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**WHEN DO TRANSPARENT PACKAGES INCREASE (OR DECREASE) FOOD
CONSUMPTION?**

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ABSTRACT

Transparent packages are pervasive in food consumption environments. Yet, past research has not systematically examined whether and how transparent packaging affects food consumption. The authors propose that transparent packaging has two opposing effects on food consumption as it enhances food salience, which increases consumption (salience effect), and facilitates consumption monitoring, which decreases consumption (monitoring effect). They argue that the net effect of transparent packaging on food consumption is moderated by food characteristics (e.g., size and appearance). For small, visually attractive food, the monitoring effect is low, so the salience effect dominates and people eat more from a transparent package than from an opaque package. For large food, the monitoring effect dominates the salience effect decreasing consumption. For vegetables, which are primarily consumed for their health benefits, consumption monitoring is not activated, so the salience effect dominates, which ironically decreases consumption. The paper's findings suggest that marketers should offer small foods in transparent packages and large foods and vegetables in opaque packages to increase post-purchase consumption (and sales).

Keywords: Packaging design, transparent packaging, external cues, food consumption.

Over the past decade, marketing scholars have examined the effects of various factors on food consumption (e.g., Garg, Wansink, and Inman 2007; Kahn and Wansink 2004; Khare and Inman 2006; McFerran et al. 2010; Wansink and Chandon 2006). A key conclusion in this literature is that how much we eat is not only influenced by physiological hunger cues, but also by various external cues including “family and friends, packages and plates, names and numbers, labels and lights, colors and candles, shapes and smells, distractions and distances, cupboards and containers” (Wansink 2004; 2006). Thus, food packaging has emerged as an important cue affecting food consumption. In this paper, we focus on one aspect of packaging, transparent (versus opaque) packaging and examine its effect on food consumption.

Insights on the effects of (transparent versus opaque) packaging on food consumption are managerially important. Interviews with brand managers at three leading food companies (Kraft Foods, Frito-Lay, and Dr. Pepper Snapple Group) confirmed that packaging decisions are critical not only because of their effects on consumers’ in-store purchase decisions, but also on post-purchase food consumption. These managers indicated that marketers have a deep and long-standing interest in stimulating post-purchase consumption and therefore understanding the factors that influence consumption. Traditionally marketers have used generic advertising to promote consumption and repeat purchase (Chakravarti and Janiszewski 2004). For example, in 1999, the Wine Market Council launched a campaign to increase wine consumption using the slogan “*Wine: What are you saving it for?*” Developed by the same people who made the “*Got Milk?*” campaign, this ad targeted consumers who have wine at home (but were not drinking it) to change the then widespread notion that wine should be saved for special occasions, and to promote the idea of drinking wine daily.

Compared to more than a billion dollars spent annually on ad campaigns aimed at increasing product consumption (Chakravarti and Janiszewski 2004), these managers noted that packaging would be a more cost-efficient way to influence post-purchase consumption. They also noted some market trends that accentuate the importance of studying the effects of packaging, especially transparent packaging, on food consumption. First, more consumers are eating food directly from the package, which means that packaging exerts a direct and lasting influence on their consumption. Given the fast paced lifestyles of individuals, on-the-go eating is growing with 54% of consumers seeking snacks that can be eaten on the go, i.e., eaten directly from the package (Wyatt 2012). Second, transparent packaging has become more popular in the marketplace as it addresses the increasing demand from consumers to see what they are buying (Schürmann 2008). This suggests that many consumers are eating food directly from transparent packages. Third, the warehouse retailing industry has been growing rapidly during the past few decades. More consumers now buy food in bulk from warehouse clubs (e.g., Costco, Sam's Club, etc.) at discounted prices, stockpile it, repackage it into transparent containers or bags and eat it over multiple occasions. Because of this trend, these managers expressed interest in providing repackaging solutions to these consumers. Thus, this study's insights will help marketers develop packaging strategies to increase their products' consumption.

To further establish the managerial relevance of our research, we conducted a field study to examine the prevalence of transparent packages in the marketplace. The study covered four food categories (chips, cookies, crackers, and nuts) and included both fully transparent and partially transparent packages (opaque packages with transparent windows) in four supermarkets across two large cities in the United States. We selected these four categories because they are

among the top ten food categories and accounted for over \$ 25.7 billion sales in 2011.¹ We present the evidence from the field study in Table 1.

---- Insert Table 1 here ----

As shown in Table 1, transparent packages (including fully transparent and partially transparent packages) in these four product categories account for 40% of all stock keeping units (SKUs). Transparent packages occur most in nuts (77% of all SKUs) and least in chips (20%). These numbers confirm that transparent packaging is prevalent in the marketplace and its incidence varies across food categories calling for insights on packaging transparency effects based on food characteristics.²

From a theoretical perspective, our research addresses a gap in the marketing literature. Factors such as the package's shape (Raghubir and Krishna 1999; Wansink and Van Ittersum 2003), size (Argo and White 2011; Coelho Do Vale, Pieters, and Zeelenberg 2008; Scott et al. 2008) and the product image on the package (Madzharov and Block 2010) have been shown to affect food consumption. To the best of our knowledge, past research has not yet systematically examined the effects of packaging transparency on food consumption, the issue we focus on in this paper.

We develop a theory of transparent packaging on food consumption based on the notion that eating food from a transparent package presents a self-control dilemma. A transparent

¹ Data courtesy of SymphonyIRI Group, a Chicago-based market research firm, in personal correspondence with the authors.

² The prevalence of transparent packages in the marketplace is surprising considering the damaging effects of light on food quality (at <http://www.foodsafetysite.com/educators/competencies/general/microbiology/mic6.html>). Interviews with two food technology experts (at Frito-Lay and Dr. Pepper Snapple Group) indicated that food will degrade if exposed sufficiently long to light. Thus, food companies use various technologies (e.g., color encapsulation or emulsions, packaging materials with ultra violet barriers) to minimize photo degradation of food.

package makes the food in it visible, which, we propose, will have opposing effects on food consumption. On the one hand, the food in the transparent package is salient, which increases consumption (“salience effect”). On the other hand, the transparent package enables consumption monitoring, which decreases consumption (“monitoring effect”). We further propose that two food characteristics, the unit size of the food (small versus large) and the appearance of the food (visually attractive versus visually plain), will moderate the dominance of the monitoring effect versus the salience effect and, thereby, influence the net effect of transparent packaging on food consumption.

