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An Empirical Analysis of the Joint Effects of Shoppers' Goals and Attribute Display on Shoppers' Evaluations

This article develops a decision-making framework that highlights how display of numeric attribute information (e.g., display of calorie information) and shoppers' goals (i.e., having a diet focus vs. a taste focus) jointly influence shoppers' choices and preferences. Across two sets of studies, including a field study involving the launch of a new Coca-Cola product, the authors show that when food items are displayed in an aligned manner (i.e., when food items with lower-value calorie information are displayed below food items with higher calorie values), shoppers assign more importance weight to calorie gap information. In turn, higher importance weight assigned to calorie gap information leads diet-focused shoppers to relatively prefer low-calorie food items but leads taste-focused shoppers to relatively prefer higher-calorie food items. The third set of studies shows that this decision-making framework has widespread applicability and is relevant in any domain in which advertising, retail, and online displays show comparisons of numeric attribute information.

Keywords: numeric attributes, vertical display differences, goals

In mid-2014, Coca-Cola launched Cola-Cola Life in Sweden, a reduced-calorie cola drink that differs from zero-calorie diet colas because it does not contain aspartame (which many perceive as unhealthy; Dean 2014). Reacting to an increased health focus among shoppers, launching Coca-Cola Life was part of Coca-Cola's efforts to reduce the average calorie content of its drinks portfolio while still avoiding the use of aspartame. Some months prior to the launch, one of the authors of this article was in discussions with Coca-Cola managers about which factors were likely to influence shoppers' choices between regular Coke and Coca-Cola Life. One factor discussed was in-store signage. Would signage indicating that Coca-Cola Life has lower calorie content be effective, despite prior research showing that merely indicating calorie values does not automatically lead shoppers to make healthier choices (Loewenstein 2011; see also Haws, Davis, and Dholakia 2016). This article was motivated, in part, by these discussions and the real-world challenges the authors (and firms like Coca-Cola) aim to examine.

To better understand the factors that influence the choice of healthier food items, we start with the foundational notion that shoppers' food choices depend on both individual differences among shoppers and the presentation format for the nutritional information (Haws, Davis, and Dholakia 2016; Loewenstein 2011; Mohr, Lichtenstein, and Janiszewski 2012). Most prior work has focused on evaluations of single food items (e.g., Gomez, Werle, and Corneille 2017; Graham and Mohr 2014; Mohr, Lichtenstein, and Janiszewski 2012); in contrast, in this article, we consider how shoppers choose among multiple food items, which represents a normative shopping situation. For example, shoppers often choose among various entrees in restaurants, multiple soup cans in supermarkets, or numerous soft drinks in convenience stores.

We focus on two specific drivers of food item choice. We start by examining shoppers' goals, which may be conceptualized as either individual differences or differences primed by the product category or shopping environment (e.g., Escaron et al. 2013; Newman, Howlett, and Burton 2014). A significant amount of prior research has highlighted goals related to dietary restraint, that is, the extent to which shoppers have diet goals which leads them to prefer food items with fewer calories[1] (Howlett et al. 2012; Visschers, Hess, and Siegrist 2010) and consume fewer calories (Cavanagh and Forestell 2013). In this article, we offer a

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[1]In this section, we contrast a focal food item with fewer calories with a comparison food item with more calories. The theory advanced herein also extends to other comparisons between all types of items described using numerical attribute information.

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different proposal, making two points. First, rather than posit that shoppers are more or less focused on diet goals, we posit that shoppers focus on diet goals versus taste goals. Second, building from work on the "unhealthy = tasty" intuition (Raghunathan, Naylor, and Hoyer 2006), we argue that taste-focused shoppers intuit that unhealthy food items will better satisfy their taste goals, so their choice decisions appear to favor food items with more calories. Thus, we take a different perspective than prior work, and so we contrast shoppers with diet goals versus taste goals.

Next, in grocery store settings, choices often involve a comparison between a focal, healthy food item and a comparison food item (Suri et al. 2012); in response, food manufacturers often provide comparisons that highlight the "nutritional gap." For example, Better'n Peanut Butter Banana spread advertises that it has "40% fewer calories," and Trop50 orange juice proclaims that it has "50% less sugar and calories," relative to comparable products. However, in many cases, only calorie information appears in the front-of-pack (FOP) information, so shoppers must perform calorie gap calculations themselves. In turn, building on work in numeric cognition (e.g., Biswas et al. 2013) and heuristics (e.g., Shah and Oppenheimer 2007), we propose that differences in the vertical display of food items could prompt differences in perceptions of the importance of the calorie gap. If a focal food item, with fewer calories, appears below another food item (i.e., if the focal food item is displayed in an aligned manner), then the subtraction task to calculate the calorie gap is easier. And if calculating the calorie gap is easier, then shoppers are likely to attach more importance to calorie gap information during their evaluations. Thus, displaying a focal food item in an aligned manner should increase the importance weight that shoppers place on the calorie gap. Among shoppers with diet goals, this increased importance weight shifts shoppers' choices *toward* the focal food item, but among taste-focused shoppers, this increased importance weight may shift the choice share *away from* the focal food item, toward the higher-calorie option. By combining these propositions, we posit that when food items are displayed in an aligned (vs. nonaligned) manner, diet-focused shoppers relatively prefer lower-calorie food items, but taste-focused shoppers make choices as if they relatively prefer higher-calorie food items. This nonintuitive proposition is the central hypothesis of our article, and we test it across multiple studies, including a field study involving the choice between regular Coca-Cola and the lower-calorie Coca-Cola Life.

More generally, in this article we focus on product domains for which advertising, retail, and online displays show comparisons of numeric attribute information. The food domain is one such domain, which involves comparisons of numeric nutritional information relating to calories (and sodium). Other exemplar domains that involve comparisons of numeric attribute information include (1) product price comparisons, as frequently seen in basket comparisons posted in supermarkets (e.g., Publix vs. Walmart), in online comparative advertisements (Dyson vs. Shark vacuum cleaners), and on price comparison tools (e.g., hotel rates on Trivago.com); (2) advertisements for robotic vacuum cleaners (e.g., Neato vs. Roomba), which involve attributes such as operating time and charging time; (3) advertisements for cellular networks (e.g., T-Mobile vs. Verizon), which involve attributes such as Internet speed; and (4) advertisements for cell phones (e.g., Apple iPhone vs. Samsung Galaxy), which involve attributes such as screen size, standby time, and talk time.

In domains involving numeric attribute information, we investigate the impact of two factors on shoppers' choice decisions. First, numeric attribute information may be displayed in an aligned (vs. nonaligned) manner, whereby aligned display involves showing the low-value numeric information below the higher-value numeric information (e.g., lower prices displayed below higher prices). Second, shoppers may have different goals, perceiving attributes as either more-is-better (MIB; preferring items with higher attribute values) or less-is-better (LIB; preferring items with lower attribute values). For example, shoppers who view price as a measure of sacrifice perceive price as an LIB attribute, whereas those who view price as a measure of quality perceive price as an MIB attribute (Dodds, Monroe, and Grewal 1991; see also Miyazaki, Grewal, and Goodstein 2005). In the domain of robotic vacuum cleaners, operating time is an MIB attribute, but charging time is an LIB attribute; in the domain of laptops, many would perceive battery life as an MIB attribute but perceive laptop weight as an LIB attribute. Building from the central hypothesis outlined previously, we posit that when items are displayed in an aligned (vs. nonaligned) manner, shoppers who perceive the displayed attribute as an LIB (MIB) attribute will relatively prefer the item with the lower (higher) value attribute.

