Advanced Review

# Values and preferences: defining preference construction

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Extensive research in the values and preferences literature suggests that preferences are sensitive to context and calculated at the time of choice. This has led to the view that preferences are constructed. Recent work calls for a better understanding of when preferences are constructed and when they are not. We contend that the answer to this question depends on the meaning of the term constructed. Constructed can mean that a preference changes across contexts. If construction is synonymous with context sensitivity, we contend that preferences are always constructed because context influences nearly every aspect of the judgment and choice process. As a motivating example, we show that preferences are influenced by goals and goals are highly context sensitive. Constructed, however, can mean instead that a preference is calculated or formulated during the judgment and choice process. If construction is synonymous with calculation, we contend that many preferences are calculated and the more important question is to what degree preferences are calculated. We review the literature that shows that the degree to which decision makers calculate preferences is influenced by goals, cognitive constraints, and experience.  *WIREs Cogn Sci*

A review of the values and preferences literature reveals a pervasive endorsement that preferences are constructed at the time of choice.[1–3] Recent work calls for a more nuanced reading of the literature and suggests that many judgments and choices are based on stable, revealed, or inherent preferences.[4–6] We heed this call and review literature that suggests when preferences are constructed and when they are not. Our review reveals that the term preference construction is often used imprecisely, with two possible meanings. First, the term constructed can mean that a preference changes across contexts. If construction is synonymous with context sensitivity, we contend that preferences are always constructed because context influences nearly every aspect of the judgment and choice process. As a motivating example, we show that context influences goals, which in turn influence preferences. Second, the term constructed can instead mean that a preference is calculated or formulated during the judgment or choice process. If construction is synonymous with calculation, we contend that many preferences are calculated and a more important question is to what degree they are calculated. We review the literature that shows that goals, cognitive constraints, and experience influence the extent to which decision makers calculate preferences. We conclude by encouraging decision theorists to abandon the debate of whether preferences are constructed. Instead, we encourage the continued development of (1) contextually sensitive choice models and (2) theories that examine how goals, experience, and cognitive constraints influence the degree to which judgments and choices are calculated.

## DEFINING VALUE AND PREFERENCE

The value of some state of the world is typically defined as the extent to which it is considered desirable or undesirable. Economists and behavioral decision theorists often use the word utility rather than value to emphasize value's subjective nature.[7] In classic utility theory, values are not measured, but rather inferred from preferences.[8] Consequently, values and preferences are often used interchangeably—a preference for some state of the world over some other state of the world demonstrates that the former is valued more than the latter.

The term preference is used in multiple ways. Economists and behavioral decision theorists often

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equate preference with choice or willingness to pay.[5,9] By this interpretation, a preference for option A over options B and C means that either a decision maker selected A over B or C or that he or she was willing to pay more for A than B or C.[8] We refer to this interpretation as an *expressed preference*. Psychologists, however, typically use the term preference to denote a latent tendency to consider something desirable or undesirable.[10] By this interpretation, preferences are equivalent to attitudes and are typically measured through scale ratings or response latency measures.[11] We refer to this interpretation as an *underlying preference*.

Typically, the literature assumes that expressed and underlying preferences are the same despite differences in the way the preferences are measured and inferred.[12] Thus, we use the general term preference unless it is necessary to differentiate between expressed and underlying preferences.

## VIOLATIONS OF UTILITY THEORY

Classic utility theory predicts that when choosing between multiple options, the decision maker always prefers the option with the highest subjective value.[13] In other words, decision makers select their preferred option based on its perceived value relative to other options in the choice set. Utility theory acknowledges that preferences vary between individuals. For example, when deciding whether to eat a bowl of soup or a bowl of ice cream, some people prefer the soup and others prefer the ice cream. However, utility theory assumes that preferences are stable and complete.[3,6,9] Stability implies that people who select soup over the ice cream in one context should exhibit the same preference in a different context. Completeness implies that an individual has a known subjective value for the soup, the ice cream, and every other possible choice option and that these underlying preferences are expressed at the time of choice.

