Food Quality and Preference 147 (2027) 106068

Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

That sounds lean and light! Sound symbolism shapes food expectations

David M. Sidhu *, Johanna Peetz, Rachel J. Burns

Carleton University, Canada

ARTICLE INFO

Keywords:
Consumption
Brand names
Food fillingness
Food perception
Phonemes

ABSTRACT

Food perceptions can be influenced by the way a food looks (e.g., packaging) and by sounds associated with it (e.g., sonic logos). In the present research, we examine whether food perception is influenced by sound symbolism in brand names. Specifically, we examine whether phonemes associated with large sizes (i.e., back vowels, sonorant consonants, and voiced stops) or small sizes (i.e., front vowels, voiceless fricatives, and voiceless stops) affect the perceived heaviness or fillingness of a snack. Across two online experiments (combined $N = 601$) presenting written descriptions of stimuli, participants perceived foods that were labelled with fictional brand names containing phonemes associated with large sizes as heavier and more filling than brand names that contained phonemes associated with small sizes. When imagining buying a snack for a friend who preferred light food (vs heavy food), participants reported greater purchase likelihood for snacks with brand names that contained small-associated phonemes (vs large-associated phonemes). In sum, this research underlines the importance of considering sound symbolism in sensory marketing decisions.

Consumers have many motives and preferences that underlie their selections of food products, such as how convenient, familiar, or filling a food is (Andretti et al., 2025; Steptoe et al., 1995). In determining which food products align with their motives and preferences, consumers may rely on cues about the food's attributes.

Packaging is one cue that affects consumer perceptions of food products (Simmonds & Spence, 2017; Krishna et al., 2017). For example, consumers perceive foods in matte, slim, and light-colored packaging as healthier than foods in glossy, wide, and vividly colored packaging, and foods in packages with rounded shapes are expected to be sweeter than foods in angular packaging (De Kerpel et al., 2020; Mead & Richerson, 2018; Van Ooijen et al., 2017; Velasco et al., 2014). Packaging cues also affect consumer expectations of how filling a food will be, which, in turn, can shape energy intake and the actual experience of satiety (Brunstrom et al., 2008; Brunstrom et al., 2010; Brunstrom & Shakeshaft, 2009; Cassady et al., 2012; Wilkinson et al., 2012). For example, foods in heavier containers are expected to be more satiating and foods with the product image positioned at the bottom of the package are perceived as heavier than when the image appears at the top (Deng & Kahn, 2009; Piqueras-Fiszman & Spence, 2012). Sound cues can also affect these perceptions. Foods presented with a low frequency sonic logo, which is a brief and memorable melodic tune associated with a brand, were rated as heavier and more filling than foods presented with high frequency jingles (Techawachirakul et al., 2025). While these are related constructs, Techawachirakul et al. (2025) distinguish between them, with "fillingness" relating to satiation and "heaviness" capturing the heaviness or density of a given food. Indeed, they found that heaviness mediated the effects of fillingness.

Another way in which sound could affect the perceptions of food is in the sounds of a brand name. *Sound symbolism* refers to the phenomenon in which language sounds (i.e., *phonemes*) are associated with certain perceptual and/or semantic properties (Sidhu & Pexman, 2018). For example, individuals associate high pitch vowels articulated with the tongue at the front of the mouth (e.g., /i/; as in "see") with smallness, and low pitch vowels with the tongue at the back of the mouth (e.g., /ɑ/; as in "saw") with largeness (Sapir, 1929; Sidhu, Vigliocco and Pexman, 2022). Previous work has also shown that sonorant consonants (e.g., /m/) and voiced stop consonants (e.g., /b/) are associated with largeness, while voiceless fricatives (e.g., /f/) and voiceless stops (e.g., /p/) are associated with smallness (Knoeferle et al., 2017). Notably, the consonants associated with largeness involve a lower pitch than those associated with smallness (Kawahara, 2021). Beyond size, the phonemes associated with large and small sizes are also associated with heavy and light weights, respectively (Sidhu, Vigliocco, & Pexman, 2022). This leads to clear predictions regarding the product names that should be associated with fillingness and heaviness. In addition, these predictions align with the results of Techawachirakul et al. (2025) that low vs. high pitch sonic logos were associated with heaviness and fillingness

* Corresponding author.
E-mail address: david.sidhu@carleton.ca (D.M. Sidhu).

https://doi.org/10.1016/j.foodqual.2026.106068
Received 25 March 2026; Received in revised form 22 June 2026; Accepted 30 July 2026
Available online 3 August 2026

perceptions of food. However, while Techawachirakul et al. (2025) focussed on the pitch of sonic logos, here we focus on sound cues coming from the brand names of food products themselves. This is a more subtle manipulation and presentation of sound properties. It also may arguably have more potential practical implications as brand names are encountered more often than jingles.

There is a great deal of research demonstrating that the sound symbolism of a product name can affect perceptions of that product (for a review, see Motoki, Park, et al., 2022). Most relevant to the present research is the fact that the sound of a food product can affect expectations of its taste. For example, Motoki et al. (2020) found that foods with front vowels in their names were expected to taste sweeter than those containing back vowels. Beyond taste, Motoki et al. (2021) found that foods with higher pitch phonemes in their names were expected to be healthier.

To our knowledge, no previous study has examined the effects of sound symbolism in brand names on perceptions of fillingness nor heaviness of a food. In the present research we examine how a sound symbolic contrast between large- vs. small-associated phonemes in brand names might affect perceptions of fillingness or heaviness of a food, and how this perception might affect purchase likelihood. We focus on fillingness rather than perceived size or weight of the food in line with Techawachirakul et al. (2025)'s work, and because perceived fillingness is a more subjective judgment. Food items are often a standard size and weight (e.g., packaged food items are labelled with the weight in grams) but vary considerably in fillingness (e.g., rice cakes vs brownies). We expect the effects of sound symbolism in brand names to be subtle and thus focus on subjective dimensions of food expectations.

