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The Light = Healthy Intuition

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This research documents a "light = healthy" intuition, such that consumers perceive foods that weigh less are healthier than their heavier counterparts with the same serving size. Subsequently, consumers consume a larger quantity of lighter-weight foods. The intuition is based on a coactivation of two meanings of the word "light": light in physical weight and light in calorie content. An implicit attitude test finds support for this association between physical weight and food healthiness. Subsequently, physically lighter foods are perceived to be healthier because they are assumed to contain fewer calories. In line with the proposed coactivation mechanism, the intuition is bidirectional, where consumers also expect healthier foods to weigh less. Consequently, they discredit health claims issued for heavier foods. Finally, it was found that activating a competing intuition is effective at debiasing the "light = healthy" intuition.

Keywords Food healthiness; Physical weight; Light; Intuition; Homograph; Associative learning; Food consumption

Introduction

Food decisions are important but a recent survey indicates that 80% of consumers are confused about them (Food Insight, 2018), presumably owing to the prevalence of diverse health claims in marketing communications (André, Chandon, & Haws, 2019). As a result, consumers rely on contextual cues for food choices, even if these are not diagnostic for food healthiness. Prior research documents several contextual factors that influence perceived food healthiness and food decisions. For example, consumers believe that more expensive foods are healthier (Haws, Reczek, & Sample, 2017) and that tastier foods are less healthy (Raghunathan, Naylor, & Hoyer, 2006). In this research, another ubiquitous cue that consumers use to infer food healthiness is identified: physical weight.

Weight information is widely available; in restaurants, the total weight of a steak or fast-food hamburger (e.g., quarter-pounder) tends to be communicated more often than their calories. Food and Drug Administration (FDA) guidelines require all packaged foods to indicate weight information as quantity indicators on both the front of the package and the top of the nutrition table (https://www.fda.gov/media/81606/download). During both purchase and consumption, consumers experience the haptic sensation of physical weight. We propose that the physical weights of foods can influence perceived food healthiness. Specifically, we posit and confirm a "light = healthy" intuition: Comparing two foods with *the same serving size*, consumers infer that the food which weighs less contains fewer calories and is thus healthier. However, this intuition is not diagnostic for assessing food healthiness. One serving of potato chips or popcorn is certainly lighter than one serving of baby carrots, but the former is by no means healthier.

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Documentation of this intuition makes several contributions. First, we add to research investigating consumer lay beliefs and food evaluations. Prior studies have documented unhealthy = tasty (Raghunathan et al., 2006), healthy = expensive (Haws et al., 2017), and healthy = less filling (Suher, Raghunathan, & Hoyer, 2016) intuitions, predicting that consumers make a heuristic judgment based on learned associations (Chaiken, 1980, 1987; Chaiken & Eagly, 1983; Petty, Cacioppo, & Schumann, 1983). This study shows that consumers also associate food healthiness with physical weight and use this intuition to guide their food decisions. Second, this study contributes to research on cross-modal sensory effects. Prior research shows that sensory cues, such as temperature (Yamim, Mai, & Werle, 2020), texture (Jansson-Boyd & Kobescak, 2020), color (Madzharov, Ramanathan, & Block, 2016), glossiness (Ye, Morrin, & Kampfer, 2020), and ambient scent and sound (Biswas, Lund, & Szocs, 2019; Biswas & Szocs, 2019) can affect perceived food healthiness. This study documents that haptic sensations of physical weight can affect perceived food healthiness, too. Finally, this research offers another nudge for healthy eating, beyond portion size effects (Cadario & Chandon, 2020; Zlatevska, Dubelaar, & Holden, 2014). Previous research has found that visually reducing the portion size lowers consumption volume (Chandon & Wansink, 2011; Wansink, 2004). In this research, while we keep both the actual and perceived portion size constant, we still influence people's consumption quantity by varying the physical weight of the package.

Theoretical Background

The word *light* is a homograph; it can express different meanings. Through activation spreading in the associative network of memory (Anderson, 1983; Collins & Loftus, 1975), the different meanings are all activated when consumers encounter the word *light*. When different meanings apply to the task at hand, they stay simultaneously activated, which may cause them to become associated over time through associative learning (Martin & Levey, 1978). Associative learning occurs when people encode a link between two elements (e.g., words, pictures), such that the presentation of one element activates the mental representation of the other. People tend to store associations when the elements are presented simultaneously or temporally contiguously (Dickinson, 2001; Janiszewski & Van Osselaer, 2000), even if they do not make logical sense (Brown & Bassili, 2002) or evoke conscious awareness (Jones, Fazio, & Olson, 2009; Moors & De Houwer, 2006). This association is strengthened with repeated coactivation (Anderson, 1983).

