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Mindless Eating

The 200 Daily Food Decisions We Overlook

Brian Wansink
Jeffery Sobal
Cornell University

How aware are people of food-related decisions they make and how the environment influences these decisions? Study 1 shows that 139 people underestimated the number of food-related decisions they made—by an average of more than 221 decisions. Study 2 examined 192 people who overserved and overate 31% more food as a result of having been given an exaggerated environmental cue (such as a large bowl). Of those studied, 21% denied having eaten more, 75% attributed it to other reasons (such as hunger), and only 4% attributed it to the cue. These studies underscore two key points: First, we are aware of only a fraction of the food decisions we make. Second, we are either unaware of how our environment influences these decisions or we are unwilling to acknowledge it.

Keywords: *estimation; food-related decisions; meal cessation; mindless eating; obesity*

Many food-related decisions occur in distracting everyday environments that may lead to relatively "mindless eating" (Wansink, 2006). This might reveal why we often cannot really explain why we ate six chocolates from the office candy dish, ate two bites of chicken for every one bite of coleslaw at lunch, or why we consumed three helpings of potatoes for dinner.

Here we investigate one of the ironies of food consumption research. Whereas environmental factors—such as the distance of a candy dish or the size of a bowl—have a seemingly large influence on behavior, people seem to wrongly believe they are unaffected (Wansink, Kent, & Hoch, 1998). This suggests the environment influences us at a basic level at which we are not aware or do not monitor (Fisher, Rolls, & Birch, 2003; Rozin, Dow, Moscovitch, & Rajaram, 1998). Understanding these influences on consumption volume has immediate implications for research, environmental design and management, nutrition education, and consumer welfare (Wansink, 2004).

There are two objectives of this article: (a) to investigate how aware people are of the food-related decisions they make and (b) to document the extent they believe food-related decisions are influenced by their environment. Study 1 used the aggregated results of a survey to produce initial estimates of how many food-related decisions are made during a 24-hr period by normal weight, overweight, and obese people. Study 2 examined 192 people who were involved in four different studies in which they were presented with an exaggerated cue (such as a larger serving bowl or popcorn bucket) and from which they ate 31% more than a control group. Participant debriefings are analyzed as to whether they believed these exaggerated cues influenced them.

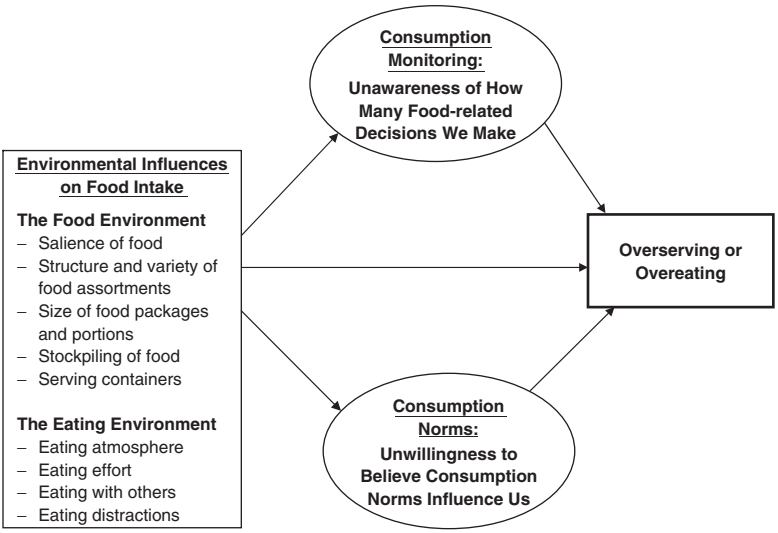
Environmental Influences of Overserving and Overeating

Within the large ecological context of the food environment, there are two common levels of analysis: macro-level and microlevel. At the macro-level, the focus is on government regulation, food industry incentives, school lunch programs, and advertising campaigns (Brownell & Horgren, 2003). At the microlevel the focus is on making a choice, such as between fresh fruit or a sweet snack.

