The Effects of the Metacognitive Cue of Fluency on Taste Perception

Ummugulsum Aysan, M.Sc.

Management

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Faculty of Business, Brock University
St. Catharines, Ontario

ABSTRACT

The relative ease that a person experiences while performing cognitive operations, namely processing fluency, affects a broad range of judgments such as product evaluations. For example, an increase in fluency through repeated exposure to product packages enhances attitude toward the brand (Janiszewski 1993). This thesis examined the effect of fluency on taste perception and demonstrated whether fluency created an advantage or disfluency created a disadvantage for taste evaluations. Experiment 1 examined the effect of perceptual fluency on taste perception. It was found that perceptual disfluency derived from reading the labels (i.e., font) lowered taste evaluations only when it was experienced before the sensory experience. Experiment 2 examined the effect of linguistic fluency (i.e., pronunciation) on taste perception. However there was no evidence for the effect of linguistic fluency on taste perception. Thus, it is concluded that either the effect size of linguistic fluency is lower than perceptual fluency, or participants discounted their linguistic fluency experience because they realized that the brand names used in Experiment 2 were not real brand names.

To sum up, it was found that perceptual disfluency created by presenting a difficult to read product-related information created a disadvantage for taste perception compared to when no information was presented. Therefore, this thesis provides the first evidence for the effect of the metacognitive cue of fluency on sensory evaluations.

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INTRODUCTION

Every aspect of a product's label deserves special attention, because seemingly unimportant details may influence the consumers' perception and have considerable financial impacts for the firm. The Campbell's Soup Company announced that new label changes, which are the result of a two-year neuromarketing research project, will help shoppers connect on a deeper level to the products and boost its condensed soup sales by 2% over the next two years (Brat 2010). When a company is introducing a new product to the market, the marketing team must make many decisions. Some of these decisions are related to the chosen fluency of the visual and linguistic elements of the label. For example, the managers need to decide which brand name will be used; in addition, should they use a difficult-to-pronounce name or an easy-to-pronounce name? Which font should be used for the brand name; an easy-to-read (ARIAL) or a difficult-to-read font (*BRUSH*)? Extant literature demonstrates that the fluency of a stimulus affects consumers' evaluations about that stimulus (Alter and Oppenheimer 2009). Given that taste perception is an important aspect of a food product's overall evaluation, this thesis examines the effect of the fluency of the visual and linguistic cues on the taste perceptions.

Numerous studies have provided evidence that the perception of taste is not clear but suggestible and ambiguous (Elder and Krishna 2010). In addition to the intrinsic cues from the food itself, extrinsic cues such as the labelling of the food (Levin and Gaeth 1988); brand name (Alison and Uhl 1964, McClure et al. 2004), price (Plassman et al. 2008, Almenberg and Dreber 2009), region of origin (Hoegg and Alba 2007) and advertisement content (Elder and Krishna 2010) affect taste perception. Extrinsic cues influence the cognitions related to taste experience

therefore creating expectations about the product (Elder and Krishna 2010). For example, in one study consumers who ordered a prix-fixe restaurant meal were given a complimentary glass of wine that had been relabelled as either "new from California" or "new from North Dakota". Those who believed they had been drinking California wine ate 12% more of their meal than those who instead believed they drank North Dakota wine, because California's Napa Valley is famous for its wines, whereas North Dakota is the last American State to produce commercial wine (Wansink, Payne, and North 2007). This study suggests that the region of origin which produced more positive sensory thoughts about the wine not only increases the taste ratings of the wine but also increases the enjoyment and the consumption of the accompanying food.

The fact that thoughts related to the sensory experiences affect sensory evaluations leads to one question; does the fluency of the visual or linguistic elements of a label play a role in the taste judgement? Fluency is a metacognitive cue that reflects the relative ease or difficulty that a person experiences while performing a cognitive task (Alter and Oppenheimer 2009) and it prompts inferences about many different aspects of the environment, including an item's value or familiarity (Oppenheimer 2008). Given that cognitions related to sensory experience affect sensory evaluations (Shiv and Nowlis 2004) the metacognitive cue of fluency may also affect sensory evaluations.

This thesis examined the relationship between the metacognitive cue of fluency and the sensory evaluation and demonstrated whether a food item presented with a disfluent label is perceived as less tasty than the same food item presented either with a fluent label or with no label. The fluency was manipulated by presenting a label with an easy-to-read or difficult-to-read font in Experiment 1 and by presenting an easy-to-pronounce or difficult-to-pronounce label in Experiment 2.

Theoretical Contribution

This research makes several key contributions to both the fluency and sensory literatures. First, past research shows the effects of fluency in product evaluations (Pocheptsova, Labroo, and Dhar 2010), however given that none of the studies involves actual consumption, they do not provide any evidence about the misattribution of metacognitive feelings to actual sensory experiences. Specifically, there is no solid evidence that the subjective feelings that fluency creates can be transferred to and can shape perceptions related to an actual consumption experience, thereby altering product evaluations. The current experiments demonstrate that metacognitive cues have effects on sensory evaluations, specifically on taste perception.

Second, extant literature shows that fluent stimuli are preferred over disfluent stimuli (Reber, Winkielman, and Schwarz 2004), however one question remains unanswered: Is fluency an advantage, or disfluency a disadvantage, for overall evaluations? Generally published fluency experiments have included a disfluent and a fluent condition, and have compared the responses of these two experimental groups. Most of the experimental designs used in the previous studies have not allowed for the integration of a control group (see Lee and Labroo 2004 for an exception[1]). The experimental design of the current studies allowed for the use of a control group. To anticipate the results, comparisons between a fluent versus a control group and a disfluent versus a control group showed that it is disfluency which creates a disadvantage, at least for sensory evaluations.

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[1] Lee and Labroo (2004) tested the effects of conceptual and perceptual fluency on affective judgements. Although they name it the control group, this group functions as a disfluent group. They find that the conceptually and perceptually fluent target words are associated with higher pleasantness ratings when compared to the control group.

The rest of this thesis is organized as follows: In the next section the key findings of the fluency literature are reviewed and hypotheses for the effect of fluency on sensory evaluations are developed. Next, the two studies where hypotheses are tested will be elaborated on. Finally, a general discussion that includes managerial and theoretical implications, ideas for future research and concluding remarks will be presented.

THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Fluency and its Effect on Evaluative Judgments

Human judgements are not only the result of rational calculation and deliberate thought processes, that is they do not rely only on the cognition , but also depend on the experiential systems such as a person's own feelings and phenomenal experiences (Winkielman et al. 2003). An important source of experiential information that plays a substantial role in judgment and decision making is the metacognitive experience of processing fluency. Fluency is defined as the relative ease that a person experiences while performing a cognitive task (Schwarz and Clore 2007).

The ease or difficulty associated with a broad range of cognitive processes has effects on judgements; that is, fluency has many potential sources (Alter and Oppenheimer 2009). Perceptual and linguistic fluency are only two of many fluency types which have an influence on consumer judgements (see Alter and Oppenheimer 2009 for a review of all of the various types of fluency). The ease with which a person perceives and identifies the physical characteristics of a stimulus is referred to as perceptual fluency (Jacoby and Dallas 1981). Perceptual fluency is

influenced by variables such as perceptual priming, visual clarity, presentation duration, repetition, or figure–ground contrast. The font in which questionnaires are printed in, such as a clear font (e.g., 12-point Arial) versus an unclear font (e.g., a small, grey, italicized font like *sample*, or condensed font, like **Haettenschweiler** or **Impact**) is the most common technique used in fluency studies. Linguistic fluency refers to the ease at which a word is read (Shah and Oppenheimer 2007). For example, some obscure English words are harder to pronounce than others (e.g., euneirophrenia vs. beestings), and some letter-strings are easier to process than others (e.g., SBG vs. SUG).

A common approach to the fluency mechanism is to view fluency as the perceived difference between the expected ease and the actual ease (Whittlesea and Williams 2001a, 2001b). According to the discrepancy attribution hypothesis, when people have a fluency experience that is lower or higher than their expectations, they unconsciously attribute this discordant experience to a source related to the context (Whittlesea and Williams 1998). People use their naïve theories (Schwarz 2004), which they acquired from their past experiences or their environments (Morris, Menon, and Ames 2001), to account for their surprising fluency experience. Which naïve theory they use depends on the context and the judgement domain at hand. For example, if consumers are asked to judge whether they have seen a face before, they may naively assume that previously-seen faces will be easier to process than novel faces. In this context, fluency implies prior exposure (Alter and Oppenheimer 2009).

There is a general consensus among researchers that the experience of high fluency is associated with enhanced evaluations (Schwarz 2004, Winkielman et al. 2003). It has been found that fluent stimuli receive higher evaluations than disfluent stimuli across a wide array of domains, such as judgments of liking (Zajonc 1968, Bornstein and D'Agostino 1992), truth

(Begg et al. 1992), choice deferral (Novemsky et al. 2007), valuation (Alter and Oppenheimer 2008), and risk perception (Song and Schwarz 2009). Similar effects of fluency have been observed in the consumer choice domain. It was found that an increase in fluency through repeated exposure to brand names and product packages resulted in more favorable attitudes towards the brand (Janiszewski 1993). It was also found that semantically cueing the visuo-perceptual features of the product may enhance perceptual fluency and result in higher liking of the product (Labroo, Dhar, and Schwarz 2008).

Hypotheses Development

Given that the metacognitive cue of fluency prompts inferences about evaluative judgments, it may also influence sensory evaluations. In light of the past literature, this thesis proposes that the metacognitive cues generated by performing cognitive tasks (e.g., reading product information) have an impact on taste perceptions. Specifically, it is proposed that in addition to a dependence on intrinsic cues from the food itself (e.g., smell) and extrinsic cues (e.g., advertising), taste perception is susceptible to the influence of the metacognitive cue of fluency.

In general, the influence of experiential information (namely metacognitive experiences, moods, emotions, and bodily sensations) is more pronounced, when the experience deviates from the expected baseline values (Schwarz 2004). When expectations are experimentally manipulated, unexpected fluency has been found to be more influential to evaluations than expected fluency (Whittlesea and Williams 1998; 2000). That is, fluency experience must be surprising to show an effect on judgment (Whittlesea and Williams 1998; 2000; 2001a; 2001b).

