Perceptual and Cognitive Salience and Their Effects on Product Valuations

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Three studies employing conjoint designs demonstrate that 1) salience biases can occur in a graded fashion and impact on attribute part-worths even when all information is accessible and relevant, 2) salience biases can be perceptual or cognitive in nature, and 3) salience biases on part-worths may decline over repeated decisions.

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Paper #1: The Influence of Number Format on Consumer Attention
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Paper #2: Perceptual and Cognitive Salience and their Effects on Product Valuations
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Paper #3: Promotion Emotion: The Salience of Restrictions vs. Rewards in Framing a Deal
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Paper #4: How Tradeoff Framing Impacts Attribute Focus and Shifts Choices
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SESSION OVERVIEW
Daily life is filled with tons of information, only some of which can be processed at a given time (Kahneman 1973). Given limited consumer attention and sensitivity to context, how this attention is directed is critical. Retailers, advertisers, and other marketers can make various benefits or costs of products salient and sway consumer opinion.

But, why and how does making some information salient affect how consumers evaluate products? There are many different possible pieces of information to make more or less salient, whether it’s the restrictions to a deal, product attributes, or numbers on a product page or advertisement. With recent advances demonstrating how salience may influence consumer product evaluations (Milosavljevic et al. 2012; Towal, Mormann, and Koch 2013), there are still many open questions about the nature of this relationship and whether it applies to a multitude of contexts. For example, does the numeric information formatting affect salience and product valuation? Does the salience of time versus money influence intertemporal tradeoffs? Can salience effects occur even when consumers are not overwhelmed with information? Does the effect of salience persist over several weeks, or is it short-lived? Can emphasizing certain elements of a deal affect consumer perceptions of that deal and purchase?

This session deals with these and other questions across laboratory, eye-tracking, and field experiments to develop the understanding of how salience shapes consumer behavior. Romero, Craig, Kumar, and Mormann study how number format (symbolic versus verbal) affects product evaluations. Using eye-tracking they demonstrate how negative temporal attributes representation affects attention and evaluation: people fixate quicker on symbolic numbers, which depress product valuations. Weingarten and Hutchinson examine how salience biases occur even when all information is accessible and relevant. They find product valuations can be biased by both cognitive salience (i.e., greater elaboration on some attributes) and perceptual salience (e.g., position effects), but that cognitive salience effects may decline as people make more decisions. Raghubir, Inman, and Wakefield investigate, in lab and field studies, how making “reward” versus “restriction” (i.e., strings attached) aspects of a deal salient for promotions affects deal evaluations and purchase behavior. They find that framing a deal as a restriction and then a reward bolsters deal positivity. Finally, Xu and Urminsky demonstrate how consumer patience changes based on whether calling attention to time or money in eliciting intertemporal preferences. They find more impatience when consumers pick how long to wait for a large reward than when determining the money they would forego for a sooner payout.

Taken together, we will discuss how salience shapes consumer behavior in different choice contexts including time-money and price-quality tradeoffs, product valuations, and product choice. Overall, we examine how salience affects product valuations and choice through several different instantiations of salience, which have direct applications even to advertising and retailing.

Given the importance of these effects to the theory and practice of consumer behavior, this session should appeal to multiple audiences with attention and perception, retailing, intertemporal choice, differences in money and time, advertising, and heuristics and biases.

The Influence of Number Format on Consumer Attention
EXTENDED ABSTRACT
As a consumer, would you evaluate the cost of purchasing a gym membership any differently if its price was expressed as “50 dollars a month” rather than “Fifty dollars a month”? This research proposes that consumers process symbolic representations of numbers (e.g., 5) differently than word representations (e.g., five), which ultimately leads to changes in quantity estimations and product evaluations. While previous work on numerical cognition has looked at changes in unit presentation (e.g., 3 weeks vs. 21 days) or precision (e.g., 115 vs. 120), the present research uniquely studies whether the visual notation of quantitative information can influence consumer judgment even when keeping magnitude and unit constant.

