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Some insights into the development of food and brand familiarity: The case of soy sauce in the Netherlands

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ABSTRACT

With the increasing globalization, new unfamiliar flavors gradually find their way into local Western cuisines. The mechanisms behind the successful integration of novel flavors into local cuisines are largely unknown. This study investigates the effects of frequency of soy sauce use, levels of food neophobia, and brand specificity on liking of a relatively unknown flavor in the Netherlands, soy sauce. A total of eighty-nine (26 men and 63 women; mean age 47.5 ± 17.7 years) high- and low-frequency users of soy sauce rated liking of five soy sauces separately presented with and without branding information. Liking of four soy sauces with the typical salty and savory flavor increased with increasing frequency of use, and with decreasing levels of food neophobia. Another soy sauce with additives resulting in a distinctive taste was liked irrespective of the frequency of use. Soy sauces, which were recognized correctly or incorrectly as the participants' own familiar brand, received 50% higher or lower liking ratings than other soy sauces, respectively. Furthermore, users of one of the brands preferred the taste of their own brand over that of other brands, whereas users of the other brands did not show such specificity, indicating clear differences in specificity of liking soy sauce among the various user groups. This study provides insights into consumer liking and preference of semi-familiar foods, revealing the contribution of consumer traits and brand familiarity that may influence the spread of unfamiliar foods.

1. Introduction

When unfamiliar foods are encountered for the first time, consumers are typically somewhat anxious to put the food in their mouths. With subsequent encounters, the food becomes more and more familiar, and the wariness and anxiety are replaced by trust because the consumer can anticipate with a high degree of certainty how the food will taste (Fenko et al., 2015), and how much of the food should be consumed before one is full (Brunstrom et al., 2010). Such familiarity with food (food familiarity) plays a role in consumers' liking and preference, even if there is a difference in taste perception between cultures (Prescott, 1998). Not surprisingly, familiar foods are generally preferred more than unfamiliar ones, and familiarity is, therefore, one of the main determinants of food choice (Pula et al., 2014; Steptoe et al., 1995). This determinant depends on the traits of individual consumers and, for example, whether consumers are willing to try novel flavors and foods. This unwillingness, or fear, to try new flavors and foods is commonly referred to as food

neophobia (Dematte et al., 2014) and is the opposite of foodophilia. Food neophobia has been linked to diets in childhood (Falciglia et al., 2000) and to the frequency of consumption of certain foods by young people (Knaapila et al., 2011). Food neophobic consumers tend to avoid exposure to unfamiliar foods, which in turn is associated with reduced pleasantness of odors, reduced sniffing behavior, and avoiding choosing uncertain flavor (Raudenbush et al., 1998). Such effects are not seen in the cases of familiar foods (Raudenbush & Frank, 1999). Moreover, food neophobia also affects non-sensory factors such as sensitivity to information. For example, it has been reported that food neophilic children responded to healthy food messages and changed food choices significantly compared to neophobic children, i.e., they consumed less chocolate after viewing healthy food adverts. (Dovey et al., 2011).

Food familiarity not only refers to the food's intrinsic properties such as the familiarity of its taste but extends to the food's extrinsic properties such as its packaging and brand name (or "brand familiarity"). This brand familiarity gives consumers trust and commitment to specific

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brands (Ashley & Leonard, 2009) and facilitates the preference (Paasovaara et al., 2012) and selection of one's familiar food from a range of other similar foods when the food itself may not even be visible, e.g., selection of one's familiar cereal from other cereals in the supermarket. The effects of brand familiarity already start at a young age, as demonstrated by the effects of fast-food branding on young children's taste preferences (Robinson et al., 2007). Repeated exposure to foods not only increases food familiarity and food preference, but may increase the sensitivity to detect small perceptual differences in the food (Gonzalez et al., 2008; Rabin, 1988). Variations in food familiarity, for example, between countries with different histories and food cultures, may be more relevant for variations in food sensitivity and hedonic responses than genetic variations (Chung et al., 2012). With the increasing globalization, consumers are increasingly encountered to new unfamiliar foods and flavors, and therefore, insights into the mechanisms underlying the development of food familiarity become more important. From a scientific perspective, these insights may help understand how food habits of certain unfamiliar foods develop or modify existing, less healthy food habits into a healthier direction. From a business perspective, these insights may assist food companies with the successful introduction of new foods and flavors in existing and new markets.

