How Cognitive Glitches and Psychological Biases Influence How Much People Eat

In addition to choosing the wrong mix of foods, many Americans simply eat too much food as well. According to ERS data on food consumption, the average daily calories available in the U.S. food supply increased by more than 500 calories per person between 1970 and 2004. Surprisingly, experimental studies find that choosing what to eat and choosing how much to eat may be controlled by separate psychological mechanisms. Environmental factors seem to have a stronger effect on the amount people eat than tastes and preferences (Wansink and Kim, 2004). In particular, the eating environment (atmosphere, effort, social facilitation, and distractions) and the food environment (salience, structure, size, stockpiling, and shape) affect consumption volume by setting consumption norms (an indication of how much people should consume) and inhibiting monitoring accuracy. These subtle cues can have large impacts on consumption volume, often without the individual's being aware of their effect (see Wansink, 2004, for definitions of terms and complete review of the consumption volume literature).

Where We Eat and With Whom

The eating environment is defined as all factors external to the presentation of the food itself. Social situations may encourage individuals to eat more than they would normally. When eating in groups or social situations, individuals tend to eat quantities that are similar to others (Birch and Fisher, 2000; de Castro, 1994). Individuals may alter what they eat due to the distraction of conversation and increase consumption volume as the size of the gathering increases (de Castro and Brewer, 1992) or as the length of meal is extended (Bell and Pliner, 2003). When wanting to impress others at the table, as in a job interview, individuals will often eat less (Chaiken and Pliner, 1990; Mori, Chaiken, and Pliner, 1987, Stroebele and de Castro, 2004). Social gatherings also tend to decrease the variance of consumption; those who normally eat large amounts eat less, while those who normally eat little will eat more (Clendennen, Herman, and Polivy, 1994; Pliner et al., 2003).

Other aspects of the eating environment, such as lighting, odor, and temperature, can influence consumption volume (Wansink, 2006; Wansink, 2004). People tend to shorten the duration of meals in brightly lit environments compared with places that are more dimly lit. People also tend to be less self-conscious when the lighting is low, thus increasing the likelihood of eating more than they would normally.

Beyond mentioning their impact as part of nutrition education, it is difficult to imagine how controlling where people eat, with whom, or the atmosphere within a dining area could be feasible within either FSP or WIC. However, these findings do have implications within the school meals programs. It may be that simply decreasing the number of students seated at each table could have a significant impact on the amount of food consumed at school meals. Making school cafeterias more brightly lit could be another way to help students better monitor their actual consumption volume.

How Food Is Presented—Salience and Stockpiling

The primary factor in managing consumption volume is the accuracy with which individuals gauge how much they eat (Arkes, 1991; Polivy et al., 1986). Rules of thumb, such as eating one package or one bowlful of food or choosing products that are lower in fat or calories, are often used to monitor consumption volume. Such rules of thumb can have unintended effects on dieters. For example, Wansink and Linder (2003) found that while diners correctly believed that dipping bread in olive oil would increase the fat content relative to spreading butter on the bread, their total consumption volume may have negated this difference. These same diners tended to eat 23 percent more bread during the course of the meal when choosing butter over olive oil (Wansink and Linder, 2003).

Increasing the salience of food may increase consumption volume because it serves as a reminder of a pleasurable experience. Simply seeing a food can also lead to unplanned consumption (Boon et al., 1998; Cornell, Rodin, and Weingarten, 1989). Salience may be generated internally, leading to greater consumption volume than externally generated salience. Scientists were able to manipulate the salience of soup by simply asking individuals to write a description of the last time they ate soup. Those asked to describe their experience consumed more than twice as much soup in the next 2 weeks as did a control group that was not asked (Wansink and Deshpande, 1994).

Similarly, individuals who happened by a cookie dish, and impulsively decided to eat, ate fewer cookies than those who deliberately sought out the cookies (Wansink, 1994). Conversely, placing candies just 3 feet away from one's desk, as opposed to directly on one's desk, can significantly reduce the volume of consumption (by five to six chocolates a day, see Painter, Wansink and Heiggelke, 2002).

Stockpiling food can also increase consumption (Chandon and Wansink, 2002). In an experiment where homes were stocked with large quantities of ready-to-eat food, the foods were consumed at greater than twice the rate of consumption than in homes given more normal amounts of the food within the first week (Chandon and Wansink, 2002). After the first week, consumption rates were similar between the two treatments. Some have speculated that stockpiled foods may increase visibility and salience of the food. However, experiments attempting to isolate this phenomenon have been inconclusive (Terry and Beck, 1985; Wansink and Deshpande, 1994).

Devising ways to directly manipulate the salience of foods within the WIC or food stamp program is difficult to imagine. However, nutrition education within these programs could highlight ways to increase the salience of certain foods, such as fruits and vegetables, relative to other less healthful foods by changing where they are stored within the home. The school meals programs, on the other hand, have the ability to work with cafeterias and lunchrooms to change the placement of specific food items to adjust their relative prominence. Salads, fruit and vegetable servings, or other more healthful foods could be displayed more prominently, such as at the beginning of the cafeteria lines or on a level that is easily accessible. By contrast,

desserts, soft drinks, or other less nutrient-dense foods could be offered so they are harder to reach and harder to see.

