A Perspective on Eating Behaviors from the Field of Judgment and Decision Making

Ellen Peters, Ph.D.

Abstract

Background In this commentary, I review a key theme—the construction of preferences—that underlies the psychology of judgment and decision making and may influence eating behaviors. Its central idea is that, in many situations, we do not know what we prefer and, as a result, we construct our preferences “on the spot” based on internal and external cues available at the moment.

Purpose To understand the extent of construction processes, one has to know both the decision maker (and how he or she draws meaning from information) and the environment she or he faces. I consider possible roles for affect and deliberation in the construction of eating preferences and also examine some existing evidence for two potentially important individual differences—numeracy (number ability) and aging.

Conclusion Research implications concerning ways to improve eating behaviors are considered.

Keywords Decision making · Information processing · Eating behaviors · Numeracy · Aging

Introduction

The most prominent view in contemporary social science is that human beings “have” preferences and that their choices reflect these preferences. In eating behaviors, for example, many people “prefer” high-fat foods. Of course, most people also “prefer” to be healthy, and this preference comes in conflict with the former one. Some people strongly “prefer” spinach over broccoli whereas others do not have a preference but will willingly choose between them nonetheless at dinner. We carry preferences in memory for many things such as spinach and chocolate, having built these preferences over a lifetime of experiences. Some preferences are rather abstract (e.g., I want to be healthy) whereas others are quite concrete and specific (e.g., I hate broccoli).

How are choices made, however, when “preferences” do not exist, or they exist but are in conflict? A major theme in the literature on judgment and decision making is that of the construction of preferences. Its central idea is that in many situations, we do not really know what we prefer, and as a result, we construct our preferences “on the spot” based on internal and external cues available at the moment. “Virtually every current theory in decision making can be considered a theory of preference construction” (p. 3, [1]). The emerging view in the decision literature is that in many situations, preference measurement is best considered as architecture (building a set of preferences) rather than as archeology (uncovering existing preferences; [2–4]). The work to date in eating behaviors has perhaps focused overly on archeology and not enough on architecture. As a result, in this commentary, I examine the relevance of preference construction for understanding decisions about eating.

The Construction of Preferences in Eating Behaviors

Preference construction in eating decisions, like other decisions, will depend on how decision makers process
available information. Preference construction is more likely in situations that are unfamiliar and where the options have not been experienced (and, thus, stable preferences do not exist). Such unfamiliar situations might include choices about end-of-life care or prostate-cancer treatment [5–7]. Although one might expect people to have consistent beliefs in such critical and basic areas (e.g., how they wish to die), the data suggest that their preferences fluctuate and can depend on transient feeling states. Of course, in some ways, it is not surprising that reactions to one’s own mortality are complex, highly emotional, and changeable. What may be more surprising is that even in familiar domains such as everyday eating behaviors that happen frequently and are considerably less emotional, decisions are quite prone to preference construction nonetheless. For example, Wansink, Painter, and North [8] demonstrated that people “constructed” the quantity of food they consumed, at least in part, from a visual cue. When given a bottomless bowl of soup (that filled itself from a tube hidden in the bottom of the bowl), they unknowingly consumed more than when given a normal bowl. Presumably, individuals knew how hungry they were, but they constructed the amount they consumed at least partially from the visual cue of how much soup was left in the bowl rather than basing the quantity they consumed on internal hunger signals or their customary consumption quantity [9].

Other characteristics that predict when preference construction is more likely (besides unfamiliarity and lack of experience with options) include: (a) when conflicts exist among known preferences; (b) when it is difficult to translate feelings into a numerical scale (e.g., freshly picked local produce tasks great; how much more are you willing to pay for it?); and (c) when we do not have strong feelings about different options or have conflicting feelings about them [10]. Decisions involving numeric information, such as nutrition-fact labels, calorie monitoring, and portion size estimation, may be particularly susceptible to preference construction because processing numeric information is difficult, and many people are less proficient with numbers [11, 12]. As a result, individuals will not always use numeric information in meaningful ways [13]. For example, how much of a good is purchased at the grocery can be influenced by purchase limits introduced at the point-of-sale in a process that involves anchoring on provided values. In one study [14], buyers purchased more cans of soup when purchases were limited (e.g., a limit of four [or 12] per person) than when they were not limited; further, more soup was purchased with higher limits. The buyers appeared to anchor on the maximum purchase quantity and use it as a cue to construct the number of soup cans to purchase. In another study in the same paper, individuals who retrieved an internal anchor (by explicitly estimating the quantity they usually consumed) were not susceptible to the externally provided maximum purchase quantity. Because larger quantities available in the home can lead to greater consumption, understanding how to predict these and other constructive processes and how to counteract them is important.

