Receptacle interacts with consumer's need for touch to influence tea-drinking experience

Chujun Wang[1], Yubin Peng[1], Charles Spence[2], & Xiaoang Wan[1]

1. *Department of Psychology, Tsinghua University*
2. *Crossmodal Research Laboratory, Department of Experimental Psychology, University of Oxford*

Correspondence to Xiaoang Wan, Department of Psychology, School of Social Sciences, Tsinghua University, Beijing, China 100084. E-mail: wanxa@mail.tsinghua.edu.cn.

Abstract

Purpose – This study was designed to investigate how the material properties of the tea-drinking receptacle interact with a participant's motivation and preference for extracting and using information obtained via haptic perception, namely the need-for-touch (NFT), to influence his or her tea-drinking experience.

Design/methodology/approach – Seventy-two blindfolded participants were instructed to sample room-temperature tea beverages served in a cup that was made of ceramic, glass, paper, or plastic. They were then asked to rate how familiar they were with the taste of the beverage, to rate how pleasant the taste was, and to specify how much they would like to pay for it (i.e., willingness-to-pay ratings).

Findings – The material of the receptacles used to serve the tea exerted a significant influence over the pleasantness ratings of the tea, and interacted with the participants' NFT, exerting a significant influence over their willingness-to-pay for the tea. Specifically, high-NFT participants were willing to pay significantly more for the same cup of tea when it was served in a ceramic cup rather than in a paper cup; whereas the low-NFT participants' willingness-to-pay for the tea was unaffected by the material of the receptacles.

Originality/value – Our findings suggest that consumers may not be equally susceptible to the influence of the receptacle in which tea, or any other beverage, is served. Our findings also demonstrate how the physical properties of a receptacle interact with a consumer's motivation and preference to influence his or her behavior in the marketplace.

Keywords: receptacle; tea; need-for-touch; willingness-to-pay

Paper type: Research paper

Introduction

Numerous studies have demonstrated that a wide range of contextual factors influence people's perception of, and ratings concerning, a wide variety of food and drink products (Cardello and Meiselman, 2018), including the physical and sensory properties of the receptacles or containers (Spence and Wan, 2015). For example, many studies have demonstrated that the shape of the receptacle used to serve drinks can influence the perceived taste/flavor of these drinks, such as wine (Vilanova *et al*., 2008), beer (Mirabito *et al*., 2017), and cola (Cavazzana *et al*., 2017).

However, very few studies have been conducted to investigate whether all consumers are equally susceptible to the influence of such contextual (or product-extrinsic) cues. For example, consumers differ from one another in terms of their motivation to prefer extracting and using information that they obtain via haptic perception. This is what has come to be known as the need for touch (NFT, Peck and Childers, 2003a). It remains unclear whether the receptacles used to serve drinks can interact with consumer characteristics in order to influence their perception of, subjective ratings concerning, and willingness to pay for, beverages.

This issue is of particular importance for tea, one of the world's most popular drinks. The receptacles used to drink tea are an integral part of the tea-drinking process (Li, 1993), and influence consumers' expectations concerning the tea beverages prior to their consumption (Li *et al*., 2020). Despite the popularity of tea worldwide and the possible health benefits of tea-drinking (Macfarlane and Macfarlane, 2004; Pan *et al*., 2017), surprisingly few studies have been conducted to investigate the influence of receptacles on the tea-drinking experience. Traditionally, ceramic cups have often been used to serve hot drinks such as tea in fine restaurants or at home (Schifferstein, 2009). However, receptacles made of other materials, such as glass, paper, or plastic, are often used for fast-food chains or take-away tea beverages.

The present study was therefore designed in order to investigate how the material properties of the receptacle used to serve tea interact with a consumer's NFT to influence his or her tea-drinking experience rather than exclusively investigating the effect of the material of the receptacle. The results of the present study will hopefully provide insights into consumer behavior research, and offer some practical implications for tea stores and tea houses.

Literature review

In the literature, the attributes of a product can be classified into three categories, including product-intrinsic cues, product-extrinsic cues, and contextual cues (Iop *et al.*, 2006). Product-intrinsic cues refer to those attributes that belong directly to the product itself, whereas product-extrinsic cues refer to the attributes that are also related to the product but not actually part of the product (Asioli *et al.*, 2017; Symmank, 2019), such as brand and packaging. Contextual cues refer to the environmental variables surrounding a product in which it is presented or consumed (Piqueras-Fiszman and Spence, 2011; Spence *et al.*, 2012).

The receptacles used to serve drinks are usually viewed as contextual cues (for a review, Spence *et al.*, 2012). The visual properties of the receptacles used to serve drinks can exert a significant influence on consumers' perception of the drinks held within (Risso *et al.*, 2015). Consumers' drinking experience may also be influenced by haptic information regarding the receptacles used to serve the drink via tacile perception (Krishna and Morrin, 2008), such as the texture, shape, temperature, and weight information of the receptacle (Lederman and Klatzky, 1987). Haptic information is often obtained via an individual's mechanoreceptors as well as tactile receptors located in hands (Klatzky and Lederman, 1992), but it can also come from the oral-somatosensory perception based on the receptors around the oral cavity during drinking (Piqueras-Fiszman and Spence, 2012).