Within this broad ecological context, there is an intermediate level that is often overlooked because it lies between the policy arena and personal choice. This intermediate level is the environment in which we live and work. It is a level that can influence food intake without involving the taste, texture, or quality of the food itself; that is, regardless of whether one is eating an apple or an apple pie, these environmental factors can often unknowingly drive intake. To avoid having to continually make caveats about different food categories, it is useful to differentiate those drivers that are independent of the food being examined from those that are more dependent.

We will use the term *eating environment* to refer to the ambient factors that are independent of food, such as atmosphere, the effort of obtaining food, the time of day, the social interactions that occur, and the distractions that may be taking place (e.g., Birch & Fisher, 2000; Birch, McPhee, Shoba, Steinberg, & Krehbeil, 1987; Clendennen, Herman, & Polivy, 1994; Pliner, 1973). In contrast to the eating environment, the *food environment* refers to those factors that directly relate to the way food is provided or presented, such as its salience, structure, package or portion size, whether it is stockpiled, and how it is served (e.g., Chandon & Wansink, 2002; Kahn & Wansink, 2004; Rolls, Engell, & Birch, 2000). The specific features of a food, such as its taste, texture, nutritional

Figure 1
Environmental Influences on Overserving and Overeating



Note: Adapted from Wansink (2004).

value, and so on, will not be directly examined here because they relate to the characteristics of a food category and not to the environment where the food is eaten (eating environment) or presented (food environment).

Although many of the influences of the eating environment and the food environment have been identified and listed by some scholars (Stroebele & de Castro, 2004), others have focused on identifying the domain of their influence, such as the kitchenscape, tablescape, platescape, and foodscape (Sobal & Wansink, 2007 [this issue]). Perhaps a richer way to view the influence of these environments is by referring to how they influence our consumption. Although the quantity of a food a person serves and eats is partly determined by personal norms (what he or she usually serve and eat), the norms can also be altered on any given occasion by the environmental cues around that person. These cues can suggest an altered consumption norm and can also interfere with our ability to monitor how much we have eaten. As Figure 1 indicates, two of the principal ways in which these environments influence how much we consume are through (a) the consumption norms they suggest and (b) the way they disrupt our intake or consumption monitoring ability.

How Does Consumption Monitoring Relate to Consumption?

Our ability to monitor our consumption can help reduce discrepancies between how much we eat and how much we believe we eat. Our environment can have an exaggerated influence on consumption because it can bias or confuse estimates of how much someone has eaten, or even the number of times someone thinks she or he is actively making decisions about starting or stopping an eating episode.

It is not surprising to note that a major determinant of how much one eats is often whether he or she deliberately monitors or even pays attention to how much he or she eats (Polivy & Herman, 2002; Polivy, Herman, Hackett, & Kuleshnyk, 1986). In lieu of monitoring how much they are eating, people can use cues or rules of thumb (such as eating until a bowl is empty) to gauge the amount of food consumed.

Unfortunately, using such cues and rules of thumb can yield inaccurate estimates. In one study, unknowing diners were served tomato soup in bowls that were refilled through concealed tubing that ran through the table and into the bottom of the bowls. People eating from these "bottomless" bowls consumed 73% more soup than those eating from normal bowls but estimated that they ate only 4.8 calories more (Wansink, Painter, & North, 2005).

Are We Aware of the Consumption Norms That Have Led Us to Overeat?

People can be very impressionable when it comes to how much they will eat (Herman & Polivy, 1984). Someone can often "make room for more" (Berry, Beatty, & Klesges, 1985; Lowe, 1993) and be influenced by consumption norms around them (see Figure 1).

For many individuals, determining how much to eat or drink is a mundane and relatively low-involvement behavior that is a nuisance to continually monitor, so they instead rely on consumption norms to help them determine how much they should consume (Wansink & Cheney, 2005). Many seemingly isolated influences of consumption—such as package size, variety, plate size, or the presence of others—may suggest how much is typical, appropriate, or reasonable to eat or drink. As with normative benchmarks in other situations, they may often be relatively automatic and occur outside of conscious awareness (Schwarz, 1996, 1998). Even when consumption norms do influence us, there is anecdotal evidence that people are generally either

unaware of their influence or they are unwilling to acknowledge it (Vartanian & Herman, 2005).