In the sections that follow, we first present our theory and hypotheses of the effects of packaging transparency on food consumption (see Table 2 for an overview). We then test the hypotheses in five experiments where participants ate food from either transparent or opaque packages in an environment that mimics food consumption in the real world (i.e., they ate while watching a TV show). We conclude with a discussion of implications of the paper’s findings for managerial practice, consumers, marketing theory, and further research.

---- Insert Table 2 here ----

Theory and Hypotheses

The Paradox of Transparent Packaging

The paradox of transparent packaging is that, on the one hand, seeing the food in the transparent package makes it salient, which increases consumption (i.e., salience effect) while,

on the other hand, consumers can see how much they have eaten, that is, the transparent package enables consumption monitoring which decreases consumption (i.e., monitoring effect).

The salience of the food is an important external cue that stimulates consumption (Wansink 2004). Aside from hunger, consumers most frequently mention “I saw the food” as the reason for initiating food consumption (Tuomisto et al. 1998). The mere sight of food increases reported hunger (Bossert-Zaudig et al. 1991; Klajner et al. 1981), salivation (Hill, Magson, and Blundell 1984), secretion of insulin (Johnson and Wildman 1983) and release of dopamine, a neurotransmitter associated with feelings of pleasure and reward (Volkow et al. 2002) and desire for food (Wang et al. 2004).

In addition, the food’s visual cues increase the quantity of food consumed (Cornell, Rodin, and Weingarten 1989; Rogers and Hill 1989). For example, people eat more sandwiches in transparent wrap than those in opaque wrap (Johnson 1974). Likewise, Hershey’s Kisses candies in clear jars are consumed more quickly than those in opaque jars (Wansink, Painter, and Lee 2006). Hence, the mere visibility of food in a transparent package can increase consumption. In contrast, when food visibility is blocked (by eating blindfolded), consumption decreases by about one fourth for both normal-weight and obese participants (Barkeling et al. 2003; Linné et al. 2002).

However, just as visual cues can initiate and promote food consumption, they can also terminate food consumption (Wansink, Payne, and Chandon 2007). In the simplest case, people may stop eating once their plate or bowl is empty. Wansink, Painter, and North (2005) found that when a soup bowl was designed to automatically refill itself, those who had been given these bowls ate, on average, 73% more than those eating from regular bowls. They continued eating

because they did not see an empty bowl. These findings suggest that “people use their eyes to count calories and not their stomachs” (Wansink, Painter, and North 2005, p. 98).

A key determinant of how much consumers eat is whether they pay attention to how much they are eating, i.e. whether they monitor their consumption (Polivy et al. 1986). Across many contexts, monitoring is a key determinant of self-control success or failure (Baumeister 2002; Baumeister and Heatherton 1996; Carver and Scheier 1998). An extension of this logic to eating food from transparent versus opaque packages suggests that because consumers can monitor the food left over in a transparent package (e.g., “There were eight cookies in the pack, now there’re only four left!”), they may perceive that they have eaten enough and stop eating sooner from a transparent package than from an opaque package which, similar to the bottomless soup bowl in Wansink et al.’s (2005) study, does not enable consumption monitoring.

In summary, transparent packaging may have two opposing effects on food consumption. The transparent package may increase food consumption because the food is salient, and it may also decrease food consumption because it enables consumption monitoring. Given these opposing effects, we propose that the net effect of transparent packaging on food consumption will be determined by two food characteristics, its size (small versus large) and appearance (visually attractive versus visually plain).

Food Size and Food Appearance

We propose that one way to mitigate the monitoring effect of transparent packaging is to consider small food (e.g., Froot Loops, Cheerios) for which consumers’ motivations to engage in consumption monitoring may be relatively low. Consumption monitoring is triggered when consumers perceive current consumption act as a self-control threat. That is, the temptation must be big enough to hinder the pursuit of an over-arching goal, such as to control or lose weight

(Fishbach and Shah 2006). If the consumption act does not present itself as a sufficiently large self-control threat, consumers will not activate their coping mechanisms, thereby succumbing to the temptation. This is consistent with the counteractive control theory (Trope and Fishbach 2000) which posits that the level of self-control effort depends upon the perceived strength of the temptation. This is also consistent with the critical level model of threat (Gilbert et al. 2004) which suggests that people expect intense stressors to last longer than mild ones and will take action to attenuate the distress only when the stressor is beyond a certain threshold. Thus, little temptations or “small sins” may go unnoticed, opening the door for more to follow. In support of this logic, Kroese, Evers, and De Ridder (2011) show that weak, rather than strong temptations create more unfavorable conditions for effective self-regulation by inhibiting the mental accessibility of weight-watching goals and increasing food consumption. In a similar vein, Coelho Do Vale et al. (2008) report that tempting food in small, versus large packages remain undetected (by “flying under the radar”), actually increasing food consumption.

Extending this logic, we propose that consumers may perceive each item of the small food to be a “small, harmless” temptation which is not a threat to their self-control. This allows consumers to continue eating the small food under the pretext of “just one more” again and again. That is, consumption monitoring is low. Therefore, we anticipate that when eating small foods, the transparent packaging’s salience effect will play a dominant role in influencing consumption. We next discuss a food characteristic that, we propose, will moderate this salience effect.

Foods differ in terms of their appearance, a key sensory property with implications for consumption (e.g., Kawaguchi et al. 2006; Marcelino et al. 2001). The importance of food appearance manifests itself in the obsessive craftsmanship of master chefs who fashion their

dishes into visual artworks (Imram 1999). Consumers' appetites increase after seeing pizza and consumption quantity is positively related to the visual quality of the pizza (Marcelino et al. 2001). Visually attractive food is an effective treatment for loss of appetite in cancer patients (Kawaguchi et al. 2006), whereas visually plain food reduces food consumption, leading to dramatic weight losses in obese individuals (Schachter, Goldman, and Gordon 1968).

Extending the above discussion to the consumption of small food, we hypothesize that when the food is visually attractive, it will strengthen the transparent package's salience effect. That is, the vividness of the food attracts attention and acts as a constant reminder of the small, harmless temptation, and thereby triggers the "eating just one more" behavior again and again, increasing consumption. However, when the food in the transparent package is visually plain, the salience effect will be weakened. That is, the visually plain, monochromatic food renders the small temptation "quiet" and easy to ignore, so that transparent packaging will not increase food consumption. Thus, we propose:

H₁: Consumption of small, visually attractive food will be higher from a transparent package than from an opaque package (H_{1a}), whereas consumption of small, visually plain food will not be different between a transparent package and an opaque package (H_{1b}).