If there is a perception of discrepancy, that is the fluency experience is surprisingly high or surprisingly low, it affects evaluations.

For example, when a consumer is invited to an orange juice tasting, an expectation is formed pertaining to several aspects of the orange juice tasting experience, even though not all of these expectations are conscious. One of these aspects is the fluency of processing any information related to the orange juice, such as the juice's brand name. The context of the sampling shapes the consumer's expectations; when served a utilitarian product, in a simple cup, in a grocery store, a consumer would expect that the product has a typical name (perhaps a fluent name just like others on the market), or that any information about the product would be presented in a typical font. The consumer would not expect a disfluent name (because prototypical orange juices have fluent names) or that any information related to the product would be presented in a disfluent font (because information related to a prototypical orange juice packaging is usually easy to read). It is also possible that the context of consumption creates the expectation of a disfluent name. For example consumers who dine at a luxurious restaurant might expect the items on the menu to be complex.

In this research, it is proposed that it is not simply the case that people will prefer products associated with fluent versus disfluent information. Rather, provided that the tasting context calls for a fluent processing experience, there will be no perception of discrepancy if cognitions related the product are fluent. Therefore fluent product information will not affect its evaluations. Consequently, the evaluations of the fluent group will be similar to that of a control group which does not receive any information, given that there is no discrepancy-attribution process when no information is received.

H_{01}a: Fluent product information presented before tasting will not affect consumers' overall liking of the product; therefore overall liking ratings will be similar to that of the no label condition.

H_{01}b: Fluent product information presented before tasting will not affect consumers' willingness to buy the product; therefore willingness to buy ratings will be similar to that of the no label condition.

H_{01}c: Fluent product information presented before tasting will not affect consumers' willingness to pay for the product; therefore willingness to pay ratings will be similar to that of the no label condition.

H_{01}d: Fluent product information presented before tasting will not affect consumers' perceptions about its ability to quench thirst; therefore quench ratings will be similar to that of the no label condition.

Lee, Frederick, and Ariely (2006) demonstrated that the information about an unfavourable ingredient (vinegar) in a beer lowered taste ratings only if the information is provided before tasting. In line with this finding, it is expected that the metacognitive cue of fluency will be misattributed to the sensory experience only when it is experienced immediately before the sensory episode. It is also expected that if product-related information is provided after the sensory episode, consumers will not re-evaluate their earlier sensory experience in light of their post-consumption fluency experience. Therefore, the sensory evaluations of the after tasting groups will be similar to that of the control group.

H_{02}a: Fluent or disfluent product information presented after tasting will not affect consumers' overall liking of the product; therefore overall liking ratings will be similar to that of the no label condition.

H_{02}b: Fluent or disfluent product information presented after tasting will not affect consumers' willingness to buy the product; therefore willingness to buy ratings will be similar to that of the no label condition.

H_{02}c: Fluent or disfluent product information presented after tasting will not affect consumers' willingness to pay for the product; therefore willingness to pay ratings will be similar to that of the no label condition.

H_{02}d: Fluent or disfluent product information presented after tasting will not affect consumers' perceptions about its ability to quench thirst; therefore quench ratings will be similar to that of the no label condition.

Provided that the tasting context calls for a fluent processing experience, there will be a perception of discrepancy and an attribution necessary when the product-related information is presented in a disfluent font, only before tasting. This feeling of discrepancy, namely surprising disfluency, will be misattributed to the taste experience. It is also expected that surprising disfluency will be considered a negative cue because it reflects a failure of the actual fluency to meet the expected fluency level. Consequently, it is expected that the sensory evaluation ratings of the disfluent before group will be lower than that of a control group.

H1a: Consumers' overall liking of the product will be lower if it has disfluent information versus no information associated with it.

H1b: Consumers' willingness to buy the product will be lower if it has disfluent information versus no information associated with it.

H1c: The willingness to pay for a product will be lower if it has disfluent versus no information associated with it.

H1d: A beverage will have a lower perceived ability to quench thirst if it has disfluent versus no information associated with it.

These hypotheses are tested in two orange juice tasting studies (see Table 1). In Experiment 1, perceptual fluency is manipulated whereas in Experiment 2, linguistic fluency is manipulated.

Insert table 1 about here

EXPERIMENT 1: EFFECTS OF PERCEPTUAL FLUENCY ON TASTE PERCEPTION

Experiment 1 examined the effect of perceptual fluency of information processing on sensory evaluations for utilitarian products. It is expected that the perception of discrepancy created by the low fluency of information processing will lead to lower evaluations compared to the no label condition, because consumers will misattribute this surprising fluency to not liking the taste experience. It is also expected that high fluency will lead to similar evaluations with the no label condition.

Method

Participants. 137 (100 female and 37 male) Brock University students participated in the experiment in return for a course credit. Their mean age was 22.48 (*Min*= 18, *Max*= 62, *S.D.* = 5.77).

Materials. The experiment was run using Medialab software. Each participant received an unlabelled Styrofoam cup filled with 30 mL of a private label orange juice.

Experimental Design. The study employed a 2 (difficult-to-read font vs. easy-to-read font) X 2 (label shown before vs. after) between-subjects design with readability and timing as factors. Readability was manipulated by presenting a fictitious label associated with the product (the grove name, Knollwood) either in an easy-to-read font (KNOLLWOOD) or in a difficult-to-read font (*KNOLLWOOD*; Song and Schwarz 2008). The grove name was presented following this sentence "The oranges for this orange juice sample come from the following farm" which was in 12-pt Times New Roman font. Timing was manipulated by presenting the grove name either before or after the tasting (Lee et al. 2006, Siegrist and Cousin 2009). Besides these 4 groups there was a control group that did not see any label. Participants were randomly assigned to one of these 5 conditions (see Figure 1).

Insert figure 1 about here

Procedure. Participants were invited to participate in a tasting study. They were informed that they would taste an orange juice sample and then answer some questions about the sample as well as some questions about themselves. They were first asked to report their current thirst level, on a 7-point scale (1 = Not at all, 7 = Very thirsty)[2]. Participants were asked to report their thirst level because the level of motivation might affect the desire to consume orange juice,

[2] What is your current thirst level?

thereby altering evaluations. Participants in the before condition saw the grove name, rated their familiarity with the grove name and then tasted the sample. Familiarity was also measured on a 7-point scale (1 = Not at all, 7 = Very familiar)[3]. Participants in the after condition first tasted the sample, then saw the grove name and rated their familiarity with the grove name.

Participants in the easy-to-read group saw the grove name in black 12-pt Arial font; while participants in the difficult-to-read group saw it in black 12-pt Brush Script MT font. Afterwards, participants evaluated the sample across five measures before answering some personal and variety seeking questions. Some of these questions were asked to acquire basic demographic information about the participants while others were asked because they might be potential covariates (Appendix A). After this, participants were thanked and debriefed.

Participants evaluated the sample across 5 measures. Overall liking and willingness to pay was measured similar to Siegrist and Cousin (2009) except that willingness to pay was also measured with a reference price. Willingness to buy was measured similar to Wszelaki et al. (2005). Ability to quench was measured similar to Winkielman, Berridge, and Wilbarger (2005). The order of these questions was as follows: "Overall, how much do you like this orange juice sample?" (1 = Not at all, 7 = Very much); "How likely is it that you would buy this orange juice?" (1 = Not at all, 7 = Very likely); "How much would you be willing to pay for a 1.89 L carton of this orange juice?" (enter amount in dollars); Willingness to pay with reference price: "Typically a 1.89 L carton of orange juice like the one you just tasted sells for $1.99. Would you be willing to pay more, less, or the same for a carton of this orange juice?"(1 = Less than $1.99, 2 = $1.99 and 3 = More than $1.99) and "How much did this orange juice quench your thirst?" (1 = Not at all, 7 = Very much).

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[3] How familiar are you with this grove name?

Results

Insert table 2 about here

Results were analyzed using a MANOVA with timing and readability as independent variables and overall liking, willingness to buy, willingness to pay and quench as dependent variables. The means and the standard deviations for the five experimental groups are shown in Table 2.

The first set of null hypothesis cannot be rejected because there is no difference between easy-to-read before and control conditions. In line with the first set of null hypothesis, participants in the easy-to read before condition gave similar ratings for all the measures when compared to the participants in the no label condition (all t values are between 0 and -.5; and p's > .1). That is, easy to read font did not provide any advantage compared to the no label condition.

The second set of null hypothesis cannot also be rejected because there is no difference between after tasting and control conditions. In line with the second set of null hypothesis, participants in the after tasting conditions gave similar ratings for all the measures when compared to the participants in the no label condition (all t values are between 0 and -1.3; and p's > .1). That is, ease or difficulty of the font did not affect evaluations after tasting compared to no label group.

Insert figure 2 about here

A reliability analysis showed that responses to overall liking and willingness to buy could be combined into one variable (Cronbach's $\alpha = .89$), which was named *desirability*. A MANOVA demonstrated that for desirability the main effect of readability was marginally significant ($F(1,134) = 3.56, p < .07, p_{rep} = .86$), and the readability by timing interaction was significant ($F(1,134) = 4.60, p < .05, p_{rep} = .88$; see first row of Table 2 and Figure 2). The desirability score of the difficult-to-read before group ($M = 3.38$) was significantly lower than that of the no label group ($M = 4.66$, $t(57) = -3.18, p < .01, p_{rep} = .98$).

Insert figure 3 and 4 about here

When overall liking and willingness to buy were analysed separately, similar results were found. For overall liking, the main effect of readability was marginally significant ($F(1,134) = 3.62, p < .06, p_{rep} = .86$; see second row of Table 2, also see Figure 3). In support of hypothesis 1a, the overall liking of the difficult-to-read group ($M = 3.77$) was significantly lower than the no label group ($M = 5.00$, $t(57) = -3.22, p < .01, p_{rep} = .98$). The main effect of readability was also marginally significant for willingness to buy ($F(1,134)=2.89, p < .10, p_{rep} =.82$). There was also a significant interaction effect between readability and timing in willingness to buy ($F(1,134) = 4.66, p < .04, p_{rep} = .90$, see third row of Table 2, also see Figure 4). In support of hypothesis 1b, the willingness to buy score of the difficult-to-read before group ($M = 3.00$) was significantly lower than the no label group ($M = 4.33$, $t(57) = -2.93, p < .01, p_{rep} = .97$). In summary, as

proposed by hypothesis 1a and 1b, the difficult-to-read font of the label posed a disadvantage for the desirability of the drink, because it lowered overall liking and willingness to buy.