Tactile perception consists of both physical and psychological processes (e.g., Liao *et al*., 2016), and the influence of the receptacles on the perception of the content inside may have a physical or psychological origin (Spence and Wan, 2015; Zhao *et al*., 2018). Touch provides effective attribute, structural, and affective information to consumers (Peck and Wiggins, 2006), sometimes including information that cannot be obtained visually (McCabe and Nowlis, 2003). Therefore, touching the product, its packaging, or the drinking vessel can exert a significant influence on consumers' perception of the products (Peck and Shu, 2009). For example, the weight of the containers has been shown to influence participants' ratings of drinks (Kampfer *et al*., 2017; Maggioni *et al*., 2015). Similarly, the texture of the drinking vessel has been shown to influence the perception of water (Krishna and Morrin, 2008; Risso *et al*., 2019), juice (Chen *et al*., 2019), coffee (Carvalho *et al*., 2020), and Chinese cold tea beverage (Tu *et al*., 2015).

Interestingly, some consumers have stronger motivation and preference for extracting and using haptic information than others, thus indicating that some individuals are more haptically-oriented than others. Such need for touch can be measured by Peck and Childers' (2003a) 12-item NFT scale. The high-NFT individuals are more influenced by the sense of touch when such haptic information is diagnostic to the task they are performing (Grohmann *et al*., 2007; Peck and Childers, 2003b), such as the touch of a suit during its evaluation. By contrast, Krishna and Morrin (2008) demonstrated that participants with a lower level of general liking of haptic input (i.e., autotelic NFT), were more susceptible to the haptic cue nondiagnostic to the task, such as the touch of a cup in the evaluation of the water inside the cup.

Unlike water, the sensory properties of tea beverages depend on many details of the tea-making process in Chinese or Japanese tea culture (Lee *et al*., 2008), including the utensils that are used to make and serve the tea. Therefore, it remains unclear whether consumers consider the receptacle used to serve tea as a diagnostic or nondiagnostic cue to the evaluation of tea. If the material of the receptacle were to exert a greater influence on the high-NFT participants than on the low-NFT participants when evaluating tea drinks, it would suggest that the participants consider the receptacle as diagnostic. Alternatively, if the material of the receptacle were to exert a greater influence over the low-NFT participants (than over the high-NFT participants) when evaluating tea drinks, it would suggest that the material of the receptacle may be considered as a nondiagnostic cue in the case of tea drinking. These two possibilities are tested in this study.

Materials and methods

Participants

Seventy-two adults (mean age = 20.8 ± 2.1 years, ranging from 18 to 27 years; 36 males and 36 females) were recruited from the participant pool of the psychology department of Tsinghua University, Beijing, China, to take part in the study. All of the participants reported that they were right-handed, had normal taste and haptic perception, and had normal or corrected-to-normal vision without color blindness. The study was approved by the ethics committee of the psychology department of Tsinghua University. Each participant signed written informed consents before the experiment started, and received 30 Chinese Yuan (CNY).

The participants were randomly divided into three groups with the same number of participants (n = 24) in each group. The G*Power software was used to estimate the sample size (Faul *et al.*, 2007), and the results revealed that a sample of 24 participants in each group would be sufficient to detect the effects with $\eta_p^2 \geq 0.24$ (statistical power = 0.95), suggesting that we had a sufficient sample size in this study.

Apparatus and stimuli

Considering that the sensory properties of the same type of tea may differ depending on the country of origin (Lee *et al.*, 2013), we used Chinese brand green tea (Jinghua brand, Green Tea, manufactured by Beijing Ershang Group Ltd., Beijing, China, http://www.bjfood.com.cn), Japanese brand green tea (Oi Ocha brand, Green Tea, manufactured Itoen Ltd., Tokyo, Japan, by http://www.itoen.com) and British brand green tea (Twinings brand, Pure Green Tea, manufactured by Twinings Ltd., London, UK, http://www.twinings.com). As shown in Figure 1, the tea beverage was presented in four different cups made from different materials, including a ceramic cup with colored print on one side (221 ml), a transparent glass cup (257 ml), a white paper cup (249 ml), and a transparent plastic cup (271 ml). The diameter of the ceramic, paper and plastic cups was 7 cm, and the diameter of the glass cup was 7.5 cm.

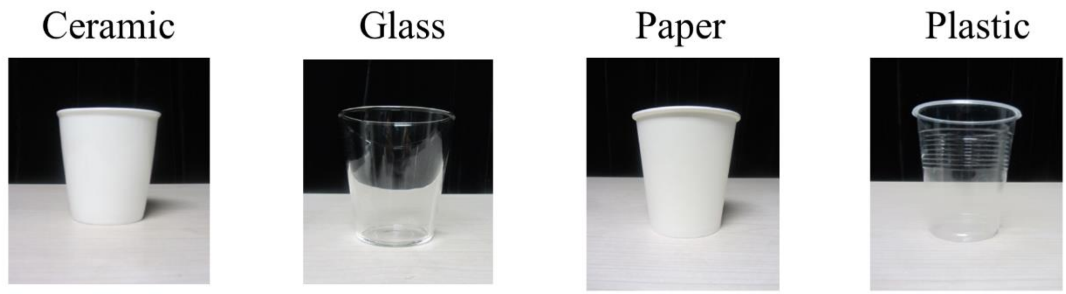

Figure 1. The four cups used in the present study.