Given the importance of food familiarity in food choice behavior, the lack of relevant studies is somewhat surprising. Previous studies typically examined foods that are either highly familiar, such as beer (Giacalone et al., 2015), soft drinks (McClure et al., 2004), and yogurts (Paasovaara et al., 2012), or completely unfamiliar, such as *Yokan*, a local Japanese confection tasted for the first time by German participants (Gotow et al., 2018). Few studies use test foods (or flavors) that are somewhat familiar or only familiar to a small group of consumers, the so-called "semi-familiar foods". Knowledge of the barriers that prevent a more widespread acceptance of these foods by consumers may facilitate the integration of novel foods and flavors in traditional food cultures (Fenko et al., 2015). One of good examples of a "semi-familiar food" in the Western world is soy sauce. Soy sauce is one of the most popular liquid condiments (Yokotsuka, 1998) and is widely consumed in Eastern and Southeast Asia (Diez-Simon et al., 2020; Wanakhachornkrai, 2003). There are many types of soy sauce globally, of which *Ketjap Manis*, a thick and sweet tasting soy sauce (Lioe et al., 2010), has been popular in Dutch cuisine. However, recently, the Japanese- ("shoyu") and Chinese-style soy sauces ("jiang-you") (Gao et al., 2019) are gaining popularity in the Western world. These soy sauces consist primarily of soybeans, wheat, and salt (Kataoka, 2005), resulting in the typical salty and savory taste, as was recently reviewed by Diez-Simon et al. (2020). Currently, this type of soy sauce is primarily associated with specific foods such as sushi and stir-fry and is relatively unfamiliar to most of the Western consumers even though its popularity is rising (Kataoka, 2005; Tu et al., 2012; Yan et al., 2013). Despite its growing popularity, the history of "semi-familiar" soy sauce in Western countries is still much shorter than that of well-known familiar foods, such as yogurts, and there are still negative attitudes among Western people towards the taste (Tu et al., 2012) and preference (Chang et al., 2012) of soy products.

The present study investigates the effect of familiarity with soy sauces in general, as well as familiarity with specific brands of soy sauces, on flavor liking (including aroma and taste) of various soy sauces presented with and without branding information. Participants include non or light-users and high-frequency users of soy sauce and cover a wide range of food neophobia. Based on the literature, this study aimed to elucidate:

- 1) If liking of soy sauces in general is positively related to frequency of use.
- 2) If liking of soy sauces is inversely related to the degree of food neophobia.
- 3) How familiar regularly used soy sauces brands influence on liking and preference, i.e., brands that consumers are used to, are preferred over other brands.

2. Materials and Methods

2.1. Participants

Dutch participants (n = 89; 26 men and 63 women with an average age of 47.5 ± 17.7 years) were recruited after screening with an online survey by Wageningen Food & Biobased Research (The Netherlands). Exclusion criteria were allergy or intolerance to wheat, gluten, soybean, and rice.

In the recruitment questionnaire, participants were asked to indicate the brand of soy sauce that they used most often ("own brand"), as well as the frequency of use with an 8-point ordinary scales (labeled with 'I do not know soy sauce,' 'never used,' 'less than once a year,' '1-2 times a year,' 'once per 3-4 months,' '1-2 times a month,' '1-2 times a week,' and 'more than 3 times a week').

All participants provided written consent to participate in the experiment. The participants received a monetary reward after the study.

2.2. Products

Five soy sauces were selected for this study (Brands A-E). Three of them (Brands A-C) were salty and savory soy sauces available in Dutch supermarkets and are the top three most frequently used by participants (Table 1). Brand D shares the ingredients and sensory characteristics with Brands A-C, but in contrast to those soy sauces, Brand D is only available in Asian supermarkets and is therefore not known to the typical Dutch consumer. Brand E is unfamiliar to most of Dutch consumers, and the taste is clearly different from that of the other soy sauces because it contains different ingredients (sweeteners and other additives with a distinctly different taste). All soy sauces used in this study are summarized in Table 1.

In addition to these five soy sauces, dark brown-colored salty water (16% sodium chloride which is close to the NaCl concentration of soy sauces in this study) was prepared as a control sample to evaluate the effect of soy sauce aroma. The color of the control sample matched that of soy sauce by using flavorless and tasteless black and brown food coloring (PME trade, London, UK). Thus, the control sample resembled the five soy sauces in terms of color and saltiness, but lacked the typical soy sauce flavor. The soy sauces and the control sample (1 ml) were kept at room temperature in translucent small plastic bottles labeled with random three-digit codes. Sticky-rice (Yumenishiki, JFC Deutschland GmbH, Germany) was prepared by steam-convection according to the preparation instructions and used as a carrier for soy sauce. The cooked rice was portioned into 16 g portions in black small plastic cups and provided at 60 degrees Celsius. The balance between rice (16 g) and soy sauce (1 ml) was decided based on a preliminary test by the experimenters, where especially avoiding too high saltiness levels was a criterium. Cooked rice was used because it is a commonly used carrier of soy sauce in the Netherlands, and because it reduces the perceived saltiness of the soy sauces.

Table 1

Characteristics of the five soy sauces used in this study, their availability in Dutch supermarkets, the presence and additives, and the number of participants who use each brand.

Brand	Availability in the Dutch supermarket	Additives	The number of brand user
A	Yes	No	n = 18
B	Yes	No	n = 6
C	Yes	No	n = 28
D	No	No	-
E	No	Yes	-

The other thirty-seven participants either use other brands or did not use any soy sauce.