1. Experiment 1

In Experiment 1 we examined whether the perception of foods as filling or heavy differs when brand names evoke largeness or smallness. Participants imagined food items with a brand name that included phonemes usually associated with largeness or the same food items with a brand name that included phonemes usually associated with smallness. Thus, this involved a broad sound symbolic contrast between large- and small-associated phonemes.

2. Method

2.1. Ethics statement

These studies were approved by the Research Ethics Board at Carleton University.

2.2. Participants

Participants were recruited from the crowdsourcing website Prolific (recruitment was restricted to working-age American who speak fluent English[1]). An initial sample included 220 participants and a replication sample included another 220 participants (the replication sample was preregistered: https://aspredicted.org/f9zu32.pdf). Samples are combined for ease of presentation. A total of 214 and 219 participants completed the experiments, respectively. All participants indicated they had normal or corrected-to-normal vision. Three participants were removed for failing an attention check. One participant was removed for indicating that their data was not useable (because they responded randomly). The final sample of 429 included 217 women, 210 men, and one non-binary participant (M_{Age} = 42.64; SD_{Age} = 10.71).

2.3. Procedure

Participants took part online through the experiment platform Gorilla (https://gorilla.sc/). Participants first completed the food rating task. They were instructed that they were going to be asked to "imagine various new food products with different invented names". They were not explicitly asked to say the name out loud. On each trial they were asked to imagine one of ten snacks, paired with a made-up brand name label. For example, "Imagine a new brand of snack cracker called Gobo." Of the ten snack items, half were calorie dense (152–600 kcal/100 g) and half were light (0–150 kcal/100 g; Foroni et al., 2022; calorie density was retrieved from the US Department of Agriculture website, https://fdc.nal.usda.gov/). Of the 20 brand names, half contained phonemes associated with large sizes (i.e., contained back vowels, sonorant consonants, and voiced stops; e.g., "fipee", "spaytiki"), and half contained phonemes associated with small sizes (i.e., contained front vowels, voiceless fricatives, and voiceless stops; e.g., "norgo", "blorogo"; Knoeferle et al., 2017). In particular, our brand names were a subset of the 40 used in Experiment 1 by Sidhu and Peetz (2025), which compared large and small associated words. They were found to differ on a variety of dimensions, with the largest difference observed for size. We omitted or modified any that were judged as having a food word as a close orthographic or phonological neighbour (e.g., "keef" because of "beef"). The brand names in each pair were matched on the number of syllables, direction of articulation (e.g., movement from the back to the front of the mouth; Topolinski & Boecker, 2016), and orthographic distance to existing words (Levenshtein distance to 20 closest neighbours; using the "vwr" package in R; Keuleers & Keuleers, 2013). We also collected ratings of each brand name's pronounceability and likeability on ten-point Likert scales from separate groups of pilot participants ($N_{pronounceability}$ = 19; $N_{likeability}$ = 20; see Appendix for ratings). The two groups of brand names did not differ on pronounceability, but small-associated names were rated more positively (M = 5.58) than large-associated names (M = 4.43; $t(12.86) = 2.43$, $p = .03$). This is due to the fact that phonemes such as /i/ are both small and positive (Knoeferle et al., 2017; Rummer et al., 2014). To account for this, pronounceability and likeability were included as control variables in all analyses.

The pairing between snacks and brand names was random, as was the order in which they were presented. Participants received 20 trials in total. In each trial, they rated how filling they would expect this food item to be, on a scale from 0 (*Not Filling at All*) to 100 (*Extremely Filling*) and rated how heavy they would expect this food item to be, on a scale from 0 (*Not Heavy at All*) to 100 (*Extremely Heavy*). In the second sample, participants were also asked how likely they would be to buy each snack, on a scale from 0 (*Not Likely to Buy It at All*) to 100 (*Definitely Buy It*).

Following the food rating task, participants were asked how hungry they currently were on a scale from 0 (*Not Hungry at All*) to 100 (*Very Hungry*) and when they last ate (one hour ago, two hours ago, three hours ago, four hours ago, more than four hours ago). Because we did not preregister analysis of time since participants last ate, we do not analyze this variable further. In the second sample, participants were also asked how often they buy filling food, heavy food, and healthy food on scales from 0 (*Never*) to 100 (*A Lot*). Purchase habits varied widely for healthy (M = 66.96, SD = 23.27), filling (M = 67.38, SD = 18.36), and heavy (M = 51.08, SD = 20.57) food.

3. Results

3.1. Data analysis

All data and analysis code can be found at https://osf.io/73swr. Analyses were conducted in R (R Core Team, 2024) using the packages

[1] This restriction is part of a standard recruitment protocol in the lab that conducted the study. We aimed to recruit Americans assuming they are not overly motivated by the financial compensation (our compensation rate being below minimum wage for the US but not in other countries) which might introduce bias due to overcompliance. English fluency is necessary to understand the survey. We focus on working-age participants because financial decisions shift after retirement.

"lme4" (Bates et al., 2015) and "afex" (Singmann et al., 2024). They consisted of linear mixed effects regressions. We began with a full random effects structure with random intercepts for participants, brand names and snacks and all possible slopes for effects of interest. The specific slopes depended on the effects included in a given analysis, but those considered comprised slopes for brand name type (for participant and snack), food type (for participant and brand name), hunger level (for brand name and snack), buying preferences (for brand name and snack) and goal condition (for brand name and snack; in Experiment 2 only). In order to deal with convergence issues we attempted the following remedies, in order: increasing the number of iterations, switching to the "bobyqa" optimizer, removing the correlation between the random subject intercept and slope, individually removing the random slopes (beginning with the one with the lowest associated variance), and individually removing the random intercepts (beginning with the one with the lowest associated variance; see Brauer & Curtin, 2018; Meteyard & Davies, 2020). We followed this process without examining fixed effects until arriving at the final model. See Online Supplementary Material (https://osf.io/73swr) for all final model formulas. All continuous predictors were standardized globally (i.e., across the entire dataset). We used the "emmeans" package (Lenth et al., 2022) to compute estimated marginal means (EMM).