Insert figure 5 about here

The willingness to pay (with no reference price) variable was logtransformed because there were outliers given that there was no reference price. For the logtransformed willingness to pay, the main effect of timing was significant ($F(1,134) = 4.60$, $p < .04$, $p_{rep} = .90$; see fourth row of Table 2, see also Figure 5). As proposed in hypothesis 1c, the difficult-to-read before group ($M = 2.30$, log$M = .32$) gave significantly lower ratings than the no label group ($M = 2.73$, log$M = .42$, $t(57) = -2.42$, $p < .02$, $p_{rep} = .93$). That is, perceptual difficulty in reading the label also lowered willingness to pay compared to the no label group.

Insert figure 6 about here

Finally, supporting hypothesis 1d, the difficult-to-read label was also associated with a lowered perceived ability to quench thirst. In support of hypothesis 1d, the difference across the 5 conditions for the quench measure was marginally significant ($F(4,134) = 2.01$, $p < .10$, $p_{rep} = .81$, see fifth row of Table 2 and Figure 6).The quench score of the difficult-to-read before condition ($M = 3.58$) was significantly lower than the no label condition ($M = 4.67$, $t(57) = -2.89$, $p < .01$, $p_{rep} = .97$).

Insert table 3 about here

Willingness to pay (with the reference price $1.99) was analyzed using a contrast analysis. Frequencies across the five conditions are presented in Table 3. Contrast analyses provided further support for hypothesis 1c; participants in the difficult-to-read before condition were more likely to select to pay less than the original price instead of paying equal to or more than the original price. On the other hand, participants in the no label condition were more likely to select to pay equal to or more than the original price instead of paying less than the original price; the difference of frequencies between the two groups was significant ($z = -3.54, p < .001$). There was no difference in frequencies of the easy-to-read group when compared to the no label group ($z = -1.57, p > .10$). Finally, the frequencies of the easy-to-read after ($z = -1.22, p > .2$) and difficult-to-read after ($z = 1.63, p > .1$) groups were similar to that of the no label group.

Gender, smoking habits, variety seeking, and familiarity were all used as covariates in a MANOVA. However, these variables had no effect on the data, so they will not be discussed further. Thirst was also used as a covariate; it did not have a significant effect on any other dependent variable except ability to quench. The perceived ability to quench thirst was correlated with thirst level ($r = .475, p < .0001, p_{rep} = 1$); a univariate ANOVA with readability and timing as independent variables showed that the difference across the 5 conditions for the quench measure was more significant when thirst was used as a covariate($F(4,134) = 7.296, p < 0.0001, p_{rep} = 1$).

Discussion

Experiment 1 provided the first evidence that the metacognitive cue of fluency can alter sensory experiences. Processing a disfluent label not only decreased taste ratings but also diminished willingness to buy, willingness to pay and perceived ability of the drink to quench thirst. Furthermore, Experiment 1 demonstrated that perceptual fluency does not produce an advantage, *rather disfluency creates a disadvantage*. This may be because the sampling context created an expectation of a fluent label, given that it was a utilitarian product, served in a plain cup in a simple room. When participants experienced fluent processing, their sensory evaluations were not affected by the feeling of fluency, given that there was no perception of discrepancy between their expectations and the fluency experience. However, when they experienced unexpectedly low fluency, there was a perception of discrepancy between the expectations and the actual experience, which required an attribution. The feelings of disfluency were misattributed to the orange juice sample, thereby causing lower product evaluations.

Experiment 1 also demonstrated that fluency cannot alter product evaluations once the sample has been consumed. Fluency of the label had no effect on ratings after the actual taste experience. This may be because sensory evaluations are not subject to post hoc re-evaluations. Consumers do not reinterpret their experience to align with the mildly unsettling metacognitive cue (disfluency of the label) about what they had just consumed. These results are compatible with those of Lee, Frederick, and Ariely (2006), who found that the disclosure of the contents of beer affected preference for the beer only if the disclosure preceded the tasting. This finding suggested that disclosure of the ingredient affected preferences by influencing the experience

itself, rather than by acting as an independent negative input or by modifying retrospective interpretation of the experience.

These findings are also in line with the discrepancy-attribution hypothesis (Whittlesea and Williams 1998). When there is a perception of discrepancy between the expected and actual fluency experience before tasting, the experience of surprising disfluency is misattributed the product. Similar to the disclosure of the secret ingredient in beer (Lee et al. 2006), the feeling of disfluency does not act as an independent negative input; rather it is misattributed to be a part of the tasting experience. However after tasting, given that the taste evaluations are already formed, the feelings of disfluency cannot be misattributed to the product. Furthermore, feelings of disfluency cannot modify the retrospective interpretation of the experience.

This experiment showed that perceptual fluency related to a taste experience manipulated by changing the font of the label associated with the product affects taste perception. Specifically, disfluent font lowered product evaluations. This leaves the question of whether other forms of fluency, such as linguistic fluency can affect sensory experience. Does the linguistic fluency experienced while processing product related information, such as the producer name or brand name, affect evaluations? For example, will the selection of the linguistically fluent name Flinks over a linguistically less fluent name Frurio create more favourable evaluations for a new product given that these two names neither imply any attributes nor have any semantic associations to the product? This question will be addressed in Experiment 2.

EXPERIMENT 2: EFFECTS OF LINGUISTIC FLUENCY ON TASTE PERCEPTION

The premise of the Experiment 1 was to show how perceptual fluency affects taste perception. Experiment 2 seeks to replicate the finding that the metacognitive cue of fluency affects sensory evaluations. In Experiment 2 whether linguistic fluency affects taste perception was tested. Using a different fluency manipulation, Experiment 2 aims to generalize the main finding of the Experiment 1 to different fluency types. Experiment 2 also seeks to rule out the explanations that mood or general orange juice liking differences might have caused the results in Experiment 1.

Method

Participants. 121 (83 female and 38 male) Brock University students participated in the experiment in return for course credit. Their mean age was 21.55 (*Min*= 17, *Max*= 50, *S.D.* = 4.86).

Design and Procedure. The study employed a 2 (difficult-to-pronounce name vs. easy-to-pronounce name) X 2 (label shown before vs. after) between-subjects design with ease of pronunciation and timing as factors. There was also a control group which did not see any brand names. The design and procedure was similar to that of the Experiment 1 with some exceptions. First, instead of presenting the same grove name in either easy-to-read or difficult to read font, ease of pronunciation was manipulated similar to Alter and Oppenheimer (2006) by presenting

either an easy-to-pronounce (Flinks) or a difficult-to-pronounce name (Frurio). A pretest was done to select the brand names that would be used in the actual experiment.

Second, instead of one name, participants saw 3 different names (either 3 easy-to-pronounce or 3 difficult-to-pronounce names depending on the condition) in random order. This was done to improve the power of the experiment. They were given 3 cups filled with the same orange juice, although participants were told that they would taste 3 samples. They answered the same evaluation questions for each sample.

Third, participants also reported their general liking of orange juice (1 = not at all, 7 = very much). These data allowed us to ensure that any differences across the conditions in the evaluations of the orange juice were not due to the orange juice being generally more desirable in one condition than the others (Labroo, Dhar, and Schwarz 2008, Labroo and Kim 2009).

Finally, participants were asked to report how they felt at the moment (1 = bad mood, 7 = good mood) at the end of the experiment. This question was added to rule out the explanation that mood differences between the different groups might have caused any differences in evaluations (Labroo et al. 2008, Labroo and Kim 2009).

Pretest. Twenty-six Brock University students participated in the pretest. They were presented with a list of 30 fabricated names, 15 were easy-to-read (e.g., Flinks, Tanley) and 15 were difficult-to-read (e.g., Ulymnius, Equusia; from Alter and Oppenheimer 2006). Participants were told that they would see 30 orange juice brand names and were asked to rate the names across six dimensions including prototypicality, value, liking and familiarity (see Appendix B for pretest questions). These dimensions were examined to ensure that (1) pre-experimental prototypicality, familiarity, liking and perceived value can be ruled out as a possible factor in evaluations,

because if the scores for these variables differed across the names, the variables might confound the results of Experiment 2; (2) if fluency plays a role in judgment, it can be attributed to ease of pronunciation, or the perceived similarity to orthographic regularity in the English language (Whittlesea and Williams 2000).

Insert table 4 about here

Independent sample t-tests were used to select the names. Each easy-to-pronounce name was compared with each difficult-to-pronounce name. For example, an easy-to-pronounce name, Flinks, was compared with 15 difficult-to-pronounce names using independent sample t-tests. These comparisons provided us with 3 pairs of names (one difficult-to-pronounce and one easy-to-pronounce) which were different in similarity to English structure and ease of pronunciation, but similar in prototypicality, familiarity, liking, and perceived value. Mean values for the selected 3 easy and 3 difficult to pronounce names that satisfied these criteria are in Table 4 (Frurio vs. Flinks; Jojemnen vs. Slingerman and Creaumy vs. Deerbond).

Results

Insert table 5 about here

Results were analyzed using a MANOVA with timing and ease of pronunciation as independent variables and overall liking, willingness to buy, willingness to pay and ability to

quench thirst as dependent variables. The ratings for the dependent variables of the three samples were combined into one single rating by taking their average. The means and the standard deviations for the five experimental groups are shown in Table 5. The analysis of the MANOVA showed that there was no difference across the five groups (all p's > .05).

Insert figure 7 about here

An analysis of MANCOVA with timing and ease of pronunciation as factors and desirability, willingness to pay, quench independent variables and orange juice liking as a covariate showed that desirability was different across the 5 groups ($F(4,112) = 2.33$, $p < .05$, $p_{rep} = .88$). Fluency and timing main effects and interaction effect were not significant (see first row of Table 5 and Figure 7).

Insert figure 8 about here

The MANCOVA analysis with orange juice liking as covariate showed that the difference in willingness to buy was significantly different across the 5 groups ($F(4,112) = 2.93$, $p < .02$, $p_{rep} = .94$, see third row of Table 5). Fluency and timing main effects and interaction effect were not significant (see figure 8).