We next consider large food (e.g., cookies) where we expect consumption monitoring to be dominant. We seek to pit the transparent package's salience effect, which promotes food consumption, against its monitoring effect, which inhibits food consumption. To this end, we need to only consider a visually attractive, large food because if the food is visually plain, we anticipate that seeing the food in a transparent package will not promote food consumption (following from H_{1b} above), which will not allow us to pit the transparent package's salience effect against its monitoring effect.

When the food is large, it is likely to be considered a “big” temptation. As a result, it will readily appear on the self-control radar and activate the consumer’s coping strategies to deal with possible over-consumption (Coelho Do Vale et al. 2008; Fishbach and Shah 2006). Thus, for large food, we propose that the monitoring effect will dominate the salience effect in influencing consumption. This is consistent with the counteractive control theory (Trope and Fishbach 2000) that temptations elicit self-control efforts to counteract anticipated costs. The stronger the temptation and the higher anticipated cost, the higher the self-control effort. Further, strong temptations can automatically activate higher-order goals, which inhibit succumbing to temptations (Fishbach, Friedman, and Kruglanski 2003).

So, we propose that after starting to eat the large, visually attractive food from a transparent package, the monitoring effect activated by the food’s large size and enabled by the package’s transparency will dominate the salience effect. When consumers monitor the amount of food that they have eaten, *ceteris paribus*, this should decrease food consumption. Thus, we hypothesize:

H₂: Consumption of large, visually attractive food will be lower from a transparent package than from an opaque package.

Vegetables

So far, we have considered small food where the transparent package’s monitoring effect is mitigated and, if the food is visually attractive, its salience effect increases consumption, and large, visually attractive food where the transparent package’s monitoring effect dominates its salience effect and decreases consumption. Next, we consider a type of food where the transparent package’s monitoring effect is weak, if any, regardless of food size and its salience

effect ironically decreases consumption, regardless of food appearance. Specifically, we consider vegetables.

People appear to categorize foods as healthy (“virtuous”) and unhealthy (“vice”) according to a good-bad dichotomy (Chernev and Gal 2010; Dhar and Wertenboch 2000). Vegetables are considered virtuous because they are natural, rich in ingredients such as fiber, vitamins, minerals, etc. that are beneficial to health, and lack high levels of salt, sugar and butter, the staple of processed, artificial foods, which make them calorie-dense, palatable, and indulgent. While health-oriented individuals include a larger proportion of fruits and vegetables in their diet, their concerns about the low taste quality of such diets are obstacles to further increasing the consumption of fruits and vegetables (Glanz et al. 1998; Raghunathan, Naylor, and Hoyer 2006). Thus, people appear to consume vegetables for health benefits rather than for taste.

It is, therefore, logical to expect that when eating vegetables, people may let their guard down and not exert self-control because they consider vegetables to be part of a healthy diet. Therefore, we argue that the monitoring effect of the transparent package will be weak, if at all here, regardless of food size, so that the net effect of transparent packaging on vegetable consumption will be driven primarily by the salience effect.

Further, foods that do not appeal to the taste buds also do not appeal to the eyes (Sørensen et al. 2003). Thus, we propose that because healthy foods such as vegetables are not considered to be tasty, seeing the vegetable may be a visual turnoff, regardless of its visual quality. Thus, with vegetables, the salience effect of transparent packaging should be negative decreasing consumption. In sum, we predict that eating vegetables (large or small, colorful or monochromatic) from a transparent package should decrease food consumption (relative to an opaque package) because of a “seeing leads to less eating” effect. Thus, we hypothesize:

H₃: Consumption of vegetables from a transparent package will be lower than from an opaque package.

We report results from five studies (see Table 2 for an overview). We tested H_{1a} and H_{1b} in Study 1 with Froot Loops as the small, visually attractive food and Cheerios as the small, visually plain food. We tested H_{1a} and H₂ in Study 2 with M&M candies as the small, visually attractive food and M&M cookies as the large, visually attractive food. Then we ran two studies to establish the generalizability of the findings from Study 1 and Study 2 in which we used fully transparent packages and student participants. Specifically, in Study 3, we tested H_{1a} using M&M candies and partially transparent packages which are also prevalent in the marketplace (see Table 1). In Study 4, we tested H_{1a} using M&M candies and fully transparent packages with non-student participants. Finally, we tested H₃ in Study 5 (student participants) with baby carrots as the vegetable, using both fully and partially transparent packages.

We also tested the mediation mechanisms prescribed in our theory in Study 2. Because we used M&M candies as the small, visually attractive food and M&M cookies as the large, visually attractive food in Study 2, we are able to examine (1) whether the effect proposed in H_{1a} (that the consumption of visually attractive, small food will be higher from a transparent package than from an opaque package) is mediated by food salience in the transparent package and (2) whether the effect proposed in H₂ (that the consumption of visually attractive, large food will be lower from a transparent package than from an opaque package) is mediated by consumption monitoring enabled by the transparent package.³

³ We tested and found support for the mediating role of food salience in the other studies. However, in the interest of brevity, we report the mediation analysis only in Study 2 where we can test the mediating role of both food salience (M&M candies) and consumption monitoring (M&M cookies).

Study 1: Visually Attractive and Visually Plain, Small Food

Method

We designed Study 1 to test H_1 using two small foods, Froot Loops and Cheerios. Froot Loops are colorful which makes them visually attractive, whereas Cheerios are monotonous which makes them visually plain. Except for color, these two foods are identical on other visual aspects (e.g., size, shape, texture; see Table 2); moreover, both are breakfast cereals and have the same caloric density (110 calories in one serving size). To confirm that these two foods differ in their visual attractiveness, we ran a manipulation check where 50 participants (different from those who participated in the main studies) rated the two foods on three 7-point Likert scales (-3 = strongly disagree; 3 = strongly agree): (1) “This food is visually appealing,” (2) “This food is visually plain (reversed coded),” and (3) “This food is colorful,” which were combined to form a single index of visual attractiveness (Cronbach’s $\alpha = .86$). As expected, Froot Loops were rated significantly higher than Cheerios on this index ($M = 1.76$ vs. $M = -1.87$; $t(49) = 19.0$, $p < .0001$).

