Money, Beer, and Toys: Essays in Consumer Decision Making

by

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Submitted to the Alfred P. Sloan School of Management
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ABSTRACT

This dissertation consists of three essays that examine different facets of decision making in consumers.

Essay 1: Shopping Goals, Goal Concreteness, and Conditional Promotions

We propose a two-stage model to describe the increasing concreteness of consumers' goals during the shopping process, testing the model through a series of field experiments at a convenience store. Using a number of different process measures (experiment 1), we first established that consumers are less certain of their shopping goals and construe products in less concrete terms when they are in the first (vs. second) stage of the shopping process. The results of experiments 2 and 3 next demonstrate that goal-evoking marketing promotions (e.g. conditional coupons) are more effective in influencing consumers' spending when consumers' goals are less concrete.

Essay 2: Try It, You’ll Like It: The Influence of Expectation, Consumption, and Revelation on Preferences for Beer

Patrons of a pub evaluated regular beer and “MIT brew” (the same regular beer with some balsamic vinegar) in one of three conditions. One group tasted them blind (the secret ingredient was never disclosed). A second group was informed of the contents before tasting. A third group learned of the secret ingredient immediately after tasting, but prior to indicating their preference. Not surprisingly, preference for the MIT brew was higher in the blind condition than either of the two disclosure conditions. However, the timing of the information mattered substantially. Disclosure of the secret ingredient significantly reduced preference only in the before condition, when it preceded tasting, suggesting that disclosure affected preferences by influencing the experience itself, rather than by acting as an independent negative input or by modifying one’s retrospective interpretation of the experience.

Understanding the roles of emotion and cognition in forming preferences is critical in helping firms choose effective marketing strategies and consumers make appropriate consumption decisions. In this work, we investigate the role of the emotional and cognitive systems in preference consistency (transitivity). Participants were asked to make a set of binary choices under conditions that were aimed to tap emotional versus cognitive decision processes. The results of three experiments consistently indicate that automatic affective responses are associated with higher levels of preference transitivity than deliberate cognitive considerations, and suggest that the basis of this central aspect of rational behavior—transitivity—lies in the limbic system rather than the cortical system.

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Finally, to my parents and to my brother, Bennet, I wish to dedicate this dissertation. Thanks for all your love and patience, and the many sacrifices you have made so that I can pursue my dream. God bless.
To my parents and my brother, Bennet
I wish to thank On Amir, Mary Caulfield, Shane Frederick, Christopher Hsee, John Lynch, and Kristina Shampan’er for their thoughtful comments, as well as Hayley Barna, James Beatty, Juan Carlos Arredondo Brun, Ariadna Elizade, Insoo Kim, Colin Klick, Joy Lee, Ivory Liu, Latha V. Pasupuleti, Sarika Singh, Sek-Loong Tan, Ketty Tanizar, and Nelly Tanizar for their research assistance. I am especially grateful to Mr. Frank La Verde, Mr. Marc Semon, and all staff of La Verde’s Market for their kind support and cooperation.
ABSTRACT

We propose a two-stage model to describe the increasing concreteness of consumers’
goals during the shopping process, testing the model through a series of field experiments
at a convenience store. Using a number of different process measures (experiment 1), we
first established that consumers are less certain of their shopping goals and construe
products in less concrete terms when they are in the first (vs. second) stage of the
shopping process. The results of experiments 2 and 3 next demonstrate that goal-evoking
marketing promotions (e.g. conditional coupons) are more effective in influencing
consumers’ spending when consumers’ goals are less concrete.
Accumulating evidence points to the pivotal role of goals in our daily lives, providing us with a sense of direction and clarity for our actions, and influencing the way we think and behave (Gollwitzer 1990; Kruglanski et. al. 2002; Kunda 1990; Locke and Latham 1990). It has been demonstrated that goals can serve as an effective self-regulation mechanism (Shah, Friedman, and Kruglanski 2002), an important source of experienced utility (Kahneman 2000; Loewenstein 1999), and an avenue to satisfy “innate psychological needs” such as competence and autonomy (Deci and Ryan 2000).

Building on the concept of goals, we examine how the types of consumption goals consumers have change over time as consumers go through the shopping process. We also test an important marketing implication of these ideas—that the success of marketing actions, such as promotions, depends on the type of goals consumers have when they are exposed to such promotions, and on the ways in which these promotions can influence their goals.

When considering consumers’ goals, it is difficult to imagine that such goals would be highly specified at all times. For example, a thirsty consumer might have an initial goal of drinking something, but this goal might later translate into the more specific goal of drinking a particular flavor of milkshake. Evidence for the idea that goals change from being abstract to more precise is apparent in Trope and Liberman (2003)’s construal level theory. From this stream of research, it is becoming clear that individuals define objectives and actions in super-ordinate terms for target activities in the distant future, and translate them into more concrete, subordinate actions only as the target activities draw nearer. For instance, respondents to a questionnaire (Trope and Liberman 2003, 406) construed the activity “locking a door” as “putting a key in the lock” if they
were told that the activity were to take place tomorrow, but as “securing the house” if it were to take place sometime next year. A more direct treatment of this idea in the goals literature is Gollwitzer (1990, 1999)’s mindset theory. According to Gollwitzer, people’s execution of volitional control involves two phases. In the first phase, individuals are uncertain about their goals; they are in a deliberative mindset, and seek to define “a desired performance or an outcome” (Gollwitzer 1999, 494). In the second phase, individuals have already established their goals, and switch to an implemental mindset where they pursue implementation intentions and well-defined “when, where, and how of responses leading to goal attainment” (494; see Carver and Scheier 1998, Kruglanski and Webster 1996, and Lewin et. al. 1944 for other analogous dual-process models of motivation.)

Empirical research has shown that, in addition to being associated with different thought contents, these two distinct mindsets are also characterized by different cognitive orientations tuned toward thoughts and information that are congruous to the mindsets. This congruency between mindset and cognitive orientation further facilitates the attainment of the deliberative and implemental goals by causing selective attention to and encoding of congruent information (Gollwitzer, Heckhausen, and Steller 1990). Furthermore, individuals in a deliberative mindset are generally more receptive and open-minded toward available information, compared to those in an implemental mindset. This higher receptivity to information is evident not only in a greater sensitivity to new information, but also in an increased readiness and a faster speed of processing peripheral information (Gollwitzer and Bayer 1999; Heckhausen and Gollwitzer 1987).
One other stream of research that might shed some light on the process by which goals become more specific and concrete over time is the work on preference construction in decision making (see Payne, Bettman, and Johnson 1993 for a thorough review). As an example of preference construction, Ariely, Lowenstein, and Prelec (2003, Experiment 1) found that participants’ willingness-to-pay for a bottle of ‘98 Cotes du Rhone was highly correlated with the price equivalent to the last two digits of their social security number when they were first asked whether they would be willing to pay that particular price for the wine (although the participants were reminded that their social security numbers were random quantities that conveyed no relevant information). What this and other research in the same vein demonstrate is that consumers’ preferences are generally ill-defined and incomplete, and when the time to make a decision arrives, consumers “construct” their preferences in a way that is based partially on their internal likes and dislikes, and partially on the environmental cues available at the time they make the decision (Huber, Payne, and Puto 1982; Tversky, Sattath, and Slovic 1988; Tversky and Simonson 1993). In terms of its applicability to goals and how they change over time, the work on preference construction suggests that goals might not only change because of their natural progression, but might also be defined by the context and available environmental cues (Bagozzi and Dholakia 1999), particularly when the goals are not concrete or have not already been defined. This differential influence of contextual cues on goal definition as a function of the concreteness (or stage) of goals resonates with the aforementioned finding by Gollwitzer and his colleagues (Gollwitzer and Bayer 1999; Heckhausen and Gollwitzer 1987) that individuals in a deliberative (vs. implemental) mindset are more receptive toward new information.
Integrating the general ideas from Trope and Liberman's construal level theory,
Gollwitzer's mindset theory, and the work on preference construction leads to a two-
stage framework that combines the increasing concreteness of shopping goals with the
sensitivity of these goals to contextual influence—we refer to this theory as the shopping
goals theory. According to this framework, the initial stage of shopping is a stage where
consumers are generally uncertain about what they want to buy or how much they want
to spend, and are thus susceptible to contextual and external influence as they consider
different factors in constructing their shopping goals. Once consumers have constructed
concrete shopping goals, they move to a second stage characterized by goal determinism
and action tenacity. In this stage, consumers largely adhere to the goals they have set.
They strive to attain these goals, and are thus less susceptible to contextual and external
influence such as promotions.

TESTING THE SHOPPING GOALS THEORY

To test this two-stage theory, we first have to demonstrate that consumers
conceive of their shopping goals in different ways during their shopping process—that
they initially think about their goals in more general and abstract terms, and later in more
specific and concrete terms.

We first tested this idea by approaching consumers either before or after they
enter a store, examining the differences in how they construe the products they are about
to buy and the amount of money they are considering spending:
**H1:** Compared to consumers in the initial stage of their shopping, those in the later stage of their shopping are (a) more certain of what they want to buy and how much they are going to spend; and (b) construe the products they are considering in lower-level, more concrete terms.

The next aspect of the theory to be tested is the idea that the influence of external factors (e.g. promotions) on shopping goals can be more pronounced in the first stage of the shopping process, but more limited in the second stage. We tested this idea in a series of field experiments at a convenience store using conditional coupons that entitled customers to a monetary discount if they spent at least a stipulated amount (e.g. “Spend $X or more and get $Y off”). We selected this type of coupons specifically for their goal-evoking property—the minimum spending requirements on these coupons can suggest concrete spending targets for consumers. Common examples of conditional promotions include offers of free shipping conditional on spending $X at Amazon.com, and promises of a small gift conditional on spending $Y at the Clinique counter (see also Nunes and Drèze (2004) for the effects of concrete rewards in loyalty programs). In our field experiments, we approached consumers under different conditions that should make them think about their shopping goals at different levels of concreteness (using different operational definitions for the causes of the transition from the first stage to the second stage of the model), and examined how the type of coupon promotion interact with these conditions to influence consumer spending:

**H2:** The effects of conditional coupons with minimum spending requirements are likely to be larger when consumers are in the initial stage of their shopping when their shopping goals are less concrete, relative to when
consumers are in the later stage of their shopping when their shopping goals are more concrete.

The rest of this article is structured as follows: we first describe a series of five experiments conducted at a convenience store, each looking at one measure related to hypothesis 1. Having established that consumers do indeed have different mindsets and different levels of goal concreteness in different stages of the shopping process, we next report the results of two field experiments involving conditional coupons conducted at the same convenience store. In experiment 2, we tested the ability of conditional coupons to either increase or reduce spending, under conditions where consumers’ own goals were either more or less concrete. The results showed that such coupons can either increase or decrease spending depending on the required minimum spending, but only when consumers’ goals are not concrete. In experiment 3, we again demonstrated the effectiveness of conditional coupons (relative to unconditional coupons) in evoking the construction of concrete shopping goals, and the dependence of this effectiveness on the concreteness of consumers’ own shopping goals, using a different manipulation of goal concreteness. We conclude with a general discussion of our findings, as well as a number of suggestions for future research.

GENERAL EXPERIMENTAL SETUP

We conducted a series of field experiments at a local convenience store—La Verde’s Market—to test the proposed theory. Since all the experiments utilized the same basic setup, we first provide general details about the experimental environment. Formed
in 1989, La Verde’s Market is a mid-size convenience store situated within the premises of MIT. The store has a floor space of 4,000 sq feet, and stocks more than 20,000 SKUs of common grocery products and household items. About 3,500 customers visit the store each day, with the average customer spending about $4 per visit and buying two items at the store. (These figures were obtained from an analysis of La Verde’s Market’s transaction history, as well as interviews with both the owner and the manager of the store.)

In each experiment, a research assistant, disguised as a store employee, randomly handed customers different types of questionnaires (experiments 1a-e), or coupon promotions that were either conditional (i.e. “Spend $X or more and get $1 off”) or unconditional (i.e. “Spend any amount and get $1 off”) (experiments 2 and 3). Whereas experiment 1 was based on responses to surveys and hence posed no particular challenge, experiments 2 and 3 involved real purchases and thus some experimental challenges. The first challenge was to minimize any potential selection bias due to missing data. In order to capture the spending amounts of all customers whether they met the spending conditions or not, the cashiers were instructed to ask all customers for their coupons during checkout. We were not fully successful in this endeavor. Inevitably, there were some customers who entered the store and exited without buying anything, such that we were unable to account for their data. Nonetheless, given that the number of these “missing coupons” across conditions was comparable, we do not believe they limit our analysis (moreover, pilot studies that varied greatly in the proportion of coupons accounted for showed the same pattern of results). The second challenge involved the variability in spending. Although the average spending was generally low across the
various conditions and experiments (below $5), there were some large transactions, usually made by departments or student groups. To avoid any biases due to these outliers, we removed transactions that were above $20 (just over three SDs above the average spending) from the analyses of all experiments. However, retaining them in the analyses does not change the results or the conclusions.