Insert figure 9 about here

The analysis also demonstrated that quench ratings were also marginally different across the 5 groups when orange juice liking was used as a covariate ($F(4,112) = 2.13, p < .07, p_{rep} = .85$). The fluency and timing main effects and interaction effect were not significant (see fifth row of Table 5 and figure 9).

MANCOVA analysis demonstrated that there was no difference across the five conditions for overall liking (see second row of Table 5) or willingness to pay (in $; see fourth row of Table 5).

Insert table 6 about here

Contrast analyses also demonstrated that there was no difference across the five conditions in terms of selecting less than or equal to the actual price and higher than the actual price (all p's > .05). Frequencies across the five conditions are presented in Table 6.

Gender, smoking, variety seeking, mood, and thirst did not have any effect on the data, so they will not be discussed further. A one-way ANOVA was conducted to examine whether mood and orange-juice liking were significantly different across the five groups. The results showed that participants' moods did not differ across the five groups ($F(4,114) = 1.97, p > .1, p_{rep} = .81$). The results also showed that participants' general orange juice liking did not differ across the five groups ($F(4,114) = 1.00, p > .4, p_{rep} = .56$).

Discussion

The main purpose of Experiment 2 was to replicate the results of Experiment 1 using linguistic fluency as a manipulation, rather than perceptual fluency. However, Experiment 2 did not provide any evidence in support of the three hypotheses. One reason why there was an effect of perceptual fluency on taste perception but there was no evidence for an effect of linguistic fluency on taste perception may be that there is a possible difference in the effect sizes of perceptual versus linguistic fluency. There is evidence in literature that there might be a difference in effect sizes of different fluency types. For example, Lee and Labroo (2004; Experiment 1) found an effect of conceptual fluency but not an effect of perceptual fluency on liking scores of target words. Conceptual fluency reflects the ease with which the target comes to consumers' minds and pertains to the processing of meanings related to the target (Hamann 1990). Although Lee and Labroo (2004) did not actually report effect sizes, it may still be the case that different fluency types have different effect sizes. Taking these findings into consideration for the current study, it is possible that it may be easier to observe an effect of perceptual fluency relative to linguistic fluency.

Additionally, there are four categories of linguistic fluency (phonological, lexical, orthographic, and syntactic; Alter and Oppenheimer 2009). For instance, some non-word strings are easier to pronounce than others (Barnings vs. Yoalumnix: phonological fluency) and some words are simpler alternatives to more complex words (use vs. utilize: lexical fluency; Alter and Oppenheimer 2009). Experiment 2 used a phonological fluency manipulation. Brand names used in the easy-to-pronounce groups were easy-to-pronounce non-word strings, whereas brand

names used in the difficult-to-pronounce groups were difficult-to-pronounce non-word strings. Given that different fluency types may have different effect sizes, different linguistic fluency types may also have different effect sizes. Therefore, it may be easier to observe an effect of lexical fluency relative to phonological fluency that was used in Experiment 2.

Another possible explanation as to why there was an effect of perceptual fluency on taste perception but no effect of linguistic fluency on taste perception may be that participants discounted their fluency experience for the latter because they did not believe that the brand names used in Experiment 2 were authentic. There is evidence in the fluency literature that consumers do not use their fluency experience blindly, but rather they try to attribute it to a related source using their naïve theories about the fluency experience (Oppenheimer 2008). Whenever consumers recognize that the source of fluency is not related to the judgment domain at hand, they tend to discount fluency as a cue to their judgment (Alter and Oppenheimer 2009). For example, people underestimate the prevalence of surnames like Bush and Clinton relative to similarly common but non-famous names like Stevenson and Woodall. This effect occurs because people discount the role of name availability as a cue for frequency when there is an obvious reason why the names should be highly fluent (Oppenheimer 2004). Likewise, given that the prototypicality of the brand names (i.e., whether they are typical orange juice names) used in Experiment 2 was low (i.e., the average rating was under 3 on a 7- point scale), participants might have discounted the fluency of names as a cue to their liking because it was obvious that these names were fabricated. Using brand names with higher prototypicality ratings might have produced an effect of fluency on taste evaluations.

It is also possible that there was no evidence for linguistic fluency on taste perception because participants ma have skipped over reading the brand names. Therefore, a modification

of the current manipulation may demonstrate an effect of linguistic fluency on taste evaluations. For example, an auditory manipulation may be used instead of a visual manipulation. That is, if the researcher reads the brand names aloud instead of presenting the brand names on the computer, the fluency manipulation may be more effective at generating an effect of linguistic fluency on taste perception. Also, showing a picture of a carton instead of just showing the brand name on a computer screen may improve the effect of fluency manipulation.

Nonetheless, given that there were no mood differences across the five conditions in Experiment 2, this experiment ruled out the alternative explanation that the results of Experiment 1 were due to mood differences between groups. It seems as though the fluency manipulation does not affect reported mood.

GENERAL DISCUSSION

A primary objective of this research is to contribute to the literature on sensory perception within marketing in showing that the fluency of the cognitions related to a product can affect resulting metacognitions during product experience and ultimately affect sensory evaluations. Another objective is to demonstrate whether fluency is an advantage or disfluency is a disadvantage. Experiment 1 demonstrated that perceptual fluency can alter sensory experiences. Being associated with a perceptually disfluent label impaired the hedonic and intensive value of the product, measured by overall liking, willingness to buy, willingness to pay and perceived ability of the drink to quench thirst. Specifically, Experiment 1 showed that the perceptual fluency of the cognitions related to a food product affected the product experience and taste perception. Furthermore, comparisons of the control group ratings with the other groups

demonstrated that perceptual fluency does not produce an advantage, rather disfluency creates a disadvantage. Experiment 1 also showed that fluency cannot alter product evaluations once the sample has been consumed. It demonstrated that fluency is not an independent input that can be used in product evaluations. Specifically, fluency can only affect sensory evaluations through the misattribution mechanism that occurs during consumption. Consumers cannot disentangle the feeling of fluency from their integral feelings for the product. To sum up, Experiment 1 demonstrated that perceptual fluency of the cognitions related to product affect sensory evaluations, only when they are experienced before product experience.

The aim of Experiment 2 was to replicate the findings of Experiment 1 using a different fluency manipulation; however the findings of Experiment 2 failed to replicate the results of Experiment 1. Experiment 2 used a similar experimental design to Experiment 1, with two important differences. First, in Experiment 2, linguistic fluency was operationally defined as the ease of pronunciation, whereas in Experiment 1, perceptual fluency was operationally defined as the font readability. Second, in Experiment 2, the information provided about the product was the brand name, whereas in Experiment 1 the information provided was the grove name. One possible explanation for the null effect might be that it may be easier to observe an effect of perceptual fluency relative to linguistic fluency.

Another explanation as to why there was no evidence for the effect of linguistic fluency on taste perception may be that, the effect of linguistic fluency was discounted because the names used in Experiment 2 were perceived as fictional names given that they had low prototypicality ratings. It is also possible that using a different manipulation that involves having the participants read the brand names out aloud instead of simply reading them on a screen might have changed the results in that the taste ratings of the disfluent group might be lower compared

to the fluent and no label groups. However, the findings of Experiment 1 and Experiment 2 together lead to the conclusion that the metacognitive cue of perceptual fluency, and not linguistic fluency, shapes sensory evaluations.

Theoretical Implications

This research makes several contributions to the consumer behaviour and sensory evaluation literatures. First, this research provided the first evidence that the metacognitive cue of fluency can alter sensory experiences. This is an important contribution to the sensory evaluation literature, given that the metacognitive cue of fluency is an undiagnostic cue that does not provide any information about the quality of the product, unlike extrinsic cues such as brand name, price or promotional materials, which interact with messages arriving from the senses to create expectations about the products (Deliza and MacFie 1996). Specifically, the effect of extrinsic cues is thoughts-driven or cognitive (Elder and Krishna 2010); that is, these cues create cognitions about the product. For example, when consumers learn that there is an unfavourable ingredient in beer, negative sensory thoughts that lead to unfavourable expectations about the beer are generated (Lee et al 2006). On the other hand, the effect of processing fluency cannot affect evaluations by creating expectations; given the fact that metacognitions are by-products of cognitions and they cannot generate sensory thoughts about the product.

Furthermore, Experiment 1 demonstrated that pre-consumption fluency experiences affect taste perception whereas post-consumption fluency experiences do not affect taste evaluations. This finding suggests that fluency experiences can shape one's actual taste experience, but only if experienced before consumption. Consumers cannot differentiate the

feeling of fluency that they incidentally have during the consumption from their feelings towards the products (Schwarz 2004), therefore their consumption experience is shaped by the discordant fluency experience. Thus, the effects of metacognitive cues are similar to extrinsic cues that create sensory expectations about the product. For example, information about an unfavourable ingredient in beer lowered taste ratings about the product only when it was presented before a tasting episode, by creating negative sensory thoughts about the beer (Lee et al. 2006). Similarly, in Experiment 1, surprising disfluency lowered taste ratings before tasting because the discordant fluency experience was misattributed to taste experience. That is, both extrinsic cues and metacognitive cues affect taste perception by shaping the tasting experience.

Moreover, with the use of a control group, it was demonstrated that disfluency creates a disadvantage, and it is not necessarily the case that fluency creates an advantage to one's taste experience. According to the discrepancy-attribution hypothesis, the surprising fluency experience created by the difference between expected ease and actual ease in performing cognitive operations should be attributed to an appropriate source (Whittlesea and Williams 1998), based on consumers naïve theories of cause and effect (Schwarz 2004), depending on the context and judgment domain. The context of the task (a utilitarian product, served in a plain cup, within a simple room) and participants' prior experiences (utilitarian products have fluent labels) led them to expect a fluent processing. As such, participants did not experience a perception of discrepancy in the no label condition and in the fluent condition. Therefore, fluency did not create an advantage relative to when no label was provided. However, participants' ease of processing product-related information in the disfluent condition was discordant with their expectations, which created a feeling of unpleasant surprise, and they in turn misattributed this surprising disfluency to not liking the taste experience. That is, when a

product is associated with a disfluent label, it is a disadvantage for the taste experience, because the surprising disfluency is considered as a negatively-valenced cue, as it represents a failure of the actual fluency to meet the expected fluency level.