123 (42 females) undergraduate students participated in an experimental session containing several studies, including Study 1, in exchange for course credit. The experiment had a 2 (food: visually attractive vs. visually plain) \times 2 (package: transparent vs. opaque) between-subjects design. Participants were randomly assigned to one of the four conditions.

The experiment was computer-mediated. Participants started with a seemingly unrelated Ads Evaluation Study. They were told that the purpose of the study was to obtain their opinions of commercials. They read the following statements “During the next 20 minutes you will

perform an ‘ad evaluation’ task. Since most commercials are usually watched at home, we want to create a natural environment while you watch the commercials. Therefore, we have included a ‘*The Office*’ episode to mimic regular TV viewing. Moreover, since previous studies have shown that 70% of snacks are consumed while watching TV, you’ll find next to the computer, some snacks that you can eat while doing this study.”

Located next to each computer was a transparent or opaque package of Froot Loops or Cheerios depending on the experimental condition. The transparent and opaque packages were identical in shape, size and volume and each had a zip lock seal. The transparent packages were made from clear transparent plastic, while the opaque packages were made from brown kraft paper (see Table 2). We filled the packages to their near-full capacity with 36 grams of Froot Loops or Cheerios. We used a digital food scale to make sure that each bag weighed exactly the same (i.e., 45 grams as the bag weighed 9 grams).

Participants were told to eat as much as they wanted. They then wore a headphone and saw a sequence of three commercials, followed by a six-minute extract of a *The Office* episode, followed by a second sequence of three commercials, followed by another six-minute extract of a *The Office* episode, followed by a third sequence of three commercials. The study was programmed so that they could not skip any of the commercials. The total TV viewing time was 20 minutes across all participants. To increase the believability of the cover story, after viewing all the commercials, participants indicated the commercials that they had enjoyed most, disliked most, and remembered best.

After evaluating the commercials, participants were told to stop eating, zip the package, and raise their hand. A lab assistant collected the package and put it into an envelope, and instructed them to write down the last four digits of their cell phone number on the envelope. We

used this partial cell phone number to match a participant's consumption data with her responses in the computer survey, where we also collected this information.

Then, participants were told that the next part of the study examined the effects of TV viewing on food consumption and that they would answer some questions about the food that they had just eaten. The first set of questions measured the two proposed mediators, food salience and consumption monitoring. Food salience was measured using six 7-point Likert scales (-3 = strongly disagree; 3 = strongly agree): (1) "They were visible," (2) "They were attractive," (3) "They were easy to eat," (4) "They kept attracting my attention," (5) "I thought of eating them all the time" and (6) "It was difficult to resist eating them" (adapted from Wansink, Painter, and Lee 2006). Consumption monitoring was measured using six 7-point Likert scales: (1) "I could easily see how many pieces of snack were left in the pack," (2) "It was easy for me to count the number of pieces of snack in the pack," (3) "I kept track of how many pieces of snack were left over in the pack," (4) "I ate very few pieces of the snack," (5) "I lost track of how many pieces of snack I ate" (reversed coded) and (6) "I kept eating, one piece after another, because eating one more piece was nothing" (reversed coded).

Two open-ended questions asked participants to list their thoughts about the food and their consumption experience, and to provide their consumption norms for the food that they had eaten (i.e., how much they thought they would eat in a single serving). Participants then provided responses to some close-ended questions (-3: not at all; 3: very much) including their liking for the food ("How much do you like [name of the food] in general?"), preexisting health goal ("Are you concerned with being slim?" and "How important is it for you to watch your weight?"), hunger level ("How hungry were you before you came to [name of the lab] today?"), restrained

eating pattern (Herman and Polivy 1980), gender, age, height and weight.⁴ After the experiment, the lab assistant weighed each package to compute the quantity of food (in grams) that each participant consumed during the ad evaluation task.

Results

We expect that for small foods, if the food is visually attractive (i.e. Froot Loops), people will consume more from the transparent package than from the opaque package (H_{1a}), whereas if the food is visually plain (i.e. Cheerios), this will not be the case (H_{1b}).

In the Froot loops condition ($n = 63$), participants, on average, ate 13.89 grams ($SD = 13.11$). In the Cheerios condition ($n = 60$), the mean consumption was 7.55 grams ($SD = 10.31$). A 2 (food) \times 2 (package) Analysis of Covariance (ANCOVA) with liking for the food as a covariate ($p = .002$) conducted on the quantity of food consumed (in grams) revealed a significant main effect of food (overall, participants ate significantly more Froot Loops than Cheerios; $F(1, 118) = 6.7, p = .01$), and a significant two-way interaction effect of food \times package ($F(1, 118) = 3.9, p = .05$). The planned comparisons showed that when eating the visually attractive Froot Loops, participants ate significantly (69%) more from the transparent package than from the opaque package ($M_{\text{transparent}} = 16.80$ vs. $M_{\text{opaque}} = 9.92$; $t(118) = 2.4, p = .02$), supporting H_{1a} . For the visually plain Cheerios, there was no difference in food consumption between transparent and opaque packages ($M_{\text{transparent}} = 7.46$ vs. $M_{\text{opaque}} = 8.60$; $t(118) = -.4, p = .70$), supporting H_{1b} .

⁴ We measured these variables as potential covariates. However, only liking for the food emerged as a significant covariate which we included in the ANOVA models. The other variables (i.e., preexisting health goal, self-reported hunger, restrained eating, gender, age, and Body Mass Index (BMI)) had no impact on food consumption in the studies. Moreover, time of the day (i.e., when participants conducted the study) had no effect on food consumption. We also examined and found in this and the other experiments that the different covariates did not interact with the independent variables of interest (i.e. transparent versus opaque packages, attractive versus plain foods, and small versus large foods) in affecting food consumption.

Discussion

To summarize, Study 1 showed that for small foods, the effect of packaging transparency on consumption was moderated by food appearance. People consumed 69% more of the visually attractive Froot Loops from the transparent package than from the opaque package (H_{1a}). However, the consumption of the visually plain Cheerios was the same across transparent and opaque packages (H_{1b}).

In this study, we also found a main effect of food on consumption. Participants consumed about 6 grams more when they ate Froot Loops than when they ate Cheerios. This indicates that they might find Froot Loops tastier than Cheerios. However the difference in taste between Froot Loops and Cheerios cannot explain the empirical support we found for the interaction effect. For example, whether packed in transparent or opaque package, Froot Loops ought to be equally tasty, yet participants ate more from the transparent package than from the opaque package, an effect can only be explained by the fact that the transparent package showcased the visual appeal of Froot Loops (i.e., it was more salient) whereas the opaque package blocked the visual appeal of the food. Overall, Study 1 indicates that first, for small foods, visual attractiveness increases consumption; second, for visually attractive small foods, transparent packaging increases consumption.

