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# 50 Years of Context Effects: An Integrative Framework of Past Findings and Directions for Future Research

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# 50TH ANNIVERSARY SPECIAL ISSUE SUBMISSION

This paper has been submitted for consideration in the 50th anniversary special issue of *JCR*. Please re-read the call for papers (included below) prior to beginning your review. Thank you!

**Note the lower page limits for special issue submissions (20 pages for manuscripts and 25 pages for web appendixes).**

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***The Journal of Consumer Research (JCR)* invites submissions to its Special Anniversary Issue to be published in June 2024, fifty years after the Inaugural Issue of June 1974.**

The Special Anniversary Issue will pay tribute to the diverse and multi-disciplinary nature of consumer research by featuring articles on theory, conceptualizations, and constructs from various disciplinary perspectives (e.g., psychology, economics, sociology, and anthropology), various methodological approaches (e.g., experiments, qualitative studies, empirical modeling, multi-method approaches, machine learning/AI), and a wide range of consumer and consumption phenomena. As always, papers may be conceptual, theory-based, substantive, consumer culture research, or (multi-) methods/empirical quant papers (see the journal's description and evaluation criteria for these types of papers).

***What will be special about this Special Issue?*** As a Special Anniversary Issue, we want it to be big both in scope and in size. We challenge authors to deliver insights on the big picture of consumer research, exploring important issues and developments from the past, present, and future of consumer research. What have we learned about consumers in 50 years? What have we learned about how to do consumer research? What are we learning now? And what do we need to learn in the next 50 years?

***A Big-Picture Issue.*** We hope this issue becomes a go-to reading on consumer behavior. Articles focused on the past of consumer research and its history may provide critical reviews of consumer theories that have demonstrated lasting impact or propose a new integrative theory. These articles should address key findings and phenomena and discuss their relevance for addressing future research issues and important practical issues. Papers may also include reviews of the evolution of important consumer-insights methodologies or present a new consumer-research relevant methodology. Papers addressing the now of consumer research may focus on unresolved issues, current debates and challenges to the field. They may include empirical studies that address an important unresolved issue or address philosophy-of-science issues of consumer research or disciplinary issues of overcoming silos in knowledge creation. Finally, in addition to exploring the past and present, the Special Anniversary Issue will also explore how the field may further develop and what new topics may emerge as central to the field of consumer behavior. Papers may explore questions and domains of interest to future researchers, plot future research agendas, or report empirical studies on the role of future technologies.

***A Big-Tent Issue.*** Given the nature of the Special Anniversary Issue, the Editors will strive to include a variety of scholars of different backgrounds and at different stages of their careers. To aid this, rather than publishing the usual number of six to 10 long papers, the goal is to include many more short articles. Manuscripts submitted to the Special Issue should be no more than 20 pages (including the title, abstract, references, figures, and tables). A web appendix of up to 25 pages may be included. All other requirements of manuscript submission apply. The Editors may also solicit some pieces by reaching out to potential author groups. Both open-submission and invited papers will go through the usual review process.

**Submissions for the issue will begin on March 1, 2022 and close on May 31, 2022.** The review process will last for about one year; papers will be accepted in 2023. Because of the complex production and firm publication date set by the 50th Anniversary, exceptions for deadlines (e.g., submission, revision) and page length will not be possible.

