In Pieces: Food Is More Filling When Served in Several Pieces

Aner Tal, Cornell University, USA
Brian Wansink, Cornell University, USA

Consumers' psychological satiety is driven by external cues to quantity eaten. Two studies explore the role of number of units in determining satiety. We find that dividing food into 4 separate units increases satiety, but only if the units are kept close enough to maintain volume perception.

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Nutrition and Numerosity: The Effects of Non-Used and Non-Consumed Items on Consumption Experiences and Outcomes
Chair: Noah VanBergen, University of Miami, USA

Paper #1: Motivated Ignorance: The Hedonic Cost of Nutritional Information
Scott Davis, Texas A&M University, USA
Kelly L. Haws, Vanderbilt University, USA

Paper #2: The Influence of Package Formats on Consumers’ Perceptions of Product Adequacy and Efficacy Responses
Veronika Ilyuk, Hofstra University, USA
Lauren Block, Baruch College, USA

Noah VanBergen, University of Miami, USA
Caglar Irmak, University of Miami, USA
Julio Sevilla, University of Georgia, USA

Paper #4: In Pieces: Food Is More Filling when Served in Several Pieces
Aner Tal, Cornell University, USA
Brian Wansink, Cornell University, USA

SESSION OVERVIEW
An individual engaged in the process of food consumption is exposed to myriad subtle cues and pieces of information, each of which may or may not be attended to and incorporated into the consumption experience. Extant research has shown that even irrelevant information (e.g., the size and color of dinnerware; the color of juice one consumes; Hoegg and Alba 2007; Van Ittersum and Wansink 2012) has important impacts on consumption. Yet, several ubiquitous aspects of consumption contexts, such as product numerosity and nutritional information, remain relatively less explored—particularly from a perspective of non-usage or non-consumption.

The authors in this session focus on how the usage vs. non-usage of subtle features of the consumption environment affects a range of consumption-relevant outcomes. In particular, we shift our focus away from the typical emphasis on how what is consumed affects consumption experiences, to instead ask: How do features of the consumption environment that are not consumed or not attended to affect consumption experiences?

In the first paper, Davis and Haws show that not receiving nutritional information impacts consumers’ enjoyment of hedonic foods, an effect they term “motivated ignorance.” Their studies show that consumers who are lower in eating self-control seek less and spend less time evaluating nutritional information relating to unhealthy foods to avoid the hedonic cost of this information and increase predicted and actual enjoyment of the foods.

Ilyuk and Block show that packaging may affect the perceived and actual efficacy derived from products such as energy-enhancers and medication. Their studies show that consuming the same amount of such products from a single-serving (vs. multi-serving) package may lead to greater product efficacy due to the perception of consuming all available resources (vs. a fraction of all available resources), respectively.

While the presence of non-consumed products hurts efficacy in some cases, VanBergen, Irmak, and Sevilla show that present but non-consumed products can improve efficacy in others. In particular, their results show that consumers who are unfamiliar with an energy-enhancing product derive greater benefits from a single consumed unit if the consumed unit is alongside several non-consumed units. Consumers familiar with the product show the opposite pattern of results, performing better in the absence of non-consumed products.

Finally, Tal and Wansink show that satiety—an outcome explicitly related to food consumption—can be influenced by the way the units of a food item are presented. Their studies show that consumers feel fuller when food is divided into more units and spaced closely together. More distal spacing makes the consumed food appear smaller relative to the total food space (i.e., the sum of consumed and non-consumed area), reducing perceptions of satiation.

Together, the authors in this session provide insight into the variety of ways that non-consumed aspects of the consumption environment affect the experience of food consumption. Given the growing importance of health and wellness research, we believe this session has implications for consumers and practitioners alike and will interest a wide audience of researchers studying aspects of food consumption, nutritional information, and numerosity.

Motivated Ignorance: The Hedonic Cost of Nutritional Information

EXTENDED ABSTRACT
Prior research has suggested that disclosure of nutritional information is only effective in reducing obesity when consumers are motivated to seek out and process such information (Howlett et al., 2009). Since consumers generally believe that unhealthy items taste better (Raghunathan, Naylor, & Hoyer, 2006), there may be a substantial hedonic cost when objective nutritional facts are known to the consumer. Research has shown that consumers are sometimes willfully ignorant of easily obtainable product attributes when these attributes conflict with goals and generate negative emotions (Ehrrich and Irwin 2005). Due to heightened conflict with hedonic goals, we propose and examine across four studies that individuals low in eating self-control will be motivated to ignore available nutritional information for indulgent foods, and doing so will heighten their enjoyment.