Managerial Implications

Taste perception is an important aspect of a food product's overall evaluation. This thesis demonstrates that seemingly unimportant details such as the readability of fonts of the labels on packaging might have implications for consumers' perceptions of a food product. Understanding the role of fluency in consumer decisions provides marketers with a set of new tools to improve the desirability of their products.

Extant literature has shown that marketing activities may affect product evaluations, taste ratings and even the actual performance of the products. This thesis provides evidence that marketing actions can also shape sensory evaluations through metacognitive experiences. Low perceptual fluency generated by reading product labels may have negative implications in many areas. First, it has implications for packaging. Packaging is an integral element in communicating with the consumer and the perceptual fluency of the elements on a package may affect consumers' evaluations of the product, including taste perceptions. Especially for new products, all the elements of the packaging must have high perceptual fluency, because low perceptual fluency may impair the product's desirability. Even if consumers buy the product with perceptually disfluent labels before having a chance to taste it, their willingness to make a repeat purchase may decline after tasting the product, because low perceptual fluency related to the product will lead to lower taste evaluations compared to high perceptual fluency.

Additionally, the findings from Experiment 1 might have implications for food sampling in stores. Given that the taste experience can be shaped by the perceptual fluency of the product information, marketers should design product sampling contexts that are in line with consumers' expectations. When a utilitarian food item is distributed to consumers, the fluency of the visual elements should be high. Disfluency of processing the cues associated with the product might impair taste evaluations. The perceptual fluency of restaurant menus should also be in line with consumers' expectations. If the perceptual fluency of the items on the menu does not meet consumers' expectations, it might attenuate consumers' taste perception.

Although this thesis reports an affect of fluency on taste perception, several variables might moderate the impact of fluency on taste evaluations. First, the effect of fluency is likely to be more pronounced the more it deviates from consumers' processing expectations (Schwarz 2004). In other words, if the actual fluency is close to the expected fluency level, its effect on evaluations would be minimal.

Furthermore, extant literature shows that high motivation to process information attenuates the influence of retrieval fluency—the subjective ease or difficulty with which people bring to mind exemplars that conform to a particular rule (Alter and Oppenheimer 2009)—on evaluations (Schwarz 2004). High personal relevance (Rothman and Schwarz 1998); high need for cognition (Florack and Zoabi 2003) and sad moods (Ruder and Bless 2003) are factors which increase the motivation to process information. As retrieval fluency is a metacognitive cue like processing fluency, these factors are expected to influence the effect of processing fluency on evaluations in the same way.

In addition, it is expected that the effects of processing fluency on evaluative judgments will be strongest under conditions that limit the extraction of additional information. Conditions

that impose time pressures, limit cognitive capacity, and reduce the motivation to process a stimulus in sufficient detail may compete with the fluency signal in the computation of a judgment (Winkielman et al 2003). For example, consumers who make important evaluations will have high motivation to process product related information in detail, and as such, their evaluations will be less affected by undiagnostic cues, such as fluency.

Finally, age can be another potential moderator to the effect of fluency on taste evaluations; as the perception of discrepancy might be higher for older consumers due to degeneration in their eyesight.

Future Research Directions

This thesis demonstrated that being associated with a disfluent label creates a disadvantage for food products' taste evaluations. Because consumers do not expect to have a disfluent processing, they misattribute this perception of discrepancy to not liking the product depending on the context. However, different tasting contexts (e.g., tasting orange juice in a luxurious restaurant) may cause disfluency to be an advantage for evaluations. Furthermore, potential moderating factors might attenuate the effect of fluency on taste perception.

Given that the interpretation of fluency relies on consumers' naïve theories, it is possible that the relationship between fluency and liking can be reversed in situations where people hold different naïve theories. Extant literature shows that there are judgment contexts that evoke naïve theories in favour of disfluency. When people believe that the subjective experience of processing fluency is an indicator of negative value, high fluency may lead to more negative evaluations (Winkielman et al 2003). Fluent stimuli are familiar, but also run-of-the-mill and

comfortable; conversely, disfluent stimuli are intriguing and novel. As such, people may, in some cases, for example while evaluating innovative products, amusement parks, hedonic products, prefer novel, complex and surprising stimuli over simple and familiar ones (Cox and Cox 1988). For example, people expect amusement park rides with difficult to pronounce names to be more amusing (Song and Schwarz 2009).

One context that evokes the use of naïve theories in favour of disfluency is when consumers' evaluate hedonic products. Recent research on hedonic products has shown that low fluency leads to enhanced desirability for hedonic products compared to high fluency (Pocheptsova et al. 2010). According to the discrepancy-attribution hypothesis, surprisingly high fluency may lower evaluations compared to the evaluations of a control group if consumers expect disfluent processing. In the case of special occasion products however, consumers may expect disfluent processing given that disfluency signals that the product is not typical but rare and unique. When the cognitions related to the product are disfluent, there will be no perception of discrepancy. However when the processing is fluent there will be a perception of discrepancy and consumers will attribute this to the product using their naïve theories. They might think this is just one of the ordinary chocolates. Therefore, their evaluations might be lower compared to a control condition where no label is present.

Similarly, when evaluating innovative products people use inferences that are in favour of disfluency. It was found that a product is judged as more innovative when consumers have difficulty processing the product description (Cho and Schwarz 2006) because perceived difficulty is used as a signal to novelty. When consumers experience high fluency when consuming innovative products, they may perceive a discrepancy, and in turn misattribute this perception to familiarity (which does not signal novelty), thereby lowering their innovativeness

evaluations. In the case of food products, high fluency of the cognitions related to the product may also affect consumers' taste perception; given that people misattribute fluency depending on the judgment domain.

Further research is required to examine whether the effect of the metacognitive cue of fluency on sensory perception is moderated by the affective intensity of the consumption experience. It was found that the effect of mood on post-consumption product evaluations is influenced by pre-consumption mood only if the consumption experience is affectively neutral (Miniard et al. 1992). When consumption evokes powerful affective responses, as in the case of a repugnant (e.g., an insipid old fish) or delicious meal (e.g., a luscious fresh cake), a pre-consumption mood state is likely to dissipate in the face of the mood induced by consumption-based affective responses. Similarly, when the product experience produces very strong affective reactions, the effect of metacognitive cue of fluency on taste perception might be attenuated because the effect of fluency might dissipate facing the intense affective responses evoked by the product. Future research is required to examine the moderating role of the affective reactions generated by the product experience on the relationship between metacognitive cues and sensory evaluations.

Finally, in future research these findings can be generalized beyond the domain of taste. The fluency of the product information may also shape consumers' olfactory experiences (e.g., the scent of a perfume). The perceptual fluency of the product information related to a perfume might affect its perceived scent. Future research is required to examine the effect of fluency on sensory evaluations other than taste.

CONCLUSION

The findings of this thesis extend our understanding of the role of processing fluency in human judgment. Previous research indicates that high processing fluency associated with a product affects the target product's evaluations. Across two experiments, this thesis demonstrated that the metacognitive cue of fluency can also affect sensory evaluations, if presented before tasting. The findings also suggest that disfluency is a disadvantage, and it is not inevitably the case that fluency creates an advantage. Future research is required to determine the effects of potential moderators of the effect of fluency on taste evaluations, such as consumers' need for cognition, age, importance of the evaluation for the consumer, and the affective intensity of the consumption. Additionally, future research should investigate the influence of fluency based on different types of products such as hedonic products (e.g., wine, gourmet cheese). Understanding the role of fluency on sensory evaluations will enable marketers to improve the desirability of their products by using more nuanced marketing tactics.

APPENDIX A

1. Please indicate your sex. (1 = male, 2 = female),
2. Please enter your age.
3. Select the rating which describes you best for the following 3 questions;
    a. I like to try different things.

        (1 = Agree, 5 = Disagree)

    b. I like a great deal of variety.

        (1 = Agree, 5 = Disagree)

    c. I like new and different styles.

        (1 = Agree, 5 = Disagree)
4. Do you have any food or drink allergies? (Yes, No)
5. Please enter all food/drink allergies in the spaces provided.
6. Which of the following best describes your food preferences?

    1 = Vegetarian,

    2 = I only eat some animal products,

    3 = I eat most/all animal products
7. Do you smoke?

    1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Always

APPENDIX B

1. Does this name sound similar to a *prototypical* orange juice name?

1 = Not at all, 7 = Very Prototypical

2. How *easy* is it *to say* this brand name?

1 = Not at all, 7 = Very Easy

3. How much would you *value* a 1.89 L carton of this orange juice?

1 = $1.5, 7 = $4.5

4. How *similar* is this brand name in structure to English words in general?

1 = Not at all, 7 = Very Similar

5. How *familiar* are you with this brand name, have you heard this name before?

1 = Not at all, 7 = Very Familiar

6. How much do you *like* this brand name?

1 = Not at all, 7 = Very Much

TABLE 1

HYPOTHESES AND RESULTS

		Hypothesis	Support for Hypothesis	
			Exp 1	Exp 2
			perceptual fluency	linguisti fluency
H_{01}	a	Fluent product information presented before tasting will not affect consumers' overall liking of the product; therefore overall liking ratings will be similar to that of the no label condition.	Yes	No
	b	Fluent product information presented before tasting will not affect consumers' willingness to buy for the product; therefore willingness to buy ratings will be similar to that of the no label condition.	Yes	No
	c	Fluent product information presented before tasting will not affect consumers' willingness to pay for the product; therefore willingness to pay ratings will be similar to that of the no label condition.	Yes	No
	d	Fluent product information presented before tasting will not affect consumers' perceptions about its ability to quench thirst; therefore quench ratings will be similar to that of the no label condition.	Yes	No
H_{02}	a	Fluent or disfluent product information presented after tasting will not affect consumers' overall liking of the product; therefore overall liking ratings will be similar to that of the no label condition.	Yes	No

	b	Fluent or disfluent product information presented after tasting will not affect consumers' willingness to buy for the product; therefore willingness to buy ratings will be similar to that of the no label condition.	Yes	No
	c	Fluent or disfluent product information presented after tasting will not affect consumers' willingness to pay for the product; therefore willingness to pay ratings will be similar to that of the no label condition.	Yes	No
	d	Fluent or disfluent product information presented after tasting will not affect consumers' perceptions about its ability to quench thirst; therefore quench ratings will be similar to that of the no label condition.	Yes	No
H1	a	Consumers' overall liking of the product will be lower if it has disfluent information versus no information associated with it.	Yes	No
	b	Consumers' willingness to buy for the product will be lower if it has disfluent information versus no information associated with it.	Yes	No
	c	The willingness to pay for a product will be lower if it has disfluent versus no information associated with it.	Yes	No
	d	A beverage will have a lower perceived ability to quench thirst if it has disfluent versus no information associated with it.	Yes	No

