and outcome simulation for distant future are hypothesized to match the respective default control conditions (match), whereas outcome simulation for near future and process simulation for distant future are hypothesized to cause preference deviation from the respective control conditions (mismatch), it is appropriate to test for a modified 1-df interaction by combining the control with the match conditions. Before testing for the modified interaction, two separate ANOVA tests for the match and mismatch conditions were conducted: First, I computed a 2 (near vs. distant future)  $\times$  2 (control vs. match) ANOVA. As expected, no main effects of simulation ( $F(1,183) = .13, p = .71$ ) or interaction between time and simulation ( $F(1,183) = 0, p = .99$ ) were found. Second, I conducted a 2 (near vs. distant future)  $\times$  2 (control vs. mismatch) ANOVA. As expected, there was a significant interaction between simulation and time ( $F(1,183) = 7.94, p = .005$ ). Thus I combined our control with match conditions and performed a modified 2

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<sup>2</sup> Process simulation may have had a lesser effect in this case because the experiment was conducted at the end of the semester when students may have had a general preference toward easy topics.

(near future vs. distant future) x 2 (match vs. mismatch) ANOVA that tested for the unique (1 df) main effect at each point of time. A significant interaction between time and simulation,  $F(1,185) = 11.07, p < .001$  was found.

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### *Discussion*

The results from the control conditions of Experiment 1 replicate prior findings (e.g., Liberman and Trope 1998) and demonstrate that people have a relatively stronger preference toward the higher-feasibility option for the near future than for the distant future. In support of the hypotheses, the results further show that for the near future, outcome simulation caused a greater change in preference toward the higher-desirability/lower-feasibility option ( $H_{1a}$ ), leading to preferences that were consistent with the control preference for the distant-future option ( $H_{1b}$ ). Conversely, for the distant future, process simulation created a greater preference change in favor of the higher-feasibility/lower-desirability option ( $H_{2a}$ ), leading to preferences that were consistent with those in the control condition for the near-future option ( $H_{2b}$ ).

Why doesn't process simulation in the near future and outcome simulation in the distant future cause any change in preference? My explanation focuses on the natural processing characteristics at each point in time. Thus, in the near-future scenario, process simulation enhances the dominant processing mode, in which the corresponding focus is on concrete feasibility-related thoughts. In contrast, outcome simulation enhances the dominant processing mode in the distant future by focusing on abstract desirability-related thoughts.

Experiment 1 provides direct evidence that process and outcome simulation can be used to change preferences and create preference consistency over time. In the next study, I

provide further evidence for these results by examining the phenomena in a more typical consumption context while increasing the external validity by including choice as a dependent variable and increasing the internal validity by using a more subtle and consistent manipulation of process and outcome simulation.

## ***EXPERIMENT 2***

Experiment 1 provides support for my hypotheses that use of process simulation for the distant future and outcome simulation for the near future can help attenuate preference inconsistency over time. Yet the task of choosing an assignment may have idiosyncratic characteristics that limit our ability to generalize the findings to more typical consumer contexts. In Experiment 2, I switch to a different domain (i.e., the choice of a software package) to test whether the impact of process- and outcome-based thoughts generalizes to a consumption situation with a multiattribute product. In addition, choice was added as a dependent variable. Finally, the simulation instructions were modified so that they are more closely aligned with those used in the marketing literature (Escalas and Luce 2003, 2004).

### ***Method***

*Participants and design.* A total of 225 students were recruited at a major southeastern university and were paid \$5 as compensation. The experiment followed a 2 (time: near future, distant future) x 3 (simulation: control, outcome simulation, process simulation) between-subjects design.

*Stimuli.* The basic scenario of the stimuli asked participants to imagine that they had an important project (to create a photo essay) for one of their classes that was due either in two

days or at the beginning of the next semester, which was a little over two months from the time participants completed the questionnaires. The project required the use of a photo album software package. There were two software packages from which participants could choose, both of which had free trial versions that could be downloaded from the Web and were valid for 48 hours. All projects were to be graded and then posted on the Web. Participants were asked to consider the following two options: One software package had a higher *PC Magazine* quality rating (rated as ★★★★★) with complete image editing features (i.e., numerous predesigned themes, improved layout tools). However, this package had a large file size and a medium difficulty level, for which downloading, installation, and tutorial were estimated to take approximately 45 minutes. The other software package had a lower *PC Magazine* quality rating (rated as ★★★☆☆) with some image editing features (i.e., limited themes, basic layout tools). However, this package had a small file size and a low difficulty level, for which downloading, installation, and tutorial were estimated to take approximately 10 minutes. Descriptions of both software packages also included an excerpt from a review: “allows for the creation of fabulous photo essays, but difficult and time consuming to learn and use” for the software package with advanced features, and “some limitations of final layout and editing options, but simple to use, easy to learn, and gets the job done” for the more limited but easier to use software package (See Appendix B). The order of the software packages was counterbalanced.

*Procedure:* The process simulation instructions focused on the process of using the software package while the outcome simulation instructions focused on the final outcome of the project. In addition, instructions for process and outcome simulation contained the same number of words (65) and the same structure (for the exact wording, see the Appendix C). In

this experiment, I used a similar procedure and dependent measures as were used in Experiment 1 but with some additional measures. First, in addition to the preference measure, participants' binary choice between the two options was included. Second, as a manipulation check for time, after the main task, participants were asked to rate their perceptions of the time gap between now and the due date of the project. Third, participants were then asked to indicate how important the capabilities of the software and the difficulty of setting up and using the software were to them when they made their decision about which software package to choose. Finally, I asked participants to rate how much they thought about the process of using the software and the final quality of the project when they were making their decisions.

### *Results*

As in Experiment 1, the main dependent measure was the relative preference between the high-feasibility and the high-desirability options. For the relative preference, higher scores represent greater preference for the higher-feasibility option (the software package that had a low-quality rating but was easier to use), and lower scores represent greater preference for the higher-desirability option (the software package that had a high-quality rating but was difficult to use). I report similar analyses as those in Experiment 1. In addition, I report the choice data, as well as coded responses of participants' written responses to the simulation instructions. Three coders were asked to code participants' thought protocols independently to identify whether each argument was a process- or outcome-related thought.

The intercoder reliability was .95 for outcome-related thoughts and .91 for process-related thoughts. The coding results of three coders were aggregated.<sup>3</sup>

*Manipulation check.* The coded open responses indicate that participants had more outcome-related thoughts in the outcome simulation conditions ( $M = 4.73$ ) compared with process simulation conditions ( $M = 1.87$ ;  $F(1, 140) = 161.68, p < .001$ ); and that participants had more process-related thoughts in the process simulation conditions ( $M = 4.05$ ) than in the outcome simulation conditions ( $M = 1.62$ ;  $F(1, 140) = 122.74, p < .005$ ). This indicated that the simulation conditions had the intended effect on the type of thoughts participants generated, but participants performed overall similar levels of total elaboration for both types of simulation ( $F(1, 140) = 1.89, p = .17$ ).

The effectiveness of the manipulations was further tested using participants' self-reports about the importance of process- and outcome-related features in their decisions. I calculated the difference between people's self-reported amount of thinking about the process of using the software versus the final quality of the project and found a significant main effect of time ( $F(1, 215) = 4.02, p < .05$ ) and a significant effect of simulation ( $F(2, 215) = 3.28, p < .05$ ) but no significant interaction. I also found similar results for self-reported measures of the importance of the software's capability and the difficulty of setting up and using the software; this result shows that outcome simulation increases the importance of

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<sup>3</sup> The coding revealed that four participants did more than twice the opposite simulation than they were instructed to do, and thus I dropped them from the analysis, which resulted in a sample size of 221. The results based on all 225 participants (including those who did not follow the instructions) fully replicated the results based on 221 participants, except that the simple effect of process simulation in the distant future was not significant compared with the distant-future control condition. All other pairwise contrasts and the differencing analysis yielded the same results. To test the robustness of the results further, I used analyses with different criteria: I conducted analyses based on participants who (1) did not do more of the opposite simulation than the simulation that they were supposed to do ( $N = 213$ ) and (2) did not do more than 1.5 times the opposite simulation ( $N = 214$ ). The results fully replicated the results based on 221 participants.

abstract desirability considerations, whereas process simulation increases the importance of concrete feasibility considerations.

In addition, the manipulation check measure of the temporal distance between now and the due date of the project confirmed that our time manipulation was successful: Participants perceived the time gap in the near-future conditions ( $M = 4.02$ ) as significantly shorter than that in the distant-future conditions ( $M = 7.39$ ),  $F(1,219) = 168.58$ ,  $p < .001$ .

*Control conditions.* Consistent with the predictions of prior research and the results in Experiment 1, under no simulation, participants in the near-future condition preferred the higher-feasibility software package ( $M = 7.13$ ) significantly more than participants in the distant-future condition ( $M = 5.42$ ),  $F(1,215) = 7.60$ ,  $p < .01$ ,  $\omega^2 = .132$ ; see Figure 2.

*Near future:* As in Experiment 1, I computed a set of planned contrasts to test the relative effectiveness of the different simulation types. Again, the results were fully consistent with the hypotheses: In the near-future conditions, there was no significant difference in the relative preference between the process simulation condition ( $M = 7.03$ ) and the control condition ( $M = 7.13$ ),  $F(1,215) = .03$ ,  $p = .86$ . However, participants who engaged in outcome simulation ( $M = 5.59$ ) indicated a significantly greater preference toward the higher-desirability software package than participants in the control condition ( $M = 7.13$ ),  $F(1,215) = 6.04$ ,  $p < .05$ ,  $\omega^2 = .166$ , in support of  $H_{1a}$ . Furthermore, as expected, preferences associated with outcome simulation for the near future ( $M = 5.59$ ) were not significantly different from the control preference for the distant future ( $M = 5.42$ ),  $F(1,215) = .08$ ,  $p = .78$ , indicating that the natural preference inconsistency over time was eliminated after outcome simulation for the near future, in support of  $H_{1b}$ .



*Distant future:* In the distant-future conditions, there was no difference in preferences between outcome simulation ( $M = 5.28$ ) and the control condition ( $M = 5.42$ ),  $F(1,215) = .05$ ,  $p = .82$ . However, after the process simulation, participants indicated a significantly greater preference toward the higher-feasibility software package ( $M = 6.66$ ) than participants in the control condition ( $M = 5.42$ ),  $F(1,215) = 3.76$ ,  $p < .05$ ,  $\omega^2 = .266$ , in support of  $H_{2a}$ . Furthermore, as a result of process simulation for the distant future, the natural preference inconsistency over time was eliminated: There was no difference between the preferences after process simulation for the distant future ( $M = 6.66$ ) and the control preference for the near future ( $M = 7.13$ ),  $F(1,215) = .55$ ,  $p = .46$ , in support of  $H_{2b}$ .

As in Experiment 1, before combining the control and match conditions to test for the modified interaction, two separate ANOVAs were run: The 2 (near vs. distant future) x 2 (control vs. match) ANOVA showed no main effect of simulation ( $F(1, 215) = .07$ ,  $p = .79$ ) or interactions between time and simulation ( $F(1, 215) = 0$ ,  $p = .96$ ). The 2 (near vs. distant future) x 2 (control vs. mismatch) ANOVA indicated a significant interaction between simulation and time ( $F(1, 215) = 9.64$ ,  $p < .005$ ). Finally, the modified 2 (near future vs. distant future) x 2 (match vs. mismatch) ANOVA showed a significant interaction between time and simulation,  $F(1,217) = 12.89$ ,  $p < .001$ , supporting the hypotheses

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*Choice.* For the choice between software packages, an overall chi-square test showed a significant difference between participants' choices across the six conditions ( $\chi^2(5) = 17.14$ ,  $p < .005$ ,  $\omega^2 = .078$ ). Overall, the results replicated the preference results. As predicted, in the control conditions, the percentage of people who chose the higher-feasibility software

package for the near future ( $M = 72\%$ ) was significantly greater than the percentage of people who chose the same software package for the distant future ( $M = 42\%$ );  $\chi^2(1) = 6.93, p < .01, \omega^2 = .09$ . In terms of the effect of mental simulation, when the choice was for the near future, the percentage of people who chose the higher-feasibility software package after process simulation ( $M = 78\%$ ) did not change compared with that in the control condition ( $M = 72\%$ ;  $\chi^2(1) = .35, p = .55$ ). However, after outcome simulation, the percentage of people who chose this software package ( $M = 49\%$ ) significantly decreased compared with that in the control condition ( $M = 72\%$ );  $\chi^2(1) = 4.26, p < .05, \omega^2 = .056$ , which provides additional support for  $H_{1a}$ . Furthermore, outcome simulation in the near future led to consistent choices over time as there was no difference between the percentage of people who chose the higher-feasibility software package after outcome simulation for the near-future ( $M = 49\%$ ) and the natural distant-future condition ( $M = 42\%$ ;  $\chi^2(1) = .32, p = .57$ ), which provides further support for  $H_{1b}$ .

Conversely, when participants made a choice for the distant future, there was no significant difference between outcome simulation ( $M = 44\%$ ) and the control condition ( $M = 42\%$ );  $\chi^2(1) = .04, p = .84$ . However, the percentage of people who chose the higher-feasibility software package after process simulation ( $M = 63\%$ ) increased (marginally) compared with that in the control condition ( $M = 42\%$ );  $\chi^2(1) = 3.14, p < .08, \omega^2 = .043$ , which provides further support for  $H_{2a}$ . In support of  $H_{2b}$ , I again find that process simulation for the distant future led to consistent choices over time, as I did not observe a difference between the percentage of people who chose the higher-feasibility software package after process simulation in the distant-future ( $M = 63\%$ ) and that in the natural near-future condition ( $M = 72\%$ );  $\chi^2(1) = .67, p = .41$ .

## *Discussion*

Experiment 2 replicated the findings of Experiment 1 and prior literature, demonstrating that people have inconsistent preferences over time: a relatively stronger preference toward the higher-feasibility/lower-desirability option in the near future and a stronger preference toward the higher-desirability/lower-feasibility option in the distant future. In support of the hypotheses, I again demonstrated that outcome simulation for near-future options changed preferences in favor of the higher-desirability/lower-feasibility option. In addition, process simulation for distant-future options changed preferences toward the higher-feasibility/lower-desirability option. This general pattern of results held for both relative preference and choice. These results were obtained in a more typical consumption context with a multiple-attribute product set that forced participants to perform benefit–effort trade-offs, while using a more subtle and consistent manipulation of process and outcome simulation. The open-ended responses, as well as participants’ self-reports, further indicate that the simulation manipulation employed had the intended effects.

## ***GENERAL DISCUSSION***

In this research, a temporal-based mental mechanism from the mental simulation literature was employed toward the goal of achieving preference consistency over time. I hypothesize and demonstrate in two experiments that preference inconsistency over time can be attenuated by regulating levels of mental representations with either process simulation or outcome simulation, depending on the temporal distance.

Taken together, the findings of essay 1 suggest that for near-future options, where concrete feasibility-related thoughts are naturally focused upon and desirability is relatively

ignored, process simulation does not change the focus of people's thoughts and thus does not change their preferences. However, outcome simulation enables preferences in the near-future to be consistent with preferences that are developed in distant-future scenarios, because outcome simulation focuses on abstract desirability-related thoughts, with relatively less emphasis on feasibility, similar to the natural tendency found when evaluating distant-future options. In terms of distant-future options, where the focus is on abstract desirability, rather than concrete feasibility, outcome simulation does not change the focus of people's thoughts and therefore does not change their preferences. In these cases, process simulation is better able to bring preferences into line with natural near-future preferences, by shifting the focus away from abstract desirability-related thoughts and toward concrete feasibility-related thoughts.

### *Consistent Yet Different Preferences*

The studies show a preponderance of support for the notion that specific types of simulation can create preference consistency across time. Thinking about the process of setting up and using a software package (in three months) ultimately led consumers to think as if they were choosing the software today. Thinking about the long-term benefit of the project (when making an immediate decision) ultimately lead consumers to think more like they were making a future decision. For both time frames (near and distant future), our explanation is based on the idea that a previously ignored (or underweighted) aspect of the decision is incorporated into the decision after simulation. Yet at no point do these preferences converge.