Study 1 introduced 128 participants (54% female) to a product evaluation task involving relatively healthy Baked Ruffles potato chips or relatively unhealthy Doritos, depending on condition. The packaging for the chips was shown on-screen including the nutrition facts panel. Participants were asked to carefully review the packaging and time spent doing so was recorded. Next, we captured an individual difference measure self-control (SC) using Tangney et al.’s (2004) scale items. The interaction between the condition and SC was significant in predicting the time spent reviewing the packaging ($F(1,124) = 6.96, p < .01$). A spotlight analysis at 1 SD above and below the SC mean revealed the effect of the experimental condition on time spent reviewing the packaging to be marginally significant at both one SD below ($\beta = -8.99, SE = 4.62, p = .05$) and above the self-control mean ($\beta = 8.30, SE = 4.61, p = .07$). Individuals lower (higher) in self-control tended to pay less (more) attention to nutritional information for unhealthy Doritos relative to healthier Baked Ruffles.

In study 2, we examined the effects of information choice on downstream enjoyment. Specifically, 103 participants (34% female) were asked to choose to view or skip nutritional information for a large slice of chocolate cake. Those who chose “view” were shown...
that the large indulgence contained 960 calories and 52 grams of fat. Regardless of whether they chose to view or skip, participants next imagined eating a bite of cake and rated enjoyment on a 9-point scale. In a logistic regression, we found that lower levels of self-control corresponded to a greater likelihood of skipping the nutritional information ($\beta = .55$, $p < .001$). Importantly, we found a significant interaction between information choice and self-control ($F(1,199) = 6.96$, $p < .01$). A spotlight analysis at 1 standard deviation below the self-control mean showed that individuals lower in self-control who chose to skip nutritional information anticipated significantly higher enjoyment for the chocolate cake dessert relative to those who viewed ($\beta = 1.85$, $p < .01$). High self-control participants at 1 standard deviation above the mean did not show significantly varying enjoyment between the choices ($\beta = -.43$, NS).

In study 3, 170 participants (47% female) were instructed to evaluate chocolate truffles that were present at their workstations. Each participant ate two truffles and, depending on experimental condition, viewed nutritional information either before consuming the first truffle or between consuming the first and second truffles. Enjoyment was measured after each truffle was eaten. Self-control tendencies and demographics were collected at the end of the session. Our analysis revealed a significant interaction of the timing of nutritional information and SC in predicting the enjoyment differential between the first and second truffle ($F(1,162) = 7.58$, $p < .01$). Measured enjoyment of the first and second truffle varied significantly between experimental conditions for those lower in self-control ($\beta = .89$, $p < .01$) but not for those higher in self-control ($\beta = -.19$, NS). Individuals lower in self-control experienced a significant drop in enjoyment when viewing nutritional information between the first and second truffle, supporting our prediction that such information produces a hedonic cost.

We next investigated whether hedonic costs result in reduced consumption in study 4. Participants (n=194, 62% female) were asked to sample one chocolate-covered almond and then choose whether to view nutritional information or customer reviews for the product. After viewing the information they selected, they were invited to consume the chocolate-covered almond snack (up to 40g) as they watched a video. Our analysis revealed a significant interaction between information choice and self-control ($F(1,181) = 4.12$, $p < .05$), such that those low in self-control consumed marginally more of the snack when they chose to view customer reviews vs. nutritional information ($\beta = 3.26$, $SE = 1.80$, $p < .08$). Those higher in self-control did not significantly differ in consumption for the two information types ($\beta = -1.77$, $SE = 1.82$, NS). Additionally, an indirect effect of eating enjoyment linked the information choice and self-control interaction to the quantity of almonds consumed ($\beta = -1.53$, $SE = .79$, 95% bias-corrected bootstrap CI: -3.18, -0.08).