Homograph-generated associations have been demonstrated in research on metaphors. Weight implies both physical heaviness and importance (i.e., "weighty matters"), the association of these meanings leads people to perceive books that contain more important information as literally heavier (Schneider, Rutjens, Jostmann, & Lakens, 2011); people also assign greater importance to a subsequent task when they carry heavier items (Zhang & Li, 2012). Interestingly, similar associations are also found in homophones—reading "bye" increases people's propensity to "buy" (Davis & Herr, 2014). We posit that this mechanism underlies the association between the two meanings of *light*: "low in calories" and "low in weight."

Growing healthy eating trends have led to more foods adopting "light" labels to signal their healthiness. According to FDA guidelines, products using this label must meet one of three criteria, the most prominent of which requires "a third fewer calories, or no more than half the fat of the original version of the product" (https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=101.56). This usage of "light" in foods provides the meaning of "low in calories." When consumers encounter light labels, the other meaning of *light*, low physical weight, is also activated. This coactivation of "low in calories" and "low in weight" will lead consumers, over time, to associate these two meanings as they are both applicable to food assessments. Owing to a general tendency of consumers to equate low calories with food healthiness (Carels, Harper, & Konrad, 2006; Carels, Konrad, & Harper, 2007), this association leads consumers to develop a general idea that healthy foods weigh less. As learned associations tend to be bidirectional, we propose that consumers expect that (a) lighter-weighted foods are healthier (by virtue of containing fewer calories) and (b) low-calorie healthier foods weigh less.

The proposed light = healthy intuition has several important consequences. First, perceived food healthiness based on physical weight may directly influence consumption quantities such that people consume more of the lighter-weighted foods because of the healthiness halo. Second, the light = healthy intuition could discredit the "healthiness" appeals of heavier products. Consumers may

be less likely to believe that a heavier product is also healthier. Finally, we propose a simple debiasing strategy based on the fact that healthiness is a multifaceted construct. Thus, activating another healthiness related intuition may offset the light = healthy intuition. The conceptual framework is illustrated in Figure 1.

Study 1. Implicit Attitude Test

Study 1 uses the implicit attitude test (IAT; Carpenter et al., 2019; Greenwald, McGhee, & Schwartz, 1998; Greenwald, Nosek, & Banaji, 2003) to confirm the association between physical weight and food healthiness.

Method

The study recruited 199 Amazon Mechanic Turk (MTurk) panelists (53.77% male, M_{age} = 39.58, SD = 11.93). Participants were asked to categorize images or words appearing in the center of the screen correctly to a category appearing on the left or right top corner of the screen, as quickly as possible. The study created four groups of stimuli (Appendix S1): (a) low-calorie food images (e.g., veggie burger, oatmeal chips), (b) high-calorie food images (e.g., hamburger, potato chips), (c) words associated with "light-weight" (e.g., of little weight, easy to carry), and (d) words associated with "heavy-weight" (e.g., of great weight, difficult to carry). We created 11 pairs of food items and two items within each pair were of the same serving size. In line with established IAT procedures (Greenwald et al., 2003), participants completed seven blocks of categorization tasks (Table 1). We compared the response time between the congruent pair ("Healthy/Light" & "Unhealthy/Heavy") block (block 4), and the incongruent pair ("Healthy/Heavy" & "Unhealthy/Light") block (block 7). The order of the blocks was counterbalanced.

Results and Discussion

Response latencies in the congruent pair were 1,269.24 ms (SD = 429.16) and those in the incongruent pair were 1,475.51 ms (SD = 449.54). The D-score was significantly greater than 0 (D = 0.45, SD = 0.47, $t(133) = 10.98$, $p < .001$, 95% CI = [0.37, 0.53], Cohen's d = 0.95), suggesting that participants responded significantly faster in assigning the stimuli when healthy and light were grouped together. These results support the proposed association between physical weight and perceived food healthiness.

Study 2. Infer Healthiness from Weight

Study 2 serves three objectives. First, we demonstrate the light = healthy intuition prompts consumers to infer food healthiness from weight information. Second, we confirm that calorie estimates drive perceived healthiness based on physical weight and rule out two competing mechanisms: food density and food fillingness. Keeping serving size constant, heavier foods might be perceived as less healthy as they have greater density, defined as the degree of food compactness (e.g., a piece of denser cake is heavier than a piece of fluffy cake) and/or because they are more filling, defined as the subjective assessment of whether a food satisfies hunger (Suher et al., 2016). Finally, as the "light" label refers mostly to low-calorie and fat content, we propose that other health-related inferences (e.g., organic nature) may be limited.

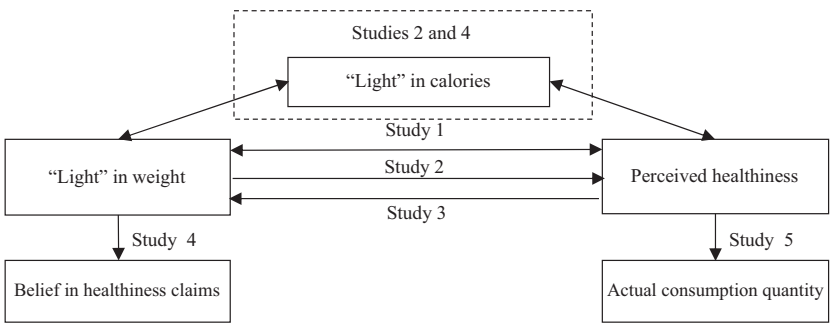

Figure 1. Conceptual framework.