Thus, the following question remains: Which is the “correct” or “better” preference? Is it a mistake to ignore or underweigh the amount of work necessary to learn to use the software when selecting for the distant future? Is it wrong when the decision is imminent to focus more on this constraint and to undervalue the quality of the project? This is a general philosophical issue that I do not attempt to answer in this research. I conjecture that the answers to these questions lie in consumers’ ability to trade off short-term pain against long-term gain, which has both situational- and personality-related dimensions.

However, from a marketer’s perspective, if there exists a goal of maximizing long-term satisfaction, one would generally want consumers to form preferences that focus on the long-term usefulness rather than the immediate constraints. When immediate constraints sway the decision toward the simple, easy to learn software package, long-term satisfaction may be compromised. Additionally, if consumers spend more money on the software package with more advanced features, but never use those features due to unanticipated usage constraints, opting for the more advanced software package could lead to a loss of consumer utility. Certainly there are many situations in which the constraints may play an important role in consumers’ long-term satisfaction. For example, imagine a consumer who purchases a PDA focused entirely on the attractive features (i.e., having all of their contact and scheduling information available). If they ignore or underweigh the effort associated with learning how to use the product and obtain the benefits (i.e., learning the handwriting recognition script and entering all of the information), they may be unsatisfied with their purchase. In those situations, ignoring the constraints may leave consumers worse off in the long run. Thus, when thinking about preference consistency it is important to understand the long-term implications of both constraints and benefits.

### *Asymmetries Associated with Enhancing the Underweighted Processing Mode*

I hypothesize and find that enhancing the naturally underweighted processing mode changes preference. I support the notion that process versus outcome manipulations actually influence the relative degree of process-/outcome-focused thoughts rather than involving either a process-only or an outcome-only focus. I consistently find that the preferences associated with enhancing the naturally neglected processing mode were highly different from the natural or control group preference. However, there was an interesting pattern to the results, illustrated by the choice shares of software packages in Experiment 2: For the distant future, process simulation is thought to enhance the focus on the effort required by using the software and thus would be expected to lead to a significant increase in the percentage of participants who selected the software with less effort required. Yet after process simulation, there is only a marginally significant shift (from 42% to 63%) to the easier software.

It is possible that while participants imagined the process of installing and learning to use the software, the step-by-step set-up and learning process ultimately led them to think about the benefits of the completed projects. In other words, perhaps participants in the process simulation condition thought not only about the process but also about the outcome. This conjecture was supported by the coding results of Experiment 2, which showed a significant difference regarding the ratio of *intended simulation* to *opposite simulation* taken from each individual participant: The ratio of outcome-related thoughts to process-related thoughts in the outcome conditions was 2.48, whereas the ratio of process-related thoughts to outcome-related thoughts was 1.38 in the process simulation conditions ( $F(1,146) = 6.86, p < .05$ ). This is consistent with the findings of previous research which demonstrates that

process simulation can include outcome-focused thought (Escalas and Luce 2003, 2004; Pham and Taylor 1999).

#### *Moderating Effect of Timing on the Effectiveness of Process Versus Outcome Simulation*

A possible direction of additional research could be the application of these findings to better understand the conditions in which process or outcome simulation is more effective. The majority of the studies in the mental simulation literature show that process simulation has a superior role in increasing performance (Taylor et al. 1998) or behavioral intentions (Escalas and Luce 2003, 2004). However, other empirical research has suggested a positive role of outcome simulation in terms of goal attainment (Taylor and Pham 1999). Although this conflict is not well established, and more definitive research is needed, my framework provides an added dimension to research on mental simulation by suggesting a potential explanation for these findings.

I propose that the timing of an event is an important difference between studies showing the positive role of process simulation and those indicating a positive role of outcome simulation: Studies that show a beneficial role of process simulation are based on activities in the relatively distant future (e.g., preparing for an exam after multiple days, see Oettingen and Mayer 2002; Pham and Taylor 1999) in which low-level feasibility-related thoughts are naturally ignored but can be activated by process simulation. However, the study that indicated a positive role of outcome simulation is based on activities in the immediate future (e.g., writing the essay in the next hour; see Taylor and Pham 1999), in which the high-level desirability-related thoughts were naturally underweighted but could be enhanced by outcome simulation. Thus, I suggest that the timing of an event is an important

mediator of the effectiveness of process and outcome simulation. A caution associated with my interpretation is that the mental simulation literature has mostly focused on behavior in terms of performance, whereas the current studies examine preference. Escalas and Luce's (2003, 2004) findings demonstrate that there are parallels between performance and preference, but further research could extend the findings and investigate the moderating effect on performance.

### *Conclusions*

This research has examined the role of process- and outcome-focused mental simulation to overcome preference inconsistency over time in domains in which the trade-off between desirability and feasibility is required. I demonstrated that outcome simulation, which focuses on the abstract high-level desirability consideration could help change preference in the near future so that it is consistent with the natural distant-future preference. Conversely, process simulation, which focuses on the concrete low-level feasibility consideration, could help change preference in the distant future so that it is consistent with the natural near-future preference. In sum, this research establishes that mental control mechanisms such as the focus of simulation can be used to alter construal levels to achieve consistent preferences across different temporal distances.



## **CHAPTER 3 -- ESSAY 2**

### **MENTAL SIMULATION AND THE EVALUATION OF REALLY NEW PRODUCTS: THE ROLE OF PROCESS VS. OUTCOME-FOCUSED THOUGHTS**

Really new products (RNP) allow consumers to do something they have never been able to do before. While a RNP may provide a strategic benefit from a competitive perspective, it also places a large learning burden on consumers. Indeed, consumers were found to have a higher degree of uncertainty associated with a RNP than with an incrementally new product (INP) (Hoeffler 2003). In this research, I identify another important dimension of RNPs associated with the mental representation that is formed when consumers consider the product: a focus on the feasibility of incorporating the product into one's daily routine versus a focus on the desirability of the end benefits. I draw on research on new product learning to show that the higher degree of complexity and uncertainty associated with RNPs leads to different mental representations of RNPs (compared with INPs): While people naturally evoke more desirability-focused considerations about the salient benefits than feasibility considerations about the process of using a product for INPs, the difference between desirability-focused and feasibility-focused considerations is smaller for RNPs.

More importantly, I propose and demonstrate how mental simulation can be used to change the default mental representation of a RNP, and ultimately enhance product evaluation. Based on the complementary role of process vs. outcome simulation versus the

default mental representations (Zhao, Hoeffler and Zauberman 2006), I argue that as people naturally ignore the process of using INPs, process simulation activates the naturally ignored feasibility considerations which leads to higher product evaluation than outcome simulation. On the contrary, for RNPs, there will be no differences regarding the effect on evaluations between traditional process and outcome simulation because the gap between the natural evoked desirability and feasibility considerations is minimal. After addressing the potential confound in the traditional mental simulation literature between affect/cognition and simulation type (i.e. process simulation being more cognitive focused and outcome simulation more affective focused) (Taylor et al. 1998; Pham and Taylor 1999; Escalas 2003, 2004), I test the efficacy of each type of mental simulation under a specific information processing mode and the following pattern emerges. Outcome simulation is more effective than process simulation for product evaluation under a cognitive focus, whereas process simulation is more effective than outcome simulation under an affective focus. Additionally, I examine the potential mediating role of degree of planning, which has been identified as a mediator in the existing mental simulation research (Taylor et al. 1998; Escalas and Luce 2004). Finally, I examine the role of level of uncertainty which has been identified as a key difference between INPs and RNPs (Hoeffler 2003).

In the current essay, I first draw on research in new product learning and identify the default mental construal of RNPs and INPs. Given RNPs' natural mental representations (which are based on both feasibility and desirability related considerations), I review the mental simulation literature and propose hypotheses about the effect of process and outcome simulation on the evaluation of INPs and RNPs. More importantly, I investigate the potential confound of cognitive vs. affective components of mental simulation and predict the unique

effect of process vs. outcome simulation for RNPs under cognitive vs. affective processing mode.

### ***NEW PRODUCTS AND MENTAL REPRESENTATIONS***

Innovations typically result from a change to or the elimination of product attributes or features within an existing category (Goldenberg, Mazursky and Solomon 1999; Moreau, Lehmann and Markman 2001). Innovations such as technological breakthroughs that create or at least substantially expand a category are defined as RNPs, whereas modifications of an existing product or product line extensions are often defined as INPs (Dahl and Hoeffler 2004; Lehmann 1994; Moreau, Markman and Lehman 2001). Existing research on new product learning showed that consumers have greater uncertainty for RNPs than INPs (Hoeffler 2003). Specifically, while people have the baseline knowledge or experience in a similar domain and are able to understand the link between features and benefits for INPs, it is difficult for them to figure out the links between the features and benefits provided by those features for RNPs (Hoeffler 2003; Hoeffler and Ariely 1999; Moreau, Lehmann and Markman 2001; Veryzer 1998). As such, RNPs are often more complex and require more consumer learning.

In this research, I identify a key difference between RNPs and INPs in consumer evaluation: the mental representation of the product in terms of high-level desirability and low-level feasibility considerations. The distinction between desirability and feasibility corresponds to the distinction between ends and means (Gollwitzer and Moskowitz 1996). Desirability refers to an action's end state, or the high-level "why" aspect of an action. On the contrary, feasibility refers to the process of reaching an action, or the low-level "how"

aspect of an action (Liberman and Trope 1998; Vallacher and Wegner 1987). When applied to product learning, desirability reflects the benefits of using a product (i.e. why using a product) whereas feasibility reflects the process of using the product (i.e. how to use the product). Since the terms “desirability” and “feasibility” come from research on psychological distance (Liberman, Trope and Stephan 2006), one might intuitively expect that for INPs, which people are more familiar with and seem to be “closer”, people would focus more on the feasibility considerations. Whereas for RNPs, which are less familiar and seem to be more “distant”, people would rely more on the desirability related aspects. However, as demonstrated in prior research, the essential difference between both types of products is product complexity and the related degree of uncertainty (Hoeffler 2003). Therefore, I argue that psychological distance does not apply in the evaluation of INPs and RNPs. Rather, it is the motivation and capability of learning that impacts what aspects of INPs vs. RNPs will be naturally more accessible.

According to Wood and Lynch (2002), high prior knowledge leads to complacency and superficial processing of product information. In this research, high knowledge led to more comprehensive learning of different aspects of the product (such as benefits, side effects, usage instructions for an allergy medicine) only when newness cues were given (Wood and Lynch 2002). This implies that while people do not process all aspects of INPs due to lower motivation, people may have a higher motivation to consider all aspects of RNPs (i.e. both feasibility and desirability issues), if the innovativeness of the product serves as a more salient newness cue.

Consistently, past research differentiated between products with low vs. high complexity based on the extent of new knowledge required for effective usage (Alba and

Hutchinson 1987), and suggested that consumers assign different weights to the benefits and costs of the novel attributes for different types of products (Mukherjee and Hoyer 2001).

When evaluating products with lower complexity, consumers rely more on the salient benefits (or desirability) while showing less interest in learning about actually using the product. However, for products with higher complexity, consumers naturally consider both the process of using the product and the product benefits (where the relative focus on feasibility or desirability directly impacts evaluation). This suggests that compared with lower-complexity INPs where consumers consider more outcome (or benefits) than process of using (or feasibility), the accessibility of the feasibility and desirability aspects does not differ as much for the higher-complexity RNPs. More formally,

**H1:** While consumers naturally pay more attention to the desirability considerations than feasibility considerations for INPs, their natural focus on both consideration aspects are the same for RNPs.

### ***PROCESS- VERSUS OUTCOME-FOCUSED MENTAL SIMULATION***

In this section I review research on mental simulation and explore the effect of traditional process and outcome simulation on the evaluation of RNPs. Mental simulation is the imitative mental representation of events (Taylor and Schneider 1989). The role of mental simulation or mental imagery has been widely studied in various areas of psychology (Taylor et al. 1998) or in different marketing contexts (MacInnis and Price 1987; Shiv and Huber 2000 etc.). However, not all types of mental simulation are equally effective. Research in psychology has identified two distinctive types of mental simulation: process simulation that is focused on the process of going through the steps of reaching a goal (i.e. the feasibility aspect) versus outcome simulation that is focused on the desirable outcome of achieving the goal (i.e. the desirability aspect).

The majority of the research has indicated that process simulation is more effective for goal attainment than outcome simulation (Taylor et al. 1998). For example, studies based on multiple-day tasks found that students achieved higher performance in their exams or class projects after process simulation than after outcome simulation (Pham and Taylor 1999; Rivkin and Taylor 1999; Taylor et al. 1998). In the context of the impact of advertising on incremental products (i.e. shampoo or vitamin), Escalas and Luce (2003, 2004) have shown that process focused advertisements increased behavioral intentions, especially when the arguments were strong. However, another study based on an imminent event found that outcome simulation led to higher-quality essays than process simulation (Taylor and Pham 1999). Taylor and Pham (1999) conclude their work by stating that it is unclear what is responsible for these contradictory findings regarding the effect of process and outcome simulation.

Recent work in the context of preference over time (Zhao, Hoeffler and Zaubermaun 2006) has examined the effect of mental simulation from a temporal perspective and demonstrated that each type of simulation is more effective when it augments the mental representation of an event that is naturally neglected. Process simulation is more effective for distant future events because it activates the naturally ignored feasibility considerations; whereas outcome simulation is more effective for near future events as it encourages the naturally ignored desirability considerations. This finding also offers a possible explanation to the seemingly contradictory findings in the mental simulation literature mentioned above.

Based on the complementary effect of mental simulation in terms of activating the naturally less accessible considerations, I believe that although process simulation (which enhances feasibility considerations for INPs) will be more effective than outcome simulation

to increase the evaluation of INPs, the same effect would not hold for RNPs. Since people's natural mental representations between the desirability and feasibility related aspects for RNPs are not as different from each other as for INPs, the effect of the traditional process and outcome simulation in terms of enhancing product evaluation will not lead to differences in evaluation:

**H2:** Process simulation increases the evaluation of INPs more than outcome simulation, whereas there is no advantage of the traditional process or outcome simulation over each other for RNPs.

### ***COGNITIVE VS AFFECTIVE PROCESSING MODE***

If there is no substantial difference between the traditional process and outcome simulation on the evaluation of RNPs, does this mean that mental simulation can not be employed to enhance to evaluation of RNP? In this section I discuss a possible confound in the traditional mental simulation literature and propose a factor that will evoke the unique effect of each type of simulation toward the goal of increasing the evaluation of RNPs, namely a cognitive vs. affective processing mode. In addition, I identify degree of planning and level of uncertainty as mediators of the unique effect of process and outcome simulation under each specific processing mode.

Cognitive information processing is based on “cool,” slow and analytic thinking whereas affective information processing is based on “hot,” rapid and emotional feelings (Epstein 1994; Metcalfe and Mischel 1999). A large amount of research has examined the role of affective and cognitive focus and demonstrated that focusing on the cognitive vs. affective components leads to very different attitudes (Edell and Burke 1987), evaluations (Zauberman, Diehl and Ariely, forthcoming) and decisions (Hsee and Rottenstreich 2004;

Metcalf and Mischel 1999; Shiv and Nowlis 2004). A close look at the traditional mental simulation manipulations (Taylor et al. 1999; Escalas and Luce 2003, 2004) shows that to some degree, traditional process vs. outcome simulations are confounded with a cognitive vs. affective focus. In the psychology literature, process simulation often puts more emphasis on the cognitive components such as the step-by-step process of doing something, while outcome simulation usually focuses on the affective components such as feeling the joy of achieving something (Pham and Taylor 1999; Taylor et al. 1998).