3.2. Food perception

There was a strong correlation between ratings of fillingness and heaviness, computed after centering each person's ratings, $r = 0.67$, $p < .001$. Nevertheless we continue with these as separate variables given the distinction between them made by Techawachirakul et al. (2025) (i.e., fillingness relating to satiation; "heaviness" relating to density), but see Online Supplementary Material (https://osf.io/73swr) for results when these are combined. A linear mixed effects regression predicted perceived fillingness with brand name (small-associated phonemes [−0.5] vs. large-associated phonemes [0.5]) as a predictor. This and all subsequent models also included each brand name's standardized pronounceability and likeability scores as control variables. These were only significant predictors of the likelihood to buy in Experiment 1 and are only reported there. The present analysis showed a main effect of brand name on fillingness ($b = 6.07$, $SE = 0.96$, $p < .001$) such that foods presented with a brand name that included phonemes associated with largeness (henceforth *large brand names*) were judged as more filling ($EMM = 53.5$, $SE = 2.01$) than those with a brand name including phonemes associated with smallness (henceforth *small brand names;* $EMM = 47.4$, $SE = 2.01$). Similarly, brand name showed a main effect on perceived heaviness ($b = 7.39$, $SE = 1.31$, $p < .001$) such that foods presented with a large brand name were judged as more heavy ($EMM = 46.1$, $SE = 1.95$) than those presented with a with a small brand name ($EMM = 38.7$, $SE = 1.95$). See Fig. 1. Full model output can be found in Online Supplementary Material.

Next, we examined whether the sound symbolism effect was moderated by the type of food. Separate linear mixed effects regressions predicted fillingness and heaviness, with brand name type, food type (calorie-light foods [−0.5] vs. calorie-dense foods [0.5]), and their interaction. The interaction was non-significant for both fillingness ($b = 1.29$, $SE = 0.75$, $p = .10$) and heaviness ($b = 0.87$, $SE = 0.76$, $p = .25$). The main effect of food type did not predict fillingness ($b = -2.93$, $SE = 3.76$, $p = .46$) nor heaviness ($b = -2.60$, $SE = 3.49$, $p = .48$). The main effect of brand name type remained significant in the model predicting fillingness ($b = 6.10$, $SE = 0.96$, $p < .001$) and heaviness ($b = 7.46$, $SE = 1.30$, $p < .001$).

Next, we examined whether the sound symbolism effect was moderated by the level of hunger participants felt at the time of the food rating task. Separate linear mixed effects regressions predicted fillingness and heaviness, with brand name type, level of reported hunger, and their interaction. The interaction was non-significant for fillingness ($b = 0.14$, $SE = 0.68$, $p = .84$) and heaviness ($b = 0.38$, $SE = 0.70$, $p = .59$). Greater reported hunger predicted higher ratings of fillingness ($b = 2.19$, $SE = 0.67$, $p = .001$) and heaviness ($b = 1.47$, $SE = 0.71$, $p = .041$). Brand name remained a significant predictor in both models (p's $< .001$).

3.3. Likelihood to buy

In the second sample we also collected participants' ratings of how likely they would be to purchase each snack. A linear mixed effects regression predicted purchase likelihood with brand name type, and found no main effect ($b = -0.44$, $SE = 0.77$, $p = .58$). We did however find that participants reported being more likely to purchase a food if its name was easier to pronounce ($b = 0.97$, $SE = 0.40$, $p = .03$) and if it was more likeable ($b = 1.30$, $SE = 0.46$, $p = .01$). A subsequent model also found that there was no interaction between brand name type and food type ($b = -0.12$, $SE = 1.57$, $p = .94$). There was also no interaction between brand name type and hunger ($b = -0.46$, $SE = 0.79$, $p = .57$).

We explored whether participants' reported habitual purchasing of filling, heavy, and healthy food moderated effects of brand name on purchase likelihood. To that end we ran three separate linear mixed effects regressions predicting likelihood to buy the food items with brand name type, one of the three buying habit measures, and their interaction term with brand name as predictors. The interactions were not significant for habitual purchasing of filling foods ($b = 0.15$, $SE = 0.92$, $p = .87$), healthy foods ($b = 0.24$, $SE = 0.63$, $p = .70$), nor heavy foods ($b = 0.16$, $SE = 0.70$, $p = .83$).[2]

4. Discussion

As expected, the brand name of a food affected participants' expectations of how heavy and how filling the food was. Brand names that contained phonemes associated with largeness led participants to perceive the food as more heavy and filling than brand names that contained phonemes associated with smallness. This effect was similar across calorie- dense and calorie-light foods, which is not surprising because calorie content of a food does not necessarily align with perceptions of fillingness (e.g., 200 cal of pasta were judged to be as satiating as 894 cal of nuts in work by Brunstorm et al., 2008). The effect was also similar regardless of the level of hunger participants felt. It is possible that the sound symbolism of brand names is a "cold" rather than "hot" cognition (Loewenstein, 2005) that stays relatively consistent regardless of people's state. However, our data cannot speak to this possibility with confidence as hunger was self-reported in our study and very likely did not vary enough (and was not experimentally induced) to examine the influence of sensory states.

Notably, participants reported being more likely to buy brand names that were easier to pronounce and more likeable. However, the size sound symbolism effect of brand names did not affect participants' purchase intentions for the food products. It is perhaps not surprising that perceiving a food as heavier or more filling does not affect purchase behavior, without taking into account a person's current eating goals. That is, in this study we assessed previous purchasing habits rather than purchasing goals or preferences in the moment (and prior habits ranged widely). To better evaluate the impact of brand names on purchase intentions based on current goals, in the next study we manipulate these goals by experimentally assigning participants to keep a specific purchasing goal in mind.