This study was conducted in a psychology lab on campus, and each participant was scheduled to take part in the study individually. Similar to Wan *et al.*'s (2014b) study of tea-drinking, all of the tea beverages were prepared about 30 minutes before the time at which each participant was scheduled to arrive at the lab. The experimenters used an electronic kettle to heat purified water to 100°C and let it cool to 85°C. They then made each cup of green tea beverage by stewing a green tea bag in

120 ml water in a glass for 3 minutes. They stirred each tea bag twice before removing it from the water and poured 20 ml of tea beverages into a 20-ml paper cup that was attached to the bottom of the ceramic, glass, paper, and plastic cups shown in Figure 1. These tea beverages had cooled down to room temperature by the time the experiment started. The experimenters also inserted a plastic straw (19 cm in length and 0.5 cm in diameter) into each cup of tea, and the participants were instructed to sample these tea beverages via the straw. These experimental procedures allowed us to control the possible physical or chemical influence of the receptacles on the flavor/taste of the tea beverages across four different cups when the tea beverages were prepared. Moreover, the tea beverages presented to the participants did not have any physical contact with the four cups made of different materials, which allowed us to control the influence of touch temperature and any other oral-somatosensory factors when the participants were sampling the tea beverages.

Design and procedure

As mentioned above, participants were randomly divided into three groups of 24 participants each. Similar to Tu *et al.*'s (2015) study of Chinese cold tea, we had each group of participants sample one type of tea in the present study. Each participant drank the same green tea for four rounds, with a different cup being used in each round. The order of these four cups was determined by a Latin-square design across participants. In order to control the tea-drinking procedure, a square-shaped frame made of paper was mounted on the table that the participants sat in front of, and the cups were always placed inside this frame so the tea beverages were always presented at the same location across trials and participants.

At the start of each trial, we used Wan *et al.*'s (2014b) experimental procedure in which each participant was instructed to wear an eye mask to exclude any visual information about the tea or the receptacle that may influence their taste perception (Hoegg and Alba, 2007). An experimenter placed a cup on the table and guided the participant's hands to reach for the cup. The participant held the cup with both hands (with palms covering approximately three-quarters of the cup), brought it close to his or her lips, and reached the straw. After the participant had sampled the tea via the straw, the experimenter removed and hid the receptacle before asking the participant to take off the eye mask. The participant was then asked to complete the following tasks online at www.unipark.de. Specifically, they were asked to rate the taste of the tea (sweetness, saltiness, sourness, bitterness, and astringency) on 9-point scales, with higher values indicating the increased intensity of the rated attributes. They were also asked to rate how much they were familiar with the taste of the tea beverage (i.e., familiarity ratings), and how pleasant the taste of the tea beverage was to them (i.e., pleasantness ratings), both on 9-point scales. They were asked to indicate their willingness-to-pay (WTP) by specifying the amount of money (in CNY) they would like to pay for the tea beverages that they had just sampled. This procedure was repeated until the participants had finished all four trials.

At the end of the experiment, the participants were also asked to complete a Chinese version of Peck and Childers' (2003a) NFT scale (Cronbach's $\alpha = 0.85$). The participants were asked to rate the extent to which they would agree or disagree with each statement on a 7-point scale ranging from strongly disagree to strongly agree, so a higher score indicated an individual being more haptically-oriented. The participants were also asked to indicate how frequently they consumed green tea in everyday life ('every day', 'often', 'occasionally,' or 'never').

Results

Preliminary analyses

We performed 3 (Tea Brand: Chinese, Japanese, or British brand) × 4 (Receptacle: ceramic, glass, paper, or plastic cup) mixed-design analyses of variance (ANOVAs) on the participants' mean ratings of taste, familiarity, pleasantness, and WTP, with Tea Brand as a between-participants factor and Receptacle as a within-participants factor. The results revealed no main effect of Tea Brand, nor a significant interaction term on any of the measures, all Fs < 2.06, ps > 0.12. Therefore, the data from all three types of green tea were combined in the following data analyses.

We also calculated the participants' NFT scores by averaging their scores on all items (*Mean* = 4.3, *SD* = 0.8, *Median* = 4.25), which indicated a combination of their need for the hedonic and functional aspects of touch (autotelic and instrumental NFT, respectively; Peck and Childers, 2003b). We then conducted a median split and divided all participants into a high-NFT group (N= 35) and a low-NFT group (N= 37). These two groups' mean ratings of taste, familiarity, and pleasantness, and WTP are summarized in Table I.

INSERT TABLE I ABOUT HERE

Here it should be noted that the distribution of these WTP scores is heavily skewed to the right. In order to perform an ANOVA on these data, we needed to perform a log transformation on the raw WTP scores (see Shen *et al.*, 2014). Some of the participants specified their WTP as zero in certain of the trials, so a log 10-transformation was performed on all the raw WTP scores after adding one to the original value.

Taste ratings

We performed 4 (Receptacle: ceramic, glass, paper, or plastic cup) × 2 (NFT: high or low) mixed-design ANOVAs on the ratings of sweetness, sourness, bitterness, saltiness, and astringency, with Receptacle as the within-participants factor and NFT as the between-participants factor. As summarized in Table II, the results revealed a significant main effect of Receptacle on saltiness scores, whereas none of other main effects or interaction terms reached significance. Pairwise comparisons with Bonferroni corrections revealed that the same green tea was rated as tasting saltier when it was served in a paper cup ($M = 3.2$, $SD = 2.0$) than in a plastic cup ($M = 2.7$, $SD = 1.5$), $t(71) = 2.77$, $p = 0.044$, Cohen's $d = 0.34$. None of other pairwise comparisons reached significance, all ts < 2.09, ps > 0.23.