Past evidence of the presence or the absence of this awareness has sometimes been suggested in the context of lab experiments (Nisbett & Wilson, 1977). The problem with trying to generalize from such artificial contexts is that people are generally aware that some manipulation has occurred, and they may be reluctant to acknowledge any influence, primarily because of reactance. This phenomenon can best be observed in the context of controlled field studies conducted in natural environments (Meiselman, 1992).

In support of Figure 1, two studies investigated the two possible mediating mechanisms of consumption monitoring and consumption norms. Study 1 provides preliminary evidence about our unawareness of how many food-related decisions we make. Study 2 content analyzes debriefing data from four studies of environmental cues and shows we wrongly deny the impact these cues have on how much we eat.

Study 1

Are We Aware of How Many Food-Related Decisions We Make?

Method. The study involved a sample of 154 college students and adults who were diverse in terms of their age and economic strata. This sample had been involved in earlier studies and had agreed to be recontacted for further research. They were contacted through e-mail and asked a series of questions related to the number of food-related decisions they made during a typical day.

Based on an analysis of the 151 articles reviewed in Wansink (2004) and the 96 articles reviewed in Stroebele and de Castro (2004), five different types of food-related decisions were identified. These were classified as "when" decisions, "what" decisions, "how much" decisions, "where" decisions, and "who" decisions. These two review articles also provided the range of illustrations that were used when explaining the questions to the participants.

Questions regarding these five food-related decisions were presented to participants in a way that helped minimize the bias caused by "availability heuristics" that are often used to estimate the frequency of the occurrence of an event (Oppenheimer 2004). Providing cognitive cues such as *when*, *what*, *how much*, *where*, and with *whom* they eat, should help people be more accurate in their frequency judgments (Pandelaere & Hoorens, 2006).

Participants were initially asked to estimate how many total decisions they made about food and beverages in one day. They were then asked specific questions about the number of when, what, how much, where, and who decisions they made for a typical meal, snack, and beverage (15 total questions). Specific examples were given for each category of questions. For example, for the when questions, participants were given the following instructions: "There are many 'when' decisions you make with food. You decide when to eat, when to start cooking, when it is done cooking, when to start serving, when to stop eating and so on. Please try and estimate how many of these 'when' decisions you make in the following situations." The participants were then asked: "How many 'when' decisions do you make for a typical meal," "How many 'when' decisions do you make for a typical snack," and "How many decisions do you make for a typical beverage?" Consistent with Rappaport and colleagues (Rappaport, Peters, Downey, McCann, & Huff-Corzine, 1993), this same format for questioning was then repeated with questions related to what, how much, where, and who in these three situations.

Following these 15 questions (when, what, how much, where, and who decisions for meals, for snacks, and for beverages), participants were asked how many meals, snacks, and beverages they ate during the typical day. Using their answers, an aggregate index was created to estimate how many total decisions they made about food during a "typical day."

At the end of the study, questions related to their age, gender, height, and weight were asked, and their body mass index (BMI) was calculated. Following the guidelines of the Center for Disease Control and the World Health Organization (World Health Organization, 1998), participants were classified as normal weight if their BMI was below 25 kg/m^2, as overweight if their BMI was higher than 25 kg/m^2, and obese if it exceeded 30 kg/m^2.

Despite efforts to minimize any biases in estimation that occur (such as the availability bias), this calculated index of food-related decisions comes with the normal caveats associated with any such index (Bradburn, Sudman, & Wansink, 2004). To further assess the general validity of this index, a second method was also used to corroborate the responses of three volunteers. These three individuals were contacted 6 months after the first study and asked if they wanted to be involved in what they believed was an unrelated exercise. They were each given a handheld digital counter and were asked to "click" the counter every time they made a food-related decision during one 24-hr weekday. They were then given the same directions and illustrations they had been given 6 months earlier.

