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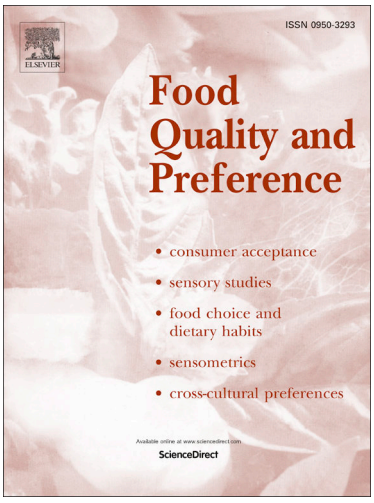

Short Communication

Seeing sweet and choosing sour: Compensatory effects of typeface on consumers' choice behavior

Kristian Rolschau, Qian Janice Wang, Tobias Otterbring

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Seeing sweet and choosing sour: Compensatory effects of typeface on consumers' choice behavior

Kristian Rolschau*
Department of Management/MAPP
Aarhus University
Fuglesangs Allé 4
8210 Aarhus V
Denmark
Email: krro@mgmt.au.dk

Qian Janice Wang
Department of Food Science
Aarhus University
Agro Food Park 48
8200 Aarhus N
Email: qianjanice.wang@food.au.dk

Tobias Otterbring
Department of Management/MAPP
Aarhus University
Fuglesangs Allé 4
8210 Aarhus V
Denmark
Email: toot@mgmt.au.dk

*Corresponding author.

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Seeing sweet and choosing sour: Compensatory effects of typeface on consumers' choice behavior

Abstract

The present research included two field studies investigating, firstly, the effects of round and angular typefaces on taste expectations and, secondly, how such expectations may have downstream effects on naturalistic consumer choice. A taste experiment conducted at a science festival asked participants (N = 125) to rate the expected and actual sweetness and sourness of beer served from plastic cups labelled with either angular or round typeface. Effects of typeface were found on both taste expectations and perceived taste, but in opposite directions; participants rated the expected sourness of a beer as higher in the round (vs. angular) typeface condition, whereas they rated perceived sourness as lower in the round compared to the angular typeface condition. A follow-up field study conducted at a beer bar tested whether different typefaces on a beer board would affect actual beer choices. Data consisted of beer transactions (N = 1,952) and included the monetary amount, and the specific style, and size of beer purchased. The results showed that average transaction amount was lower in the round (vs. angular) typeface condition, and that customers purchased more sour beer options in this condition. These findings support a crossmodal compensation account, and suggest that round typefaces could increase choices of contrasting sour products. Hence, marketers may want to consider how typefaces can either enhance or diminish certain tastes.

Keywords: Typography; Typeface; Taste; Crossmodal correspondences; Crossmodal compensation; Consumer choice; Field study.

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1. Introduction

It has long been recognized that different typefaces have different connotations and associations. One needs to look no further than the internet's playful disgust for typefaces such as comic sans or papyrus (Oneextrapixel, 2018) to see how people attach emotion and importance to typefaces. On a more serious note, typefaces play an important role in the development of marketing materials and product packaging design, which are often connected to significant financial costs for companies, underlining the importance of choosing the right typeface for products and brands. Certainly, typefaces can affect perception and convey meaning beyond the actual semantic message, so it is not surprising that this design element has received attention in regards to fields such as advertising and product packaging (Childers & Jass, 2002). However, even though typeface is a central part of food-related marketing, advertising, and packaging, research on the effects on taste expectation and perception has only started to gain traction (for a review, see Velasco & Spence, 2019). Indeed, several studies have shown how shapes can elicit certain associations and expectations within the food domain (Velasco et al., 2014), and other studies have revealed how, for instance, expectations play an important role in the actual perceived taste of a product (Piqueras-Fiszman & Spence, 2015).