Table 1
Study 1: Trial Blocks in IAT

Block	Number of trials	Function	Items assigned to left-key response	Items assigned to right-key response
1	20	Practice	Healthy	Unhealthy
2	20	Practice	Light	Heavy
3	20	Practice	Healthy/Light	Unhealthy/Heavy
4	40	Critical test block	Healthy/Light	Unhealthy/Heavy
5	20	Practice	Unhealthy	Healthy
6	40	Practice	Healthy/Heavy	Unhealthy/Light
7	40	Critical test block	Healthy/Heavy	Unhealthy/Light

Note. The following procedures were used to clean the data (Greenwald et al., 2003): (1) Participants whose trial response latencies were greater than 10,000 milliseconds (ms) were coded as missing values (0.03% of total trials); (2) if more than 10% of a participant's response times were less than 300ms, the participant's responses were removed (65 participants, or 32.66%, removed, leaving 134 participants); and (3) participants were forced to correct the errors in categorization trials, so we did not impose any error penalty (14.82% error rate). The dataset for the final sample demonstrated good internal consistency (82.21%).

Method

MTurk panelists ($N = 177$, 50.3% male, $M_{age} = 39.48$, SD = 11.54) participated in this one-factor (weight: light vs. heavy) between-subjects study. They read that Susan planned to make a chicken Caesar salad and found a recipe for a 300 g portion that contained 400 calories. We provided the list of seven ingredients in the salad with the exact quantities (Table 2). In the light [heavy] condition, participants read that Susan followed this recipe and used exactly the same amount of ingredients and ended up with 250 g [350 g] of the salad. Thus, the difference between the actual and expected weight of 300 g was not a result of the changes in the ingredient portions, but in the type of ingredients used to make the salad. Participants chose from seven pairs of ingredients, which Susan most likely used to make the salad. Each pair contained one healthy ingredient and one unhealthy/regular ingredient. Four healthy ingredients were explicitly low in calories and the other three were described as organic (Table 2). Finally, participants estimated the calorie count of the salad and evaluated its density and fillingness on a 9-point scale (1 = "not at all dense/filling," 9 = "extremely dense/filling").

Results and Discussion

Choice of ingredients. Separate chi-square tests for each ingredient showed that in the light condition, participants were more likely to choose healthy ingredients with fewer calories (Table 2) for all four calorie-related ingredients (p's < .001). In contrast, for three ingredients indicating organic options, only organic eggs prompted a significantly higher choice share in the light condition ($p = .03$) and no difference arose for the other two ingredients (p's > .08). Thus, we find that "light" reliably

Table 2
Study 2: Choice Share of Healthy Ingredients and Organic Ingredients

	Choice percentage of healthy ingredient				
Ingredient pair	Heavy condition	Light condition	Chi-square (1)	p	Cohen's d[a]
Grilled chicken versus Fried chicken	55.7%	86.5%	20.51	<.001	0.90
Fat-free Parmesan cheese versus Regular Parmesan cheese	19.3%	50.6%	18.98	<.001	0.82
Fat-free salad dressing versus Regular salad dressing	22.7%	64.0%	30.74	<.001	0.98
Fat-free bacon versus Regular bacon	22.7%	57.3%	22.02	<.001	0.82
Organic eggs versus Regular eggs	27.3%	41.6%	4.01	.03	0.37
Organic lettuce versus Regular lettuce	25.0%	32.6%	1.24	.17	0.22
Organic tomato versus Regular tomato	25.0%	36.0%	2.51	.08	0.29

[a]Cohen's d was calculated based on a comparison of choice proportions (Grissom & Kim, 2012).

prompts inferences of low-calorie content but less reliable inferences of other healthiness dimensions (i.e., organic). Additional analyses were undertaken to compare the choices between low-calorie ingredients and organic ingredients in Appendix S2.

Mediation test. As predicted, participants estimated that the salad contained more calories (M_{heavy} = 437.05, SD_{heavy} = 96.89; M_{light} = 345.30, SD_{light} = 72.04, $t(175) = 7.14$, $p < .001$, $d = 1.08$) and was denser (M_{heavy} = 6.41, SD_{heavy} = 1.64; M_{light} = 5.55, SD_{light} = 1.73, $t(175) = 3.38$, $p = .001$, $d = 0.51$) in the heavy condition. The difference in filling perceptions between the two conditions was marginally significant (M_{heavy} = 7.17, SD_{heavy} = 1.28; M_{light} = 6.78, SD_{light} = 1.51, $t(175) = 1.88$, $p = .06$, $d = 0.28$). Next, we summed the choice of four low-calorie ingredients as a general healthiness score and ran a mediation test (*Process* model 4; Hayes, 2018) with 10,000 samples entering the weight condition (1 = light condition) as the independent variable, the general healthiness score as the dependent variable, and calorie estimates, density, and fillingness as three parallel mediators. The mediation showed a significant indirect effect of calorie estimates ($b = -0.38$, SE = 0.10, 95% CI = [−0.59, −0.20]). However, neither density nor fillingness was significant (Figure 2). The results support that light in calories drive perceived food healthiness in the light = healthy intuition. Study 3 tests whether consumers expect healthier food to weigh less.