5. Experiment 2

In Experiment 2 we examined whether brand names would affect the

[2] Likeability remained a significant predictor in all of these models predicting likelihood to buy (p's $< .02$). Pronounceability was a significant predictor in the model including an interaction with hunger ($p = .03$), habitual purchasing of filling foods ($p = .046$) and habitual processing of healthy foods ($p = .02$).

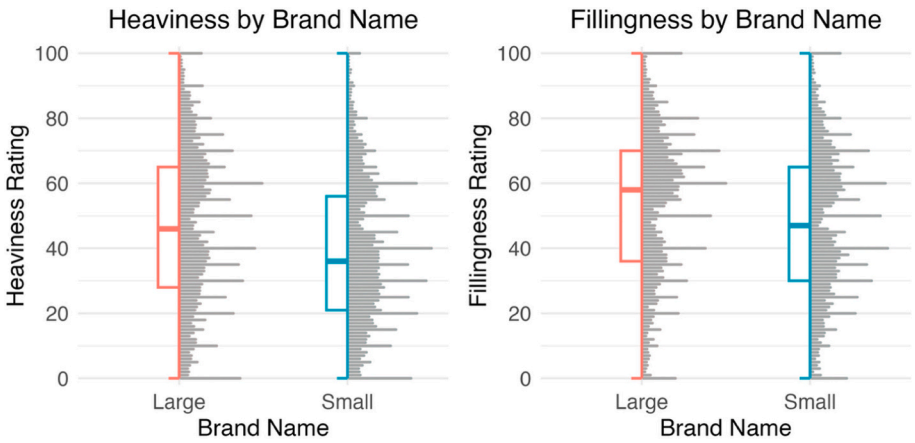

Fig. 1. Fillingness and heaviness ratings by brand name type. *Note.* Box plots show median ratings, interquartile ranges and minimum/maximum values. The horizontal stacks show distributions of individual ratings.

reported likelihood of buying a given food for a friend based on the friend's hypothetical food goals (similar to Techawachirakul et al., 2025, Study 2). This design allowed us to experimentally assign participants to consider different food goals in the moment. In one condition they were told to buy food for a friend who preferred heavy, filling food, and in another condition they were told to buy food for a friend who prefers light, lean food. We expected that brand names would affect purchase intention in line with the assigned food goals. This experiment was preregistered: https://aspredicted.org/pw645i.pdf. Note that the inclusion of pronounceability and likeability as control variables was decided on during the review process, and thus they were not included in the preregistration. However, the results do not change if they are removed.

6. Method

6.1. Participants

A total of 220 participants were recruited from the crowdsourcing website Prolific (recruitment was restricted to working-age American who speak fluent English, as per lab-specific online recruitment protocols). All participants indicated they had normal or corrected-to-normal vision. No participants failed the attention check, nor indicated that their data was not useable. In line with preregistered criteria, we excluded 48 participants whose responses to the post experiment questionnaire suggested that they did not remember the buying preferences of their friend, or otherwise misunderstood the instructions.[3] The final sample of 172 participants included 107 women, 60 men, one non-binary, one transman, and one agender participant (M_{Age} = 44.80; SD_{Age} = 11.25).

6.2. Procedure

The materials and procedure were the same as in Experiment 1, except for the following changes. Participants received instructions before the task to imagine that they are buying food for a friend. They received one of two sets of instructions, counterbalanced across conditions. Participants in the "heavy food preference" condition received the following instructions: "In addition, we would like you to imagine that you are buying food for a friend. This friend attaches great importance to foods that are filling, and normally chooses food that is heavy." Those in the "light food preference" condition received the same instructions except were told that: "This friend attaches great importance to foods that are lean, and normally chooses food that is light.". At the end of the survey, participants were asked to describe their friend's food preference in open ended format as a check that they had read and understood this manipulation.

Across the 20 trials of food ratings, participants rated the foods on heaviness and fillingness (as in Experiment 1) and also rated how likely they would be to buy it for their friend from 0 (*Not Likely to Buy It for Friend at All*) to 100 (*Definitely Buy It for Friend*).

7. Results

As in Experiment 1, pronounceability and likeability were included as control variables in all models. They were not significant predictors in any model and so are not reported on here.

7.1. Food perception

There was once again a strong correlation between ratings of fillingness and heaviness, computed after centering each person's ratings, r = 0.74, $p < .001$; see Online Supplementary Material (https://osf.io/73swr) for results when these are combined. A linear mixed effects regression predicting fillingness with brand name type showed a main effect of brand name on fillingness (b = 5.85, SE = 1.63, p = .002) such that foods presented with large brand names were judged as more filling (EMM = 52.0, SE = 2.90) than those with a small brand name (EMM = 46.2, SE = 2.89). Similarly, brand name showed a main effect on perceived heaviness (b = 8.09, SE = 1.60, $p < .001$) such that foods presented with a large brand name were judged as more heavy (EMM = 44.8, SE = 2.48) than those with a small brand name (EMM = 36.7, SE = 2.38). See Fig. 2.

As in Experiment 1, a subsequent model found there was no significant interaction between brand name and food type when predicting fillingness (b = 1.67, SE = 1.25, p = .18) nor heaviness of the food (b = 1.84, SE = 1.29, p = .15). The main effect of food type did not predict fillingness (b = −2.12, SE = 5.48, p = .71) nor heaviness (b = 0.62, SE = 4.54, p = .89). The main effect of brand name remained a significant predictor in both models (p's < .001).