INSERT TABLE II ABOUT HERE

Familiarity and pleasantness ratings

The results of the Receptacle × NFT ANOVAs on the familiarity and pleasantness ratings are also summarized in Table II. The results revealed a significant main effect of the Receptacle on the pleasantness scores, but none of other main or interaction effects reached significance. Pairwise comparisons with Bonferroni corrections revealed that the same tea beverage was rated as tasting more pleasant when it was served in a ceramic cup (M = 4.8, SD = 1.9) rather than in a paper cup (M = 4.2, SD = 1.8), t (71) = 3.02, p = 0.017, Cohen's d = 0.36. None of other pairwise comparisons reached significance, all ts < 2.26, ps > 0.16.

Willingness-to-pay scores

As also summarized in Table II, a Receptacle × NFT mixed-design ANOVA on the transformed WTP scores revealed a significant main effect of Receptacle, but it was qualified by a significant interaction term. In order to interpret the significant interaction term on the transformed WTP scores, we performed one-way repeated-measure ANOVAs for each group of participants separately. The results revealed a significant main effect of Receptacle for the high-NFT group, F (3, 102) = 5.62, p = 0.001, η_p^2 = 0.14; but no such effect was observed for the low-NFT group, F

(3, 108) = 0.43, $p = 0.73$. Pairwise comparisons with Bonferroni corrections revealed that the high-NFT participants were willing to pay significantly more for the same tea when it was served in a ceramic cup rather than a paper cup (see Figure 2 for an illustration), $t(34) = 4.16$, $p = 0.001$, Cohen's $d = 0.71$; whereas no other pairwise comparisons reached significance for the high-NFT participants, all ts < 2.59, ps > 0.08.

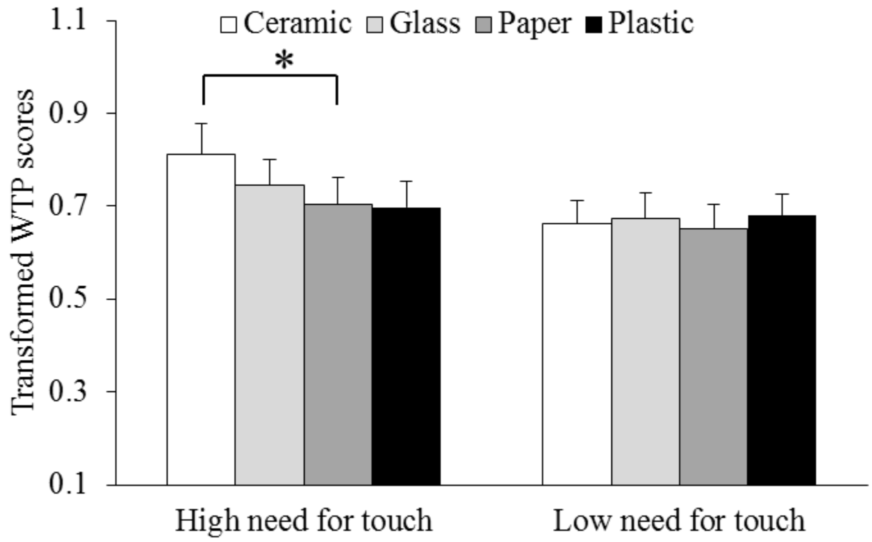

Figure 2. Mean scores of transformed WTP for ceramic, glass, paper and plastic cups given by high or low need for touch (NFT) participants in the present study.

Notes: Error bars show the standard errors of the means, and * denotes $p < 0.001$.

Finally, it should be noted that 10%, 8%, 76%, and 6% of the participants reported that their tea-drinking frequency was 'every day', 'often', 'occasionally,' and 'never,' respectively.

Discussion

In summary, three major findings emerge from the analysis of the results of this study. First, the material properties of the receptacles influenced the participants' pleasantness ratings of green tea beverages. That is, they considered the same green tea drink to be more pleasant when it was served in a ceramic cup than in a paper cup. This result is somehow striking, presumably because our participants were only asked to hold the cups in their hands without extensive touching as in Tu *et al.*'s (2015) earlier study of Chinese cold tea. It is possible that our participants gave higher pleasantness ratings to a tea served in a ceramic cup because they considered it as a more appropriate receptacle for tea-drinking than a paper cup (see also Raudenbush *et al.*, 2002; Wan *et al.*, 2015, for discussion of receptacle appropriateness). It should also be noted that people may transfer their perception about the receptacles to the content inside, thus exhibiting a phenomenon referred to as sensation transference (Krishna and Morrin, 2008; Spence and Wan, 2015). The weights of the ceramic, glass, paper, and plastic cups used in this study were 144g, 120g, 5g, and 2g, respectively. Considering that the weight of cups constrained the influence of receptacles on participants' taste ratings of Chinese cold tea (Tu *et al.*, 2015), it is also possible that the differences in the weight of the cups may also influence our participants' ratings of the drink inside in this study.