Study 3. Infer Weight from Healthiness

Method

MTurk panelists (N = 300, 52.7% male, M_{age} = 39.23, SD = 11.84) participated in this one-factor (food healthiness: regular vs. healthy) between-subjects study. Participants in the regular [healthy] condition saw one traditional [healthy] chocolate cake containing regular ingredients (e.g., whole milk, sugar) [low-calorie ingredients (e.g., nonfat milk, stevia)]. Participants read that this type of cake's weight was normally between 550 and 650 g, and they had to guess the weight of the traditional [healthy] chocolate cake using a slider (between 550 and 650 g). Both conditions used the same photograph of the cake to keep the serving size constant.

Results and Discussion

Participants gave a lower weight to the healthy cake (M = 599.93 g, SD = 27.03) than the traditional cake (M = 608.87 g, SD = 23.31; $t(298) = 3.07$, $p = .002$, $d = 0.35$). This indicates that people infer that food containing low-calorie ingredients weighs less than the regular counterpart. We replicated this finding using a within-subjects design in Appendix S3.

Study 4: Consumer Responses to Intuition-Inconsistent Information

As study 3 demonstrated that consumers expect healthy food to weigh less than the regular counterpart, brands should design healthy products to weigh less than less healthy options. Otherwise, consumers may discount a healthiness claim as it is inconsistent with the light = healthy intuition. To test this proposition, we used two actual products: Kraft mayonnaise and Kraft light mayonnaise. In reality, the "light" version weighs more than the original version for equal serving sizes, which creates an interesting real-world case.

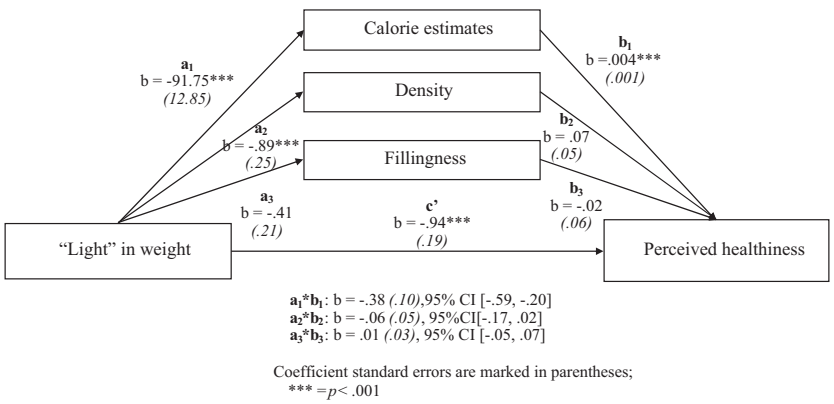

Figure 2. Study 2: Parallel mediation test.

Method

344 MTurk panelists were recruited to participate in this one-factor (healthiness claim: intuition-consistent vs. intuition-inconsistent) between-subjects study. Participants read that a mayonnaise brand was launching a light version, and the original and light versions were packaged in identical jars. They imagined holding the jars of both versions in their hands, and they sensed a weight difference between two jars. In the intuition-inconsistent [intuition-consistent] condition, the light mayonnaise was heavier [lighter] than the original version. Weight information on the jar stated that the light mayonnaise weighed 1,440 g [1,248 g], whereas the original weighed 1,248 g [1,440 g]. Thereafter, participants indicated to what extent they believed that the light mayonnaise (a) was healthier and (b) contained lower calories, and (c) how much healthier was the light mayonnaise to the original version (all measured on 7-point scales, 1 = "not at all/a lot less healthy," 4 = "somewhat/equally healthy," and 7 = "very much/a lot healthier"). As an attention check, participants had to recall which mayonnaise weighed more.

Results and Discussion

After removing 70 participants (20.3%) who failed the attention check, the final sample included 274 participants (48.5% male, M_{age} = 42.42, SD = 12.47). All the reported effects remained statistically significant with the full sample (Appendix S4).