Similarly, a subsequent model found that there was no significant interaction between brand name and level of hunger in the prediction of fillingness (b = −0.37, SE = 0.98, p = .71), nor heaviness (b = 0.33, SE = 1.01, p = .75). Greater reported hunger did not predict fillingness (b = 1.57, SE = 0.99, p = .12), nor heaviness (b = 1.32, SE = 0.87, p = .13). Brand name remained a significant predictor in both models (p's < .002).

[3] However, the pattern of results are unchanged when these participants are included.

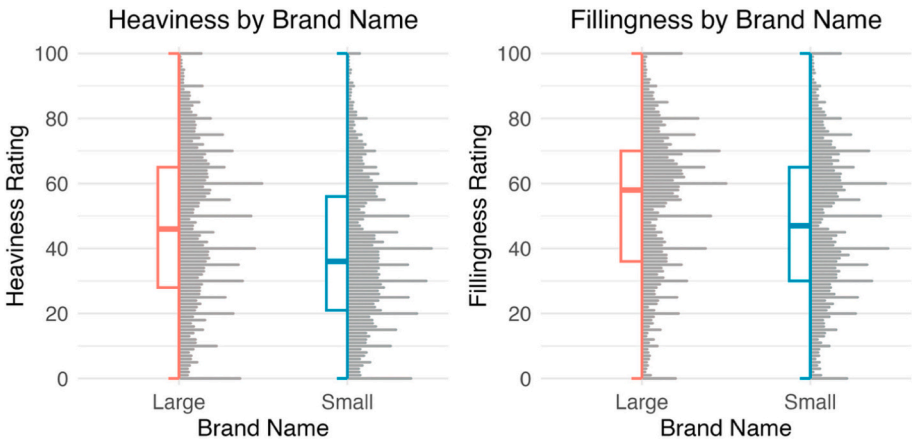

Fig. 2. Fillingness and heaviness ratings by brand name type. *Note.* Box plots show median ratings, interquartile ranges and minimum/maximum values. The horizontal stacks show distributions of individual ratings.

7.2. Likelihood to buy

Next, we examined whether purchase intentions were in line with the food goals participants were asked to consider. We ran a linear mixed effects regression predicting purchase intentions with brand name, goal condition (friend with lean/light preference [−0.5] vs. friend with filling/heavy preference [0.5]), and their interaction. The interaction was significant ($b = 14.31$, $SE = 3.00$, $p < .001$), see Fig. 3. Follow up analyses using estimated marginal means revealed that participants who were buying food for a friend that preferred filling/heavy food reported being more likely to purchase food with a large brand name ($EMM = 47.6$, $SE = 2.84$) than a small brand name ($EMM = 40.2$, $SE = 2.68$), $b = 7.47$, $SE = 1.90$, $p < .001$. However, those buying food for a friend that preferred lean/light food reported being more likely to buy food with a small brand name ($EMM = 60.0$, $SE = 2.65$) than a large brand name ($EMM = 53.2$), $b = -6.84$, $SE = 1.85$, $p < .001$. There was also a main effect of friend preference such that participants in the lean/light food preference condition reported being more likely to buy snacks overall ($b = -12.74$, $SE = 2.47$, $p < .001$). There was not a significant main effect of brand name ($b = 0.31$, $SE = 1.12$, $p = .78$). Unlike in Experiment 1 there was also not a significant main effect of pronounceability ($b = 0.73$, $SE = 0.50$, $p = .17$), nor likeability ($b = -0.30$, $SE = 0.58$, $p = .61$).

We also conducted exploratory Bayesian multilevel mediation analyses, using the "brms" (Bürkner, 2021) and "bayestestR" (Makowski et al., 2019) packages in R. It was necessary to use a Bayesian approach to include crossed random effects, as in the earlier analyses. These models included random intercepts for participant, brand name and snack. They included brand name type as a predictor, likelihood to buy as the outcome variable, pronounceability and likeability as controls, and either heaviness or fillingness as the mediator. We ran separate models for those in the heavy/filling and the light/lean friend conditions. The indirect effects of brand name type on likelihood to buy via perceived heaviness of the food were statistically credible (i.e., their 95% credible intervals did not include 0) in both the heavy/filling preference condition, $B = 7.31$, $_{95\%}CI$ [4.17; 10.59], and the light/lean preference condition, $B = -5.44$, $_{95\%}CI$ [−8.22; −2.88]. The indirect effects of brand name type on likelihood to buy via perceived fillingness of the food were statistically credible in both the heavy/filling preference condition, $B = 6.08$, $_{95\%}CI$ [2.15; 10.12], and the light/lean preference condition, $B = -1.57$, $_{95\%}CI$ [−2.72; −0.47]. However, note that while results support mediation, the data were collected cross-sectionally and causal links cannot be determined with certainty.

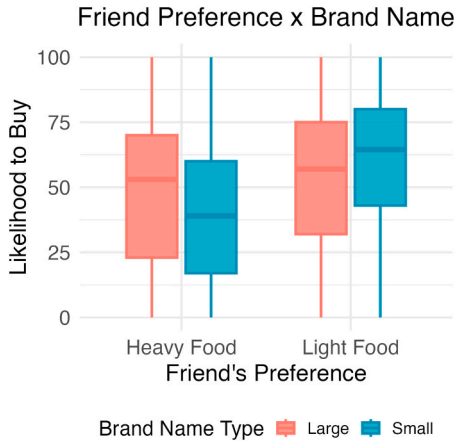

Fig. 3. Likelihood to buy based on friend preference condition and brand name. *Note.* Box plots show median ratings, interquartile ranges and minimum/maximum values.

8. Discussion

As expected, the brand name of a food again affected participants' expectations of how heavy and how filling the food was. In addition, brand names were linked to purchase likelihood judgments in line with food goals participants considered. When buying for a friend who preferred heavy food (light food), participants reported greater likelihood to buy snacks with a large (small) brand name. This suggests that the sound symbolism effect of brand names can extend to purchase intentions when the symbolized dimensions are linked to currently active food goals. Notably, when participants were motivated by a relevant goal of purchasing a snack for a friend, other properties of the name (i.e., pronounceability and likeability) no longer affected likelihood to buy. The mediation analyses suggested that this was mediated by the brand names' perceived heaviness and fillingness.