# 50 Years of Context Effects:

# An Integrative Framework of Past Findings and Directions for Future Research

## CONSUMER RELEVANCE AND CONTRIBUTION STATEMENT

In this paper we review prior consumer research on context effects, discuss an integrative theoretical account of prior findings, and offer directions for future research on this topic. Our work makes three key contributions to the consumer literature. First, we offer an integrative framework that can explain (a) the occurrence of context effects (e.g., Huber, Payne, and Puto 1982; Simonson 1989), (b) failures to replicate context effects (e.g., Frederick, Lee, and Baskin 2014; Yang and Lynn 2014), (c) a set of theoretical puzzles documented in the consumer literature related to asymmetries in the occurrence of context effects (e.g., Evangelidis, Levav, and Simonson 2018; Heath and Chatterjee 1995; Simonson and Tversky 1992), and (d) novel context effects (e.g., Mochon 2013). Second, our paper introduces a novel perspective of consumer context effects as phenomena that arise—or fail to arise—due to neurobiological constraints that pertain to how our brains process information (Carandini and Heeger 2012; Dumbalska et al. 2020; Louie, Khaw, and Glimcher 2013; Webb, Glimcher, and Louie 2019). By doing so, our framework introduces insights from computational sciences to consumer research in an attempt to overcome silos in knowledge creation. Third, we plot an agenda for future research that focuses on pushing the boundaries of past research in an attempt to boost the relevance and practical usefulness of context effects for individuals and policy-makers.

## ABSTRACT

Over the past 50 years, consumer researchers have presented extensive evidence that consumer preference can be swayed by the decision context, particularly the configuration of the choice set. Classic context effects, such as attraction and compromise effects have become cornerstones of consumer research and have inspired numerous theories in marketing, psychology, and computational sciences that have offered explanations of the observed choice behavior. In this paper, we advance a theoretical account of context-dependent preferences inspired by computational models of normalization. This account views choice behavior as a boundedly rational process under neurobiological constraints, whereby context effects are traced to how stimulus information is encoded in our brains. This account can integrate a multitude of findings in consumer behavior under a common framework. Importantly, we invoke this account to explain successes and failures to replicate context effects, as well as a wide range of related theoretical puzzles documented in the consumer literature. Finally, we articulate directions for future research that could meaningfully build on—and contribute to—extant knowledge on this topic. Our framework introduces insights from computational sciences to consumer research in an attempt to overcome silos in knowledge creation.

Key Words: Context Effects, Context Dependence, Computational Models, Normalization, Neurobiological Constraints

Over the past 50 years, a substantial volume of consumer research has demontrated that preference is contingent on the decision context, particularly the configuration of the choice set. For instance, in their seminal paper that received the first ACR/Sheth foundation long-term contribution award, Huber, Payne, and Puto (1982) showed that preference for a target option can increase when an asymmetrically dominated decoy option is added next to the target. Relatedly, Simonson (1989) showed that preference for a target option can increase when a new extreme alternative is added, such that the target becomes the intermediate option within the set. Tversky (1972), on the other hand, argued that relative preference for a target option can decrease by the addition of a new alternative that is similar to the target. These empirical regularities have garnered thousands of citations over the past decades. Indeed, context effects have been among the cornerstones of consumer research, and have inspired multiple descriptive theories in marketing, psychology, and economics that aim to explain how humans make choices. Context effects have even inspired research in animal sciences that demonstrate the occurrence of context effects, such as attraction, in animals' foraging choices. Like humans, honeybees' (Shafir, Waite, and Smith 2002), rufous hummingbirds' (Bateson et al. 2003), and grey jays' (Waite 2001) preference for a target option increased when new options were added.

Much of the classic research on the impact of context on choice was motivated by demonstrating violations of basic properties of rational choice theory, such as IIA (Ray 1973), regularity (Luce 1977), and value maximization. Numerous descriptive theories of decision making that could accommodate these results were advanced and published in premier business and psychology journals (e.g., Bhatia 2013; Noguchi and Stewart 2018; Rooderkerk, Van Heerde, and Bijmolt 2011; Trueblood, Brown, and Heathcote 2014; Tversky and Simonson 1993).

In addition to broad descriptive theories, specific explanations for context effects have been advanced over the past 50 years as well. Some of these explanations are centered on the idea

that consumers invoke the relationships between options as reasons to justify their decisions (e.g., Simonson 1989; Shafir et al. 1993). For instance, in the case of the attraction effect, one may invoke the fact that the target option is strictly better than the decoy as a reason for choosing the former. Bettman et al. (1998) argued that this should be particularly true in situations that involve decisions between simple options wherein the relational properties among the options are easy to ascertain. Other explanations center on the idea that choices based on relational properties between the options are more cognitively frugal (Evangelidis and Levav 2013; Evangelidis al. 2018; Montgomery 1983). According to this view, choice of dominating or compromise alternatives requires fewer mental resources and is less effortful compared to decisions that are based on the value of the attributes and the resolution of tradeoffs.