Study 2: Visually Attractive, Small and Large Food

Method

In Study 2, we consider large foods, which should readily appear on the self-control radar triggering consumption monitoring. Note that we consider only large, visually attractive foods because the intention here is to pit the transparent package's monitoring effect on decreasing food consumption against its salience effect on increasing food consumption. As we theorize and find support in Study 1, the salience effect is high only when the food is visually attractive.

We designed Study 2 to test H_2 using M&M cookies (the large, visually attractive food), and to replicate the support we find for H_{1a} in Study 1 using M&M candies (the small, visually attractive food). We used these two foods as stimuli in Study 2 because M&M cookies are larger than M&M candies but equally colorful (see Table 2). Both foods have almost identical caloric density (one M&M cookie weighs 15.5 grams and provides 80 calories (i.e., 1 gram = 5.16 calories), 1 gram of M&M candies provides 5 calories). Results of a manipulation check showed that, although M&M candies were rated visually more attractive than M&M cookies ($M = 2.37$ vs. $M = 1.19$; $t(49) = 6.2$, $p < .0001$), the rating was significantly greater than zero, the midpoint of the -3 to 3 scale, even for the less attractive M&M cookies ($t(49) = 8.8$, $p < .0001$), indicating that both foods were considered visually attractive. Both foods were rated higher in visual attractiveness than Cheerios, the visually plain food used in Study 1 ($t(49) = 22.2$, $p < .0001$ for M&M candies and $t(49) = 16.0$, $p < .0001$ for M&M cookies).

To confirm that M&M candies are consumed as small-sized food (i.e., a small temptation at each moment) relative to M&M cookies, we videotaped some participants ($n = 80$). A research assistant coded the video based on whether the participants picked up M&M candies one or two pieces at a time (small size) or by the handfuls (large size, because a handful of M&M candies will be equivalent to a M&M cookie). A chi-square test indicated that most participants (66 out of 80) ate M&M candies one or two pieces at a time and only a few (14) ate them by the handful

$(\chi^2 (1, n = 80) = 33.8, p < .001)$.

Study 2 (N = 183, 90 females) had a 2 (food: small vs. large) \times 2 (package: transparent vs. opaque) between-subjects design. We filled the packages with 191 grams of M&M candies (i.e., the total package weight was 200 grams as the package itself weighs 9 grams) or six M&M cookies. All other aspects of this study were identical to Study 1.

Results

We expect that for M&M candies (small, visually attractive food), people will eat more from a transparent package than from an opaque package (H_{1a}), replicating the pattern for Froot Loops (small, visually attractive food) in Study 1. For M&M cookies (large, visually attractive food), however, people will eat less from a transparent package than from an opaque package (H_2). We also predict that the effect in H_{1a} will be mediated by the salience of M&M candies in the transparent package, and that the effect in H_2 will be mediated by participants' monitoring the consumption of M&M cookies in the transparent package.

In the M&M candies condition (n = 91), participants ate an average of 22.42 grams (SD = 27.56). In the M&M cookies condition (n = 92), the mean consumption quantity was 37.74 grams (SD = 26.83). A 2 (food) \times 2 (package) ANCOVA with liking for the food as a covariate ($p = .007$) conducted on the quantity of food consumed (in grams) revealed a significant main effect of food (overall, participants ate more M&M cookies than M&M candies; $F(1, 178) = 18.6, p < .0001$) and a significant two-way interaction effect of food \times package ($F(1, 178) = 8.3, p = .005$). The planned comparisons showed that, when eating the small, visually attractive M&M candies, participants ate (58%) more from the transparent package than from the opaque package ($M_{\text{transparent}} = 26.47$ vs. $M_{\text{opaque}} = 16.75$; $t(178) = 1.8, p = .08$), supporting H_{1a} . For the large, visually attractive M&M cookies, participants ate (28%) less from the transparent package

than from the opaque package ($M_{\text{transparent}} = 32.29$ vs. $M_{\text{opaque}} = 45.10$; $t(178) = -2.3$, $p = .02$), supporting H_2 .

We next estimated the ANCOVA on the two process variables, food salience and consumption monitoring. We created separate indices for food salience (Cronbach's $\alpha = .80$) and consumption monitoring (Cronbach's $\alpha = .66$) by averaging the associated items. The intraindex correlation indicated two distinct constructs ($r = -.25$). A factor analysis with a varimax rotation validated the presence of only these two factors (using eigenvalue > 1 criterion) and found that every individual item loaded most highly onto the intended factor. Thus, the two indices seem to capture the intended constructs effectively.

For consumption monitoring, we found main effects of both food and package. Participants who ate M&M cookies monitored their consumption more than those who ate M&M candies ($M = .48$ vs. $M = -.76$; $F(1, 178) = 66.9$, $p < .0001$); and those who ate from the transparent package monitored their consumption more than those ate from the opaque package ($M = .28$ vs. $M = -.56$; $F(1, 178) = 31.7$, $p < .0001$). However, the mean monitoring score was significantly greater than zero (the midpoint of the -3 to 3 scale) only in the M&M cookies/transparent condition ($M = .89$, $t(45) = 5.7$, $p < .0001$). In the three other conditions, it was either not different from zero or significantly below zero ($M = .08$, $t(45) = .6$, $p = .54$ for M&M cookies/opaque; $M = -.33$, $t(43) = -2.0$, $p = .05$ for M&M candies/transparent; and $M = -1.20$, $t(46) = -8.9$, $p < .0001$ for M&M candies/opaque). Thus, participants monitored their consumption when they ate the large food, but only when eating it from the transparent package.

For food salience, there was only a main effect of package: the food in the transparent package was rated as being more salient than the food in the opaque package ($M = .67$ vs. $M = -.66$; $F(1, 178) = 59.9$, $p < .0001$). The mean salience score was significantly greater than zero

($t(89) = 5.3, p < .0001$) in the transparent condition for both M&M candies ($M = .63$) and M&M cookies ($M = .71$), but significantly below zero ($t(92) = -5.2, p < .0001$) in the opaque condition for both M&M candies ($M = -.66$) and M&M cookies ($M = -.65$). Thus, food salience was high for both visually attractive foods (whether large or small), but only in the transparent condition.