9. General discussion

Cues surrounding a food product affect perception of the product. These cues can include the way a food looks (e.g., packaging; De Kerpel et al., 2020; Mead & Richerson, 2018; van Ooijen et al., 2017) and sounds associated with it (e.g., sonic logos, Techawachirakul et al., 2025; brand names, Motoki, Park, Pathak and Spence, 2022; Motoki et al., 2020). The present research identifies additional sound symbolism features in brand names that affect expectations of the extent to which a food will be filling and heavy or light and lean. Specifically, using a broad sound symbolic contrast, we found that brand names containing large-associated phonemes (i.e., back vowels, sonorant

consonants, and voiced stops) increased the expectations of food as filling and heavy compared to brand names that contained small-associated phonemes (i.e., front vowels, voiceless fricatives, and voiceless stops). This effect of brand names on food expectation extended to purchase intentions when food goals were in line with the associated dimensions of the food (i.e., buying food with large-associated phoneme brand names for a hypothetical friend who preferred heavy food). This was mediated by the perceived fillingness/heaviness of foods with different names. Altogether, this may be an instance of sounds leading to sensory expectations, which has been observed with soundtracks playing along with tasting (see Guedes et al., 2023; Wang et al., 2020).

9.1. Theoretical contributions

The present studies contribute to a body of research examining how sound symbolism of a product name can affect perceptions of that product (Motoki, Park, Pathak and Spence, 2022). The present studies show that sound symbolism in brand names can affect expectations of fillingness or heaviness of the foods. The finding that individuals will make use of sound symbolic cues when performing goal directed behavior (i.e., buying for a specific friend) is also novel. In addition, research in sound symbolism has begun to explore the extent to which sound symbolic cues are overshadowed by other information (e.g., Sidhu et al., 2025). With this in mind, it is notable that the sounds of brand names had an effect when presented with specific foods (e.g., "granola bars named gawb" vs. simply "a food named gawb").

9.2. Potential practical implications

From a practical standpoint, this research contributes the possible importance of considering sound symbolism in marketing decisions (Krishna & Schwarz, 2014). For example, meal replacement drinks might want to signal fillingness, and comfort food products might aim to suggest heaviness and indulgence. Phonemes might be one possible way to communicate these attributes in the brand name. However, it is important to acknowledge that the present data do not demonstrate this phenomenon in a realistic marketplace situation as the present studies involved a highly controlled online decision environment with no real consequences. Furthermore, differences in effect size in the present studies were modest (e.g., about 6–8% shift in Study 1), and phonemes affected purchase intentions only when food goals were clear (when imagining buying a product for a hypothetical friend with a specific food goal, Study 2). The extent to which these sound symbolism effects translate to real food, real brand names, and real choices in people's daily life remains to be determined.

9.3. Limitations and future directions

The present studies employed simple stimuli that did not have visual, auditory, or sensory elements: participants simply read the brand names of the food items they were rating. In other words, stimuli lacked perceptual richness and results might not extend to the richer multisensory experience of real-world food choices. Although this limits the ecological validity of these studies, this paucity of information might have limited effects. Indeed, stronger effects might be found if brand names were to involve both visual and auditory cues (e.g., seeing and hearing the brand name spoken in an advertisement).

The instructions used in Study 2 (i.e., imagine buying food for a friend that attaches importance to foods that are heavy/filling vs. lean/light) allowed us to evaluate the impact of brand names on purchase intentions based on specific purchasing goals. However, these instructions may have inadvertently signalled the study's purpose and participants may have altered their responses to align with their perceptions of researcher expectations. Although data supported other hypotheses that are less susceptible to demand characteristics, demand characteristics cannot be ruled out.

The present research focused on English speaking samples only and recruitment was limited to working-age Americans. However, there is evidence that sound symbolism associations transcend languages and cultures (e.g., Ćwiek et al., 2021; Sidhu & Peetz, 2025) and that large-associated phonemes are associated with largeness not only among English speakers but also among speakers of Japanese (Ohtake & Haryu, 2012), and Mandarin (Chang et al., 2021).

The present research does not disentangle the specific phonemes involved in shifting food expectations. Rather, we used a broad sound symbolic contrast with a set of phonemes that together are known to be associated with larger sizes or smaller sizes, respectively (Knoeferle et al., 2017; Sidhu, Vigliocco, & Pexman, 2022). As a result, "large" and "small" brand names differed in a number of ways, including vowel type, consonant type and voicing. It is not possible to pinpoint exactly which properties were responsible for the results we observed. Future research might separate the different aspects of phonemes involved in shaping food heaviness and fillingness associations. In addition, phonemes evoke a variety of different associations (i.e., pluripotentiality; Akita et al., 2024). Indeed, although we controlled for it, these two sets of stimuli differed in rated likeability. They have also previously been shown to differ in arousal, valence, speed, and still other dimensions, in Sidhu and Peetz (2025). We cannot rule out the possibility that one of these dimensions played a role here. Interestingly, we observed one instance of context playing a role in highlighting certain associations. That is, when not given a purchasing goal, the likeability of a given name determined likelihood to buy. When heaviness/fillingness was made relevant through an assigned goal, then participants were more affected by the size associations of a given name.

In addition, there are features of invented words that affect expectations beyond sound symbolism (e.g., direction of articulation; Topolinski & Boecker, 2016). Our stimuli were matched on pronounceability, wordlikeness and direction of articulation. Nevertheless, there may be some other unaccounted for, non-sound symbolic, variable that could play a role in these results.