EXPERIMENT 1: SPENDING UNCERTAINTY AND PRODUCT CONSTRUAL

Overview and Method

To test the hypothesis that consumers modify their goals and cognitive orientations during the shopping process, we designed a set of five experiments, each using a different dependent measure to capture the change in the concreteness of consumers' goals over the course of their shopping. Each experiment measured either a potential change in how certain consumers were of their impending spending during the shopping process, or how concrete they construed the products they considered buying.

In each experiment, we “manipulated” the location where we approached consumers—50 customers just outside the store at the entrance, and 50 along the back aisles inside the store. The rationale for this manipulation is based on the intuition that customers inside the store are more likely to have, at least partially, made up their minds about what they want to buy, given that they are closer to having to make such decisions. Hence, the customers who are asked to respond just before entering the store are representative of those with less concrete shopping goals (in the earlier stage of their shopping), whereas the customers who are asked to respond inside the store are
representative of those with more concrete shopping goals (in a later stage of their shopping.)

To measure the potential change in consumers’ degree of certainty of their spending amount, we asked customers for their confidence and their estimated spending range. In experiment 1a, we first asked customers to estimate how much they think they were going to spend at the store, and then to indicate (on a scale from 1 to 10) how certain they were of this amount. In experiment 1b, we asked customers to indicate the upper and lower bounds on their expected spending. We predicted that customers interviewed just before entering the store (those in the earlier stage of their shopping) would have less concrete goals than those interviewed inside the store (those in the later stage of their shopping), and would thus express a lower degree of certainty in their expected spending.

To measure the potential change in the degree of concreteness of consumers’ product construal, we asked respondents to create and classify shopping lists into categories. In experiment 1c, we asked the customers to list the items they planned to buy. Subsequently, two independent raters (blind to the objective of the experiment) were asked to rate the degree of concreteness of the shopping lists on a scale from 1 to 3. In experiment 1d, we asked customers to list the items they would buy if there were a storewide 20% discount in the store. Following two filler questions, customers were then asked to classify the items they had just listed into as many or few categories as they saw fit. In experiment 1e, based on Liberman, Sagristano, and Trope (2002, Study 1), we gave each customer a fixed list of 20 products (e.g. Diet Coke, Duracell AA Batteries, Lays Potato Chips etc.) to categorize as they saw fit. We predicted that customers interviewed
just before entering the store (those in the earlier stage of their shopping) would have less concrete goals than those interviewed inside the store (those in the later stage of their shopping), and would thus construe products in less concrete terms. In particular, we expected this tendency to manifest in listing less concrete items on their shopping lists in experiment 1c, in using fewer (and broader) categories to classify their own shopping lists (experiment 1d) as well as the external shopping list (experiment 1e).

**Results and Discussion**

The results of these five experiments (summarized in the table below) support the idea that consumers have less concrete shopping goals when they first enter a store, but more concrete shopping goals and well-defined preferences as their shopping progresses (perhaps after gaining greater exposure to the products in the store, and/or having more time to consider these products in relation to their own needs and preferences.) Consistent with our predictions, the customers in the earlier stage of their shopping expressed a significantly lower degree of certainty (experiment 1a) and a bigger numeric range (experiment 1b) for their expected spending amount. Their lower degree of certainty in their expected spending amount was also reflected in their significantly more varied response in experiments 1a-b. At the same time, in the earlier stage of their shopping, customers listed less concrete products (e.g. generic categories instead of specific brands) on their shopping lists (experiment 1c), and used fewer (and broader) categories to classify the products they self-generated (experiment 1d) or given to them (experiment 1e). These results support the first basic aspect of our theory (hypothesis 1). The next step is to examine whether this difference in goal concreteness creates differential
susceptibility to particular types of marketing promotions. In experiments 2 and 3, we shall use price promotions to test hypothesis 2—that the effects of conditional coupons are likely to be larger when consumers are in the earlier stage of their shopping (with less concrete shopping goals), compared to when they are in the later stage of their shopping (with more concrete shopping goals).

<table>
<thead>
<tr>
<th>Dependent Measure</th>
<th>Means</th>
<th>Significance Testing</th>
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<tbody>
<tr>
<td><strong>Experiment la</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spending certainty</td>
<td>$M_{oa} = 7.70$, $SD = 1.72$</td>
<td>$M_{ia} = 9.02$, $SD = 1.10$</td>
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<tr>
<td>(1: very uncertain, 10: very certain)</td>
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<tr>
<td><strong>Experiment lb</strong></td>
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<tr>
<td>Spending range</td>
<td>$M_{oa} = 3.92$, $SD = 3.64$</td>
<td>$M_{ia} = 1.72$, $SD = 3.08$</td>
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<tr>
<td><strong>Experiment lc</strong></td>
<td></td>
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<tr>
<td>Concreteness of shopping list</td>
<td>$M_{oa} = 1.97$, $SD = 0.66$</td>
<td>$M_{ia} = 2.40$, $SD = 0.65$</td>
</tr>
<tr>
<td>(1: least concrete; 3: most concrete)</td>
<td></td>
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<tr>
<td>Inter-rater reliability = 86%</td>
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<tr>
<td><strong>Experiment ld</strong></td>
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<tr>
<td># Categories used in classification</td>
<td>$M_{oa} = 2.24$, $SD = 0.96$</td>
<td>$M_{ia} = 2.70$, $SD = 1.28$</td>
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<tr>
<td><strong>Experiment le</strong></td>
<td></td>
<td></td>
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<tr>
<td># Categories used in classification</td>
<td>$M_{oa} = 4.82$, $SD = 1.70$</td>
<td>$M_{ia} = 6.08$, $SD = 2.72$</td>
</tr>
</tbody>
</table>

EXPERIMENT 2: COUPON CONDITIONS AS SHOPPING GOALS

Overview and Method

One of the goals of experiment 2 was to replicate the general findings from experiment 1 using a measure of real expenditures, and to test if indeed consumers in the earlier stage of the shopping process are more susceptible to conditional coupons of the form “Spend $X$ and get $1$ off.” As in experiment 1, we manipulated the degree of concreteness of consumer’s shopping goals by handing out coupons to them either just
before they entered the store (i.e. low level of goal concreteness), or along the back aisles of the store (i.e. high level of goal concreteness).

In addition, since the issue of financial incentives is central to coupons, we needed a control to tease apart the goals and financial incentives accounts in explaining consumers' redemption of conditional coupons. Without such controls, it would be impossible to claim that consumers are using these coupons to construct concrete shopping goals rather than merely to enjoy financial savings. To achieve this objective, we also manipulated the condition (minimum required spending level) of the coupons to be either above or below consumers' typical spending at the convenience store. The logic for this manipulation is that the goals and financial incentives accounts have divergent predictions for the spending of consumers who receive conditional coupons with a lower-than-average (but not higher-than-average) spending requirement. If the financial value of coupons were the only factor consumers consider in their spending decisions, conditional coupons with lower-than-average minimum required spending can be less effective in increasing consumers' spending than those with higher-than-average minimum required spending, but should not have an overall negative effect on their spending. In contrast, the goals account predicts that these lower-than-average coupons can result in the construction of lower shopping goals, and thus, a decrease in overall spending.

To set the coupon condition levels in this experiment, we started with an analysis of La Verde's Market's transaction history, which showed that the average consumer spends about $4 on each visit. Based on this baseline, the spending requirement for the high minimum spending level was set at $6, whereas the spending requirement for the
low minimum spending level was set at $2. In the conditional-$6 (conditional-$2) coupon condition, consumers were given a coupon that entitled them to receive a $1 discount if their total purchase was at least $6 ($2).

In sum, we investigated whether conditional coupons can both increase and decrease consumer’s spending depending on the coupon condition levels, and whether this increase or decrease would be larger when consumers’ shopping goals were less concrete (before entering the store.) The overall design was a two (level of goal concreteness: low vs. high) x two (minimum required spending: $2 vs. $6) between-subjects design. One hundred coupons per condition were handed out in line with the general procedure described previously.

Results

Customers’ total spending was analyzed in a two (level of goal concreteness) x two (minimum required spending) ANOVA, revealing a significant main effect of minimum required spending ($F(1, 341) = 20.52, p < .001$), a non-significant main effect of the level of goal concreteness ($F(1, 341) = 1.05, p = .31$), and a significant interaction between the level of goal concreteness and minimum required spending ($F(1, 341) = 14.95, p < .001$).

As shown in figure 1, consumers who received the coupons inside the store (i.e. consumers with a higher level of goal concreteness) responded in a similar way to the two levels of minimum spending ($F(1, 341) = 1.42, p = .23$). In contrast, consumers who received the two types of coupons outside the store (i.e. consumers with a lower level of goal concreteness) differed in their average spending ($F(1, 341) = 42.72, p < .001$).
Examining separately the two coupon types, planned contrasts revealed that relative to the customers who received the conditional-$6 coupons inside the store, those who received the conditional-$6 coupons outside the store spent significantly more ($F(1, 341) = 3.90, p < .05$). In contrast, relative to the customers who received the conditional-$2 coupons inside the store, those who received the conditional-$2 coupons outside the store spent significantly less ($F(1, 341) = 12.43, p < .001$).

In order to better understand how the coupons influenced individual spending levels, we used two different binary variables to code whether each consumer spent just above the required minimum expenditure of the two coupons ($2-4$ and $6-8$). Using these two variables as dependent measures, we ran two separate logistic regressions with dummy independent variables for the two factors of minimum required spending and level of goal concreteness, as well as their interaction. As predicted, the interaction terms significantly predicted customers’ probability of spending within the $2$ range just above the two minimum required spending levels ($\beta = 1.79, p = 0.007$ with $2-4$ spending as the dependent measure; $\beta = 1.64, p = 0.003$ with $6-8$ spending as the dependent measure). As can be seen in Figure 2a, for customers who received the conditional-$2 coupon, the propensity to spend between $2$ and $4$ was significantly higher when their level of goal concreteness was low (57.5%) than when it was high (28.3%; $\chi^2(1) = 14.44, p < .001$). Similarly, for customers who received the conditional-$6 coupon, the propensity to spend between $6$ and $8$ was marginally higher when their level of goal concreteness was low (47.5%) than when it was high (32.6%; $\chi^2(1) = 3.24, p = .07$).
Discussion

Consistent with hypothesis 2, the results of experiment 2 indicate that issuing conditional coupons to customers has differential effects on their spending depending on the concreteness of their shopping goals (i.e. the location where these coupons were handed out). This experiment also demonstrates that customers’ spending tends to shift with the minimum spending conditions stated on their coupons. When the required spending level is higher than their typical spending level, they spend more; when the required spending level is lower, they spend less. This difference in response to the two types of conditional coupons illustrates that consumers’ redemption of conditional coupons cannot be completely accounted for by pure financial incentives.

We replicated this latter result in a separate one-factor experiment where, instead of minimum spending requirements, we handed out coupons that required customers to buy a certain number of items before they could enjoy a discount. Keeping in mind that the typical customer who visits the store buys an average of two items, we found that customers in the experiment who had to buy at least three items before they could enjoy a discount \((N = 85, M = 3.28, SD = 1.17)\) bought significantly more items than those without coupons \((N = 114, M = 2.69, SD = 2.13; t(197) = 2.31, p = .02)\), whereas those who had to buy just one item before they could enjoy a discount \((N = 89, M = 2.11, SD = 1.50)\) bought significantly fewer items than those without coupons \((t(201) = 2.19, p = .03)\). In addition to the replication, these results also show that the goal-evoking property
of conditional coupons is not exclusive to the use of monetary conditions (and thus
goals), but can potentially be generalized to other types of conditions.