The finding that stockpiled foods are consumed in greater quantity may have implications for how benefits are distributed within the Food Stamp Program. There is speculation that the monthly food stamp benefit disbursement contributes to sporadic consumption of food. Shortly after benefits are issued, food expenditures spike and thus foods are more plentiful within the home compared with the end of the month.[3] If recently stockpiled foods are consumed in greater quantity, program participants, especially among those who have problems of self-control, would be more likely to experience binge-eating at the beginning of the food stamp cycle. Therefore, allowing FSP participants to choose to have benefits distributed more frequently could reduce the variation in the quantity (and possibly quality) of food intake throughout the month.

[3] Evidence that stockpiling food leads to increased consumption in the short run may offer another explanation for the finding by Shapiro (2005)—that consumption patterns among food stamp recipients challenge the assumption of exponential discounting.

How Food Is Presented—Variety, Shape of Container, and Packaging

The structure or variety of food can also lead to increased consumption volume. In particular, offering a greater variety of foods increases the consumption volume of that food (Miller et al., 2000; Rolls, 1986; Rolls et al., 1981). Recent work has found that even increasing aspects of variety not associated with taste or nutrition significantly increases consumption volume. For example, subjects presented with 10 versus 7 colors of M&M candies consumed 43 percent more candy (Kahn and Wansink, 2004). Another experiment presented one set of subjects with identical numbers and variety of colors of jelly beans. However, while one treatment group received the jelly beans sorted by color, the other received the assortment mixed. Those who received the mixed assortment ate 69 percent more on average (Kahn and Wansink, 2004).

Larger portion sizes are frequently cited as contributors to increased obesity rates in the United States (Rolls, 2003; Young and Nestle, 2002). Experimental research does show that people eat more when presented with larger packages or portions of food (Diliberti et al., 2004; Rolls et al., 2004; Wansink, 1996; Nisbett, 1968; Rolls, Morris, and Roe, 2002; Edelman et al., 1986). Doubling the portion size increases consumption anywhere from 18 percent to 25 percent for meal-related foods and by up to 45 percent for snack foods (Wansink, 1996). Surprisingly, this result is robust to any number of different treatments. Larger portions lead to greater consumption even if the food is reported to be repulsive by the subjects (Wansink and Kim, 2004). Moreover, eating from larger packages causes less accuracy in monitoring consumption volume; when eating from larger packages, people underestimate their own consumption to a larger extent compared with when they eat from smaller packages (Wansink, 1996). Alternatively, increasing the calorie density appears to have little effect on consumption volume (Rolls, Bell, and Waugh, 2000; Rolls et al., 1998; Rolls, Morris, and Roe, 2002).

The shape of serving containers, such as bowls, plates and glasses, can also significantly affect the volume of consumption. Individuals tend to focus on the height of a glass rather than its width (Krider, Raghubir, and Krishna,

2001; Piaget, 1969; Raghubir and Krishna, 1999). Teenagers were found to pour 88 percent more juice into short, wide glasses than into tall, thin glasses, when both types of glasses held the same volume. Similarly, bartenders asked to pour 1.5 ounces of gin poured 26 percent more into tumbler-style glasses than into tall, thin glasses (Wansink and van Ittersum, 2003).

Lastly, there is evidence that other alterations in food packaging or presentation may make it easier to assess consumption volume. Introducing more intermediate packaging in containers of chips or other items, such as individually wrapped sets of cookies within a bag, seems to draw attention to consumption volume and make it easier for individuals to determine an appropriate stopping point (Wansink, 2004).

Compared with the FSP or WIC, it is more straightforward to apply implications from these findings to the school meals programs. Increasing the number of different vegetables or fruits offered within a single salad may lead students to consume a greater amount. Changing the shape of containers that are used could also promote consumption of certain foods and beverages relative to less healthful foods. Tall, thin glasses could be used for less healthful beverages while shorter, wider glasses could be used for beverages such as low-fat milk, water, and fruit juices. Similarly, larger bowls could be used for servings of fruits and vegetables, while small plates and dishes could be used for desserts or other less nutritious foods. Finally, placing packaging restrictions, such as 100-calorie packs, in vending machines and prepackaged foods a la carte is another way to help individuals monitor their own consumption volume within the schools.

In addition to highlighting the effects of variety, container shape, and product packaging on consumption volume in nutrition education for food stamp and WIC participants, there may be opportunities to apply some of the findings more directly. Interested program participants could be given a set of glasses, dishes, and/or bowls that contain some sort of visual graphic to indicate appropriate portion sizes. Promoting single-serving packaging for whole-grain cereals or low-fat cheese slices may also be feasible within the WIC package.