TABLE 2

EXPERIMENT 1: MEANS AND STANDARD ERRORS OF DEPENDENT VARIABLES

	No Label		Before				After			
			Easy-to-read		Difficult-to-read		Easy-to-read		Difficult-to-read	
	N=33		N=27		N=26		n=26		n=25	
	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM
desirability (out of 7)	4.67	0.26	4.57	0.37	3.38	0.31	4.25	0.27	4.20	0.29
overall liking (out of 7)	5.00	0.23	4.81	0.35	3.77	0.32	4.69	0.29	4.52	0.30
willingness to buy (out of 7)	4.33	0.31	4.33	0.40	3.00	0.33	3.81	0.31	3.88	0.31
willingness to pay ($ value)	2.73	0.13	2.71	0.20	2.31	0.21	2.78	0.17	2.85	0.18
quench (out of 7)	4.67	0.23	4.19	0.27	3.58	0.30	4.19	0.26	4.20	0.34

TABLE 3

EXPERIMENT 1: FREQUENCY OF RESPONSES TO WILLINGNESS TO PAY QUESTION ACROSS 5 GROUPS

How much will you pay?	No Label	Before		After	
		Easy-to-read	Difficult-to-read	Easy-to-read	Difficult-to-read
less than 1.99	1	4	10	3	4
1.99	19	13	10	14	16
More than 1.99	13	10	6	9	5

TABLE 4

PILOT STUDY FOR EXPERIMENT 2: MEANS OF THE SELECTED BRAND NAMES

	Pair 1		Pair 2		Pair 3	
	Easy	Difficult	Easy	Difficult	Easy	Difficult
	Flinks	Frurio	Slingerman	Jojemnen	Deerbond	Creaumy
prototypicality	2.58	2.76	3.04	2.27	2.04	1.85
value	2.81	2.73	3.00	2.69	2.77	2.73
familiarity	1.23	1.15	1.31	1.04	1.12	1.42
liking	3.15	2.62	3.00	2.35	2.42	2.15
Ease of pronunciation	6.19*	3.88*	5.54*	2.69*	6.23*	3.85*
similarity to English	5.50*	3.50*	5.65*	2.31*	5.77*	3.88*

*All t's > 4.26 and all p's < .001

TABLE 5

EXPERIMENT 2: MEANS AND STANDARD ERRORS OF DEPENDENT VARIABLES

	No label		Before				After			
			Easy-to-pronounce		Difficult-to-pronounce		Easy-to-pronounce		Difficult-to-pronounce	
	n=23		n=24		n=25		n=24		n=25	
	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM
desirability (out of 7)	4.46	0.25	4.36	0.25	4.24	0.25	4.08	0.20	4.39	0.23
overall liking (out of 7)	4.65	0.26	4.60	0.25	4.53	0.25	4.44	0.17	4.60	0.22
willingness to buy (out of 7)	4.26	0.30	4.13	0.27	3.95	0.26	3.71	0.25	4.17	0.26
willingness to pay ($ value)	2.62	0.21	2.44	0.15	2.32	0.16	2.23	0.14	2.62	0.14
quench (out of 7)	4.00	0.31	4.13	0.21	4.01	0.25	4.33	0.20	3.97	0.22

TABLE 6

EXPERIMENT 2: FREQUENCY OF RESPONSES TO WILLINGNESS TO PAY QUESTION ACROSS 5 GROUPS

How much will you pay?	Before			After	
	No Label	Easy-to-pronounce	Difficult-to-pronounce	Easy-to-pronounce	Difficult-to-pronounce
Less than 1.99	3	13	20	21	9
1.99	9	33	27	20	28
More than 1.99	6	17	16	19	23

FIGURE 1

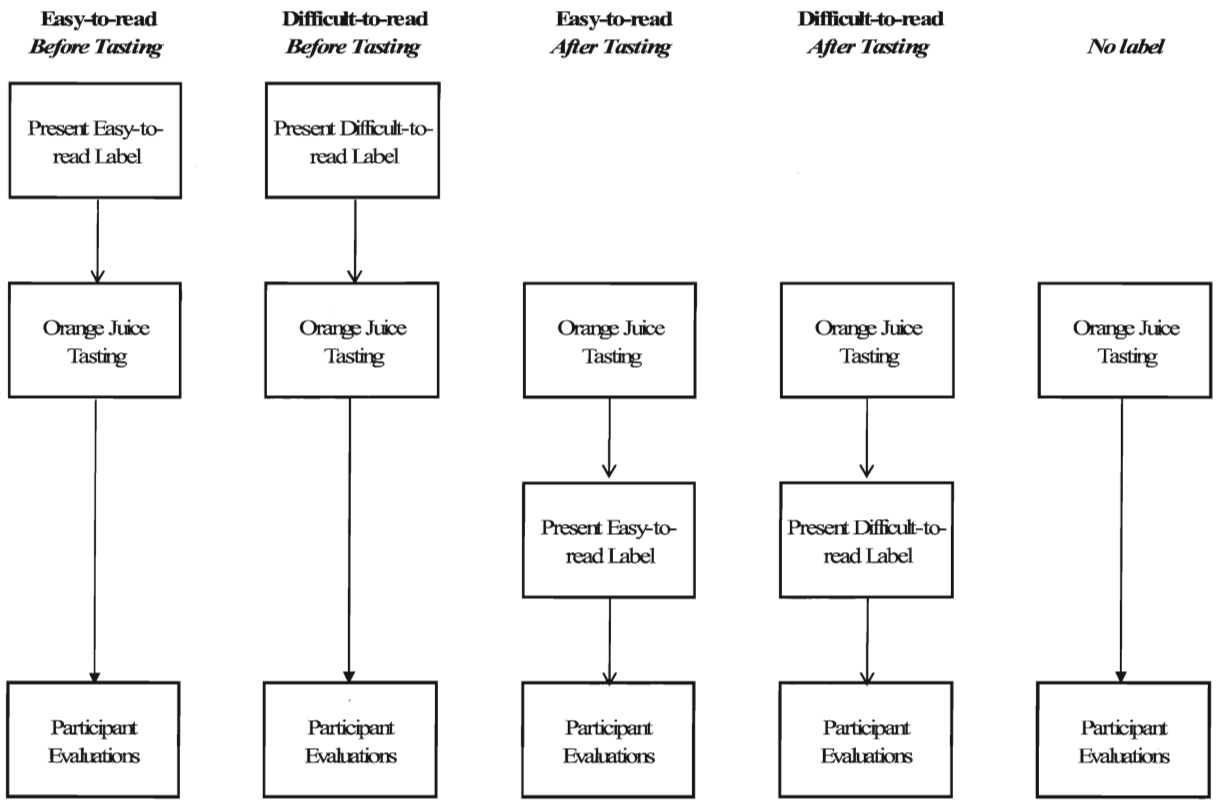


Fig. 1. Illustration of the procedure for each of the five conditions, in which readability and timing of labels were manipulated (adapted from Lee, Frederick and Ariely 2006).

FIGURE 2

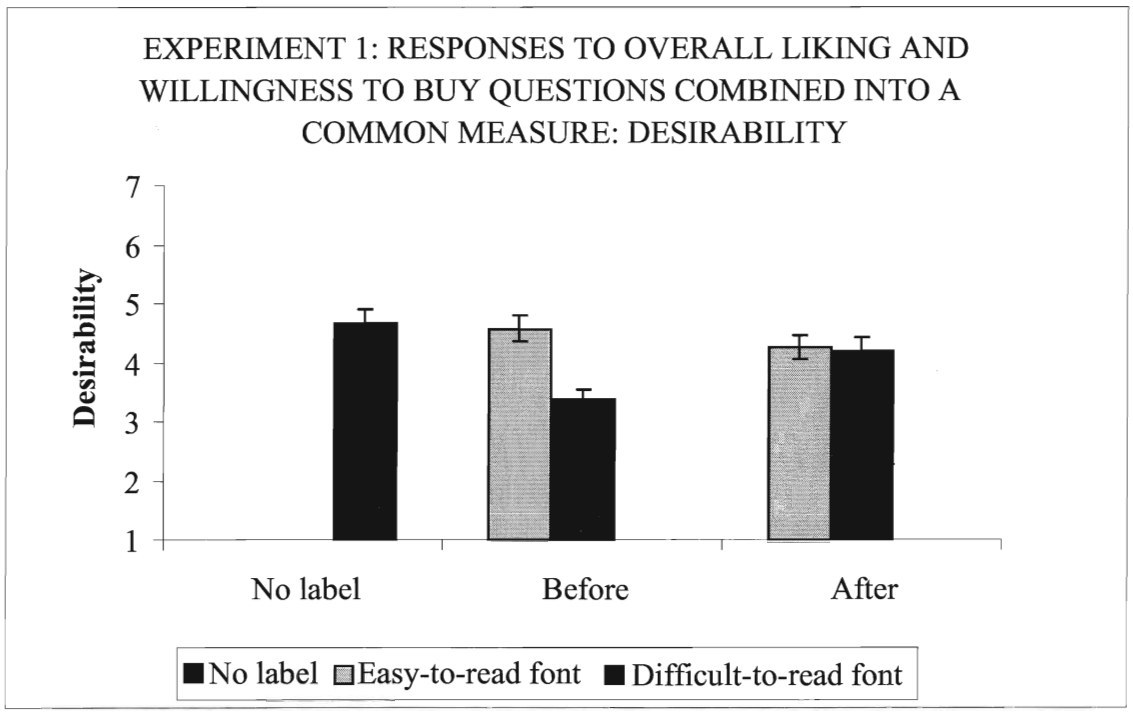

EXPERIMENT 1: RESPONSES TO OVERALL LIKING AND WILLINGNESS TO BUY QUESTIONS COMBINED INTO A COMMON MEASURE: DESIRABILITY
Desirability
7
6
5
4
3
2
1
No label
Before
After
No label
Easy-to-read font
Difficult-to-read font