In the marketing literature, research (Escalas and Luce 2003, 2004) tries to incorporate both cognitive and affective components into the process and outcome simulation instructions. While this approach seems to balance and unconfound the effect of the cognitive and affective components of each type of simulation, those two components might interfere with each other when applied to RNPs. As past research has indicated, consumers have both the cognitive and affective uncertainty associated with RNPs (Hoeffler 2003; Castano et al. 2006). In this co-existence of cognitive and affective responses, affective response (e.g. overall anxiety) would impact cognitive processing because affect could easily precede and bias cognitive thinking (Epstein 1994). On the other hand, cognitive information processing (e.g. trying to understand novel product information) might lead to negative affect because the process of processing product information induces affect (Garbarino and Edell 1997). As a result of this interference between cognitive and affective processing mode, the unique effect of each type of mental simulation might be blocked. Thus I attempt to tease apart the cognitive and affective processing focus and investigate the effect of process and outcome simulation on the evaluation of RNPs under each type of processing.



### *Cognitive Processing Mode:*

Existing mental simulation theory suggests that thinking about the process of using a product increases adoption intentions (e.g. Escalas and Luce 2003, 2004). However, given the nature of the high complexity of RNPs, it is difficult for consumers to understand how to use the features of a RNP (Hoeffler 2003). Consistently, numerous research has taken the cognitive perspective to investigate consumers' learning mechanisms for novel products and indicated a negative effect of focusing on these unique product features. Earlier work showed that when people have low knowledge and little experience with a product, they can be overwhelmed by the detailed product features and thus spend little effort on the evaluation task (Bettman and Sujan 1987). Bettman and Sujan (1987) demonstrated that using an abstraction strategy and focusing on the end benefits associated with the product motivates more effort investment and increases the evaluation of those unfamiliar products. Similarly, recent research indicated that for products with higher complexity, focusing on the learning process associated with novel attributes evokes higher learning cost inferences and decreases evaluations of the product (Mukherjee and Hoyer 2001). However, switching the focus to the benefits and promoting value (benefit based) inferences increases product evaluation for novel attributes. Further, direct evidence in recent research on RNPs showed that it is difficult for consumers to picture the detailed cognitive process about how they would use the novel features of the RNP, leading to lower evaluations (Dahl and Hoeffler 2004).

This prior research leads to the conclusion that for the evaluation of RNPs under a cognitive processing mode, outcome simulation (focused on the abstract desirability-related considerations) is more effective for enhancing the evaluation than process simulation (which is focused on the difficult feasibility-related) considerations.

### *Affective Processing Mode:*

Recent research on narrative self-referencing demonstrated that relying on narrative self-referencing stories when evaluating a product results in less critical analysis of the arguments, fewer negative thoughts and stronger affective responses, which in turn enhances attitude towards the product (Debevec and Romeo 1992; Green and Brock 2000; Escalas 2004; West, Huber and Min 2004). As a broad definition of narrative self-referencing, it incorporates general knowledge about human goal-oriented action episodes that consist of a goal, action and an outcome (Pennington and Hastie 1986). As such, the content of narrative self-referencing is close to the content of process simulation which focuses on the steps of achieving a goal.

The role of affective orientation was found to be central to narrative self-referencing. For example, research has shown that if a self-referencing task triggers analytical processing, people are sensitive to argument strength (Burnkrant and Unnava 1989, 1995). However, if the self-referencing task is affective oriented (i.e. narrative self-referencing), it leads to a strong reliance on affective processing mode and distracts attention from the specific product related facts (Sujan, Bettman and Baumgartner 1993). Specifically, self-referencing stories tend to evoke positive affect rather than negative affect due to “the immersion into a text” effect (Escalas 2004; West, Huber and Min 2004). Therefore, regardless of the characteristics of the product arguments (e.g. weak or strong), narrative self-referencing with an affective focus will increase positive affect, decrease sensitivity to argument quality, and increase evaluation (Escalas 2004). On the contrary, other research has shown that an ad emphasizing the focus on product benefits is not as effective as an ad emphasizing the focus on self-using

the product because product benefits are more abstract and result in less self-referencing and affective responses. The less positive impact on preference is due to the lack of immersion into the text and the related strong affective responses (Debevec and Romeo 1992).

In sum, the findings above imply that affective-oriented process simulation leads to more narrative self-referencing. As one mentally immerses oneself into the process of the product usage, it evokes strong affective responses, switching attention away from the cognitive processing of the novel product features and reducing the negative cognitive construal of the product features, which ultimately leads to higher product evaluations. Affective-oriented outcome simulation (focusing on the end benefits of the product), however, is not sufficient to induce self-referencing due to its abstractness and is weaker in evoking affective responses, limiting its impact on product evaluation. This suggests that under an affective state, process simulation would lead to higher evaluation of the RNPs than outcome simulation.

As such:

**H3:** Under a cognitive focused processing mode, outcome simulation leads to higher product evaluations than process simulation; whereas under an affective focused processing mode, process simulation leads to higher product evaluations than outcome simulation.

*Degree of planning:* What might mediate the effect of process and outcome simulation on the evaluation of RNPs? Classic research in mental simulation has shown that process simulation leads to higher degree of planning (i.e., how to study for an exam (Taylor et al. 1998), or how to use a product (Escalas and Luce 2004)). This leads to higher performance or product adoption, respectively. This is consistent with the notion that after people develop high implementation intention, they are more successful in goal attainment (Gollwitzer 1999).

In the evaluation of RNPs, I also expect that the degree of planning plays a facilitating role in different combinations of simulation type and information processing mode.

Under a cognitive information processing mode, as research on new product learning has indicated, people have little knowledge about the link between the product features and product benefits for RNPs (Hoeffler 2003), thus it is difficult for them to start from the complex product features and form a cognitive-oriented step-by-step plan about how to make use of those novel features of a RNP (e.g. Dahl and Hoeffler 2004). However, Park and Smith (1989) showed that when people were instructed to think about the benefits of the products, they not only based their product decision on the product benefits, but also used a top-down process and developed a great amount of thoughts about how to incorporate the products in specific product usage situations. This implies that under a cognitive processing mode, outcome simulation, which focuses on the cognitive benefits of the product, could lead to a higher degree of planning, or higher implementation intentions, in terms of how to use the product.

On the contrary, when consumers have an affective focus, they form more narrative self-referencing under process simulation than outcome simulation. Two key elements of narrative self-referencing are: 1) it first organizes events in terms of a temporal dimension such as episodes of beginning, middle and end, and 2) it establishes causality between episodes such as goal, action and outcome (Bruner 1990). As such, the composition of those episodes appears just like a set of plans regarding how to take actions that lead to the final goal. Therefore, I argue that affective-focused process simulation leads to a higher degree of planning than outcome simulation. This is driven by the fact that process simulation causes more narrative self-referencing than outcome simulation.

**H4:** Under a cognitive focused processing mode, outcome simulation leads to a higher degree of planning than process simulation; whereas under an affective focused processing mode, process simulation leads to a higher degree of planning than outcome simulation.

**H5:** Degree of planning mediates the effect of simulation type and information processing mode on product evaluation.

*Level of certainty:* As people are able to develop a plan for using the product (i.e. forming implementation intentions) after specific type of mental simulation, I argue that this would reduce their level of uncertainty:

**H6:** Under a cognitive focused processing mode, outcome simulation leads to a higher level of certainty than process simulation; whereas under an affective focused processing mode, process simulation leads to a higher level of certainty than outcome simulation.

**H7:** Level of certainty mediates the effect of simulation type and information processing mode on product evaluation.

A pilot study and two experiments were conducted to test the hypotheses.

### ***PILOT STUDY***

This pilot study is designed to uncover the default consideration level for products with different degrees of newness. In this study, I asked participants to list their thoughts about using the product and investigated whether people naturally think more about the process of using or the end benefits of the product for INPs and RNPs.

## ***Method***

Sixty-nine students at a major southeastern university were recruited to complete a set of studies which include this study and were paid \$5 as compensation. The study has a 2-level single factor design (product newness: INP, RNP).

### *Procedure, stimuli and measures*

*Procedure.* Participants were randomly assigned to one of the two conditions. Participants first read the product information, then they were asked to “describe what comes to your mind when you think about using this product.”

*Product stimuli.* In the INP conditions participants were given a mock ad that included a picture of the latest version of the IBM ThinkPad. In the RNP conditions, the mock Ad included a picture of a product called an AudioPC. The picture of the AudioPC was taken from a product under development by Sony that has a vertical screen orientation with a smaller inlaid keyboard on the bottom of the product. The company logo was removed from each product and all brand identification information was eliminated (i.e., the product was called XI-100 in all conditions). Both product information sheets had 4 components: The headline, the picture and a short description underneath the picture, followed by a set of product features. The headline stated “The XI-100 is the mobile product for people on the go.” The short description underneath the picture paralleled the headlines “The XI-100 ultra-portable notebook gives users outstanding performance in a small and light notebook.” Following the short description, each product included a list of eight features (four were common features and four were distinctive features; see Appendix D & E). Note that the same product stimuli for the RNP and INP are used in the later experiments.

A pretest was conducted to test the innovativeness of the ThinkPad (INP) and AudioPC (RNP) and the associated level of uncertainty. Ninety-five students at the same university viewed either the mock ad for ThinkPad or AudioPC and then answered three questions regarding the innovativeness of the product from 1 (not very innovative, not very novel, not very original) to 9 (very innovative, very novel, very original), as well as five questions regarding level of uncertainty with the usefulness of the product, benefit of the product, their ability to make use of the product, their ability to get the full use out of the product and their overall feeling of uncertainty, based on the same scale. The three newness measures were aggregated into an innovation index ( $\alpha = .91$ ) and the results showed that AudioPC ( $M = 5.67$ ) was rated as significantly more innovative than ThinkPad ( $M = 4.37$ ),  $F(1, 93) = 14.90, p < .001$ ). Similarly, the five uncertainty measures were aggregated into an uncertainty index ( $\alpha = .89$ ) and the results showed that people had lower level of certainty with AudioPC ( $M = 5.44$ ) than with ThinkPad ( $M = 6.34$ ),  $F(1, 93) = 7.98, p < .01$ ).

*Measures.* After participants described their thoughts about the product, they proceeded to the questions. They answered three manipulation check questions regarding the innovativeness of the product from 1 (not very innovative, not very novel, not very original) to 9 (very innovative, very novel, very original). Subsequently they were asked to indicate the amount of visualization they used in this task. As the main measures of this study, they rated how much they thought about the process of using the XI-100 and how much they thought about the end benefits of using the XI-100. All scales were based on a 1 (not at all) to 9 (a lot) point scale.

## Results

*Manipulation check:* The three product newness related questions were aggregated into an innovativeness index ( $\alpha = .89$ ). As anticipated, the AudioPC was rated as significantly more innovative than the ThinkPad ( $M_s = 5.78$  vs.  $4.76$ ;  $F(1, 67) = 6.17$ ,  $p < .05$ ).

*Mental representations:* Participants in both the INP (ThinkPad) and RNP (AudioPC) conditions used a similar amount of visualization ( $M_s = 5.24$  vs  $5.43$ ,  $F(1, 67) = .14$ ,  $p = .71$ ). However, as expected, there was a marginally significant interaction between type of product and type of thoughts ( $F(1, 67) = 3.36$ ,  $p = .07$ ,  $\omega^2 = .299$ ): When evaluating the INP, participants indicated that they had significantly more thoughts associated with the end benefits of the product ( $M_s = 6.12$ ) than with the process of using the product ( $M_s = 5.32$ ),  $F(1, 33) = 4.27$ ,  $p < .05$ ,  $\omega^2 = .234$ . Yet, when evaluating the RNP, participants indicated that they made similar number of thoughts about the end benefits ( $M_s = 6.40$ ) and the process ( $M_s = 6.45$ ) of using the product,  $F(1, 34) = .46$ ,  $p = .83$ , which supported H1. See figure 3.

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Insert figure 3 about here  
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## Discussion

The pilot study confirmed H1 and showed that people's default mental representations (i.e. end benefits versus process of using the product) of the RNP differ from those of the INP. Specifically, participants naturally focused more on the end benefits than the process of using for the INP, their mental representation about the end benefits of using the product (or desirability) and the process of using the product (i.e. feasibility) did not differ for the RNP.



## ***EXPERIMENT 1***

The pilot study showed the natural level of construal of INPs and RNPs that are evoked. The purpose of experiment 1 is to manipulate the type of mental simulation to enhance the accessibility of different aspects of the products and examine its impact on the evaluation of both incremental and really new products.

### ***Method***

One hundred and thirty students at a major southeastern university were recruited to complete the experiment and were paid \$5 as compensation. The experiment was a 2 (product newness: INP, RNP) x 2 (simulation type: process focused, outcome focused) between-subjects design.

### ***Procedure, stimuli and measures***

*Procedure.* Participants were randomly assigned to different conditions. The experiment consisted of three stages: In the first stage, participants read the general instructions and examined the product information. Then they were instructed to practice mental simulation about the product for 2 minutes (which was timed). Afterwards they moved on to the dependent measures.

*Stimuli.* The same product stimuli as in the pilot study were used. After participants read the product information, they were told to turn to the next page to read the simulation instructions and practice simulation. The manipulations of process and outcome simulation mirrored the language used in the prior mental simulation manipulations (Escalas and Luce

2004, p. 283). Detailed simulation instructions are presented in Appendix F. Participants were timed for 2 minutes to think about the product based on the specific instructions and write down their thoughts (to make sure that they did mental simulation before answering the questions).

*Measures.* Participants were first asked to indicate their product evaluation and purchase interest. Multiple items were used to capture the evaluation and purchase intention. Participants answered four questions related with their evaluation of the XI-100 including overall evaluation; how they would rate the XI-100; whether they think the XI-100 is an excellent product; and their attitude towards the XI-100. As for measures of purchase interest, participants indicated how interested they would be in purchasing the XI-100; how seriously they would consider the XI-100; and what the likelihood is that they would buy the XI-100. Subsequently, they answered the 3-item manipulation check questions for product. As the manipulation check for type of mental simulation, participants indicated the content of their thoughts on a scale anchored at 1 (a lot about process) and 9 (a lot about end benefits).

## ***Results***

*Manipulation checks:* The three product newness related questions were aggregated into an innovativeness index ( $\alpha = .93$ ). As anticipated, the RNP (AudioPC) was rated as significantly more innovative than the INP (ThinkPad) ( $M_s = 6.26$  vs.  $4.68$ ,  $F(1, 189) = 35.97$ ,  $p < .001$ ). Regarding the content of simulation, there was a significant main effect of simulation type: Participants in the process oriented conditions thought relatively more about the process of using the product whereas participants in the outcome oriented conditions thought relatively more about the end benefits of the product ( $M_s = 5.55$  vs.  $6.18$ ,  $F(1, 126) =$

3.74,  $p = .055$ ). These results showed that product newness and focus of mental simulation were successfully manipulated.

*Product evaluation:* A product evaluation index was created by aggregating the four evaluation related items ( $\alpha = .93$ ). A 2 (INP vs. RNP) x 2 (process vs. outcome simulation) ANOVA showed no main effect of product ( $F(1, 126) = 1.37, p = .24$ ) or simulation ( $F(1, 126) = .92, p = .34$ ). As expected, there was a marginally significant interaction between product newness and simulation type ( $F(1, 126) = 3.15, p = .078, \omega^2 = .354$ ). In terms of simple effects, process simulation was more effective in increasing product evaluation than outcome simulation ( $M_s = 6.95$  vs.  $6.37, F(1, 63) = 4.15, p < .05, \omega^2 = .242$ ) for INPs. Finally, the difference between the effect of process simulation and outcome simulation for RNPs was not significant ( $M_s = 6.33$  vs.  $6.50, F(1, 63) = .30, p = .58$ ). These results provide some support H2. See figure 4A.