As predicted, participants in the intuition-consistent condition believed the healthy claim more ($M_{intuition\text{-}consistent}$ = 4.36, $SD_{intuition\text{-}consistent}$ = 1.40; $M_{intuition\text{-}inconsistent}$ = 3.98, $SD_{intuition\text{-}inconsistent}$ = 1.55; $F(1, 272) = 4.71$, $p = .031$, $d = 0.26$) and perceived the light mayonnaise as healthier ($M_{intuition\text{-}consistent}$ = 5.04, $SD_{intuition\text{-}consistent}$ = 0.80; $M_{intuition\text{-}inconsistent}$ = 4.47, $SD_{intuition\text{-}inconsistent}$ = 1.24; $F(1, 272) = 20.84$, $p < .001$, $d = 0.55$). Participants also reported a greater calories difference between the two versions of mayonnaise in the intuition-consistent condition ($M_{intuition\text{-}consistent}$ = 4.82, $SD_{intuition\text{-}consistent}$ = 1.34; $M_{intuition\text{-}inconsistent}$ = 4.33, $SD_{intuition\text{-}inconsistent}$ = 1.52; $F(1, 272) = 8.06$, $p = .005$, $d = 0.34$). A serial mediation test confirmed that the intuition-inconsistent healthiness claim increased the calorie estimate of the light mayonnaise, which lowered its perceived healthiness, which in turn lowered the belief in its healthiness claim (b = −0.13, SE = 0.05, 95% CI = [−0.22, −0.04]; *Process* model 6; Hayes, 2018; Figure 3).

Study 5. Effect of the Light = Healthy Intuition on Actual Consumption Quantity

Study 5 aims to conceptually replicate the light = healthy intuition in a realistic setting, and to test its effect on actual consumption. We inconspicuously manipulated the weight of the container instead of the food itself. We predict that participants will consume more of the seemingly lighter-weighted product as it is considered healthier.

Method

Participants were ostensibly invited to a taste study to sample two types of M&M's. The cover story was that M&M's had recently introduced a healthier version with healthier ingredients, and the study was to determine whether consumers could distinguish between the two versions. In reality, both containers contained identical candies with the same quantity. Two identical bowls were used, and a weight was added to the invisible, hollow bottom of one container. The final weights were 400 versus 315 g.

Participants who agreed to participate (N = 50, 54% male, M_{age} = 22.44, SD = 2.12) helped the research assistant carry the two containers to the laboratory for the taste test. They held both containers for approximately 30 s. In the laboratory, participants started sampling and guessed which container contained the healthy M&M's. Thereafter, participants were asked to watch three movie trailers, allegedly for a different task, during which they could eat more of the M&M's in both the containers. None of participants finished all the M&M's in either container. We measured the weight of the M&M's remaining in each container.

Participants' purchase intentions, willingness to pay, and evaluations of taste, sweetness, calories, and vitamins in M&M's in each container were also measured. The analyses on these measures and a replication study are reported in Appendix S5.

Results and Discussion

Participants were more likely to indicate that the lighter container contained the healthy M&M's (64%, $\chi^2(1, N = 50) = 3.92$, $p = .048$). Furthermore, participants consumed significantly more M&M's from the lighter container (M_{light} = 30.36 g,

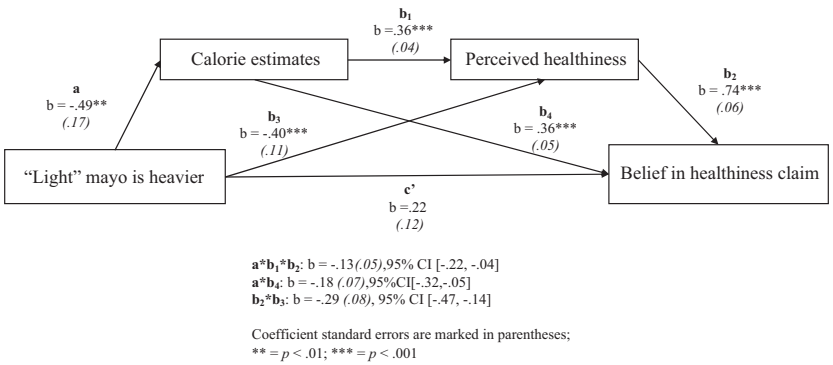

Figure 3. Study 4: Serial mediation test.

SD_{light} = 21.67; M_{heavy} = 21.58 g, SD_{heavy} = 14.55; t (49) = −3.01, p = .004, d = 0.55). Thus, study 5 shows that light = healthy intuition affects consumers' actual consumption quantity.

Study 6: Debiasing the Light = Healthy Intuition by Activating a Competing Association

In this study, a potential debiasing strategy is considered. As proteins are commonly regarded as nourishing, they are often viewed as healthy (Carels et al., 2006; Kozup, Creyer, & Burton, 2003). A *heavier* option might be perceived as *healthier* if the weight difference is attributed to a protein difference. In this case, the light = healthy intuition may be attenuated or even reversed.