FIGURE 3

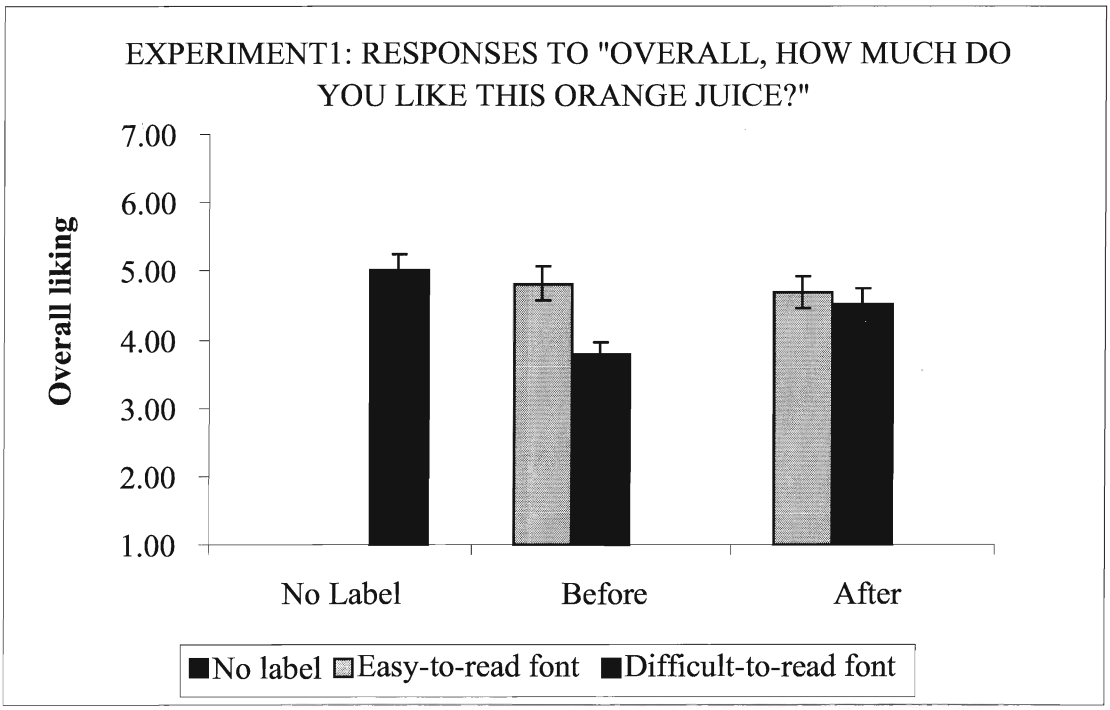

EXPERIMENT1: RESPONSES TO "OVERALL, HOW MUCH DO YOU LIKE THIS ORANGE JUICE?"
Overall liking
7.00
6.00
5.00
4.00
3.00
2.00
1.00
No Label
Before
After
No label
Easy-to-read font
Difficult-to-read font

FIGURE 4

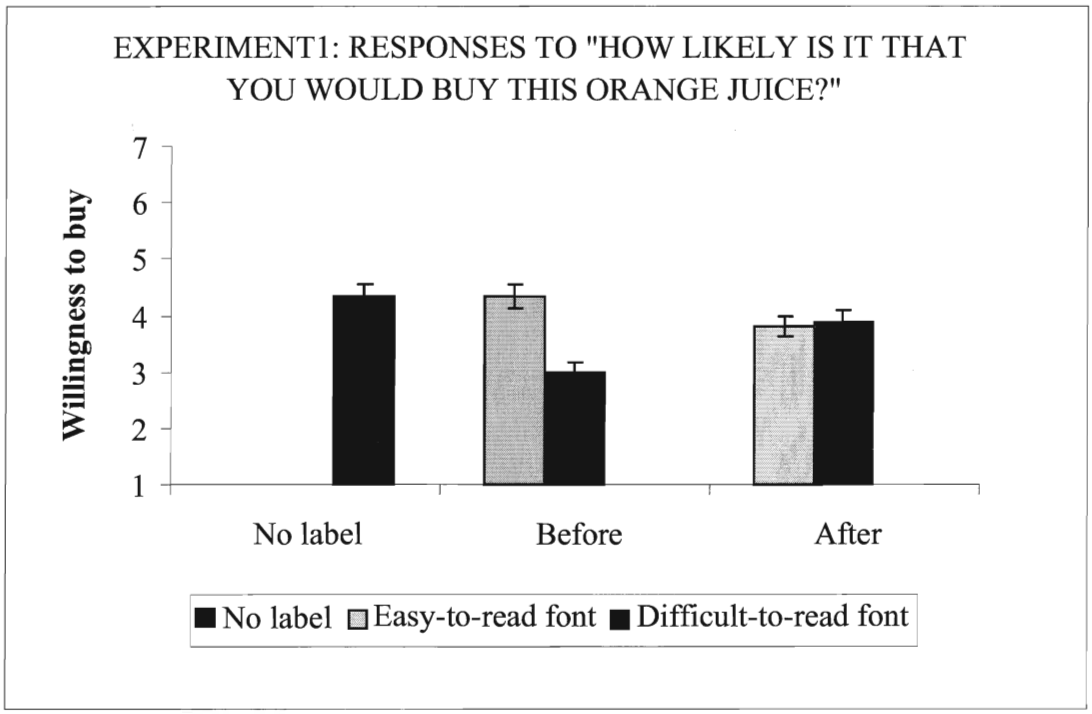

EXPERIMENT1: RESPONSES TO "HOW LIKELY IS IT THAT YOU WOULD BUY THIS ORANGE JUICE?"
Willingness to buy
7
6
5
4
3
2
1
No label
Before
After
No label
Easy-to-read font
Difficult-to-read font

FIGURE 5

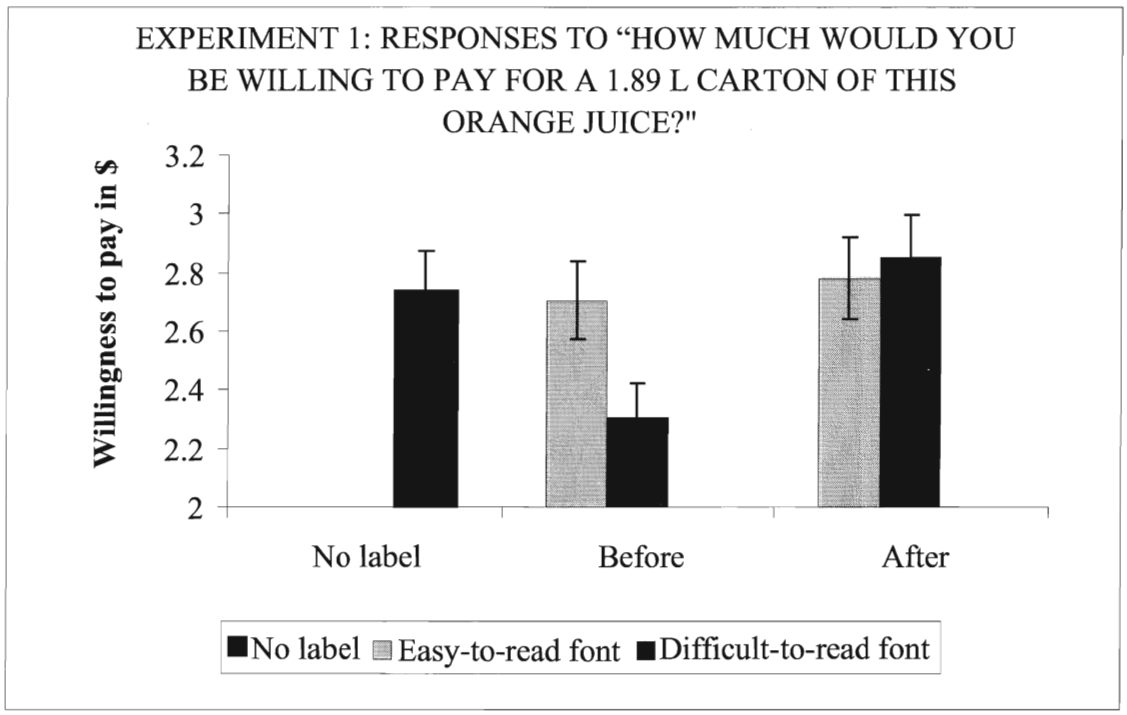

EXPERIMENT 1: RESPONSES TO "HOW MUCH WOULD YOU BE WILLING TO PAY FOR A 1.89 L CARTON OF THIS ORANGE JUICE?"
Willingness to pay in $
3.2
3
2.8
2.6
2.4
2.2
2
No label
Before
After
No label
Easy-to-read font
Difficult-to-read font