Behavioral decision theory developed, in part, by showing that preferences are neither stable nor complete. Instability is typically demonstrated by showing preference reversals. For example, systematic preference reversals are caused by differences in the method used to measure preferences,[2] the framing of choice information,[14] and the presence or absence of extraneous options in a choice set.[15,16] Although utility theory does not address psychological processes *per se*, the completeness principle implies that preferences are activated or retrieved, as opposed to being calculated, at the time of choice. In other words, completeness assumes that underlying preferences exist and are the lone determinant of expressed preferences. Research, however, suggests that preferences are not always complete—decision makers adaptively vary the extent to which they calculate their preferences during the decision-making process.[1]

Based on this and other compelling evidence reviewed in detail elsewhere,[2,17–19] decision theorists have convincingly demonstrated that preferences are not always stable, nor are they always complete. If they were, systematic reversals in expressed preferences and adaptive decision-making strategies would not be easily and pervasively demonstrated.

## WHEN ARE PREFERENCES CONSTRUCTED?

Because systematic reversals in preferences and adaptive decision-making strategies are so easily and pervasively demonstrated, behavioral decision theorists typically conclude that preferences are constructed.[1,17] The conclusion, however, can range from the more conservative observation that 'consumers may lack a well-defined preference structure[20]' to the slightly more ambitious claim that 'preferences are often constructed[2]' to the more extreme belief that 'choice is inherently constructive.[1]'

A few researchers have recently challenged the idea that preferences are always or even usually constructed[4,5]. Simonson,[5] in particular, argues that many decisions are based on stable, underlying preferences, and he calls for a better understanding of when expressed preferences are constructed and when they are not.

We contend that determining whether preferences are always or even usually constructed depends on how the term constructed is defined. The term constructed is used to describe situations in which preferences are not stable and situations in which preferences are not complete. Consequently, preference construction has multiple meanings.

Preference construction can mean that preferences are not stable.[5,21] Thus, one meaning of preference construction is that *preferences are context sensitive*. This use of constructed is fairly prevalent in the literature. For example, Payne and colleagues[22] claim that one of the two major tenets of preference construction is that preferences are influenced by properties of the decision task. Dhar and Novemsky[6] also state that 'researchers concluded that inconsistency implied preferences were constructed' and that 'completeness violations do not speak to the issue of inherent versus constructed preferences.' In this sense, preference construction refers to a behavioral

outcome: expressed preferences change because of changes in context.

Preference construction, however, can also mean that preferences are incomplete. Therefore, a second meaning of preference construction is that *preferences are calculated* or formulated while making a decision as opposed to merely being retrieved. Payne and colleagues[22] claim that the other major tenet of preference construction is that preferences are calculated when responding to a valuation question or making a decision. In a related article[1] they state, 'preference formation may be more like architecture, building some defensible set of values, rather than like archaeology, uncovering values that are already there.' This meaning of constructed is also implied in statements such as, 'preferences are not simply read off some master list but are constructed on the spot.[2]' We use the term calculation to refer to the extent to which decision makers integrate multiple pieces of information from memory or the environment to form a preference during the decision-making process. Calculation implies that the decision maker does not base an evaluation or decision solely on a retrieved evaluation or past choice. Calculation encompasses several psychological processes involved in forming a preference, including the consideration,[23–25] weighting,[26–28] valuation,[29,30] and integration[1] of inputs relevant to the decision at hand. In this sense, preference construction refers to a psychological process: the extent to which preferences are calculated while making a judgment or decision.

To document the two ways in which preference construction is defined and operationalized in the literature, we searched for journal articles using preference construction (or a closely related term) in the title or keywords in the ABI/Inform, Business Source Complete, and PsycINFO databases. Our admittedly noncomprehensive search yielded the 27 articles listed in Table 1 with review articles and empirical articles listed separately. Next, we sorted the articles according to how they define and operationalize preference construction. In many cases, we had to infer the definition of preference construction, and in a few cases, we were uncertain of the intended meaning. Some of the articles discussed both the aforementioned meanings of preference construction. In these cases, we listed the paper twice paraphrasing both definitions.

There are two major takeaways from the table. First, preference construction is sometimes defined and operationalized to mean that preferences are context sensitive and other times defined and operationalized to mean that preferences are calculated. Second, preference construction is not always defined and operationalize in the same way. Although most articles define construction in terms of calculation, many operationalize preference construction as context sensitivity.

