

How Cognitive Glitches and Psychological Biases Influence What People Eat

Through carefully controlled experiments, psychologists and behavioral researchers have documented widespread observance of behaviors and problem-solving techniques that do not conform with standard assumptions of standard economic theory. For example, experiments where subjects are asked to perform fairly simple reasoning tasks, such as calculating the probability that event A will occur given event B, show that the vast majority of respondents make systematic errors. Psychologists infer that these errors are the result of individuals' using simple decision rules, or heuristics, which lead to seemingly illogical choices or biases (Conlisk, 1996; Kahneman, Slovic, and Tversky, 1982). These errors become more prevalent when decisions are made when there is some element of chance or uncertainty about the results of a choice or when some rewards from a decision are realized after a significant passage of time, rather than immediately. While using simple heuristics may lead to biases, doing so may still be a more efficient approach to problem solving if it provides an adequate solution without the greater time and mental costs of a more deliberative approach. Experimental research findings suggest that the heuristics used to simplify decisionmaking can predictably affect which foods they eat, how much, and their willingness to consume that food again. Experimental and theoretical research also describes how problems of self-control may arise when the benefits from a decision are separated from the costs by a time lag.

Making Changes, by Default

One idiosyncrasy of consumer choice frequently observed in experimental studies is that individuals exhibit an asymmetry in how they value gains relative to losses. Known as loss aversion (Kahneman and Tversky, 1984), this asymmetry gives rise to anomalous behavior, known either as an endowment effect (Thaler, 1980) or a status quo bias (Samuelson and Zeckhauser, 1988). Both anomalies refer to aversions that cause individuals to willingly pay much less to acquire an item than they would accept to part with it (Samuelson and Zeckhauser, 1988; Kahneman, Knetsch, and Thaler, 1990). This aversion also makes individuals much more likely to choose the default options, even when the costs of switching to a different option are low (or even negative). For example, Choi et al. (2003) found that only 26 percent to 69 percent of employees opted to participate in a 401(k) program when they were not automatically enrolled compared with participation rates of 85 percent among employees for whom the default option was to enroll. Similarly, Thaler and Benartzi (2004) found that saving rates increased dramatically when employees were offered a plan where a specified fraction of their future pay increases were automatically diverted into a savings account.

Such findings from behavioral experiments suggest that individuals will be apt to make decisions that are more harmonious with their long-term objectives when those decisions are presented as the default options. Relating this to USDA's nutrition assistance programs, one way to increase the likelihood that program participants make healthier food choices would be to make such choices the default. Within the school cafeteria framework, a healthy meal could be automatically preordered for students each day. Students who

wanted a different, less healthful food choice (such as a la carte offerings) would then have to change their order and pay the cost difference, if any. Among Food Stamp Program participants, the default option could be a more restrictive food stamp package that fulfilled certain nutrition guidelines, such as a minimum percentage of the benefit amount to be allocated to purchase of whole-grain foods, dark green vegetables, or fruits. To opt out of this package, participants would need to specify that they would prefer the current benefit program.

The characteristics of the goods or services in question as utilitarian or hedonic have been found to play a role in how likely individuals are to exhibit status quo biases. Hedonic characteristics are associated with a sensory experience and immediate gratification. Utilitarian attributes, on the other hand, are more functional and typically associated with a longer term goal, such as good health (Hirshman and Holbrook, 1982; Strahilevitz and Myers, 1998). Individuals tend to view goods in terms of moral structure—classifying them as “wants” or “shoulds” (Bazerman, Tenbrunsel, and Wade-Benzoni, 1998). The notion that some goods are virtuous or necessary while others are sinful or extravagant leads to very different choice behavior. Dhar and Wertenbroch (2000) show that utilitarian characteristics are more important when deciding which goods to acquire and hedonic characteristics are more important in determining which to give up. Thus, while individuals appear to be deliberative in determining which products to select, they seem to be more reactionary when choosing which items to forgo.

In the context of food, this suggests that individuals are more likely to add utilitarian foods (which are likely to be healthier) to their diet than they are to eliminate a hedonic (and typically less healthful) food. This odd twist on the status quo bias works against efforts to reduce consumption of foods that are viewed as extravagant, making it much more difficult to reduce caloric intake. These findings also support the concept of considering the healthfulness of default menu items and food packages within the nutrition assistance programs.

Distractions, Cognition, and Eating

Certain situations also affect the likelihood that individuals’ decisions will be based more on emotional than on rational factors. Epstein (1993) proposes the Cognitive-Experiential Self Theory (CEST) to describe this conflict. This model supposes that there are two processes used to evaluate every stimulus:

1. An experiential system to make rapid evaluations based on emotions.
2. A cognitive process to make more deliberative evaluations based on rational thinking.