We aim to make the following contributions. Generally speaking, we outline a parsimonious framework that examines how shoppers react to advertising, retail, or online displays in (a wide variety of) product domains involving numeric attribute information. This article identifies two elements that jointly determine shoppers' reactions: (1) whether shoppers view the displayed attribute as an LIB attribute or an MIB attribute, and (2) whether the attribute information is displayed in an aligned or nonaligned manner, which influences the importance weight shoppers put on this attribute information. We suggest that firms can use this framework to better design advertising, retail, and online displays. While Biswas et al. (2013; work on the subtraction principle) provide an initial examination of aligned (vs. nonaligned) displays, their stated process mechanism does not easily extend beyond the price promotion domain and was examined only in LIB contexts. The current article substantially modifies and broadens the process mechanism underlying the subtraction principle to allow it to extend into multiple product domains. Moreover, we explicitly contrast LIB versus MIB contexts, outlining exactly how shoppers' attribute perceptions (i.e., LIB vs. MIB) and display alignment *jointly* influence their choices and perceptions.

In addition, we aim to make two contributions specific to the food domain. Not only is the food domain important from both a firm perspective and a shopper perspective, but also the growing importance of how best to motivate people to make healthy food choices has prompted increased research focus in this domain. First, prior research suggests that people who have less focus on diet goals pay less attention to calorie information (e.g., Bialkova, Sasse, and Fenko 2016; Cavanagh and Forestell 2013; Mohr, Lichtenstein, and Janiszewski 2012). In contrast, we show that people who have less focus on diet goals (i.e., have

more focus on taste goals) indeed pay attention to calorie information (similar to people with more focus on diet goals), but because of the unhealthy = tasty intuition, these shoppers behave as if they prefer food items with more calories (unlike people with more focus on diet goals). Second, as a novel point not evidenced in prior research, we show that whether shoppers make goal-consistent choices is contingent on whether food items are displayed in an aligned manner. Next, we develop our propositions and test them across multiple product domains, including in a field study involving the choice between regular Coca-Cola and the newly launched, low-calorie Coca-Cola Life.

Conceptual Development

Shoppers' Goals During Food Item Choices

What goals do shoppers have when they make food item choices? To answer this question, we turn to literature at the intersection of food-related research and research into goals. On the one hand, there may be individual differences (i.e., "trait differences") across shoppers, and these differences should lead to shoppers having different goals when making food item choices. Specifically, some shoppers have diet goals (Herman and Polivy 2004; Howlett et al. 2012; Naylor, Droms, and Haws 2009), so they prefer food items with fewer calories or less sodium (LIB behavior).

Prior research has examined the extent to which shoppers focus on diet goals (Haws, Davis, and Dholakia 2016; Mohr, Lichtenstein, and Janiszewski 2012; Naylor, Droms, and Haws 2009; Van Herpen and Van Trijp 2011), and the subsequent impact on food item choices and consumption. This prior research has indicated that people who have less focus on diet goals tend to pay less attention to nutritional information. Thus, Mohr, Lichtenstein, and Janiszewski (2012; p. 66) show that when presented with less healthy versus more healthy food items, people with higher levels of dietary concerns were significantly more likely to choose the healthier food item, but people with low levels of dietary concerns were relatively indifferent across food items ("significantly higher purchase intentions ... for all values of dietary concern above 3.80" vs. "no significant differences below ... the Johnson–Neyman point"). Similarly, Cavanagh and Forestell (2013; p. 508) found that restrained eaters consumed more (relatively healthy) Kashi cookies than Nabisco cookies, "whereas the unrestrained eaters did not differ in their consumption of the two brands," Finally, Bialkova, Sasse, and Fenko (2016; p. 44) asked participants to choose between (relatively healthy) cereal bars and (relatively unhealthy) potato chips. They found that "consumers highly concerned about health preferred to buy cereal bars ($p = .018$), while less concerned consumers selected to buy chips and cereals with equal probability ($p > .4$)." Taken together, these findings appear to indicate that people with low levels of dietary concerns are relatively indifferent between the less healthy food item and the healthier food item. In this article, however, we posit differently, and so we make two distinct points.

Shoppers' goals. Rather than describing shoppers' goals on a continuum anchored by more versus less focus on diet goals, in this article we propose that the relevant anchors should be diet goals versus taste goals. As a novel point, we emphasize the explicit presence of taste goals (and not just less focus on diet goals), consistent with Andrews, Netemeyer, and Burton's (1998) use of a taste goal prime as a control condition.

Prior literature has indicated that shoppers with more focus on diet goals pay attention to nutrition information ("consumers who expressed a great concern for ... dietary eating ... made more active use of the health label information"; Bialkova, Sasse, and Fenko 2016, p. 40), and so are more likely to prefer food items with fewer calories. However, distinct from prior literature, we propose that shoppers with less focus on diet goals (i.e., those with taste goals) also pay attention to nutrition information but use it differently, such that they choose food items with more calories. We clarify that we are not claiming that shoppers with taste goals deliberately seek out food items with more calories; rather, we suggest that these shoppers intuit that high-calorie food items are tastier (unhealthy = tasty intuition); in their quest for taste, they select relatively higher-calorie food items.

To make this prediction, we build from research into behavioral traits (related to food preferences, and related to impulsivity) and perceptions of food. First, we build from work that connects dietary restraint to impulsiveness. The work of Van Koningsbruggen, Stroebe, and Aarts (2013; Table 1; p. 83) indicates that those low on dietary restraint are more likely to be impulsive. Second, more impulsive people are likely to prefer tasty food, and they are both more likely to pick up (tasty) cookies (Ramanathan and Menon 2006; Figure 3, p. 638) and more likely to choose (tasty) cake over salad (Sengupta and Zhou 2007; Study 2, p. 301). Third, unhealthy foods are more likely to be perceived as tasty (see work on the unhealthy = tasty intuition[2] [Mai and Hoffmann 2015; Raghunathan, Naylor, and Hoyer 2006). Overall, we posit that people low on dietary restraint (i.e., those with taste goals) may behave as if they prefer (relatively) unhealthy food items.

Individual differences versus state differences. Beyond just individual differences (e.g., extent of diet intentions), environmental factors may also prompt differences in (diet vs. taste) goals, which we term "state differences." Product category differences may trigger differences in goals, with shopping for health-focused foods potentially triggering diet goals and shopping for candy potentially triggering taste goals. Advertising differences may also prompt differences in goals. Foods advertised as health foods or diet foods, or foods packaged reflecting "greenness" may trigger diet goals, whereas foods advertised as comfort foods may prompt taste goals. Thus, it is possible that the same person may have diet goals when examining a certain type of food item and yet may have taste goals when examining a different type of food item.

These discussions suggest that those with diet goals should prefer lower calorie food items, whereas those with taste goals should (in line with the unhealthy = tasty intuition) behave as if

[2]Similarly, other, somewhat less well-known research has indicated that people often assume that the presence of increased sodium levels is associated with better taste (e.g., Henney, Taylor, and Boon 2010).