Across four studies, we examine the efficacy of providing nutritional information by exploring whether individuals lower in self-control tend to avoid available nutritional information for more indulgent foods and whether such exposure influences consumption. We measured tendencies to view nutritional information through time spent looking at packaging (study 1) and explicit choices to view or not view nutrition facts (studies 2-4). Further, we find that people with low self-control tend to consume more unhealthy food when they avoid nutritional information (studies 2 and 4) and enjoy unhealthy food more (less) when avoiding (viewing) nutritional information (studies 2-4). These findings, using different food stimuli and various formats of information, show that nutritional disclosure may be a promising intervention for individuals lower in self-control but there are obstacles to clear in getting these consumers to view and process the information provided.

**The Influence of Package Formats on Consumers’ Perceptions of Product Adequacy and Efficacy Responses**

**EXTENDED ABSTRACT**

Marketers offer products in a variety of package formats—from large containers to smaller, single-serve, individually-wrapped and travel-size alternatives. Although much of prior research has focused on the effects of portion, serving, and package size on consumption of foods (for a review see Zlatevska, Dubelaar, and Holden 2014), little inquiry has been made into the effects of product packaging on consumers’ perceptions of product efficacy. In this research, we build on extant research on the effects of resource availability and product packaging on consumption (Morewedge, Holtzman, and Epley 2007; Wansink 1996) and implicate package format—single-serve vs. multi-serve packages—as a source of product efficacy experiences and expectations.

During consumption, a product’s package necessarily defines the accessible “resource inventory” and the serving/dosage defines the consumption quantity. Although the ratio of consumption quantity to resource availability is, in and of itself, uninformative to product efficacy inference, we suggest that consumers may erroneously rely on the size of the resource inventory when making efficacy judgments when processing capacity (herein PC) is limited. We propose and demonstrate that consuming a particular serving/dosage of a product from a smaller resource inventory (i.e., the entirety of a single-serve package, a “whole”) may subjectively feel more adequate than consuming the same amount from a larger resource inventory (i.e., a multi-serve package, namely one containing many servings/doses). Across three studies, we used a 2 (Package Format: Single-Serve vs. Multi-Serve) X 2 (PC: High vs. Low) between-subjects design; PC was manipulated by imposing a cognitive load.

In study 1, participants were given 1-ounce of Gatorade G-Series Pro 02 Perform powder to mix into a water bottle from either an individually-wrapped, 1-ounce, packet (single-serve condition) or a 32-ounce container (multi-serve condition). They were asked to drink the mixture (purportedly capable of increasing mental acuity) as needed while they performed a verbal GMAT task; actual efficacy experiences were captured by task performance (Ilyuk, Block, and Faro 2014; Shiv, Carmon, and Ariely 2005; Wright et al. 2013). As hypothesized, an ANCOVA revealed a significant package format by PC interaction on task performance, controlling for how much participants drank and how well they usually perform on standardized tests ($F(1,93)=5.44$, $p<.05$). Contrast analysis indicated that when PC was low, task performance was higher when participants were given Gatorade powder from the single-serve package ($M=40.33$% than an equivalent amount from a multi-serve package ($M=40.01$%; $F(1,93)=4.21$, $p<.05$). However, when PC was high, there was no difference in task performance between the two package conditions ($F(1,93)=1.56$, $p=.21$). Perceived product adequacy exhibited a similar pattern: when PC was limited, perceptions of having an adequate quantity were higher for those who received 1-ounce of powder from a single-serve ($M=5.65$) than from the multi-serve package ($M=4.78$; $F(1,95)=3.80$, $p=.05$). However, when PC was high, there was no significant difference in perceptions of adequacy ($F(1,95)=5.48$; $F(1,95)=2.18$, $p=.14$). Moderated mediation analysis showed that perceived product adequacy mediated the effect of package format on task performance in the low (CI[-3.3866, -1.206]) but not high PC condition (CI[-0.0368, 2.9676]).