Research on the effects of typefaces has displayed how the shape of typefaces affects the expected sweetness, sourness, bitterness, and saltiness of both foods and drinks (Velasco, Hyndman, & Spence, 2018a; Velasco et al., 2015a, b). These findings are typically explained by means of crossmodal correspondences, referring to the tendency to match dimensions across sensory modalities (Spence, 2011). In the realm of crossmodal correspondences, the matching of the shape of typefaces with tastes appears to depend largely on the roundness/angularity of the

typeface (for other important features, see Van Leuwen, 2006). Round shapes are matched with sweetness, while angular and sharp shapes are matched with sourness and bitterness (Spence & Deroy, 2013), and consistently so across cultures and languages (Velasco et al. 2018b). These correspondences appear to be driven, in large part, by liking of the shapes and tastes (Velasco et al., 2015a). This mediation of liking has further been proposed to largely dependent on the readability of the typeface (Velasco et al., 2015b), and indeed, the relationship between readability and positive affect has been supported in several studies (Gump, 2001; Winkielman & Cacioppo, 2001).

Only a few studies have tested these typeface–taste effects in naturalistic settings. One example is Velasco et al. (2018a), who tested typeface effects on ratings of sweetness, sourness, and flavor intensity in the naturalistic settings of museums and festivals. Here, participants tasted a jelly bean with the words "eat me" projected on a screen in either a round or an angular typeface, after which the procedure was repeated with the opposite typeface. The authors found typeface–taste congruent effects with higher sweetness ratings for jelly beans when the round (vs. angular) typeface was projected, and higher sourness ratings when the angular (vs. round) typeface was projected. However, actual choice was not captured in these experiments. In fact, few if any studies on typeface–taste effects have employed actual choice as the main outcome variable. For that reason, it is relevant to investigate whether the established typeface effects "survive" in real world situations, where the typeface is competing with innumerous other sensory stimuli. Therefore, the present research examined whether typeface-related taste expectations have downstream effects on naturalistic consumer choice by applying typeface manipulations in actual field settings.

We hypothesized that typefaces would induce typeface-congruent taste expectations. This prediction is to a large extent based on the experiments by Velasco and colleagues, who found consistent matching of angular typefaces with sourness and round typefaces with sweetness (Velasco et al., 2015a, b; 2018a, b). That is, an angular typeface should skew expectations towards sour tastes and a round typeface would skew expectations towards sweeter tastes. Regarding actual choice outcomes, we refrained from making precise predictions, as both congruent and incongruent scenarios between typeface and consumer choice seem plausible. On the one hand, typefaces could elicit effects similar to priming effects, where the presence of, for example, an angular typeface would prime greater preferences for, and choices of, crossmodally congruent sour options. On the other hand, however, consumers may be more inclined to choose an option that, under regular circumstances, would be perceived as too sour if the typeface gives expectations of sweetness. This latter scenario would imply that the expected taste induced by a particular typeface (e.g., sweetness expectations following exposure to round typeface) may have a compensatory effect on consumers' subsequent choice behavior, such that they choose an option whose taste qualities are contrasting to, rather than congruent with, the typeface (i.e., more sour choices). Such a crossmodal compensation account has recently received attention in the marketing literature (Biswas & Szocs, 2019). Indeed, Biswas and Szocs (2019) found that extended exposure to unhealthy-but-appetitive food scents lead to fewer purchases of unhealthy foods. This effect was driven by crossmodal compensation, where the unhealthy-but-appetitive scent enhanced feelings of a rewarding experience, which reduced the desire to acquire unhealthy foods. In the present context, this implies that the desire for sweet (vs. sour) beverages would diminish after exposure to sweet (vs. sour) taste-related typefaces.

Motivated by the above-mentioned rationale, a pilot study was conducted to test the impact of typeface manipulations on taste expectations, and whether such manipulations would translate into effects on actual taste perceptions. Building on the pilot study, a field study was then conducted to test whether typeface-induced expectations would have downstream effects on actual beer choices.