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Insert figure 4A about here  
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*Purchase interest:* Similarly, a purchase interest index was created based on the three purchase questions ( $\alpha = .94$ ). Again the results of a 2-way ANOVA showed no main effect of simulation ( $F(1, 126) = 1.41, p = .24$ ), but a significant main effect of product ( $F(1, 126) = 4.66, p < .05$ ), which showed that participants had a stronger purchase interest towards the INP than the RNP. More importantly, there was a marginally significant interaction between product newness and simulation type ( $F(1, 126) = 3.23, p = .075, \omega^2 = .309$ ): For the INP, process simulation was more effective in increasing purchase interest ( $M_s = 5.48$ ) than outcome simulation ( $M_s = 4.48$ ),  $F(1, 63) = 4.97, p < .05, \omega^2 = .201$ . However, for the RNP, purchase interest after process simulation ( $M_s = 4.16$ ) was not different from purchase

interest after outcome simulation ( $M_s = 4.36$ ),  $F(1, 63) = .17$ ,  $p = .69$ , which provided additional support for H2. See figure 4B.

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Insert figure 4B about here  
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## ***Discussion***

These findings in experiment 1 confirmed H2 and indicated that process and outcome simulation impact the evaluation of RNPs differently from INPs. For an INP (which naturally evokes a desirability focus), process simulation which activates the feasibility related mental representations leads to higher product evaluation than outcome simulation (which redundantly encourages desirability focus). However, for RNP (where people naturally consider both desirability and feasibility), process and outcome simulation lead to similar product evaluations.

The finding that process simulation is more effective than outcome simulation in increasing the evaluation of an INP is consistent with the classic findings where familiar products such as shampoo or vitamins were used (Escalas and Luce 2003, 2004). However, for the RNP which is the focus of this research, the results didn't replicate prior research (process simulation to be better than outcome simulation). This finding seems to conflict with the findings in a recent study in the RNP domain (Castano et al. 2006) which used a virtual course as an example of RNPs and demonstrated that the adoption of the RNP will be strongest when the decision is for the near future and process simulation is encouraged.

After carefully examining the mental simulation manipulations in this work, their instructions (Castano et al. 2006) differ a lot from the traditional simulation manipulations (e.g. Escalas and Luce 2003, 2004). While traditional simulation manipulations just globally

directs people's attention to a basic aspect (i.e. process or outcome) of a product (Escalas and Luce 2003, 2004), Castano et al. (2006) uses paragraph-long detailed instructions with lots of examples about the process or the outcome of using the product. So, in a strict sense, participants did not simply receive process vs. outcome simulation instructions, they received helpful visualization aids to facilitate their simulation, which, not surprisingly, benefits the subsequent task (Dahl, Chattopadhyay and Gorn 1999). This is even more evident in the process simulation conditions, where people naturally had a lot difficulty when thinking about how they can use the RNPs (Hoeffler 2003; Dahl and Hoeffler 2004).

## ***EXPERIMENT 2***

Experiment 1 demonstrated that for RNPs, the effect of traditional process and outcome simulation were not different from each other in terms of product evaluation. As illustrated earlier in this essay, traditional process and outcome simulation are confounded within the type of processing mode (cognitive vs. affective). The simulation manipulations in experiment 1, which followed the classic manipulations in consumer research (Escalas and Luce 2003, 2004), purposely combined cognitive and affective focus within each type of simulation. In the conceptual framework of this essay, I theorized that each type of simulation should be more effective for the evaluation of RNPs under a different information processing mode. Thus, the purpose of experiment 2 is to tease apart the effect of cognitive vs. affective processing mode for each specific mental simulation type (process and outcome) and investigate whether/when each type of simulation will impact the evaluation of a RNP. To do so, the cognitive versus affective processing mode of process and outcome simulation is manipulated and their interactive effects on the evaluation of RNPs are examined.

## ***Method***

One hundred and twenty-one students at a major southeastern university completed the experiment to fulfill research participation credit as part of an introductory marketing course. The experiment was a 2 (simulation type: process vs. outcome) x 2 (processing mode: cognitive vs. affective) between-subjects design based on the same RNP stimuli (AudioPC) used in experiment 1.

### *Procedure and measures*

*Procedure.* Participants were randomly assigned to one of the four conditions. Participants received instructions about the specific ways in which they should examine the product before reviewing the product information. They were directed to either focus on the specific features or benefits of the product (cognitive conditions) or the specific emotions they may feel about the features or benefits of the product (affective conditions). Detailed instructions for the mental simulation are presented in Appendix G. After participants examined the ads with the product information, they had several lines to write down their thoughts/feelings. To strengthen our manipulation of the cognitive vs. affective focus, these lines were started with the words “I would think ...” for cognitive focused conditions and “I would feel...” for affective focused conditions (Kivetz and Keinan 2006). After participants finished their writing, they proceeded to the questions at their own pace.

*Measures.* The same multiple-item measures were used as in experiment 1 to capture the evaluation and purchase intention of the RNP. Degree of planning was captured by asking participants to what extent they have figured out exactly how they might use the XI-100. Level of certainty was measured by asking participants to rate their certainty about the

usefulness of the XI-100. Lastly, participants were asked how much effort they put into this visualization exercise. All measures were based on 1 to 9 point scales.

## **Results**

*Product evaluation:* The four evaluation related items were aggregated ( $\alpha = .94$ ) and a 2-way ANOVA showed no main effect of simulation type ( $F(1, 117) = .81, p = .37$ ) or processing mode ( $F(1, 117) = .15, p = .71$ ), but an anticipated significant interaction between those two variables ( $F(1, 117) = 11.37, p < .001, \omega^2 = .088$ ). Specially, under a cognitive processing mode, outcome simulation increased product evaluation significantly more than process simulation ( $Ms = 6.56$  vs.  $5.32, F(1, 58) = 9.04, p < .005, \omega^2 = .111$ ). However, under an affective mode, process simulation was more effective than outcome simulation ( $Ms = 6.19$  vs.  $5.47, F(1, 59) = 7.88, p = .084, \omega^2 = .325$ ). These results provide support for H3; See figure 5A.

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Insert figure 5A about here  
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*Purchase interest:* An index for purchase interest was created by aggregating the purchase interest related questions ( $\alpha = .96$ ). Similar to product evaluation, a 2 x 2 ANOVA showed no main effect of simulation type ( $F(1, 117) = .02, p = .88$ ) or processing mode ( $F(1, 117) = 1.71, p = .19$ ), but an expected significant interaction between those two factors ( $F(1, 117) = 14.36, p < .001, \omega^2 = .070$ ). Specially, outcome simulation increased purchase intention significantly more than process simulation under a cognitive processing mode ( $Ms = 4.52$  vs.  $3.17, F(1, 58) = 7.48, p < .01, \omega^2 = .133$ ), whereas process simulation was more

effective than outcome simulation under an affective mode ( $M_s = 4.02$  vs.  $2.77$ ,  $F(1, 59) = 6.87$ ,  $p < .02$ ,  $\omega^2 = .146$ ). This provided further support for H3; See figure 5B.

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 Insert figure 5B about here  
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*Degree of planning:* A 2 x 2 ANOVA showed no main effect of simulation type ( $F(1, 116) = .43$ ,  $p = .51$ ) or processing mode ( $F(1, 116) = .48$ ,  $p = .49$ ). As anticipated, there was a significant interaction between those two variables ( $F(1, 116) = 6.05$ ,  $p < .02$ ,  $\omega^2 = .165$ ): Under a cognitive processing mode, outcome simulation increased degree of planning directionally more than process simulation ( $M_s = 5.43$  vs.  $4.73$ ,  $F(1, 58) = 1.95$ ,  $p = .17$ ). However, under an affective mode, process simulation increased degree of planning significantly more than outcome simulation ( $M_s = 5.42$  vs.  $4.21$ ,  $F(1, 58) = 4.17$ ,  $p < .05$ ,  $\omega^2 = .240$ ), providing some support for H4.

*Mediating role of degree of planning:* The mediating role of degree of planning on product evaluation and purchase intention was tested (Baron and Kenney 1986). First, as indicated above, there was a significant interaction between the simulation type and processing mode on degree of planning. Second, degree of planning significantly predicted product evaluation ( $F(8, 111) = 6.43$ ,  $p < .001$ ) and purchase interest ( $F(8, 111) = 6.36$ ,  $p < .001$ ). Third, as described previously, simulation type and processing mode also interacted to predict product evaluation ( $F(1, 117) = 11.37$ ,  $p < .001$ ) and purchase interest ( $F(1, 117) = 14.36$ ,  $p < .001$ ). Fourth, although the interactive effect of step 3 didn't become non-significant, it reduced its significance for both product evaluation ( $F(1, 115) = 5.18$ ,  $p < .05$ ) and purchase intention ( $F(1, 115) = 8.21$ ,  $p = .005$ ) after degree of planning was added as a covariate. According to Baron and Kenney (1986), there exists a partial mediating role of



degree of planning for the interactive effect of simulation type and processing mode on product evaluation and purchase intention. In addition, Sobel tests showed that degree of planning was a significant mediator for the interactive effect between simulation type and processing mode for evaluation ( $t = 2.25, p < .05$ ) and purchase interest ( $t = 2.17, p < .05$ ), confirming H5.

*Level of certainty:* A 2 x 2 ANOVA showed no main effect of simulation type ( $F(1, 116) = .72, p = .40$ ) or processing mode ( $F(1, 116) = .28, p = .60$ ), but a significant interaction between those two factors ( $F(1, 116) = 3.97, p < .05$ ). Under a cognitive processing mode, outcome simulation only directionally increased level of certainty more than process simulation ( $M_s = 5.27$  vs.  $4.83, F(1, 58) = 7.3, p = .40$ ), which provided limited support to H6. However, under an affective mode, process simulation increased level of certainty more than outcome simulation ( $M_s = 5.39$  vs.  $4.31, F(1, 59) = 3.66, p = .061$ ). This provided support for H6.

*Mediating role of level of certainty:* A series of tests were performed to examine the mediating role of certainty on product evaluation and purchase intention based on Baron and Kenney (1986). First, as indicated above, there was a significant interaction between the simulation type and processing mode on level of certainty. Second, level of certainty significantly predicted product evaluation ( $F(8, 111) = 3.62, p = .001$ ) and purchase interest ( $F(8, 111) = 4.40, p < .001$ ). Third, as described previously, simulation type and processing mode also interacted to predict product evaluation ( $F(1, 117) = 11.37, p < .001$ ) and purchase interest ( $F(1, 117) = 14.36, p < .001$ ). Fourth, although the interactive effect of step 3 didn't become non-significant, it reduced its significance for both product evaluation ( $F(1, 115) = 6.66, p < .05$ ) and purchase intention ( $F(1, 115) = 9.62, p < .005$ ) after level of certainty was

added as a covariate. According to Baron and Kenney (1986), when the first 3 steps are fulfilled whereas the last step is not fully met, I observe a partial mediation. Also, Sobel tests indicated that level of certainty was a marginally significant mediator for the interactive effect between simulation type and processing mode for evaluation ( $t = 1.83, p < .07$ ) and purchase interest ( $t = 1.81, p = .07$ ). These results suggested that level of certainty partially mediated the interactive effect of simulation type and processing mode on product evaluation and purchase intention, partially supporting H7.

*Effort:* There was one more measure that was worth noting, namely the effort that participants spent on the visualization exercise. There was a significant interaction between simulation type and processing mode ( $F(1, 117) = 6.78, p < .01$ ) on the spent on the exercise. Specially, when the processing mode was cognitive, participants spent much more effort on the task when they were asked to focus on the outcome of the RNP ( $M = 5.73$ ) than on the process of using the product ( $M = 4.23$ ),  $F(1, 58) = 10.46, p = .002$ . This is consistent with the notion that people are more willing to spend effort on the evaluation task if they are asked to focus on the end benefits compared with focus on the specific product features (Bettman and Park 1980; Bettman and Sujan 1987). When the processing mode is affective and cognitive effort is a less relevant factor, effort did not differ between outcome ( $M = 4.63$ ) and process simulations ( $M = 4.94$ ),  $F(1, 59) = .35, p = .56$ .

## ***Discussion***

Experiment 2 differentiated between cognitive and affective information processing mode to investigate the unique effect of each type of mental simulation on the evaluation of RNPs. Specially, under a cognitive processing mode, participants in the outcome simulation

indicated a higher product evaluation and purchase interest for the RNP compared with those in the process simulation conditions. However, under an affective processing mode, process simulation led to a higher product evaluation and purchase interest compared to outcome simulation. Further, the same pattern emerged for degree of planning about how to use the RNP and certainty with the RNP as the results showed that each factor was a partial mediator for the interactive effect of simulation type and processing mode.

### ***GENERAL DISCUSSION***

In this research, I identify a key characteristic of the RNPs related with the mental construal that is formed when consumers consider adopting the product, and propose ways to use process vs. outcome focused mental simulation to increase the evaluation of RNPs. I hypothesize and demonstrate in two experiments that the unique effectiveness of a specific type of simulation in augmenting evaluation will be elicited under a cognitive or affective information processing mode, respectively.

#### *Summary of Findings*

Taken together, the findings in essay 2 suggest that compared to INPs (where consumers tend to consider product benefits more than the process of using the product), RNPs evoke both the desirability related considerations about the end benefits of product and the feasibility related consideration about how to use the product. Based on the complementary role of mental simulation, there is only a minimal difference between the effect of traditional process and outcome simulation in terms of increasing product evaluation for RNPs.

However, I find that traditional process and outcome simulation are confounded with cognitive and affective information processing mode, and that each type of simulation has a unique effect under each specific processing mode. I demonstrate that under a cognitive information processing mode, outcome simulation is more effective at increasing the evaluation of RNPs than process simulation, because the product features are too novel and complex, consumers are better off using an abstraction strategy focusing on the end benefits of the product. On the contrary, under an affective information processing mode, process simulation is more effective at increasing the evaluation of RNPs than outcome simulation because affective focused process simulation leads to less critical thinking about the novel product information. Instead, more narrative self-referencing is driven (and thus a higher degree of planning about how to use the product result), which leads to higher certainty and higher evaluation for RNPs. However, affective-focused outcome simulation does not facilitate narrative self-referencing due to the abstractness of product benefits, thus limiting the spontaneous formation of plans about how to use the product. Finally, degree of planning and level of certainty each partially mediates the interactive effect of simulation type and information process mode.

### *Contributions*

This research contributes to the new product literature by introducing another dimension of RNPs that differentiates them from INPs: mental construal of the product with a focus on high level desirability or low level feasibility. Existing research on RNPs has used degree of uncertainty or familiarity with the features and benefits as the key differences between RNPs and INPs and showed that people have higher uncertainty associated with

RNPs and are less familiar with the features and benefits for RNPs compared with INPs (Hoeffler 2003, Veryzer 1998). This work contributes to the new product learning literature by being the first to apply the distinction between desirability and feasibility-related mental construal in the really new product domain. At the same time, since construal level has been widely used in choice over time literature (e.g. Liberman and Trope 1998) and recently in research about psychological distance (for a review see Liberman, Trope and Stephan 2006), this research complements construal level theory by indicating that psychological distance is not the only factor that causes different construal levels. Degree of newness also leads to different mental construal of the products.

This research also adds significantly to the mental simulation literature by examining the confounding effect between process vs. outcome simulation and the cognitive vs. affective focus. Past research either mixes process simulation with cognitive focus and outcome simulation with affective focus (Taylor et al. 1998), or places an equivalent emphasis on cognitive and affective focus within each type of simulation (Escalas and Luce 2003, 2004). I tease apart different information processing modes and indicate the unique effect of process vs. outcome simulation under each processing mode on the evaluation of RNPs.

#### *Limitation and Future Research*

I theorize that each type of mental simulation plays a complementary role and will be effective when each type activates the mental construal of the product that is naturally neglected. Further, I find that for the evaluation of RNPs, cognitive-focused outcome simulation enhances product evaluation more than cognitive-focused process simulation, whereas affective-focused process simulation is more effective than affective-focused

outcome simulation. While I identify degree of planning as an important mediator of this effect, it is still an interesting question as to whether people's default mental construals for a RNP are cognitive-focused feasibility considerations and affective-focused desirability considerations.