Arabic symbols have long been associated with precision and accuracy (Windschitl and Wells 1996). Moreover, due to their ideographic notation (Besner and Coltheart 1979), Arabic numbers (when compared to verbal numbers) possess shape features that make them more visually salient (Treisman and Gormican 1988; Wolfe and Horowitz 2004). Centered on these cognitive and perceptual characteristics, we propose that symbolic numbers (vs. verbal numbers) increase attention to quantitative information presented.

Attention eliminates distractions from the stimulus, allowing consumers to process information more efficiently (Posner and Rothbart 2005). Attention has also been known to bias magnitude perception upward. For example, a package that attracts more attention is associated to higher volume (Folkes and Matta 2004). Because number magnitude is a judgment of relative “size” (Dehaene 1992; Coulter and Coulter 2005) and given that Arabic numbers should increase attention to quantitative information, we expect that they should also lead to higher magnitude perceptions. Furthermore, we propose that the direction in which Arabic numbers will affect product evaluation depends on whether higher magnitudes of the advertised attribute is a positive addition to the product.

Our initial objective is to demonstrate that number notation can influence attention to quantitative information. Thus, in our first study, we manipulated number notation as well as the amount of product information presented in each product package. Based on
the principles of attention, we expect that when the amount of product information presented is large, there will be more competition for attention among product elements. Hence, symbolic numbers should lead to greater attention to quantitative information when the display is visually complex. However, when the amount of information presented is small, consumers will be able to attend equally to quantitative information regardless of the number format, and hence, our effects will be attenuated.

We created seventeen different stimuli for consumer products that highlighted a quantitative benefit. For nine out of seventeen products, we included a large amount of information in the package design. A pretest confirmed that consumers correctly identified the amount of information manipulation.

Our main study used eye-tracking technology to provide evidence for an attention-based mechanism. Sixteen students (43.8% female, average age = 23.25) from a large US University participated in a mixed factor design. Number format (symbolic vs. verbal) was manipulated between-subjects and amount of information was measured within-subjects. Participants evaluated three products as a part of a practice trial. Subsequently, they evaluated 17 different products (e.g., a cheese cracker, a light bulb, a car, etc.). Across conditions, the products only differed on the numerical notation (e.g., the cracker cheese content as “4 cheese” versus “Four cheese”). Once participants viewed the image, they pressed the spacebar to continue. In the session, we continuously recorded the participant’s eye movements using Tobii eye-tracking apparatus.

We separated the results by amount of information presented in the package (small vs. large). We ran a repeated-measure Analysis of Variance (ANOVA) with number format (symbolic vs. verbal) as a between-subjects factor. The time to first fixation for each product category created (small vs. large information) was the within-subjects factor. The results confirmed a significant main effect of amount of information ($F(1,14) = 68.10, p < .001$) and a marginally significant number format x amount of information interaction ($F(1,14) = 3.37, p = .09$). In line with our attention-based hypothesis, it took less time for consumers to fixate on the symbolic (vs. verbal) number when the products presented a large amount of information ($M_{\text{symbol}} = 5.04, M_{\text{verbal}} = 7.06; F(1,14) = 4.38, p = .05$), however, this effect was attenuated when the products contained small amount of information ($M_{\text{symbol}} = 1.86, M_{\text{verbal}} = 2.10; F(1,14) = .31, p = .58$).

Study 2, we explored the influence of number notation on product evaluations. Seventy-three MTurk panelists (39.7% female, average age = 32.7) participated in a single-factor between-subjects design (number notation: symbol vs. verbal). We created an advertisement for a new refrigeration product, VTex, that can chill any food item in 45 (vs. forty-five) seconds. Because the main purpose of this product is to chill food items quickly, higher magnitudes should be associated with lower product evaluations. Participants looked over the ad. Subsequently, they provided their attitudes toward brand VTex ($\alpha = .94$) and indicated how likely they would be to purchase the product if available locally ($\alpha = .96$). As expected participants evaluated VTex more negatively when the temporal attribute was presented in symbolic rather than verbal format ($M_{\text{symbol}} = 5.13, M_{\text{verbal}} = 5.83; F(1, 71) = 6.12, p < .05, \eta^2_{\text{partial}} = .08$). Similarly, participants were less willing to purchase the product when the temporal attribute was presented in symbols rather than words ($M_{\text{symbol}} = 4.38, M_{\text{verbal}} = 5.22; F(1, 71) = 4.23, p < .05, \eta^2_{\text{partial}} = .05$). The results of this study suggest that number notation influences downstream evaluations depending on the valence of the information.