2.3. Procedure

Participants visited the sensory lab of the Wageningen University and Research once for a 45-min session. Participants were seated in individual booths equipped with computers. The session was divided into three tasting blocks (Block 1, 2, and 3) separated by 5 min intervals and one block (Block 4) without tasting.

In Block 1, participants rated the six samples (5 soy sauces and 1 salty water) with rice in the unbranded condition. In Block 2 and 3, participants were again presented with the five soy sauces samples with rice, but now the bottle with the brand name of the soy sauce was also presented.

In Block 1–3, participants received samples of soy sauce (and salty water in Block 1) together with cups of cooked rice. Participants were instructed to mix the samples with the rice and taste at least one teaspoon of the mixture. They were allowed to spit the sample out after tasting. Participants filled out the questionnaire (see 2.4.) and waited for the new soy sauce/rice combination. This procedure was repeated for all samples. The order of soy sauce provided to the participant in each block

was randomized between participants. Also, participants were instructed to rinse their mouths with tap water between samples and between blocks.

In Block 4, participants were asked general questions without tasting.

The schematic experimental procedure and all questions used in Blocks 1–4 are summarized in Fig. 1.

2.4. Sample size and data collection

The required number of participants was based on a statistical power calculation using G*Power software (Faul et al., 2009) for the initial multivariate ANOVA (MANOVA) model (5 soy sauce samples \times 2 brand conditions (unbranded and branded) \times 2 groups (high- and low-frequency user)). Based on an effect size η_p^2 of 0.14 (Tomczak et al., 2014) and a power of 0.8 (Sink & Mvududu, 2017), the required number of participants was 79 participants. Eight-nine participants were recruited for this study to compensate for possible drop-out.

In this study, participants' responses were collected with

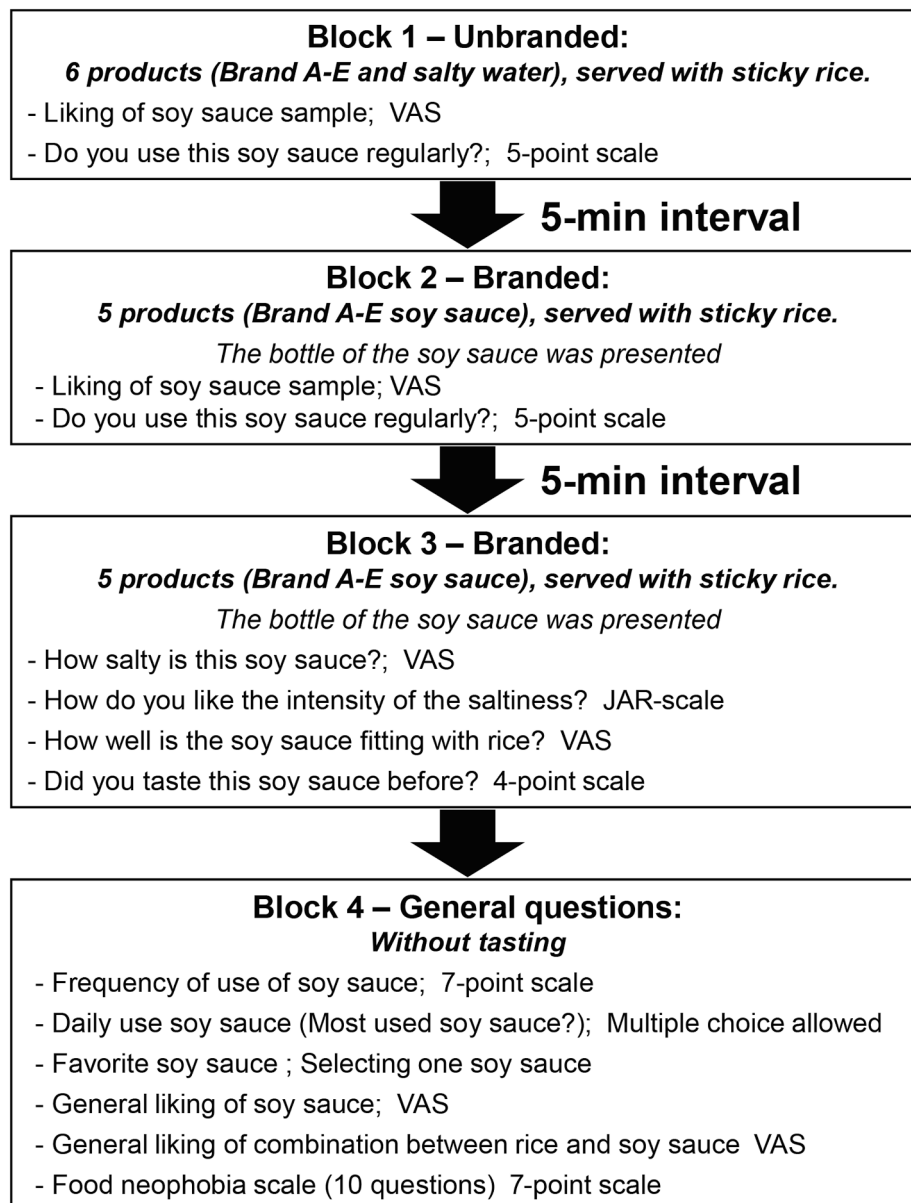


Fig. 1. Design of the study.