Based on these results, we conclude that for small, visually attractive M&M candies, consumption monitoring is low, and food salience is high only in the transparent package condition, so that the latter should mediate the food consumption. For large, visually attractive M&M cookies, both consumption monitoring and food salience are high, but only in the transparent package condition. Our theorization suggests that when both mechanisms are operational, consumption monitoring will dominate food salience in influencing consumption (Fishbach, Friedman, and Kruglanski 2003). We thus examine the mediation by food salience for M&M candies and by consumption monitoring for M&M cookies.

We ran the mediation analyses using the approach proposed by Preacher and Hayes (2004) and Zhao, Lynch, and Chen (2010). Using the SAS macro provided by Preacher and Hayes (2004), our bootstrap results supported the proposed mediation mechanisms. For M&M candies, the indirect effect of package (transparent vs. opaque) on consumption quantity through the hypothesized mediator, food salience, was significant ($b = .17, SE = .06$; 95% confidence interval [CI] = .07 to .31). For M&M cookies, the indirect effect of package (transparent vs. opaque) on consumption quantity through the hypothesized mediator, consumption monitoring, was also significant ($b = -.07, SE = .04$; 95% confidence interval [CI] = -.16 to -.01).

Discussion

Study 1 showed that for small foods, the effect of packaging transparency on consumption was moderated by food appearance. In Study 2, we showed that when food

appearance was held constant (visually attractive), the effect of packaging transparency on consumption was moderated by food size. For the small, visually attractive food (M&M candies), people ate 58% more from the transparent packages than from the opaque package (H_{1a}), replicating the finding in Study 1 for Froot Loops. For the large, visually attractive food (M&M cookies), however, they ate 28% less from the transparent packages than from the opaque package (H_2).

In this study, we established food salience as the factor that mediates the effect of packaging transparency on the consumption of small, visually attractive foods. Because M&M candies were more salient in the transparent package than in the opaque package, people consumed 10 grams more from the transparent package. We also established consumption monitoring as the factor that mediates the effect of packaging transparency on the consumption of large, visually attractive foods. Because people could monitor their consumption of M&M cookies more when eating from the transparent package than from the opaque package, they ate 13 grams less from the transparent package.

The finding that people eat fewer cookies from the transparent package support our thesis that, for large food, the transparent package's monitoring effect dominates the salience effect so that the net effect of packaging transparency on the consumption of large food is negative. Note that if the salience effect had instead dominated the monitoring effect, this net effect should have been positive (as the food is visually attractive).

Study 3 and Study 4: Generalizability of Findings

In Studies 1-2, we used fully transparent packages. To investigate the robustness of the packaging transparency effect, we conducted Study 3 (N = 51, 32 females) using partially transparent packages (see Table 2). We used only M&M candies in Study 3 because the transparent window on the package was large enough for the M&M candies to be salient⁵. For the larger-sized M&M cookies, the display window would have been too small to allow participants to effectively monitor their consumption of the cookies. We filled the packages with 191 grams of M&M candies, as in Study 2. This study was similar to the previous studies in all other respects.

We expect that people will eat more M&M candies from the package with a transparent window than from the opaque package (H_{1a}) replicating the findings in the previous studies with small, visually attractive foods in Study 1 and Study 2. A one-way (package: partially transparent vs. opaque) ANOVA⁶ conducted on the quantity of food consumed (in grams) revealed that the main effect of package was significant ($F(1, 49) = 4.9, p = .03$): participants ate (76%) more from the partially transparent package ($M = 39.36$) than from the opaque package ($M = 22.41$), supporting H_{1a} .

In Study 4, we use non-student participants to examine the generalizability of our findings beyond the student population used in Studies 1-3. 41 staff members (age 24-66, median age = 41, 33 females) at a Midwestern University took part in the study. They were recruited by an e-mail request for participation in a research study related to ad commercials. In exchange for participation, they received a \$20 gift card to a local restaurant and had a chance to win a \$75

⁵ To confirm that the food was indeed perceived as visually salient, we estimated a one-way (package: partially transparent vs. opaque) ANOVA on the food salience index (Cronbach's $\alpha = .79$). The main effect of package was significant such that the food in the partially transparent package was rated as more salient than the food in the opaque package ($M = 1.27$ vs. $M = .06$; $F(1, 49) = 12.3, p = .001$). The mean salience score was significantly greater than zero ($t(21) = 5.9, p < .0001$) in the partially transparent condition, but not significantly different from zero ($t(28) = .3, p = .80$) in the opaque condition. These results were consistent with Study 2.

⁶ Liking for the food was not a significant covariate and thus not included in the analysis.

Amazon gift certificate. In this study, we used only M&M candies as testing the same food in different situations allows us to establish the robustness of the findings across multiple settings. We again filled the packages with 191 grams of M&M candies. This study was similar to the previous studies in all other respects.

The one-way (package: transparent vs. opaque) ANOVA⁷ conducted on the quantity of food consumed (in grams) revealed that the main effect of package was significant ($F(1, 39) = 4.5, p = .04$): participants ate (88%) more from the transparent package ($M = 34.15$) than from the opaque package ($M = 18.00$), supporting H_{1a} . Thus, we replicated the findings in Studies 1-3 for small food with a sample from a non-student population.

Study 5: Vegetables

Method

In Study 5, we investigate the effect of package condition (i.e. transparent or opaque) on the consumption of vegetables. From a theoretical perspective, we propose that because vegetables are not considered to be tasty, seeing the vegetable may be a visual turnoff, regardless of its visual quality. Thus, with vegetables, the salience effect of transparent packaging should be negative decreasing consumption. In other words, in this study, we focus on the transparent package's salience effect (because monitoring effect is weak, if any, for vegetables) and argue that it does not always increase food consumption (as reported in Studies 1-4) but can actually decrease food consumption.

⁷ Liking for the food was not a significant covariate and thus not included in the analysis.

Study 5 (N = 65, 27 females) had a one-factor (package: fully transparent vs. partially transparent vs. opaque) between-subjects design, and participants were randomly assigned to one of the three conditions. The procedure in this study was similar to that used in the previous studies. We use baby carrots as the stimuli and we placed 12 baby carrots (about 113 grams) in each package.