**Affect and Cognition in Preference Construction**

This architecture or building of preferences seems to be influenced by cognitive reasons and by feelings. Recent research in decision making demonstrates that information processing is influenced by these two different modes of thinking: affective/experiential and deliberative ([15–17]; these modes are also called Systems 1 and 2, respectively—see [18, 19]). Both modes of thought are important to forming decisions.

The deliberative mode is conscious, analytical, reason-based, verbal, and relatively slow. It is the deliberative mode of thinking that is more flexible and provides effortful control over more spontaneous experiential processes. Kahneman [19] suggests that one of the functions of the deliberative system is to monitor the quality of the affective/experiential system’s information processing and its impact on behavior.

The experiential mode, in contrast, produces thoughts and feelings in a relatively effortless and spontaneous manner. The operations of this mode are implicit, intuitive, automatic, associative, and fast. This system is based primarily on affective (emotional) feelings. As shown in a number of studies, affect provides information about the goodness or badness of an option that might warrant further consideration and can directly motivate a behavioral tendency in choice processes [20, 21]. Marketers, who well understand the power of affect, typically aim their ads to evoke an experiential mode of information processing. As a result, individuals must learn to cope with these feelings that food marketers attempt to elicit if they want healthy eating habits. Both modes of thinking—deliberative and experiential—are important, and good choices appear most likely to emerge when the two modes work in concert and decision makers think as well as feel their way through judgments and decisions (e.g., [20]).

Recent research has developed and tested decision theories that incorporate affect as a key ingredient in the construction of preferences. Within these theories, integral affect (positive and negative feelings about a stimulus) and incidental affect (positive and negative feelings such as mood states that are independent of a stimulus but can be misattributed to it) are used to predict and explain a wide variety of judgments and decisions ranging from choices among gambles to life satisfaction and valuation of human lives [22–24]. Slovic and Peters [25], for example, review
findings about the “affect heuristic,” a decision-making strategy that bases decisions on the rapidly experienced good and bad feelings attached to decision alternatives. They suggest that reliance on feelings will sometimes improve decision making and other times harm it (see also [26]).

These two systems also interact—the extent of cognitive resources available can modulate the influence of affective considerations. In one study, for example, Shiv and Fedorikhin [27] found that individuals with experimentally reduced working memory capacity were more likely than a control group to choose a piece of chocolate cake over a bowl of fruit salad. They conclude that when cognitive resources are limited, spontaneous affective reactions (chocolate cake tastes good) rather than cognitions (fruit salad is healthier) have a greater influence on choice. In contrast, when cognitive resources are readily available, cognitions related to the consequences of food choices will have greater impact, and consumers will be more likely to make healthier choices. These results imply that diet interventions may be more successful when they include training components in areas such as stress management and time management as a way to increase the cognitive resources available for dieting and thereby decrease the role of affect in decisions. The results also underscore the importance of emotional triggers and emotional regulation in eating behaviors and the need for further research concerning such affects. Eating itself can elicit affective reactions and influence subsequent choices in the meal (Rothman, Sheeran, & Wood, this issue). Finally, individuals may also differ in their extent of emotional reactions and availability of cognitive resources in ways that may matter to eating behaviors.

Individual Differences in the Construction of Preferences

Preferences are constructed based not only on cues from the situation but also on stable characteristics of the decision maker (e.g., traits such as emotional reactivity, habits, and genetic makeup) and the decision maker’s transient characteristics at the moment of decision making (e.g., states of arousal, stress, or pain). As an eminent learning theorist once said, “To understand or predict what a rat will learn to do in a maze, one has to “know both the rat and the maze”” (p. 10, [28]). In other words, one has to understand the context or the situation that the individual faces, but one also has to understand the decision maker and how he or she will process and draw meaning from the information.

In this section, I focus on two individual differences—numeracy and age—that influence information processing and decision making and have been linked to some extent with problematic information processing and/or behaviors with respect to food.

Numeracy

Numeracy (defined as the ability to understand and use basic mathematical and probabilistic concepts) is an important skill in making good judgments and decisions [29]. Substantial problems exist in the USA, however, with respect to low numeracy [30]. Although more education is linked with higher numeracy [30], even highly educated individuals can be innumerate [31] and scores on a simple numeracy test tend to decrease significantly with older age; women also tend to score lower than men [32].

Inadequate numeracy may be an important barrier to individuals’ understanding and use of information in eating behaviors. For example, numeracy has been associated with comprehension of nutrition labels. Rothman et al. [33] found that comprehension of nutrition labels was significantly associated with numeracy skill and that this association held after adjusting for education and income. Although 89% of participants in their study reported using food labels, there were many errors in comprehension. In fact, only 32% could accurately calculate the number of carbohydrates in a 20-oz soda with 2.5 servings. Such findings are important given the need for diabetics and others with chronic health problems to carefully control food intake (often by counting carbohydrates), the number of dieters in weight-control programs who count calories or numbers of points, and recent educational efforts on numeric indicators such as body mass index (BMI) and waist-to-hip ratios. Lower numeracy, in fact, has been associated in a diabetic population with misinterpreting glucose meter readings and miscalculating carbohydrate intake and medication dosages; it also had a weak association with higher hemoglobin A1C levels [34].