TABLE 1
Johnson–Neyman Regions in Study 1

Diet Scale[a]	Effect	SE	z	*p*-Value	LLCI	ULCI	Participant Behavior Consistent with:
−1.3100	**−.5238**	**.1939**	**−2.7014**	**.0069**	**−.9038**	**−.1438**	Taste goals (30.11% of sample)
−.4310	**−.2416**	**.1233**	**−1.9600**	**.0500**	**−.4833**	**.0000**	
−.3100	−.2028	.1175	−1.7262	.0843	−.4331	.0275	
.6900	.1182	.1337	.8836	.3769	−.1439	.3802	
1.6765	**.4348**	**.2218**	**1.9600**	**.0500**	**.0000**	**.8696**	Diet goals (7.95% of sample)
1.6900	**.4391**	**.2232**	**1.9672**	**.0492**	**.0016**	**.8766**	
2.6900	**.7601**	**.3311**	**2.2955**	**.0217**	**.1111**	**1.4090**	

[a]Mean-centered values for diet intentions scale.
Notes: This table illustrates the conditional effect of alignment on choice of Coca-Cola Life, at values of diet intentions scale. LLCI = lower-limit confidence interval; ULCI = upper-limit confidence interval. Boldfaced cells indicate significance.

they seek out higher-calorie food items. Next, we propose that differences in how food items are displayed affect the extent to which shoppers' goals influence food item preferences, and we elaborate on this point in the following subsection.

Differences in Display Format

Food items are only seldom evaluated in isolation; instead, such evaluations often involve a comparison of a focal food item with potential alternatives (Suri et al. 2012). In many cases, nutritional information is available FOP, so shoppers can calculate the attribute gap (e.g., calorie gap, sodium content gap). For example, a grocery shopper aiming to buy cereal may find a focal food item, which has fewer calories, displayed either below or above a higher-calorie food item. Both food items display calorie content FOP. If the propensity to engage in calorie gap calculations depends on whether the food items are presented in an aligned (vs. nonaligned) display, then such display differences may influence food item choice. We first consider whether differences in the display format influence shoppers' propensity to initiate a subtraction task to calculate the calorie gap, then we discuss how this propensity might influence the importance weight shoppers attach to the calorie gap for their evaluations.

Impact on propensity to initiate the subtraction task. In general, a comparison of two attributes that feature numeric information involves subtraction (Thomas and Morwitz 2009). However, prior research has not fully explored how presenting a smaller number below versus above a larger number influences subtraction calculations. We integrate research in numeric cognition with pricing research to examine this question. First, in the subtraction task A − B, A is the minuend, and B is the subtrahend. People generally perceive that it is normative to present a larger minuend above a smaller subtrahend, and prior research has affirmed that fewer computational errors occur with this format (Fuson and Briars 1990). Second, in a study of how people verify addition problems, Yip (2002) finds that inaccurate equations that fail to conform to conventional presentation norms are perceived as harder to verify as correct (e.g., it is more difficult to determine whether 7 = 3 + 5 is correct than whether 3 + 5 = 7 is correct). Accordingly, we posit that subtraction equations in which a smaller-value subtrahend appears below (above) the minuend are easier (harder) to verify. Third, because people do not like to work on overly challenging problems (Oppenheimer 2008), locating a smaller-value subtrahend above the minuend—contrary to the norm in contexts involving difference calculations—may reduce the propensity to perform a subtraction task. In research on price promotions, Biswas et al. (2013) propose the subtraction principle, a somewhat similar information processing sequence. They proposed that when sale prices are displayed to the right of the original price (i.e., smaller number to right of the larger number), shoppers perceive the subtraction task as cognitively easier and so are more likely to calculate the discount depth. However, if sale prices appear to the left of the original price, shoppers perceive the subtraction task as cognitively harder and so are less likely to initiate a subtraction task. Rather, shoppers would approximate discount depth at around 10%–12% (reflecting a discount depth benchmark from Blair and Landon [1981]).

Now assume that two (competing) cereals explicitly provide FOP calorie information. Building on the previous arguments, if the focal, healthy cereal is displayed in an aligned manner, then shoppers can calculate the calorie difference relatively easily. But if the focal cereal is displayed in a nonaligned manner, shoppers may perceive the subtraction task as harder and so may be less likely to initiate the subtraction task to calculate the calorie gap.

Importance weight attached to the calorie gap during evaluations. During evaluations, people grant easy-to-process cues higher importance weights (Shah and Oppenheimer 2007, pp. 371–72; see also Oppenheimer 2008). This point has roots in prior work on heuristics, which shows that people more heavily weight easier-to-access cues. For instance, people use brand name perceptions as proxy for product quality (Maheswaran, Mackie, and Chaiken 1992), use ease-of-imageability of attributes (like hallways) as an input for making apartment evaluations (Keller and McGill 1994), and so on. Therefore, if shoppers perceive that calculating the calorie gap is relatively easier, during evaluations they assign more importance weight to the calorie gap. Continuing with the cereal example, if the focal, low-calorie cereal is displayed in an aligned manner, during evaluations shoppers attach relatively higher importance weight to calorie gap information.

This mechanism substantially enhances the generalizability of the subtraction principle mechanism proposed in Biswas et al. (2013). The subtraction principle predicts that displaying the

sale price in a nonaligned manner increases subtraction difficulty. In turn, due to subtraction difficulty, shoppers who are less likely to initiate the subtraction task to calculate discount depth assume a 10%–12% discount depth (benchmark from Blair and Landon 1981). This mechanism, especially the point about the assumed discount depth, is fairly specific to the pricing domain. We modify the subtraction principle mechanism and propose that shoppers who are more (less) likely to initiate the subtraction task attach more (less) importance weight to discount depth information (more generally, attribute gap information). Consequent to this modification, the subtraction principle can apply beyond the pricing domain to a wide variety of other product domains.

Furthermore, the studies in Biswas et al. (2013) focus exclusively on the domain of price promotions and imply that shoppers generally prefer an overall lower price, in effect implying that price is an LIB attribute. We point out that there are contexts wherein price may be perceived as an MIB attribute, often for reasons relating to signaling of quality (Dodds, Monroe, and Grewal 1991; Miyazaki, Grewal, and Goodstein 2005; Monroe 1973). In this article, we generalize the work of Biswas et al. (2013), examining both LIB and MIB attributes, while also examining attributes such as calories, which are perceived by some as LIB and perceived by others as MIB. Appendix A lists the aforementioned points and shows the various ways this research modifies and broadens the prior conceptualization of the subtraction principle.

Setting Up the Hypotheses

Displaying a focal, healthy food item in an aligned (vs. nonaligned) manner should increase the perceived importance weight of the calorie gap during evaluations. For shoppers with diet goals, the increased importance weight of the calorie gap should increase preference for the focal food item. For shoppers with taste goals, however, the increased importance weight of the gap should enhance their preference for the comparison food item with higher levels of calories and reduce their preference for the focal food item. Formally,

H_1: For shoppers with diet (taste) goals, displaying a focal, healthy food item in an aligned manner increases (decreases) choice share of the focal, healthy food item.

H_1 is our central hypothesis, stating that presenting food items in an aligned (vs. nonaligned) manner increases goal-consistent food choices and preferences. The next two hypotheses outline the mechanism underlying this central hypothesis. We propose that (1) during evaluations, presenting food items in an aligned (vs. nonaligned) manner increases the importance weight placed on the calorie gap (H_2), and (2) during evaluations, increased importance weight placed on the calorie gap increases the propensity to make goal-consistent food choices (i.e., increases the propensity that shoppers with diet (taste) goals are more (less) likely to choose the focal, healthy food item; H_3).

H_2: Displaying the focal, healthy food item in an aligned (vs. nonaligned) manner increases the importance weight of attribute gap information during evaluations.

H_3: For shoppers with diet (taste) goals, increased importance weight of attribute gap information increases (decreases) choice share of the focal, healthy food item.

Study 1 is a field study in a supermarket and is an initial test of H_1. It involves shoppers choosing between regular Coca-Cola and the newly launched Coca-Cola Life. In Study 2a, we reexamine H_1 in a lab study, using a chocolate context, wherein we associate chocolate with either diet goals or taste goals. In Study 2b, we examine the full process model (H_1–H_3), using a soup can choice context. Given that Studies 1 and 2 relate to the food domain, in Studies 3a and 3b we generalize our findings by examining other product domains. Stimuli exemplars (for all studies) appear in Appendix B.