Taken together, the results in this experiment demonstrate that conditional
coupons are “time sensitive.” This type of promotion seems to be more effective when
consumers are in the earlier stage of their shopping (when their goals are less concrete
and when they are more open to external influences), than when they are in the later stage
of their shopping. If consumers were consistently flexible in deciding what to buy or how
much to spend throughout their shopping process, then they should have been equally
likely to set new shopping goals based on the coupons’ conditions regardless of where
they had obtained the coupons. Thus, these results suggest that the flexibility of
consumers’ shopping targets is higher when they enter the store, causing them to shape
their behavior according to the conditions on the coupons. Once inside the store,
consumers’ targets are more concrete and rigid, and the effectiveness of the conditional
coupons is largely diminished.

EXPERIMENT 3: GOAL-RELEVANCE RECALL

Overview and Method

In experiment 2, we demonstrated the effects of changes in goal concreteness by
using a type of promotion that has goal-evoking properties (i.e. conditional coupons), and
by relying on a natural change in the concreteness of consumers’ goals during the
shopping process. While relying on natural variations such as location is useful in
reducing possible demand effects and interference with consumers’ natural shopping
process, this manipulation also lacks empirical control. In experiment 3, we replaced the location manipulation with another manipulation that was aimed at the same general construct of goal concreteness but using a more controlled, though more intrusive, manipulation. Using a different manipulation had a further advantage of providing another operational definition for goal concreteness.

The manipulation we chose hinged on the similarity between the time of day of the focal visit to the convenience store, and the time of day of a recalled previous visit. The logic of this manipulation is based on the idea that recalling a previous visit that took place during a similar time can activate relevant goals for the focal shopping and thus make the focal goals concrete, while recalling a previous visit that took place during a dissimilar time is most likely to activate irrelevant goals and has a weaker effect on the concreteness of the focal goals. Thus, customers’ current shopping goals could be made more concrete if they recalled what they had bought during a relevant past shopping experience instead of an irrelevant one.

In experiment 3, as customers approached the entrance of the convenience store, a research assistant (disguised as a store employee,) holding a coupon in his hand, asked them to recall what they had bought on a previous visit to the store. Once a customer had given his or her answer, the research assistant handed the customer the coupon he was holding in his hand, and immediately approached another incoming customer. This procedure was used to ensure that customers did not think their answers would influence in any way the coupon they would get, as well as to make it clear to them that their responses were not recorded.
The first factor we manipulated was the type of coupon. To test the effectiveness of conditional coupons, we contrasted consumers’ response to conditional coupons (“Spend $X and get $1 off”) with their response to unconditional coupons (“Spend any amount and get $1 off”). The basic idea for this comparison is that although both types of coupon provide a financial incentive, only the conditional coupon can provide a goal for spending. Another difference from experiment 2 is that experiment 3 was conducted in the evening (after 5pm). Given that the level of spending in the store was higher in the evenings (many customers bought dinner foods), we used a higher minimum required expenditure of $8 for the conditional coupon.

The second factor we manipulated was the level of fit between the focal shopping visit and the recalled shopping visit. In the condition designed to evoke a similar past experience, customers were asked to indicate what they had bought the last time they had visited the store in the evening, while in the condition designed to evoke a dissimilar past experience, customers were asked to indicate what they had bought the last time they had visited the store in the morning.

The overall experimental design was a two (coupon type: conditional vs. unconditional) x two (level of goal concreteness: low vs. high) between-subjects design. One hundred coupons were handed out in each condition. We predict that the similarity to the recalled shopping visit would influence the concreteness level of consumers’ current shopping goals, and that the level of goal concreteness would in turn influence consumers’ susceptibility to the goals evoked by the conditional coupons. If this prediction holds, customers who were asked the time-relevant question (evening recall) should be less influenced by the conditional coupons, compared to those who were asked
the time-irrelevant question (morning recall). Based on this reasoning, however, the type of recall question should have no effect on the spending of customers who received the unconditional coupon.

Results

Customers’ total spending was analyzed in a two (coupon type) x two (level of goal concreteness) ANOVA, revealing a significant main effect of coupon type ($F(1, 332) = 41.18, p < .001$), a significant main effect of goal concreteness ($F(1, 332) = 8.01, p = .005$), and a significant interaction effect between coupon type and goal concreteness ($F(1,332) = 5.66, p = .02$). As shown in figure 3, on the whole, customers who received the conditional coupon (with a higher-than-average minimum required spending) spent significantly more than those who received the unconditional coupon. However, this difference was less pronounced for the customers who were asked to recall a time-relevant shopping experience, which presumably made their goals more concrete, relative to those who were asked to recall a time-irrelevant shopping experience. Examining the separate effects of the two coupon types, planned contrasts revealed that for customers who received the conditional coupon, those who had to recall a time-relevant shopping experience (i.e. high level of goal concreteness) spent significantly less than those who had to recall a time-irrelevant shopping experience (i.e. low level of goal concreteness) ($F(1, 332) = 12.45, p < .001$). However, the time relevance of the recall question had no significant effect on customers who received the unconditional coupon ($F(1, 332) = 0.11, p = .74$).
A broader inspection of spending levels (see figure 2b for the proportion of customers who spent within different spending brackets in each condition) revealed that, consistent with the general spending pattern found in experiment 2, among customers who received the conditional coupon in experiment 3, those whose shopping goals were less concrete (i.e. those who recalled their last morning purchase) were more likely to spend just above the minimum required spending (i.e. $8-$10) on the coupons than those whose shopping goals were more concrete (i.e. those who recalled their last evening purchase) (32.1% vs. 16.7%, $\chi^2 = 4.05, p = .04$). In contrast, among customers who received the unconditional coupon, there was no significant difference in the proportion of customers who spent within the same bracket between customers with different levels of goal concreteness (6.8% vs. 13.7%, $\chi^2 = 1.66, p = .2$).

Discussion

The results of experiment 3 once again demonstrate the basic effect of conditional coupons as drivers of spending behavior, as well as consumers’ differential responsiveness to these coupons contingent on the level of concreteness of their current shopping goals. Experiment 3 thus provides a conceptual replication of experiment 2 while using a more controlled (and intrusive) experimental manipulation. With these results in mind, we are more confident that the results of experiment 2 were not due to a particular way of “manipulating” the concreteness of consumers’ shopping goals.
Notably, the results also demonstrate the importance of the relevance of cues for goals beyond their mere presence.

GENERAL DISCUSSION

Building on separate streams of research – mindset theory, construal level theory, and preference construction, we describe a two-stage model by which consumers construct and complete concrete shopping goals or targets. According to this view, consumers start the shopping process with ill-defined goals, construct concrete goals as they go through the shopping process, and after constructing these goals, implement them.

As a first test of the shopping goals theory, we conducted a series of field experiments at a convenience store, using a number of process measures to ascertain the different goal orientations and mindsets that consumers have in the two stages of the shopping model. In congruence with the predictions of the theory (hypothesis 1), experiment 1a-e demonstrate that consumers who are in the earlier stage of their shopping process are not only less certain about their shopping lists and spending, but also construe products in higher-level, less concrete terms. Having established that consumers do indeed have different orientations and concreteness of shopping goals in the two stages of the shopping model, we next examined the marketing implication of consumers’ differential responsiveness to promotions across the two different stages (experiments 2 and 3). We tested whether marketing promotions that could help consumers set shopping goals (such as conditional coupons) would be more effective in
the earlier stage than in the later stage of their shopping (hypothesis 2). We found that (1) consumers tend to use conditional coupons with minimum spending requirements to set concrete shopping goals, increasing or decreasing their spending in tandem with the required level stipulated on the coupons; (2) a substantial proportion of consumers tend to spend just above the condition level, consistent with a shopping goals account; (3) the propensity for consumers to be influenced by conditional coupon promotions is highly sensitive to the stage at which the consumers receive the coupons. Irrespective of whether consumers' own shopping goals became more concrete naturally during their shopping process (experiments 2), or externally through recall of a relevant prior shopping experience (experiment 3), consumers with more concrete shopping goals were less influenced by the conditional coupons they received compared to those with less concrete shopping goals.

Together, these results support the two-stage shopping goals theory where consumers start with fuzzy shopping goals, which became more concrete as the shopping experience progresses. Because of the initial lack of concreteness of their goals, consumers' sensitivity to external cues such as conditional coupons are likely to be higher in the earlier stage of their shopping when their goals are more malleable. However, although shopping goals are potentially labile when consumers are in this initial stage, they can also be rather resistant to change in the later stage of shopping, even in the presence of attractive promotions.

The results of these field experiments might also be useful in extending our understanding of preference construction and promotions more generally. In terms of preference construction, the results suggest that consumers are more susceptible to
external influences such as marketing messages, promotions, and context effects in earlier stages of the shopping process, but might be more resistant to these influences once they have selected a course of action. In terms of promotions, in addition to factors such as deal proneness (Lichtenstein, Netemeyer, and Burton 1995), advertising value (Leclerc and Little 1997), and psychological income effect (Heilman, Nakamoto, and Rao 2002), the results of our experiments suggest that the degree of shopping goal concreteness is yet another factor that could influence the effectiveness of in-store promotions, particularly those that evoke the extemporaneous construction of shopping goals.

Looking at the results of our experiments, one might ask whether consumers are aware of the influence of these conditional coupons on their goal setting and subsequent spending. To examine this question, we first conducted another field experiment in which we handed out either conditional or unconditional coupons (as in experiment 3) to customers either inside or outside the store (as in experiment 2). As predicted, the results showed a significant interaction between the two factors on customers’ spending ($F(1, 347) = 5.44, p = .02$)—while the location of coupon distribution did not affect the spending of customers who received the unconditional coupon ($p = .28$), those who received the conditional coupon spent significantly more when they received them outside the store (i.e. low level of goal concreteness) than those who received them inside the store (i.e. high level of goal concreteness) ($p = .03$). Next, we asked a different set of customers to predict in a within-subjects design the results of this experiment. Consistent with the actual behavior, the respondents predicted that the conditional coupon would lead to a higher average spending than the unconditional coupon ($p < .001$). However, in
stark contrast to the actual behavior, the respondents predicted that customers who received coupons inside the store would spend more (not less) than those who obtained them at the entrance of the store, regardless of the type of coupon ($p = .004$). These results suggest that although consumers can intuit the effects of the financial incentives of conditional coupons on spending decisions, they cannot intuit the interaction between their level of goal concreteness and the effectiveness of conditional coupons on spending decisions.

**Other Accounts for the Effects of Conditional Coupons: “Deal Seeking” and Anchoring**

In our field experiments, we used conditional coupons as a vehicle to demonstrate that when consumers do not have well-defined preferences or concrete shopping goals, they can construct shopping goals based on external promotional devices. One way to think about conditional coupons is that the conditions themselves help define the best deal consumers can get, and it is consumers’ proclivity for deal seeking that drives their subsequent purchasing behavior. For example, having received a coupon that offers $1 with a minimum spending of $6, consumers could evaluate the magnitude of the discount as a ratio to their spending, hence perceiving the $1 discount to be greater if they were to spend closer to $6 than $12. Yet another related way to think about the implied “deal attractiveness” of conditional coupons is that they signal to consumers information (or expectations) regarding deal value and scarcity (Inman, Peter, and Raghubir 1997), or cues about the idiosyncratic fit between consumers and coupons (Kivetz and Simonson 2003).
These general alternative perspectives suggest that a fruitful venue for future research could involve a deeper understanding of the complete set of inferences consumers can draw from the conditional coupons they receive regarding the value of the offered deal, its scarcity, or the level of idiosyncratic fit between them and the coupons as a way to understand the effects of such promotions on consumers' behavior. We should note, however, that while it is important to understand the inferences consumers draw from conditional coupons, such inferences are unlikely to be able to account for the changes in construal levels reported in experiment 1, the interactions with the location of coupon distribution in experiment 2, or the interactions with the relevance of shopping recall in experiment 3.

Another way to interpret the effects of the conditional coupons could be based on consumers' anchoring on the required minimum spending amounts on the conditional coupons (Tversky and Kahneman 1974). At first glance, our experimental manipulations do not seem to have much in common with the most standard manipulations of anchoring, which are based on irrelevant anchors, such as numbers on a roulette wheel (Tversky and Kahneman 1974), social security numbers (Ariely, Loewenstein and Prelec 2003), and other forms of unrelated numerical priming (Chapman and Johnson 1999; Mussweiler and Strack 2001), as well as explicitly asking participants to compare these anchors with the target. Yet, it is possible that goals and anchoring are conceptually related mechanisms. In fact, Wilson and his colleagues (1996) demonstrated empirically that anchoring can occur even in the absence of any specific instruction to compare the anchor and the target, an effect they called the "basic anchoring effect." Related results by Wansink, Kent and Hoch (1998) also proposed anchoring as the process to describe
how promotions such as multiple-unit prices and purchase quantity limits can influence the quantity of products that consumers buy.

