

Mindless Eating and Environmental Cues

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Abstract

Package size, plate shape, lighting, socializing, and variety are only a few of the environmental factors that can influence the consumption volume of food far more than most people realize. Although such environmental factors appear unrelated, they generally influence consumption volume by inhibiting consumption monitoring and by suggesting alternative consumption norms. For economists, this research suggests where the rationality related to food consumption breaks down, what myths we need to see through, and what possible solutions lie ahead.

Mindless Eating and Environmental Cues

Food choice decisions are not the same as intake volume decisions. The former determine *what* we eat (soup or salad); the latter determine *how much* we eat (half of the bowl or all of it). Fortunes of money, time, and intelligence have been invested into understanding the physiological mechanisms that influence food choice (1). Much less has been invested in understanding how and why our environment influences food consumption volume (2). Yet environmental factors (such as package size, plate shape, lighting, variety, or the presence of others) increase our food consumption volume far more than we realize.

This is one of the puzzles of food consumption research: Whereas people can acknowledge that environmental factors influence others, they wrongly believe they are unaffected. Perhaps they are influenced at a basic level of which they are not aware or do not monitor. Understanding these drivers of consumption volume has immediate implications for research, policy, and personal interventions. There are three objectives of this paper: 1) Explain why environmental factors unknowingly influence consumption intake, 2) identify three resulting myths that may compromise the effectiveness of both research and intervention approaches, and 3) offer implications to move research, policy, and personal dietary efforts forward with more certainty and focus.

Why Do We Overeat?

Many environmental factors influence consumption. Consumption norms and consumption monitoring are two ideas that tie these factors together. An important theme of

this review is that these ideas partially explain why many practically unrelated environmental factors consistently influence eating behavior in predictable ways.

Consumption Norms Offer Suggestible Benchmarks

People are very impressionable when it comes to how much they will eat. There is a flexible range to how much an individual can eat (3), and one can often “make room for more” (4-6). For this reason, a person may be content eating from 3-5 pieces of pizza and from 12-16 ounces of cola for lunch without feeling overly hungry or full.

For many individuals, determining how many ounces of cola to drink or how many pieces of pizza to eat for lunch is a low-involvement behavior that can be based on how much one normally buys or consumes (7). Yet consumption can also be unknowingly influenced by norms or cues that are present in the environment including package size, variety, plate size, or the presence of others. These cues operate much like a framing effect, or reference point, in consumption (8).

Norms suggest a consumption quantity (or a range) that is acceptable. That is, the number of items in an assortment or the eating behavior of a dinner companion may serve as a benchmark that a person uses to gauge how many items should be eaten or how much should be drunk. Similarly, anything involving size suggests a consumption norm. Large packages (9), large plates (10), large serving bowls (11), large serving spoons (12), and even large pantries (13) have all been shown to increase how much a person serves and consumes by 15-45%. What is notable is that package and portion size can even increase the consumption of unfavorable foods. For instance, when movie-goers in a Philadelphia Suburb were given either medium-size or large-size containers of stale, 14-day old popcorn, they still ate 38% more despite its poor taste (14). It would appear that

environmental cues may sometimes be as powerful – within limits – as the taste of food itself.

All of these cues perceptually suggest to us that a larger amount of food is normal, appropriate, typical, and reasonable to consume. Most individuals dutifully follow these suggestions. The use of consumption norms, as with normative benchmarks in other situations, may be relatively automatic and may often occur outside of conscious awareness (15, 16).

Consumption Monitoring and Calorie Estimation is Highly Inaccurate

Paradoxically, people who tend to be most focused on food consumption and weight control may be particularly susceptible to the environmental factors that spark overeating and undermine their attempts at restraint (17, 18). Eating is multidimensional and difficult to monitor. This can cause people to focus more on food choice than on their consumption volume of the chosen food, and it can lead to unmonitored, unintended results. For instance, people dining at an Italian restaurant correctly believed that if they ate butter with their bread they would consume fewer fat calories than if they instead dipped their bread in olive oil. What they did not realize, however, is that they unfortunately compensated by eating 23% more bread during the course of the meal (19).