Our reading of the articles from the search revealed that the literature sometimes conflates the meanings of the term constructed (Table 1). This occurs in part because context sensitivity is typically interpreted as evidence that preferences are calculated.[1,6] In other words, preference instability is seen as evidence that preferences are incomplete. Context sensitivity, however, does not necessarily imply that preferences are calculated.[1] For example, a decision maker may retrieve an underlying preference for soup over ice cream at lunch but retrieve an underlying preference for ice cream over soup after dinner. Similarly, calculation does not necessarily imply that choices will change across context.[6,48] For example, a decision maker may weigh different possible advantages and disadvantages of soup and ice cream at lunch and again after dinner but end up selecting the same option on both occasions.

In summary, context sensitivity and calculation are distinct and probably should not both be equated with the term constructed. Thus, the question 'when are preferences constructed?' is actually two different questions: 'when are preferences context sensitive?' and 'when are preferences calculated?' We address each of these questions in turn.

## WHEN ARE PREFERENCES CONTEXT SENSITIVE?

A majority of the empirical articles in Table 1 operationalize preference construction in terms of preference instability or context sensitivity. Consequently, most of the evidence that preferences are constructed is based on the observation that preferences change as a function of task, measurement, and choice environment.[2]

Simonson[5] argues that many of the preference reversals documented in the literature may not be typical of decisions made outside highly contrived experimental tasks. He argues that many decisions are based on underlying preferences that are fairly stable across contexts. However, we contend that preferences are always context sensitive. We briefly review the growing evidence that suggests that all cognition and behavior is context sensitive. Then, as a motivating example, we show how preferences depend on goals and how goals systematically change across contexts.

## Cognition Is Context Sensitive

Research in psychology stresses the contextual sensitivity of cognition. Cognitive psychologists have argued that context always influences cognition and, by extension, behavior. Perception is sensitive to both context and experience. Even psychophysical attempts to scale the relationship between weight and heaviness or lumens and brightness are highly sensitive to changes in the measurement technique and the range of stimuli.[49,50] As an example of how perception is influenced by context, consider Figure 1. In this figure, the middle character is typically perceived to be 'B' when it appears between other letters but '13' when it appears between other numbers.[19] Cognitive psychologists have also provided strong evidence that memories are highly sensitive to contextual cues rather than simply being retrieved as stored.[51] After viewing pictures of a car accident, participants were

**TABLE 1** | Definitions and Operationalizations of Preference Construction in the Literature

| Citation | Meaning of Preference Construction | |
|---|---|---|
| Review Articles | Defined as Context Sensitive | |
| Kivetz et al.[4] | Context dependent (p. 182) | |
| Payne et al.[22] | Shaped by the interaction between information-processing abilities and properties of the choice task (p. 245) | |
| Simonson[5] | Not stable; sensitive to context, elicitation method, and description of options (p. 157) | |
| | Defined as Calculated | |
| D'Agostino[31] | Unknown before choice (p. 10) | |
| Bettman et al.[32] | Formed by integrating primitives (i.e., multiple inputs) during choice (p. 171) | |
| Dietz and Stern[33] | The process of making a decision (p. 262) | |
| Payne et al.[22] | Formed during choice (p. 245) | |
| Simonson[5] | Formed during choice (p. 155) | |
| Empirical Articles | Uncertain of Definition | Operationalized as Context Sensitive |
| Arvai et al.[34] | | Susceptibility to a framing effect |
| Caruso and Shafir[35] | | Extent to which attention to mood influenced preferences |
| Dhar et al.[36] | | Susceptibility to context effects |
| Dhar et al.[27] | | Susceptibility to a previous similarity judgment |
| Fischer et al.[37] | | Susceptibility to the prominence effect |
| Hoeffler and Ariely[38] | | Preference instability over time |
| Yoon and Simonson[39] | | Susceptibility to context effects |
| | Defined as Calculated | Operationalized as Context Sensitive |
| Amir and Levav[40] | Formed during choice (p. 145) | Susceptibility to the attraction effect |
| Bateman et al.[41] | Formed during choice (p. 376) | Susceptibility to the affect heuristic |
| Coupey et al.[28] | Formed during choice (p. 459) | Susceptibility to the prominence effect |
| Drolet et al.[42] | Not retrieved (p. 200) | Susceptibility to the compromise effect |
| | Formed during choice (p. 201) | |
| Johnson et al., 2005[43] | Formed during choice (p. S17) | Susceptibility to elicitation method |
| Kramer[44] | Formed during choice (p. 224) | Inconsistency between elicitation methods |
| | Defined as Context Sensitive | Operationalized as Calculated |
| Haubl and Murray[26] | Shaped by interaction between processing abilities and task environment (p. 77) | Changes in attribute importance weights |
| | Uncertain of definition | Operationalized as calculated |
| Johnson et al.[45] | | Changes in attribute consideration and weighting |
| Zhang and Markman[24] | | Attributes considered during choice |