One way to distinguish the two accounts is to consider the expected effectiveness of different types of anchors. In experiment 3, customers who received conditional coupons were given two anchors—one (high) anchor was based on the minimum required spending ($8), and the other was based on the amount that they recalled to have spent on their previous visit to the store. This second anchor was low for the time-irrelevant conditions (based on the amount that they had spent in the morning), and high for the time-relevant conditions (based on the amount that they had spent in the evening). Based on a simple anchoring account, one would predict that the consumers who received two high anchors would spend more than those who received one high and one low. The prediction of the goals account, which was supported by the data, is opposite—evoking the high-relevance recall (i.e. high second anchor) should reduce consumers’ spending with the conditional coupons compared to evoking the low-relevance recall (i.e. low second anchor).

Another way in which the basic anchoring account and the goals account differ is the time-course of their effectiveness (Mussweiler and Strack 2001). If we consider our shopping setup, the straightforward prediction of anchoring is that anchors introduced at the closest proximity in time to when buying decisions are made should, arguably, have the largest influence on behavior. This leads to the prediction that providing coupons inside the store just next to the goods will have the highest impact. The prediction of the goals account is opposite—providing the coupons earlier in the shopping process might be more effective. Again, the experimental results support the goals account over the basic
anchoring account. Nonetheless, more work is clearly needed to better understand the process of anchoring and adjustment, and its links to goal setting.

**Future Research: Underlying Mechanisms of the Two-Stage Model**

There are many unanswered questions regarding the proposed two-stage shopping goal process. First, while the current research conceptualizes goals in line with Gollwitzer’s (1990) mindset theory, it is unclear whether the concept of two goal types or two goal stages is a useful simplification of a truly continuous process, or whether there are indeed two distinct stages by which goals are defined. Being able to answer this question will also help us understand the factors that can shift consumers from the first stage to the second stage of their shopping, and the factors that can keep them in the first stage for a longer period of time.

A second unanswered question pertains more specifically to the progression from the first stage to the second stage of the shopping process. According to our model, consumers who are in the second stage cannot go back to the first stage of their shopping (even when they obtain new information or new incentives). While the results of our experiments support this unidirectional progression, it is not clear whether consumers can, under some circumstances, traverse more freely between the two stages, nor is it clear why movement between these two stages is not symmetric. Broadly speaking, there are multiple candidate accounts for why people might set goals and stick to them: ambiguity aversion (Webster and Kruglanski 1994), self-control (Shah and Kruglanski 2003), loss aversion (Heath, Larrick and Wu 1999), emotional depression (Kuhl and Beckman 1994), and the most likely candidate in our opinion, shopping efficiency.
From the perspective of shopping efficiency (Chandon, Wansink, and Laurent 2000), consumers are cognitive misers and therefore use the coupon conditions as a convenient means to help them set spending goals, subsequently refusing to entertain other goals for similar cognitive efficiency reasons (i.e. to avoid the cost of thinking) or to avoid the emotional cost of changing their decisions. One way to test this particular account could be to use individual differences such as need for cognition (Cacioppo and Petty 1982) or need for cognitive closure (Webster and Kruglanski 1994) to shed some light on the role of cognitive efficiency in this process.

A third unanswered question concerns the possibility of negative long-term effects of conditional coupons. For example, in our coupon experiments, consumers' pursuit of their externally based goals might have caused them to purchase items that they did not really need or want, leading to subsequent regret over their impulsive and imprudent purchases. It would be important to investigate the extent to which such negative long term behavior can occur in our setting, since such adverse outcomes can lead consumers to develop negative attitudes toward such promotions, or toward the retailers using them.

A fourth, and final, unanswered question relates to the degree of generalizability of our experimental findings. For methodological consistency, we have conducted all our experiments in a local convenience store. Arguably, the process of purchasing more expensive goods, e.g. furniture and high-end electronics, might involve more planning, a higher tendency to self-generate concrete shopping goals, but perhaps even greater openness to revising the decision process. Such factors could cause consumers to be either more or less prone to the contextual goal construction effects that we found, but
they should also be informative regarding boundary conditions for these goal effects, and more generally, the mechanisms underlying the two-stage shopping model.
REFERENCES


FIGURE 1

CUSTOMER SPENDING IN EXPERIMENT 2

Error bars denote standard errors. The two numbers at the base of each column denote respectively the number of coupons accounted for and the number of coupons redeemed.
FIGURE 2

DISTRIBUTIONS OF CUSTOMER SPENDING IN EXPERIMENT 2 (TOP PANEL) & EXPERIMENT 3 (BOTTOM PANEL)

FIGURE 2a: Experiment 2

FIGURE 2b: Experiment 3
FIGURE 3

CUSTOMER SPENDING IN EXPERIMENT 3

Error bars denote standard errors. The two numbers at the base of each column denote respectively the number of coupons accounted for and the number of coupons redeemed.
Try It, You’ll Like It:

The Influence of Expectation, Consumption, and Revelation on Preferences for Beer

I would like to thank Shane Frederick, Stephen Garcia, Reid Hastie, Nathan Novemsky, Jonathan Schooler, and Timothy Wilson for their thoughtful comments and suggestions, the Muddy Charles and Thirsty Ear for letting us peddle our MIT brew, and Trader Joe’s for making a balsamic vinegar that so nicely complements the subtle notes of light beers.
ABSTRACT

Patrons of a pub evaluated regular beer and “MIT brew” (the same regular beer with some balsamic vinegar) in one of three conditions. One group tasted them blind (the secret ingredient was never disclosed). A second group was informed of the contents before tasting. A third group learned of the secret ingredient immediately after tasting, but prior to indicating their preference. Not surprisingly, preference for the MIT brew was higher in the blind condition than either of the two disclosure conditions. However, the timing of the information mattered substantially. Disclosure of the secret ingredient significantly reduced preference only in the before condition, when it preceded tasting, suggesting that disclosure affected preferences by influencing the experience itself, rather than by acting as an independent negative input or by modifying one’s retrospective interpretation of the experience.
The quality of an experience is jointly determined by "bottom up" processes, which reflect the characteristics of the stimulus impinging on our sensory organs, and "top down" processes, which reflect the beliefs, desires, and expectations of the perceiver. The role of each can be illustrated by our perception of ambiguous figures, such as Jastrow’s famous rabbit/duck illusion. Our visual experience surely depends on what is there but may also be affected by what we expect to see. Although that image is never interpreted as a giraffe or a scorpion, it might look like either a rabbit or duck depending on which concept has been primed.

The influence of top-down and bottom-up processes has been a central theme across many domains of psychology. Visual perception is affected by prior conceptual structures, as well as by characteristics of the visual stimulus itself (Biederman, 1972; Palmer, 1975); assessments of a person’s ability are influenced by our expectations of their ability, as well as by objective performance measures (Jones et. al., 1968; Darley & Gross, 1983); judgments of extended events are driven by the quality of our experiences and the interpretation we impose on them (Brief et. al., 1993; David et. al., 1997); the enjoyment of a film is influenced by our expectations of its quality, as well as by its true quality and the conditions under which it is viewed (Klaaren, Hodges, & Wilson, 1994); and even our memories can be colored by our theories of what should have occurred, rather than what did occur (Cohen, 1981; Stangor & McMillan, 1992).

The domain of food and drinks provides a particularly fertile testing ground for researching the influence of conceptual information on subjective experiences: Coke is rated higher when consumed from a cup bearing the brand logo (McClure et al., 2004), a slice of turkey is rated higher if thought to come from a popular brand than an unpopular
one (Makens, 1965), *Perrier* is preferred to *Old Fashioned Seltzer* when consumed with the labels showing, but not otherwise (Nevid, 1981), preference for one's favorite beer vanishes if the labels are removed (Allison & Uhl, 1964), the presence of the word "soy" causes nutrition bars to be rated as more grainy and less flavorful (Wansink et al., 2000), bitter coffee seems less so if consumers are repeatedly misinformed that it is not bitter (Olson and Dover, 1978), strawberry yogurt and cheese spreads are liked more if labeled "full-fat" than if labeled "low-fat" (Wardle and Solomons, 1994), and, intriguingly, people ate more vanilla ice cream if it was accurately labeled "high fat" (Bowen et al., 1992). 

Besides documenting the separate influences of top down and bottom up processes, some researchers have examined how they interact by manipulating when conceptual information is presented relative to the experience. For example, Hoch and Ha (1986) exaggerated the qualities of a J.C. Penney shirt either before or after respondents examined it and found that information provided before the evaluation caused participants to spend more time examining the fabric, and led them to evaluate the shirt more favorably than if that information followed the experience (see also Levin & Gaeth, 1988). This suggests that prior knowledge can affect the allocation of attention or use of information (such as the time spent examining the stitching). However, it remains unclear whether knowledge can also change the experience itself (e.g. the tactile quality of the material), just as it remains unclear in most taste test studies whether brand identity is just another input to one's overall evaluation (a valued attribute in its own right, like temperature or sweetness) or whether it modifies the actual gustatory experience (by
affecting the tongue’s chemoreceptors or the part of the brain that interprets the gustatory signal).

In the current research, we examine whether information affects perception by adding balsamic vinegar to one of two beer samples – an additive that most find conceptually offensive.¹ We compare preferences across three conditions: a blind condition in which the additive remains secret, and two disclosure conditions in which the identity of the secret ingredient is revealed either before tasting or after tasting. The after condition allows us to diagnose whether conceptual information only affects preferences or whether it changes our experience of the stimulus. To illustrate how the after condition could shed light on the interaction of top-down and bottom-up processes, suppose Allison and Uhl (1964) had included a third condition in which participants received brand information after they had sampled the five beers. If this group would rate the beers similarly to the before group (the ordinary or control condition in which participants knew which brand they were consuming), it would suggest that the brand information was a distinct separate input to evaluations – an expression of support for one’s preferred brand. If, however, the ratings of the after group would resemble the ratings of the blind group, it would suggest that brand information affects the taste experience itself, but that once the taste is established, brand information has no further influence; it would not alter the way in which respondents characterized their consumption experience.

¹ To verify our assumption that people would be averse to the idea of balsamic vinegar in beer, we asked 121 patrons of The Muddy Charles, a local pub, to assess how beer would taste if balsamic vinegar were added, on a scale ranging from -10 (much worse), to +10 (much better). Eighty percent of the respondents expected that balsamic vinegar would make the beer taste worse. The mean rating was -4.03, which is significantly below 0 [F(1,119) = 22.45, p < 0.01].
A similar design could also be used in other studies investigating the role of affective expectations. For example, in a study by Wilson and colleagues (1989), all participants saw three truly funny cartoons, followed by three not-so-funny ones. Half of the participants were told nothing, while the other half were led to expect that all the jokes would be funny. The misinformed group rated the less funny cartoons to be just as funny as the funny ones. A videotape of their facial expressions suggested the positive expectations did improve their actual cartoon viewing experience, that the ratings weren’t just an experimental demand effect reflecting respondents’ reluctance to admit that they didn’t get the cartoons that they had been told were found funny by others. Nevertheless, it would have been instructive to know how respondents would have rated the cartoons if they had received the bogus information about others’ ratings after seeing the cartoons. Would their prior “unbiased” experience govern their ultimate evaluation, or would they also be affected by this delayed (mis)information?

EXPERIMENTAL APPROACH

Respondents consumed two beer samples: one unadulterated sample, and one sample of “MIT brew” containing several drops of balsamic vinegar – a beer flavoring that most participants find conceptually offensive, but which does not, at this concentration, degrade the beer’s flavor (in fact, it slightly improves it). Respondents were randomly assigned to one of three conditions. In the blind condition, they tasted the two samples without any information about the contents. In the before condition, they tasted the two samples prior to being told which beer contained balsamic vinegar. In the after condition, they were told which beer contained balsamic vinegar, prior to tasting either. In the after
condition, they first tasted the beers, and were then told which beer contained balsamic vinegar (see Figure 1).

In comparing these conditions, we have the following tests: If top down processes play no role, the three conditions should not differ (Blind \approx Before \approx After). However, if knowledge does influence preferences, as our intuition and prior research suggest, preference should be lower in both of the disclosure conditions. Of greatest interest was the results of the after condition. If the presence of a conceptually aversive additive is an independent input to evaluations, the timing of the information would not matter, and preferences for the MIT brew should be reduced by an equal degree in both disclosure conditions (Blind > Before \approx After). However, if expectations influence the consumption experience itself, preference for the MIT brew should be markedly lower in the before condition than the after condition (Blind \geq After > Before).