Study 1: A Field Study

Method

We ran Study 1 over four days in a supermarket in Stockholm. Coca-Cola (Sweden) provided us with bottles of regular Coca-Cola (CCR; more calories = 879 kJ[3]) and of the newly launched soft drink, Coca-Cola Life (CCL; fewer calories = 565 kJ, focal drink). We had access to endcap shelving, which we modified using two different display versions that alternated every few hours, displaying CCL in either an aligned manner (i.e., CCR on the shelf above and CCL on the shelf below) or a nonaligned manner. The shelf-signs clearly showed the kJ values associated with each drink. We specifically clarify that each shopper saw only one of the two display versions.

Shoppers were intercepted and asked to participate in the study. In return, they would receive either CCR or CCL, whichever they preferred. Shoppers examined the display, then chose a CCL or CCR bottle (the experimenters restacked the shelf each time, so shoppers always saw fully stacked CCL and CCR shelving.) Next, shoppers moved to another area, where they completed a short survey. The survey included a short-version diet intentions scale, with two items from Stice (1998; "I take small helpings in an effort to control my weight," "I limit the amount of food I eat in an effort to control my weight"; 1–5 scale; 1 = "never," and 5 = "always"; r = +.59, $p < .05$), and also included demographics (age and gender). In all, 352 shoppers ($Median_{age}$ = 20.0 years; 67.9% women) participated in this 2 (display: aligned vs. nonaligned) × continuous (diet intentions scale) between-subjects study.

Results

We used PROCESS (Model 1; Hayes 2013) to investigate the interaction. The dependent variable was soft drink choice (CCR = 0, CCL = 1), and the two independent variables were diet intentions (mean-centered at M = 2.31) and display (nonaligned = –1, aligned = 1). In the logistic regression for soft drink choice, we found significant main effects of diet intentions (b = –.34, SE = .12, z = –2.91, $p < .05$), no significant main effects of display (z = –.94, $p = .35$), and (most importantly) a significant interaction effect (b = .32, SE = .12, z = 2.72, $p < .05$). The positive interaction term indicated that for

[3]In Sweden, nutritional values are provided in kilojoules (kJ) and not in calories (1 calorie ≅ 4.18 kJ).

those with higher diet intention scores, presenting CCR and CCL in an aligned manner increased choice of CCL (the focal, lower-calorie drink).

A floodlight analysis (Table 1) revealed that for those with relatively high diet intention scores (mean-centered scores > 1.68; 7.95% of sample), the simple effect of displaying CCL in an aligned display condition was significantly positive (at score of 1.68: b = .44, SE = .22, z = 1.96, $p = .05$), implying increased choice share for the lower-calorie CCL. However, for those with low diet intention scores (mean-centered scores < –.43; 30.1% of sample), the simple effect of displaying CCL in an aligned display was significantly negative (at score of –.43: b = –.24, SE = .12, z = –1.96, $p = .05$), implying decreased choice share for the lower-calorie CCL (and increased choice share for the higher-calorie CCR). Study 1 results are consistent with H_1.

Studies 2a and 2b: Follow-Up Tests

Study 2a

In Study 1, shoppers differed in the extent of their diet intentions, reflecting trait dispositions. Moving beyond traits, in Study 2a we acknowledge that shoppers may differ in their (taste vs. diet) goals, contingent on the food item category. That is, the same shopper could have different goals, conditional on differences between food item categories. Some sets of food items (e.g., health foods) may prompt diet goals, but others (e.g., desserts) may be associated with taste goals. To the extent that products prompt different goals, the effects of presenting food items using an aligned (vs. nonaligned) display may differ. To examine this point, in Study 2a we prime participants to associate the same product (in this case, chocolates) with either a taste goal or a diet goal.

Method. This was a 2 (goal association: taste goal vs. diet goal) × 2 (display: aligned vs. nonaligned) between-subjects design, involving 255 undergraduate students (65.1% women) taking a survey in a behavioral lab. Participants were told that the survey was about beliefs and preferences about chocolate. First, we primed chocolate as being associated with either a taste goal or a diet goal, using a mechanism outlined in prior work (e.g., Dhar and Wertenbroch 2000; Roggeveen et al. 2015). For the taste goal, participants were told that "there are many reasons why people eat chocolate. And yet, what is often comes down to, is that people eat chocolate because it makes them happy. At the end of a long day, eating a piece of chocolate is the perfect reward." Next, participants were asked to write a few words about why people should eat chocolate. Participants generally responded in ways consistent with a taste goal (e.g., "People should eat chocolate because it makes them happy. It feels rewarding to have some at the end of a day," "It's a well-earned reward at the end of a long day," "Eating chocolates make people happy. They think [it's the] perfect reward"). For the diet goal, participants were told that "there are many reasons why people eat chocolate. Interestingly—and this may not be well known—people should eat chocolate for health reasons. Medical studies have shown that chocolate can not only reduce LDL (bad cholesterol) and increase HDL (good cholesterol) but also reduce the incidence of stroke. Next, participants were asked to write a few words about why people should eat chocolate. Participants generally responded in ways consistent with a diet goal (e.g., "It is good for your cholesterol and can prevent strokes," "People should eat chocolate because it can improve aspects of your health," "reduce LDL/increase HDL/reduce chance of a stroke").

Next, participants were shown two chocolate boxes. Each chocolate in box W had approximately 91 calories, and each chocolate in box K had approximately 68 calories. Participants were shown the two boxes either in an aligned manner or in a nonaligned manner (box W displayed below box K). Finally, participants were asked which box of chocolates they would prefer to take a piece of chocolate from (single-item, 11-point scale; –5 = "box K," and +5 = "box W").

Results. We ran an analysis of variance for chocolate preference. We found no significant main effects for display ($F(1, 251) = .02$, $p > .8$), significant main effects for goal association ($F(1, 251) = 18.9$, $p < .05$), and a significant two-way interaction between goal association and display ($F(1, 251) = 10.3$, $p < .05$).

When chocolate was associated with taste goals, participants' preference for low-calorie chocolate box K was weaker when box K was displayed in an aligned manner ($M_{aligned} = .68$, SD = 3.54; $M_{not\ aligned} = -.69$, SD = 3.86; $F(1, 251) = 4.67$, $p < .05$). Put another way, when chocolate was associated with a taste goal, participants' preference for the higher-calorie chocolate box W was significantly stronger when box W was displayed in an aligned manner. In contrast, when chocolate was associated with a diet goal, participants' preference for low-calorie chocolate box K was significantly stronger when box K was presented in an aligned manner ($M_{aligned} = -2.70$, SD = 3.02; $M_{not\ aligned} = -1.20$, SD = 3.79; $F(1, 251) = 5.64$, $p < .05$). These results are consistent with our central hypothesis, H_1.

Study 2b

In Study 2b, we test the full process model across H_1–H_3. In addition, whereas Studies 1 and 2a involved some version of the attribute "calories," Study 2b involves the attribute "sodium."

Method. Two hundred sixty-one U.S. undergraduate students (56.7% women) participated in a two-part study for course credit. First, as part of a set of multiple studies, participants filled out the short, five-point (1 = "never," and 5 = "always"), six-item diet intentions scale (Stice 1998; $\alpha = .91$). The six items were "I take small helpings in an effort to control my weight," "I limit the amount of food I eat in an effort to control my weight," "I hold back at meals in an attempt to prevent weight gain," "I sometimes avoid eating in an attempt to control my weight," "I skip meals in an effort to control my weight," and "I sometimes eat only one or two meals a day to try to limit my weight."