The biggest danger of not monitoring one's intake is that one eats more calories than they would otherwise want. Studies involving calorie estimation have shown that the general process of estimating how many calories one has consumed is tremendously influenced by the external environment.

In general, all people underestimate their calorie consumption by a predictable

compressive power function. The magnitude of estimation bias is typically measured as the percentage deviation from actual magnitude, $\gamma \equiv (\hat{X} - X)/X$, where \hat{X} is the individual's estimate of calories consumed, and X is the actual number of calories consumed. Misperception of consumption volume may also be measured as the log ratio of estimated to actual size $\lambda \equiv \ln(\hat{X}/X)$. Both measures are closely related, $\lambda = \gamma + 1$, and therefore we use the more intuitive measure, γ , to quantify the magnitude of bias in descriptive analyses. If the individual's perceived consumption is a compressive power function of actual consumption, then $\hat{X} = \alpha X^\beta$, with $\alpha > 0, \beta < 1$. In this case, $\partial\gamma(X)/\partial X = \alpha(\beta - 1)X^{\beta-2} < 0$. Therefore, if meal size estimations follow a compressive power function, the magnitude of the underestimation bias increases as the actual size of the meal increases, even if the bias is measured in proportion to the observed meal.

In addition to this basic tendency to underestimate one's calories as a function of the size of a meal, people are also biased by the "health halos" that accompany labels. A series of studies where foods were falsely labeled as being "low fat" led consumers to overconsume these foods relative to control foods. Even when taking into account the average (11%) reduction in the calorie content of low fat offerings, these people ate 34% more calories than the control group (20). A similar result was found with regard to how much a person ordered and ate from restaurants they perceived as healthier versus less healthy (e.g., Subway vs. McDonalds). That is, although consumers ate 11% fewer calories than when at McDonalds, they estimated they had eaten 37% fewer.

There appears to be a related double-danger to being in distracting environments

filled with friends, family, television, and thoughts about what else needs to be done that day: 1) People do not monitor how much they eat, and 2) they underestimate calories consumed the more they eat.

Two Myths of Mindless Eating

The unique context of eating may challenge the assumptions that researchers and public policy officials have about consumers and rational decision making. When faced with food, people respond differently than when faced with a car purchase. This can lead researchers and public policy officials to make assumptions about mindful eating that take on untested yet near mythical surety in research and policy realms.

Mindless Eating Myth 1: Informed, Intelligent Consumers Are Smarter Than Their Dinnerware

In one study, 62 MBA students were presented with a 90 minute class session that used lectures, videos, demonstrations, and group activities to underscore that if they were presented with a gallon serving bowl of Chex Mix, they would serve and eat more than if they were instead presented with two half-gallon serving bowls. At the end of this session, these were informed, intelligent consumers. Six weeks later, these same students were invited to an apparently unrelated Super Bowl party where they were presented either gallon-size serving bowls of Chex Mix or twice as many half-gallon bowls. Those presented with the gallon bowls served 53% more and ate 59% more. When asked if they believed the size of the serving bowls influenced their behavior, they denied it influenced them (11).

Similarly, consider the studies showing that Philadelphia bartenders poured 28-32% more into short wide tumblers than tall, narrow high-ball glasses. Immediately after they poured and after pointing out their bias, the bartenders were asked to pour again. Although they were a bit more accurate, they still poured 21% more into the wider glasses than the taller ones (21).

Even when shown that larger packages bias consumption by at least 20%, many people in lab and field studies wrongly maintain that they were unaffected (9). The same is true with other studies examining low involvement behaviors (22). Whereas people readily acknowledge these environmental factors influence other people, they deny the influence on themselves.

In relating this to consumption, it is well supported that the size of a package can increase consumption (9), as can the size of portion servings in kitchens (23, 24) and in restaurants (25).