Another question that is worth further investigation is associated with affective process simulation. While affective process simulation leads to less cognitive information processing, yet a higher degree of planning, what is the role of memory? Past research on self-referencing indicates that people have a worse recall of product features after narrative self-referencing (Escalas 2004; Sujan, Bettman and Baumgartner 1993). In our experiment 2, participants weren't asked to recall product features. Future research could test participants' memory about product features and examine its relations to affective responses, degree of planning and product evaluation for RNPs.

## **CHAPTER 4 -- ESSAY 3**

### **VISUALIZATION AND NEW PRODUCT EVALUATION: THE ROLE OF MEMORY AND IMAGINATION-FOCUSED VISUALIZATION**

The Segway Human Transporter (HT) is a hydrogen-powered personal transportation device that mimics the human body's ability to maintain its balance and is designed for local transportation at a speed of up to 12.5 mph (Kemper 2003). Innovations like the Segway HT which represents technological groundbreaking departure from traditional transportation categories (i.e., car or bicycle) are often defined as really new products (RNPs), and allow consumers to do things that they have never been able to do before (Dahl and Hoeffler 2004; Hoeffler 2003; Lehman 1994; Moreau and Lehman 2001).

To help consumers learn about the new benefits associated with RNPs, mental simulation of product usage has been identified as an effective cognitive tool (Dahl, Chattopadhyay and Gorn 1999; Dahl and Hoeffler 2004; Hoeffler 2003). For example, research has demonstrated how mentally simulating the usage of an RNP increases consumers' ability to accurately predict the benefits of an RNP (Hoeffler 2003). However, due to the human nature of being "lazy organisms" or "cognitive misers" (Fiske and Taylor, 1991; Bettman, Luce and Payne 1998), consumers are reluctant to engage in the extensive cognitive thinking that may be required. Consequently, in the new product domain, when asked to visualize new product-related activities, people underestimate the usefulness of the radically new features (Dahl et al. 1999; Dahl and Hoeffler 2004). Consumers base their mental images on their memories about past consumption routines which are more easily

accessible. However, focusing on past consumption patterns may highlight the requisite behavior changes and thus enhance learning cost inferences (Murkejee and Hoyer 2001) associated with adopting a RNP. As a result, overall evaluations of a really new product are discounted (Dahl and Hoeffler 2004).

If traditional visualization is both anchored by a reference to memories about past activities and truncated in order to preserve cognitive resources, perhaps refocusing the visualization on imaginative new uses could lead to enhanced evaluations. This idea is supported by evidence from the new product design domain where Dahl and colleagues (1999) found that when designing a product, using imagination-based visual imagery (e.g., going beyond previously seen images, visualizing new, never-before-experienced events) resulted in more original product designs than using visual imagery based on existing memories. In this research, I incorporate visual mental imagery with an imaginative focus into new product learning and examine the impact of the imaginative focus on the evaluation of RNPs.

In the first experiment, the impact of traditional visualization (memory-focused) versus visualization with a focus on imagination (i.e., visualizing novel uses) was compared. After demonstrating the impact of imagination-focused visualization, I shift to understanding the process by which such visualization impacts evaluation. The key factor that I identify is the role of the ease/difficulty of the visualization exercise. In experiment 2, the difficulty of imagination focused visualization was manipulated by altering the accessibility of potential experiences to show how heightened difficulty of the visualization task reduces evaluation of an RNP. In experiment 3, I examine the role of providing visualization aids to demonstrate that enhanced ease of visualization leads to higher evaluations for RNPs. Finally, all 3



experiments demonstrate that while type of visualization impacts the evaluation of RNPs, it has a limited impact on more incrementally new products (INPs).

### ***VISUALIZATION AND REALLY NEW PRODUCT EVALUATION***

Really new products (RNPs) allow consumers to do some things that they have never been able to do before. As such, a variety of methods have been proposed to help consumers learn about the new benefits associated with RNPs. Research has proposed that providing relational analogies to existing products could be an effective method to help consumers learn (Gregan-Paxton and John 1997; Gregan-Paxton and Moreau 2003). In particular, Moreau and colleagues (Moreau, Lehmann, and Markman 2001; Moreau, Markman and Lehmann 2001) showed how analogies could be used to enhance the comprehension and acceptance of new products. Yet, as Roehm and Sternthal (2001) note, the lack of common attributes between RNPs and existing products makes it challenging to find appropriate products to use when providing analogies to consumers. Another method that has been employed to help consumers learn about the new benefits found in RNPs is mental simulation (or visualization) of product usage.

Visualization is a form of cognitive processing where visual information is represented in working memory (MacInnis and Price 1987). Visualization enables the generation, interpretation, and manipulation of information through spatial representation. Visualization has been examined in a number of marketing contexts including advertising effectiveness (Edell and Staelin 1983), preference formation (Phillips, Olson, and Baumgartner 1995), attitude development (Kisielius and Sternthal 1984), anticipatory satisfaction with an experience (Shiv and Huber 2000; MacInnis and Price 1987), and the

aforementioned creativity in product design (Dahl et al.1999). The use of mental simulation as a cognitive tool to help consumers evaluate products is well established (Phillips 1996; Shiv and Huber 2000). As Walker and Olson (1997, pp 159) state, when consumers make product decisions they often form “visual images of certain product-related behaviors and their consequences.” Within the domain of RNPs, visualization has been used to enhance the accuracy of preference measurement (Hoeffler 2003) and to impact the evaluation of RNPs (Dahl and Hoeffler 2004).

Prior work on measuring preferences for RNPs has demonstrated how visualizing using a RNP leads to more stable preferences (Hoeffler 2003). Yet, while mental simulation led to more stable preferences, research has also shown that it could lead to lower overall evaluations and lower adoption intentions (Hoeffler 2003; Dahl and Hoeffler 2004). As a possible explanation for these seemingly conflicting findings, I propose the following:

Human beings are found to be “lazy organisms” or “cognitive misers” who naturally conserve their limited information processing resources. They use the most easily accessible or available information for their decisions and take shortcuts whenever they can (Bettman et al. 1998; Feldman and Lynch 1988; Fiske and Taylor 1991). As a consequence of these cognitive processing characteristics, errors and biases occur. Consistently, in the new product domain, when people are asked to think about the benefits/drawbacks of really new products (Hoeffler 2003) or to “picture themselves making use of the product” (Dahl and Hoeffler 2004), they take the easier approach and limit their mental imagery to the most readily accessible consumption situations, namely the typical existing consumption scenario of existing products in their memory. While focusing on past usage might save initial cognitive effort, this memory-based focus could highlight the behavioral change required to fit the

RNP into past product usage patterns, and thus increase consumers' inferences associated with potential learning costs (Murkejee and Hoyer 2001). This heightened focus on the potential learning costs requiring changes in behavior could consume valuable cognitive resources which hinders the ability of consumers to fully imagine the potential new benefits (Keller and Staelin 1987; Murkejee and Hoyer 2001). This, ultimately leads to a lower overall evaluations of a RNP.

While traditional visualization focused on memory-based experience decreases the evaluation of RNP, I propose that refocusing visualization with an imaginative emphasis might enhance evaluations. Prior work has incorporated visual mental imagery into product design by explicitly comparing the effect of memory-based and imagination-based visualization, and has found advantages for imagery that was based on the designer's imaginations (Dahl et al. 1999). In that research, participants were asked to "use past memories to form visual images of potential (product) designs" in the memory visualization condition and "use imagination to form visual images of potential (product) designs" in the imagination visualization conditions (Dahl et al. 1999; p. 22). In addition, participants in a third condition were asked to use a spontaneous visualization process with neither a memory nor an imagination focus. This work showed that when people were asked to form spontaneous mental images, their imagery was primarily memory-based, which supports our view that consumers are unwilling to engage in extensive cognitive processing unless they are pushed to do so. More importantly, this research found that imagination focused visual imagery led to more useful and original new product designs (when designers also incorporated the customer into their visualization exercise) than visual imagery with a memory based focus (or spontaneous visualization). These findings suggest that changing the

focus of visualization from simply using the product to encouraging the imaginative new usage of the product will enhance consumer evaluations of a RNP.

The impact of specific types of visualization on the evaluation of really new products is our primary focus in this research, yet I would also like to demonstrate a boundary condition of these effects when applied to INPs. As such, a comparison between RNPs and their more incremental counterparts is important. One of the fundamental differences between RNPs and INPs that is noteworthy in this context is the higher amount of learning costs associated with RNPs compared with an incremental product (Hoffler 2003; Murkejee and Hoyer 2001). For an INP with a lower level of complexity, when consumers focus on existing consumption patterns, less behavior changes are required and lower learning costs are involved (Murkejee and Hoyer 2001). This implies that consumers will have the mental resources to estimate the value of new capabilities of the INP, which they would naturally do when they focus on the potential new uses of the product. Therefore, switching the focus of visualization from existing usage situations to new usage situations will not have as large of an impact on evaluations of an INP.

This leads to the following hypothesis:

**H1:** Imaginative-focused visualization will lead to higher evaluations of a RNP than memory-focused visualization, whereas focus of the visualization exercise (memory vs. imagination) will not have an impact on the evaluation of an INP.

### ***EXPERIMENT 1: FOCUS OF VISUALIZING***

Experiment 1 manipulates the focus of a visualization task and examines the impact on the evaluation of both incremental and really new products. Participants were asked to either freely visualize a new product or imagine completely new types of activities. In addition, difficulty or ease associated with each type of visualization was measured.

## ***Method***

One hundred and fifty-nine students at a major southeastern university were recruited to complete the experiment and were paid \$5 as compensation. The experiment was a 2 (product newness: INP, RNP) x 2 (visualization: memory-based visualization, visualization with a focus on imaginative usage) between-subjects design.

### *Procedure, stimuli and measures*

*Procedure.* The experiment was conducted block-wise with memory-based visualization and imagination focused visualization run in separate blocks. Participants were randomly assigned to either the INP or the RNP in each visualization block. The experiment consisted of three stages: In the first stage, participants were given 2 minutes to read the general instructions and examine the product information. Then they were instructed to visualize using the product before proceeding to the dependent measures.

*Product stimuli.* The same stimuli for INP and RNP as in essay 2 were used (see appendix D and E).

*Visualization.* After participants read the product information, they were told to turn to the next page to read the visualization instructions. In the memory-based visualization conditions, participants read the following instruction:

When thinking about whether to buy new products, many consumers find that using **visualization** to form visual images (pictures in the mind) of the uses of the product can help them evaluate it.

Visualizing activities with the XI-100, may help you evaluate the XI-100. Please **free your mind to visualize these activities** (i.e. think about ways you will use computers) as you evaluate the XI-100.

In the imagination focused visualization conditions, participants read the following instruction:

When thinking about whether to buy new products, many consumers find that using **imagination** to form visual images (pictures in the mind) of potential uses of the product can help them evaluate it.

**Unleashing your imagination** and visualizing **new activities** that you have never been able to do with computers before, may help you evaluate the XI-100. Please **push yourself to visualize these new activities** (i.e. think about new ways you will use computers) as you evaluate the XI-100.

After all participants read the instructions, the experimenter orally repeated the last sentence of each manipulation instruction, respectively, and asked participants to close their eyes and visualize/imagine using the product for 2 minutes before moving on to the dependent measures. Participants' visualization was timed by the experimenter.

*Measures.* Multiple items were used to capture the overall evaluation of the product and also to perform the requisite manipulation checks. Participants were asked to indicate their overall evaluation of the XI-100 and how they would rate the XI-100 based on a 1 (bad, poor) to 9 (good, excellent) point scale. As manipulation checks for the level of the product's newness, participants rated the innovativeness of the XI-100 from 1 (not very innovative, not very novel, not very original) to 9 (very innovative, very novel, very original). Subsequently, they were asked to indicate the amount of visualization they used to help their evaluation based on a 1 (very little visualization) to 9 (lots of visualization) point scale and rate the type of activities that they envisioned in the visualization exercise, anchoring from 1 (mostly past activities) to 9 (mostly new activities). The former measure (i.e. amount of visualization) will be used as a covariate in the succeeding analysis for product evaluation. Participants then indicated how easy or difficult they found the visualization task based on a similar 1 to 9 point scale. Finally, participants described the mental pictures that they had during the

visualization task. Note that some of these mental pictures (particular activities) were used in a later experiment as aids to the visualization task.

## **Results**

*Manipulation checks:* The three product newness related questions were aggregated into an innovativeness index ( $\alpha = .92$ ). As anticipated, the AudioPC was rated as significantly more innovative than the ThinkPad ( $M_s = 6.23$  vs.  $4.75$ ,  $F(1, 155) = 26.83$ ,  $p < .001$ ,  $\omega^2 = .037$ ). Regarding type of visualization (i.e. memories vs. new activities), there was a significant main effect of visualization type: People in the imagination conditions envisioned new activities significantly more than people in the memory-based visualization conditions who naturally accessed more past activities ( $M_s = 5.06$  vs.  $3.50$ ,  $F(1, 155) = 23.89$ ,  $p < .001$ ,  $\omega^2 = .042$ ). This was consistent with the expectations that when simply asked to visualize using the product, people generally take the less mentally exhaustive approach of limiting the imagination of completely new uses.

*Product evaluation.* The two product evaluation questions were aggregated into an evaluation measure ( $\alpha = .92$ ). A 2x2 ANOVA was conducted controlling for amount of visualization and there was no main effect of product ( $F(1,154) = .65$ ,  $p = .42$ ) or visualization strategy ( $F(1,154) = .60$ ,  $p = .44$ ). As predicted, there was a significant interaction between product and visualization strategy ( $F(1,154) = 4.29$ ,  $p < .05$ ,  $\omega^2 = .233$ ): Imagination focused visualization increased the evaluation of RNP (AudioPC) compared with free visualization ( $M_s = 6.91$  vs.  $6.21$ ,  $F(1,75) = 5.62$ ,  $p < .005$ ,  $\omega^2 = .178$ ). However, there was no difference between the two types of visualization strategy on the evaluation for

the INP (ThinkPad) ( $M_s = 6.29$  vs.  $6.45$ ,  $F(1,80) = .22$ ,  $p = .64$ ; see figure 6), providing support for H1.

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Insert figure 6 about here  
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*Mediating role of ease of visualization.* A series of tests was performed to examine the mediating role of ease of visualization based on Baron and Kenney (1986). First, a two-way ANOVA, in which ease of visualization was the dependent variable, revealed an interaction between the product and visualization as the two independent measures ( $F(1, 153) = 4.00$ ,  $p < .05$ ,  $\omega^2 = .250$ ). Second, ease of visualization significantly predicted product evaluation ( $F(8, 148) = 3.12$ ,  $p < .005$ ,  $\omega^2 = .320$ ). Third, as described previously, the two independent factors also interacted to predict product evaluation. Fourth, when I added ease of visualization to this model as a covariate, the interactive effect of the independent factors became non-significant ( $F(1, 152) = 2.24$ ,  $p = .14$ ). This set of analysis suggested that ease of visualization mediated the interactive effect of product and visualization type on product evaluation.

## ***Discussion***

Experiment 1 demonstrated that compared with visualization which was memory-focused, imagination-based mental imagery increased the evaluation of RNP, but had no impact on the evaluation of an INP. This is, for the RNP, encouraging people to focus on the new uses of the product increased evaluations. However, for the INP, focusing on the new uses did not impact the evaluation of the product. When asked to employ an imagination-focused visualization, people envision more new usages of the product and are willing to



engage in more extensive visualization. However, when asked to just freely visualize using the product, people rely on the more readily available past activities and are less willing to expand the cognitive effort necessary to fully appreciate the product. This highlights the importance of the amount of effort associated with the visualization task which will be the focus of the remainder of this paper.