Second, a week later, the same undergraduate students participated in a soup choice study. Because the popular press tends to highlight the negative influences of sodium on health, we did not expect many participants to know that higher sodium (also) can be associated with better taste. Therefore, we asked each participant to read a couple of paragraphs that summarized extracts from various publications, stating that although sodium is associated with obesity and high blood pressure, it also tends to be associated with better taste and aroma. All participants

read both paragraphs, such that all participants received two-sided information.

Next, participants observed two (similar-looking) cans of chicken soup, next to which we showed the respective sodium levels (can N = 477 mg, can B = 664 mg). Participants also learned that the cans typically contained about two servings each, had 90–100 calories per can, and were similar in their content weight (approximately 19 oz.). These soup cans appeared in either an aligned manner (can N below can B) or a nonaligned manner (can N above can B), leading to a 2 (display: aligned vs. nonaligned) × continuous (diet intentions scale) between-subjects design.

Participants first chose their preferred soup can and indicated the importance weight of various factors for their choice decision by allocating five points across (1) sodium content, (2) number of servings per can, and (3) whether the soup contained chicken. Participants could allocate points however they wished, as long as the total points allocated across the three elements totaled five.

We anticipated that presenting the soup cans in an aligned manner will lead participants to place increased importance weight on sodium content. Among those who scored high on the diet intentions scale, participants who assigned more weight to the sodium content should be more likely to choose low-sodium can N. However, if participants scored low on the diet intentions scale, such that they likely focus more on taste, then those who placed more weight on sodium content should be more likely to choose higher-sodium can B (due to the unhealthy = tasty intuition) and so should be less likely to choose can N and more likely to choose can B.

Results. First, we ran a logistic regression for soup choice (can B = 0, can N = 1), in which the independent variables were the diet intentions score (mean-centered at M = 2.21) and display (not aligned = –1, aligned = 1). The main effect of mean-centered diet intentions score was significant (b = .77, SE = .18, z = 4.34, $p < .05$), the main effect of the vertical display was not significant (z = .30, $p = .76$) and the interaction effect was significant (b = .69, SE = .18, z = 3.86, $p < .05$). The positive interaction term indicated that those with higher diet intention scores were more likely to choose the low-sodium soup can in the aligned display condition.

Second, the floodlight analysis (PROCESS Model 1) depicted in Table 2 revealed that for those with mean-centered diet intention scores greater than .36 (34.9% of sample), soup can N was relatively more preferred in the aligned display condition (at score of .36; b = .29, SE = .14, z = 1.96, $p = .05$). However, for those with (mean-centered) scores less than –.54 (32.2% of sample), the lower-sodium soup can N was relatively less preferred in the aligned display condition (at score of –.54; b = –.33, SE = .17, z = –1.96, $p = .05$), and higher-sodium soup can B was relatively more preferred. This was consistent with results in prior studies and with H_1.

Next, the importance weight that participants assigned to sodium content information was higher in the aligned display condition ($M_{aligned} = 3.22$, SD = .91; $M_{nonaligned} = 2.02$, SD = .72; $F(1, 259) = 140.3$, $p < .05$); this result was consistent with H_2. As an important point, prior work (Bialkova, Sasse, and Fenko 2016) has indicated that those with higher (lower) levels of diet concerns paid more (less) attention to nutrition information, whereas we assert that this is not the case and that those with taste goals (i.e., with lower levels of diet concerns) would continue to pay attention to nutrition information. Consistent with our assertion, there was no correlation between diet intention scores and importance weight for sodium (r = .02, $p > .7$).

Third, for those with mean-centered diet intentions scores greater than .87 (i.e., with scores 1 SD above the mean diet intentions scale score), the PROCESS (Model 14; Hayes 2013) output indicated that the mediating effect of the importance weight assigned to sodium was significantly positive (95% confidence interval = [.07, .74]). Thus, if participants scored higher on the diet intentions scale (i.e., had diet goals) and placed more importance weight on sodium during the choice process, they were more likely to choose can N. But for participants with mean-centered diet intention scale scores less than –.87 (i.e., with scores 1 SD below the mean diet intentions scale score), the PROCESS (Model 14) output indicated that the mediating effect of the importance weight for sodium was significantly negative (95% confidence interval = [–.57, –.01]). Thus, if participants scored lower on the diet intentions scale (i.e., had taste goals) and placed more importance weight on sodium during the choice process, they were less likely to choose lower-sodium can N and more likely to choose the higher-sodium can B. These results were consistent with H_3.

Studies 3a and 3b: Generalizing the Results

Studies 1 and 2 focused on the food domain. To generalize the results, we examine other product domains. First, in Study 3a, we present an incentive-compatible study involving an LIB scenario that examines choice between two kitchen implements. In Study 3b—in an MIB scenario—we examine a choice between cell phone accessories. In Study 3b, we also examine factors that may moderate the effects in this research.

The hypotheses (H_1–H_3) are fairly specific to the food domain. However, these hypotheses can easily be modified to extend to any product domain. In Study 3a, for instance, the prediction is that using an aligned display will increase choice share of the focal item.

Study 3a

Method. We administered this two-cell (sale price display: aligned vs. nonaligned) between-subjects design to attendees of three sessions of a cooking class held in a gourmet food store in an upscale U.S. neighborhood. We asked them to participate in a five-minute (voluntary) study, and approximately two-thirds of attendees chose to participate. Among these 43 participants, the median age group were those over 50 years old, 79.1% were women, and median household income was $100,000–$200,000.

All participants were given a study booklet. The first page showed two upscale Wusthof brand cooking knives. On the left side of the page, we presented a picture of knife A (comparison knife) along with a brief description and a sale price of $71; on the right side of the page, we presented a picture and a brief

TABLE 2
Johnson–Neyman Regions in Study 2b

Diet Scale[a]	Effect	SE	z	*p*-Value	LLCI	ULCI	Participant Behavior Consistent with:
−1.2100	**−.7911**	**.2588**	**−3.0568**	**.0022**	**−1.2984**	**−.2839**	Taste goals (32.18% of sample)
−.5414	**−.3313**	**.1690**	**−1.9600**	**.0500**	**−.6625**	**.0000**	
−.2100	−.1033	.1416	−.7296	.4657	−.3807	.1742	
.3597	**.2886**	**.1472**	**1.9600**	**.0500**	**.0000**	**.5772**	Diet goals (34.86% of sample)
.7900	**.5846**	**.1913**	**3.0564**	**.0022**	**.2097**	**.9594**	
1.7900	**1.2724**	**.3415**	**3.7262**	**.0002**	**.6031**	**1.9417**	
2.7900	**1.9602**	**.5100**	**3.8435**	**.0001**	**.9606**	**2.9598**	

[a]Mean-centered values for diet intentions scale.
Notes: This table illustrates the conditional effect of alignment on choice of the low-sodium soup can, at values of diet intentions scale. LLCI = lower-limit confidence interval; ULCI = upper-limit confidence interval. Boldfaced cells indicate significance.

description of knife B (focal knife), showing an original price of $114 and a sale price of $77. In the nonaligned display condition, the sale price appeared above the original price, whereas in the aligned display condition, the sale price was shown below. Participants indicated which knife they preferred. On the second page, we provided another set of two Wusthof brand knives (knife C and knife D) using a similar presentation, but here the focal knife was on the left side of the page. The focal knife, knife C, had an original price $102 and a sale price of $75. Knife D (on the right side of the page) served as the comparison knife, with a sale price of $68. Participants again indicated which knife they preferred. Finally, participants provided their gender, age range, and household income range. To ensure that participants took the task seriously, we told participants (prior to starting the study), that they should make careful choices because (in each session) one participant would be randomly selected to receive one of the two knives chosen.