Results. Of the 150 participants recruited, 139 (93%) completed the study. These participants (75% female) ranged from age 19 to 71 years,

with the average age of 42.9 years. Participants' BMIs (calculated from self-reports of weight and height) ranged from 16.7 to 38.6 with the average BMI being 26.9.

The average participant initially estimated he or she made 14.4 food- and beverage-related decisions in the day (see Table 1). On aggregating the number of individual decisions they estimated having made, it was found the average participant made an estimated number of 226.7 decisions, which is significantly higher, $t(df) = 165$, $p < .001$, than the initial global estimate. Part of these inconsistencies are due to a tendency for people to consider only food choice decisions as actual food decisions. For example, a snack deliberation in front of a vending machine would not be counted as a food-related decision by many people unless it resulted in an actual purchase. Still, people made an average of 59 decisions related to what foods they would eat, which was much higher than the 14.4 they initially estimated.

Across the three standard levels of BMI (normal weight, overweight, obese) it was expected that there would be a linear relationship between BMI and the number of food-related decisions made. Indeed, obese participants made more than 100 more food-related decisions than those participants who were merely overweight (295.3 vs. 193.4; $t[df] < 2.7$, $p < .05$). It is interesting to note, however, the number of decisions made by obese participants was not statistically more than those made by those with normal weight (295.3 vs. 223.9; $t < 1.3$, *ns*). These results suggest that the influence that a person's BMI has on the number of food-related decisions they make may be U shaped (see Figure 2).

How does this aggregated index of food decisions compare with the days when each decision was individually counted by three of the participants? When these three participants individually counted each food-related decision they made in a 24-hr period, the number was within an average of 11% of the aggregated number that had been calculated 6 months earlier. The aggregated number of food-related decisions these three individuals initially estimated were calculated to be 198, 214, and 237 decisions. Six months later, when given the handheld counters, the respective number of clicked decisions was 217, 283, and 221, respectively. To minimize reactance, these three individuals were not required to separately account for the number of clicks associated with meals, snacks, or desserts.

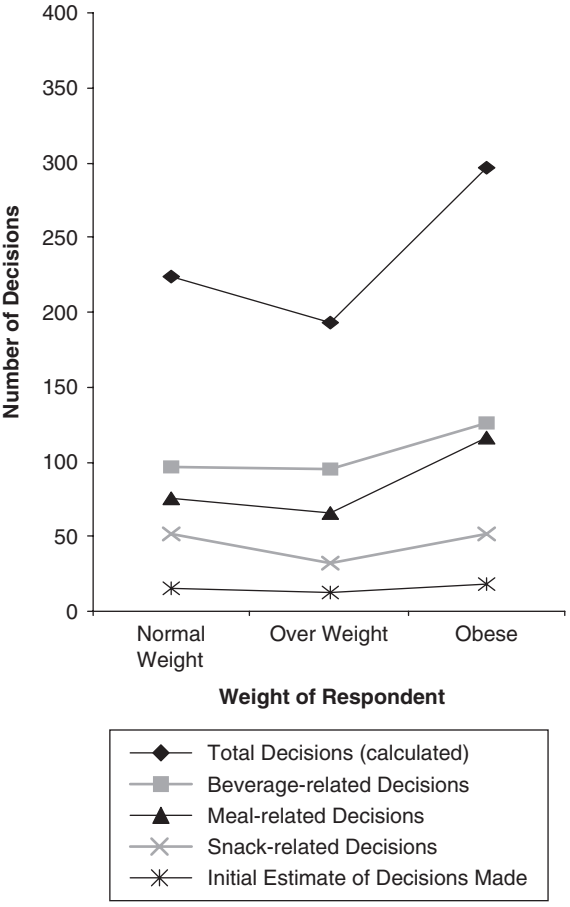
Discussion. Given that people so dramatically underestimate the number of food-related decisions they make in a day, it is not unfair to say we often engage in mindless eating. Each of these small decisions is a point where a person can be unknowingly influenced by environmental cues. In the interest