The latter explanation of context effects is consistent with a recently-emerging view of choice behavior as a boundedly rational process under neurobiological constraints (e.g., Dumbalska et al. 2020; Louie, Khaw, and Glimcher 2013; Webb, Glimcher, and Louie 2019). According to this view, our brains are faced with neurobiological constraints that arise because neurons demand energy to transmit information, while our brain needs to allocate limited resources across various neural systems (Webb et al. 2019). Given these processing constraints, our brain encodes information in a relative—rather than absolute—manner because relative coding is more frugal. This relative coding of information is typically referred to as *normalization*. Normalization allows for the efficient processing of information about multiple alternatives that can minimize decision error. Recently, researchers in computational sciences argued that context effects are the result of normalization (e.g., Dumbalska et al. 2020; Louie et al. 2013; Webb et al. 2019), hence providing a biological basis for consumer researchers' thesis that context-based decisions are cognitively frugal (e.g., Evangelidis et al. 2018). This view of

context-dependent preferences as the result of normalization in cognitive processes can explain why context effects have been observed in studies of both animal and human behavior.

In this paper, we propose that normalization is key to understanding a wide range of phenomena reported in the consumer literature on context effects that include the classic attraction, compromise, and similarity effects that previous research focused on as well as more recently identified context effects. Further, models featuring normalization can yield novel predictions and insights for consumer researchers.

We offer an account of the association between context and preference that is inspired by computational models of normalization. Our account integrates a multitude of findings in consumer behavior under a common framework, and can explain failures to replicate context effects as well as a wide range of theoretical puzzles that we describe below. Importantly, we offer directions for future research that could meaningfully build on—and contribute to—extant knowledge on this topic. Our suggestions aim to push current boundaries in order to increase the relevance and practical usefulness of context effects for individuals and policy-makers.



## AN INTEGRATIVE ACCOUNT OF CONTEXT EFFECTS BASED ON NORMALIZATION

Drawing on recently emerged computational models of normalization, we propose that consumers encode information about choice options in a relative manner. Specifically, we propose that consumers' cognitive process during evaluation involve a type of normalization referred to as *divisive normalization*, whereby the responses of neurons are divided by a common factor, such as the sum of all activities across a pool of neurons (Carandini and Heeger 2012). In the case of consumers' evaluations of choice options, divisive normalization implies that values