In study 2, we held package size completely constant while varying the resource inventory (number of servings). All participants were given a packet of Sport Beans® (caffeinated jelly beans); they
were asked to eat one serving of 5 Sport Beans® and to perform three cognitive tasks. We manipulated the quantity of servings in the packets prior to distribution: those in the single-serve condition received a packet containing 5 Sport Beans® whereas those in the multi-serve condition received a packet containing 15. Analysis of task performance for all three tasks replicated the pattern found in study 1: when PC was low, task performance was higher in the single-serve, 5-pack condition, than in the multi-serve, 15-pack condition. However, when PC was high, there was no difference in performance between the two package conditions. Further, perceived product adequacy exhibited a similar pattern: when PC was limited, perceptions of having an adequate quantity of Sport Beans® were higher for those in the single-serve ($M=5.36$) than in the multi-serve condition ($M=4.11$; $F(1,108)=10.61$, $p<.005$). However, when PC was high, there was no significant difference in perceptions of adequacy ($F<1$). Analyses of moderated mediation for each task revealed that perceived product adequacy mediated the effect of package format on task performance in the low but not high PC condition.

In study 3, given the inability to test the effects on actual efficacy experiences due to the nature of the utilized product (pain medication), we gauged product efficacy expectations. Participants imagined experiencing a painful headache. They were given a description of a popular OTC pain reliever—Advil®—and asked to imagine taking a dose of 2 tablets from either a 2-tablet travel-size packet (single-dose condition) or a bottle (multi-dose condition); an image was provided in both conditions. In line with the results of the previous studies, contrast analysis showed that in the low PC condition, efficacy expectations (5-items; $α=.85$) were higher when participants imagined consuming the medication from the single-dose packet ($M=4.96$) than from the multi-dose bottle ($M=4.30$; $F(1,98)=4.59$, $p<.05$). However, in the high PC condition, there was no difference in efficacy expectations ($F<1$). Similarly, when PC was limited, perceptions of product adequacy (to relieve the symptoms) were higher for those in the single-dose ($M=5.19$) than in the multi-dose condition ($M=3.90$; $F(1,98)=6.53$, $p<.01$); in the high PC condition, there was no significant difference in perceptions of adequacy ($M_{\text{single-dose}}=4.08$ vs. $M_{\text{multi-dose}}=4.64$; $F(1,98)=1.23$, $p=.27$). Perceived product adequacy mediated the effect of package format on efficacy expectations in the low ($CI=[-2.254, -0.043]$) but not high PC condition ($CI=[-0.139, 1.17]$).

Together, these studies document a new bias in which consumers rely on the quantity of servings within a package to infer whether a fixed amount (serving/dose) is adequate to produce the desired result. Accordingly, we introduce a previously unexplored antecedent to efficacy perceptions/experiences: feelings of (in)adequate consumption. Also, whereas prior work has shown how available resources may change consumption levels, this research demonstrates how available resources affect behavioral outcomes when consumption is fixed. We suggest that this research has implications for consumer health and well-being.

Present but Not Consumed: The Interaction of Assortment Size and Product Familiarity on Expected and Actual Product Efficacy

EXTENDED ABSTRACT

The use of performance-enhancing products (e.g., energy drinks) has been increasing rapidly over the past decade (Wong 2013), a trend accompanied by increasing numbers of health-related conditions related to over-consumption of these products (SAMHSA 2014). While knowledge of the physiological effects performance-enhancing products (PEPs) have on consumers is obviously critical, it is also necessary to understand the psychological factors influencing consumption of PEPs, given that consumption depends heavily on perception and expectations (Hsee 1996; Shiv, Carmon, and Ariely 2005).

Building on extant research on the effect of expectations on actual product efficacy (Irma, Block and Fitzsimons 2005; Shiv et al. 2005), this research contributes to our knowledge of the psychological influences of perceptions on experiences involving PEPs. Specifically, we examine how the number of products included in an assortment from which consumers take a product influences consumption experiences. In so doing, we show how an often-neglected but ubiquitous aspect of consumption—the presence of products that are not consumed in an assortment—affects the experience of consumption.

Extant research provides some insight into the ways that non-consumed products will impact product efficacy. Individuals often rely on quantitative heuristics as they evaluate products (Josephs, Giesler, and Silvera 1994; Pelham, Sumarta, and Myaskovsky 1994). One such quantitative heuristic likely implicated in expectation formation is the number of products available for consumption. Individuals often use the proportion, rather than the absolute amount, of material used or consumed as the basis for judgments of product efficacy (Silvera, Josephs, and Giesler 2001). When this proportion is higher, consumers perceive greater product effectiveness. Applied here, this implies that PEPs present but not consumed in an assortment will detract from the efficacy of consumed PEPs.

