

Supplemental Online Materials

Pilot Study

Given the prior evidence that grasping a product improves evaluations (Grohmann et al., 2007) and increases choice (Streicher & Estes, 2015) of the given product, marketers should encourage consumers to touch their product. Of course, there are many methods for encouraging product touch. We conducted a Pilot Study that focuses on one common strategy, namely, creating novel or attractive package designs. We tested whether haptic exposure to a Coca-Cola bottle would increase processing fluency, liking, and purchase intentions for a novel visual design of the bottle. We had participants evaluate visual designs (see Figure 1) while either grasping a Coca-Cola bottle behind a screen (*visuo-haptic* condition) or not (*visual-only* condition). In addition, given the importance of perceived ownership in other mere touch effects (Peck & Shu, 2009; Shu & Peck, 2011), we also measured perceived ownership here.

Figure 1: Novel visual designs evaluated in the Pilot Study.



Methods

Participants. 98 students at a typical European university participated in a product design study (mean age: 23.3 years; 51.6% female). Participants were randomly assigned to conditions, and after completing the experiment participants were debriefed for hypothesis guessing and thanked with a gift (candies).

Stimuli. The haptic stimulus was a 0.25-litre Coca-Cola bottle, mounted upright on a fixture to facilitate naturalistic grasping and to prevent moving or lifting. Visual stimuli were original-size images of the bottle, developed by a professional graphic designer who created novel visual designs of the bottle decorated with unobtrusive artwork and including the brand name Coca-Cola (see Figure 1).

Procedure. Participants were seated in front of a 21-inch computer screen and informed that they would see products on the screen. Each participant was presented two novel bottle designs randomly sampled from the four designs. Each of the two designs was presented individually onscreen and was evaluated separately, and thus there were two experimental trials. The images were presented on the right side of the screen (to facilitate grasping by those in the visuo-haptic condition), and they remained onscreen for 4 seconds. After viewing each product design, participants reported their attitude toward the product (i.e., liking, purchase intention), processing fluency (3 items taken from Labroo, Dhar, & Schwarz, 2008), and perceived

ownership (2 items taken from Peck & Shu, 2009) of the given product. Participants in the visuo-haptic condition were additionally instructed to grasp the product behind the right side of the screen when the image appeared. They were instructed to grasp the product as if holding it (not gradually exploring it) and only for the time that it was visually present on the screen (i.e., 4 seconds). The haptic stimulus was placed directly behind the visual stimulus, which made grabbing quite easy while also creating a fairly realistic visuo-haptic experience. Aside from the haptic exposure, this condition was otherwise identical to the visual-only condition. Participants in both groups first completed a practice trial with a tomato soup can that they also grasped behind the screen (visuo-haptic group) or not (visual-only group). After the second and final trial, they answered several control questions, most of which were adapted from Labroo et al. (2008). See Table 1 for a list of measures and items.

Table 1. Measures and items used in the Pilot Study.

Measures administered after each trial	
Attitude toward the product ($r = .78$)	1 = dislike very much, very unlikely to buy; 7 = like very much, very likely to buy
Processing fluency ($\alpha = .87$)	1 = not at all attractive, not at all eye-catching, difficult to process; 7 = very attractive, very eye-catching, easy to process
Perceived ownership ($r = .89$)	I feel like I own the product, I feel a very high degree of personal ownership of the product (1 = strongly disagree; 7 = strongly agree)
Measures administered after the final trial	
Involvement in the task ($r = .66$)	1 = not at all involved, not at all engaged; 7 = very involved, very engaged
Task liking ($r = .69$)	1 = dislike very much, not at all interesting; 7 = like very much, very interesting
Task complexity	1 = very difficult; 7 = very easy
Mood	1 = feel very bad; 7 = feel very good
Coca-Cola preference ($r = .79$)	1 = dislike very much, buy never; 7 = like very much, buy very often