Can the mere notation of a number shape magnitude judgments and product perceptions? We propose that due to cognitive (i.e., precision) and perceptual (i.e., salience) differences between symbolic and verbal numbers, consumers direct more attention to quantitative information, which in turn, affects downstream evaluations. Given the essential role numbers play in forming consumer judgments, the findings of this research have important managerial implications. This research proposes and provides evidence that managers should use these different representations selectively depending upon the message they would like to emphasize.

### Perceptual and Cognitive Salience and their Effects on Product Valuations

**EXTENDED ABSTRACT**

How do consumers evaluate products? Myriad papers and models have suggested how consumers tend to integrate information about products they view (e.g., Anderson 1971; Bettman et al. 1998). Yet, there are common instantiations of consumers employing more salient but irrelevant information while neglecting less salient but relevant information (e.g., Carpenter, Glazer, and Nakamoto; Klayman and Ha 1987). In some such cases, salience may even affect the valuation of given information (Hutchinson and Alba 1991; Towal, Mormann, and Koch 2013).

We propose a model of interactions among salience and valuation in consumer decision-making. This model expands upon the accessibility-diagnosticity framework from Feldman and Lynch (1988). In their memory-based model, accessibility is the readiness (based on recency or frequency) to apply informational inputs (Higgins 1989). Inputs that are accessible are then judged for their diagnosticity (here, valuation), and inputs that are inaccessible do not enter the decision process. Accessibility, which is a memory-based analog of salience, is thus treated categorically: either information is accessible or it is not. In this paper we show salience is not merely categorical and exists a graded effect when all information is accessible and relevant.

The present model also contributes to the literature by distinguishing between two unique sources of salience: perceptual salience (based on location or noticeability in the immediate environment) and cognitive salience (based on elaboration in working memory). Further, we examine the temporal dynamics of salience biases over repeated judgments. If the bias declines over time, then the explanation of the bias may be one of familiarity, whereas if the bias increases over time, the bias may be explained through polarization.

We use a rating-based conjoint paradigm in three studies and multiple product categories to demonstrate the influence and temporal dynamics of the salience bias. We present participants with one of three product categories (cars, cell phone plans, Disney vacation packages), each of which had four attribute identities with two levels each. For example, for cars these attributes were MPG (28, 33), sound system (Basic, Advanced), warranty (1 year, 4 years), and safety level (3.5 Stars, 4.5 Stars). Participants were asked to make willingness-to-pay (WTP) judgments for sixteen combinations of these attributes in two phases: a learning phase in which they made two judgments per page, and a test phase in which they made one judgment per page. All participants saw the same products in the learning phase and test phase, but we manipulated the order of products in the learning phase between-subjects. We used the WTP judgments in each phase to calculate each attribute’s part-worth valuation in each phase separately (Green et al. 2001).

In this setup, we manipulate perceptual salience (salience determined by immediate environmental position) based on the position of an attribute in a list: attributes in more extreme positions should be more salient than those in the middle (Dayan and Bar-Hillel 2011; Mantongakis et al. 2009). We control for attribute identity by position...
by using four orders of attribute presentation from a 4×4 Latin square such that all attribute identities, across participants, appear in each position (Rosenthal and Rosnow 2008).

We manipulate cognitive salience (likelihood of elaborating on information) by changing the order of presentation of product versions in the learning phase: in the Biased condition, subjects only saw one attribute vary on a page for four pages in the learning phase: this was the fourth (bottom) attribute. In the Control condition, three attributes differed on each page of the learning phase. We predict attributes made more cognitively salient (by being the only attribute to vary on each page) in the learning phase in the Biased condition, here the bottom attribute (attribute four), will receive higher valuations than in the Control condition in the test phase that was common to all participants.