Results. Consistent with results in Studies 1 and 2, participants preferred the focal knife relatively more when the sale price was shown in an aligned manner. When sale price was shown below the original price, the choice shares for both focal knives B and C were 84.0%; when sale price appeared above the original price, choice shares for the focal knives fell to 33.3% (knife B) and 61.1% (knife C). These choice share differences were significant for knives A versus B ($\chi^2(1) = 11.49$, $p < .05$) and directionally significant for knives C versus D ($\chi^2(1) = 2.88$, $p = .09$).

Study 3b

This study involved a cell phone battery scenario wherein participants were provided with numeric information on battery life, an MIB attribute. Our incoming expectation was that relative preference for the focal item, with longer battery life, would be greater when it was presented in an aligned (vs. nonaligned) manner. Furthermore, a key element of our theory is that if the focal item and the comparison item are displayed in an aligned manner, then it is relatively easier for the shopper to perform the difference calculation. However, if the difference calculation is very easy in the first place, then alignment differences should not affect the perceived ease of performing difference calculations, thus mitigating our proposed effects.

Methods. Participants from Amazon Mechanical Turk (N = 250, 37.8% women, median age group 26–30 years, median annual income $25–$50,000) took a Qualtrics survey. After an instructional manipulation check question (see Oppenheimer, Meyvis, and Davidenko 2009), the survey outlined a scenario wherein the participants used their cell phone a lot, so participants were aiming to buy a cell phone case with an integrated cell phone battery. Then participants read brief descriptions of two cell phone cases with batteries. Case/Battery H (the comparison item) had been on the market for six months, earned good reviews, and offered an incremental battery life of 246 minutes. Case/Battery J (the focal item) was a bit thicker, and because it had just launched, reviews were not available, but the manufacturer claimed an incremental battery life of 331 minutes. The participants were randomly assigned to a 2 (display: aligned vs. nonaligned) × 2 (calculations: harder vs. easier) between-subjects design. In the harder difference calculation condition, the battery lives were 246 minutes (H) and 331 minutes (J); in the easy difference calculation condition, battery lives were 250 minutes (H) and 350 minutes (J). We elicited relative preference on a seven-point scale (1 = "strong preference for H," and 7 = "strong preference for J") and captured demographic information.

Results. We found that 35.6% participants gave incorrect responses to the instructional manipulation check (consistent with ranges in Oppenheimer et al. [2009]), so we removed them from the analyses (consistent with recommendations in Oppenheimer et al. [2009]). An analysis of variance for relative preference revealed significant main effects (for both display and difference calculations, $F(1, 157) > 3.9$, $p < .05$), as well as a directionally significant interaction effect ($F(1, 157) = 3.31$, $p = .07$). When battery life differences were harder to calculate, using an aligned display (i.e., locating J above H) led to significantly increased preferences for the focal, longer-life battery J ($M_{above} = 3.98$, SD = 1.93 vs. $M_{below} = 2.70$, SD = 1.59; $F(1, 157) = 9.38$, $p < .05$). In contrast, when difference calculations were easy, locating J above H did not significantly influence relative preferences ($M_{above} = 4.03$, SD = 2.19 vs. $M_{below} = 3.85$, SD = 1.89; $F(1, 157) = .17$, $p > .6$).

Discussion

Consistent with the theory in this article and with our a priori expectations, any factor that makes the difference calculation easier should serve as a suitable moderator for our effects. In Study 3b, we examined the specific case of when difference calculations were easy (e.g., 350 − 250), and thus, alignment differences should not influence the importance weight that shoppers would generally give to the difference gap. Other instances when difference calculations should be easier may include when, for example, the difference gap is explicitly stated (e.g., the difference percentage is explicitly shown ["40% more battery life," "25% less sodium"]) or the difference is very large. In all these cases, there would be no need for the shopper to perform the difference calculations to figure out that the difference gap is substantial, so shoppers should generally give the difference gap relatively high importance weight. These factors—some of which were foreshadowed in Biswas et al. (2013)—all (potentially) constitute moderators to our effects.

General Discussion

For shoppers who have diet goals, presenting a focal, healthy food item in an aligned (vs. nonaligned) manner increases its choice share. In contrast, for shoppers with taste goals, presenting the focal food item in an aligned (vs. nonaligned) manner decreases its choice share and increases the choice share of the competing, less healthy food item. This nonintuitive interaction result reflects our central hypothesis (H_1), whereby the extent to which shoppers make made goal-consistent food item choices is higher (lower) when the food items are displayed in an aligned (nonaligned) manner. Drawing on work in food-related research, goals, and numeric cognition, we outline the underlying process mechanism in H_2–H_3. Whereas Studies 1 and 2 illustrate H_1–H_3 in the food domain, Study 3 shows that our proposed decision-making framework has widespread applicability, potentially extending to any domain wherein advertising, retail displays, or online displays involve comparisons of numeric attribute information.

Theoretical Contributions

Our study makes several contributions to the body of work relating to shoppers' food-related goals and how shoppers make food choices. First, prior research has suggested that people with less focus on diet goals pay less attention to nutrition information (Naylor, Droms, and Haws 2009; Van Herpen and Van Trijp 2011). For example, Mohr, Lichtenstein, and Janiszewski (2012, p. 64) argue that "those very involved with their dietary choices will ... [be influenced by] nutrition labels," and they found (p. 66) that differences in purchase intentions across less healthy versus healthier food items arose among those with higher levels of diet intentions but not among those with lower levels of diet intentions. Bialkova, Sasse, and Fenko (2016) and Cavanagh and Forestell (2013) found similar effects, such that people who were more concerned about health were more likely to prefer healthy food items over less healthy food items, but people less concerned about health expressed no clear preference. In contrast, we propose that people with less focus on diet goals (i.e., those with taste goals) do indeed pay attention to nutrition labels; however, because of the unhealthy = tasty intuition, these shoppers behave as if they prefer food items with more calories or sodium. This explanation better reflects the interaction result in Studies 1–2, implying a specific disordinal (crossover) pattern. If shoppers with taste goals merely ignored (or paid less attention to) nutrition information, the interaction pattern in Studies 1–2 would be different and would reflect an ordinal pattern. In contrast with prior research, we find that it is possible to find cases wherein those score lower on the diet intentions scale behave as if they may prefer higher-calorie food items—especially when attribute information is presented in an aligned manner. This point highlights a key contribution of this article.

Second, prior research into shoppers' food choices has tended to ignore the impact of display differences (and other contextual differences) related to the presentation of calorie information. Specifically, even as prior research posits that people with diet goals focus more on low-calorie items, it ignores the possibility that these effects may be weaker if lower-calorie food items are displayed in a nonaligned manner. In Studies 1 and 2, the effect of diet intention scores (or diet vs. taste primes in Study 2a) on choices and preferences is moderated by differences in attribute display. In essence, shoppers are more likely to make goal-consistent choices when food items are displayed in an aligned manner. This point is both new and nontrivial. Beyond the implications for practice (as we discuss subsequently), this finding may explain null results that arise when differences in diet intentions do not prompt different choices or preferences. For example, consider Study 2b. We reanalyze the data and, purely for illustrative purposes, median-split the diet intentions variable. If we consider just the two cells reflecting the nonaligned display condition, the relative choice shares for the low-sodium soup can were 39.7% (low diet intentions) versus 43.1% (high diet intentions) ($\chi^2(1) = .15$, $p = .69$). Examining just these cells might lead a researcher to conclude that differences in diet intentions do not affect shoppers' choices. Yet when we consider the other two cells, which involve aligned food item displays, the relative choice shares shift to 22.2% (low diet intentions) versus 70.7% (high diet intentions) ($\chi^2(1) = 30.65$, $p < .05$). Thus, examining just the data pertaining to an aligned display would lead a researcher to a very different conclusion: that differences in diet intentions significantly affect shoppers' choices. Both points are contributions beyond modifying and broadening the subtraction principle and are highlighted as such in Appendix A.