Table 1
People's Underestimation How Many Food-Related Decisions They Make

	Normal Weight (BMI < 25) (n = 71)	Overweight (BMI 25 - 30) (n = 38)	Obese (BMI > 30) (n = 30)	Average	F Value (p value)
"How many total food-and beverage-related decisions do you make in one day?"	14.8	12.2	17.9	14.4	.13 (.88)
Aggregate number of daily food-related decisions by occasion					
Meal-related decisions	76.1	66.3	116.0	79.4	2.82 (.06)
Snack-related decisions	51.8	31.8	52.9	46.4	.63 (.54)
Beverage-related decisions	95.9	95.3	126.4	101.0	1.12 (.33)
Total (calculated) number of food- and beverage-related decisions	223.9	193.4	295.3	226.7	.131 (.88)

Note: BMI = body mass index.

Figure 2
The Calculated Number of Daily Food- and Beverage-Related Decisions



in better controlling food intake, people need to be more aware of the number of decisions that influence what they eat as well as when they start and when they stop eating.

These results raise the possibility that a person's BMI may have a U-shaped influence on the number of food-related decisions she or he makes. It may be

that the people who make the most decisions about food are those who are either of normal weight or those who are obese. Although they both think about food frequently, their subsequent behavior may differ. Those of normal weight might generate more "no"-related decisions than those who are obese.

At the core of mindless eating is the supposition that we make many more food-related decisions than we are aware of having made. Whereas some decisions focus on the choice of particular foods, many more decisions involve the initiation and cessation of eating (Rozin, Kabnick, Pete, Fischler, & Shields, 2003). We need to monitor not only how much we eat, but also how frequently. One concern may be that we have little idea of how frequently we make these decisions. If people were more conscious of the number of food-related decisions they make in a day, they could be more vigilant of how their environment is influencing them (French, Story, & Jeffery, 2001).

Study 2

Are We Aware of the Consumption Norms That Have Led Us to Overeat?

Study 1 suggested that we make many more food-related decisions than most of us realize. Each of these decisions that we are not consciously aware of provides an opportunity for being unknowingly influenced by environmental cues. In Study 2, we investigated whether people (a) are aware of overconsuming or (b) aware of being affected by these cues after the cues and their general impact are made salient.

Method. Study 2 involved an analysis of four controlled field studies that investigated how environmental factors such as package size, serving bowl size, and plate size influenced how much people consumed in natural environments when randomly assigned to an exaggerated treatment condition. Participants in these studies spanned a wide range of ages and backgrounds (including graduate students, moviegoers, and Parent Teacher Association members), and in each study they were systematically assigned to different conditions and their consumption behavior was assessed. Across all of these studies, the same two questions were asked of those in the exaggerated (e.g., big bowl) treatment conditions:

1. "How much did you eat compared to what is typical for you?"
2. "In this study, you were in a group that was given [a larger bowl]. Those people in your group ate an average of 20%-50% more than those who

were instead given [a smaller bowl]. Why do you think you might have eaten more?"

The qualitative data collected during the postexperiment debriefings was coded using content analysis procedures (Neuendorf, 2002; Webber, 1989). The answers to the first question about amount eaten were coded as either "less than," "about the same," or "more than." The second question about explanations for overeating was coded as (a) they denied eating more, (b) they attributed it to hunger, (c) they attributed it to the intervention, or (d) an other explanation (being in an exciting situation, etc.). Individual calculations of coding reliability between the two coders were alpha = .94 (for the "how much" question) and alpha = .74 (for the "why" question). Much of the variability for the why question was due to the answers that were subsequently coded upon agreement as "Miscellaneous."

Results. In total, 379 people were involved in these field studies with 51% (192) being in the exaggerated environmental cue condition. Brief descriptions and results for each study are shown in Table 2. Within these treatment groups, the average increase in consumption over the control was 31%. However, an average of 73% of the participants believed they ate as much as they normally ate. Of those remaining, an average of twice as many believed they had eaten less compared to those who thought they might have eaten more (19% vs. 8%). For those 8% to have eaten enough to fully account for this 31% increase, each would have had to eat an average of 387% more than the average member in the control group.