Second, the material of the receptacles appeared to interact with the participants' characteristics in terms of influencing their WTP for the green tea beverages. The high-NFT participants' willingness to pay for the tea beverages was influenced by the material of the receptacles, as they reported being willing to pay more for the same tea when it was served in a ceramic than in a paper cup. By contrast, the low-NFT participants' willingness to pay was not significantly influenced by the material of the receptacles. This finding is in line with Becker *et al*.'s (2011) earlier findings that the transfer effects from food packaging to contents may be moderated by the characteristics of the consumer. Moreover, our findings demonstrate an interaction between contextual cues and the characteristics of the consumer in terms of the influence on people's judgment of product values. Previously, it has been demonstrated that high- and low-NFT individuals are more likely to be influenced by haptic cues that were diagnostic and undiagnostic to the task, respectively (Grohmann *et al*., 2007; Krishna and Morrin, 2008; Peck and Childers, 2003b). Therefore, our results suggest that our participants might consider the material of the receptacles as diagnostic to their evaluation of the tea beverages, presumably because many details of the tea-making process (including the utensils being used for preparing and serving tea) can influence the sensory properties of tea beverages in Chinese or Japanese tea culture (Lee *et al*., 2008).

Third, our results reveal that the participants rated the same green tea as tasting saltier when served in a paper cup than in a plastic cup. Unlike Tu *et al*.'s (2015) findings with Chinese cold tea, the influence of receptacle on the ratings of sweetness did not reach significance in the present study, presumably as Chinese cold tea used by their study was sweetened, whereas the unsweetened green tea beverages in the present study were freshly made in the lab and were characterized by a bitter and astringent taste (Wan *et al*., 2014b). Even though saltiness was not one of the major characteristics of green tea beverages when the participants were describing their taste (Lee and Chambers, 2007), the subtle difference in the salty taste of tea beverages can be detected by electronic devices such as electronic tongue and electronic nose (Buratti *et al*., 2013). Moreover, Huang *et al*. (2019) demonstrated that the saltiness of tea beverages can be influenced by sensory cues that came from other sources than the tea beverages themselves, that is, the color of a cup of tea that the participants saw in virtual reality.

It should be noted that we did not find any significant differences in the pleasantness or familiarity ratings of the tea presented in the paper and plastic cups, so the difference in the saltiness ratings may not be attributed to either of these factors. Alternatively, even though the participants had no visual cues about each cup, the first color that came to their mind while holding a paper cup was very likely to be white due to object-color associations (Palmer and Schloss, 2010) between paper/cardboard and white-color. Thus, it is possible that they gave higher saltiness ratings to the beverages presented in these paper cups based on the color-taste associations between white and saltiness (Harrar, Piqueras-Fiszman, & Spence, 2011; Wan *et al*., 2014a), compared to the transparent plastic cups.

As with any study, there are also certain limitations as far as the interpretation and generalizability of our findings are concerned. First, the experimental design of the present study does not allow us to discriminate whether the influence of cup material is due to the surface feel by hands or by the perception of weight; whereas Tu *et al*.'s (2015) Experiment 2 demonstrated that the influence of the receptacle on the participants' taste ratings was constrained when the weight of the cup was controlled for. In this study, we asked the blindfolded participants to drink tea beverages via a straw to control for the influence of oral-somatosensory factors, they were asked to hold the cup in both hands for convenience, making it hard to control the influence of weight. Second, it will also be interesting to explore whether there are fundamental differences in high- and low-NFT individuals' information processing in future research, as previous research has provided mixed evidence. That is, Yazdanparast and Spears (2012) suggested that low-NFT individuals may rely more on the relational processing which emphasizes the shared themes or similarities among different information sources; whereas Chylinski *et al.* (2015) suggested that high-NFT individuals may be more likely to be aware of crossmodal interactions and shape perception across sensory modalities. Third, we only tested young adults in the present study, and a majority of them (76%) reported drinking tea occasionally in daily life. However, young and older participants might differ in their drinking experience with certain receptacles, daily consumption of, and willingness to pay for certain drinks. Therefore, caution should be exercised before generalizing our findings to consumers of other age groups, and participants of different age groups should ideally be recruited in future studies. Even though the sensory properties of the same type of tea often differ depending on the country of origin (Lee *et al*., 2013), our results did not reveal a significant main effect of Tea Brand, presumably because tea brand was used as a between-participants factor in the present study, and each participant only drank the same type of green tea during the whole experiment.

Our findings also have direct implications in the marketing of tea beverages. Even though a negative packaging attribute may sometimes result in positive evaluations of products inside (McDaniel and Baker, 1977), our findings distinguish tea from other popular drinks by highlighting the important role of drinking vessel in people's consumption and product evaluation (see also Choi and Lee, 2019 for the findings of ready-to-drink milk tea products). For one, our findings suggest that fast-food chains or tea stores who sell take-away tea beverages need to be very careful in terms of whether to choose paper cups to contain their tea beverages. For another, our findings provide some insights for the tea houses about using ceramic cups to serve tea beverages to improve consumers' drinking experience, especially for customers who have a higher level of motivation and preference for using haptic information. Moreover, our findings also provide empirical evidence about why tea stores should provide potential customers with an opportunity to sample the tea beverage in ceramic cups so as to stimulate their desires to purchase.

In conclusion, the results of the present study demonstrate how receptacles made from different materials influenced the participants' tea-drinking experience. Our findings also revealed how the material of these receptacles interacted with an individual's motivation to use, and preference for using, haptic information they obtained (in this study by means of their hands with oral somatosensory factors being well controlled for) to influence their willingness to pay for the same tea beverages. Our findings also provide a nice demonstration of how contextual cues interact with an individual's motivation and preference to influence consumer behavior in the marketplace. More research is called for to investigate the influence of contextual cues on consumers' tea-drinking experience, especially given this drink's global popularity.