Method

MTurk panelists (N = 292, 46% male, M_{age} = 40.08, SD = 12.37) participated in this one-factor (debias condition: control vs. protein) between-subjects study. Two flavors (chocolate-caramel vs. peanut-caramel) of energy bars of the same brand and the same serving size were used as stimuli. We randomized the weight information on each energy bar, such that each flavor was heavier than the other, half of the time. In the control condition, we presented only the weight information and participants were asked to judge which bar was healthier. In the protein condition, we presented both the weight information and the amount of protein in each energy bar, such that the difference in weight was equivalent to the difference in protein (Appendix S6). We predicted that more people would choose the heavier [lighter] energy bar as the healthier option in the protein [control] condition. In addition, we explicitly measured participants' light = healthy and protein = healthy beliefs and additional analyses on these measures are included in Appendix S7.

Results and Discussion

A chi-square test revealed a significant effect of the debiasing condition on healthiness judgments (Wald χ^2 (1) = 25.41, p < .001). In the control condition, 60.7% of the participants chose the *lighter* energy bar as the healthier option. In contrast, in the protein condition, 68.7% chose the *heavier* energy bar as the healthier option (Figure 4).

This study provides additional evidence for the light = healthy intuition, using a healthier food item (energy bar). When only weight information is salient, people rely on it to make healthiness evaluations and perceive the lighter option as the healthier one. When protein information becomes salient, the intuition is reversed, and people perceive the heavier option to be healthier.

General Discussion

People associate food healthiness with low weight (study 1). Correspondingly, people infer a lower-weight food option to be healthier (studies 2 and 5) and consume more food from a lighter container (study 5). The intuition is bidirectional as people assume healthier foods weigh less (study 3), leading them to discredit health claims for heavier foods (study 4). The activation of a competing intuition reduces the use of light = healthy intuition in healthiness judgments (study 6).

This study expands research on consumer food-related lay beliefs (Haws et al., 2017; Raghunathan et al., 2006; Suher et al., 2016) by showing that people also assess food healthiness based on physical

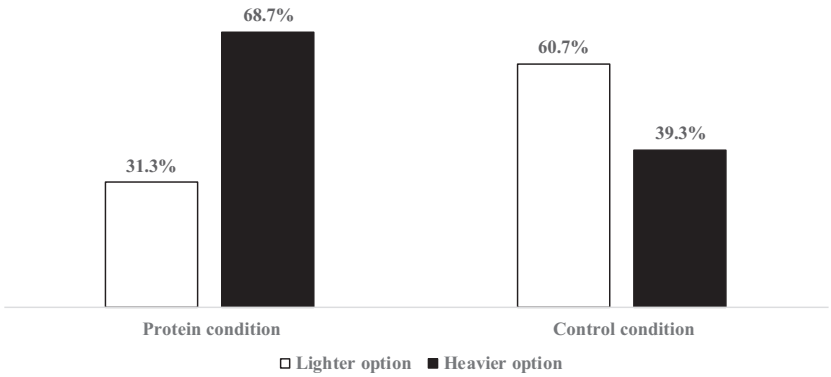

Figure 4. Study 6: Perceived healthiness based on the light = healthy intuition, reversed in the protein condition.

weight. Such intuitions are efficient decision shortcuts for judgments, but they often lack accuracy. For example, several lighter-weight snacks, such as potato chips, popcorn, and candies, are not necessarily healthier when compared to other snacks of the same serving size (e.g., fruits and vegetables). The overgeneralized use of these intuitions may be particularly problematic for the light = healthy intuition. Unlike previously identified intuitions that are result from repeated observations of co-occurrences of healthy foods with high prices or inferior tastes, the light = healthy intuition is evoked by a coactivation of two concepts associated with a homograph, which are not necessarily correlated in actual food healthiness assessments.

The findings of this study are relevant for product and package design decisions. This study shows that the physical weight of containers can influence consumers' perceived food healthiness. Lowering the physical weight of a "light" version of a product (without reducing its quantity) enhances the healthiness perception. In contrast, consumers discredit health claims of products that weigh more, meaning brands need to ensure that the healthy version of the product is lighter than the regular counterpart.

Finally, our findings suggest several fruitful avenues for future research. First, our research did not explicitly compare healthy foods with unhealthy ones. The theory implies that the intuition should apply across categories. However, future research could directly test whether the intuition indeed influences perceived healthiness and weight expectation in cross-category comparisons. Second, we demonstrate that consumers may consume more lighter-weight foods believing that they contain lower-in-calorie ingredients and thus healthier, and the inference about ingredients' organic nature is limited. Future research can more extensively consider the weight-based inferences, such as consumers associating the consumption of heavier food items with the possibility of a weight gain, but not with other health consequences such as diabetes and heightened blood pressure. Finally, future research could investigate the effect of food weight on other consumption outcomes, that is, actual food choices and evaluations.

We propose that coactivation of multiple meanings of "light" underlies the intuition, but we acknowledge that other mechanisms are also plausible. For instance, people may associate low body weight with health and overgeneralize this association to food items. Additionally, the intuition may simply reflect an actual relationship that people learn overtime: Eating heavier food items may serve one's caloric needs better. This study believes that multiple processes may underlie the intuition shown, and invite future research to dig deeper into these.