### ***EASE OF THE VISUALIZATION TASK***

Beyond the main findings, experiment 1 hints that ease of visualization could impact product evaluation. Indeed, there is a large amount of research in psychology and marketing that examines the role of ease of information processing (Anand-Keller and McGill 1994; Garbarino and Edell 1997; Sanna and Schwarz 2004; Sherman et al 2002; Schwarz 1998, 2004; Schwarz et al. 1991; Waenke, Bohner and Jurkowitsch 1997). Garbarino and Edell (1997) find that alternatives requiring more cognitive effort to evaluate led the decision maker to choose that alternative less frequently than an alternative requiring less effort to evaluate. Recent research on the accessibility of experiences hints at the potential for the difficulty of the visualization exercise to impact evaluations. Notably, Schwarz (1998, 2004) and colleagues (Sanna and Schwarz 2004) found that people rely more on the accessibility of experiences (i.e., ease of retrieval) than the accessible content. For example, subjects who recalled only four childhood events felt that they remembered their childhood better than subjects who were asked to recall 12 events (Schwarz 1998). Further evidence for the impact of accessibility was found in the marketing context by Waenke, Bohner and Jurkowitsch (1997), who demonstrated that having to name 10 reasons for choosing a focal car led to lower evaluations than having to name only one reason, primarily due to the ease of retrieval.

Prior work on visualization with both incremental and really new products has demonstrated that the difficulty of the visualization task can mediate the impact on evaluation (Dahl and Hoeffler 2005). Dahl and Hoeffler (2005) found that visualizing others using the new product was easier for RNPs than self-visualization, and that higher perceived visualization ease led to higher evaluations for the product. At the same time, research has identified another key difference between evaluating a RNP and an INP, namely the amount of preference construction that is thought to occur when evaluating the product (Bettman et al. 1998). For incremental products, where participants have some experience in the domain, preferences will be less susceptible to the subtle context effects (such as experienced ease during the visualization exercise). In particular, recent research has shown that level of knowledge can influence the perception of how diagnostic retrieval ease is likely to be (Tybout et al. 2005). For example, when people were asked to generate thoughts about a focal car, people to whom the features were more familiar relied more on the retrieval content, whereas people who had lower familiarity with the product and found it more difficult to process the product information, relied more on the retrieval ease. This leads to the following prediction:

**H3:** Perceived ease of the visualization task will impact the effect of visualization on the evaluation of an RNP but have no impact on the evaluation of an INP.

Experiments 2 and 3 proceed to investigate the question of how ease of visualization impacts the efficacy of the visualization task to enhance evaluation. To do so I focus exclusively on imagination-based visualization as this was found to be the effective strategy (in experiment 1) that impacted the evaluation of the RNP. In the following experiments I move from measuring ease of visualization (and identifying it as a mediator) to manipulating difficulty (experiment 2) and ease of visualization (experiment 3) directly.

### ***EXPERIMENT 2: MAKING IMAGINATION MORE DIFFICULT***

Our manipulation of ease of imagination in experiment 2 followed the previous approaches (Schwarz 1998; Waenke, Bohner and Jurkowitsch 1997) by asking people to imagine one (versus eight) new activities for a new product. It is expected that imagining one example will be easier whereas imagining eight examples will be more difficult. I predict that the ease of imagining these activities, in turn, will have a larger impact on the product evaluation of an RNP than on an INP.

#### ***Method***

Eighty-four students were recruited at the same university to complete the experiment and were paid \$5 as compensation. The experiment was a 2 (product newness: INP, RNP) x 2 (difficulty of imagination visualization: producing 1 activity, producing 8 activities) between-subjects design.

#### ***Procedure, stimuli and measures***

*Procedure.* A similar procedure was employed as in Experiment 1 with a slight difference. After participants examined the product information in stage 1 and imagined using the product in stage 2, they were asked to describe the activities they had envisioned

for 2 minutes to make sure that they did the visualization before they answered the questions. Participants were timed for 2 minutes while they described their mental images. Note that in experiment 1 where free visualization and imaginative visualization were compared, I asked participants to describe their thoughts after they finished answering all the questions to avoid any impact on the evaluations. However, in experiment 2 (and also 3), describing the thoughts is an essential part of the manipulation of ease of visualization because the perception of ease would be more accurate if participants are forced to spell out the activities. Therefore, they described their thoughts before they proceeded to the questions.

*Manipulations.* The same mock ads as experiment 1 were used as a manipulation of product newness (INP and RNP). The imagination instructions were similar to those in the imagination conditions in experiment 1, with the additional information that asked participants to envision either one or eight new activities that they had never been able to do with computers before, but will be able to do with the XI-100.

*Measures:* After participants were instructed to perform the imagination exercise and describe their mental pictures, they answered a set of questions which were similar to experiment 1 and included the two product evaluation measures as the main DVs, three product newness related question as manipulation checks for product newness, a question regarding how easy/difficult they found the visualization exercise to be, and a question about the amount of visualization. As in experiment 1, amount of visualization was used as a covariate.

## Results

*Manipulation checks:* As in experiment 1, the product newness related questions were aggregated into an innovativeness index ( $\alpha = .90$ ). The results showed that the AudioPC was rated as marginally more innovative than the ThinkPad ( $M_s = 5.73$  vs.  $5.04$ ,  $(F(1,80) = 3.39$ ,  $p < .07$ ,  $\omega^2 = .298$ ). In terms of ease of imagination, thinking of eight new activities was perceived to be more difficult than thinking of 1 example ( $M_s = 5.32$  vs.  $3.84$ ,  $F(1,80) = 11.45$ ,  $p < .001$ ,  $\omega^2 = .087$ ).

*Product evaluation.* The two product evaluation related questions were aggregated into an overall evaluation measure ( $\alpha = .95$ ). There was a significant interaction between product and visualization strategy on the evaluation measure,  $(F(1,79) = 4.22$ ,  $p < .05$ ,  $\omega^2 = .237$ ), but there was no main effect of product ( $F(1,79) = 2.03$ ,  $p = .16$ ) or number of examples required ( $F(1,79) = 2.03$ ,  $p = .16$ ). When imagination of new uses was easier (i.e., imagining only 1 new activity) for the RNP (AudioPC), participants increased their evaluation compared with when the imagination of new uses was difficult (i.e., imagining 8 new activities) ( $M_s = 6.90$  vs.  $5.83$ ,  $F(1,41) = 4.68$ ,  $p < .05$ ,  $\omega^2 = .214$ ). However, there was no difference in evaluation when thinking of 1 vs. 8 new activities for the INP (ThinkPad) ( $M_s = 6.71$  vs.  $6.90$ ,  $F(1,39) = .20$ ,  $p = .66$ ; See figure 7). These results provided support for H3.

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Insert figure 7 about here  
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*Cognitive responses:* To get some insight into the impact of the manipulation on the actual thoughts used in visualization, I had the written protocol analyzed to determine the number of thoughts that were accessed. If participants were able to successfully visualize more activities, then the impact of the difficulty of the visualization exercise might be

attenuated. Indeed, this did occur, but only for the incrementally new product, as illustrated by the analyses below.

Two independent coders who were blind to the hypotheses were asked to count the number of thoughts that were related with the product features provided for each participant. The inter-coder reliability was .94. A 2x2 ANOVA indicated a marginally significant effect of product ( $F(1,80) = 2.98, p < .10, \omega^2 = .335$ ), number of thoughts required to produce ( $F(1,80) = 3.24, p < .10, \omega^2 = .309$ ) and interaction between those two factors ( $F(1,80) = 2.77, p < .10, \omega^2 = .361$ ). In particular, participants were able to generate significantly more thoughts related with the INP in the 8-example conditions than in the 1-example condition ( $M_s = 3.15$  vs.  $1.98, F(1,39) = 4.50, p < .05, \omega^2 = .223$ ), but they generated similar amount of thoughts related with the RNP in both the 8- and 1-example condition ( $M_s = 2$  vs.  $1.95, F(1,41) = .013, p = .91$ ).

Considering the fact that for both products, participants perceived it to be more difficult to produce 8 examples than 1 example, these coding results implied that for the RNP, people did rely on retrieval ease rather than retrieval content since they lowered their evaluation in the 8-example condition (even though the retrieval content was similar in both visualization conditions). On the contrary, for the INP, people appeared to rely more on the retrieval content since they did not lower their evaluation for the INP in the 8-example condition even though it was more difficult. This is consistent with the findings of Tybout et al. (2005) regarding the moderating role of product knowledge on the effect of experienced ease.

## ***Discussion***

The results of experiment 2 indicate that when thinking of new uses for new products, the ease/difficulty of visualization matters when the product is really new, but does not when the product is only incrementally new. Specifically, for the RNP, envisioning 8 new activities was perceived to be more difficult, leading to a decreased evaluation compared to thinking of only 1 new activity. For the INP, imagining 8 activities was also perceived to be more difficult than thinking of 1 activity, but it did not impact the evaluation of the product.

### ***EXPERIMENT 3: MAKING IMAGINATION EASIER***

Experiment 2 showed that when asked to visualize eight new activities, participants lowered their evaluation of a RNP due to the difficulty of visualization. How could the product evaluation be enhanced? An intuitive answer would be to make the visualization easier. In the consumer learning literature, Dahl et al. (1999) demonstrated that providing people with visualization trainings helps product design. Moreover, research in product design has shown that when people are given an external example for product design, this external example activates a mental representation of the product which may prevent the construction of other representations of the product (Dahl and Moreau 2002; Finke, Ward and Smith 1992). Thus I expect that giving people one example would not make the visualization task any easier, whereas giving people abundant examples should increase the ease and thus serve as aids for consumer's visualization of new usages. The manipulation of ease of imagination in experiment 3 followed this notion by giving participants different amount of activities that they could refer to when they imagine the new uses of a product. I

predict that receiving more examples of activities will make the imaginative visualization easier, leading to higher evaluations of the RNP.

### ***Method***

Eighty-three students at the same southeastern university were recruited to complete the experiment and were paid \$5 as compensation. The experiment was a 2 (product newness: INP, RNP) x 2 (number of visualization aids: 1 activity, 8 activities) between-subjects design.

*Procedure.* The procedure of experiment 3 was the same as experiment 2 except for the imagination instructions. Instead of asking participants to envision either one or eight activities, participants were provided with a list of one or eight activities as an aid for their visualization. The activities were taken from the written protocols of participants in experiment 1, based on the frequency of being mentioned.

In the 1 example conditions, participants were given the following example:

- Taking notes in class that you can paste directly into handouts (e.g., Powerpoint)

In the 8 examples condition, participants were given the following examples:

- Carrying the lightweight computer with you all over campus
- Taking notes in class that you can paste directly into handouts (e.g., Powerpoint)
- Bringing to a sporting event to capture and dictate audio and writing a blog of what is happening.
- Writing directly on PDF and reading my notes on the handouts
- Typing and working in the dark with lighted keyboard
- Audio recording a professors lecture and replaying portions of the lecture when reviewing and studying for test
- Watching an entire movie on a plane without the battery dying
- Signing electronic documents and transfer with computer signature

### ***Results***

*Manipulation checks:* The three product newness related questions were aggregated into an innovativeness index ( $\alpha = .93$ ). As anticipated, the AudioPC was rated as significantly more innovative than the ThinkPad ( $M_s = 6.07$  vs.  $4.94$ ,  $F(1,79) = 8.41$ ,  $p < .005$ ,  $\omega^2 = .119$ ).



Regarding ease of imagination, imagination after receiving 8 examples was perceived to be less difficult than imagination after receiving only 1 example ( $M_s = 4.26$  vs.  $5.02$ ,  $F(1,79) = 2.79$ ,  $p < .10$ ,  $\omega^2 = .358$ ).

*Product evaluation.* Again, the two product evaluation related questions were aggregated into an evaluation measure ( $\alpha = .95$ ) and amount of visualization was used as a covariate. The ANOVA indicated a non-significant main effect of product ( $F(1, 78) = .09$ ,  $p = .76$ ). However, there was a significant effect for the number of examples given (one or eight) ( $F(1, 78) = 9.24$ ,  $p < .005$ ,  $\omega^2 = .108$ ). This main effect was driven primarily by the RNP (AudioPC), as indicated by the significant interaction between product and visualization strategy ( $F(1, 78) = 5.99$ ,  $p < .05$ ,  $\omega^2 = .168$ ): For the AudioPC, evaluation after receiving 8 examples increased significantly compared with the condition where only 1 example was given ( $M_s = 7.47$  vs.  $5.55$ ,  $F(1,39) = 18.91$   $p < .001$ ,  $\omega^2 = .053$ ). Conversely, for the ThinkPad, there was no significant impact associated with receiving 8 examples versus receiving 1 example ( $M_s = 6.53$  vs.  $6.20$ ,  $F(1,40) = .40$ ,  $p = .53$ ; See figure 8). Again, this provided support for H3.

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Insert figure 8 about here  
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*Cognitive responses:* To investigate the impact of different amount of examples on the actual number and type of participants' thoughts, I asked two independent coders who were blind to the hypotheses to code the written protocol based on whether the thoughts were related with the product features described on the ad or the example activities that participants received. The overall inter-coder reliability was .80.

As a result, I found that when only given one example, people tended to focus on the product features and produced a greater number of thoughts based on the features than participants receiving 8 examples ( $M_s = 1.97$  vs.  $1.19$ ,  $F(1, 76) = 11.01$ ,  $p = .001$ ). In addition, participants who were given one example envisioned fewer thoughts related with examples given compared with people receiving 8 examples ( $M_s = .44$  vs.  $1.31$ ,  $F(1, 76) = 43.55$ ,  $p < .001$ ). More interestingly, in terms of the total number of thoughts, our coding results showed that participants envisioned more thoughts when receiving 1 example than when receiving 8 examples ( $M_s = 2.47$  vs.  $1.97$ ,  $F(1, 76) = 4.93$ ,  $p < .05$ ), which was rather driven by the RNP: There was a marginally significant difference for the overall number of actual thoughts between the 1 vs. 8 example conditions for RNP ( $M_s = 2.69$  vs.  $2.16$ ,  $F(1, 37) = 3.05$ ,  $p < .09$ ), but not for INP ( $M_s = 2.25$  vs.  $1.79$ ,  $F(1, 39) = 2.01$ ,  $p = .17$ ). Given that participants were able to envision more activities after receiving 1 example than receiving 8 examples for the RNP, and that they indicated a lower evaluation towards the RNP in the 1 example condition, I conclude that it was not the content of the thoughts, but the perceived ease of creating thoughts, that impacted the evaluation of the RNP. However, for the INP, content of thoughts seemed to influence product evaluation as its pattern matched the evaluation pattern.

## ***Discussion***

Overall, experiment 3 mirrored and extended the results of experiment 2 and indicated that when imagining new uses of new products, ease of imagination plays a role for the RNP, but not for the INP. Specifically, for the RNP, having 8 examples as an aid for the visualization makes visualization easier and it increases the overall evaluation (as compared

to only having one example). Interestingly, I also found that receiving more examples actually constrained people's imagination so that their thoughts were mostly about the examples given and the overall number of thoughts that they could come up with was lower than those people who were only provided with 1 example. However, the actual number or type of thoughts did not impact evaluation. Rather, it was the perceived ease of mentally creating new activities that directly impacted evaluation. Finally, when a product was incrementally new, the number of examples given did not impact ease of evaluation or product evaluations.

### ***GENERAL DISCUSSION***

In this essay I examined the impact of specific types of visualization on the evaluation of RNPs. I compared the traditional memory-focused visualization with a new type of visualization focused on the imaginative aspects of a RNP. In experiment 1, I demonstrated that the focus of the visualization task (i.e. focus on past product activities or imaginative new use) has an important impact on the evaluation of an RNP and no impact on the evaluation of a more incrementally new product. Specifically, visualizing the imaginative new uses that are enabled by a RNP leads to a higher evaluation. In addition, perceived ease of visualization mediated the impact on evaluation – leading to the manipulation of difficulty and ease in the following experiments. In experiment 2, difficulty of imagination was manipulated by prompting subjects to come up with 1 or 8 new activities that they could perform with the new product. This manipulation had the predicted effect for the RNP (lowering the evaluation of the product when 8 activities were required) and no effect on the incremental product. In experiment 3, I took the exact opposite approach and manipulated ease of

imagination by providing participants with 1 or 8 activities related with the new product. The results show that providing visualizations aids had a large impact on the evaluation of the RNP and no impact on the evaluation of the incremental product. Specifically, participants who were given 8 examples had a higher evaluation of the RNP than participants who were given only one example due to the higher perceived ease.