When told of their treatment group's bias, and when asked why they might have eaten more, 21% claimed they did not eat more, and 69% said that if they did eat more, it was because they were hungry. Only 4% of the participants believed they had eaten more because of the environmental cue that had been specifically named. Six percent claimed they ate more for miscellaneous reasons, such as because it was a special occasion (the Super Bowl) or because it was "free."

Discussion. Of those who did believe it possible that they ate more, only 4% acknowledged it was because of the environmental cue. This hesitancy to acknowledge one being influenced by an external cue is common and has even been found when people are presented with tangible evidence of their bias. For instance, when pouring a standard drink of alcohol, the horizontal-vertical illusion has led professional bartenders with more than 5 years of experience to pour an average of 29% more alcohol in short, wide glasses

Table 2
Field Study Participants Deny the Influence Interventions Have on their Intake Behavior[a]

Sample and Context of Study	Intervention and Findings	"How much did you eat compared to what is typical for you?"				"In this study, you were in a group that was given [a larger container]. Those people in your group ate an average of 20%-50% more than the others. Why do you think you might have eaten more?"[b]				
		Less	About the Same	More	χ^2	"I didn't eat more"	"I was hungry"	"The (intervention) influenced me"	Other	$\chi^{2\,d}$
40 MBA students at a Super Bowl party in a bar in Champaign, IL (Wansink & Cheney, 2005)	Those serving themselves Chex Mix from 4-liter bowls (n = 19) served 53% more than those serving from 2-liter bowls	23%	57%	20%	10.55 ($p < .01$)	63%	31%	3%	3%	22.78 ($p < .001$)
98 adults preparing a spaghetti dinner for two in Hanover, NH (Wansink, 1996)	Those given half-full 32-oz boxes of spaghetti (n = 51) prepared 29% more than those given full 16-oz boxes.[c]	18%	73%	9%	70.36 ($p < .001$)	71%	27%	4%	8%	67.76 ($p <.001$)
161 afternoon moviegoers in a Chicago suburb (Wansink & Park, 2001)	Those given 240-gm buckets of popcorn (n = 82) ate 53% more than those given 120-gm buckets	19%	75%	6%	128.77 ($p < .001$)	15%	77%	5%	3%	152.00 ($p < .001$)

(continued)

Table 2 (continued)

Sample and Context of Study	Intervention and Findings	"How much did you eat compared to what is typical for you?"				"In this study, you were in a group that was given [a larger container]. Those people in your group ate an average of 20%-50% more than the others. Why do you think you might have eaten more?"[b]				
		Less	About the Same	More	χ^2	"I didn't eat more"	"I was hungry"	"The (intervention) influenced me"	Other	$\chi^{2\,d}$
158 evening moviegoers in Feasterville, PA (Wansink & Kim, 2005)	Even when given stale, 14-day-old popcorn, those given 240-gm popcorn buckets (n = 40) ate 34% more than those given 120-gm buckets of the same popcorn	14%	78%	8%	141.65 ($p < .001$)	12%	79%	2%	7%	179.42 ($p < .001$)
Average across all studies (Weighted by the number of participants per study)		19%	73%	8%	331.26 ($p < .001$)	21%	69%	4%	6%	203.97 ($p < .001$)

a. Answers are from those in the treatment group who received the intervention that resulted in greater consumption.
b. The specific intervention in the study was noted at this point. Here, the example of larger bowls was used.
c. In this study, people poured spaghetti but did not actually consume it. Questions were modified to reflect *pouring* instead of *eating*.
d. The chi-square test was conservatively conducted excluding the "Other" response from the analysis. Including this resulting in all p's < .001.