**TABLE 1** | Continued

| Citation | Meaning of Preference Construction | |
|---|---|---|
| | Defined as Calculated | Operationalized as Calculated |
| Haubl and Murray[26] | Formed during choice (p. 77) | Changes in attribute importance weights |
| Milch et al.[23] | The process of making a decision (p. 243) | Reasons, goals, and attributes considered during choice |
| Niedrich and Swain[46] | The process of making a decision (p. 310) | Weighting of information inferred from choice |
| Peters et al.[47] | Formed during choice (p. 309) | Inputs (e.g., affect and information) considered during choice |
| Simon et al.[30] | Formed during choice (p. 1) | Changes in importance ratings and valuations of attributes |
| Wang and Lee[25] | Calculated using a variety of strategies (p. 29) | Information considered during choice |

Many of the papers do not explicitly define preference construction. In these cases, we did our best to infer intended meaning of preference construction. In a few cases (listed in a separate section), we were unable to infer the intended meaning of preference construction.

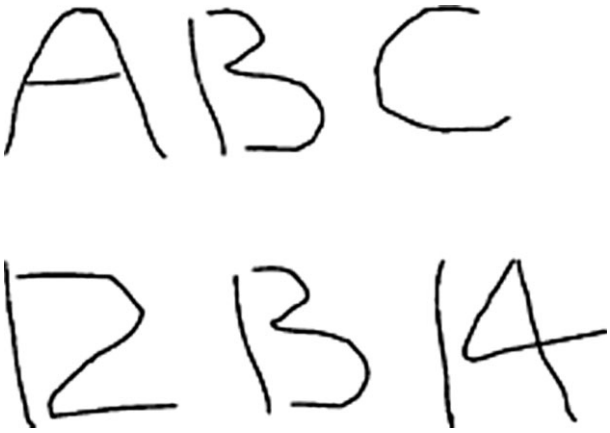


**FIGURE 1** | Illustration of how perception is sensitive to context. The middle figure is typically perceived to be 'B' when it appears between other letters in the top row. However, the same figure is typically perceived to be '13' when it appears between other numbers in the bottom row (adapted from Kahneman[19]).

more likely to remember broken glass in one of the pictures if questions about the accident suggested that the cars 'smashed into each other' rather than 'hit each other.[52]' Additionally, most leading models of cognitive representation and processing view cognition as an interaction between dynamic contextual inputs and relatively stable constraints.[53,54]

Social psychologists also document pervasive contextual influences on attitudes and behavior.[55] In Darley and colleagues'[56,57] classic studies, contextual variables, such as the presence of other people or whether the person is running late, predict decisions to help a potential victim better than stable dispositions, such as religious views. More recent research shows that decisions are even influenced by extremely subtle environmental cues often operating outside conscious awareness.[58] For example, survey participants were more likely to prefer products associated with the color orange, such as Fanta, when asked to complete the survey with an orange pen and more likely to prefer products associated with the color green, such as Sprite, when asked to complete the survey with a green pen.[59] Given the belief that cognition and behavior always depend on context, it seems likely that preferences are also always sensitive to context.

A complete review of the many ways that context influences perceptions, thoughts, and behavior is beyond the scope of this article. In order to further support our claim that preferences are always sensitive to context, next we delve more deeply into the literature that shows how goals, which are a primary determinant of behavior, change over time and across contexts.

## Preferences Depend on Unstable Goals

A compelling reason for why preferences are not stable is that preferences depend on goals and goals change over time and across context.[60] Goals are desired end states that may or may not be consciously accessible.[61] Goals can be genetically inherited, as is the case with biological drives (e.g., hunger), or learned through experience, as is the case with culturally idiosyncratic goals (e.g., publishing influential research papers). Importantly, people behave in a way that will increase the likelihood of attaining their most accessible goals.[62]

Goals influence values and preferences because decision makers select options for the goals the options facilitate, not the attributes they possess.[60] Goals, consequently, directly influence the extent to which options and outcomes are preferred.[63–65] Goals can also shape preferences indirectly by influencing the reference point used to evaluate an option or outcome[66] or the process used to calculate a decision.[1,29,37] This literature suggests that when goals change, preferences typically change as well. For example, a consumer may prefer soup when she wants to warm up but ice cream when she wants to cool down.