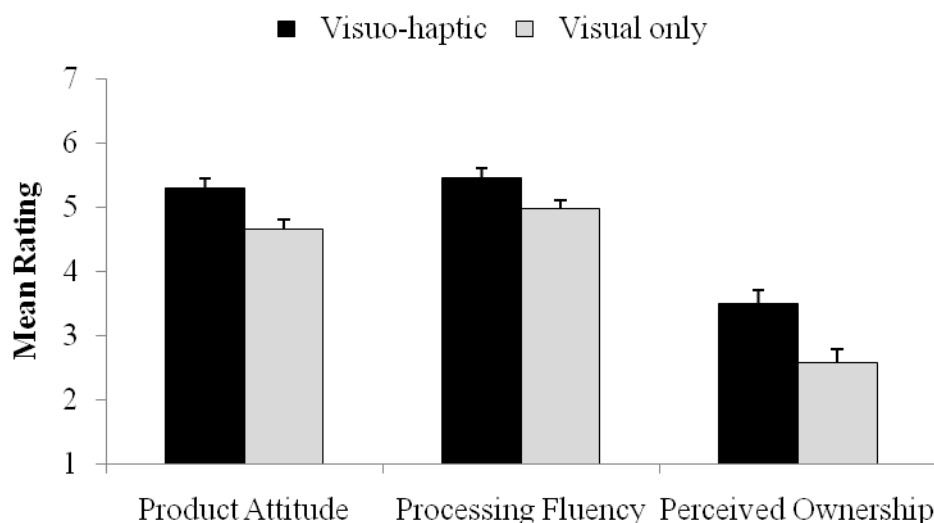
Results

Control factors. Debriefing revealed that none of the participants guessed the purpose of the study, and independent t-tests confirmed that the type of exposure had no significant effect on task involvement, task liking, task complexity, mood, or liking of Coca-Cola (all $p > .5$).

Product attitude, processing fluency, and perceived ownership. Participants' preference for Coca-Cola correlated significantly with product attitude ($r = .41, p < .01$), perceived fluency ($r = .23, p < .05$), and perceived ownership ($r = .30, p < .01$), so we included this preference factor as a covariate in all subsequent analyses. Indeed, this covariate remained significant in each of the three analyses (all $F > 6, p < .05$), but it did not interact with the exposure condition in any of them. In a preliminary analysis, data were analyzed via a 2 (condition: visual-only, visuo-haptic; between-participants) \times 2 (trial: first bottle, second bottle; within-participants)

mixed ANCOVA. However, there was no main effect or interaction involving the trial factor in attitudes, processing fluency, or perceived ownership (all $p > .28$). Thus, for simplicity, we averaged the data across the two product designs evaluated by each participant. After statistically controlling participants' preference for Coca-Cola, the type of exposure significantly affected product attitude [$M_{vi-ha} = 5.28$ vs. $M_{vi} = 4.64$, $F(1, 93) = 10.66$, $p < .01$, $d = .59$], processing fluency [$M_{vi-ha} = 5.45$ vs. $M_{vi} = 4.98$, $F(1, 93) = 6.5$, $p < .05$, $d = .50$], and perceived ownership [$M_{vi-ha} = 3.48$ vs. $M_{vi} = 2.59$, $F(1, 92) = 9.9$, $p < .01$, $d = .60$]. These evaluations are shown in Figure 2. Participants who grasped the Coca-Cola bottle reported significantly more positive attitudes toward the design, greater fluency of processing the design and greater perceived ownership of the product than participants who only viewed the designs.

Figure 2. Evaluations ($M + SE$) of product attitude, processing fluency, and perceived ownership of novel visual designs after visuo-haptic exposure to the bottle or after visual exposure only.



Mediation. We conducted a multiple mediation analysis with haptic exposure as the independent variable, processing fluency and perceived ownership as mediators and product attitude as the dependent variable. Preference for Coca-Cola was included as a covariate. Bootstrapping (Hayes, 2013, model 4; 10,000 samples) revealed that perceived fluency and perceived ownership jointly mediated the effect of grasping on product attitudes, as the total indirect effect through the two mediators was significant (bias-corrected 95% $CI = .0705-.3987$). The covariate, preference for Coca-Cola, also had a significant positive effect on product attitude, $B = .07$, $t(90) = 3.79$, $p < .001$. The direct effect of haptic exposure on product attitudes was nonsignificant, $B = .09$, $t(90) = 1.45$, $p > .1$, thus indicating full mediation.

Examining the specific indirect effects, we found indirect-only mediation for perceived fluency (Zhao et al., 2010). Controlling for haptic exposure, perceived fluency had a significant positive effect on product attitude (path b_1), $B = .83$, $t(90) = 11.53$, $p < .001$. The indirect path of grasping on product attitudes through perceived fluency was also significant ($CI = .0488-.3669$), indicating mediation. In contrast, controlling for haptic exposure, perceived ownership had no significant effect on product attitude (path b_2), $p > .1$, and the indirect path of grasping on product attitudes through perceived ownership was also nonsignificant ($CI = -.0055-.0948$), indicating no mediation. Moreover, the indirect effect of processing fluency (point estimate = .2027) was significantly larger than the indirect effect of perceived ownership (.0302), $CI =$

.0162–.3562. We also tested for serial mediation (Hayes, 2013, model 6), but in neither a fluency → ownership model nor an ownership → fluency model was the fit significantly improved over a model with fluency as the sole mediator. Hence, full mediation occurred through processing fluency, no mediation occurred through perceived ownership, and the indirect effect of processing fluency was significantly larger than the indirect effect of perceived ownership.