Importantly, however, we argue that individuals’ familiarity with the consumed PEP will impact their product efficacy judgments and, hence, actual product efficacy. Specifically, we propose that a consumer unfamiliar with a PEP will form greater product efficacy expectations when more units of the PEP are present in the assortment. This is because when consumers are unsure of a product’s efficacy, a larger assortment size will enhance perceived availability and, thus, credibility of the product, leading to greater expected and actual product efficacy. When consumers are familiar with the PEP, on the other hand, consuming one unit of the product from a large assortment will lower performance as the non-consumed units in the assortment will reduce the perceived proportion consumed. We test these predictions in three studies and find consistent support.

In our first study, we tested the impact of non-consumed products on performance for a highly familiar product: Red Bull energy drinks. We asked participants to imagine they were up late studying for an exam and decided to have a Red Bull. We showed participants a picture of a single can of Red Bull (vs. a 24-pack of Red Bull cans) and asked them to imagine they purchased (one of the) can(s) they were shown. We then asked the extent to which they believed their physical performance would improve as a result of consuming the can of Red Bull. As expected, individuals expected to derive a greater benefit from this familiar product when they imagined consuming a lone can vs. the can from a large assortment ($p=.05$).

Our second study built on study 1 in two important ways. First, we used a product that is familiar to some participants and less familiar to others. Second, we showed that actual behavioral performance, not only expectations, is affected by consuming energy-enhancing products taken from small vs. large assortments. To achieve these goals, we asked participants to consume a single Gatorade Energy Chew (a relatively new product at the time of the study) taken from a baggie containing either one single chew or six total chews. After consuming the chew, participants completed two measures of performance, one requiring speed and accuracy (correctly identifying the number of dots shown on a screen in under two seconds) and the other drawing more on cognitive resources (rearranging letters...
in a 10-letter word to form new words). After completing the tasks, we asked participants how familiar they were with Gatorade Energy Chews (1 = not at all familiar; 9 = extremely familiar). We expected that individuals who were familiar with the product would show better performance in the single-chew condition, while less familiar individuals would show better performance in the six-chews condition.

Results on both measures of performance supported our expectations. Participants’ score on the word task showed a significant 2-way interaction between condition (1 vs. 6 chews) and mean-centered product familiarity ($p < .05$): Participants more familiar with the product performed better in the 1- vs. 6-chew condition, while the opposite pattern was observed for less familiar individuals. Similar 2-way interactions were seen on participants’ reaction times (2-way interaction $p = .05$) and the number of correct responses on the dot task (2-way interaction $p = .08$).

Finally, in study 3 we extended the generalizability of the effect by using a different type of “product”: classical music. Research on the “Mozart Effect” suggests that listening to classical music can enhance performance (Angel, Polzella, and Elvers 2010). We thus asked participants to listen to a 4-minute composition by Mozart that was either accompanied by five other song titles on the screen or not. After listening to the song, participants completed a different measure of performance. Afterwards we asked whether or not participants had heard of the Mozart Effect before the study. As expected, a significant 2-way interaction ($p < .05$) showed that, for participants who had (had not) heard of the Mozart Effect, performance was better when the song they heard was the only (one of six) song(s) presented on the screen.

Together, these studies show that consumption and product efficacy experiences are not only affected by what is consumed, but also by what is not consumed. These results have both practical (e.g., packaging considerations, particularly for new product introductions) and theoretical implications in the areas of food consumption, numerosity, and product efficacy.

**In Pieces: Food Is More Filling when Served in Several Pieces**

EXTENDED ABSTRACT

Would eating a bagel cut into pieces make it more filling? Satiety, or the sense of how full one is, is driven by psychological, as well as physiological, factors (Wansink 2007; Redden and Galak 2013). People feel full or empty, and assess their need to eat more, based not only on how much they’ve eaten, but on external cues as to quantity eaten, as well on their perspective regarding the meal, for instance whether it counts as a meal or a snack (Wansink et al. 2010). Broadly speaking, if people think they ate a more substantial meal, they feel fuller.