EyeQuestion® software (Logic8 EyeQuestion, The Netherlands). Questions were presented on a monitor, and responses were given using a computer keyboard. In Block 1 and 2, participants rated 'How much do you like this soy sauce?' using a visual analog scale (VAS) and rated 'Is this your brand?', using a 5-point category scale ('Yes-sure,' 'Yes-unsure,' 'No-unsure,' 'No-sure,' and 'Not applicable.'). In Block 3, participants rated the saltiness and the liking of salt intensity. Also, participants were asked 'How well is the soy sauce fitting with rice?' as the degree of fit (or compatibility) of the mixture of soy sauce and rice, and 'Did you taste this soy sauce before?'. The saltiness was collected using a VAS with anchors "not at all" and "very much" placed at the left and right extremes, respectively. The liking of salt intensity was collected with a just-about-right (JAR) scale with 'just about right' in the center, and with 'too weak' and 'too strong' at the left and right extremes, respectively. In Block 4, the general questionnaire, the frequency of use of soy sauce was asked again using the 7-point ordinary scale (without 'I do not know soy sauce') used during recruitment. Also, participants selected from a list of soy sauce brands that they used most often (allowed multiple choices) as well as their favorite brand (only one choice was allowed). These data were also used to confirm the previous responses during recruitment. Furthermore, participants rated from memory, i.e., without tasting, their liking for soy sauces in general ('How much do you like soy sauce?') and for soy sauce with rice ('How much do you like topping soy sauce on rice?') using VAS scales. Each VAS was shown with 'not at all' and 'very much' at the left and right extremes. The VAS and JAR scale data were quantified from 0 to 100 after the data were acquired. Finally, the participants filled in the "Food neophobia scale (FNS)" (Pliner & Hobden, 1992), which consists of 10 statements. Answers with each statement were indicated using a 7-point scale ('disagree strongly' to 'agree strongly'). Ratings on five of the 10 statements were reversed to make them compatible. Finally, all 10 responses were summed to obtain a total neophobia score, ranging between 10 and 70 (Pliner & Hobden, 1992).

2.5. Statistics

To verify the relationship between the degree of food neophobia and other participants' features such as the general liking of soy sauce and frequency of use, correlation analysis was conducted. Pearson's correlation (r) was used for the general liking of soy sauce and the general liking for soy sauce – rice combination, and Spearman's rank correlation (Spearman's ρ) was used for the 8-point ordinary scale of the frequency of use. A chi-square test of independence was used to compare the frequencies of use for the various brand users.

Mixed model ANOVAs were adopted to investigate the main and interaction effect on soy sauce liking (Smith et al., 2003). To examine the difference in the taste of soy sauces and investigate the impact of soy sauce flavors without the effect of the brand, the model under unbranded condition were constructed; the model between samples (6; all soy sauces and salty water) and the degree of food neophobia (2; neophiliacs and neophobics) with the participant as a random factor. Also, the model on liking score was compared by soy sauce products (5) \times branding conditions (2; unbranded or branded) \times frequency of use (2; high- or low-frequency users) with a random factor (participant). For soy sauce products, salty water was excluded from the mixed model because it was presented only in Block 1 (unbranded condition).

For the effect of brand recognition, another model was applied. The main and interaction effects on liking scores were compared by the branding conditions (2) and the answer of brand identification (2; Yes or No, including sure and unsure) with a random factor (participant). For the answer to brand identification, participants who chose 'Not applicable' were excluded because they could not judge the brand identification. A significant interaction was compared by pairwise t -test.

To examine the effects of the own brand on liking score, own brand was a between-subject variable, whereas test soy sauces (typical soy sauce Brand A-D) and the participants were considered as fixed factors

and a random factor, respectively. In addition, liking of soy sauce may be mediated by its characteristic sharp salty flavor. This was tested by a statistical model with saltiness and liking of salty intensity as dependent variables, frequency of use, and neophobia as independent variables.

For all statistical tests, p -values < 0.05 were considered statistically significant. Furthermore, a significant effect among products was followed up with Tukey's HSD test as a post-hoc comparison. Also, to compare liking scores between own brand and other brands for each brand user, Dunnett's test post-hoc comparison was adopted based on their own brand's liking score. All analyses were conducted using IBM® SPSS® statistics, version 25 (Armonk, New York, USA).

3. Results

3.1. The effects of frequency of use and food neophobia on liking

The participants recruited for this study varied widely with regard to their frequency of use of soy sauces. The participants were divided into equally-sized groups according to their frequency of use (Bredahl, 2004). Participants who used soy sauces at least once a month were denoted "high-frequency users ($n = 47$)", the other participants, who never or rarely use soy sauce (less than once a month), were denoted "low-frequency users ($n = 42$)". The food neophobia scores of the participants ranged from 10 to 52, with a median score of 23. Following previous studies (Barrena & Sánchez, 2013), the participants were divided into "neophobics (≥ 23)" and "neophiliacs (< 23)" based on the median of the grouped FNS scores.