2. Pilot study

2.1 Methods

A simple taste study was conducted at a science festival where participants (N = 125; 58% male) were asked to taste two beers from plastic cups equipped with a sticker displaying the text *'Drink me'* (presented in Danish) in either an angular typeface or a round typeface. Unbeknownst to participants, both cups contained the same beer. Using a *Lindr Pygmy 40K* beer cooler and dispenser system with two taps and a hose splitter, it was possible to connect the same beer keg to the two taps. The connection to the keg was hidden under the table, thus giving the impression of two different beers connected to the system. Approximately 5 cl of beer was served in each of the 20 cl plastic cups; see Figure 1 for the cups.

Figure 1. Tasting cups - angular (left) and round (right)

Participants were initially asked to indicate their expectations of sweetness and sourness of the beer in the first plastic cup (with angular typeface), then taste the beer, followed by them indicating their actual taste perceptions of the sweetness and sourness of the beer. Sweetness and sourness were rated individually on 7-point scales with *Not at all* and *Very* as scale endpoints. The same procedure was then repeated for the beer in the second plastic cup (with the round typeface); i.e., the two plastic cups were not presented at the same time. Participants were encouraged to have a sip of water in between the tastings of the two beers.

2.2 Pretests of stimuli

Before conducting the experiment, the two typefaces were pretested to ensure that they differed in perceived sweetness/sourness, and a suitable beer was selected based on its perceived taste ambiguity, with tones of both sweetness and sourness.

First, two typefaces were identified for the pilot study, inspired by those specific typefaces found to score the highest on sourness and sweetness, respectively, in similar studies (Velasco et al., 2015a; Velasco et al., 2015b). The typefaces were tested to ensure that the stimuli would be perceived in the desired manner; i.e., that the angular typeface was indeed perceived as

being angular with an expected sour taste, and that the round typeface was perceived as being round with an expected sweet taste. In total, 43 participants (M_{AGE} = 29 years, 70% male) were presented with both the angular and round typeface in a randomized order, and were asked to indicate whether they perceived it as mostly round or mostly angular on a 7-point semantic differential scale with 'angular' and 'round' as the scale endpoints. A paired samples *t*-test revealed a statistically significant difference between the angular (M = 2.44, SD = .98) and round (M = 6.09, SD = 1.15) typeface on the roundness/angularity dimension ($t(42) = 13.62$, $p < .001$). Furthermore, both typefaces were rated as significantly different from the scale midpoint of 4, ($t(42) = -10.39$, $p < .001$) and ($t(42) = 11.93$, $p < .001$), respectively, with the angular typeface perceived as relatively angular and the round typeface perceived as relatively round.

A second pretest aimed to ensure that the roundness/angularity of the typefaces would induce taste expectations in the hypothesized directions. A total of 96 participants (M_{AGE} = 39 years, 49% male) were presented with either the angular or the round typeface and were asked to rate it on separate sliding scales (from 0 and 100) regarding how sweet and sour they would expect a beer with the given typeface to taste[1]. Again, the two typefaces were significantly different, with the round typeface rated as less sour ($t(94) = -6.00$, $p < .001$) but sweeter ($t(94) = 4.70$, $p < .001$) than the angular typeface; see Table 1.

Table 1. Means and standard deviations for taste expectations of angular and round typefaces

	Angular typeface	*Round typeface*

[1] We also measured bitterness expectations in a similar way and found a significant difference between the angular (M = 52.10, SD = 25.18) and round (M = 25.81, SD = 29.49; $p < .001$) typeface condition on this metric as well. However, since the biggest difference across the typeface conditions occurred between expectations of sweetness and sourness, and given that sourness has been shown to be associated with bitterness in related research (e.g., Velasco et al., 2015a), which was also evident in our pretest (r = .70, $p < .001$), our studies focused on typeface effects on sweetness and sourness.