Goals change for many reasons, and as they change, they create preference instability. Goals can be primed by exposure to means or opportunities for fulfilling the goal,[67] opposing temptations,[68] or desired but unattained personality traits.[69] Once primed, the effect of goals on choice will increase with time, unless the goals are subsequently inhibited or released.[70] Goals are inhibited when competing goals become more active[64,71] and released when the goal is attained,[72] progress has been made or is expected to be made toward the goal,[73,74] or when the goal seems too difficult to attain.[75] For example, the smell of soup may activate a desire for a healthy meal and cause the consumer to prefer soup to ice cream. However, after eating the soup, the health goal will be released and a goal to indulge may become more active, causing the consumer's preference to switch from soup to ice cream.

Many of the examples of preference instability in the literature can be explained by assuming that choice is driven by goal pursuit rather than utility maximization.[60,63] Consider Tversky and Kahneman's[14] classic illustration of how preferences change depending on the way information about the choice options is framed. In the famous Asian disease problem, participants are asked to choose between a riskless and a risky solution to help combat the outbreak of a disease expected to kill 600 people. The options are either presented as gains (i.e., lives saved) or losses (i.e., lives lost). People tend to prefer the riskless option when the outcomes are described in terms of lives saved but the risky option when they are described in terms of lives lost. Although this preference reversal is inconsistent with utility theory, it is consistent with the hypothesis that decision makers pursue accessible goals. Framing the options in terms of lives gained activates an approach goal: saving lives. The riskless option, in which 200 lives are saved, attains this approach goal with certainty. However, the risky option, in which there is a two-third probability that no lives will be saved, risks failing to attain the goal. Conversely, framing the option in terms of lives lost activates an avoidance goal: not losing lives. Here, the only possible way to attain the goal is to select the risky option in which there is a one-third probability that no lives will be lost. The riskless option, in which 400 lives will be lost, fails to attain this goal with certainty.

Changes in goal states will direct attention to different information and alter thought processes,[62] which we suspect provides compelling explanations for other classic demonstrations of preference instability, such as the attraction effect[16] and the compromise effect.[15] In both the attraction effect and the compromise effect, adding an extraneous option to a choice set increases expressed preference for the asymmetrically dominant option or compromise option, respectively. In both cases, adding the extraneous option makes the choice of the focal option easier to justify. As previously discussed, increasing the means for making a justifiable decision may activate the goal to make a justifiable decision,[67] which likely enhances preferences for both the asymmetrically dominant and compromise options.[60]

### Summary

If preference construction means that preferences are context sensitive, then the emerging consensus in psychological science that all cognition and behavior is sensitive to context suggests that preferences are always constructed. As an example, preferences are highly influenced by goals and goals change systematically across contexts and over time. Moreover, differential goal activation may explain preference reversals documented in the behavioral decision-making literature.

Although preferences are always sensitive to context, they may not always be calculated during the decision-making process. In the next section, we discuss the second meaning of the term constructed by discussing factors hypothesized to influence the extent to which preferences are calculated.

## WHEN ARE PREFERENCES CALCULATED?

Despite a pervasive tendency to operationalize preference construction as preference instability, decision-making researchers often define preference construction as a process of arriving at a decision rather than the decision outcome itself.[1,2,9] In this view, a constructed preference is an expressed preference that is calculated during the process of making a decision. Specifically, calculation refers to the integration of multiple inputs or pieces of information into a judgment or decision. The inputs that shape a calculated preference can be retrieved from memory, observed in the choice environment, or inferred based on the decision maker's general beliefs. We refer to expressed preferences based solely on an underlying preference, existing attitude, past decision, or genetically inherited instinct as being retrieved rather than calculated. Calculation need not imply consciousness, as there is emerging evidence that decision makers are capable of unconsciously considering and integrating multiple pieces of information.[76]