Results

We predict that people will eat fewer baby carrots from a transparent package than from an opaque package (H₃). Participants, on average, ate 22.69 grams of baby carrots (SD = 40.15) from the fully transparent package (n = 23), 24.48 grams (SD = 36.27) from the partially transparent package (n = 21), and 41.92 grams (SD = 44.16) from the opaque package (n = 21). Because the quantities consumed were similar in the fully and partially transparent package conditions, we combined them into a single “transparent package” condition. A one-way ANCOVA with liking for the food as a covariate ($p < .0001$) conducted on the quantity of food consumed (in grams) revealed a significant main effect of package such that participants ate (78%) more baby carrots from opaque packages than from transparent packages ($F(1, 62) = 4.2$, $p = .03$).⁸ Thus, the results support H₃.

Discussion

In the previous studies we showed that for regular (processed, artificial) foods, when consumption monitoring is low (because when the food is small it is less likely to appear on the

⁸ When we did not combine the fully and partially transparent package conditions and estimated a more detailed one-way (fully transparent vs. partially transparent vs. opaque package) ANCOVA, the main effect of package was below the level of statistical significance ($p = .14$). However, the fully transparent vs. opaque and partially transparent vs. opaque contrasts were still significant (p 's $< .05$). We conjecture that the weak main effect was because of the similar quantity of consumption across the two transparent package conditions; hence we decided to combine these two conditions for analysis.

self-control radar, e.g., Froot Loops), package transparency increases food consumption. In Study 5, however, we found that for healthy vegetables such as carrots, when consumption monitoring is low (because there is no need to restrict the intake of healthy vegetables), packaging transparency ironically decreases consumption. Specifically, seeing the baby carrots in the transparent package led participants to eat 18 grams less than in the opaque package (H₃). Thus, for healthy vegetables, such as carrots, seeing leads to less eating.

General Discussion

In this paper we study the effect of transparent versus opaque packaging on food consumption. This is a managerially important topic given marketers' deep and long-standing interest in stimulating post-purchase consumption, which directly increases sales of their products. This topic however is understudied by researchers who are interested in the effects of packaging on food consumption.

Across the five studies, we provide convergent evidence that transparent packaging increases the consumption of small foods (if they are visually attractive, e.g., M&M candies) and decreases the consumption of large (e.g., cookies) and healthy foods (e.g., baby carrots). The findings across the studies are robust with respect to the type of transparent package (fully or partially transparent), the type of consumers (undergraduate students or middle aged adults) and their chronic characteristics including preexisting health goal (e.g., weight watching), restrained eating tendency, gender, age, and BMI, as well as their temporary state (e.g., hunger level).

Implications for Marketers

The findings from our studies generate actionable implications for marketers who can strategically manage a packaging cue, i.e. transparent versus opaque packaging, to increase consumption and sales of their products. First, for small foods, based on findings from Studies 1-4, if the food is visually attractive (e.g., Froot Loops, M&M candies), to increase post-purchase consumption, marketers should use transparent packages or encourage consumers to use transparent bags (e.g., zip lock bags) to repackage food sold in bulk packages. Our findings showed that transparent packaging increased the consumption of Froot Loops by 69% in Study 1 and M&M candies by 58%, 76%, and 88% in Studies 2, 3, and 4, respectively, during the 20 minutes TV and snack time incorporated in our studies. We conjecture that food consumption from transparent packages may be even higher in the real world where consumers usually spend many hours watching TV (or browsing the web) and eating snacks. These increases in at-home food consumption directly translate to increased sales.

Second, for small foods that are not visually appealing (e.g., Cheerios), marketers can use either transparent or opaque packages since, based on findings from Study 1, packaging transparency does not make a difference in people's consumption. However, marketers can use product development effort to increase the visual appeal of such small foods and then use transparent packages to increase post-purchase consumption. Indeed, given the importance of visual appeal of foods in stimulating consumption, investing on re-vitalizing the existing products to make them more visually attractive should result in increased sales.

Third, Study 2 showed that for large, visually attractive foods (e.g., M&M cookies), people ate (28%) less from the transparent package than from the opaque package. This is because transparent packaging's monitoring effect (which decreases consumption) dominates its salience effect (which increases consumption). These findings suggest that marketers can use

opaque packages to increase food consumption via decreased consumption monitoring or, alternatively, use opaque packages with a small transparent window to leverage the effects of both decreased consumption monitoring and increased food salience. In the latter case though, the size of the window needs to be carefully designed—it should be large enough so that consumers can see the food (and get tempted) but not too large so that they can use it to monitor their consumption quantity.

Fourth, for large foods that are visually plain, marketers should also use opaque packages to decrease consumption monitoring and thus increase consumption. Here, unlike visually plain, small foods, spending resources on improving the visual appeal of large foods may not translate into increased sales. Because consumers monitor their consumption of large foods closely, opaque packages should always be the strategic packaging choice. The use of opaque packages renders visual appeal unimportant for large foods.

Finally, Study 5 showed that the consumption of baby carrots was (78%) higher from the opaque package than from the transparent package, which suggests that marketers of baby carrots should use opaque packages to increase post-purchase consumption. In 2010, carrot farmers debuted a controversial, \$25 million marketing campaign that rebrands (and packages) baby carrots as junk food. The packaging strategy we offer is certainly less costly and more truthful than the junk-food branding which has been dismissed by some observers as “an insult to the intelligence of children” and “completely disconnected from reality” (Walker 2010).

The traditional packaging used by carrot farmers is not conducive to increasing post-purchase consumption because of the lack of convenience factor. As a marketing expert observed “You know, unzip the 2-pound bag of baby carrots...grab a few baby carrots ... rezip it...” (McGray 2011). Our suggestion is that, while marketers can still use the traditional, transparent

bulk packs to showcase the vegetables' freshness at the point of purchase which is important for consumers (Schürmann 2008), they can consider offering small opaque packs (tagged onto the bulk pack) so that consumers can repack the food for more convenient consumption. As consumers eat baby carrots directly from opaque packs across multiple occasions, they are likely to eat more, which would be a win-win situation as consumers will incorporate more vegetables into their diet and farmers will enjoy higher sales.

Implications for Consumers

Our findings also offer suggestions to consumers in terms of effectively regulating their consumption of processed, tempting foods while increasing their consumption of natural, healthy foods. Specifically, for small foods, to regulate consumption consumers should eat them from opaque packages (which mitigate food salience) rather than from transparent packages. However for large foods, to regulate consumption, consumers should eat them from transparent packages (which facilitate consumption monitoring) rather than from opaque packages. For vegetables such as carrots, consumers should eat them from opaque packages rather than from transparent packages, as this is likely to increase consumption by a very substantive 78%.