The impact of packages and portions on consumption is sizable. When packages double in size, this has generally translated into a 18-25% increase in consumption for many meal-related foods (such as spaghetti) and a 30-45% increase in many snack-related foods (9). Such predictable increases in consumption occur even when Rolls and her colleagues altered the energy density of the food (26, 27), thus indicating that something is driving people to consume these foods past the point of satiation. In effect, the volume of food eaten tends to be a better indicator of how “full” one considers oneself than does the calorie density of the food (28-30)

Mindless Eating Myth 2: We Know When We Are Full

One objection to studies that show that people overserve themselves in response to environmental cues is to argue that people may get tricked into overserving themselves, but they

would not overeat. This presupposes that a person is more responsive to their internal cues of satiation (such as hunger or taste) than to external cues.

Sociologically, this may not be as true for Americans than for others. One study asked a matched set of 150 Parisians and Chicagoans when they knew they were through eating dinner. The Parisians said they knew they were through eating dinner when they “were no longer hungry” or when the “food no longer tasted good” – both of these are internal cues of satiation. In contrast, the Chicagoans said they knew they were through eating dinner when their “plate was empty” or when the TV show they were watching “was over” – external cues of satiation. Regardless of their culture, overweight people used external cues more than internal cues (31).

This physiological view toward satiety was further challenged in a study that suggested that people stop eating when their dish is empty. A soup bowl was designed to automatically refill itself. Those who were given these bowls ate an average of 73% more than those sitting across from them with a regular bowl. After 15 minutes, the study was stopped and those with refillable soup bowls were asked to rate their satiety. Following this, when asked if they were full, a common response was, “How can I be full, I still have half a bowl left?” (32). A similar study involving the bussing of chicken wing bones at an all you can eat restaurant showed a similar result. Those whose chicken wings had been bussed, ate 34% more, but did not believe it (33).

People may believe they know when they are full, but studies in the field suggest they eat more with their eyes than with their stomach. Indeed, we may think we know when we are full, but that is our fallibility.

The Future of Mindless Eating

Food consumption volume is not the same as food choice. The mechanisms behind each of these are very different. Although impressive resources have been invested into understanding food choice (1, 34), it is now becoming increasingly important to better understand what drives food consumption volume (2). Given the unknowing impact that environmental factors have on consumption, consumer welfare will advance if these discoveries help them personally and effectively alter their environment without them having to continually monitor how much they eat.

Research Advances through Theory

Since the mid-1960s, researchers have been identifying many important factors correlated with food consumption. The next evolutionary step needs to be in the direction of understanding the “whys” behind food intake volume. The focus needs to explain why we eat how much we eat, rather than simply showing how much is eaten and when.

In redirecting our research efforts, two promising areas for study involve 1) consumption norms, and 2) consumption monitoring and calorie estimation. Both at least partially explain the impact of seemingly disparate drivers of consumption (such as package size, variety, and social influences). Keeping a focus on the mechanisms or processes behind consumption – the whys behind it – will help the interdisciplinary area of food consumption progress in ways that can raise its profile and its impact on policy makers, and ultimately on consumer welfare (35).

Increasing Consumer Well-being Requires Changing One’s Personal Environment

A wide range of people and institutions would like to better control a person’s

consumption of food for a wide range of reasons. Those in the hospitality industry want to decrease food costs (via serving size) without decreasing satisfaction. Those in public policy want to decrease waste. Those in health and nutrition want to decrease over-consumption. Those in strenuous field situations want to decrease *under*-consumption. Those on restricted diets want to decrease calories, fat, or sugar intake.

Consumption is a context where understanding fundamental behavior has immediate implications for consumer welfare (36). 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. This is why simply knowing these environmental traps does not typically help one avoid them (37, 38). Relying only on cognitive control (39) and on willpower (40) is often disappointing. Furthermore, consistently reminding people to vigilantly monitor their actions around food is not realistic (41). At best, continued cognitive oversight is difficult for people who are focused, disciplined, and concentrated. It is nearly impossible for those who are not.

What can be done? The environment can work for people or against people. On one hand, it can unknowingly entice and contribute to our over-consumption of food. On the other hand, a personally altered environment can help people more effortlessly control their consumption and lose weight in a way that does not necessitate the discipline of dieting or relinquishing self-governance to another. For some, this might involve repackaging food into single-serving containers, storing tempting foods in less convenient locations, and pre-plating one's food prior to beginning a meal. For others, simply using narrow glasses and smaller plates might be all that is required to make their environment less conducive to overeating.

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