Usage of soy sauces was strongly negatively related to food neophobia scores: neophobics reported lower frequency of use of soy sauces than neophiliacs (Spearman's $\rho = -0.41$, $n = 89$, $p < 0.01$), and liked the taste of (unbranded) soy sauces significantly less than food neophiliacs (mean liking scores rated by neophobics and neophiliacs were 50.0 and 55.7, respectively, $F(1, 89) = 4.48$, $p = 0.04$, $\eta_p^2 = 0.05$). Similarly, both the general liking for soy sauce as it is and for soy sauce with rice, rated from memory in Block 4, showed a strong negative correlation with FNS scores ($r = -0.47$, $n = 89$, $p < 0.01$, and $r = -0.47$, $n = 89$, $p < 0.01$, respectively). The difference of general liking scores between the actual taste and the taste based on memory was larger in neophiliacs than in neophobias. (69.3 versus 52.7, for neophiliacs and neophobics, respectively).

3.2. Liking of soy sauce taste and the effects of branding

Liking for the taste of the unbranded soy sauces varied significantly with soy sauce brands ($F(5, 445) = 8.16$, $p < 0.01$, $\eta_p^2 = 0.27$). Post-hoc testing showed that Brand E (mean liking score 61.7) and A (56.3) were significantly liked more than all other brands, except brand B, and the salty water control. Liking for brands B (53.1), C (50.5), and D (49.6) and the salty water control (45.9) was not statistically different.

Overall, branding did not affect the taste liking of soy sauces neither as the main effect ($F(1, 801) = 1.89$, $p = 0.17$, $\eta_p^2 = 0.02$) nor as interaction with products or usage.

Liking of the taste of unbranded and branded soy sauces varied with usage ($F(1, 89) = 16.20$, $p < 0.01$, $\eta_p^2 = 0.15$). Overall, low-frequency users liked the taste of soy sauce (47.8) significantly less than high-frequency users (58.8). Usage interacted marginally significantly with products ($F(4, 801) = 2.10$, $p = 0.08$, $\eta_p^2 = 0.06$). Post-hoc tests, by which the difference between high- and low-frequency users was compared pairwise for each brand, showed that low-frequency users liked all soy sauce brands less than high-frequency users, except for Brand E (see Fig. 2).

Saltiness and liking of salt intensity of soy sauces varied between brands ($F(4, 356) = 8.66$, $p < 0.01$, $\eta_p^2 = 0.31$, and $F(4, 356) = 7.39$, $p < 0.01$, $\eta_p^2 = 0.26$, respectively). No significant effects of food neophobia and frequency of use on saltiness and liking of salt intensity were observed (Figure S1).

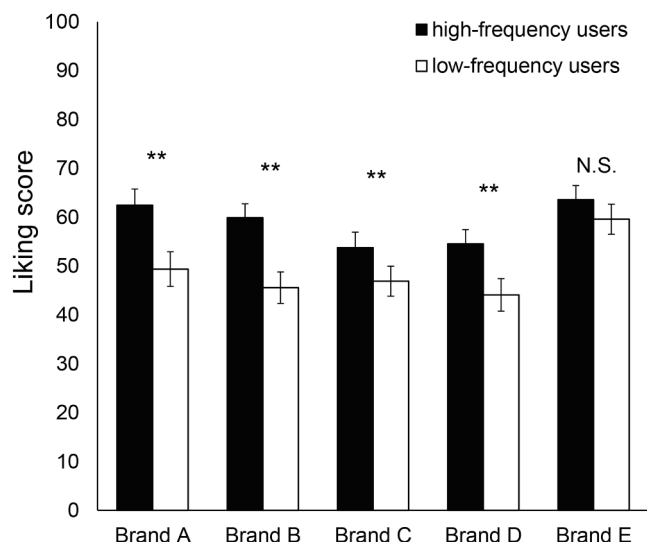


Fig. 2. Liking of soy sauces on a scale of 0–100 by high- (n = 47) and low-frequency users (n = 42). Results are averaged across unbranded and branding conditions. The data are presented as the means ± standard error. The significant difference between high- and low-frequency users are indicated with (*) for $p < 0.05$ and (**) for $p < 0.01$.

3.3. Own brand recognition

Participants were grouped according to their reported own brand ('Brand A-C' users) and 'the others,' which included participants who used other brands or who used no soy sauce at all. Participants were rather good at correctly recognizing the taste of unbranded soy sauce as "not their own brand" (range 62.5% – 85.9%, well above chance levels of 20%). However, correct recognition of their own brand based on the unbranded taste was much poorer. Brand B and C users could only identify their own brand as accurately as their chance levels (25% – 33.3%). In contrast, Brand A users were relatively good at recognizing their own brand (61.1%) (see Table 2).