FIGURE 6

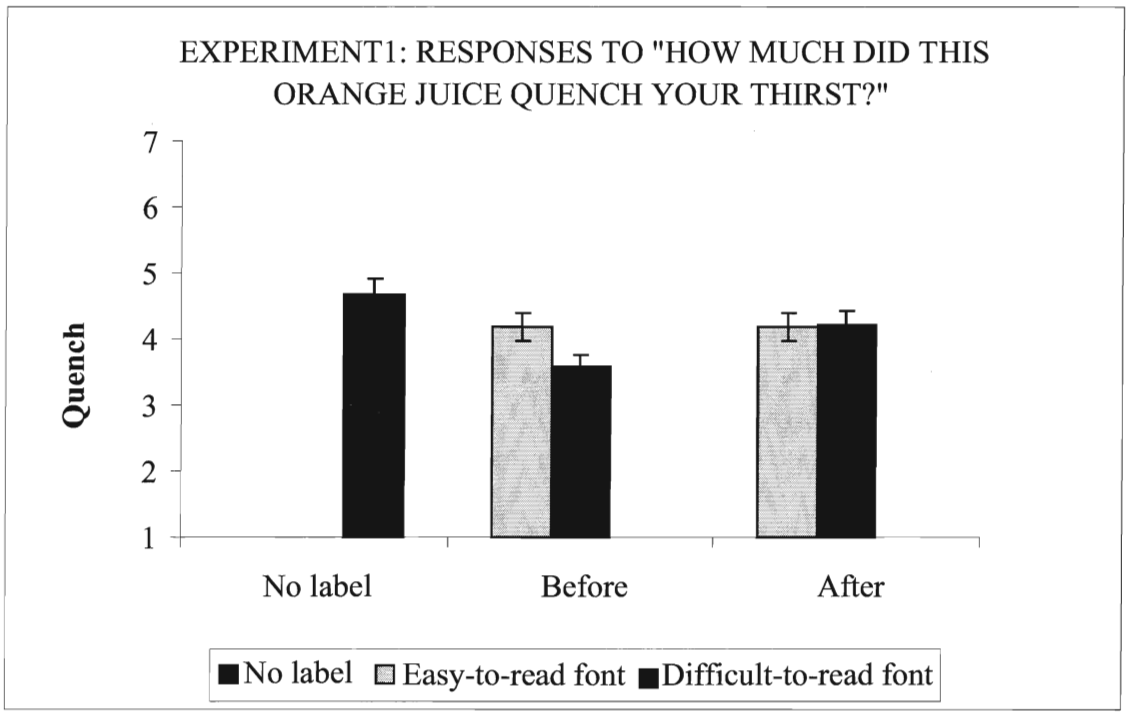

EXPERIMENT1: RESPONSES TO "HOW MUCH DID THIS ORANGE JUICE QUENCH YOUR THIRST?"
Quench
7
6
5
4
3
2
1
No label
Before
After
No label
Easy-to-read font
Difficult-to-read font

FIGURE 7

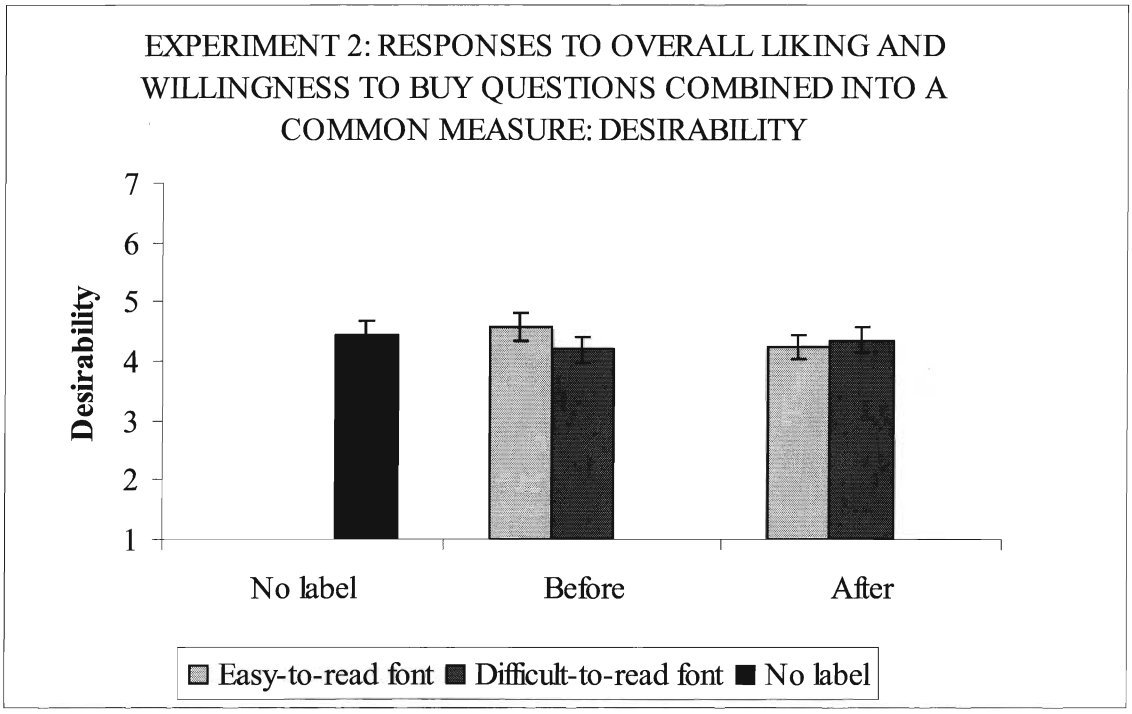

EXPERIMENT 2: RESPONSES TO OVERALL LIKING AND WILLINGNESS TO BUY QUESTIONS COMBINED INTO A COMMON MEASURE: DESIRABILITY
Desirability
7
6
5
4
3
2
1
No label
Before
After
Easy-to-read font
Difficult-to-read font
No label

FIGURE 8

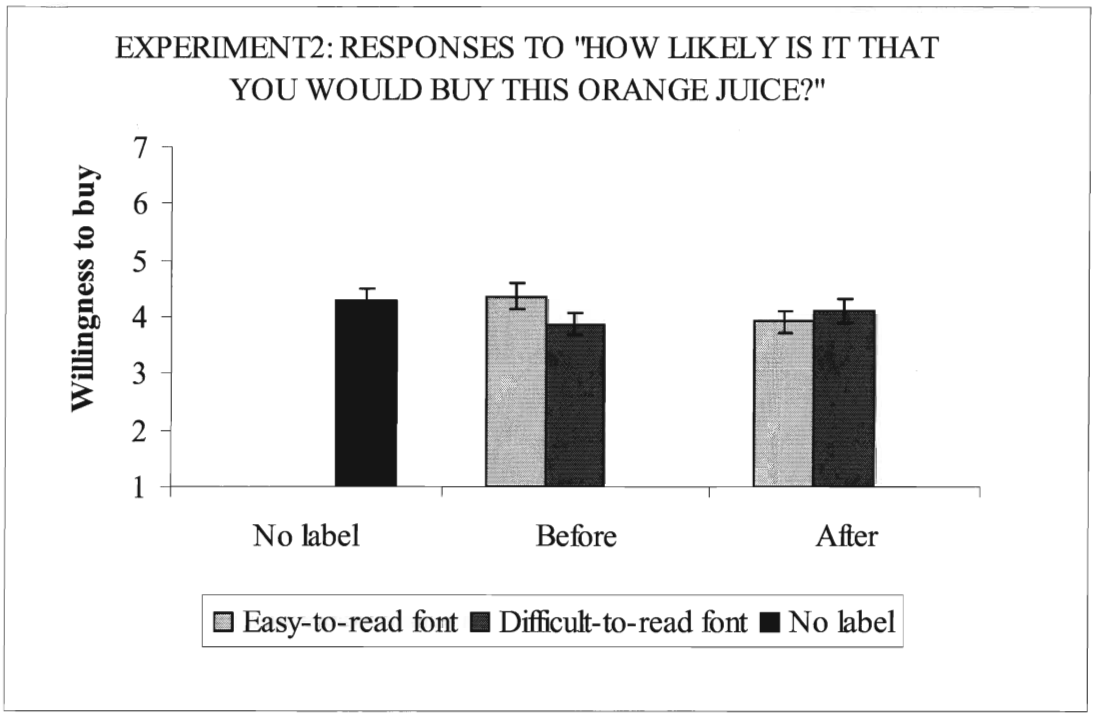
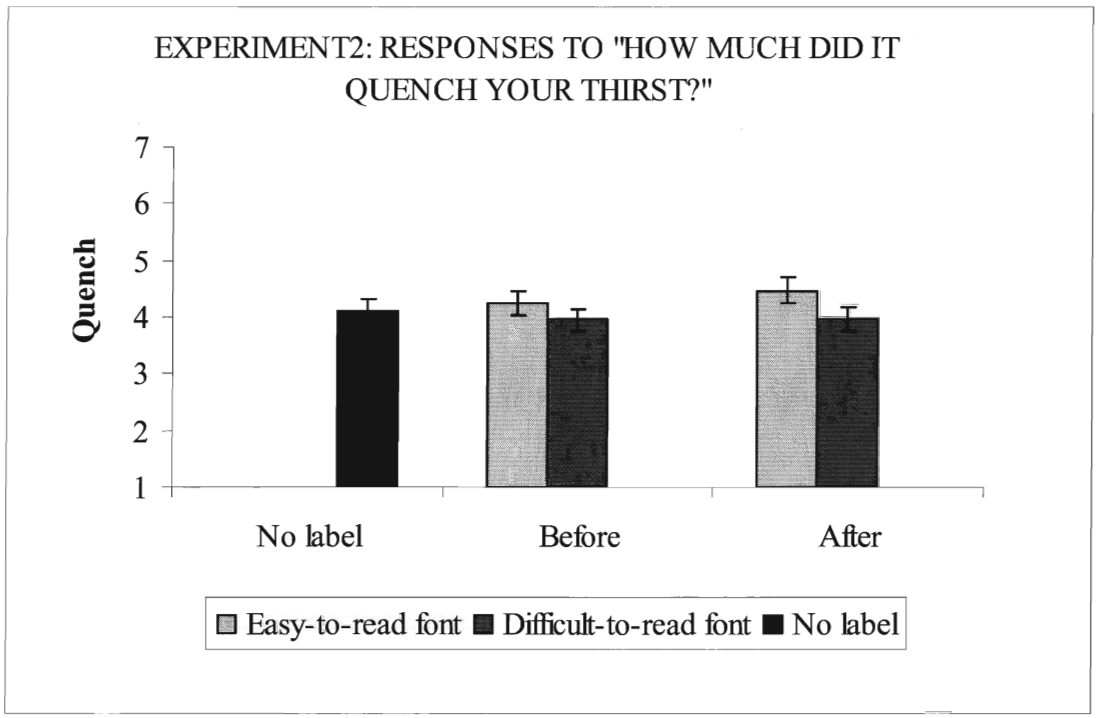

EXPERIMENT2: RESPONSES TO "HOW LIKELY IS IT THAT YOU WOULD BUY THIS ORANGE JUICE?"
Willingness to buy
7
6
5
4
3
2
1
No label
Before
After
Easy-to-read font
Difficult-to-read font
No label

FIGURE 9


EXPERIMENT2: RESPONSES TO "HOW MUCH DID IT QUENCH YOUR THIRST?"
Quench
7
6
5
4
3
2
1
No label
Before
After
Easy-to-read font
Difficult-to-read font
No label

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