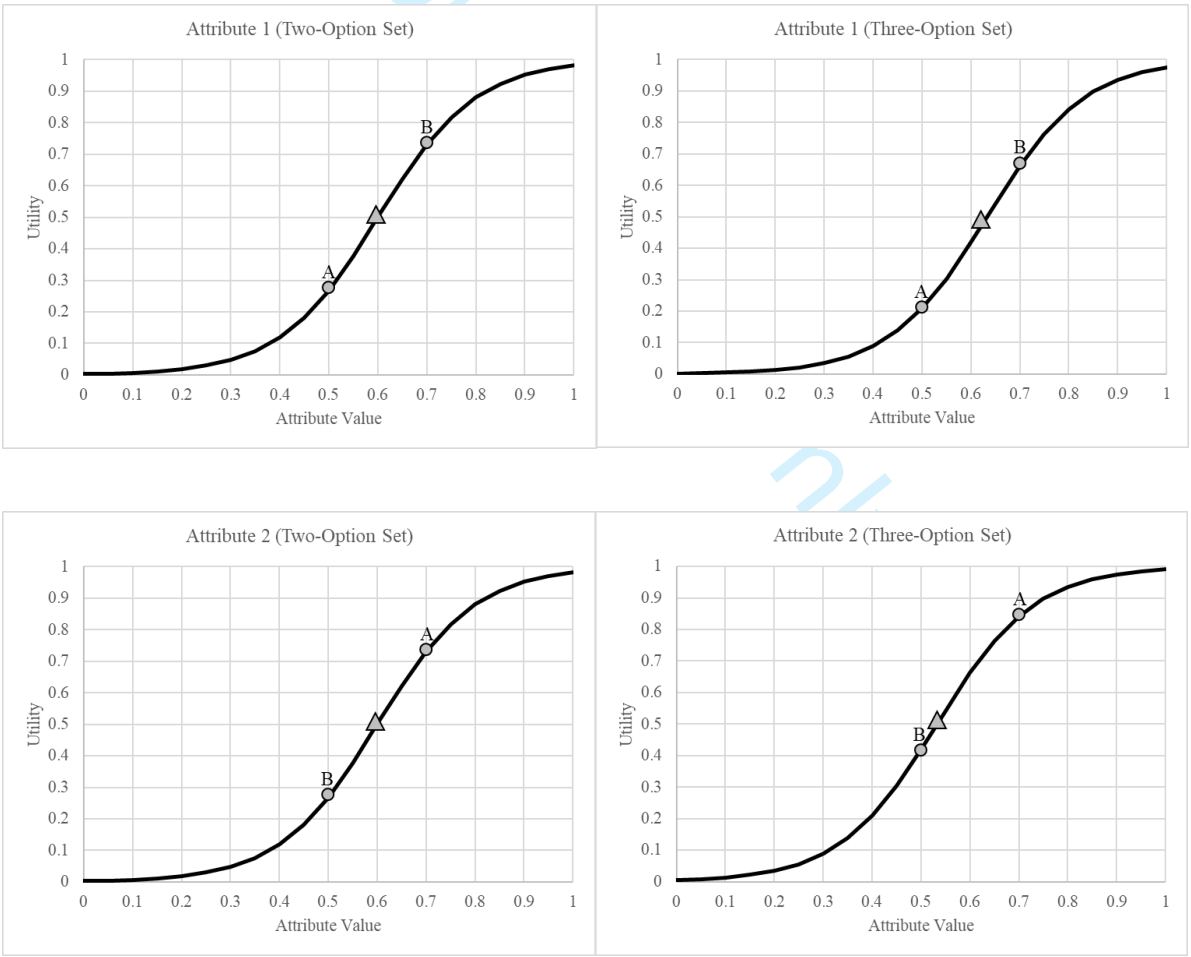
are normalized by the local context (Louie et al. 2013). For instance, according to Dumbalska et al. (2020), normalization takes place at the level of attribute values. That is, an attribute value is normalized relative to the average of all values through a non-linear gain function (i.e., a sigmoidal function). According to this model, for each attribute, the utility of each option is derived from a logistic function with slope *s* whose *inflection point* is determined by the mean value of all attribute values (plus a bias *c*). As such, introducing a new option to the set can influence preference for existing alternatives by shifting the inflection point of the slope. Put simply, this means that consumers' evaluations of a given option can change as a function of the decision context because the addition of new options to the set influence the value function by which consumers evaluate the option's attribute values.

To demonstrate this, consider the case of the attraction effect (Huber et al. 1982; Huber and Puto 1983). For example, consider a two-option set that comprises A (attribute 1 value: 0.5, attribute 2 value: 0.7) and B (attribute 1 value: 0.7, attribute 2 value: 0.5). In this set, the mean value on each attribute equals 0.6. Now consider the case where an asymmetrically dominated decoy option C (attribute 1 value: 0.7, attribute 2 value: 0.4) is added to the set, such that B is dominating C. When C is introduced, the mean of all attribute 1 values increases from 0.6 to 0.633, while the mean of all attribute 2 values decreases from 0.6 to 0.533. This means that the inflection point of attribute 1 increases to some extent, while the inflection point of attribute 2 decreases to a relatively greater extent. Overall, these changes produce a larger increase in the overall utility of option B relative to that of option A (see Figure 1). As a result, choice of B will likely increase when the decoy is added to the set, consistent with an attraction effect. Thus, according to Dumbalska et al. (2020), normalization can provide a very simple account of classic context effects that traces these empirical regularities to natural constraints in how our brains process information. Importantly, we theorize that normalization is fundamental to understanding

not only the occurrence of attraction or compromise effects (as in Dumbalska et al. 2020; Louie et al. 2013; Webb et al. 2019), but, in fact, a wider range of findings from the consumer literature on context effects. Further, normalization models can yield novel predictions and insights for consumer researchers. We elucidate those below.