Recognition, either correct or incorrect, of the own familiar brand increased liking scores significantly ($F(1, 560) = 129.27, p < 0.01, \eta_p^2 = 0.17$). Even though branding had no overall effect on liking, as indicated before, branding did affect liking scores when it facilitated correct recognition of their own familiar brand ($F(1, 547) = 5.58, p = 0.02, \eta_p^2 = 0.01$). Liking scores for soy sauces that were believed to be the own familiar brands in the unbranded condition, significantly decreased by as much as 50% when this 'belief' was disconfirmed by the branding information in the branded condition. Vice versa, liking scores increased by as much as 50% by branding information when a soy sauce that was previously believed to be another brand turned out to be, in fact, the own familiar brand. Liking scores did not change when the 'belief' based on unbranded taste was confirmed by the brand presentation (see Fig. 3).

3.4. The influence of the regularly used soy sauce brand on liking

To examine whether "own brand" advantage in liking was the same

Table 2
Discrimination rate of "own brand" recognitions per user group based on the taste of unbranded soy sauces.

% correct responses	"Own brand"	"Not own brand"
Brand A users	61.1%	62.5%
Brand B users	33.3%	62.5%
Brand C users	25.0%	78.6%
Other users	–	85.9%

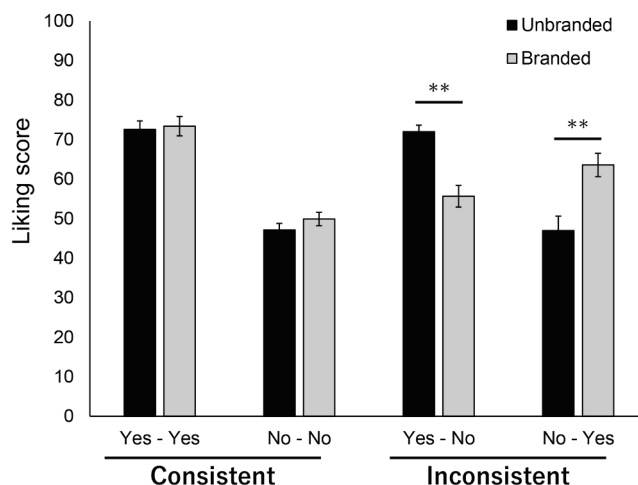


Fig. 3. Liking scores for soy sauces identified as own regular brand ("Yes": including 'Yes-sure' and 'Yes-unsure') or other brands ("No": including 'No-sure' and 'No-unsure'). Soy sauces were presented with and without branding information (Block 1 and Block 2, respectively, see Fig. 1). Consistent pairs were correctly identified as their own regular brand ("Yes-Yes") or other brands ("No-No") in both branding conditions. Inconsistent pairs were incorrectly identified as their own brand in the unbranded condition and correctly identified in the branded condition ("No-Yes") or vice versa ("Yes-No"). The data are presented as the means ± standard error. The significant difference between with and without branding are indicated with (*) for $p < 0.05$ and (**) for $p < 0.01$.

for all similarly tasting Brands A-D, participants were segmented into four groups based on their "own brand" (Brand A users, B users, C users, or all other brands including participants who never use soy sauce; see Table 1). There was little difference in the frequency of use between groups ($\chi^2(18) = 17.63, p = 0.48, \Phi = 0.45$), and liking scores of savory soy sauces (Brand A-D) were compared within each segmented group. Without branding, Brand B users and C users liked the taste of the other brands just as much as the taste of their own brand (respectively Brand B: $F(3, 18) = 2.23, p = 0.12, \eta_p^2 = 0.81$ and Brand C: $F(3, 84) = 1.68, p = 0.18, \eta_p^2 = 0.18$). In contrast, liking by Brand A users varied significantly with other brands ($F(3, 71) = 3.33, p = 0.02, \eta_p^2 = 0.50$). Post-hoc testing showed that these participants liked their own brand (Brand A) better than Brand C ($p = 0.06$) and D ($p < 0.05$). All other brand users did not show the difference in liking for a particular brand ($F(3, 112) = 2.01, p = 0.12, \eta_p^2 = 0.17$) (see Fig. 4).

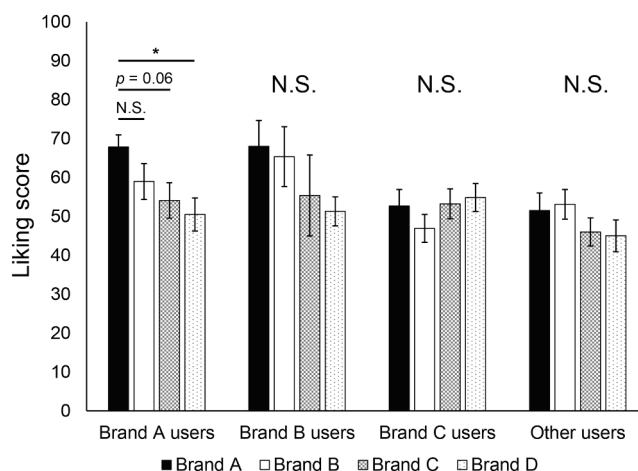


Fig. 4. Liking for soy sauce brands A-D as a function of own brand usage. The data are presented as the mean ± standard error; The significant difference between brands is indicated with (*) for $p < 0.05$ (Dunnett's test).