EXPERIMENTS 1-3: PREFERENCES

Our first three experiments were conducted at two local pubs: The Muddy Charles and The Thirsty Ear. Patrons were approached and asked to participate in a short study involving free beer. Those who agreed (nearly everyone) tasted two 2-oz. samples of beer: “regular” beer (Budweiser or Samuel Adams) and the “MIT brew,” which included several drops of balsamic vinegar.²

² When the control beer was Samuel Adams, we added 6 drops. When it was the lighter Budweiser, we added 4 drops. Budweiser was used in the first two experiments and Sam Adams in the third. We switched after discovering that Budweiser is not a very popular beer among our participants, many of whom even disputed whether it deserves to be called a “beer.”
There were 388 participants in total (90 in Experiment 1, 139 in Experiment 2, and 159 in Experiment 3). In each experiment, participants were randomly assigned to one of three experimental conditions (blind, before, and after). After tasting the two samples, respondents indicated their preference between them. In Experiment 1, participants were simply asked to indicate which of the two samples they liked more. In Experiment 2, they indicated which of the two samples they would like to receive a full (10-oz) glass of. In Experiment 3, the blind condition was the same as in Experiment 2, but in the before and after conditions participants received a full (10-oz) glass of regular beer, some balsamic vinegar, a dropper, and the “secret recipe” (“Add 3 drops of balsamic vinegar per ounce and stir”). We monitored whether (and how much) balsamic vinegar participants actually added to their beer, and used this to code their preference between the two beer types. It turned out that all participants added either the exact amount of balsamic vinegar specified by the recipe or none at all, creating a binary dependent measure.

Results

As can be seen in Figure 2, preference for the MIT brew was higher in the blind condition (59%) than in the before condition (30%). This difference was significant overall [$F(1, 385) = 23.15, p_{rep} = .99, \eta^2 = .057$], and for each of the three experiments individually (all $p_{reps} > .95$). More importantly, the preference for the MIT brew in the before condition was significantly lower than in the after condition, both overall [52% vs. 30%, $F(1, 385) = 13.86, p < 0.01, p_{rep} = .99, \eta^2 = .035$], and for each of the experiments
individually (all $p_{rep} > .90$). By contrast, the after condition did not differ significantly from the blind condition, either overall [59\% vs. 52\%, $F(1, 385) = 1.17, p_{rep} = .66, \eta^2 = .003$], or for any of the individual experiments (all $p_{rep} < .56$).

Together, the results show that disclosure of contents affects the preference for the MIT brew only if it precedes tasting, which suggests that preferences are influenced primarily through the effect of expectations on the taste experience itself. Respondents in the after conditions appeared content to let their experience dictate their preferences, and apparently, did not reinterpret their experience to align with the mildly unsettling news of what they had just consumed. These results are compatible with those of Levin and Gaeth (1988), who found that hamburger falsely labeled as “25\% fat” received slightly lower taste ratings if that fat content was reported before tasting than if it was reported after tasting, although the difference in their study was not significant (perhaps because people do not regard beef fat to taste bad, even if they have health concerns about eating it).

**EXPERIMENT 4: ARE THESE RESULTS OBVIOUS?**

Our mothers often used creative labeling to trick us into eating something they knew we would otherwise oppose (e.g. by calling crab cakes “sea hamburgers”). They knew such deception was required to gain our consent, but that they need not maintain the lie after we had consumed the foods, and would often debrief us afterwards, with smug satisfaction (“By the way, son, in case you were wondering, “sea” means “crab.”).
They suspected (correctly in most cases) that we could not “handle the truth” before eating, but could handle it after our senses had signaled that this was good stuff.

To test whether our mothers are especially clever, or whether these results are obvious, we presented Experiment 2 to sixty-eight MIT students. After describing the procedure, we told them, truthfully, that the MIT brew had been chosen over regular beer by 70% in the blind condition and 41% in the before condition, and asked them to predict the percent who chose it in the after condition, offering $50 for the most accurate prediction.

Results

As can be seen from Figure 3, respondents could not generally predict the results. Predictions were uniformly spread over the entire interval (with some even falling outside the interval). They were not clustered near the upper range of the interval, as would be predicted if our results could be foreseen. Thus, these results are not, in fact, obvious – at least not to MIT students.

GENERAL DISCUSSION

The current work focuses on the relative importance of, and interaction between, two different bases for preferences: knowledge (top down) and experience (bottom up). The results across three experiments suggest that the information (about the presence of a
conceptually offensive ingredient) influences preferences more when received before consumption than when received after consumption. The MIT brew was liked much less when respondents knew it contained balsamic vinegar than when they learned this afterward. Indeed, if revealed after consumption, disclosure of our secret ingredient did not significantly reduce preferences for our MIT brew (there were no significant differences between the blind and after conditions). Together, these results suggest that, expectations affected real time experience itself, not just people’s post hoc characterization of the experience.

Our results raise several additional questions. First, how important is the temporal interval between sensory experience, the receipt of other information, and the evaluative judgment? In our experiments, negative information received after consumption did not markedly reduce evaluations of the MIT brew. By contrast, Braun (1999) found that after respondents had consumed diluted orange juice tainted with vinegar, subsequent evaluations were markedly elevated if they were later told that the orange juice was “sweet, pulpy, and pure.” Her results may differ from ours because that misleading information was presented 30 minutes after drinking the orange juice, during which respondents may have partially forgotten the experience, diminishing the weight of the experience relative to the misinformation.

A second issue raised by these experiments is the speed with which conceptual attitudes align with experiences. If we are coerced or tricked into discovering that we actually enjoy some unusual food (rice pudding), food additive (balsamic vinegar), or sexual practice (fill in the blank), do we eagerly consume it at the next opportunity, or do our prior expectations linger, despite their disconfirmation? In our experiments,
preferences converged with experiences after only a single trial (recall that only 20% thought balsamic vinegar would improve a beer’s flavor, yet 52% in the after condition preferred the MIT brew). However, it remains unclear whether respondents in the after condition who preferred the MIT brew would continue preferring it on subsequent visits to the pub. Sometimes, a single positive taste experience may extinguish preconceptions, but in other cases, the original negative conception may linger, and gradually regain ascendance over fading taste memories. Tuorilla, Lesher and Cardillo (1994), found that expectations quickly return, even after being disconfirmed. In that study, respondents tasted normal and fat free versions of saltine crackers and pound cake. Although a blind taste test disconfirmed respondents’ expectations that fat free products would taste worse, when they came back to the lab a month later, they retained their original negative impressions of those products. A study by Klaaren, Hodges, and Wilson (1992) suggests that positive expectations may also linger. In that study, students who were told they would enjoy The Immigrant (a silent film starring Charlie Chaplin) not only reported greater enjoyment, but were more likely to participate in a subsequent study involving a different Chaplin film. Moreover, their willingness to participate correlated only with their original affective expectation, and not with other manipulations of their real time experience (the comfort of the chair and the angle at which they were forced to view the film). These results suggest that hedonic theories (expectations) may sometimes outweigh hedonic experience as determinants of remembered and predicted utility.

A third challenge is to understand the specific perceptual, attentional, and cognitive mechanisms that mediate the effect of expectations on experience (or reported experience). One interpretation of our results is that people (reasonably) anticipate
disliking the MIT brew, and this negative anticipatory emotion lingers to degrade their subsequent consumption experience (see Wilson & Klaaren, 1992). Another possibility, advanced by Hoch and Ha (1986), is that expectations bias informational search. They found that evaluations of J.C. Penny polo shirts were more favorable if participants were first told that the shirts were made with “great craftsmanship, styling and meticulous quality control” than if those claims were presented after participants had examined those shirts (and the shirts of competing brands). They proposed that the brand specific claims induced respondents to devote more time inspecting the J.C. Penney shirt, searching for information that confirmed the product claims. It seems unlikely that participants in our before condition spent more time consuming the MIT brew, searching for negative aspects of the experience. However, prior knowledge of the additive may have changed the way they interpreted their ambiguous beer experience (some combination of wet, bitter, sweet, sour, carbonated, and malty). When the secret ingredient was disclosed before consumption, they may have focused on the negative aspects of that multidimensional experience, and falsely attributed those negative elements to the vinegar rather than the beer. However, when the information followed the experience, they did not appear to attribute any of the bad elements of their ambiguous consumption experience to the presence of the balsamic vinegar. Thus, the malleability of our tastes is likely influenced by the timing of attitude discrepant information.

In a review of the role of sensory expectation on sensory perception, Deliza and MacFie (1996) conclude (p. 122) that “it is an immensely complex topic which has had very little research attention.” We agree. As emphasized by our discussion, the relative influence of perceptual and conceptual inputs on overall evaluations likely depends on
the timing of the information, the timing of the judgment, the particular domain, and the range of sensory and cognitive processes engaged by the particular task instructions.

Thus, we are not confident that we have uncovered an opportunity to get rich selling pocket sized packets of balsamic vinegar to pub patrons. Nonetheless, we are confident that this experimental approach will prove intellectually profitable to those interested in the relationship between conceptual knowledge, experience, and the construction of preference.
REFERENCES


FIGURE 1

GRAPHICAL ILLUSTRATION OF THE MANIPULATION OF INFORMATION TIMING (RELATIVE TO TASTING AND PREFERENCE INDICATION) ACROSS THE THREE CONDITIONS (BLIND, BEFORE, AND AFTER)
FIGURE 2

PERCENTAGE OF RESPONDENTS INDICATING PREFERENCE FOR MIT BREW IN EXPERIMENTS 1-3
FIGURE 3
DISTRIBUTION OF RESPONDENTS’ PREDICTIONS OF THE PREFERENCE FOR MIT BREW IN THE AFTER CONDITION IN EXPERIMENT 4

The real preferences in Experiment 2 were 70% and 41% in the blind and before conditions respectively.
In Search of Homo Economicus:
Preference Consistency, Emotions, and Cognition

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ABSTRACT

Understanding the roles of emotion and cognition in forming preferences is critical in helping firms choose effective marketing strategies and consumers make appropriate consumption decisions. In this work, we investigate the role of the emotional and cognitive systems in preference consistency (transitivity). Participants were asked to make a set of binary choices under conditions that were aimed to tap emotional versus cognitive decision processes. The results of three experiments consistently indicate that automatic affective responses are associated with higher levels of preference transitivity than deliberate cognitive considerations, and suggest that the basis of this central aspect of rational behavior—transitivity—lies in the limbic system rather than the cortical system.
Prior research has established that both the emotional system and the cognitive system contribute to decision making but provide different types of inputs (Damasio, 1994; Loewenstein & O'Donoghue, 2004) and apply with different force within different decision environments (e.g. see McClure et. al., 2004 for the different degrees of relative dominance of the two systems in choosing delayed versus immediate monetary rewards). This distinction between cognition and emotion is also evident across a wide array of research programs, including the emotion-cognition dual-process model (see Loewenstein & O’Donoghue, 2004 for a recent review), type I versus type II processes (Kahneman & Frederick, 2002), associative system versus rule-based system (Sloman, 1996), non-verbal processes versus verbal processes (Paivio, 1986), hot system versus cold system (Metcalfe & Mischel, 1999), reflexive system versus reflective system (Lieberman, Gaunt, Gilbert, & Trope, 2002), experiential system versus rational system (Epstein, 1990, 1994), and the “approach/avoidance” versus “true/false” distinction (Zajonc 1998, p. 591), to name a few. Moreover, neuroscience evidence adds additional support to this distinction by demonstrating the relationship between automatic emotional response and activity in the limbic system (with the amygdala and the anterior cingulate being the prime players), and the relationship between more controlled processes and the front regions (orbital and prefrontal) of the brain (Damasio, 1994; LeDoux, 1996; Panksepp, 2004). It should be noted that while such a dual-system conceptualization is undoubtedly an oversimplification and an inaccurate representation of the complex human mind, it is also clear that this emotion-cognition distinction has substantial merit.

Given this distinction between emotion and cognition and their role in decision making, it is important to ask whether decisions that are based on cognitive inputs or
emotional inputs are better, or which approach individuals should adopt in decision making.