**FIGURE 1**

AN ILLUSTRATION OF THE IMPACT OF ADDING A DECOY ON THE UTILITY DERIVED BY EACH ATTRIBUTE VALUE BASED ON DIVISIVE NORMALIZATION




*Note*: The two graphs show how the utility of each focal option (A and B) on each attribute is determined by a sigmoidal logistic function. The triangle on each graph denotes the inflection

point, such that the curvature of the function changes from concave-upward to concave-downward. The graphs on the left refer to the case where there is no decoy option in the set (two-option set). The graphs on the right refer to the case where an asymmetrically dominated decoy is added next to target option B. As a result, the inflection points of the two slopes change and the total utility of B relative to A increases.

## Limits of Attraction

In recent years, a debate about the robustness of context effects has emerged in consumer research. At the heart of this debate lies the work of Frederick, Lee, and Baskin (2014) and Yang and Lynn (2014), who questioned the robustness of the attraction effect. Jointly, the two groups of authors presented the results of over a hundred studies suggesting that the attraction effect is rather limited to stylized representations of stimuli wherein products are described on attributes that are numerically represented (e.g., numeric quality ratings and prices). When consumers experience product attributes, such as when they view pictures of a product, the authors argue and empirically demonstrate that the attraction effect is unlikely to replicate. In response to these papers, Huber et al. (2014) argued that any attempt to replicate the attraction effect should meet a set of assumptions that were not clearly articulated by prior research (see also Simonson 2014).

We will attempt to explain the results of Frederick et al. (2014) and Yang and Lynn (2014) through the lens of normalization. Specifically, we previously argued that context effects occur because consumers normalize an option's attribute values relative to the average of all values when encoding stimulus information. Importantly, we posit that normalization may not be feasible for *all* attributes. We propose that the distinction between vertical and horizontal attributes may be a key determinant of the occurrence of context effects. Attributes are considered vertical when there is a universal agreement that higher (or lower) values are more desirable. For example, a consumer may be choosing between two hard drives where one has

more capacity than the other but is also more expensive. For this choice, there is a universal agreement that higher capacity is more desirable (and that higher price is less desirable). Thus, price and capacity can be considered vertical attributes. In contrast, attributes are considered horizontal when there is no universal agreement about which values are more desirable, such that preferences are determined by taste (Spiller and Belogolova 2017). For example, a consumer may be choosing between two hard drives that have the same capacity and price but differ in color—one is red and the other is blue. In this choice, there is no universal agreement that one color is better than the other; preference for a given color is merely a matter of taste.

Arguably, prior consumer research has provided ample evidence that consumers' choices can be influenced by the decision context. However, it is important to note that said evidence largely stems from studies where products were described along vertical—rather than horizontal—attributes. Consumers in those studies typically made choices between lower-quality lower-price options and higher-quality higher-price alternatives, whereby there was likely a universal agreement that higher values on attributes related to quality were more desirable (whereas higher prices were less desirable).

We propose that, while normalization may occur naturally for vertical attributes, it may be not apply to horizontal attributes. That is, consumers may not be able to normalize attribute scores when processing horizontal attributes because they inherently cannot assess the central tendency, such as average values, of such attributes. For instance, a consumer choosing between three devices that differ in color (e.g., one is red, the second is blue, and the third is green) cannot encode values on the attribute "color" through a normalization process because calculations of average scores are not feasible. As such, normalization may not be applicable to horizontal attributes, which can explain why context effects may not be observed when stimuli feature horizontal dimensions. Indeed, a closer examination of the stimuli of Frederick et al. (2014)

reveals that horizontal attributes were consistently used across studies. For instance, it is likely that participants in those studies were unable to normalize attribute scores on attributes such as the type of fruit, the view of apartments, the decor of apartments, flavor of kool-aid, movie actors, popcorn flavors, etc. (see Table 1 in Frederick et al. 2014). Further, along those lines, it is likely that consumers find it hard to normalize attribute values when those are represented perceptually compared to when they are represented numerically. For instance, participants in Study 3a of Frederick et al. (2014) may have been unable to normalize attribute values on picture quality when those were represented visually (through images of TVs) compared to when they were represented numerically. Naturally, normalization is easier to apply when values are represented through numbers (Dumbalska et al. 2020). Therefore, we propose that context effects are contingent on the extent to which consumers can normalize attribute values. When normalization is inhibited, such as when (a) the attribute is horizontal or (b) the attribute is vertical but represented visually (vs. numerically), context effects are less likely to be observed.