We explore the coactivation of two meanings of light, but light can also describe a taste that is not intense or a color with medium saturation. According to spreading activation processes, these other meanings may also become accessible when consumers encounter the light label, such that people may expect healthy foods to have plainer tastes or less saturated colors. Prior research has established that foods packaged in vivid, color-saturated packaging are perceived as less healthy than foods in muted, less color-saturated packaging (Mead & Richerson, 2018). Similarly, consumers consume more light-colored hedonic foods than dark-colored hedonic food (Madzharov et al., 2016). Such studies draw on conceptual fluency (Mead & Richerson, 2018) and pleasure (Madzharov et al., 2016) as potential drivers, but we propose that the coactivation of multiple meanings in a homograph can serve as an overarching mechanism that may

explain these previously documented effects. We call for continued research into other "light"-related intuitions, with a coactivation account.

REFERENCES

Anderson, J. R. (1983). A spreading activation theory of memory. *Journal of Verbal Learning and Verbal Behavior*, *22*(3), 261–295. https://doi.org/10.1016/S0022-5371(83)90201-3

André, Q., Chandon, P., & Haws, K. (2019). Healthy through presence or absence, nature or science?: A framework for understanding front-of-package food claims. *Journal of Public Policy & Marketing*, *38*(2), 172–191. https://doi.org/10.1177/0743915618824332

Biswas, D., Lund, K., & Szocs, C. (2019). Sounds like a healthy retail atmospheric strategy: Effects of ambient music and background noise on food sales. *Journal of the Academy of Marketing Science*, *47*(1), 37–55. https://doi.org/10.1007/s11747-018-0583-8

Biswas, D., & Szocs, C. (2019). The smell of healthy choices: Cross-modal sensory compensation effects of ambient scent on food purchases. *Journal of Marketing Research*, *56*(1), 123–141. https://doi.org/10.1177/0022243718820585

Brown, R. D., & Bassili, J. N. (2002). Spontaneous trait associations and the case of the superstitious banana. *Journal of Experimental Social Psychology*, *38*(1), 87–92. https://doi.org/10.1006/jesp.2001.1486

Cadario, R., & Chandon, P. (2020). Which healthy eating nudges work best? A meta-analysis of field experiments. *Marketing Science*, *39*(3), 465–486. https://doi.org/10.1287/mksc.2018.1128

Carels, R. A., Harper, J., & Konrad, K. (2006). Qualitative perceptions and caloric estimations of healthy and unhealthy foods by behavioral weight loss participants. *Appetite*, *46*(2), 199–206. https://doi.org/10.1016/j.appet.2005.12.002

Carels, R. A., Konrad, K., & Harper, J. (2007). Individual differences in food perceptions and calorie estimation: An examination of dieting status, weight, and gender. *Appetite*, *49*(2), 450–458. https://doi.org/10.1016/j.appet.2007.02.009

Carpenter, T. P., Pogacar, R., Pullig, C., Kouril, M., Aguilar, S., LaBouff, J., . . . Chakroff, A. (2019). Survey-software implicit association tests: A methodological and empirical analysis. *Behavior Research Methods*, *51*(5), 2194–2208. https://doi.org/10.3758/s13428-019-01293-3

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology*, *39*(5), 752–766. https://doi.org/10.1037/0022-3514.39.5.752

Chaiken, S. (1987). The heuristic model of persuasion. *Social Influence: The Ontario Symposium*, *5*, 3–39.

Chaiken, S., & Eagly, A. H. (1983). Communication modality as a determinant of persuasion: The role of communicator salience. *Journal of Personality and Social Psychology*, *45*(2), 241–256. https://doi.org/10.1037/0022-3514.45.2.241

Chandon, P., & Wansink, B. (2011). Is food marketing making us fat? A multi-disciplinary review. *Foundations and Trends in Marketing*, *5*(3), 113–196. https://doi.org/10.2139/ssrn.1854370

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review*, *82*(6), 407–428. https://doi.org/10.1037/0033-295X.82.6.407

Davis, D. F., & Herr, P. M. (2014). From bye to buy: Homophones as a phonological route to priming. *Journal of Consumer Research*, *40*(6), 1063–1077. https://doi.org/10.1086/673960

Dickinson, A. (2001). The 28th Bartlett Memorial Lecture Causal Learning: An associative analysis. *The Quarterly Journal of Experimental Psychology Section B*, *54*(1b), 3–25. https://doi.org/10.1080/02724990042000010

Food Insight (May 2018). 2018 Food and Health Survey. Retrieved from https://foodinsight.org/2018-food-and-health-survey/

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*(6), 1464–1480. https://doi.org/10.1037/0022-3514.74.6.1464

Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*, *85*(2), 197–216. https://doi.org/10.1037/0022-3514.85.2.197

Grissom, R. J., & Kim, J. J. (2012). *Effect sizes for research: Univariate and multivariate applications*. Abingdon, UK: Routledge.