Discussion

Grasping a Coca-Cola bottle behind a screen increased liking and purchase intentions of novel visual designs of the bottle. Although touch was previously known to increase product evaluations and choice (Grohmann et al., 2007; Streicher & Estes, 2015), this Pilot Study provides the first demonstration that this *mere touch* effect may occur rapidly, with haptic exposure as brief as a few seconds, and with haptic exposure manipulated separately from the visual stimulus. Moreover, this study is also the first to demonstrate that processing fluency mediates the mere touch effect. Haptic exposure facilitates visual identification of objects (Pesquita et al., 2013; Reales & Ballasteros, 1999), and thus touching a product facilitates consumers' ability to think about the product, which in turn ultimately improves evaluations.

We found no evidence that this effect was mediated by perceived ownership. However, this result must be interpreted with caution, as our study was not designed to provide a strong test of this factor. Indeed, this experimental paradigm differed importantly from prior demonstrations of perceived ownership, in that the haptic and visual sources were spatially distinct in this study (i.e., the grasped object was located behind the viewed object). Moreover, although we did find that product touch increased perceived ownership (see also Peck & Shu, 2009; Shu & Peck, 2011), the brief haptic exposure in our paradigm may not have been sufficient for perceived ownership to develop fully as a processing mechanism in our study.

Although informative as an initial test of our predictions, this study has several important limitations. The studies reported in the main text (henceforth *main studies*) address these concerns with improved methods, as described next. (1) The haptic exposure in this study (4 seconds) may have been too brief for ownership perceptions to develop fully. Therefore, haptic exposure was doubled to 8 seconds in the main studies. (2) Because the haptic stimulus was located directly behind the visual stimulus in this study, it is unclear whether participants perceived these haptic and visual sources as truly distinct. Therefore, the haptic and visual stimuli were more clearly separated in the main studies. (3) In this study, participants in the visuo-haptic condition reached for and touched the haptic stimulus, whereas participants in the visual-only condition only viewed the stimulus. Thus it is unclear whether the observed effect was due to motor fluency from reaching, or visual fluency from touching. Therefore, in the main studies participants in both conditions placed their arms and hands in the same location, and only the haptic exposure differed. (4) This study measured as the primary dependent variable liking and purchase intentions, which are conceptually similar to some of the items in the processing fluency measure (see Table 1), thus raising concerns of whether the mediator and dependent variables are truly independent. The main studies instead measured actual product choice as the primary dependent variable, which is more conceptually distinct from the processing fluency measure. (5) This study measured processing fluency via subjective ratings only (as in Labroo et al., 2008). The main studies additionally include an objective measure of processing fluency, which validated the subjective measure. (6) Finally, this study measured perceived ownership via subjective ratings only (as in Peck & Shu, 2009), whereas willingness to pay (WTP) may be a preferred measure of ownership (Shu & Peck, 2011). Therefore, the main studies measure WTP (which is reported below).

Study 1: Additional Measures and Analyses

Visual fluency. Subjective ratings of processing fluency assume that participants are aware of the ease of their own cognitions, but haptic priming may occur unconsciously (Streicher & Estes, 2015). We therefore tested whether our objective measure of fluency reliably predicted our subjective measure. To do this, we first subtracted the fluency scores for the left product from the fluency scores of the right product, so that negative and positive values respectively indicate greater fluency for the left or right product. We then used those relative fluency scores as the dependent variable (see Wänke & Hansen, 2015), with the first-named object as the independent variable. The raw values indicate that participants who named the left object first also rated the left object as more fluent ($M = -.36$, $SE = .18$), whereas participants who named the right object first rated the right object as more fluent ($M = +.72$, $SE = .30$). This difference was significant, $t(138) = 2.27$, $p < .05$, thus indicating that the objective fluency measure did indeed predict the subjective fluency ratings. This supports the validity of our subjective fluency ratings.

Willingness to pay. We also included WTP as a control measure, because touching a product can increase the sense of ownership, which is often evident as increased WTP (e.g., Florack et al., 2014; Peck et al., 2013; Peck & Shu, 2009; Shu & Peck, 2011). In the present study, however, the touched product was physically distant from the seen product, and thus any perceived ownership from touching the source object should not transfer to the target object. Consequently, we expected no effect of haptic exposure on WTP. Nonetheless, at the end of the Study 1 procedure, participants reported their WTP for both of the viewed products (see Table 1 in the main text for item wording). A 2 (product: left, right) \times 2 (group: visual-only, visuo-haptic) mixed ANOVA revealed no significant interaction ($p = .24$) or main effect (both $p > .08$). As expected, grasping one product had no effect on WTP for a haptically similar product in a different location.

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