The primary determinant of which process takes over is the availability of processing resources (time, necessity to deal with other decisions, etc.). Impulsive behavior, such as choosing less healthy foods over healthy foods, may result from the presentation of food choices, the presence of stress, or other demands on processing ability. Shiv and Fedorikhin (1999) find that individuals who were given some cognitive task to perform while choosing

between cake or fruit salad were much more likely to choose the cake than those given only the food-choice task. This result held true even if the price of the cake was raised considerably higher than the price of the fruit salad.

The standard economic framework can be adjusted to incorporate the possibility that individuals toggle between using a cognitive process to make decisions and an experiential system to make decisions based primarily on emotions. If it is true that emotions take precedence over reason as processing resources decrease, then another way to improve the healthfulness of individuals' food choices is to manage their processing resources. When processing resources are low, it is more likely that an individual will make consumption choices based solely on immediate considerations. When these resources are higher, the same individual will be more likely to consider the tradeoffs between current consumption and future well-being.

Within the school meals programs, processing resources could be affected by distractions or time constraints that occur while making meal selections or choosing when to stop eating. Consequently, students may be more likely to make healthful menu selections or more reasonable quantity decisions if afforded more time in which to do so. Alternatively, the nutritional value of foods chosen might improve if individuals were given the opportunity to make selections in a calmer environment—possibly in class, before heading to the cafeteria. Another way to mitigate the effect of a distracting environment would be to draw attention to the more healthful foods by making them more accessible or displaying them more prominently. Within the FSP or WIC, processing resources might again correspond to similar distractions or time constraints. A possible way to mitigate these factors would be to give participants the option of preselection or preordering their grocery items (whether program-provided or not) at times when fewer distractions might be present.

Mental Accounting

Lowering the price of one good, food for example, will have both an income and a substitution effect, according to standard economic predictions. With the income effect, individuals increase food purchases in response to more room in their budget. This change in price may also have a substitution effect, where people change how they allocate expenditures among broad categories. In this case, lowering food prices may lead to only a slight increase in total food purchases while generating a much greater increase in expenditures on other items.

By contrast, mental accounting (Thaler, 1980; Shefrin and Thaler, 2004) supposes that individuals categorize their income by earmarking it for specific purposes or specifying that it be used within a certain timeframe. The idea that money is not fungible but is set aside for a specific purpose is engrained in consumers' vocabularies early on with terms such as “lunch money,” “rainy day funds,” and “mad money.” Income sources seen as one-time events are viewed as more frivolous (such as tax refunds) and are subsequently earmarked for more frivolous consumption (like plasma televisions). Individuals may also categorize a certain amount of income for food consumption based on factors such as the source of income (employment, welfare, food stamps, and gifts).

In contrast to the more standard framework, mental accounting predicts that once money is earmarked for a purpose, one will spend within a certain category until funds are entirely depleted. Thus, if allocating a portion of income to current food spending, and food prices decline, one may overlook the opportunity to shift the surplus “food money” to another purpose. Instead, one will buy more food. In this case, finding a low price on an item may lead to overconsumption rather than substitution.

Another consequence of mental accounting is that individuals tend to exhibit a “flat-rate bias,” where they undervalue fixed costs, relative to variable costs (Thaler, 2004). Health club members typically choose to pay for their gym membership on a monthly or annual basis, even when a per-use fee would have lower total costs (DellaVigna and Malmendier, 2002).¹ One implication of a flat-rate bias is that, when only certain items can be selected using prepayment, those items will be chosen with greater frequency compared with those that can be purchased only with cash.

The idea of earmarking funds and mental accounts may partially explain why several studies have found that food stamp coupons that can be used only for food purchases are more effective at raising food expenditures than an equal benefit amount given as cash even when both coupons and cash are used on food (reviewed in Fox, Hamilton, and Lin, 2004). This outcome is contrary to rational economic theory, which predicts that cash and coupons would have the same effect. This concept also lends support to the idea that providing further guidelines on the proportion of food stamp allotments that should go toward the purchase of healthful foods, such as fruits, dark green vegetables, and whole grains, could increase the purchase of more healthful items among program participants.