The results of essay 3 add significantly to recent research on mental simulation and new product learning by identifying different types of visualization focus. Past research studying the effect of mental simulation has indicated a positive role of visualization in terms of product evaluation for incrementally new products or services (e.g. Phillips 1996; Shiv and Huber 2000), yet a negative effect of visualization on product evaluation for RNPs (Dahl and Hoeffler 2004). I proposed an explanation for these seemingly conflicting findings by showing that due to the human nature as a cognitive miser, people's default visualization is based on past product usages which are more easily accessible in their mind. As prior visualization instructed people to simply think about product usage instead of prompting people to imagine innovative new uses, people tended to preserve their cognitive resources and focus their visualization only on the most readily available images from the past product usage scenario. I conjecture that when applied to RNP, the attempt to fit a RNP into existing product usage frame evokes higher perceived learning costs and leads to a discounting of a product. I introduced the concept of *imaginative new usage focus* into this literature and showed that only if explicitly instructed to rely on imaginative new uses will visualization enhance product evaluations of a RNP.

Essay 3 also contributes to the accessibility literature by demonstrating the role of ease of imagination. Existing research on the impact of ease were mostly based on ease of

*recalling* events from past memories (Schwarz et al. 1991; Schwarz 1998), or *retrieving* reasons of using a product (Tybout et al. 2005; Wanke, Bohner and Jurkowsch 1997). Different from these retrospective perspectives, I took an anticipatory angle and manipulated ease of *creating* new activities in the domain of new product learning. The results showed that ease of creation had a similar pattern to ease of retrieval in terms of product evaluation of a RNP, but a differential pattern on the evaluation of an INP. To our knowledge, this is the first piece of work in the literature on accessibility that directly tests the differentiated role of ease of creation on learning and evaluation of a RNP and INP.

Multiple future research directions were suggested. One of the limitations of this work is that the same product category was used throughout the 3 experiments. More empirical studies are needed to test the robustness of the findings with other new product categories. An interesting question that remains is how would affect impact evaluations? Do people enjoy imaginative-focus visualization more than memory-focused visualization? In particular, when people receive more examples about the product usage as visualization aids, do they have more positive affective responses? Research on narrative self-referencing showed that when consumers put them themselves into specific situations where they interact with a product, positive affect will be increased and they pay less attention to the cognitive content of their information processing, which ultimately leads to higher product evaluation (Escalas 2004; West, Huber and Min 2004). How does this affective focus relative to the argument focus relate to people's reliance on perceived ease over the content of imagination? In addition, one could examine the role of different visualization focus (i.e. past uses vs. imaginative new uses) on the learning of hybrid products which consist of two or more product categories with different familiarity levels (Gregan-Paxton, Hoeffler and Zhao 2005).

Will consumers rely more on the familiar category under traditional visualization to save cognitive effort? Would people rely on both the high and low familiarity categories under imaginative focused visualization?

### *Managerial implications*

The results of prior research provide caution to managers who are trying to introduce new products into the marketplace. First, the use of analogies to help consumers learn about RNPs has met with limited success with consumers who have the most experience in the domain (Moreau, Lehmann, Markman 2001). Second, the inclusion of novel features has been shown to provoke learning cost inferences (Murkejee and Hoyer 2001). Third, studies on the effects of visualizing the use of RNPs have consistently found that visualizing how the product fits with existing usage patterns lowers consumer evaluations of the product (Hoeffler 2003, Dahl and Hoeffler 2004). Yet, this research points to a direction that managers could use visualization to help consumer learn about the novel benefits provided by RNPs without adversely impacting evaluations.

The findings in this essay suggest that when marketing RNPs, marketers should encourage customers to focus on the new uses that they have never been able to do with any product before. Having consumers envision the usage of these new benefits may serve the dual purpose of leading to higher estimation of the benefits provided by the product while also blocking negative thoughts about constraints (or learning costs) associated with how the new product might impact existing usage patterns (Feldman and Lynch 1988). Managers could think of different ways of to promote the product (e.g. through advertising) in order to evoke imaginative focused thoughts about the RNPs. Further, counter to the current notions

of providing one or two key benefits to consumers, this essay suggest providing multiple tasks associated with the new benefits provided by the RNP may lead to higher evaluations and faster adoption in the marketplace. However, encouraging consumers to imagine multiple tasks of the RNP without providing specific examples may lead to lower evaluation due to difficulty of imagination. For example, for the Segway mentioned at the beginning of this essay, the study findings suggest that pushing consumers to go beyond their past memories about how they traditionally traveled and instead instructing them to imagine the new perspectives provided by the Segway would be a more effective way to increase consumers' evaluation of this new transportation device. At the same time, marketers should reduce the difficulty of imagining such new usages by limiting what they ask consumer to imagine, or by providing consumers with concrete examples with specific new usage scenarios.

## **CHAPTER 5 -- CONCLUSION**

The three essays in this dissertation suggest that people tend to rely on one aspect of a product that is more accessible and thus perceived to be more diagnostic when they make decisions. This unidirectional reliance on one aspect blocks the use of other potentially more diagnostic aspects and may lead to negative consequences such as preference inconsistency over time or lowered evaluation of RNPs. As one of the major contributions of this dissertation, I propose different mental simulation strategies to alter the accessibility of neglected product aspects to achieve preference consistency and to enhance new product evaluation. Two important dimensions of product aspects were investigated: level of mental representation (high level desirability vs. low level feasibility), which was addressed in the first two essays, and focus of mental representation (memory vs. imagination focus), which was discussed in essay 3.

In essay 1, I demonstrate that outcome simulation (which augments the desirability related thoughts) is more effective in the near future to achieve preference consistency over time, while process simulation (which encourages the feasibility considerations) is more effective in the distant future to overcome preference inconsistency over time. In essay 2 I investigated the domain of new products and find that while the high-level desirability considerations related with product benefit appears more accessible than the low-level feasibility considerations related with the process of using the product for INPs, RNPs are construed with a focus on both the desirability and feasibility considerations. As such, the traditional process and outcome simulation do not differ in terms of their effectiveness to



enhance evaluations for RNPs. However, after unconfounding the effect of cognitive vs. affective focus in the traditional mental simulation literature (e.g. Taylor et al. 1998), I showed that outcome simulation is more effective to increase the evaluation of RNPs than process simulation under a cognitive information processing mode, whereas the reversal is true under an affective processing mode. I further demonstrated that degree of planning and certainty with the product are partial mediators for this effect.

In essay 3 I switched to a different dimension of people's mental representations of a new product: memory vs. imagination-focused mental representations. Essay 3 examined people's visualization focus for RNPs and showed that people naturally rely on the most readily accessible images from their memory while neglecting the imaginative new activities when they evaluated RNPs, leading to lowered evaluation of RNPs. I proposed and tested the effect of an imaginative-focused visualization strategy, which enhances the naturally neglected imaginative new uses of the RNPs and leads to higher evaluations. In addition, the studies indicate that ease of imagination directly impacts product evaluation for RNPs (i.e. more ease leads to higher evaluation).

These findings have important implications for research on choice over time and new product evaluation. In the domain of choice over time, where temporal distance has a great impact on level of mental representation and ultimately on people's decisions, the natural temporal pattern of consumer preference could be modified or even reversed by different types of mental simulation (i.e. outcome simulation for near future or process simulation for distant future). In the domain of new product learning, level of mental representation was identified as a key difference between products with different level of newness. Further, using a unique type of simulation (i.e. cognitive focused outcome simulation or affective

focused process simulation) helps increase evaluations for RNPs. At the same time, when evaluating RNPs, consumers tend to preserve their cognitive effort and rely on the most accessible mental images that are related with past memories, which lowers the evaluation of RNPs. However, pushing consumers to use their imagination and focus on imaginative new uses leads to higher evaluations, especially when imagination is made easier.

As another main contribution of this dissertation, the findings add significantly to the mental simulation literature: Essay 1 took the temporal perspective and offered a possible explanation for the contradictory findings in the mental simulation literature in terms of the relative effectiveness of process vs. outcome simulation (Taylor et al. 1998; Taylor and Pham 1999). I found that studies indicating a positive role of process simulation were based on distant future events where feasibility-related thoughts were naturally less accessible, whereas research showing a positive role of outcome simulation was based on imminent events where desirability-focused thoughts were naturally ignored. Thus, different types of simulation played a complementary role in terms of activating the naturally less accessible mental representation at a different point of time and became more effective for events with different temporal distances.

Essay 2 identified the possible confounds in the traditional mental simulation literature between type of simulation (process vs. outcome) and information processing mode (cognitive vs. affective) by revealing that process simulation had more of a cognitive mode whereas outcome simulation had more of an affective mode (Taylor et al. 1998). Essay 2 tested the effect of each type of simulation under a specific information processing mode on the evaluation of RNPs and found that each type had a unique effect in increasing evaluation, depending on the processing mode. Essay 3 added to the accessibility literature by taking an

anticipatory perspective and testing the ease of creating new product usages, instead of a traditional retrospective testing the ease of retrieving from past experiences (Schwarz et al. 1991; Schwarz 1998). Our results confirmed the applicability of the role of experienced ease in the evaluation of RNPs.

In sum, this dissertation builds on the “accessibility-diagnostics framework” (Feldman and Lynch 1988; Menon and Raghurir 2003) and extends it by showing that using mental simulation to activate the diagnostics of the naturally less accessible mental images leads to preference consistency over time and increased evaluations of RNPs. At the same time, this dissertation contributes to the simulation literature by proposing an explanation to the present conflicting findings and a potential confound in this literature (Tayler et al. 1998), as well as testing the efficacy of experienced ease from an anticipatory perspective beyond the traditional retrospective view (Schwarz et al. 1991; Schwarz 1998).

## APPENDIX A

### ESSAY 1: EXPERIMENT 1 (ASSIGNMENT CHOICE)

#### Stimuli:

Imagine that you are required to turn in a class assignment in a week [at the beginning of next semester]. The assignment requires reading a chapter and discussing a number of questions about it. There are two topics that you could choose. Topic A is very interesting, but requires lots of effort. Topic B is not as interesting, but only requires reasonable effort.

You need to choose one of these two topics to submit in a week [at the beginning of next semester].

**Topic A:** very interesting, but requires lots of effort

**Topic B:** moderately interesting, but only requires reasonable effort

#### Mental Simulation Manipulations:

##### Process Simulation:

*“Think about a difficult (an easy) assignment you have worked on in the past. Imagine how much time and effort you are going to spend on the assignment if you choose topic A (topic B).”*

##### Outcome Simulation

*“Think about an interesting (uninteresting) assignment you have worked on in the past. Imagine how you are going to benefit from completing the assignment if you choose topic A (topic B).”*

## APPENDIX B

### ESSAY 1: EXPERIMENT 2 (SOFTWARE CHOICE)

#### Stimuli:

Assume that you have an important project (creating a photo essay) for one of your classes that needs to be submitted in two days [at the beginning of next semester]. The project requires the use of a photo essay software package. There are two software packages available that would allow you to complete this project. Both software packages have free trial versions that can be downloaded from the web and are valid for 48 hours, which should give you enough time to complete the project. All projects will be graded and then posted on the web.

Below are the two software packages to choose from for your project due in two days [at the beginning of next semester].

	Software Package A	Software Package B
<b>PC Magazine Quality Rating</b>	★★★★★	★★★★☆
<b>Excerpt from Review</b>	<i>“...allows for the creation of fabulous photo essays, but difficult and time consuming to learn and use...”</i>	<i>“...some limitations of final layout and editing options, but simple to use, easy to learn, and gets the job done...”</i>
<b>Initial set-up</b>	Large file size Downloading, installation, and tutorial take about 45 min.	Small file size Downloading, installation, and tutorial take about 10 minutes.
<b>Ease of procedure</b>	Medium difficulty level	Low difficulty level
<b>Advanced features</b>	Complete image editing features (numerous pre-designed themes and improved layout tools)	Some image editing features (limited themes and basic layout tools)

## APPENDIX C

### ESSAY 1: EXPERIMENT 2 (SOFTWARE CHOICE)

#### **Mental Simulation Manipulations:**

##### Process Simulation

*Imagine the process of using software package A (B). As you imagine, focus on the procedure of using this software to create your project. Imagine how you would feel while you are using this software to create your project. That is, focus on the process of using software package A (B) to complete your project – focus on how you would feel as you are using this software.*

##### Outcome Simulation

*Imagine the final outcome of using software package A (B). As you imagine, focus on the quality of the project created with this software. Imagine how you would feel after your project is created with this software. That is, focus on the final outcome of your project completed with software package A (B) – focus on how you would feel from obtaining the result of using this software.*

## APPENDIX D

### ESSAY 2 & 3: PRODUCT INFORMATION SHEET FOR THE INP

**“The XI-100 is the mobile product for people on the go!”**



*The XI-100 ultra-portable notebook gives users outstanding performance in a small and light notebook*

- Keyboard light to illuminate the keyboard in low-light.
- Titanium Cover provides extra-light and enhanced durability.
- Extended life battery allows up to 4 hours computing.
- Optimized for connectivity with flexible connection options
- Lightweight (weighs about 4.5 pounds)
- 14" TFT screen
- Intel® Pentium® M processor at 1.73GHz
- 3 year limited warranty

## APPENDIX E

### ESSAY 2 & 3: PRODUCT INFORMATION SHEET FOR THE RNP

**“The XI-100 is the mobile product for people on the go!”**



*The XI-100 ultra-portable notebook gives users outstanding performance in a small and light notebook*

- Biometric smart pen recognizes, stores, and converts handwritten text
- Chip based audio recorder synchronizes with handwritten notes
- PDF file enhancer allows for onscreen annotation
- Wearable computer attachment has eye glass mounted LCD display
- Lightweight (weighs about 4.5 pounds)
- 14" TFT screen
- Intel® Pentium® M processor at 1.73GHz
- 3 year limited warranty



## APPENDIX F

### ESSAY 2: SUMMARY OF MENTAL SIMULATION MANIPULATIONS

#### Experiment 1 (INP vs. RNP x Process vs. Outcome Simulation)

Process simulation:

*In the following visualization exercise, please imagine the process of using the XI-100. As you imagine, focus on how you would incorporate the XI-100 into your daily routine. Imagine how you would feel while you are using this product for your school work. That is, focus on the process of using the XI-100.*

Outcome simulation:

*In the following visualization exercise, please imagine the end benefits of using the XI-100. As you imagine, focus on the end benefits of using the XI-100 in your daily routine. Imagine how you would feel as a result of improving your school work by using this product. That is, focus on the end benefits of using the XI-100.*

#### Experiment 2 (Process vs. Outcome Simulation x Cognitive vs. Affective Focus)

Cognitive oriented process simulation:

*While you are looking at the advertising on the following page, we would like you to focus on the specific features of this product and imagine the process of using this product. As you imagine, focus on how you would incorporate this product into your daily routine.*

Affective oriented process simulation:

*While you are looking at the advertising on the following page, we would like you to focus on the specific emotions that you may feel during the process of using this product. As you imagine, focus on how you would feel while incorporating this product into your daily routine.*

Cognitive oriented outcome simulation:

*While you are looking at the advertising on the following page, we would like you to focus on the specific benefits of using this product and imagine the outcome of using this product. As you imagine, focus on the specific benefits that you would receive after using this product.*

Affective oriented outcome simulation:

*While you are looking at the advertising on the following page, we would like you to focus on the specific emotions that you may feel after receiving the benefits of using this product. As you imagine, focus on how you would feel about the outcome of using this product.*

## APPENDIX G

### ESSAY 3: SUMMARY OF VISUALIZATION INSTRUCTIONS

#### Experiment 1 (INP vs. RNP x Memory vs. Imagination-Focused Visualization)

Free visualization:

*Visualizing activities with the XI-100, may help you evaluate the XI-100. Please free your mind to visualize these activities (i.e. think about ways you will use computers) as you evaluate the XI-100.*