Eating behavior in general is affected by external cues (Wansink 2004). People clear off the food from their plate, and take the amount of food on the plate to imply the quantity they should eat. Accordingly, while there is food on the plate, people tend to continue eating (Wansink et al. 2005). Accordingly, eating from bigger containers tend to lead to increased consumption (Young & Nestle 2002; Wansink & Kim 2005).

Such behavior may be partially driven by perceptual distortions, whereby people’s judgment of the size of their meal is affected by contextual variables such as how big the food portion appears relative to their plate (van Ittersum and Wansink 2012). Labeling products as larger can also lead people to think that they are eating more. Thinking that less was eaten can in turn lead people to consume more food (Aydinoglu & Krishna, 2010).

The perception of quantity can affect not just how much one would eat, but their sense of psychological satiety (Redden and Galak 2013). For example, seeing one’s leftovers may serve as an indication as to how much one has eaten, increasing satiety (Wansink 2007). Even cues to quantity eaten that do not in fact indicate how much one has eaten may lead to increased reported satiety (Tal and Wansink 2014).

In the current work we explore the notion that the number of units one thinks they have eaten affects their satiety. A prior study (Wadhera et al. 2012) found that having a bagel cut into 4 pieces led to decreased food consumption in a subsequent meal compared to eating a bagel whole. The authors conjectured that perceptions of the volume of the bagel on the plate increased satiety. A bagel cut into 4 pieces fills the plate to a greater extent, leading to increased volume perception, and consequently a sense that one has eaten more.

In the current study, we examine whether volume perceptions indeed affect satiety by providing an additional condition. In one of our 4-piece conditions the bagel is spread across the plate, to fill up more volume. In another, the pieces of the cut bagel are kept together. We conjectured that it is the perception of number of units eaten, rather than volume perception, that increases satiety, and that spacing the pieces of the bagel, rather than increasing satiety, would in fact reduce satiety since it makes the size of the bagel pieces appear smaller. We also employed a direct measure of felt satiety, rather than consumption in a subsequent meal.

Participants (N=43) were randomly assigned to one of three groups. All groups ate a mini bagel with cream cheese in a lab setting. One group got the bagel in one piece. The other two groups got the bagel cut into four pieces: for one group pieces were spread out on the plate, and for another the pieces were kept together. Participants reported on their fullness across 3 measures: hunger, fullness, and satiation, all measured on 9 point likert scales. They reported fullness before and after eating the bagels. We created a summary satiety score, and calculated the difference score between pre and post eating fullness as our dependent measure.

Increased satiety was highest when participants received the pieces close together (4.77). Satiety was higher in this condition than when participants received the bagel whole (3.75). However, receiving the 4 pieces spread apart led to reduced satiety (2.18). Differences were significant at a .04 level: F(2,41)=3.26. Participants report greater satiety when eating a food cut into several pieces, but only when those pieces are close together.

This result was subsequently replicated with a larger sample (N=72). In this study, we examined whether liking for the bagel moderated our results. Liking was measured on a 9-point likert scale. We analyzed results in a GLM model with difference in satiety as the dependent measure, and bagel condition, rated tastiness, and the interaction of the two as independent variables. There was a significant effect of condition on satiety: F(2,64)=4.21, p=.02. Having the bagel cut to 4 increased satiety (3.29) relative to eating the bagel whole (2.63). Those who received the cut bagel spread on the plate reported the least increase in satiety (1.72). There was also a marginally significant interaction of liking and condition: F(2,64)=3.02, p=.056. Those who expressed greater liking for the bagel were less influenced by condition.

Together, the studies attest that food is felt to be more filling when eaten in several pieces. However, the effects of eating the food in pieces are mitigated if the pieces are spread apart such as the serving appears smaller (each piece would appear smaller when separated from the others, creating an overall appearance of a smaller serving). In other words, it appears that eating more pieces increases satiety, as long as the perception of volume is maintained.
Further research should corroborate the mechanisms behind this phenomenon. For example, research could measure consumers' self-reports of perceived volume of the serving as well as quantity eaten. Research could also examine whether the effect increases as the number of servings increases. Finally, research could examine whether splitting the pieces but keeping them in close proximity such that the gestalt appears larger would enhance, rather than decrease, the effects of cutting.

These findings have clear implications for public health. Serving food in pieces would create a sense of increased satiety. This would allow consumers to feel full with less food, reducing consumption.

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