References

Asioli, D., Varela, P., Hersleth, M., Almli, V., Olsen, N. and Næs, T. (2017), “A discussion of recent methodologies for combining sensory and extrinsic product properties in consumer studies”, *Food Quality and Preference*, Vol. 56, pp. 266-273.

Becker, L., van Rompay, T.J.L., Schifferstein, H.N.J. and Galetzka, M. (2011), “Tough package, strong taste: the influence of packaging design on taste impressions and product evaluations”, *Food Quality and Preference,* Vol. 22, pp. 17-23.

Buratti, S., Casiraghi, A., Minghetti, P. and Giovanelli, G. (2013), “The joint use of electronic nose and electronic tongue for the evaluation of the sensorial properties of green and black tea infusions as related to their chemical composition”, *Food and Nutrition Sciences,* Vol. 4, pp. 605-615.

Cardello, A.V. and Meiselman, H.L. (2018), “Contextual influences on consumer responses to food products”, in Ares, G. and Varela, P. (Eds.), *Methods in Consumer Research, Volume 2*, Woodhead Publishing, Cambridge, UK, pp. 3-54.

Carvalho, F.M., Moksunova, V. and Spence, C. (2020), “Cup texture influences taste and tactile judgments in the evaluation of specialty coffee”, *Food Quality and Preference,* Vol. 81, No. 103841, pp. 1-9.

Cavazzana, A., Larsson, M., Hoffmann, E., Hummel, T. and Haehner, A. (2017), “The vessel’s shape influences the smell and taste of cola”, *Food Quality and Preference,* Vol. 59, pp. 8-13.

Chen, F.P., Chen, H., Hou, H.C. and Fang, W. (2019), “Do visual and haptic cues affect taste?”, *Contemporary Management Research*, Vol. 15 No. 1, pp. 25-51.

Choi, Y. and Lee, J. (2019), “The effect of extrinsic cues on consumer perception: a study using milk tea products", *Food Quality and Preference,* Vol. 71, pp. 343-353.

Chylinski, M., Gavin, N. and Ngo, L.V. (2015), "Cross-modal interactions between color and texture of food", *Psychology & Marketing,* Vol. 32 No. 9, pp. 950-966.

Faul, F., Erdfelder, E., Lang, A. and Buchner, A. (2007), "G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences", *Behavior Research Methods*, Vol. 39 No. 2, pp. 175-191.

Grohmann, B., Spangenberg, E.R. and Sprott, D.E. (2007), "The influence of tactile input on the evaluation of retail product offerings", *Journal of Retailing,* Vol. 83 No. 2, pp. 237-245.

Harrar, V., Piqueras-Fiszman, B. and Spence, C. (2011), "There's no taste in a white bowl", *Perception*, Vol. 40, pp. 880-892.

Hoegg, J. and Alba, J.W. (2007), "Taste perception: more than meets the tongue", *Journal of Consumer Research*, Vol. 33 No. 4, pp. 490-498.

Huang, F., Huang, J. and Wan, X. (2019), "Influence of virtual color on the perceived taste of tea: multisensory integration between virtual and real worlds", *Computers in Human Behaviour,* Vol. 95, pp. 168-174.

Iop, S.C.F., Teixeira, E. and Deliza, R. (2006), "Consumer research: extrinsic variables in food studies", *British Food Journal*, Vol. 108 No. 11, pp. 894-903.

Kampfer, K., Leischnig, A., Ivens, B.S. and Spence, C. (2017), "Touch-taste-transference: assessing the effect of the weight of product packaging on flavor perception and taste evaluation", *PLoS ONE,* Vol. 12 No. 10: e0186121, pp. 1-17.

Klatzky, R.L. and Lederman, S.J. (1992), "Stages of manual exploration in haptic object identification", *Perception & Psychophysics*, Vol. 52 No.6, pp. 661-670.

Krishna, A. and Morrin, M. (2008), "Does touch affect taste? The perceptual transfer of product container haptic cues", *Journal of Consumer Research,* Vol. 34, pp. 807-818.

Lederman, S.J. and Klatzky, R.L. (1987), "Hand movements: a window into haptic object recognition", *Cognitive Psychology*, Vol. 19, pp. 342-368.

Lee, J. and Chambers, D.H. (2007), "A lexicon for flavor descriptive analysis of green tea", *Journal of Sensory Studies,* Vol. 22, pp. 256-272.

Lee, J., Chambers, E. and Chambers, D.H. (2013), "A comparison of the flavor of green teas from around the world", *Journal of the Science of Food and Agriculture,* Vol. 94, pp. 1315-1324.

Lee, S.M., Chung, S.J., Lee, O.H., Lee, H.S., Kim, Y.K. and Kim, K.O. (2008), "Development of sample preparation, presentation procedure and sensory descriptive analysis of green tea", *Journal of Sensory Studies,* Vol. 23, pp. 450-467.

Li, X. (1993), "Chinese tea culture", *Journal of Popular Culture*, Vol. 27 No. 2, pp. 75-89.

Li, X., Qi, Y., Spence, C. and Wan, X. (2020), "Influence of teaware on subjective ratings of, and taste expectations concerning, tea", *Food Quality and Preference,* Vol. 80, No. 103834, pp. 1-10.

Liao, X., Li, Y., Hu, J., Li, Q. and Wu, X. (2016), "Psychophysical relations between interacted fabric thermal-tactile properties and psychological touch perceptions", *Journal of Sensory Studies*, Vol. 31 No. 3, pp. 181-192.