Finally, while we intended heaviness and fillingness to operate as separate constructs (i.e., a property of the food and an effect on the person eating), the distinction was subtle and we cannot be sure that participants construed them in exactly this way. Indeed, our decision to present the two as separate variables was theory-driven. The two dimensions were highly correlated and thus may not be empirically distinct.

The present research is limited to food items, specifically snack item. Future studies might examine whether the effects extend to products that are not food. For example, do large-associated phonemes imply heaviness for products such as electronics or stationary? Or is the sound symbolism particularly meaningful in the food domain, as food is a highly sensory product?

10. Conclusion

Sound symbolism shapes our perception of the world. Sounds that are associated with information about size and weight can have an impact on food expectations – even through minimal exposure such as reading a food product's brand name. The present research underlines the importance of considering language surrounding food products for expectation and purchase intentions.

CRediT authorship contribution statement

David M. Sidhu: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Johanna Peetz:** Writing – review & editing, Writing – original draft, Resources, Methodology, Investigation, Funding acquisition, Conceptualization. **Rachel J. Burns:** Conceptualization, Methodology, Writing – Original Draft, Writing – Review & Editing, Project administration.

Ethics statement

These studies were approved by the Research Ethics Board of Carleton University and were carried out in accordance with those approvals and guidelines.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This research was supported by a grant from the Social Sciences and Humanities Research Council of Canada (#435-2012-1211) to Johanna Peetz.

Appendix A. Appendix

Nonword Stimuli.

Table A1
Large-associated nonword stimuli.

Nonword	Mean Pronounceability	Mean Likeability
blorogo	5.16	4.15
boge	6.63	4.80
bromogaw	5.68	3.90
gawdoe	7.21	3.70
gobo	9.26	5.90
grawbaw	6.89	4.45
lomaw	8.11	4.25
norgo	8.63	4.85
ombog	7.68	3.85
wagoe	7.00	4.40

Note. Pronounceability and likeability ratings were made on a 10-point scale, with higher values indicating more pronounceability/likeability.

Table A2
Small-associated nonword stimuli.

Nonword	Mean Pronounceability	Mean Likeability
fipee	7.63	6.30
iskee	7.84	5.55
keesee	8.63	5.95
keetisp	4.58	3.10
kipi	8.58	6.80
peefik	8.11	3.65
spaytiki	6.63	5.00
spisiki	4.84	5.45
teek	9.79	6.70
tikee	8.21	7.30

Note. Pronounceability and likeability ratings were made on a 10-point scale, with higher values indicating more pronounceability/likeability.

Data availability

Data and code shared at (https://osf.io/73swr).

References

Akita, K., McLean, B., Park, J., & Thompson, A. L. (2024). Iconicity mediates semantic networks of sound symbolism. *The Journal of the Acoustical Society of America, 155*(4), 2687–2697. https://doi.org/10.1121/10.0025763

Andretti, B., Vieites, Y., Elmor, L., & Andrade, E. B. (2025). How socioeconomic status shapes food preferences and perceptions. *Journal of Marketing, 89*(6), 33–56.

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*. https://doi.org/10.18637/jss.v067.i01

Brauer, M., & Curtin, J. J. (2018). Linear mixed-effects models and the analysis of nonindependent data: A unified framework to analyze categorical and continuous independent variables that vary within-subjects and/or within-items. *Psychological Methods, 23*(3), 389.

Brunstrom, J. M., Rogers, P. J., Burn, J. F., Collingwood, J. M., Maynard, O. M., Brown, S. D., & Sell, N. R. (2010). Expected satiety influences actual satiety. *Appetite, 54*(3), 637.

Brunstrom, J. M., & Shakeshaft, N. G. (2009). Measuring affective (liking) and non-affective (expected satiety) determinants of portion size and food reward. *Appetite, 52*(1), 108–114.

Brunstrom, J. M., Shakeshaft, N. G., & Scott-Samuel, N. E. (2008). Measuring 'expected satiety'in a range of common foods using a method of constant stimuli. *Appetite, 51*(3), 604–614.

Bürkner, Paul-Christian (2021). Bayesian Item Response Modeling in R with brms and Stan. *Journal of Statistical Software, 100*(5), 1–54. https://doi.org/10.18637/jss.v100.i05

Cassady, B. A., Considine, R. V., & Mattes, R. D. (2012). Beverage consumption, appetite, and energy intake: What did you expect? *American Journal of Clinical Nutrition, 95*(3), 587–593.

Chang, Y.-H., Zhao, M., Chen, Y.-C., & Huang, P.-C. (2021). The effects of Mandarin Chinese lexical tones in sound–shape and sound–size correspondences. *Multisensory Research, 35*, 243–257. https://doi.org/10.1163/22134808-bja10068

Ćwiek, A., Fuchs, S., Draxler, C., Asu, E. L., Dediu, D., Hiovain, K., … Winter, B. (2021). The bouba/kiki effect is robust across cultures and writing systems. *Philosophical Transactions of the Royal Society B: Biological Sciences, 377*, 20200390.

De Kerpel, L., Kobuszewski Volles, B., & Van Kerckhove, A. (2020). Fats are glossy but does glossiness imply fatness? The influence of packaging glossiness on food perceptions. *Foods, 9*(1), 90.

Deng, X., & Kahn, B. E. (2009). Is your product on the right side? The "location effect" on perceived product heaviness and package evaluation. *Journal of Marketing Research, 46*(6), 725–738.

Foroni, F., Esmaeilikia, M., & Rumiati, R. I. (2022). What makes a food healthy? Sex differences in what is associated to healthiness evaluations. *Food Quality and Preference, 96*, Article 104438.

Guedes, D., Vaz Garrido, M., Lamy, E., Pereira Cavalheiro, B., & Prada, M. (2023). Crossmodal interactions between audition and taste: A systematic review and narrative synthesis. *Food Quality and Preference, 107*, Article 104856. https://doi.org/10.1016/j.foodqual.2023.104856

Kawahara, S. (2021). *Phonetic bases of sound symbolism: A review* [preprint]. PsyArXiv doi: 10.31234/osf.io/fzvsu.