In Study 1, participants used a slider scale to indicate WTP, and were randomly assigned to see one of three goods (cars, cell phone plans, Disney vacation packages). Consistent with perceptual salience, we found attributes in extreme positions (one and four) to have higher valuations than those in middle positions (two and three; $F(1, 750) = 59.95, p < .001$). Consistent with cognitive salience, we found the attribute to be made more salient in the learning phase (attribute four) was valued higher than other attributes in the Biased condition versus the Control condition ($F(1, 750) = 24.48, p < .001$).

Study 2 replicates Study 1 but with three changes. First, participants made sixteen additional judgments in two test phases that followed the first test phase, and they consisted of one judgment per page for 16 pages. These additional two test phases were meant to examine whether the salience bias observed in Study 1’s test phase would persist for additional, repeated judgments. Second, we also created another learning phase with different product versions for some participants to ensure the result generalized past the learning phase design from Study 1. Finally, participants indicated their WTP on slider scales.

Study 2 again found evidence of perceptual salience and cognitive salience ($F(1, 807) = 18.44, p < .001$), but these effects declined by test phase III (interaction of cognitive salience and phase: $F(3, 807) = 12.99, p < .001$). Therefore, although salience may bias valuation, its impact may be self-correcting.

Study 3 replicated Study 2, but this time it manipulated the cognitive salience of the third attribute for robustness. Study 3 also added another Control condition with another design matrix in the learning phase to ensure robustness. Again we found evidence of perceptual salience and cognitive salience ($F(2, 606) = 7.45, p < .01$), but an interaction of phase and salience such that the impact of salience declined by the end of test phase III ($F(6, 606) = 5.17, p < .001$).

We make three contributions over three studies for how salience influences valuation: we demonstrate salience may exert a graded (non-categorical) bias on valuation, salience biases may be perceptual or cognitive in nature, and that over repeated decisions, this bias may decline.

**Promotion Emotion: The Salience of Restrictions vs. Rewards in Framing a Deal**

**EXTENDED ABSTRACT**

Sales promotions affect sales through economic, informational, and affective components (e.g., Raghunib, Inman, and Grande 2004). While offering incentives to purchase, sales promotions often require a cost to the customer in the form of a restriction, such as time expirations, off-peak times, limited quantities, or purchase preconditions (Inman, Peter, and Raghunib 1997). How do consumers weigh the benefits against the costs associated with such restrictions? Can a reward offer be made to appear even more rewarding? Can an offer restriction be made to appear less restrictive?

Chandon, Wansink, and Laurent (2000) suggest sales promotions have a hedonic benefit (e.g., entertainment) over and above utilitarian benefit (e.g., savings, quality). Some derive satisfaction from being the “smart shopper” who takes advantage of “good” deals to signal positive traits to self and others (Schindler 1992). Being the “smart shopper” also affects the manner in which deals are evaluated (Shimp and Kavas 1984). Promotions often include explicit purchase limits (e.g., two per customer) or precondition restrictions (e.g., minimum purchase). Wansink, Kent, and Hoch (1998) report the value of a purchase limit on a sales promotion increased the average purchase quantity—suggesting people use the limit amount as an anchor to decide how much to purchase. Preconditions requiring complementary purchases or imposing time limits may serve to accentuate deal value and act as “promoters” of promotions (Inman et al. 1997) by heuristically signalling value to a customer. In their review of sales promotion research, Grewal et al. (2011) recognize the importance of framing or design of deals, suggesting future research should examine the relative effectiveness of multiple ways of communicating restrictions, such as buy-one-get-one-free and other deal limitations.

Across two field studies and a series of experiments, we examine the effect of varying the salience of a “reward” versus a “restriction” in framing a deal. We propose and show the counterintuitive effect that presenting the restriction first, followed by the reward (rather than leading with the reward, followed by the restriction) makes the restriction salient and leads to viewing the entire offer as more of a reward than a restriction and a more positive response. We examine these effects across restrictions for specific times/seats in a sports mobile marketing context (Study 1a, 1b, 2a, 3), offer available to the first few customers (Study 2b, Study 3), purchase preconditions (Studies 4 and 5), and limited time discount offers (Study 6). We find promotions that are ante perceived to be more restrictive than rewards (e.g., specific seats’ times) can be made to appear less restrictive and those perceived to be more of a reward than a restriction (e.g., available for the first few fans) can be made to appear as more of a reward.