Sourness	62.90 (22.50)[a]	30. 91 (29.24)[b]
Sweetness	21.77 (17.03)[a]	61.21 (28.53)[b]

Note: Different superscripts denote a significant difference between the angular and round typeface, $p < .001$.

To find an appropriate beer for the science festival study, a blind tasting was conducted at a beer bar with the aim of identifying a beer that could be perceived as both sweet and sour. Thirty-six consumers (M_{AGE} = 29 years, 65% male) at a beer bar were asked to taste three beers that an expert selected on the grounds that casual beer drinkers potentially could perceive them as being both sweet and sour. The consumers rated the sweetness and sourness of the beers on 7-point scales with *Not at all* and *Very* as the scale endpoints; see Table 2.

Table 2. Means and Standard deviations for pretest blind tasting

	IPA w. lactose	*Berliner Weisse w. berries*	*Flanders red ale*
Sourness	2.86 (1.35)	5.25 (1.20)	4.53 (1.23)
Sweetness	3.06 (1.24)	2.87 (1.98)	4.58 (1.25)

Only one beer scored above the scale midpoint on both sweetness and sourness, and was therefore chosen for inclusion in the pilot study at the science festival. The chosen beer was a *Flanders red ale* by the name Duchesse de Bourgogne.

2.3 Results and discussion

A paired-samples *t*-test using a Bonferroni adjusted alpha level ($\alpha = .05/2 = .025$) showed no significant difference between the two typeface conditions on sweetness expectations ($t(124) = -.61$, $p = .540$). The difference in sourness expectations was also non-significant ($t(124) = -2.24$, p

= .027), but with a directional tendency contrary to predictions; expectations of the beer served in the round typeface condition (M = 3.62, SD = 1.63) trended towards more sour ratings than expectations of the beer served in the angular typeface condition (M = 3.27, SD = 1.58). Regarding actual taste perceptions, however, there was a significant difference on sourness in the hypothesized (crossmodally congruent) direction ($t(124) = 3.97$, $p < .001$), as participants rated the beer served in the angular typeface condition (M = 5.38, SD = 1.56) as tasting more sour than the beer served in the round typeface condition (M = 4.94, SD = 1.52). There was no significant difference on perceived sweetness between the angular (M = 3.16, SD = 1.75) and round typeface conditions (M = 3.30, SD = 1.54; $t(124) = -1.19$, $p = .237$).

While the pilot study found significant results, some concerns should be acknowledged. As the participants tasted the first beer before indicating their expectations for the second beer, it is possible that the sour taste of the first beer lead participants to expect that the second beer would also be sour, thereby skewing their ratings. Another concern is sensory adaption, as the order of the beers was not counterbalanced. Thus, it is possible that the lower perceived sourness under the condition of the round typeface was due to the participants acclimatizing themselves to the taste of the beer (McBurney, 1972; Meiselmann, 1968). However, if the order of the beers were the driving force behind such results, one would expect that both the sourness and the sweetness ratings would show differences, and that effects on the expected and perceived ratings would be in the same direction, which was not found to be the case. Combined with the fact that all participants were offered a glass of water between tasting the beers, order effects thus seem unlikely as the main driver of these results. Therefore, as the pilot study still showed some indications of typeface effects, it was complemented with a large-scale field study.

3. Main study

3.1 Methods

To build on the pilot study, a quasi-experimental field study was conducted at a beer bar located in Aarhus, Denmark. A blackboard with the name, style, and Alcohol by Volume (ABV) of each of 20 different beers constituted the menu, which is a regular setup in many beer bars around the world. The blackboard functioning as the sole menu meant that customers were very likely to looking at it before ordering a beer, and consequently, be exposed to the different options in their corresponding typeface; see Figure 2. The typefaces mirrored those used in the pretests, to ensure that they would induce similar perceptions of sweetness and sourness, respectively.

Figure 2. Beer menu – Angular (left) and round (right). Note that an IPA was switched to another IPA between the photos (beer #2).