Foods that are part of the official USDA school meals must meet dietary standards. But, similar standards could also be placed on a la carte foods and foods sold separately from USDA school meals. Through prepaid cards, or point-of-sale (POS) technology, students, possibly in conjunction with parents, could specify what portion of their total bill should be spent on fruits, vegetables, desserts, or high-calorie beverages. Such options have already been tried in several school districts. The finding that individuals undervalue fixed costs relative to variable costs has possible implications for the school meals programs as well. To take advantage of this flat-rate bias, parents or students could prepay for specific, more healthful items. Other, less healthful items, such as soft drinks or high-fat desserts, could be purchased, but only with cash.²

Problems of Self-Control and Visceral Influences

Economic models typically assume individuals discount future utility exponentially, meaning that the value people place on future well-being is less than the value of today’s well-being and the value of each subsequent time period decreases at a constant rate. However, experimental and empirical studies provide examples showing that actual consumer behavior cannot be reconciled with the assumption of exponential discounting. One frequently observed anomaly is that individuals often change how they rank a less

¹ There are competing explanations for this behavior, flat-rate biases being one of them. Others include the possibility that people underestimate the future utility received from a service and that individuals may choose to overpay upfront as a commitment mechanism to influence future behavior.

² Though carbonated soft drinks are not a choice within the actual school meal programs, they are available for purchase at some schools. Some cafeterias do offer other sugary beverages a la carte.

preferable, yet more immediate reward relative to a preferable but delayed reward when the time delay between receiving either reward is changed equally (discussed by Laibson, 2004). A common example cited in the literature on experimental economics describes an individual who prefers one apple right now to two apples 24 hours from now, yet also prefers two apples in 51 days to one apple in 50 days (Thaler, 1981). Such time-inconsistent preferences find expression as a self-control problem, where one places extra value on more immediate rewards within the near term. This behavior has been linked to consistent shortfalls in retirement savings, and the need for penalties on early withdrawals of those savings (Laibson et al., 1998; Angeletos et al., 2001). In the case of food consumption, the would-be dieter may continually commit to cutting back on high-calorie foods after one more doughnut.

Repeated observation of time-inconsistent preferences has led some researchers to change this assumption by using a framework where decisionmakers lack self-control and choose alternatives that are usually less desirable or valuable over some timeframe simply because they are available sooner (see Gul and Pesendorfer, 2004, for a review). This adjustment to the more standard economic framework has been used to show that individuals can improve their longrun well-being through some sort of commitment mechanism that will enforce time consistency and set limits on current consumption levels (e.g., a 401(k) plan). Such curbs on one's ability to choose could never be a valuable tool if individuals had an ability to choose the best option after the fact.

Kivetz and Simonson (2002) found that individuals tended to choose luxury items as program rewards rather than the cash equivalent (or greater) because they feared lack of self-control would cause them to use the money for everyday expenses, and therefore, preclude their ability to afford the luxury item. This framework has also been used to explain a number of seemingly inconsistent preferences including: why individuals choose relatively more expensive annual gym memberships over "pay as you go" options, even though the latter would be less expensive for most users (DellaVigna and Malmendier, 2002); why problems of self-control coupled with decreasing time and monetary costs of food attainment may explain an increasing rise in obesity rates (Culter, Glaeser, and Shapiro, 2003); and why food stamp recipients reduce caloric intake as the days after food stamp receipt increase (Shapiro, 2005).

A limitation of such models, however, is that time-inconsistent behavior is attributed entirely to how soon a choice is available relative to its alternatives (Frederick, Loewenstein, and O'Donoghue, 2004; Loewenstein, 2004). In terms of food consumption, this means an individual will always be expected to choose the more immediately available food, regardless of his or her level of hunger. In reviewing the literature on weight loss, Herman and Polivy (2003) show that simply making some foods immediately available is not sufficient to induce binge eating.

To account for this, researchers have developed an alternate framework that allows a broader range of situations to trigger present biased behaviors (such as a self-control problem) by adding the assumption that certain visceral influences, such as feeling hunger, thirst, or pain, can add to or

detract from how much enjoyment an individual gets from current consumption (Loewenstein, 2004). For example, a plate of nachos is not terribly enjoyable after a full meal. But these same nachos may seem extremely palatable to a hungry person. Also, a hungry person is likely to make shortsighted tradeoffs between immediate and delayed food, even if that person will be feeling just as hungry tomorrow.

This visceral factors framework differs from Cognitive-Experiential Self Theory (described earlier) which assumes that the availability of processing resources—related to factors such as the amount of time afforded to make a decision, level of stress, or presence of other distraction—dictates whether an individual takes a rational approach to decisionmaking or makes evaluations based on emotions. In comparison, the visceral factors framework assumes that while an individual uses rational thinking to evaluate decisions, the amount of utility derived from consuming a specific amount of some good—say, food—will change depending on the intensity of relevant visceral influences, such as feeling hungry, nervous, or nauseous.

For explaining food choices, the visceral factors framework can illuminate how and why certain situations give rise to time-inconsistent choices. In a more neutral state, an individual may choose to consume the types and quantities of foods that are consistent with his or her long-term health objectives. As visceral factors intensify, however, the perceived value of one's current well-being increases relative to the value of one's future well-being. Thus, consumption of goods that provide immediate gratification will be consumed in greater amounts compared with situations when visceral factors are less intense.