Single-Option Aversion

Besides, accounting for failures to reproduce the attraction effect, our framework can also account for novel context effects that were documented recently in the consumer literature, such as single-option aversion (Mochon 2013). Single-option aversion describes the finding that a given (target) option can be chosen more frequently when a competing alternative is included in the choice set compared to when the target is presented in isolation (and participants have the possibility to defer choice). As in the previous examples, consider the same two options, A and B. According to this research, presenting participants with either A or B in isolation can lead to a decrease in preference for the single option compared to the case where A and B are jointly

presented. This happens because consumers defer choice more frequently when presented with a single alternative compared to when they are presented with two options.

Single-option aversion can be readily explained by our framework. Specifically, when consumers are presented with a single option, they cannot encode stimulus information in a relative manner because they lack a frame of reference that is provided by the second option. This argument highlights the fact that normalization requires the provision of at least two options. Consequently, since normalization is not feasible in the presence of a single option, consumers need to encode stimulus information in an absolute manner which can be cognitively more taxing (Dumbalska et al. 2020). In turn, when provided with a single option (vs. two options), consumers end up deferring choice more frequently. Indeed, Evangelidis, Levav, and Simonson (forthcoming) obtained evidence that consumers find it particularly hard to evaluate alternatives presented in isolation compared to when they are provided with two alternatives, which, in turn, explains their tendency to defer choice. Consumers' inability to engage in normalization in single-option environments likely underlies the occurrence of single-option aversion.



## Asymmetric Context Effects

In a meta-analysis of the attraction effect, Heath and Chatterjee (1995) observed that asymmetrically dominated options typically boost the choice share of high-quality high-price options, but often fail to increase the share of low-quality low-price alternatives. Heath and Chatterjee noted that these findings pose a "theoretical puzzle (p. 282)." Similarly, in the context of extremeness aversion, Simonson and Tversky (1992) observed that introducing a middle alternative (i.e., an alternative that has moderate quality and price) increased relative preference for high-quality high-price options, while it reduced relative preference for low-quality low-price options. Simonson and Tversky (p. 292) offered no definite explanation for this unexpected

result, which they labeled "polarization," and encouraged future research on this topic. Relatedly, Evangelidis, Levav, and Simonson (2018) showed that both attraction and compromise effects generally replicated when the added option was relatively adjacent to the "disadvantaged" alternative (i.e., the lower-share option) in the (two option) set. However, when the added option was adjacent to the "advantaged" alternative (i.e., the higher-share option) in the set, attraction effects were eliminated, while compromise effects reversed. While an extensive analysis of these results through the lens of normalization requires a lengthy exposition, divisive normalization can account for these findings if we assume that normalization is asymmetric. Asymmetric normalization can be captured by a bias parameter, which is referred to as bias *c* in Dumbalska's (2020) computational model. The logic underlying the bias parameter is that sensitivity to changes in attribute values can vary depending on the range, and potentially the type of attribute values. For instance, it is possible that the inherent differences exist between price and quality in terms of the extent to which the inflection point on these dimensions shifts when new options are added to the set. Future research could explore whether normalization processes are asymmetric depending on the nature of the attributes, as well as the values of the options on these dimensions.