(tumblers) than tall, narrow glasses (highball glasses), which held the same volume (Wansink & van Ittersum, 2005). When confronted with their bias and when shown that they poured an average of 1.9 oz compared to the 1.5 oz that was prescribed, the general reaction was one of disbelief and denial, despite the tangible evidence (Wansink & van Ittersum, 2003).

Lab studies have often found that people either do not believe they were influenced by external cues or do not want to admit this was the case (Nisbett & Wilson, 1977). Although such studies have not been systematically evaluated, their anecdotal evidence has often been discounted because of their demand effects (Vartanian & Herman, 2005). Using field studies, we show here that people claim to be unaware of these factors increasing their consumption. Even when confronted with empirical data, most participants in environmental manipulations continue to disavow the findings or to look for alternative explanations. Although these results do not fully disentangle unawareness from denial, the consistency of the findings across studies point to a strong systematic influence that goes beyond what people either know or will confess.

General Discussion

The environment influences food-related decisions consistently throughout the day. There are two problems with this. First, we are not aware of how many decisions we make that are being influenced. Second, we are not aware or we are unwilling to acknowledge that the environment has any impact on us at all. Although we make more than 200 more decisions than we think we make, many of these are "automatic" food choices where we unconsciously eat without considering what or how much food we select and consume (Furst, Connors, Bisogni, Sobal, & Falk, 1996). This is consistent with other psychological work that shows that people tend to have flawed self-assessments, leading to an unmerited overconfidence (Dunning, 2005). With food intake decisions, their overconfidence may lead to overconsumption and weight gain.

These two studies provide vivid empirical evidence of two possible mediating mechanisms (Baron & Kenney, 1986). Further research could effectively investigate the extent of this mediation by conducting a more elaborate analysis that would include precise measures of the environmental cues, the mediators, and the food consumption volume or the total number of food-related decisions.

Useful future research could also delineate the characteristics that most greatly influence these inaccuracies about food-related decision making. This type of investigation could help identify audiences and mechanisms

that could be used to make eating more salient and make people more mindful of influences of the built environment.

For example, an unexpected finding from Study 1 was that there may be a U-shaped relationship between a person's BMI and the number of food-related decisions that person makes during the day. Those who make the most decisions about food may be those who are either of normal weight or those who are obese. Although both think about food frequently, it is likely that their subsequent behavior differs. Those of normal weight might generate more no-related decisions than those who are obese. Indeed, obese people (BMI > 30) may be qualitatively different than those who are simply overweight (BMI 25-30). When grouped together for analysis, which is often the case (see Chandon & Wansink, in press), aggregation of overweight and obese people could obscure important differences. For instance if the estimates of the two groups were collapsed, they would look almost identical to that of the normal weight people.

Although the eating and food environments could be examined by environment and behavior scholars, most research on the eating environment is still being dominated by nutrition researchers. An important new area for environment and behavior research would help examine why environmental cues are so often discounted, and how the environment could better be altered to work for us rather than against us. Keeping a focus on the mechanisms or processes behind consumption—the "whys" behind it and the "hows" to influence it—will help the interdisciplinary topic of food consumption progress in ways that can raise its profile and its impact on academia, on health practitioners, and ultimately on consumer welfare.

Consumption occurs within a context where understanding fundamental behavior has immediate implications for consumer welfare. Yet simply knowing the relationship between environmental factors and consumption will not eliminate its biasing effects on consumers. People are often surprised at how much they consume, and this indicates they may be influenced at a basic level of which they are not aware or do not monitor. The environment can work for us or against us. On one hand, it can unknowingly entice and contribute to our overconsumption of food. On the other hand, altering one's immediate environment to make it less conducive to overeating can help us lose weight in a way that does not necessitate the discipline of dieting or the governance of another person (Wansink, 2006).

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Brian Wansink is the John S. Dyson Professor of Marketing in the Department of Applied Economics and Management at Cornell University. His research examines how advertisements, packaging, and personality traits influence usage frequency and usage volume of healthy foods.

Jeffery Sobal is a professor in the Division of Nutritional Sciences at Cornell University. His research examines how social factors operate in relationship to body weight, food choice, and food systems.