**Which System Would Lead to Better Decision Making?**

Evidence favoring the cognitive system: Broadly speaking, rational behaviors (calculated, forward looking, self-controlled, value maximizing) are often attributed to the cognitive cortical system, while irrational behaviors (myopic, transitory, lack of self-control, hyperbolic discounting, hot-cold empathy gap) are attributed to the emotional limbic system or to a misalignment between the cortical and the limbic systems (Ainslie & Haslam, 1992; Loewenstein & Schkade, 1999; McClure et. al., 2004; Mischel, Cantor & Feldman, 1996; Prelec & Loewenstein, 1998; Wertenbroch, 2003). Given this distinction, an emerging view is that there is a higher matching between the cognitive system and rationality, and between the emotional system and irrationality (see Camerer, Loewenstein, & Prelec, 2005 for a general discussion).

These general associations between the cognitive system and rationality, as well as between the emotional system and irrationality, are also congruent with lay beliefs. For example, in one study, we asked a group of 16 Economics or Psychology PhD students to rate the extent to which they viewed a set of behaviors (long-term planning, impulsivity, self-control, etc.) as rational versus irrational, and another group of 16 Economics or Psychology PhD students to rate the extent to which they associated the same set of

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1 More specifically, in their review paper on the application of neuroscience to economics, Camerer, Loewenstein, and Prelec (2005) defined two orthogonal dimensions of neural functioning – controlled versus automatic processes, and cognitive versus affective processes. However, they recognized that most emotional responses are automatic, while cognitive processes are generally more controlled. Although the parallel we are drawing between the cognitive system and rationality, as well as that between the emotional system and irrationality is not perfect, we adopt it as a useful simplification of our mental processes.
behaviors with the cognitive system or the emotional system. The results showed a high correlation \( r = 0.95 \) between the irrationality-rationality ratings and the emotional-cognitive ratings. Behaviors such as long-term planning were associated with rationality and deliberate cognitive thought, while behaviors such as impulsivity were associated with irrationality and emotionality, suggesting that there is a general assumed fit between the cognitive system and rationality and between the emotional system and irrationality.

Given this fit between cognition and rationality (and since most definitions of better decisions are related to rationality), one would expect that decisions made with the cognitive system would be better, while decisions that are rooted in the emotional system would be worse.

**Evidence favoring the emotional system:** Despite the general associations between Homo Economicus and the cognitive system and between Homo Psychologus and the emotional system, it is possible that some aspects of behavior generally conceived as rational might be better generated by the emotional system, as suggested by convergent evidence from evolutionary, social, and consumer psychology.

Evolutionary psychologists posit that the emotional system has evolved to carry out fast and accurate evaluations of important judgments and decisions. They have described emotions as a set of "programs" that have been specifically designed to solve evolutionarily recurrent situations or conditions, whether it is to fall in love, to escape from a predator, or to confront an unfaithful spouse. According to this view, such programs have the effect of activating, mobilizing, and coordinating a pool of resources, mental processes, goals, perceptual mechanisms, memory, attention, emotional expressions, and physiology toward the resolution of the adaptive problem at hand.
Given these roles of the emotional system, it is possible that the emotional system is better attuned to consistently and reliably provide individuals with a reading of their preferences, thus creating higher speed, accuracy, and consistency.

Suggestive evidence that some aspects of rational behavior might reside in the limbic system come also from findings in social psychology that have challenged the value of conscious thought toward rational decision making. For instance, Wilson and his colleagues (Wilson and Schooler, 1991; Wilson, et. al., 1993) found that deliberating the positives and negatives when evaluating hedonic experiences, such as food or art, can cause people to erroneously focus their attention on non-optimal criteria and adversely affect the quality of their judgment. Their results showed that participants who selected jams (or posters) under thoughtful deliberation later consumed less of their chosen jam (or were less likely to keep their chosen posters on their walls), compared with those whose selection was based on their immediate gut feeling. More recently, Dijksterhuis (2004) extended this work to examine the relative merits of conscious and unconscious thought in decision making. His experimental results suggest that unconscious thinkers consistently made more accurate judgments than conscious thinkers. For example, participants who were asked to think carefully for four minutes before choosing their favorite car from a given set of cars made objectively poorer choices (i.e. cars that had significantly fewer positive features) than participants who were distracted for the same amount of time with an anagram solving task (Dijksterhuis et. al., 2006; Study 1). Another source of evidence for the idea that the emotional system might be associated with a higher level of consistency comes from a recent finding that feeling-based
judgments, compared with reason-based assessments, exhibit greater interpersonal consistency or consensus (Pham et al. 2001, see also Pham 2004).

**Better in What Sense?**

Certainly, asking which system—cognition or emotion—produces better decisions requires that we define what we mean by “better.” In the current research, we focus on preference consistency (and transitivity) as a measure of decision quality. The notion of consistency lies at the very foundation of understanding, predicting, and influencing consumer behavior. Most marketing activities such as market research, new product development, marketing communications, and customer management assume consumers behave in somewhat consistent patterns. For example, if a customer indicates that he or she prefers small chocolate servings to large ones, it is generally assumed that he or she is likely to maintain such a preference in the following purchase occasion.

When faced with a choice task, consumers need to evaluate the overall utility of each of the alternatives they are facing and compare these utilities in order to make their final choice. Such a utility computation process is likely to vary from case to case based on the exact information consumers consider, the particular facts they retrieve from their memories, as well as the particular computations that they carry out; any of these process components is a potential source for decision inconsistency. For example, when shopping for a new Nikon digital camera, it is possible that consumers might change the aspects of the camera they focus on, the particular information they retrieve from memory, the relative importance weights they assign to the attributes, or the process of integrating these weights.
As researchers, we often treat such inconsistencies as "noise" and use statistical inference tools that allow us to examine the data while mostly ignoring these fluctuations. Yet, such noise can convey important information about the ability of the decision maker to perform good decisions, and, in particular, it can reflect their ability to conceptualize their own preferences. In the current work, we focus on such inconsistencies/noise in decision making as indicators of the ease with which consumers can formulate their preferences: we focus on the question of whether cognitive- or emotional-driven decisions are more prone to this kind of error.

**Transitivity as a Measure of Preference Consistency**

Our focus on preference consistency also relates very strongly to traditional assumptions about rationality which provide normative benchmarks against which the quality of decisions can be evaluated. The two most basic assumptions of rational preference relations in economics are completeness and transitivity, which together form the basis of rational choice theories (Mas-Colell, Whinston, & Green, 1995; p. 6). Completeness means that a consumer is able to form an opinion about the relative merits of any pair of options, say a and b in set S, such that $a \geq b$ or $b \geq a$ (where $\geq$ denotes relative preference) or both (hence also implying reflexivity). Transitivity, which is the center of the current investigation, means that a consumer should have a particular preference structure, such that for any set of bundles: a, b, and c, if $a \geq b$ and $b \geq c$, it must also be the case that $a \geq c$.

In the experiments reported here, we used transitivity (or the degree of transitivity violation) as a way to measure the degree of (in)consistency in people’s preferences over
time. Specifically, in each experiment, we take a set of $P$ products and present participants with all pair-wise combinations of these $P$ products [i.e. for 8 products, this will mean $7 \times 8 / 2 = 28$ pairs] in a random order. Based on each participant’s choice pattern, we compute how many times he or she violates transitivity (e.g. $p_x \geq p_y$, $p_y \geq p_z$, and $p_z \geq p_x$, where $p_x$, $p_y$, and $p_z$ are products within the set) as a measure of the participant’s deviation from the perfect rational benchmark. Obviously, given a large number of pair-wise decisions, it is inevitable that decision makers will make random errors during choice and consequently violate transitivity from time to time. Thus, simply demonstrating that such violations exist would be trivial and of no theoretical consequences. Instead, our interest here is to use the degree of intransitivity to compare whether choices are more consistent when individuals base their decisions on emotional or cognitive responses to the decision task. More broadly, we test whether greater reliance on the cognitive system or on the emotional system leads to greater rationality. To this end, we used different experimental manipulations aimed at activating either people’s emotional or cognitive decision processes, and examined which of two general systems—the emotional system versus the cognitive system—better comply with the transitivity assumption and thus this important aspect of rationality.

We should note that since May (1954)’s and Tversky’s (1969) early demonstrations of people’s systematic preference intransitivity, there has been substantial research examining the factors that can drive systematic intransitive choices. Thus far, it has been found that people’s preferences can be intransitive when their preferences are driven by their social context (Fishburn, 1970), by the use of satisficing heuristics (Gigerenzer, 2000) or non-compensatory decision rules (Tversky, 1969), and by
anticipated regret and counterfactuals (Loomes, Starmer, & Sugden, 1991). Intransitive preferences can also occur when information for decision making is missing (Kivetz & Simonson 2000) or costly to obtain (Haines & Ratchford 1987). Given the significant negative impact preference intransitivity has on traditional rational choice models, several researchers have proposed theoretical revisions to these models to accommodate preference intransitivity (e.g. Clark, 1994; Fishburn, 1991; Iverson & Falmagne, 1985; Kim & Richter, 1986; Loomes & Sugden, 1983; Sopher & Gigliotti, 1993). The current work differs from these prior work in that we focus not on systematic violations of transitivity (ones that are due to biases in decision making), but on intransitivity attributed to inconsistency in the way decision makers consider the choices they are facing as they encounter them again and again – an intransitivity that is caused by decision errors yielding inconsistency (and intransitivity) over time.

GENERAL EXPERIMENTAL SETUP

We used the same experimental paradigm—a pair-wise choice procedure—across all the three experiments we conducted. In each experiment, we first presented participants with the name, picture, and a short description of all products used in the experiment, and asked them to study the products for as long as they wished (the products were electronic gadgets, such as a pen with a built-in FM tuner and a voice-recording keychain; see appendix 1 for a list of the stimuli used in the experiments.) After participants familiarized themselves with all stimuli, they were told that they would see pairs of these products and had to make a choice within each pair according to a
particular criterion. The pairs of products were constructed by taking \( P \) products (eight products in Experiments 1 and 2, and ten products in Experiment 3) and presenting participants with all pair-wise combinations of these products [i.e. \( P^\star(P-1)/2 \); 28 pairs in Experiments 1 and 2, and 45 pairs in Experiment 3] in a random order.

As a measure of preference consistency, we computed the number of transitivity violations participants committed during the task for a subset of \( N \) product options, where \( N \) ranged from 3 to \( P \). For simplicity in reporting the results, we focus on violations in the form of three-way preference cycles (e.g. \( p_x \geq p_y, p_y \geq p_z, \) and \( p_z \geq p_x \)) (Kendall & Babington Smith, 1940\(^2\)). If there is no error in decision making (or if it is very low), individuals will “read” and compute their utility for the different options in a consistent way every time and will show no (or very few) violations of transitivity in this pair-wise choice paradigm. On the other hand, if individuals are prone to error in decision making, they will “read” and compute their utility very differently every time and will commit many violations of transitivity in this paradigm. Thus, we use the measure of intransitivity to capture the amount of inconsistency in evaluations, arguing that higher levels of observed intransitivity mean that the underlying computational process is more prone to fluctuating evaluations, inconsistencies, and random error.

To test whether the emotional system, rather than the cognitive system, has more consistent inputs for preferences, we asked some participants to make their decisions in a manner that we expect would rely more heavily on their cognitive system, and others to

\(^2\) Other measures have been proposed for the degree of intransitivity in a sequence of pair-wise choices (see Monsuur & Storcken 1975 and David 1988 for comprehensive reviews.) For example, Slater’s (1961) \( i \) counts instead the minimum number of preference reversals (on the binary level) needed to resolve all intransitivities, instead of the number of three-way cycles as in Kendall and Babington Smith’s (1940) measure. The experimental results are robust to the type of measure and we adopt the current approach for its simplicity.
make their decisions in a manner that would rely more heavily on their emotional system, and compare the individual transitivity scores across the different experimental conditions.

We used two different approaches to manipulate whether participants depend more heavily on the cognitive system or the emotional system during choice, drawing upon the extant literature on the general two-system model. In Experiment 1, we manipulated how the stimuli were presented during the choice task (pictorial versus verbal) based on prior research that has demonstrated that pictures trigger more emotional processing than words or symbols (Epstein, 1990; Hsee & Rottenstreich, 2004; Lieberman et. al., 2002). In Experiment 2, we kept the form of the choice stimuli constant, and instead manipulated the cognitive capacity of participants during choice. Based on prior research (Lieberman et. al., 2002; Siemer & Reisenzein, 1998), we propose that choice under high cognitive load limits cognitive ability, thus creating a greater degree of emotional processing than choice under low cognitive load. In Experiment 3 we examine whether decisions that are based on hedonic evaluations are more transitive relative to decisions that have non-hedonic aspects by manipulating the goal of the choice task participants had to perform. We next describe the procedures and report the results of all three experiments in detail.
EXPERIMENT 1: PICTURES VERSUS NAMES

Overview and Method

In the first experiment, we attempted to influence the extent to which participants relied on their emotional system or their cognitive system during choice using a characteristic distinction between the two systems—while the emotional system is more experiential and concretive (i.e. encoding reality in concrete images, metaphors, and narratives), the cognitive system is more logical and abstract (i.e. encoding reality in abstract symbols, words and numbers) (Epstein, 1990; Lieberman et. al., 2002). Drawing upon this distinction, we manipulated the manner in which the visual stimuli were represented.