4. Discussion

This study investigated the effects of frequency of use of soy sauces, brand familiarity, and food neophobia on liking for the taste of soy sauces. Overall, the results showed that 1) liking of soy sauces increased with frequency of use, 2) neophiliacs liked soy sauces more and used soy sauce more frequently than neophobics, 3) branding affected soy sauce liking only when it facilitated recognition of the own familiar brand, 4) the degree to which soy sauce users liked other brands as well as their own brand varied with their specific own brand. The first two findings are in line with the existing literature (Fenko et al., 2015; Torrico et al., 2019). The last two findings are relatively new and demonstrate the importance of using variables such as own familiar brand and product usage in consumer studies. These variables are also referred to as psycho-graphical variables.

4.1. Effects of the frequency of use and food neophobia on liking of soy sauce

The finding that neophiliacs liked more and use soy sauce more frequently than neophobics is in line with previous studies (Jaeger et al., 2017; Knaapila et al., 2017; Knaapila et al., 2011; Raudenbush et al., 1998). Interestingly, the frequency of use and levels of neophobia also showed some differences with regard to their effects on liking of soy sauces in general. Whereas food neophobics tended to like the flavor of all test soy sauces less than neophiliacs, the effect of frequency of use seems to be brand-specific. High-frequency users rated higher liking scores on Brands A-D than low-frequency users, whereas Brand E was liked as much by all types of users (Fig. 2). Brand D and E are currently not available in Dutch supermarkets. The fact that both brands are unfamiliar to both user groups and that only one of these brands is liked by low-frequency users, suggested that familiarity with the specific brands does not play a role in their liking. Rather, the difference in liking between Brand A-D and E may be explained by the different sensory characteristics between products. Brand E, which all user groups liked equally, contains additives that enhance the sweetness and reduce the typical salty and savory taste (Beebe-Center et al., 1959) (see Figure S1). This finding suggests that the reduced liking of neophobics is not related to soy sauces in general but only to the subgroup of soy sauces with the distinctive sharply salty taste. It is possible that the better-liked sweet Brand E may remind low-frequency users of another dark brown-colored soy sauce, namely Ketjap Manis (Lioe et al., 2010). The long history of Ketjap Manis in Dutch cuisine may have increased its acceptability by low-frequency users.

Interestingly, when the participants rated their general liking of soy sauce in Block 4 without actual tasting, the differences in liking scores between neophobics and neophiliacs became even larger. Closer inspection showed that this increased difference is almost exclusively caused by neophiliacs where liking scores increased from 55.7 to 69.3 when liking is based on memory rather than the actual taste. In contrast, neophobics liked soy sauces as much- or rather as little- when liking is based on memory (50.0 and 52.7). Thus, it seems that, in this study, neophiliacs liked the memorized taste even better than the actual taste. Even though taste memory has been the subject of relatively few human studies, it is considered as an important driver of food choice and eating behavior (Köster, 2009). Future studies may show whether the liking score discrepancy between memory-based taste and actual taste found in this study for neophiliacs is also found for other familiar and/or unfamiliar foods and other consumer segments.

4.2. Branding effects are mediated by their own brand recognition

Overall, liking ratings of branded products were not significantly different from liking rating of unbranded products. This result seems at odds with numerous other studies that did find effects of branding on sensory product ratings: in a review of studies on the effects of branding,

Skaczkowski et al. (2016) observed that sixty-five of the 78 studies (on unhealthy food products) reported an effect of branding information on taste and/or hedonic outcomes, including liking and preference. Other studies showed that branding has no effect on liking when the brand is identified as different from one's (unfamiliar brand) (Kamins & Marks, 1991; Paasovaara et al., 2012; Varela et al., 2010).

Even though our study lacked an overall effect of branding on liking, our results did show specific effects of branding on liking, namely when branding facilitated correct recognition of one's own brand. When participants believed (correctly or incorrectly) that they tasted their own brand, liking ratings were about 50% higher than when they believed they tasted another brand (Fig. 3). This 'belief' was often incorrect in the case of unbranded soy sauces, where own brand soy sauces were frequently confused with different brands or vice versa. When branding facilitated recognition of one's own brand after previously (incorrectly) recognized as a different brand, liking ratings increased by 50%. When branding facilitated recognition of a different brand after previously (incorrectly) recognized as one's own brand, liking ratings decreased by 50%. Finally, when branding confirmed previous recognition of own and different brands, liking ratings did not change. Due to these different effects of branding on liking, no overall effect of branding was found in this study in contrast to many other studies. A possible reason for the discrepancy for these different results may be that this study used "semi-familiar" foods for Dutch consumers. This unfamiliarity may make it difficult to recognize soy sauces solely based on their taste. Consequently, consumers rely more on branding to recognize their own and/or other brands, which is an important driver of product liking. Future studies should verify whether the mechanism found in this study by which branding affects liking can be generalized to other foods or whether it is limited to foods that are relatively infrequently consumed and/or foods that are difficult to identify based on visual and smell characteristics. Furthermore, this concept may be applicable not only to food products but also to various adventure-seeking behaviors.