To summarize, our findings suggest the following rule of thumb for health conscious consumers: Use opaque packages for small foods and transparent packages for large foods to decrease consumption, and opaque packages for vegetables to increase consumption.

Theoretical Contributions

The paper's findings contribute to the marketing literature. First, the observed effects of packaging transparency on food consumption extend, in a novel way, the literature on the effect of external cues, in general, and packaging cues, in particular, on food consumption (e.g.,

Wansink 2004). The five studies demonstrate robust, contingent positive (for small, visually attractive foods), null (for small, visually plain foods) and negative (for large foods and vegetables) effects of transparent packaging (whether fully transparent or partially transparent) on food consumption.

Second, this paper's findings offer explanations for important, but unexplained food consumption effects documented in prior studies. Previous research has shown that food visibility increases consumption (e.g., Wansink, Painter, and Lee 2006). Our theory helps explain this phenomenon. Hershey's Kisses candies in a clear jar were consumed more quickly than those in an opaque jar (Wansink, Painter, and Lee 2006) because they are small and visually attractive and, according to our theory, consumption monitoring is low and food salience dominates to increase food consumption.

Third, the findings from Studies 1-4 indicate that when the food is small, consumers' consumption monitoring is low and, as a result, small temptations can easily "fly under the radar." Taken together with past work that small package formats can ironically increase consumption despite the fact that consumers use them for external assistance in regulating food consumption (Argo and White 2011; Coelho do Vale et al. 2008; Scott et al. 2008), our findings suggest that the "small size" of visually attractive foods (but not visually plain foods) in transparent packages, like small packages, hinders consumers' self-regulation in food consumption.

Fourth, while our finding that transparent packaging increases food consumption converges with the previous work (Johnson 1974; Wansink, Painter, and Lee 2006), we provide evidence that transparent packaging can also decrease consumption (for large foods and vegetables), which has not been documented in past research. In Study 2, we find that when

consumption monitoring is high (because the food is large and deemed as a self-control threat), transparent packaging decreases consumption as it facilitates consumption monitoring. Thus, we add a novel, counterintuitive finding to the literature that transparent packaging is a double-edged sword which hinders consumers' regulation when eating small foods and facilitates it for large foods.

Finally, in Study 5, we offer yet another novel finding, that seeing the food does not always increase consumption. Past research has shown that simply seeing or smelling a food can increase reported hunger (Bossert-Zaudig et al. 1991), salivation (Hill et al. 1984) and secretion of insulin (Johnson and Wildman 1983), all of which correlate positively with food consumption. To the best of our knowledge, the possibility that food visibility can decrease food consumption has not been explored in the extant literature. We propose and find that seeing (healthy) vegetables (e.g., carrots) in a transparent package is a visual turnoff, which decreases consumption.

Limitations and Opportunities for Further Research

In this paper we focus on the effect of transparent versus opaque packaging on food consumption. Future research should look into how this packaging factor can affect consumers' choices. That both fully and partially transparent packages are prevalent in the marketplace (as found in our field study) indicates that marketers probably anticipate that transparent packaging affects consumers' in-store decision making. In a study of product contagion, Morales and Fitzsimons (2007) find that transparent (vs. opaque) packaging increases "contagion" from a disgusting source product lowering evaluations of the target product. This suggests that, even for nonfood categories, transparent packaging may affect consumers' product evaluations and

choices. Studies examining consumers' food or nonfood choice from transparent versus opaque packages would be useful extensions to this work.

In particular, in our field study, we noted the prevalence of (transparent and opaque) packages with visually attractive pictures of food (see Table 1). We do not consider these packages in our study as we focus on whether the actual food (rather than its visual representation) is visible (i.e. transparent packaging) or not (i.e. opaque packaging). Research comparing the effects of packaging on food consumption using real food versus pictures of food would be interesting.

Further, we examined regular foods that are large and small, visually attractive and visually plain, as well as vegetables. Future research can examine other characteristics of food (e.g., salty vs. sweet, fresh vs. processed), package (e.g., large vs. small), other eating situations (e.g., distracted vs. undistracted, with vs. without social presence) and other population groups (e.g., obese people, children, and people with dietary restrictions) as boundary conditions to extend this paper's findings. Also, we use baby carrots for the healthy foods, which are somewhat bland in taste. Future research which examines healthy foods with sweet taste (e.g., grapes, berries) would be useful to extend our findings on packaging effects on consumption of healthy foods.

Finally, in this paper we focus on the effect of transparent packaging on consumption of solid foods, a logical question that follows is whether and how transparent packaging may affect the consumption of liquids. Both transparent and opaque packages of liquids are prevalent in the marketplace (e.g., glass bottles, cans). So, extensions of our theory to consumption of liquids would be very useful to marketers.

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Table 1
Prevalence of Transparent Packaging in the Marketplace

Food Category	Transparent Packages (with Examples*)			Opaque Packages
	Fully Transparent	Partially Transparent (i.e., with Transparent Windows)	All	
Chips (n** = 186)	4 (2%) 	33 (18%) 	37 (20%)	149 (80%)
Cookies (n = 117)	22 (19%) 	1 (1%) 	23 (20%)	94 (80%)
Crackers (n = 126)	10 (8%) 	19 (15%) 	29 (23%)	97 (77%)
Nuts (n = 231)	120 (52%) 	57 (25%) 	177 (77%)	54 (23%)

*Due to space constraint, only one photo is presented for each food-package category. More photos are available from the authors upon request.

**Total stock-keeping units (SKUs) in the stores.

Table 2
Summary of Hypotheses and Study Stimuli

	Regular Food		Vegetable	
Food size	Small (Consumption monitoring is low)		Large (Consumption monitoring is high and decreases consumption)	Regardless of food size, consumption monitoring is weak
Food appearance	Visually attractive (Food salience is high and increases consumption)	Visually plain (Food salience is low)	Visually attractive (Food salience is high and increases consumption)	Regardless of food appearance, food salience decreases consumption
Study 1 (Froot Loops & Cheerios)				
	$H_{1a}: T^* > O^*$		$H_{1b}: T = O$	
Study 2 (M&M candies & cookies) Study 4 (M&M candies)				
	$H_{1a}: T > O$		$H_2: T < O$	
Study 3 (M&M candies) (partially transparent packages)				
	$H_{1a}: T > O$			
Study 5 (Baby carrots)				
			$H_3: T < O$	

* T and O denote the consumption quantity from Transparent and Opaque packages, respectively.