After studying the information (name, picture, and description) of all products as described in the general procedure, participants were randomly assigned to one of three conditions: in the affect poor condition, the pairs of products were presented in terms of their names, while in the affect rich condition, the pairs of products were presented in terms of their pictures (Hsee & Rottenstreich, 2004); in the third condition, both the names and pictures were available. Arguably, concrete color pictures of products engender a more affective response than their abstract alphanumeric names in black and white. Thus, to the extent that preference consistency is more closely associated with the emotional system than with the cognitive system, we expected participants in the affect-rich condition to have more transitive preferences than those in the affect-poor condition.

To ascertain the validity of our specific manipulation, we ran a study as a manipulation check, where we approached twenty-three psychology graduate students at
Harvard and asked them to rate the degree to which they believed decisions makers would use emotional versus cognitive decision processes under each of our three experimental choice conditions (pictures, names, pictures and names). As can be seen in the top panel of Figure 1, respondents rated choosing between products represented by pictures to be as emotional as choosing between products represented by names and pictures ($p = 0.29$), but both were rated to be more emotionally laden than choosing between products represented only by their names ($p < 0.001$).

A total of 75 students recruited at the student center at MIT participated in this experiment. They were each paid $1 for their participation and stood a chance to win a product they chose (hence making this experiment incentive compatible).

Results

A comparison of the number of three-way transitivity errors participants made in the affect poor and affect rich conditions supported the hypothesis that the emotional system generates a higher degree of transitivity. Participants in the affect rich condition who chose between products presented in the form of pictures made significantly fewer transitivity errors than those in the affect poor condition who chose between products presented in the form of names ($M_{affect-rich} = 0.4$ vs. $M_{affect-poor} = 1.4; t(48) = 2.51, p = .02$). Interestingly, when the product pairs were displayed in terms of both types of information (picture and name), the number of violations ($M = 1.2$) were similar to those in the affect
poor condition \([t(48) = .46; p = .65]\), but greater than those in the affect rich condition \([t(48) = 2.20, p = .03]\). These results suggest that the availability of product names was sufficient to activate the cognitive system and deteriorate choice consistency (see Figure 2 which compares the number of transitivity cycles of different sizes across the three conditions). Given that different modes of stimuli presentation generate different degrees of cognitive/emotional processing, the current results suggest that transitivity is more closely associated with automatic affective processing than controlled cognitive processing. Furthermore, although there was no significant difference across the three conditions in the amount of time participants took to study the products prior to choice \([F(2, 72) = 0.14, p = 0.87]\), nor the amount of time they took to choose their preferred products \([F(2, 72) = 1.50, p = 0.23]\), those in the affect-rich condition took marginally less time during choice than those in the affect-poor condition \((p = 0.17)\).

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**Discussion**

Consistent with the hypothesis that the emotional system generates a higher degree of transitivity, the results of this experiment show that automatic emotional processes can generate greater preference consistency than controlled cognitive processes.

To gain further confidence in these results we replicated these results in a separate experiment with 806 respondents recruited with the assistance of a web-based survey research company. Although the general level of preference transitivity was lower for these online respondents compared to the MIT participants in Experiment 1 (possibly due to the subject population or the method of data collection), the general choice pattern was
essentially the same. Participants in the affect-rich condition made significantly fewer transitivity violations than those in the affect-poor condition ($M_{\text{affect-rich}} = 4.7$ vs. $M_{\text{affect-poor}} = 6.3$, $p < 0.001$), and also spent significantly less time during choice ($p < 0.001$).

The dichotomy between the two processes—emotional and cognitive—that underlie the manipulation and results in this experiment parallels Paivio (1986)'s distinction between imagery and verbal processes and also Lieberman et. al. (2002)'s distinction between the reflexive X-system and the reflective C-system. While the imagery X-system is a “parallel-processing, sub-symbolic, pattern-matching system” (p. 204) associated with regions of the brain involved in automatic processes, the verbal C-system is “a serial system that uses symbolic logic to produce the conscious thoughts that we experience as reflections on the stream of consciousness” (p. 204) and is associated with regions of the brain involved in controlled processes. In our experiment, while presenting participants with the names of products activated their verbal C-system during choice (since language is fundamentally symbolic), presenting them with the pictures of products activated their imagery X-system. Our findings that participants who had to choose between products presented by only pictures made fewer transitivity violations than those who had to choose between products presented in names (either names alone or both names and pictures) suggests that preference transitivity is more closely associated with regions of the brain for automatic affective processing than for controlled cognitive processing.

Finally, it is also worthwhile to point out that, while the condition in which the stimuli were depicted both verbally and pictorially yielded the same low level of transitivity as the names-only condition (and lower than the pictures-only condition), the
participants in the manipulation check expected the two conditions with pictures (pictures-only and names-and-pictures) to generate similar magnitudes of emotional decision making. This contrast suggests that people might not be able to intuit how much the inclusion of names in the stimuli can reduce their reliance on emotional processing.

EXPERIMENT 2: COGNITIVE CAPACITY

Overview and Method

In this experiment, we used a different approach to investigate the roles of emotional and cognitive processes in transitivity. Instead of manipulating the mode of visual stimuli representation, we focused on the mental state of the decision maker herself. We used a cognitive load manipulation that has been widely adopted in the psychology literature (Shiv & Fedorikhin, 1999; Trope & Alfieri, 1997; see also Gilbert, Pelham, & Krull, 1988): half the participants in the experiment were asked to memorize a three-digit code (low-load condition) during the choice task, whereas the other half were asked to memorize a ten-digit code (high-load condition). The pretext for the code recall was that participants had to reproduce the correct code at the end of the choice task to enter a lottery to win one of the products they had selected. Based on prior research (Lieberman et. al., 2002; Siemer & Reisenzein, 1998), we expected participants in the high load condition, whose attentional capacities were constrained by the requirement to memorize a long numeric code, to rely more on their automatic emotional responses when choosing their preferred products. Thus, if preference consistency is indeed associated with the emotional system, then participants in the high-load condition should make fewer
transitivity errors than those in the low-load condition. On the other hand, if Homo Economicus is associated with the cognitive system instead, then we would see the opposite pattern of results.

To ascertain the validity of our specific manipulation, we ran a study in which we asked respondents to rate the degree to which they believed decision makers would use emotional versus cognitive decision processes under the two experimental conditions (low vs. high cognitive load). As can be seen in the bottom panel of Figure 1, respondents rated the high cognitive load condition as being more emotional than the low cognitive load ($p < 0.01$).

Forty students participated in this study in exchange for the opportunity to win one of the products they chose in the choice task. The students were randomly assigned to one of the two experimental conditions.

Results

As can be seen in Figure 3, the results revealed that the high-load participants committed significantly fewer transitivity violations ($M_{\text{high-load}} = 0.7, SD = 1.03$) than the low-load participants ($M_{\text{low-load}} = 1.9, SD = 2.49; t(38) = 1.99, p = 0.05$). There was, however, no significant difference between the two conditions in the amount of time participants took to study the products prior to choice [$t(38) = 0.02, p = 0.99$], nor the amount of time they took to choose the products [$t(38) = 0.99, p = 0.32$].

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Insert figure 3 about here

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Discussion

Consistent with our hypothesis, we found that participants’ whose cognitive capacity was constrained were more transitive in their choices. In accordance with prior research and supported by our manipulation checks, we believe that participants in the high load condition had less cognitive capacity for deliberation, and hence had to rely more on their intuitive emotional responses when selecting between each pair of products. One related way to interpret these results is to consider again Lieberman et al.’s (2002) distinction between the reflexive X-system and the reflective C-system. This dual-process model suggests that there is an alarm system (i.e. the anterior cingulate) that triggers the C-system when the X-system reaches a threshold. As suggested by these researchers, the sensitivity of the alarm system may be adversely affected by cognitive load, such that cognitive load prevents the C-system from being notified when its services are required. Likewise, in the case of our experiment, participants who had to memorize a long ten-digit code had to rely on their emotional responses (i.e. X-system) to the choice stimuli since their C-system has been temporarily impaired. That participants in the high load condition made fewer transitivity errors provides further support to our claim that preference transitivity is associated more closely with automatic emotional processing than with deliberate cognitive thought.
EXPERIMENT 3: HEDONIC VERSUS NON-HEDONIC CHOICES

Overview and Method

The results of the first two experiments demonstrated higher rates of transitivity when decisions are influenced by the emotional system rather than the cognitive system. In Experiment 1, participants who chose from products presented in the form of pictures were significantly more consistent in their choices than those who chose from the same products presented in verbal form (and even when both pictures and names were simultaneously present). In Experiment 2, participants who made their choices under cognitive load also showed a higher degree of consistency in their choices than those who chose under lower cognitive load.

After manipulating the representation of the stimuli (Experiment 1) and the cognitive capacity of the participant (Experiment 2), in Experiment 3, we attempted to manipulate which aspects of the stimuli the participants focused on in their choice. In particular, we manipulated the nature or goal of the choice task such that some participants were asked to choose while focusing on the hedonic aspects of the stimuli (expected pleasure, affect, etc.), whereas others were asked to choose while focusing on the objective and non-hedonic aspects of the stimuli (cost, market conditions, etc.).

A total of 127 students recruited at the student center at Duke University participated in this experiment and were each paid $3 for their participation. We used a total of ten products in the experiment, thus increasing the number of choices participants had to make from 28 to 45. After participants had familiarized themselves with the ten products, they proceeded to make a sequence of 45 pair-wise choices. Participants were
randomly assigned to one of three conditions, which varied in the type of focus participants were asked to use as their choice criteria: One third of the participants chose the product they preferred within each pair (focusing on hedonic aspects), one third of the participants chose the product they thought was more expensive (focusing on non-hedonic aspects), and one third of the participants chose the product they considered more popular (focusing on non-hedonic aspects).

Based on the previous experiments, we hypothesize that focusing on the hedonic aspects of the decisions would lead to more transitive choices, while focusing on the non-hedonic aspects of the decisions would lead to less transitive choices. Note that a choice task of this type is different from the previous ones in that it is not incentive compatible; if the participants were to adhere to the given instructions, the specific choice criterion in the instructions would directly influence their choice. This task, however, can serve as a direct test of the primary hypothesis since hedonic versus cognitive activation is manipulated in a more direct manner.

Results

A one-way ANOVA of the number of transitivity errors participants made across the three conditions revealed a significant main effect of the type of choice criteria participants used \[F(2, 124) = 3.22, p = 0.04\]. Planned comparisons further revealed that participants who used the choice criterion of which product they preferred made fewer transitivity errors \(M_{\text{preference}} = 2.3\) than both participants who used the choice criterion of which product is more popular \(M_{\text{popularity}} = 4.9; p = 0.02\) or those who used the choice criterion of which product is more expensive \(M_{\text{price}} = 4.0; p = 0.05\). There was, however,
no significant difference in the amount of time participants took to choose the products across the three conditions \(F(2, 124) = 1.44, p = 0.24\).

Discussion

The results of this experiment continue to implicate the close association between the emotional system and transitivity. In this experiment, we generalized the results of Experiments 1 and 2 to decisions that focus on hedonic versus non-hedonic aspects of the choice alternatives. Consistent with our hypothesis, the results showed that choices based on hedonic considerations (preference) are more transitive and consistent than choices that are based on non-hedonic considerations (the price or the popularity of products).

One could argue that participants who were specifically asked to decide based on price or popularity, compared to those who were asked to choose based on their preferences, were given a more complex decision task since they could have based their choices on both hedonic and non-hedonic considerations. While there were fewer violations of transitivity in the condition that asked participants to focus on their preferences, it is also important to note that the decisions in this condition did not take less time than the choices based on price or popularity. This lack of significance in decision time suggests that the choice difficulty across the three experimental conditions was approximately the same despite the use of different choice criteria. Thus, different task complexity alone cannot account for the observed differences in preference consistency.