Imagination-focused visualization:

*Unleashing your imagination and visualizing new activities that you have never been able to do with computers before, may help you evaluate the XI-100. Please push yourself to visualize these new activities (i.e. think about new ways you will use computers) as you evaluate the XI-100.*

#### Experiment 2 (INP vs. RNP x Producing 1 vs. 8 Activities)

*Please push yourself to use your imagination and envision one new activity [eight new activities] that you have never been able to do with computers before, but will be able to do with the XI-100.*

#### Experiment 3 (INP vs. RNP x Visualization Aids with 8 vs. 1 Activity)

*Please push yourself to use your imagination and envision new activities that you have never been able to do with computers before, but will be able to do with the XI-100.*

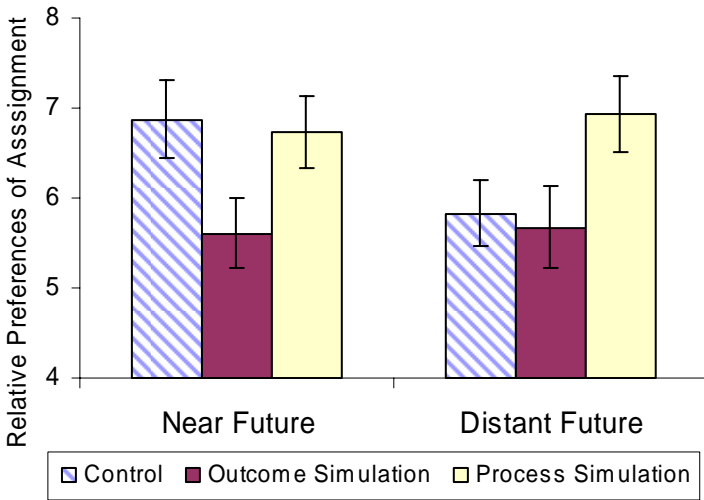
*Below are eight examples of activities [an example of an activity] that you could envision as you imagine the new uses of the XI-100.*

- *Carrying the lightweight computer with you all over campus*
- *Taking notes in class that you can paste directly into handouts (e.g., Powerpoint)*
- *Bringing to a sporting event to capture and dictate audio and writing a blog of what is happening.*
- *Writing directly on PDF and reading my notes on the handouts*
- *Typing and working in the dark with lighted keyboard*
- *Audio recording a professors lecture and replaying portions of the lecture when reviewing and studying for test*
- *Watching an entire movie on a plane without the battery dying*
- *Signing electronic documents and transfer with computer signature*

*The second example (Taking notes in class that you can paste directly into handouts (e.g., Powerpoint) was used for the 1 example condition.*

**FIGURE 1: ESSAY 1 -- EXPEERIMENT 1 RESULTS**

PREFERENCE INSTABILITY VANISHES  
WITH OUTCOME OR PROCESS SIMULATION



**Notes:** A higher score represents greater preferences toward the higher-feasibility option.

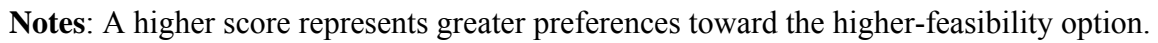
\* \* \*

-- How strongly would you prefer one topic over the other to submit next week?

**Strongly prefer Topic A**      **Strongly prefer Topic B**

1    2    3    4    5    6    7    8    9    10

PREFERENCE INSTABILITY VANISHES  
WITH OUTCOME OR PROCESS SIMULATION

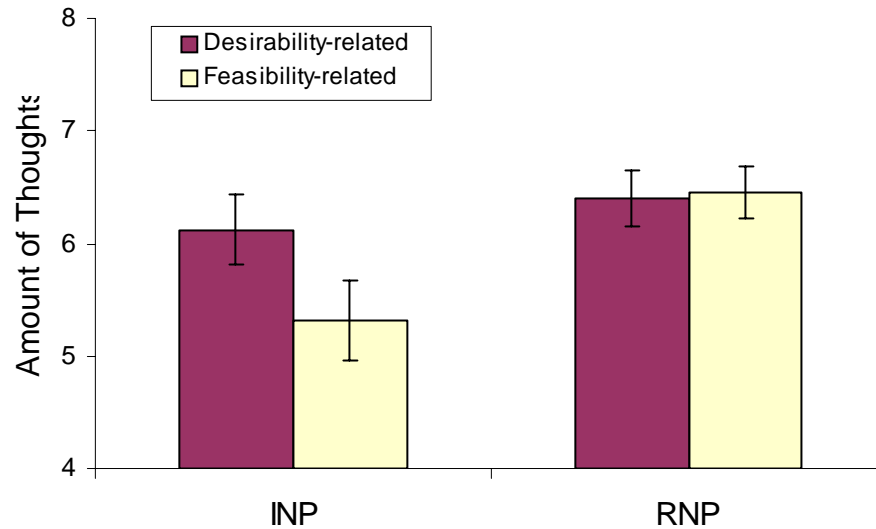


✻

Strongly Prefer Software A				Indifferent between A and B				Strongly Prefer Software B		
1	2	3	4	5	6	7	8	9	10	11

### FIGURE 3: ESSAY 2 -- PILOT STUDY RESULTS

#### MENTAL REPRESENTATION OF DESIRABILITY VS. FEASIBILITY-RELATED THOUGHTS



**Notes:** A higher score represents a higher amount of thoughts.

\*

\*

\*

-- How much did you think about the **process of using the XI-100?**

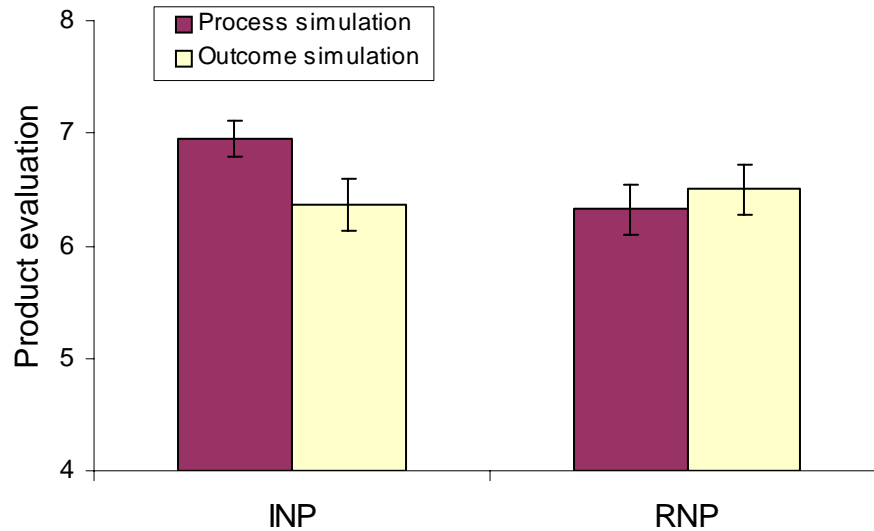
**Not at all**      1    2    3    4    5    6    7    8    9      **A lot**

-- How much did you think about the **end benefit of using the XI-100?**

**Not at all**      1    2    3    4    5    6    7    8    9      **A lot**

**FIGURE 4A: ESSAY 2 -- EXPERIMENT 1 RESULTS**

## PRODUCT EVALUATION



**Notes:** A higher score represents higher product evaluation.

✻

✻

## -- Evaluation questions

What is your **overall evaluation** of the XI-100?

1	2	3	4	5	6	7	8	9
<b>Bad</b>								<b>Good</b>

How would you **rate** the XI-100?

1 2 3 4 5 6 7 8 9  
**Poor** **Excellent**

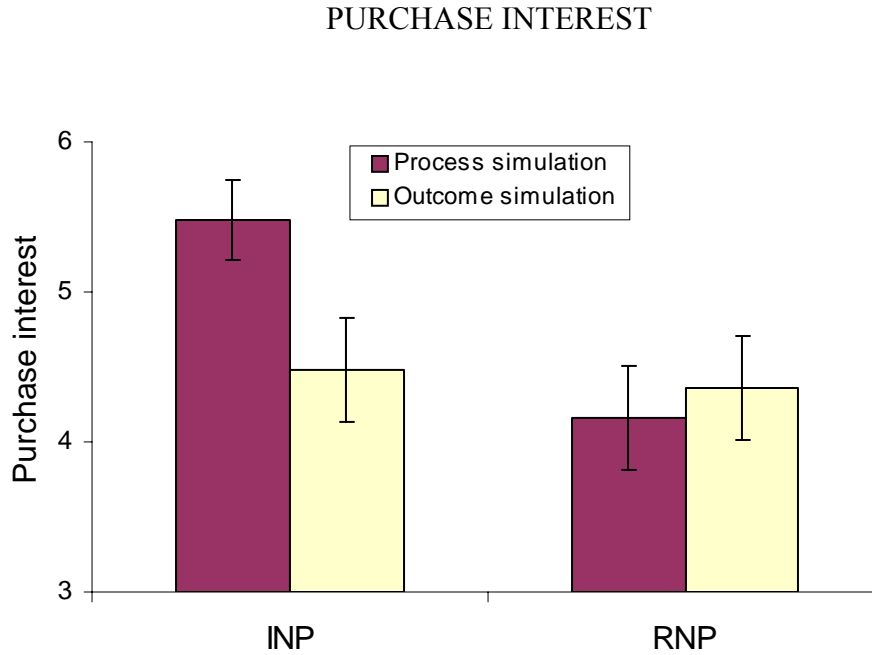
Do you think the XI-100 is an **excellent product**?

1 2 3 4 5 6 7 8 9  
Not at all Definitely

Your **attitude** towards the XI-100 is:

1	2	3	4	5	6	7	8	9
Dislike					Like			

**FIGURE 4B: ESSAY 2 -- EXPERIMENT 1 RESULTS**



**Notes:** A higher score represents higher purchase interest.

\*

## -- Purchase Interest Questions

How **interested** would you be in purchasing the XI-100?

1 2 3 4 5 6 7 8 9  
Not at all Very Interested

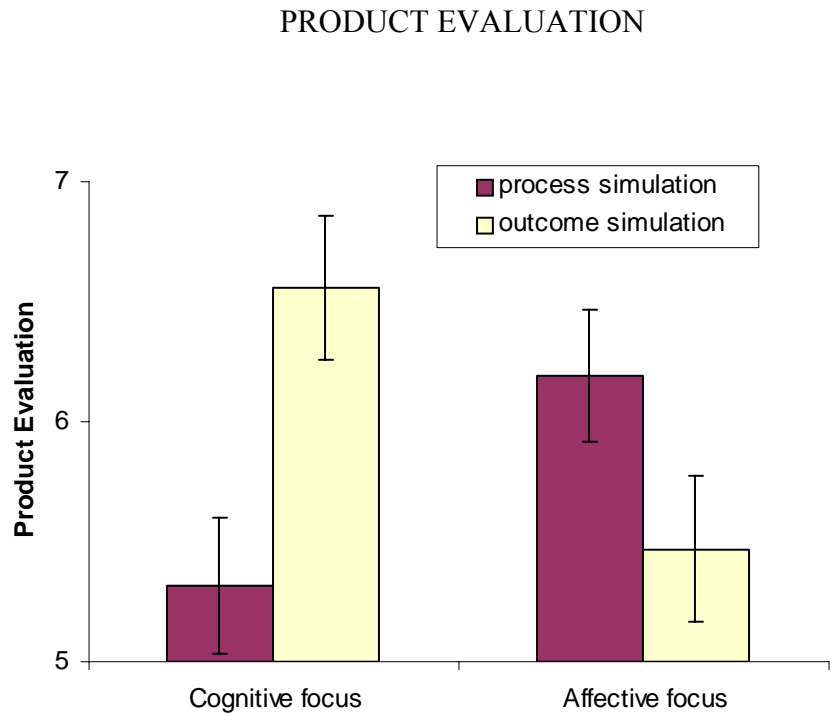
How seriously would you **consider** the XI-100?

1 2 3 4 5 6 7 8 9  
Not at all Very seriously

What is the likelihood that you **would buy** the XI-100?

1 2 3 4 5 6 7 8 9  
Not at all likely Very likely

FIGURE 5A: ESSAY 2 -- EXPERIMENT 2 RESULTS



Notes: A higher score represents higher product evaluation.

\* \* \*

-- Evaluation questions

What is your <b>overall evaluation</b> of the XI-100?	1	2	3	4	5	6	7	8	9
	Bad								Good
How would you <b>rate</b> the XI-100?	1	2	3	4	5	6	7	8	9
	Poor								Excellent
Do you think the XI-100 is an <b>excellent product</b> ?	1	2	3	4	5	6	7	8	9
	Not at all								Definitely
Your <b>attitude</b> towards the XI-100 is:	1	2	3	4	5	6	7	8	9
	Dislike								Like



## PURCHASE INTEREST



✻

1 2 3 4 5 6 7 8 9  
Not at all likely Very likely

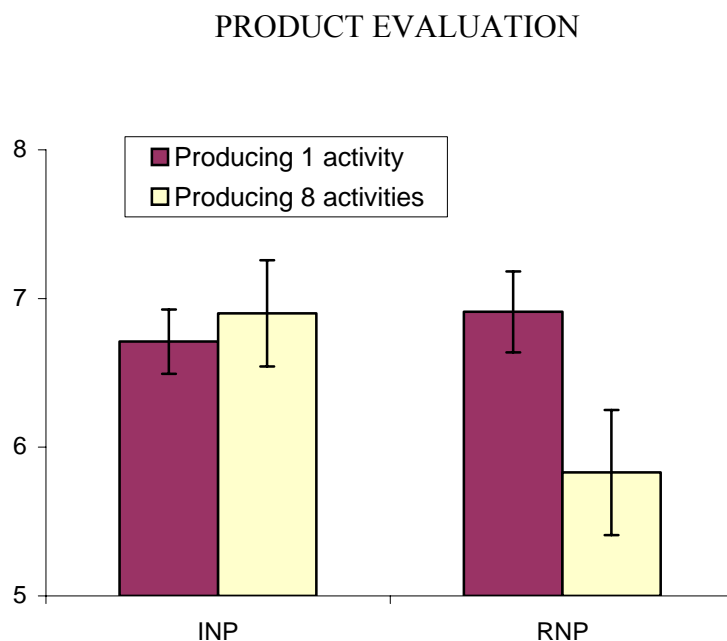
**PRODUCT EVALUATION**

Task	Memory-based	Imagination-based
INP	~6.4	~6.3
RNP	~6.2	~6.9

\* \* \*

What is your <b>overall evaluation</b> of the XI-100?	1 <b>Bad</b>	2	3	4	5	6	7	8	9 <b>Good</b>
How would you <b>rate</b> the XI-100?	1 <b>Poor</b>	2	3	4	5	6	7	8	9 <b>Excellent</b>

**FIGURE 7: ESSAY 3 -- EXPERIMENT 2 RESULTS**



**Notes:** A higher score represents higher product evaluation.

\*

\*

\*

### -- Evaluation questions

What is your **overall evaluation** of the XI-100?

1	2	3	4	5	6	7	8	9
<b>Bad</b>								<b>Good</b>
1	2	3	4	5	6	7	8	9
<b>Poor</b>								<b>Excellent</b>

How would you **rate** the XI-100?

A bar chart titled "PRODUCT EVALUATION" comparing scores for two conditions, INP and RNP. The y-axis represents a score from 5 to 8. For each condition, there are two bars: a maroon bar for "Given 8 examples" and a yellow bar for "Given 1 example". Error bars are shown for each bar.

Condition	Given 8 examples	Given 1 example
INP	~6.5	~6.2
RNP	~7.5	~5.5

\* \* \*

What is your <b>overall evaluation</b> of the XI-100?	1 <b>Bad</b>	2	3	4	5	6	7	8	9 <b>Good</b>
How would you <b>rate</b> the XI-100?	1 <b>Poor</b>	2	3	4	5	6	7	8	9 <b>Excellent</b>

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