Using this framework, Mancino (2003) and Mancino and Kinsey (2004) show that hunger can lead to unhealthy choices, especially when combined with time constraints. As individuals become busier (and time constraints begin to tighten), more convenient food becomes a substitute for leisure time. Also, as individuals become busier, they may eat less often, allowing their feeling of hunger to get out of control, leading to overconsumption. This research suggests that busier lifestyles may have created an atmosphere where increasing the interval between meals leads individuals to periodically ignore health information, causing an increase in obesity.

The empirical evidence that individuals tend to lack self-control, either because they simply prefer immediate gratification or because they are under the influence of a visceral factor, suggests that allowing them to pre-select or commit to more healthful choices would be an effective means to counteract their tendency to make shortsighted, less healthful choices. Within the school meals programs, students will be more likely to choose foods that promote better health over those that simply provide immediate gratification if they choose their foods well before meal time. Alternatively, parents or children could devise a commitment mechanism, such as making certain foods off-limits. Through point-of-sale technologies, such mechanisms are currently increasing in popularity. Some schools employ POS systems through which parents can track what menu items their children purchase at school and even specify that their POS card preclude the purchase of specific items, such as soft drinks or high-fat desserts.

Similarly, within the Food Stamp Program (FSP), participants may be more likely to choose foods that are in sync with their long-term health objectives if they make their purchasing decisions before going to the store and finding themselves tempted with less healthful food options, such as salty snack chips, high-fat dessert products, and soft drinks. One way to do this would be through preordering. Another option would be to allow FSP participants to specify that certain less healthful foods be ineligible for purchase with their electronic benefit transfer (EBT) cards. A simpler, less costly alternative currently used by some States as part of their Food Stamp and Nutrition Education programs would be to design curriculum that highlights the importance of planning meals, preparing shopping lists, and not shopping for groceries on an empty stomach or accompanied by children (Philips et al., 2000).

The monthly schedule for distributing food stamps has been cited as a potential cause of weight gain among participants. Because benefits are distributed only once a month, there is evidence of a period of overconsumption shortly after benefits are distributed, followed by a period of rationing, or under-consumption later in the cycle (Wilde and Ranney, 2000). This cycle may be even more pronounced among individuals with self-control problems—they will likely spend too much for current consumption at the expense of future consumption. Increasing the frequency of benefit disbursements could also function as another commitment mechanism. Thus, decreasing the amount available for current consumption at each decision period, while leaving total payment amount unchanged, should also boost one's ability to make time-consistent decisions.

Avoiding Temptation

A fundamental tenet of rational behavior is the axiom of the independence of irrelevant alternatives. The axiom asserts that if a person prefers option A to option B, then he or she will continue to prefer A to B even if a third, irrelevant option C is available. Frequent observation of behavior that violates this principle suggests that modeling choices under an assumption of complete rationality will be too restrictive and result in erroneous predictions about behavior. Instead, individuals seem to exhibit a “context effect” where the rankings of alternatives depend on other options offered in a choice set, even when those options are never chosen (Camerer and Loewenstein, 2004). Gul and Pesendorfer (2001) propose that individuals have preferences over the presence of temptations: The value of choosing a salad rather than a hamburger will be lower when tempting items like chocolate cake also appear on the menu, even if the cake is not chosen. Because cognitively better choices may lose their appeal when more hedonic choices are presented, Gul and Pesendorfer argue that removing tempting options that are typically considered less desirable will unambiguously improve individual well-being.

Presenting individuals with tempting alternatives may also be problematic if their willpower (ability to self-regulate) is a depletable resource (Ozdenoren, Salant, and Silverman, 2006). Experiments show that an individual's ability to exercise willpower is lower if he or she has recently engaged in prior acts of self-restraint (Baumeister and Vohs, 2003). While individuals who have honed their skills at self-regulation may find effective ways to stick with

their long-term objectives (Fishbach and Shah, 2006), less effective regulators will be better able to avert temptation by imposing additional costs (or benefits) on giving in to temptation (Fishbach and Trope, 2005).

Within the school meals setting, these findings suggest that simply presenting students with a broader array of unhealthful but flavorful foods can decrease the enjoyment they get from choosing more healthful foods. The findings also suggest that the likelihood of choosing healthful menu options decreases as the number of tempting, less healthful options increases. Another finding from this research is that giving individuals the option of precommitting to the more healthful option may improve well-being. As such, offering students the option to preselect healthful menu options could be another way to improve their food choices. Through preordering their groceries, either by phone or possibly online, FSP participants could also be given the option to preselect their foods directly through FSP.