We do not take a strong position about whether preferences are ever purely retrieved. Even recalled attitudes and instinctual reflexes are likely mediated by the integration and coordination of multiple neurons.[53] Therefore, if a neuron or other miniscule unit is seen as a single input, all preferences are calculated to some extent. Conversely, if a complete, expressible attitude or prior behavior is seen as a single unit, then preferences are not always calculated. Rather than take a strong position about whether preferences are ever purely retrieved, we instead prefer to view calculation as a continuum. Viewed as a continuum, the greater the number of inputs that are considered, weighted, evaluated, and integrated during the decision-making process, the more the preference is calculated. At the high end of the calculation spectrum, preferences are based on many considerations, attributes, and integrating operations. On the low end of the spectrum, preferences are based solely on a recalled attitude, a prior choice, or a reflexive instinct. A decision about which car to purchase will likely involve considering, weighting, evaluating, and integrating many pieces of information, whereas a decision to remove one's hand from a scorching flame will likely involve only a reflexive withdrawal. In this example, the preference for the selected car is calculated (much) more so than the preference to avoid burning one's flesh.

As previously discussed, there is considerable evidence that preferences are often calculated while making a decision.[1,2,9] However, evidence also suggests that all preferences are not calculated to the same extent. In this section, we draw from research on attitudes, judgments, and decision making to outline factors that influence preference calculation. Specifically, we review the literature that suggests that the degree of calculation depends on the goals, cognitive constraints, and experience of the decision maker.

## Goals

In addition to directly influencing preferences and values by way of context as previously discussed, goals influence the extent to which preferences are calculated. Decision makers use more calculation when they are highly motivated to make an accurate and justifiable decision.[1] Sanbonmatsu and Fazio[77] cleverly show that activating a justification goal increases calculation. In their study, participants viewed pieces of information about various departments for two different retailers. One of the stores performed better in a majority of the departments, but worse in the camera department. After exposure to this information, participants were asked to select a store at which to purchase a camera. At the beginning of the study half of these participants had been told that they would need to explain and justify their choice to the experimenter and other participants. Participants who had not been told they would need to justify their decision were more likely to base their preference on their retrieved attitude toward the stores and select the store that performed better overall. However, participants who had been told they would need to justify their decision were more likely to calculate their preference from the previously presented information and select the store that performed worse overall, but better in the camera department.

Accuracy and justification are not the only goals that increase calculation. Mantel and Kardes[78] show that need for cognition, or motivation to think, increases the extent to which decision makers calculate their preferences by integrating specific attribute information as opposed to merely retrieving an existing attitude. A separate stream of research suggests that culturally specific goals influence the extent to which decision makers calculate preferences. For example, compared with decision makers from cultures that value the expression of free choice, decision makers from cultures that value responsiveness to the desires of others are more likely to consider the values and expectations of others when making decisions.[79] Indian decision makers, who value responsiveness to others, took longer to make decisions and were less likely to base their decisions solely on their underlying preference than American decision makers, who value the expression of free choice. In each of these examples, consumers motivated to integrate additional information base their preferences on more than a retrieved underlying preference or attitude.

Other goals reduce the extent to which decision makers calculate their preferences. Research suggests that the need to minimize effort and the need for closure both reduce calculation. Decision makers motivated to reduce effort often base preferences on simplifying heuristics rather than integrating and weighting many pieces of information.[80] Similarly, decision makers with a high need for closure base preferences on less information and are less likely to subsequently update their preferences to account for new information.[81]

## Cognitive Constraints

The presence of cognitive constraints influences the extent to which preferences are calculated. Unlike goals, which can either increase or decrease calculation depending on the nature of the goal, in most situations,

increasing constraints decreases the extent to which preferences are calculated. The psychology literature presents three types of cognitive constraints: time pressure, the depletion of self-regulatory resources, and distraction.

Time pressure decreases the extent to which decision makers calculate preferences. Decision makers pressured to make a quick decision typically consider less information, make fewer tradeoffs, and are more likely to rely on existing attitudes when forming a preference.[36,77,82,83] For example, in the aforementioned study by Sanbonmatsu and Fazio,[77] participants pressured for time were more likely to base their preference on a retrieved attitude, whereas participants not pressured for time were more likely to calculate their preference using specific information about the stores. Research by Dijksterhuis[83] provides additional evidence that decreasing time pressure increases preference calculation even when participants are distracted. In several studies, participants indicated their preferences toward different apartments (or roommates) after being exposed to attribute information about each apartment (or roommate). Some participants expressed their preferences immediately after being exposed to the attribute information. Others were distracted for 3–4 min by an unrelated task before expressing their preferences. Participants who expressed their preferences after a delay were more likely to prefer options described as having more positive and less negative attributes than participants who expressed their preferences immediately after exposure to the attribute information. This suggests that time pressure reduces the extent to which decision makers tend to integrate multiple pieces of information when expressing a preference. In other words, it suggests that time pressure reduces calculation.