Numeracy has also been associated with the processing of numeric and nonnumeric sources of information in ways important to decision making [35]. For example, highly numerate individuals appear to pay more attention to numbers and number comparisons, better comprehend them, translate them into meaningful information, and ultimately use them in decisions. Decisions of the less numerate are informed less by numbers and more by other nonnumeric sources of information, such as their emotions and mood states. Such results may translate into less numerate individuals having every intention of keeping to a diet, but being swayed more by consummatory desires and moods if healthy habits have not been established. They may also be motivated less by changes in numeric indicators such as weight or BMI. Consistent with this, less numerate primary-care patients also had higher BMI scores than those who were more numerate [36]. Of course, it is...
also feasible that the highly numerate, who attend more to numbers, may be less motivated to stick to an eating plan if such numeric indicators plateau. These are empirical questions that deserve additional research.

Age Differences across the Adult Life Span

A consideration of age differences in eating behaviors and the mechanisms underlying such differences is also important. By the year 2050, the number of older persons (60 years and older) will surpass the number of younger persons (under age 15) for the first time in history [37]. The fastest-growing age group in the world is the oldest old (age 80 and older). Although obesity in older age groups rivals that of younger adults, obesity among older adults is also an issue and is linked with decreased food intake [39]. The prevalence of these two issues points towards information processing in eating decisions among older adults as a potentially important topic.

In terms of information processing in decision making, research demonstrating a variety of age-related cognitive deficits (e.g., in speed of processing and working memory; [40]) leads us to believe that judgment and decision-making capabilities may decline as an inevitable course of the aging process, particularly in unfamiliar or less-meaningful situations [41]. Older adults tend to process less information in decisions, and they process it more slowly; they also demonstrate poorer judgments and decisions than younger adults when complex or changing rules must be learned. Results from health plan choice studies support this deliberative decline in comprehension and suggest that some people do not always comprehend even fairly simple information and that this lack of comprehension increases with older age. Hibbard, Slovic, Peters, Finucane, and Tusler [42] presented employed-aged adults (18–64 years old; n=239) and older adults (65–94 years old; n=253) with 33 decision tasks that involved interpretation of numbers from tables and graphs. For example, participants were asked to identify the Health Maintenance Organization (HMO) with the lowest copayment from a table that included four HMOs with information about monthly premiums and copayments. A comprehension index reflected the total number of errors made across the 33 tasks. The youngest participants (aged 18–35) averaged 8% errors; the oldest participants (aged 85–94) averaged 40% errors; the correlation between age and the number of errors was 0.31 (p<.001).

Age-related adaptive processes, however, influence decision making in three ways [41]. First, older adults selectively use their deliberative capacities based on their level of motivation to make decisions so that age differences in decisions lessen when the decisions are more relevant or meaningful. As a result, interventions that increase the perceived relevance of making healthy choices to having a healthy, active life with grandchildren and other loved ones could be more affective with older adults than their younger counterparts. Second, older adults may focus relatively more than younger adults on emotional content (and sometimes on positive content) in decisions. For example, Fung and Carstensen [43] found that, relative to younger adults, older adults exhibited greater preference and superior memory for emotional advertisements than for nonemotional ones. In a second example, Lockenhoff and Carstensen [44] asked older and younger adults to examine information about health choices by clicking on cues indicating information that was positive, negative, or neutral. In their study, older adults selected and recalled a greater proportion of positive versus negative information compared to younger adults. As a result, older adults could be easier prey for food marketers using strongly affective appeals or misleading information [45, 46]. They may also have a harder time monitoring and controlling their eating behavior if those behaviors are not habitual. Alternatively, if food loses its emotional appeal due to physiological declines and older adults make decisions more than younger adults based on emotions, then this lack of emotional appeal could underlie the increased prevalence of malnutrition and decreased food intake among older adults [39]. The quantity of evidence for this conclusion about focus on emotional content is sparse, however, particularly with real rather than abstract gains and losses.