Our field studies demonstrate the behavioral response to restriction-first promotions, while our experiments test the process. For example, Study 1b reports the results of a field study conducted in cooperation with Major League Baseball. An email offer was delivered prior to the last series of home games in the season to a sample of 21,883 individuals who previously purchased single game tickets from the team. The standard ticket discount offers contain restrictions regarding the seats (“Get a discounted price on seats in these select areas”) and dates. In this case, the seats were restricted to selected areas in the stadium and available for only two selected games (Thursday and Sunday) in a four-game span. We adapted the standard offer to provide a reward message frame, but otherwise presented an identical deal. The regular message copy employed the email subject line of, “A special ticket offer for valued TEAM fans” while the email subject line for the reward frame message was, “A special reward for valued TEAM fans.” The regular frame offer had a slightly higher open rate compared to the reward frame (38.8% compared to 36.2%). However, among those opening the regular frame email ($n = 4,234$), only 16.6% clicked-through to the ticket purchase page to consider the offer. In comparison, 23.6% of those who opened the reward frame email continued on to the ticket purchase page. Thus, the reward frame was significantly ($p < .001$) more likely to motivate click-through to purchase. This led to an increase in revenue from the reward frame compared to the regular frame ($2,744 vs. $1,646$).
Study 5 is an experiment in which 161 business school undergraduates participated in a 2 (frame: reward vs. restriction) x 3 (25% off, 50% off, or one free) between-subjects design. Subjects were asked to assume they needed to replenish household coffee supplies and needed at least three boxes (12 cups; Keurig) or three bags (beans or ground coffee). They were told that while searching online, an ad directed them to the Distant Lands Coffee website, where they were asked to read a company description. Directed to a website with assorted coffees, participants were instructed to select three they would like. On average, subjects spent two minutes and five seconds reviewing the webpage. Participants in a reward-first condition were exposed to an offer such as “Get 50% off one Distant Lands Coffee Blend when you buy two at the regular price,” while the order was reversed for participants in the restriction-first condition. Our analysis reveals that deal evaluation was higher for the restriction-first frame (4.87) than the reward-first frame (4.56, p<.05, one-tailed) and that the effect is mediated by deal enjoyment. The results suggest a restriction-first frame leads to more favorable deal evaluations than a reward-first frame and is judged to be a more enjoyable promotion.

In sum, our research examines the role of varying the salience of rewards versus restrictions on deal perceptions and deal response. Given that deals often offer a reward with some strings attached (restrictions), we examine the effect of explicitly making the reward or restriction differentially salient in the offer as well as implicitly manipulating salience in the offer through manipulating the presentation order of the discount and the restriction. Implications for research and practice will be discussed.

**How Tradeoff Framing Impacts Attribute Focus and Shifts Choices**

**EXTENDED ABSTRACT**

People’s choices in tradeoffs depend on which attribute is salient as compensating for the other. In measuring tradeoffs, researchers often present a series of choices between a fixed option and an option varying in only one attribute, to identify the indifference point where the consumers’ preference switches. For example, the indifference point in a size-price tradeoff could be elicited by fixing volume and varying price or by fixing price and varying volume (e.g. asking consumers to choose between a $14, 20-oz bottle and a 25-oz bottle with a price of $15, $18, $21 etc., or between a $14, 20-oz bottle and an $18 bottle with a volume of 21-oz, 25-oz, 29-oz, etc.) Normatively, the framing implied by the elicitation method should not influence how consumers trade one attribute for another. However, we predict that consumers focus more attention on the attribute that varies across the choices. In the example above, the amount they are willing to pay for the larger bottle is more salient in the first version and the amount of extra volume they would need to justify the higher price is more salient in the second version. As a result, we propose that this difference in framing will shift consumers’ indifference point, and more generally affect their valuation and choices.