We conceptually replicated the effects of hedonic versus non-hedonic choices on transitivity in another experiment \((N = 64)\): using different choice criteria to manipulate
which aspects of the choice alternatives on which participants focused. Half of the participants were instructed to choose the products they “liked” more, and the other half were instructed to choose the products they “wanted” more. Although these two types of choices—liking and wanting—might appear similar on the surface, prior research suggests that choosing-by-liking could involve different decision making processes than choosing-by-wanting (Berridge, 1996). Conceivably, deciding whether one wants a particular product can generate less hedonic considerations and more cognitive considerations (such as the costs and feasibility of buying or owning the product), compared to thinking about whether one “likes” the same product.³ Consistent with the results of Experiment 3, the results of this experiment revealed that participants who chose the products they “liked” (M_{like} = 0.8, SD = 1.10) made significantly fewer transitivity errors than those who chose the products they “wanted” [M_{want} = 1.6, SD = 1.63; t(62) = 2.29, p = 0.03].

In sum, the results of Experiment 3 and the auxiliary experiment just discussed provide convergent evidence that choices based on hedonic aspects are more transitive and less error-prone than choices based on non-hedonic aspects. This experiment is especially important to marketers who often use price and popularity to influence consumers. Our results suggest that considerations that potentially abstract consumers away from their emotional responses to the products are significantly more malleable and inconsistent over time.

³ The results of a manipulation check (N = 40) supported this assumption: the respondents reported that they were more likely to base their “liking” choices (compared to “wanting” choices) on hedonic factors and less likely on cognitive factors [t(39) = 2.18; p = 0.04].
GENERAL DISCUSSION

"We arrive at the truth, not by the reason only, but also by the heart."

-- Blaise Pascal

As the canonical symbol of classical economic theory and rational choice models, Homo Economicus has generally been depicted as a supra-rational, self-interested breed that possesses immense foresight and cognitive abilities (and perhaps, consequently, an oversized and active cortical system) but at the same time, devoid of emotions. In this work, we investigated one important property of Homo Economicus—transitivity, and its relation to our emotional system and cognitive system. Our examination of transitivity in the current work was not aimed to test the validity of rational choice models or economic theory. Instead, we used this very central concept in economics as an apparatus to examine the consistency in which individuals reflect upon and decide among their choices.

The results of three experiments—in which we manipulated the visual form of the choice stimuli, the state of the choice maker, and the goal of the choice task—consistently demonstrate that Homo Economicus might actually be more “emotional” than is commonly believed. Using a pair-wise choice task and different experimental manipulations designed to activate different degrees of emotional versus cognitive decision processing, we found that participants’ preferences were more transitive (i.e., consistent) when they chose between products presented in the more affective mode of pictures instead of the less affective mode of names (experiment 1), when they made their
choices under higher cognitive load (experiment 2), and when they based their choices on their hedonic preferences instead of the price or the popularity of the products (experiment 3). Together, the results of these experiments imply that transitivity is more inherent in decisions that are derived from emotional processing rather than cognitive processing, as well as in decisions focused on hedonic inputs rather than on non-hedonic inputs. These results are consistent with the implications of prior research documenting the “rational” economic behavior of rats, pigeons, and other animals (Kagel, Battalio, & Green, 1995), coupled with neural evidence for the similarity in emotional brain structures (but the discrepancy in cognitive brain structures) between animals and humans beings (LeDoux 1996; Panksepp, 2004).

Our experimental findings also extend the stream of research on preference transitivity: in addition to other antecedents that have already been identified, preference consistency can be impaired by too much deliberate cognitive thinking. Our results are also consistent with the evolutionary account that our emotional processes might have been adapted to perform common and important tasks effectively and efficiently (Cosmides & Tooby, 2000; Damasio, 1994). To the extent that transitive preferences are objectively “better” and more optimal than intransitive preferences, our results join other prior work that have demonstrated the positive roles played by emotions in decision making (Bechara, Damasio, Tranel, & Damasio, 1997; Damasio, 1994; Davidson et. al., 2000; Dijksterhuis 2004; Loewenstein & Lerner, 2003; LeDoux, 1996; Peters & Slovic, 2000; Pham et. al., 2001; Wilson & Schooler, 1991). In particular, whereas Pham and his colleagues (2001) demonstrated that feelings-based processes (compared to reason-based processes) can not only lead to faster decisions but also more stable and consistent
judgments across individuals, our results show that emotional processes can also contribute to greater preference stability and consistency within individuals.

**Alternative Accounts**

Alternative accounts bear the burden of explaining why we observed greater preference consistency in conditions that induced more emotional and less cognitive processing across all the experiments presented. One such possible account for our experimental results in general is that different experimental manipulations, or the different circumstances under which participants had to make their product choices, changed the type of decision strategy or decision rule participants used, and that some of these strategies somehow decrease internal preference consistency. It should be noted that to the extent that these latter strategies involve more emotional processing (and hence less cognitive processing), they are essentially the rationale for our argument. Therefore, for this alternative account to be valid, the manipulations must have led to different types (and not degrees) of cognitive processing.

For example, in experiment 2 where we manipulated the degree of cognitive capacity under which participants had to choose their preferred products, one might argue that participants under higher cognitive load could have used a simplifying non-compensatory decision strategy, which in turn could have resulted in the greater transitivity observed. However, Tversky’s (1968) transitivity findings with gamble choice would lead us to predict the opposite result: if a simplifying or lexicographic decision strategy was indeed used by participants under high cognitive load, then we would expect participants under low cognitive load to have greater attentional capacity to use a more
optimizing, more compensatory strategy in making their choice, and thus be more, not
less, consistent in their choices! (See also Gigerenzer 2000 for examples of intransitivity
caued by the use of satisficing, non-compensatory decision strategies.) Moreover, the
timing results that we found in the experiment—that there was no significant difference
in how long participants took to choose across both conditions—further challenge the
validity and adequacy of this alternative account in explaining our results. Furthermore,
we also designed the experimental procedure such that participants were provided with
full information of all products and were given as much time to get familiarized with the
products as they wanted before being assigned to one of the experimental conditions.
Thus, with the exception of Experiment 3 where the choice criterion was explicitly
manipulated, we do not expect participants to make vastly different choices among the
products in Experiments 1 and 2.

To test this alternative account using the choice data from the three experiments,
we examined whether there was a change in participants’ overall preference ordering
among the given products across conditions, assuming that a change in decision strategy
would lead to a change in preference structure. We can infer a participant’s preference
order by computing his or her Kendall score for each product (i.e. the number of times
the participant chooses the product in preference to the other products in the set), and
rank order his or her Kendall scores for all the products (Cook & Kress, 1992). (In other
words, there is a set of $P$ Kendall scores for each participant, where $P$ is the number of
products in the given set.) To compare participants’ preference structure between
conditions in each experiment, we submitted participants’ Kendall scores to a MANOVA,
using the specific experimental manipulation as the independent factor. Note that since
Experiment 3 manipulated explicitly the decision criteria (and presumably the factors of consideration), we would not expect the Kendall scores in this experiment to be the same across conditions.

The MANOVA results revealed no significant difference in product preference order as a result of different modes of choice stimuli representation in Experiment 1 [Wilks’ Lambda: $F(14, 132) = 0.48, p = 0.94$], or different degrees of cognitive load in Experiment 2 [Wilks’ Lambda: $F(7, 32) = 0.94, p = 0.49$]. In the case of Experiment 3, as expected, participants who were asked to choose the more expensive product in each pair had a different choice order from those who selected either the more popular product or the product they preferred (both $ps < 0.0001$).

Together, these results support our proposed account as a valid parsimonious explanation for the experimental results—that at least one expect of Homo Economicus, transitivity, might reside in the emotional system. Participants who rely on more intuitive, emotional processing and the hedonic aspects of their decisions tend to exhibit greater preference stability and internal consistency, and thus greater transitivity and “rationality”.

**Future Research**

In this research we measured consistency by measuring transitivity violations among all pair-wise choices of a product set. There are obviously other ways to measure consistency and it would be worthwhile to design and conduct further experiments based on other measures of transitivity/consistency.
One important way to extend the results is to implement a design with greater temporal distance between consecutive pair-wise choices, e.g. getting participants to make one pair-wise choice a day over an extended period of time, and examining whether the same transitivity patterns we observed across different cognitive versus emotional decision making scenarios persist.

Another possible extension of this research is to use individual personality differences as an alternate strategy to investigate the process correspondence of transitive choices. Potential candidates include Epstein and his associates’ (Epstein et. al., 1996) Rational-Experiential Inventory (REI), Puri’s (1996) measure of consumer impulsiveness, and Cacioppo and Petty’s (1982) need for cognition scale. If the conformance to rational choice axioms is more closely associated with automatic emotional processes, then people who are more impulsive or have a lower need for cognition could be more transitive in their preferences.

A third possible area for future research stems from an application of Piaget’s (1969) theory of cognitive development in developmental psychology. Piaget proposed four stages of cognitive development, which includes a stage (III) for concrete operations (at the approximate age of seven to eleven) when children master logic and develop “rational” thinking. Piaget’s work suggests that age could be a factor that moderates the degree of transitivity of an individual’s choices. As such, it would be worthwhile and interesting to examine how adults compare with children in terms of their degrees of preference consistency.

At a more rudimentary (neural) level, our experimental results point toward the emotional limbic system as another possible abode of Homo Economicus, in addition to
the commonly assumed cortical system. This implication is consistent with recent findings of Knutson and his colleagues (2005) who found that people's expected value computations could involve both the cortical system and the mesolimbic system (specifically the cortical mesial prefrontal cortex, and the subcortical nucleus accumbens). Further experiments involving the direct examination of individuals' neural activities during choice and decision making under varying conditions are imperative to identify the precise neural substrates associated with rational choice and stable preferences, and shed more light on the neural basis of rationality and the origins of Homo Economicus.

Practical Implications

Our results suggest that marketers who study consumer preferences may improve their methods by using affect rich stimuli. For example, a conjoint analysis that includes pictures in addition to descriptions in its choice stimuli may do a far better job at tapping the more consistent components of consumer preferences. Moreover, the emotional system's contribution to stable preferences suggested by our findings points toward yet another advantage to emotional approaches to persuasion: it may be important to tap consumers' emotional systems when assessing their consumption satisfaction as this approach might yield better predictions of their future choices. Finally, our results have one other practical implication if we were to consider an important difference between brick and mortar shopping and Internet shopping: the former affords consumers a richer affective shopping experience and may lead to greater preference consistency over time. As our results suggest, the degree to which a shopping website provides rich affective cues might have a great influence on consumer preference consistency.
For the consumers, contrary to lay perceptions, attending to one’s emotional responses may prove to be very valuable in understanding one’s preferences. It is possible consumers would be much happier with choices based more on their emotional reaction. For example, if one buys a house and relies on very cognitive attributes such as resale value, one may not be as happy actually living in it, as opposed to a person who attends to his or her emotional reaction to the house prior to purchasing it. Indeed, our results suggest that the heart can very well serve as a more reliable compass to greater long-term happiness than pure reason.
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APPENDIX A

EXPERIMENTAL STIMULI

<table>
<thead>
<tr>
<th>The FM Pen</th>
<th>Quick-Release Micro Light Keychain</th>
<th>Voice Recording Keychain with LED</th>
<th>Super-Bright LED Clip Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pagemark Dictionary</td>
<td>“Talking Pictures” Photo Album for 24 pictures and 24 messages</td>
<td>Voice Recording Pen</td>
<td>LED Multi-tool</td>
</tr>
<tr>
<td>“Bright As Day!” Daylight Spectrum Booklight</td>
<td>Chrome Key Organizer With Ultra-Bright Dual LED Torch</td>
<td></td>
<td></td>
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The eight products in the top two rows were used in Experiments 1-2. All ten products were used in Experiment 3.
FIGURE 1
RESULTS OF MANIPULATION CHECKS FOR
EXPERIMENT 1 (TOP PANEL) AND EXPERIMENT 2 (BOTTOM PANEL)

Experiment 1: Pictures versus Names

Experiment 2: Cognitive Capacity

Error bars denote standard errors.
FIGURE 2

COMPARISON OF THE AVERAGE NUMBER OF TRANSITIVITY CYCLES

(EXPERIMENT 1)
FIGURE 3
COMPARISON OF THE AVERAGE NUMBER OF TRANSITIVITY CYCLES
(EXPERIMENT 2)