Keuleers, E., & Keuleers, M. E. (2013). *Package 'vwr'. (Useful functions for visual word recognition research)*.

Knoeferle, K., Li, J., Maggioni, E., & Spence, C. (2017). What drives sound symbolism? Different acoustic cues underlie sound-size and sound-shape mappings. *Scientific Reports, 7*(1), 5562.

Krishna, A., Cian, L., & Aydınoğlu, N. Z. (2017). Sensory aspects of package design. *Journal of Retailing, 93*, 43–54.

Krishna, A., & Schwarz, N. (2014). Sensory marketing, embodiment, and grounded cognition: A review and introduction. *Journal of Consumer Psychology, 24*(2), 159–168.

Lenth, R., & Piaskowski, J. (2022). *emmeans: Estimated Marginal Means, aka Least-Squares Means. R package version 1.11.0*. https://rvlenth.github.io/emmeans/.

Loewenstein, G. (2005). Hot-cold empathy gaps and medical decision making. *Health Psychology, 24*(4S), S49.

Makowski, D., Ben-Shachar, M., & Lüdecke, D. (2019). bayestestR: Describing Effects and their Uncertainty, Existence and Significance within the Bayesian Framework. *Journal of Open Source Software, 4*(40), 1541. https://doi.org/10.21105/joss.01541

Mead, J. A., & Richerson, R. (2018). Package color saturation and food healthfulness perceptions. *Journal of Business Research, 82*, 10–18.

Meteyard, L., & Davies, R. A. (2020). Best practice guidance for linear mixed-effects models in psychological science. *Journal of Memory and Language, 112*, Article 104092.

Motoki, K., Park, J., Pathak, A., & Spence, C. (2021). Constructing healthy food names: On the sound symbolism of healthy food. *Food Quality and Preference, 90*, 104157.

Motoki, K., Park, J., Pathak, A., & Spence, C. (2022). The connotative meanings of sound symbolism in brand names: A conceptual framework. *Journal of Business Research, 150*, 365–373.

Motoki, K., Saito, T., Park, J., Velasco, C., Spence, C., & Sugiura, M. (2020). Tasting names: Systematic investigations of taste-speech sounds associations. *Food Quality and Preference, 80*, Article 103801.

Ohtake, Y., & Haryu, E. (2012). *The vowel-size relationship re-examined using speeded classification. . Proceedings of the annual meeting of the cognitive science society,* Sapporo, Japan.

Piqueras-Fiszman, B., & Spence, C. (2012). The influence of the color of the cup on consumers' perception of a hot beverage. *Journal of Sensory Studies, 27*(5), 324–331.

R Core Team. (2024). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Rummer, R., Schweppe, J., Schlegelmilch, R., & Grice, M. (2014). Mood is linked to vowel type: The role of articulatory movements. *Emotion, 14*, 246–250.

Sapir, E. (1929). A study in phonetic symbolism. *Journal of Experimental Psychology, 12*(3), 225.

Sidhu, D. M., & Peetz, J. (2025). Sounds of the future and past. *British Journal of Psychology, 116*(2), 316–335.

Sidhu, D. M., & Pexman, P. M. (2018). Five mechanisms of sound symbolic association. *Psychonomic Bulletin & Review, 25*, 1619–1643.

Sidhu, D. M., Vigliocco, G., & Pexman, P. M. (2022). Higher order factors of sound symbolism. *Journal of Memory and Language, 125*, Article 104323. https://doi.org/10.1016/j.jml.2022.104323

Sidhu, D. M., Wingate, T. G., Bourdage, J. S., & Pexman, P. M. (2025). Would you hire Liam over Kirk? Name sound symbolism and hiring. *Acta Psychologica, 256*, Article 104978. https://doi.org/10.1016/j.actpsy.2025.104978

Simmonds, G., & Spence, C. (2017). Thinking inside the box: How seeing products on, or through, the packaging influences consumer perceptions and purchase behaviour. *Food Quality and Preference, 62*, 340–351.

Singmann, H., Bolker, B., Westfall, J., & Aust, F. (2024). *Afex: Analysis of factorial experiments (version R package version 1.4.1) [Computer software]*.

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite, 25*, 267–284.

Techawachirakul, M., Pathak, A., Motoki, K., & Calvert, G. A. (2025). Sonic frequencies and food perception: How high-and low-frequency sonic logos shape expectations of satiability and goal alignment. *Journal of Consumer Behaviour, 24*(3), 1511–1521.

Topolinski, S., & Boecker, L. (2016). Mouth-watering words: Articulatory inductions of eating-like mouth movements increase perceived food palatability. *Appetite, 99*, 112–120.

Van Ooijen, I., Fransen, M. L., Verlegh, P. W., & Smit, E. G. (2017). Signalling product healthiness through symbolic package cues: Effects of package shape and goal congruence on consumer behaviour. *Appetite, 109*, 73–82.

Velasco, C., Salgado-Montejo, A., Marmolejo-Ramos, F., & Spence, C. (2014). Predictive packaging design: Tasting shapes, typefaces, names, and sounds. *Food Quality and Preference, 34*, 88–95.

Wang, Q. J., Spence, C., & Knoeferle, K. (2020). Timing is everything: Onset timing moderates the crossmodal influence of background sound on taste perception. *Journal of Experimental Psychology: Human Perception and Performance, 46*(10), 1118–1126. https://doi.org/10.1037/xhp0000820

Wilkinson, L. L., Hinton, E. C., Fay, S. H., Ferriday, D., Rogers, P. J., & Brunstrom, J. M. (2012). Computer-based assessments of expected satiety predict behavioural measures of portion-size selection and food intake. *Appetite, 59*(3), 933–938.