In studies 1 – 3, we tested this proposition in the context of intertemporal choice, which is most often measured using discount rates from a monetary titration task (Urmiansky & Zauberman 2016). We propose that this approach may make the monetary (vs. temporal) aspect of the tradeoff more salient, potentially highlighting the attractiveness of the LL. In contrast, we predict that fixing the monetary amounts and varying the time delays across pairs of options in a titration task (i.e., time titration) may shift consumers’ attention to the temporal aspect.

Study 1 (N = 459) tested whether the discount factor measured would be different in a money-titration versus a time-titration task and used a 2 (SS: immediate vs. delayed) x 2 (elicitation type: money titration vs. time titration) between-subjects design. Participants were asked to finish one titration task. Results showed a significant effect of elicitation type on both discount factor ($F(1, 455) = 33.09, p < .01$) and self-reported relative attribute weight ($F(1, 455) = 13.48, p < .01$). The discount factor was lower (e.g., greater impatience was observed) in the time-titration cells than in the money-titration cells (.9918 vs. .9943), and participants in the time-titration (vs. money-titration) cells thought the time delay (vs. money amounts) mattered more (3.65 vs. 3.01). Importantly, attribute weight partially mediated the effect of elicitation type on discount factor.

Study 2 (N = 418) tested the effect of attribute salience on discount factor by having participants directly indicate their indifference point. Participants in one condition indicated the amount of money (X) in 8 weeks that would make them indifferent between that and receiving $50 now, and after a filler task, indicated the number of weeks of delay that would make them indifferent between receiving $50 now and receiving SX after that delay. Participants in the other condition, first estimated a delay, and then an amount of money based on that delay. The effect of task type and order on discount factor were significant ($F(1, 414) = 19.49, p < .01$; $F(1, 414) = 46.56, p < .01$, respectively). Discount factors were lower (people were more patient) when participants indicated time (vs. money) (.8796 vs. .8953), and when participants indicated time first and money later (vs. the reverse) (.8554 vs. .9229).

Study 3 (N = 186) tested the spillover effect of making time or money more salient via the elicitation method on a subsequent intertemporal choice, using a 2 (elicitation type: indicating money vs. indicating time) × 2 (role: creditor vs. debtor) between-subjects design. Participants first indicated their indifference point and then made a choice between two fixed options. For example, in the indicating-time-creditor condition, participants indicated N so that receiving $65 today and receiving $N in 6 weeks were indifferent, and then made a fixed choice between receiving $65 today and receiving $90 in 6 weeks. The effect of elicitation type on discount factor was significant ($F(1, 182) = 51.54, p < .01$). Pairwise comparison results showed a lower discount factor (greater impatience) when indicating time (vs. money), for both creditors (.8673 vs. .9473) and for debtors (.9329 vs. .9789). Meanwhile, consistent with our proposition, a higher proportion of creditors chose to wait to receive $90 in 6 weeks after indicating money than indicating time (73.3% vs. 31.8%), while a higher proportion of debtors chose to pay $65 today after indicating money than indicating time (92.0% vs. 80.9%).

Study 4 (N = 114) extended the attribute salience effect in time-money tradeoffs to a price-quality tradeoff in a travel package choice. We used a 2-condition (elicitation type: indicating cost vs. indicating rating) between-subjects design. For example, participants in the indicating-cost condition reported the cost that would make them indifferent between an 84%-quality-rating package for 3,780 yuan and a 93%-quality-rating package for the specified cost, and then made a choice between an 84%-rating/3,780 yuan-cost package and a 93%-rating/5,130-yuan-cost package. We found a significant effect of elicitation type on the price-quality indifference ratio ($F(1, 112) = 69.86, p < .01$). Moreover, a higher proportion of participants in the indicating-cost (vs. indicating-rating) condition chose the low-cost-low-rating package (87.7% vs. 59.6%). We also did another study to test this effect in a desirability-feasibility tradeoff and found similar results.

In summary, this research shows that different decision modes can influence discount factors and intertemporal choice, and provides initial evidence that decision mode may influence how consumers trade one product attribute for another.
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