The findings in this article also contribute to the numerical cognition literature. By examining the impact of display differences, we determine that vertical display differences lead to varying importance weights that shoppers assign to the attribute gap when making evaluations. Displaying a focal food item in an aligned (vs. nonaligned) manner, such as below (vs. above) comparison food items, leads shoppers to attach more importance weight to the attribute gap in their evaluations. We tested these effects not only within the food domain (Studies 1 and 2) but also in other domains (Study 3), indicating that these effects

have predictive applicability across a wide variety of domains wherein advertising, retail displays, and online displays involve comparisons of numeric attribute information.

Given concerns about obesity and associated health problems (Howlett et al. 2012), there is much interest in understanding when shoppers might use calorie and sodium information to make healthier choices. One challenge is to motivate shoppers to embrace diet goals, which can increase their consumption of healthier foods. However, assuming shoppers have diet goals, another challenge is to ensure that available calorie (or sodium content) information is displayed in ways that nudge shoppers toward healthier, rather than less healthy, food choices. Our findings suggest that display differences related to the location of food items can encourage shoppers' healthy choices. As our studies indicate, diet-focused shoppers are more likely to make healthy choices if nutrition information is displayed in an aligned manner.

Finally, and most importantly, this article outlines a parsimonious decision-making framework that examines how shoppers react to advertising, retail, or online displays in a wide variety of product domains involving comparisons of numeric attribute information. Building from, modifying, and expanding the work in Biswas et al. (2013), we identify two key elements that jointly determine shoppers' evaluations: (1) whether shoppers perceive the attribute as an LIB attribute or a MIB attribute and (2) whether the attribute information is displayed in an aligned or nonaligned manner. Firms can use this framework to better design advertising, retail displays, and online displays. The effects in this article apply across a variety of product domains, as evidenced in the marketplace examples we cite and in the range of studies we present (Appendix A).

Managerial Implications

Differences in shelf displays affect shoppers' purchase intentions (Grewal et al. 2011). As more firms adopt the voluntary FOP nutrition labeling system, "Facts Up Front," and as more retailers display food items to showcase such FOP information, a key question is how retailers and category captains should organize the display of food items on retail shelves. The insights in this article offer some guidance. Imagine a retailer that wants to promote the new low-calorie Coca-Cola Life soft drink. If most shoppers (at this retailer) have diet goals, or if the retailer is able to prime diet goals through in-store signage or advertising, then, on the basis of this research, the retailer will increase sales by putting cans of Coca-Cola Life below cans of regular Coca-Cola. If a retailer primarily attracts shoppers with diet goals, but its profit margins are better on regular soups, then it might choose to put the regular soup cans below the lower-sodium soup cans to encourage relatively more sales of regular soup, despite its primarily "diet-goal" shopper segment. Finally, depending on food item categories, advertising, packaging, and so on, shoppers may have different goals. To the extent a retailer knows these goals, or to the extent firms can use advertising or packaging to prime such goals, firms can use display differences to increase sales of the more profitable products within the category. For example, if the candy category prompts taste goals, and if margins are higher on candy products with more calories, then retailers should display higher-calorie candy items above other candy-items to maximize sales of these more profitable products. Thus, the findings in this article can aid retailers and category captains as they optimize in-store shelf displays. Contingent on shoppers' goals, numeric values relating to calorie content or to sodium, and relative food item profitability, retailers can display food items in ways that "push" certain high-profit food items over others. Similarly, the findings in this article may also inform how online retailers should display food items on their webpages and how supermarkets and grocery items should display food items on flyers.

The effects we describe herein are driven by differences in (locational) displays of food items, which lead to differences in importance weight attached to food item attributes, with downstream consequences. Understanding this information-processing sequence has several implications for consumer welfare and public policy. First, we provide guidance for how diet and nutrition apps might be structured to help shoppers make healthy choices, noting that those who use such apps likely already have diet goals. When diet apps provide scores of food items, whether in grocery stores or restaurants, such diet apps should motivate shoppers to not only learn exact calorie/sodium information but also to give this information greater importance weight in their evaluations. Such efforts might help mitigate any negative impact arising from retailers' use of nonaligned displays. Second, from a public policy perspective, young consumers and children are relatively unlikely to have diet goals (Burton, Wang, and Worsley 2015), and so using aligned food item displays may well backfire. Specifically, using aligned food item displays and/or explicitly prompting younger consumers to consider calorie/sodium information is likely to increase their preference shift toward higher-calorie/sodium food items. In such instances, regulatory policies governing advertising and menu signage should (seemingly counterintuitively) recommend using nonaligned display presentations and should (seemingly counterintuitively, but importantly) avoid prompting younger consumers to explicitly consider calorie/sodium information. These points highlight the role of attribute gap importance weight and distinguish this work from Biswas et al. (2013). Finally, both shoppers and policy makers need to recognize that marketers can present attribute information in ways that may mislead shoppers. For example, if a lower-calorie option involves smaller profit margins, a restaurant frequented by patrons with diet goals might display this option above a high-calorie option to reduce patrons' weighting of the calorie gap and thus reduce patrons' preference shift toward the lower-calorie option. Such a practice can be labeled as "providing full information" to patrons and is not illegal, but public policy experts would note that it may reduce welfare.

The effects outlined in this article have widespread applicability, extending well beyond the food domain. As stated previously, these effects apply to any product domain involving a comparison of numeric attributes. Thus, for example, the effects would extend to any product domain wherein prices (typically an LIB domain) are displayed; into any domain involving MIB attributes such as battery life (e.g., cell phones,

tablets, laptops) and Internet speed (e.g., cellular networks); and into domains such as robotic vacuum cleaners, which involve attributes that are MIB (e.g., operating time) and LIB (charging time).

As a specific example, some insurance companies (e.g., Progressive) provide information both about their own rates and about the rate from a competitor. Progressive shoppers would behave similarly to shoppers with diet goals, in the sense that insurance shoppers generally prefer lower insurance rates (insurance rates = LIB attribute). In line with this article's findings, we suggest that an insurance provider should present its own rate quote below the quote from a competitor. If its own rates are lower, this presentation format ensures that insurance shoppers put more weight on the "rate gap," which increases relative preference for the focal insurance company's product. If, however, the competitor's rates are lower, presenting its own (higher-amount) rates below would lead shoppers to put less weight on the rate gap, thus decreasing relative preference for the competitor's insurance product.

The advice in the previous paragraph is valid when the attributes involved are clearly LIB. However, other attributes may typically be perceived as MIB (e.g., network speed, battery life, operating time [in robotic vacuum cleaners]). In such instances, the focal firm should display its information above that of competition (exactly opposite of what is advised when the attribute is LIB). If its competitor's "scores" are lower, this presentation display ensures that shoppers put more weight on the attribute gap, which increases relative preference for the focal firm's product. If its competitor's scores are higher, then this presentation display leads shoppers to put less weight on the attribute gap, thus decreasing relative preference for the competitor's product.