Decision makers are also less likely to calculate preferences when their self-regulatory resources have been depleted. For example, depleting resources by asking participants to ignore written captions on a silent video, write an essay without using the letters 'a' or 'n,' or perform a difficult version of the Stroop task decreases their propensity to make attribute tradeoffs and increases their reliance on simplifying heuristics.[84]

The relationship between distraction and calculation is less clear. It is often assumed that distraction and time pressure have similar effects on decision makers' processing abilities[85]. This line of reasoning suggests that distraction should decrease the extent to which preferences are calculated. Although some empirical evidence supports this idea,[86] other evidence suggests that decision makers are capable of considering and integrating multiple pieces of information while distracted,[76] and in some situations may be more likely to consider and integrate information when distracted.[87] For example, Drolet and Luce[87] show that participants asked to retain 20 words in short-term memory while making a series of decisions were more likely to report using attribute tradeoffs to calculate their preferences than participants not asked to retain the words in memory. The authors argue that cognitive load disrupts decision makers' ability to consider relevant self-goal information, which allows them to make tradeoffs without experiencing negative emotions. Yet again, the relationship between distraction and calculation may depend on the decision maker's goals. Preliminary evidence suggests that distraction may be more likely to increase calculation for decision makers who want to form a unified impression[88] or avoid making emotional tradeoffs.[87] More research is needed to better understand the relationship between distraction and preference calculation.

## Experience

The likelihood of and extent to which decision makers calculate preferences depend on their experience. Research suggests that decision makers often retrieve existing underlying preferences in familiar situations.[89,90] As situations become even more familiar, underlying preferences become automatically retrieved and more likely to direct behavior.[91,92] Conversely, in unfamiliar situations, underlying preferences may not exist, so the decision maker may need to calculate a preference based on relevant, accessible information.[89] For example, in a follow-up study by Sanbonmatsu and Fazio,[77] participants asked to form an attitude about the focal camera department before being exposed to information about the department were capable of retrieving this attitude when making a subsequent choice between stores. Conversely, participants not asked to initially form an attitude toward the focal department calculated subsequent preferences, provided they were both motivated to make a justifiable decision and were not under time pressure.

Other research suggests that experienced decision makers are less susceptible to framing effects and more likely to express consistent preferences across time, choice tasks, and elicitation methods.[28,44,93] For example, Kramer[44] shows that digital camera preferences elicited through full-profile conjoint analysis were more consistent with subsequent preferences elicited through choice for participants more knowledgeable about cameras. Although preference

instability does not necessarily imply preference calculation, this research suggests that experience reduces calculation.

The relationship between experience and preference calculation depends on the nature of the previous experience. In particular, the way information has been processed in the past influences the extent to which preferences are subsequently calculated. People are more likely to use information to calculate preferences when they have previously attended to the information.[90] When specific information is not attended to, decision makers will be more likely to base preferences solely on retrieved attitudes.[77,90] Similarly, forcing decision makers to perform effortful attribute tradeoffs in prior decisions leads greater preference consistency, which tentatively suggests less calculation, in subsequent decisions.[40] Collectively, this work shows that the extent to which preferences are calculated depends on the amount and quality of the decision maker's experience.

### Integrating Goals, Constraints, and Experience

There are differing opinions about how goals, constraints, and experience interact to influence preference calculation. A number of dual-process theories[11,19,80] suggest ways in which these factors combine to influence information processing and decision making. First, the Motivation and Opportunity as Determinants (MODE) model,[77] most directly addresses the question of when preferences are more or less calculated. The MODE model suggests that in most cases, expressed preferences are based on a retrieved attitude. Expressed preferences will be calculated when and only when decision makers (1) are motivated to process information related to the decision, (2) face minimal cognitive constraints, and (3) do not have an accessible attitude or underlying preference stored in memory.