Macfarlane, A. and Macfarlane, I. (2004), *The empire of tea,* The Overlook Press, New York, NY.

Maggioni, E., Risso, P., Olivero, N. and Gallace, A. (2015), "The effect of a container's weight on the perception of mineral water", *Journal of Sensory Studies*, Vol. 30, pp. 395-403.

McDaniel, C. and Baker, R.C. (1977), "Convenience food packaging and the perception of product quality", *Journal of Marketing,* Vol. 41 No. 4, pp. 57-58.

McCabe, D.B. and Nowlis, S.M. (2003), "The effect of examining actual products or product descriptions on consumer preference", *Journal of Consumer Psychology*, Vol. 13 No. 4, pp. 431-439.

Mirabito, A., Oliphant, M., Van Doorn, G., Watson, S. and Spence, C. (2017), "Glass shape affects the flavor of beer", *Food Quality and Preference*, Vol. 62, pp. 257-261.

Palmer, S.E. and Schloss, K.B. (2010), "An ecological valence theory of human color preference", *Proceedings of the National Academy of Sciences of the United States of America,* Vol. 107, pp. 8877-8882.

Pan, C., Ma, Q., Sun, H., Xu, Y., Luo, N. and Wang, P. (2017), "Tea consumption and health-related quality of life in older adults", *Journal of Nutrition, Health & Aging*, Vol. 21 No. 5, pp. 480-486.

Peck, J. and Childers, T.L. (2003a), "Individual differences in haptic information processing: the 'need for touch' scale", *Journal of Consumer Research,* Vol. 30*,* pp. 430-442.

Peck, J. and Childers, T.L. (2003b), "To have and to hold: the influence of haptic information on product judgments"*, Journal of Marketing,* Vol. 67, pp. 35-48.

Peck, J. and Shu, S.B. (2009), "The effect of mere touch on perceived ownership", *Journal of Consumer Research*, Vol. 36 No. 3, pp. 434-447.

Peck, J. and Wiggins, J. (2006), "It just feels good: customers' affective response to touch and its influence on persuasion", *Journal of Marketing*, Vol. 70 No.4, pp. 56-69.

Piqueras-Fiszman, B. and Spence, C. (2011), "Do the material properties of cutlery affect the perception of the food you eat? An exploratory study", *Journal of Sensory Studies*, Vol. 26, pp. 358-362.

Piqueras-Fiszman, B. and Spence, C. (2012), "The influence of the feel of product packaging on the perception of the oral-somatosensory texture of food", *Food Quality and Preference*, Vol. 26, pp. 67-73.

Raudenbush, B., Meyer, B., Eppich, W., Corley, N. and Petterson, S. (2002), "Ratings of pleasantness and intensity for beverages served in containers congruent and incongruent with expectancy", *Perceptual and Motor Skills,* Vol. 94, pp. 671-674.

Risso, P., Maggioni, E., Etzi, R. and Gallace, A. (2019), "The effect of the tactile attributes of a container on mineral water perception", *Beverages,* Vol. 5 No. 23, pp. 1-8.

Risso, P., Maggioni, E., Olivero, N. and Gallace, A. (2015), "The association between the colour of a container and the liquid inside: an experimental study on consumers' perception, expectations and choices regarding mineral water", *Food Quality and Preference*, Vol. 44, pp. 17-25.

Schifferstein, H.N.J. (2009), "The drinking experience: cup or content?", *Food Quality and Preference*, Vol. 20, pp. 268-276.

Shen, L., Fishbach, A. and Hsee, C.K. (2014), "The motivating-uncertainty effect: uncertainty increases resource investment in the process of reward pursuit", *Journal of Consumer Research*, Vol. 41 No. 5, pp. 1301-1315.

Spence, C., Harrar, V. and Piqueras-Fiszman, B. (2012), "Assessing the impact of tableware and other contextual variables on multisensory flavor perception", *Flavour*, Vol. 1, No. 7, pp. 1-12.

Spence, C. and Wan, X. (2015), "Beverage perception & consumption: the influence of the container on the perception of the contents", *Food Quality and Preference,* Vol. 39, pp. 131-140.

Symmank, C. (2019), "Extrinsic and intrinsic food product attributes in consumer and sensory research: literature review and quantification of the findings", *Management Review Quarterly*, Vol. 69 No. 1, pp. 39-74.

Tu, Y., Yang, Z. and Ma, C. (2015), "Touching tastes: the haptic perception transfer of liquid food packaging materials", *Food Quality and Preference,* Vol. 39, pp. 124-130.

Vilanova, M., Vidal, P. and Cortés, S. (2008), "Effect of the glass shape on flavor perception of 'toasted wine' from Ribeiro (NW Spain)", *Journal of Sensory Studies*, Vol. 23, pp. 114-124.

Wan, X., Woods, A.T., van den Bosch, J.J.F., McKenzie, K.J., Velasco, C. and Spence, C. (2014a), "Cross-cultural differences in crossmodal correspondences between basic tastes and visual features", *Frontiers in Psychology*, Vol. 5, No. 1365, pp. 1-13.

Wan, X., Zhou, X., Mu, B., Du, D., Velasco, C., Michel, C. and Spence, C. (2014b), "Crossmodal expectations of tea colour based on its flavour: a preliminary study with naïve assessors", *Journal of Sensory Studies*, Vol. 29, pp. 285-293.