The contrast across the prior two paragraphs highlights the importance of identifying shoppers' goals and identifying whether shoppers perceive the attribute as LIB or MIB. As we have noted, what constitutes the optimal display is conditional on how shoppers perceive attributes. It is for this reason that LIB versus MIB is one of the two independent variables in this article.

Limitations and Future Research

The effects we find are driven by differences in displays of food items, which lead to varying importance weights assigned to numeric attribute information and further downstream consequences. We reiterate this important point because it helps clarify the conditions in which the effects we propose may be more versus less evident. To the extent that the effects in this article are driven by differences in importance weights, they may be more evident if the importance weight of numeric attribute information (e.g., calories, sodium, price) is neither too high nor too low. However, in certain conditions, such importance might reach high levels, and it is then that the effects we propose may be less evident. For example, if calorie attributes dominate choice (i.e., have very high importance weight), display differences likely have minimal effects, as a result of ceiling effects. Beyond the moderators identified in Study 3b, these may also constitute moderators of our effects, and these are not predicted by Biswas et al. (2013).

Future research could also further examine the information-processing mechanism outlined in H_2 and H_3. A key element of this mechanism is that subtraction calculations are perceived as more difficult when the smaller number is displayed above the larger number. Numerical cognition researchers may also examine whether individual differences related to numeracy, math anxiety, and so on may moderate the effects noted in H_2–H_3.

In addition, there are two ways shoppers can perceive numeric attributes (vector attributes vs. ideal point attributes; see Green and Srinivasan 1978; Teas 1993). This article examines the case wherein shoppers perceive attributes as "vector" attributes, preferring either more of an attribute (MIB [e.g., battery life]) or less of an attribute (LIB [e.g., for diet focused shoppers, fewer calories/less sodium), but it does not examine what happens when attributes have ideal point characteristics. What happens if shoppers believe that an "ideal" number of calories for a sandwich is around 350 calories? Future research could explore whether the effects in this article sustain when such ideal points exist for key attributes.

In this research, we assume that consumers who behave as if they prefer food items with more calories do so for taste-related reasons. But other reasons could also be operant, such as financial reasons that prompt some lower-income shoppers to prefer food items with more calories. Examining the behaviors of these shoppers is an important area for research, especially from a policy standpoint, to determine whether lower-income shoppers might prioritize calorie amounts over factors like nutrition or health.

Building on a "healthy-left, unhealthy-right" intuition, Romero and Biswas (2016) propose that a food item without nutrition labeling is perceived as healthier if displayed to the left (vs. right) of a comparison food item. Among shoppers with diet goals, such a display increases the focal, healthy food item's choice share. However, we propose that when FOP calorie information is shown, displaying the focal, healthy food item to the right of the comparison item (i.e., displaying the food items in an aligned display) may increase the importance weight that shoppers attach to the calorie gap during their evaluations and so would increase the choice share of this food item. Thus, presence of FOP calorie information may reverse Romero and Biswas's (2016) results. Research that tests these competing predictions could contribute to both theory and practice.

Implicit in our theory is that many shoppers embrace the unhealthy = tasty intuition. It would be worthwhile to reexamine these effects among populations (e.g., in France; see Werle, Trendel, and Ardito 2013) for whom this intuition may be weaker or even reversed. Finally, we only examine cases wherein attribute information is provided using numeric information. However, sometimes attribute information is provided using quasi-numeric formats, such as when Verizon contrasts its cellular coverage with AT&T using a map covered with more (vs. less) dots, without providing information relating to the actual number of dots. Would aligned (vs. nonaligned) display matter in such cases? Examining this and similar questions may further expand the applicability of this work.

APPENDIX A
Programmatic Development of the Subtraction Principle

	Initial Conceptualization (Biswas et al. 2013)	Modified, Broadened Conceptualization (Current Research)
Key independent variable exemplars	Sale price display (right vs. left; left = nonaligned display)	1. Food item with lower-value nutritional information (lower value of calories, sodium, kJ, etc.) display (above vs. below; above = nonaligned display) 2. Sale price display (above vs. below; above = nonaligned display) 3. Phone case with longer battery life display (above vs. below; below = nonaligned display)
Dependent variables	Value perceptions, purchase intentions, choice (one study)	Choice (multiple studies), preference
Mechanism	When price information is presented in a nonaligned manner → increases subtraction difficulty[a] → price gap estimated at 10%–12% → evaluations	When two elements of attribute information are presented in a nonaligned manner → increases subtraction difficulty[a] → attribute gap given less importance weight → evaluations
	Price gap estimate of 10%–12%, based on Blair and Landon (1981)	Attribute gap given less importance weight, based on Shah and Oppenheimer (2007); see also Oppenheimer (2008)
Domain applicability	Study scenarios involve price comparisons	Study scenarios relate to the food domain (attributes: calories, sodium) and battery domain (attribute: battery life); there is (also) one study involving price comparisons
	10%–12% benchmark does not "travel well" to nonprice domains	The mechanism, and the important role of importance weight, is applicable across multiple attribute domains (including the price domain)
	The price domain typically involves LIB goals (i.e., lower prices are better). Predictions apply to LIB domains.	We acknowledge that participants may have LIB goals or MIB goals, contingent on state (e.g., domain type) or trait (e.g., diet goals vs. taste goals) considerations. Predictions apply to LIB domains (e.g., price), MIB domains (e.g., battery life) and domains in which participants can have either LIB goals or MIB goals (e.g., food domain).
Moderating mechanisms	Moderators for subtraction difficulty (e.g., providing subtraction gap amount, having numbers involving easier calculations)	Moderators for subtraction difficulty e.g., having numbers involving easier calculations
	Moderators for price gap (e.g., moderate versus low discount depth)	The focus of this article was on modifying and broadening the subtraction principle.
Contributions specific to the food domain	The focus of this article was the price domain; other domains not considered/not examined	Extant literature (e.g., Mohr et al., 2012 Bialkova et al. 2016) has indicated that those with less focus on diet goals pay less attention to nutrition information. In contrast, this article indicates that those with less focus on diet goals (1) pay attention to nutrition information and (2) make choices as if they prefer higher-calorie/high-sodium food options
		The extent to which participants make goal-consistent food choices is contingent on whether food options are displayed in an aligned manner.

[a]Nonaligned presentation increases subtraction difficulty (Thomas and Morwitz 2009; see also Fuson and Briars 1990; Yip 2002).

APPENDIX B
Exemplar Stimuli

A: Study 1

B: Study 2a

Box W

Each chocolate piece
91 calories

Box K

Each chocolate piece
68 calories

C: Study 2b

Each soup can has (i) chicken-based soup, (ii) has 2 servings per can, (iii) has about 90-100 calories per serving, (iv) has the same levels of calories from fat and sugar content, and (v) has similar weight (about 19oz).

Soup can "B"

Sodium is approximately **664mg*** per serving

Soup can "N"

Sodium is approximately **477mg*** per serving

**plus/minus 10%*

D: Study 3a

Cooking Knife "A"

"strong blade with a new deflecting ridge"

Sale price $71

Cooking Knife "B"

"strong blade with bolster and full tang"

~~Original price $114~~

Sale price $77

Bread Knife "C"

"with serrated edge and straight blade"

~~Original price $102~~

Sale price $75

Bread Knife "D"

"with serrated edge and slightly curved blade"

Sale price $68

E: Study 3b

Mobile phone battery case	Online reviews	Extra battery life
J	-Just launched -Online reviews not available -Very slightly thicker	**331** minutes (expected, per manufacturer)
H	-Been out six months -Good online reviews -Slim	**246** minutes (average across independent tests)

Notes: In Studies 1, 2, and 3a, aligned display conditions are shown. In Study 3b, the aligned display/harder calculation condition is shown.

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