Another prominent model of preference calculation suggests that expressed preferences are formed by considering and integrating accessible and diagnostic inputs.[89,94] Decision makers initially consider the first input that comes to mind. This could be an instinctual reaction, an existing attitude, or any other piece of information prominently presented in the environment or easily retrieved from memory. If this initial input seems sufficiently diagnostic for the judgment or decision at hand, it alone will shape the expressed preference. If the initial input does not seem sufficiently diagnostic, the decision maker will recruit and integrate additional accessible information. According to this model, preferences will be less calculated when the most accessible input or inputs seem diagnostic. Accessibility and diagnosticity are influenced by goals, constraints, and experience. For example, goals direct perception and information search by making goal-relevant information more accessible.[62] Although the determinants of accessibility are fairly well specified,[95] the criteria for assessing diagnosticity are less clear. Clearly identifying and specifying the determinants of diagnosticity offers an opportunity for future research.

## SUGGESTIONS FOR FUTURE RESEARCH

Our review suggests that preferences are always sensitive to context but are not always calculated to the same extent. Therefore, we encourage researchers to continue to develop and refine choice models that account for context and that predict the extent to which preferences will be calculated. The MODE model[77] and the accessibility–diagnosticity model,[88,93] both of which provide promising frameworks for understanding the extent to which preferences are calculated, would benefit from expansion and refinements from additional research.

We also encourage behavioral decision theorists to acknowledge the importance of goals both in shaping preferences and influencing the extent to which they are calculated. We applaud recent efforts to incorporate goals into the decision-making literature[60,63,73,96] and urge researchers to continue developing choice models rooted in goal pursuit rather than utility maximization. Choice theories based on goals can account for the context-dependent nature of preferences and, to the extent that they also account for the decision maker's constraints and past experiences, can also predict how—and the extent to which—preferences are calculated. The passive goal guidance model[97] offers a particularly promising framework for predicting preference and choice. The model calculates preference as a function of (1) goal strength, (2) available means for goal pursuit, (3) predictive associations between means and goals, and (4) exitory or inhibitory connections between goals and means. The model also accounts for the experience of the decision maker and the influence of context by updating (1) the activation of goals and means and (2) the predictive associations between goals and means based on prior behavior and incoming contextual inputs.

Behavioral decision theorists have long acknowledged that preferences are not stable, nor are they always complete. Only by continuing to develop and refine choice models that account for the context sensitivity and adaptive and calculative nature of values

and preferences will the field finally be able to abandon choice models based on the intuitive but inaccurate notion of stable utility.

## CONCLUSION

The term preference construction has two meanings in the literature: (1) preferences are sensitive to context and (2) preferences are calculated while making a decision. In the first case, preference construction refers to an outcome. In the second case, it refers to a process for making a judgment or decision. The literature typically assumes that observing context sensitivity implies calculation. Consistent with this belief, we identified papers that define preference construction as calculation but operationalize preference construction as context sensitivity. However, as Bettman and colleagues[32] have noted in recent discussions, there is not a one-to-one mapping between calculation and context sensitivity. Calculation may yield preferences that appear to be stable across contexts.[48] Additionally, different contexts may yield retrieved yet discrepant preferences.[70] Consequently, researchers should not confuse these two meanings of preference construction.

Research intent on investigating preference calculation must recognize that calculation is a process of forming preferences, not an outcome. Appropriate methodology requires more than mere outcome measures, such as choice. Researchers have developed several techniques for investigating the processes used to make judgments and decisions, including recording the information used during the decision-making process,[82] eliciting cognitive responses,[87] measuring response latencies,[88,92] or designing choices in which the information used to arrive at the decision can be inferred from the decision itself.[77] More attention to the psychological processes mediating expressions of preference will help disambiguate the two meanings of preference construction.

The two meanings of preference construction imply different conclusions concerning when preferences are constructed. Preferences, like all cognition and behavior, are always sensitive to context. Calculated preferences vary because context influences the method used to calculate preferences, and retrieved preferences vary because different contexts trigger different goals and different means for attaining them. Although preferences are always context sensitive, they are not always calculated to the same extent. Some preferences are retrieved based on an existing attitude or instinct, whereas others are based on the integration of multiple inputs. The extent to which preferences are calculated seems to be influenced by the goals, cognitive constraints, and the experience of the decision maker. We encourage future research to continue to develop and refine theories of how contextual factors and individual differences combine to influence which preferences are expressed and the extent to which these preferences are calculated.

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