Haws, K. L., Reczek, R. W., & Sample, K. L. (2017). Healthy diets make empty wallets: The healthy = expensive intuition. *Journal of Consumer Research*, *43*(6), 992–1007. https://doi.org/10.1093/jcr/ucw078

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis second edition: A regression-based approach*. New York, NY: Ebook The Guilford Press.

Janiszewski, C., & Van Osselaer, S. M. (2000). A connectionist model of brand–quality associations. *Journal of Marketing Research*, *37*(3), 331–350. https://doi.org/10.1509/jmkr.37.3.331.18780

Jansson-Boyd, C. V., & Kobescak, M. (2020). To see is to hold: Using food surface textures to communicate product healthiness. *Food Quality and Preference*, *81*, 103866. https://doi.org/10.1016/j.foodqual.2019.103866

Jones, C. R., Fazio, R. H., & Olson, M. A. (2009). Implicit misattribution as a mechanism underlying evaluative conditioning. *Journal of Personality and Social Psychology*, *96*(5), 933–948. https://doi.org/10.1037/a0014747

Kozup, J. C., Creyer, E. H., & Burton, S. (2003). Making healthful food choices: The influence of health claims and nutrition information on consumers' evaluations of

packaged food products and restaurant menu items. *Journal of Marketing*, *67*(2), 19–34. https://doi.org/10.1509/jmkg.67.2.19.18608

Madzharov, A. V., Ramanathan, S., & Block, L. G. (2016). The halo effect of product color lightness on hedonic food consumption. *Journal of the Association for Consumer Research*, *1*(4), 579–591. https://doi.org/10.1086/688221

Martin, I., & Levey, A. B. (1978). Evaluative conditioning. *Advances in Behaviour Research and Therapy*, *1*(2), 57–101. https://doi.org/10.1016/0146-6402(78)90013-9

Mead, J. A., & Richerson, R. (2018). Package color saturation and food healthfulness perceptions. *Journal of Business Research*, *82*, 10–18. https://doi.org/10.1016/j.jbusres.2017.08.015

Moors, A., & De Houwer, J. (2006). Automaticity: A theoretical and conceptual analysis. *Psychological Bulletin*, *132*(2), 297–326. https://doi.org/10.1037/0033-2909.132.2.297

Petty, R. E., Cacioppo, J. T., & Schumann, D. (1983). Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *Journal of Consumer Research*, *10*(2), 135–146. https://doi.org/10.1086/208954

Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, *70*(4), 170–184. https://doi.org/10.1509/jmkg.70.4.170

Schneider, I. K., Rutjens, B. T., Jostmann, N. B., & Lakens, D. (2011). Weighty matters: Importance literally feels heavy. *Social Psychological and Personality Science*, *2*(5), 474–478. https://doi.org/10.1177/1948550610397895

Suher, J., Raghunathan, R., & Hoyer, W. D. (2016). Eating healthy or feeling empty? How the "healthy = less filling" intuition influences satiety. *Journal of the Association for Consumer Research*, *1*(1), 26–40. https://doi.org/10.1086/684393

Wansink, B. (2004). Environmental factors that increase the food intake and consumption volume of unknowing consumers. *Annual Review of Nutrition*, *24*, 455–479. https://doi.org/10.1146/annurev.nutr.24.012003.132140

Yamim, A. P., Mai, R., & Werle, C. O. (2020). Make it hot? How food temperature (mis) guides product judgments. *Journal of Consumer Research*, *47*(4), 523–543. https://doi.org/10.1093/jcr/ucaa017

Ye, N., Morrin, M., & Kampfer, K. (2020). From glossy to greasy: The impact of learned associations on perceptions of food healthfulness. *Journal of Consumer Psychology*, *30*(1), 96–124. https://doi.org/10.1002/jcpy.1126

Zhang, M., & Li, X. (2012). From physical weight to psychological significance: The contribution of semantic activations. *Journal of Consumer Research*, *38*(6), 1063–1075. https://doi.org/10.1086/661768

Zlatevska, N., Dubelaar, C., & Holden, S. S. (2014). Sizing up the effect of portion size on consumption: A meta-analytic review. *Journal of Marketing*, *78*(3), 140–154. https://doi.org/10.1509/jm.12.0303

Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Study 1: Stimuli in IAT.

Appendix S2. Study 2: Additional analysis.

Appendix S3. Study 3: Within-subjects design.

Appendix S4. Study 4: Analysis with the full sample.

Appendix S5. Study 5: Analysis of additional measures and one replication study.

Appendix S6. Study 6: Stimuli.

Appendix S7. Study 6: Additional analysis of process measures.

Web Appendix S1. Additional study 1: Implicit attitude test using words as stimuli.

Web Appendix S2. Additional study 2: Using food healthiness to infer weight.

Web Appendix S3. Additional study 3: Consumer disbelief in healthiness claims.