Data collection consisted of transactions from the register system of the bar, which included the monetary amount of the transaction, the number of beers, the size of the beers, and

the style of beers. In cases where more than one beer was ordered, the transaction was divided into observations for each beer. This came to a total number of observations of 1,952: 959 in the round typeface condition and 993 in the angular typeface condition.

The beer bar setting posed a few threats to the validity of the study. Firstly, as with most bars, business differs between the days, with the weekend considerably busier than regular weekdays. Secondly, the beers on the menu was often changed as beer kegs ran out. To deal with the issue of differences between days of the week, conditions were balanced during two comparable weekends and two comparable weekdays. Moreover, to address the challenge of changing beers on the menu, two initiatives were implemented: in case an empty keg was to be replaced by a new beer, the style was to be kept consistent, (i.e., an IPA was always switched with another IPA). This ensured that taste impressions would at least be similar and that the composition of the menu was kept consistent throughout the data collection. Furthermore, to measure the taste of the beer in a somewhat objective manner, we used pH levels as a measure of sourness, ABV for alcohol content, and Final Gravity (FG) as a proxy for sweetness. It should be noted, however, that these measures, while objective, are not necessarily appropriate proxies for the perceived taste. For instance, sourness also depends on titratable acidity (Hieronymus, 2017). Therefore, a bartender coded all beer options on two binary dimensions: sour (yes = 1, no = 0) and sweet (yes = 1, no = 0). These dimensions were significantly correlated with, but still different from, the objective metrics for sourness and sweetness: Spearman's $\rho = .37$, $p < .001$ and $\rho = -.55$, $p < .001$, for the links between the bartender's 1) sweetness categorization and FG, and 2) sourness categorization and pH levels, respectively.

3.2 Results and discussion

An independent samples *t*-test showed a significant difference between the two typeface conditions on the sourness (beer acidity) of the chosen beers, $t(1950) = -4.92$, $p < .001$. Consumers chose beers that were more sour, by means of pH levels, when the board menu was written using round typeface ($M = 4.43$, $SD = .42$) rather than angular ($M = 4.52$, $SD = .39$). A one-way ANCOVA showed similar results with a statistically significant effect of typeface on beer acidity ($F(1, 1949) = 22.29$, $p < .001$) while controlling for the price of the beer, which was also significantly related to beer acidity ($F(1, 1949) = 11.42$, $p = .001$). Moreover, a Pearson's chi-square analysis on 2 (typeface: round, angular) × 2 (sour beer choice: yes, no) crosstabs found a significant association between typeface condition and the bartender's sourness categorization, χ^2 (1) = 14.65, $p < .001$. Thus, there was a greater proportion of consumers choosing beers classified as sour after exposure to the beer board menu with round (13.7%) versus angular (8.3%) typeface. However, we found no difference between the two typeface conditions on the sweetness of the chosen beers, regardless of whether the objective measure of FG or the bartender's subjective categorization was used, $t < 1$ and $\chi^2 < 1$.

Interestingly, average transaction amount under the round typeface condition ($M = 48.36$ DKK, $SD = 13.80$) was approximately 3.5% lower than under the angular typeface condition ($M = 50.05$ DKK, $SD = 14.04$; $t(1950) = -2.65$, $p = .008$). A mediation analysis (PROCESS Model 4) with 5000 bootstrap samples revealed that the confidence interval (CI) for the indirect effect of typeface on transaction amount mediated by pH-levels was significantly different from 0 ($b = .017$, 95 % CI = [.006 , .031]). Including the other objective measures (i.e., ABV, FG) as covariates did not change the nature and significance of these results. Furthermore, these results

were not driven by the size of the beer as no association was found between the typeface condition and ordered size of the beer, χ^2 (1) = 1.05, p = .305.[2]

In sum, the results from the field study show that consumers were more inclined to choose more sour beers when exposed to the round (vs. angular) typeface, but that they spent less money in this condition. These findings support a crossmodal compensation account (Biswas & Szocs, 2019), and suggest that round typefaces could increase choices of contrasting sour products, with downstream effects on average transaction amounts.