4.3. Brand specificity of liking of soy sauce

The results showed that the brand-specificity of participants' soy sauce preferences varied with their own familiar brand: Brand A users liked their own Brand A better than other brands, whereas users of other brands showed no or less specificity in their preferences for soy sauces (see Table 2 and Fig. 4). Not only did Brand A users like their own soy sauce better than the other soy sauces, but they were also better at recognizing their own soy sauce under unbranded conditions. This superior recognition performance could reflect a superior sensory acuity of Brand A users compared to other brands' users. Sensory acuity may be related to factors, such as demographics, familiarity (Gotow et al., 2018), and exposure/training (Knaapila et al., 2017; Ludy & Mattes, 2012). This study was not specifically designed to investigate most of these factors. The only factor investigated was the frequency of use, which was similar for all user groups. Even though a sensory explanation of the superior recognition of brand A users cannot be excluded, alternative non-sensory explanations are also possible. It is well known that premium brands are often liked better than other brands when brand information is provided. In those cases, the premium brand's liking is not necessarily better when no brand information is provided (McClure et al., 2004; Robinson et al., 2007; Wang, 2013). In this study, however, Brand A users liked their own brand better in both branded and unbranded conditions. Perhaps, the taste of Brand A may have become for them the standard taste of soy sauce in repeated use. In addition, Brand A users may have a larger interest in soy sauces, and perhaps in foods in general, than users of other brands and pay more attention to relatively small sensory differences between soy sauces. As a result, Brand A users may have noticed the small differences between soy sauces by learning based on the taste of Brand A repeatedly. In marketing terms, larger interest in certain brands is also known as 'consumer-brand equity' (Keller, 1993). Variables such as frequency of use, own brand, and the

degree of food neophobia are also known as psycho-graphical variables. This study demonstrates that it is important to include psycho-graphical as well as the more established demographical variables, such as age and gender, in consumer studies (Lin, 2002).

4.4. Limitations of this study

This study uses test foods from only one relatively small food category (salty and savory soy sauce), and it tests this food in combination with one specific carrier (rice) and one specific mixing ratio. Other foods, other carriers and mixing ratios, and other food cultures may lead to different results (Cherdchu & Chambers, 2014; Liang et al., 2019). Furthermore, the total number of participants used in this study was enough according to the calculation of effect size, though, the size of subgroups divided into each brand user was small (see Table 1). Future studies should screen and select participants based on their own brand to ensure sufficiently large groups.

Also, this study was conducted using only Dutch participants in the Netherlands, and it can be difficult to generalize this finding to the Western countries. Therefore, for future studies, it would be of interest to investigate other Western countries. Besides, conducting a similar study in other regions where soy sauce products have differently prevailed, such as Asia (very familiar) and Africa (little familiar), would contribute to further expansion of knowledge.

5. Conclusion

This study showed that liking for soy sauce, a relatively new flavor in Dutch cuisine, increased with frequency of use and decreased with food neophobia. The negative effect of food neophobia on liking was found for all soy sauces. In contrast, the positive effect of frequency of use was limited to the soy sauces with the characteristic salty and savory taste. Our findings indicate that consumer segmentation based on idiosyncratic variables such as food neophobia and usage of specific brands can contribute to understanding consumer liking and preference. Also, it is shown that branding affects sensory hedonics via recognition of one's own familiar brands. This study provides insights into consumer liking and preference of semi-familiar foods, revealing consumer traits and brands' contributions.

CRediT authorship contribution statement

Shota Ushiyama: Conceptualization, Methodology, Investigation, Writing - original draft. **Monique H. Vingerhoeds:** Conceptualization, Methodology, Writing - review & editing. **Mayuko Kanemura:** Investigation, Writing - review & editing. **Daisuke Kaneko:** Conceptualization, Methodology, Writing - review & editing. **Rene A. De Wijk:** Conceptualization, Methodology, Investigation, Writing - original draft.

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Author contributions

SU, MV, DK, and RdW conceptualize and designed the sensory study. SU, MK, and RdW performed the sensory study and analyzed the study data. Both SU and RdW took the lead in writing the original draft manuscript. All authors provided critical review and revision toward publication.

Declaration of Competing Interest

SU reports grants from Kikkoman Europe R&D Laboratory B.V., and SU and DK are both employees of Kikkoman Europe R&D Laboratory B.V. A possible conflict of interest was prevented by following the WUR-integrity code (URL: <https://www.wur.nl/en/About-Wageningen/Integrity-and-privacy/Scientific-integrity.htm>). Products from different suppliers were included in the study, and the results are published without brand names to prevent bias.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.foodres.2021.110200>.

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