## THE FUTURE OF CONSUMER RESEARCH ON CONTEXT EFFECTS

Given the rapid advancements in technology and the ever increasing complexity of modern decisions, in order to increase its impact future research on context effects will need to move beyond impoverished hypothetical choices from limited sets of options that are vaguely described along a few attributes. Consumers nowadays make choices by drawing from a multitude of information sources, such as online reviews, social media, and interactive product demonstrations. Further, most products are now described across a wide range of attributes that

vary both in terms of their nature and complexity. Consequently, the new information environment calls for further research that adopts a richer view of contextual dimensions. Moreover, the future of consumer research on context effects likely lies in identifying how the context influences decisions that actually matter for consumers. We believe that there are various directions and areas that researchers could explore in the future. Importantly, we suspect that the key to documenting context effects in the real world likely lies on whether consumers can engage in normalization of attribute values in a given environement.

For instance, Wu and Cosguner (2020) recently obtained evidence for the attraction effect in real-life diamond sales, yet their result was contingent on consumers detecting dominance relationships between the alternatives. This finding suggests that context effects can occur in real-world settings, yet whether those are observed likely depends on whether consumers can accurately perceive and encode attribute values, as well as whether they can engage in normalization in such settings. We recommend that researchers keep the principle of normalization—as well as the type of attributes (e.g., vertical versus horizontal) that they invoke in their studies—in mind when testing the impact of context on real-world decisions.

A related avenue for future research involves exploring whether context effects can be used to nudge certain behaviors, such as health choices, sustainable consumption, and eating behavior. While nudges have been a prominent topic of empirical research in psychology, marketing, and behavioral economics over recent years, surprisingly no work has examined whether policy-makers and choice architects could nudge people's choices by using experimental manipulations drawn from context effects research. In fact, anecdotal evidence suggests that practitioners may be using some of these manipulations in an attempt to increase profits by boosting counterproductive behaviors, such as excessive food consumption. For instance, in 2011 in the US, Starbucks launched a new product size that the company coined "Trenta" which

became the largest size in Starbucks's assortment (https://www.foodbeast.com/news/starbucks-set-to-officially-launch-31-oz-trenta-cup-size/). While a product of this size may be unappealing on its own, context effects research (Simonson 1989; Simonson and Tversky 1992) suggests that the addition of a new extreme option, such as Trenta, could lead to an increase in the choice share of options that become intermediate, such as Venti (the former largest option). Consequently, it is possible that the addition of Trenta to Starbuck's assortment could sway consumers to order larger drinks than they would otherwise do in the absence of Trenta (see another example by Tim Hortons: https://nationalpost.com/news/canada/graphic-how-does-tim-hortons-new-extra-large-coffee-stack-up-against-its-old-sizes).

Interestingly, the cases of Starbucks and Tim Hortons constitute examples of *sludges*, rather than nudges, because they do not intend to improve the lives of consumers. Unlike nudges, they may discourage a behavior that is in a person's best interest, in this case limiting one's food consumption. However, policy-makers could rely on the same literature to test whether they can boost healthier choices. For example, one could examine whether they can increase choices of smaller drink items by introducing even smaller sizes to their assortment. If firms were to add smaller options to their assortment, consumers may be swayed to order smaller—rather than larger—food items. We suspect that product size choices can be susceptible to context effects because size is a vertical dimension that should be processed through normalization. Indeed, recent research has demonstrated that context effects can be observed in perceptual judgments about the size of different objects (Trueblood et al. 2013)

## CONCLUSION

One of the most prominent areas of consumer research concerns the impact of the decision context on preferences. Consumer literature on context effects had a significant impact on both social and natural sciences, where the key insights from the seminal works of Huber et al. (1982) and Simonson (1989) were further studied and extended by various researchers across a diverse set of disciplines, such as psychology, economics, and biology.

In this paper, we described a theoretical account of context-dependent preferences that is based on a view of choice behavior as a boundedly rational process under neurobiological constraints. At the heart of this account lies the idea that humans—but also animals—encode stimulus information in a relative manner, through a process referred to as divisive normalization, because neurons require energy to transmit information and there are limited cognitive resources that need to be allocated across various neural systems. This account can integrate a number of findings in consumer behavior under a theoretical common framework. Importantly, it can inspire numerous directions for future research, some of which we elucidated above. Our key goal in this article was to leverage concepts that have recently emerged in computational sciences to offer a new perspective on established findings, as well as unexplained empirical regularities and theoretical puzzles.

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