4. General discussion

This study aimed to demonstrate that the shape of typefaces affects taste expectations and further explore whether such expectations have downstream effects on naturalistic consumer choice. Results support previous findings of typefaces inducing certain taste perceptions (Velasco et al., 2015a; Velasco et al., 2015b), and suggest that these perceptions influence consumer choice, thereby extending the link between typeface and taste to actual choice behavior. Contrary to certain previous assumptions and findings, however, the present results indicate that the direction of the effects on choice behavior may not be crossmodally congruent. The round typeface, which induced expectations of sweetness according to our pretest, increased choice likelihood of sour beers rather than increasing choice likelihood of the crossmodally congruent sweet beers. Thus, it seems that typefaces can induce expectations that may lead consumers to choose products they otherwise would not consider.

[2] To remedy the concern that the creativity of the beer names could have affected the results, a creativity perceptions study was conducted on101 students (M_{AGE} = 22 years, 59% male). Participants were asked to rate the creativity of the names of the beers on sale for either the round typeface condition or the angular typeface condition. (1 = *Not very creative*; 7 = *Creative*). No significant difference in creativity perceptions was found (t < 1), thereby indicating that the beer names are unlikely to have been the main driver of our results.

From a practical point of view, this study has implications for the marketing of products where taste plays a prominent role. Marketers may want to consider whether the typeface chosen in ads, commercials, or on menus functions best to either enhance or diminish certain tastes. For instance, one could imagine using a round typeface to increase the desire to acquire certain sour products.

4.1 Limitations and future research

As the present research only comprised field studies, the underlying mechanism of the demonstrated findings cannot be inferred with certainty and it cannot be ruled out that confounding variables may have contributed to the results. For instance, attributes other than shapes have also been shown to influence the correspondence between typefaces and tastes (Velasco & Spence, 2019), including typeface liking and processing fluency (Velasco et al., 2015b). It should also be acknowledged that, while we based our specific typefaces on those typically used in previous related research, our selected typefaces still differed on aspects other than roundness versus angularity, such as in line thickness and "weight," which could potentially have influenced the results. Moreover, one could imagine effects to differ depending on which design element that is stylized. For example, a brand name in a given typeface, which can be thought of as an integral part of the product itself, may induce stronger typeface effects than a simple label that is somewhat separated from the product (such as the "drink me" label in our science festival study). Nevertheless, this research area is in need of more studies in naturalistic settings, such as in the present research, to further investigate when typefaces will affect actual behavior (Baumeister, Vohs, & Funder, 2007; Cialdini, 2009). However, future research could benefit from more controlled studies that still incorporate actual choices as dependent variables.

Certainly, there are findings from lab- and online studies that would be appropriate to replicate in real world contexts (Velasco et al., 2016).

A final interesting avenue for future research would be to study how the application of "tasty" typefaces affects post-purchase satisfaction. Although it seems that typefaces can nudge consumers towards typeface-incongruent choices, it is quite possible that post-purchase satisfaction will be lower following such manipulations due to disconfirmation regarding taste expectations (Piqueras-Fiszman & Spence, 2015; Schifferstein, 2001).

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Author Statement

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The first author collected the data in the pilot study (together with the third author) and in the main study, conducted the statistical analyses, and wrote the initial draft of the manuscript. The second and third author contributed to the conceptualization of the article and with respect to subsequent drafts. All authors approved the manuscript prior to submission and jointly declare that they have no conflicts of interest.

Highlights

- Typeface-induced taste expectations affect beer choices
- Consumers expected beer presented with a round (vs. angular) typeface to be more sour
- Round (vs. angular) typeface on a beer menu increased choices of more sour beers
- Bar earnings were lower using round (vs. angular) typeface on the beer menu