Finally, the accumulated experience and knowledge of older adults can compensate in some cases for age-related declines. Older adults’ knowledge and experience appear to benefit them in familiar life situations and may lead them to less preference construction. For example, Tentori, Osherson, Hasher, and May [47] demonstrated that older adults were less likely to let situational information (e.g., the attractiveness of a discount in comparison to other available discounts) influence their decisions in a grocery store when its choice would require a larger minimum purchase than their usual budget. Tentori et al. argued that older adults’ everyday life experience with the grocery-store context is advantageous because they have knowledge of the situational variables that may influence their judgments and can discount irrelevant information (see also [48] for similar results). In another example, examining decisions about over-the-counter drugs, Johnson and Drungle [49] found that older adults were more likely to focus on active ingredients than were younger adults and were also more systematic in their information searches, presumably reflecting their greater experience with using these drugs. Stephens and Johnson [50] also found that older adults were more likely to focus on side effects and drug interactions than were young adults. Such information is of obvious relevance to older...
adults who are more likely than the young to be taking multiple prescription drugs at any one time. Older adults’ life experiences such as in health and grocery shopping increase their expertise in these areas and may benefit judgment and decision making.

Although little research exists thus far on age differences in judgment and decision processes, it is clear that older adults will process information in food and other decisions differently than will younger adults. The resulting decisions sometimes will be better and other times will be worse. An understanding of these differences in eating behaviors can contribute to basic theory and to applications in this important domain.

**Managing Preference–Construction Processes**

Decision making occurs at all points along the continuum of eating behaviors, from understanding nutrition information to grocery shopping to weight control. Researchers attempting to expand our knowledge of eating behaviors may benefit by attending to the literature on judgment and decision making when conceptualizing and designing their research questions.

In this paper, I focused on the key theme of preference construction and examined some of its components (e.g., affective versus deliberative processes, numeracy, and age) that emerge from recent decision research. If preference construction does exist in eating behaviors as the evidence suggests, what does this mean for informed decision making and how we might promote and manage better decisions? According to Hibbard and Peters [51], making good decisions (which is what we want informed decision makers to do) requires information to be available, accurate, and timely. Nutritional facts labels, for example, meet this requirement. Decision makers also, however, must comprehend the information and comprehend the meaning of the information. Nutritional fact labels, however, are not always understood [33]. Beyond simple comprehension, individuals must be able to determine meaningful differences between options, weigh factors to match their needs and values, make tradeoffs (e.g., between risks and benefits), and ultimately choose. But consumers often make food purchases and consumption behaviors based on habit [52], implying that many of these later processes do not always take place in day-to-day eating behaviors and are instead replaced by habitual responding. For some consumers, biological factors may also play a role and constrain preference construction for food (Wardle & Carnell, this issue). In situations where habitual responses or biologically based preferences do not take over, preference construction may play a determining role in choices and undermine the notion of “informed choice.”

How can one help individuals make better-eating choices when such choices are, at least in part, constructed? One alternative is libertarian paternalism [53], an approach that recognizes that it is virtually impossible to frame information in a truly neutral manner. Within this model, the individual retains freedom of choice among a set of options that have been presented in such a way that individuals will be nudged to select the option that is most likely to promote their welfare. For example, given the instability of preferences, Johnson et al. [54] propose one strategy for producing better decisions: the careful identification of a default option. As Johnson et al. admit, however, using defaults implies that a single “better” option exists and that a paternalistic choice (i.e., the health professional knows best) can improve patient health. Nonetheless, setting up a personal “default option” for eating behaviors (e.g., I will eat a salad everyday for lunch) may be quite helpful for an individual and research on default options may prove fruitful.

Consistent with the notion of attempting to harness the power of constructed preferences, researchers might also consider whether eating decisions vary based on the content of a health communication and its framing of alternatives. They could examine whether healthy food-related decisions vary across situations and emotional states and whether such descriptive research points towards ways to encourage greater stability.

Affect and beliefs are also important. How can long-term, abstract preferences such as health be made salient enough to overcome short-term consummatory desires on an ongoing basis? Do dieters weigh all alternatives to weight control (and the costs and benefits inherent in each one) equally in order to make a “rational” decision about how to control weight? I suspect not, given the real likelihood of information overload. What is the role of affect in what can be an emotionally charged decision? Does consideration of other close family members or friends who have developed health complications from weight issues create feelings of sadness, worry, or fear, and if so, how do these emotions affect decision making?

Preferences are also constructed based on “who I am” as a decision maker. How can information best be presented to help less numerate individuals comprehend and use numeric information such as nutrition facts when they want to (e.g., only at the point of purchase for comparison or as an ongoing aid to daily consumption decisions)? Can the way information is presented assist older adults who are less flexible in their processing? Research demonstrates that careful attention to information presentation in other health contexts should allow individuals to understand and use numbers, including calorie counts, more effectively in decisions [29]. As a result, the challenge is not merely to communicate nutritional information to the public but to
understand how to present that information so that it is used appropriately in eating decisions.

These and other questions await empirical support in future eating-behavior and decision-making research. The consideration of preference-construction processes in other areas of health, environmental risk, political science, law, and economics has promoted knowledge and led to new theory development [1]. It may be here as well.

References

43. Fung HH, Carstensen LL. Sending memorable messages to the old: Age differences in preferences and memory for emotionally