Wan, X., Zhou, X., Woods, A.T. and Spence, C. (2015), "Influence of the glassware on the perception of alcoholic drinks", *Food Quality and Preference,* Vol. 44, pp. 101-110.

Yazdanparast, A. and Spears, N. (2012), "Need for touch and information processing strategies: an empirical examination", *Journal of Consumer Behaviour,* Vol. 11, pp. 415-421.

Zhao, H., An, J., Spence, C. and Wan, X. (2018), "Influence of the color and size of the plate on the subjective ratings of, taste expectations concerning, and willingness-to-pay for, Asian noodles" *Journal of Sensory Studies,* Vol. 33 No. e12443, pp. 1-10.

Acknowledgements

This research was supported by the National Natural Science Foundation of China (Grant No. 71872097 & 71472106) awarded to Xiaoang Wan. The authors would like to thank the undergraduate research assistants in Dr. Wan's lab for their help in data collection.

Conflict of Interest

The authors declare no conflict of interest.

Tables

Table Ⅰ. Mean ratings scores on 9-point scales and WTP scores (in Chinese Yuan) with SD in parentheses for the low- and high-NFT participants.

	Receptacle	Low NFT	High NFT	Mean
Bitterness	Ceramic	5.7 (1.8)	5.8 (2.0)	5.8 (1.9)
	Glass	5.4 (1.9)	5.6 (2.3)	5.5 (2.1)
	Paper	5.8 (1.9)	5.7 (2.1)	5.9 (1.9)
	Plastic	5.6 (1.7)	6.1 (1.9)	5.7 (1.8)
Astringency	Ceramic	5.7 (1.9)	5.3 (2.4)	5.5 (2.1)
	Glass	5.3 (2.0)	5.1 (2.2)	5.2 (2.1)
	Paper	5.5 (1.9)	5.9 (2.2)	5.7 (2.1)
	Plastic	5.6 (1.7)	5.5 (2.1)	5.6 (1.9)
Sweetness	Ceramic	2.7 (1.4)	2.7 (1.4)	2.7 (1.4)
	Glass	3.0 (1.5)	2.5 (1.4)	2.8 (1.4)
	Paper	2.2 (1.1)	2.5 (1.8)	2.3 (1.2)
	Plastic	2.7 (1.5)	2.4 (1.3)	2.6 (1.6)
Saltiness	Ceramic	3.1 (1.7)	2.4 (1.8)	2.8 (1.7)
	Glass	2.9 (1.7)	2.9 (1.8)	2.9 (1.7)
	Paper	3.4 (2.0)	3.0 (1.9)	3.2 (2.0)
	Plastic	2.9 (1.6)	2.4 (1.4)	2.7 (1.5)
Sourness	Ceramic	3.2 (1.4)	2.6 (1.0)	2.9 (1.9)
	Glass	3.4 (1.1)	3.1 (1.3)	3.3 (2.2)
	Paper	3.6 (1.2)	3.2 (1.1)	3.4 (2.1)
	Plastic	3.4 (1.1)	3.2 (1.1)	3.3 (2.1)
Familiarity	Ceramic	5.5 (2.1)	6.0 (1.9)	5.8 (2.0)
	Glass	5.7 (2.2)	5.7 (1.9)	5.7 (2.0)
	Paper	5.7 (2.0)	5.3 (2.1)	5.5 (2.0)
	Plastic	5.6 (2.0)	5.5 (2.0)	5.6 (2.0)
Pleasantness	Ceramic	4.6 (1.9)	5.0 (1.9)	4.8 (1.9)
	Glass	4.6 (1.6)	4.4 (2.0)	4.5 (1.8)
	Paper	4.3 (1.8)	4.0 (1.8)	4.2 (1.8)
	Plastic	4.1 (1.5)	4.3 (1.9)	4.2 (1.7)
WTP	Ceramic	4.9 (4.3)	8.7 (11.5)	6.8 (8.8)
	Glass	5.1 (4.4)	6.2 (5.5)	5.7 (5.0)
	Paper	4.8 (4.1)	6.0 (6.4)	5.4 (5.4)
	Plastic	4.9 (4.1)	5.7 (5.9)	5.3 (5.0)

Table II. The results of the ANOVA analyses.

Effect	Measure	*df*	*F*	η_p^2
Receptacle	Bitterness	3, 210	0.91	-
	Astringency	3, 210	1.40	-
	Sweetness	3, 210	2.33	-
	Saltiness	3, 210	3.45*	0.05
	Sourness	3, 210	1.89	-
	Familiarity	3, 210	0.37	-
	Pleasantness	3, 210	3.35*	0.05
	$WTP_{transformed}$	3, 210	3.18*	0.04
NFT	Bitterness	1, 70	0.20	-
	Astringency	1, 70	0.04	-
	Sweetness	1, 70	0.27	-
	Saltiness	1, 70	1.31	-
	Sourness	1, 70	0.80	-
	Familiarity	1, 70	0.00	-
	Pleasantness	1, 70	0.01	-
	$WTP_{transformed}$	1, 70	0.99	-
Receptacle × NFT	Bitterness	3, 210	0.12	-
	Astringency	3, 210	0.92	-
	Sweetness	3, 210	1.23	-
	Saltiness	3, 210	1.05	-
	Sourness	3, 210	0.43	-
	Familiarity	3, 210	1.21	-
	Pleasantness	3, 210	0.90	-
	$WTP_{transformed}$	3, 210	3.64*	0.05

Note: * denotes $p < 0.05$.