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Making Online Products More Tangible: The Effect of Product Presentation Formats on Product Evaluations

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Abstract

Although several studies have looked at the effects of online product presentations on consumer decision making, no study thus far has considered a potential key factor in online product evaluations: tangibility. The present study aims at filling this gap by developing and testing a model that relates different online product presentation formats to the three-dimensional concept of product tangibility. We test how the three tangibility dimensions influence perceived diagnosticity and, eventually, online purchase intentions. A between-subjects lab experiment ($n = 366$) was used to test the hypothesized effects of three common online product presentation formats (pictures vs. 360 spin rotation vs. virtual mirror). The results showed that out of these formats, virtual mirrors were superior in providing a sense of product tangibility, followed by the 360-spin rotation format and static pictures. Furthermore, in terms of predictive validity, two of the three tangibility dimensions significantly increased perceived diagnosticity, which, in turn, positively and strongly affected purchase intentions. Overall, our results add to previous works studying the relationships between online product presentation formats and consumer decision making. Also, they hold value for online practitioners by highlighting the potential benefits of applying technologically advanced product presentation formats such as the virtual mirror.

Introduction

ALTHOUGH THE INTERNET has been embraced as a shopping channel over the past two decades, the fact that consumers cannot feel, touch, or try products in web store environments remains an obstacle,[1,2] especially for the sales of physically tangible products.[3,4] Tangible product qualities, such as material, texture, fit, workmanship, and quality, are important evaluation criteria for consumers,[4] but they are difficult to assess online, because online shopping channels lack the opportunity for actual physical product trial.[5] According to the literature, a lack of tangibility may have several negative consequences for consumers, such as a greater difficulty of evaluation,[6–8] greater perceived processing effort,[9] higher risk perceptions,[3] and lower levels of customer engagement.[10] Thus, it appears that making good decisions based only on mediated representation of products is difficult for consumers, which is reflected by relatively high return rates for online shopping.[11]

The objective of this article is to answer the question as to whether a possible way to overcome the intangibility constraint of the online shopping channel lies in product presentation. There are currently many different product presentation formats that are available and implemented by online retailers. Plain text and static pictures have been around since the early days of online shopping, and are still widely used, but richer, more dynamic, and more interactive presentation formats, such as 360-spin rotation tools and virtual mirrors, are also implemented online. In this article, we propose and empirically test a model that relates three online product presentation formats (pictures vs. 360 spin rotation vs. virtual mirror) to product tangibility. As a way to test the predictive validity of this structure within the product evaluation and purchase process, the subsequent effects of tangibility on perceived diagnosticity and thus of online purchase intentions are also tested.

Our study contributes to research on online shopping in three important ways. First, although previous research has acknowledged that product presentation formats may help consumers in their decision-making process,[12–15] the role of tangibility as a mediating factor in this process has been overlooked. This is remarkable given the fact that intangibility has been noted as a significant obstacle in online shopping, research,[6,7,16,17] and practice. Second, we contribute to prior research on tangibility by linking it to perceived diagnosticity, thereby unraveling the process of why tangibility is of

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influence in online consumer decision making. An understanding of (in)tangibility has recently been emphasized as a research priority for scholars in several fields.[5,18,19] Finally, we focus on the role of three presentation formats as determinants of tangibility. Research so far has been looking at the lack of tangibility in online settings and its impact[3,18] but not at how to create perceptions of tangibility in an online setting.

Tangibility

Based on the work of Laroche et al.,[7,16,17] we consider tangibility to be a multidimensional construct, consisting of the dimensions of mental tangibility, physical tangibility, and specificity. *Mental tangibility* reflects the ease with which a customer can mentally comprehend a product and can have a clear mental representation of it. *Physical tangibility* refers to the extent to which a product has a physical presence and is accessible to the senses. *Specificity* equals and refers to the customer's ability to precisely define or describe identifiable characteristics, features, or outcomes of a product. Although a lack of tangibility has been associated mostly with services, physical products also become less tangible when offered via computer-mediated channels such as the Internet.[3,5] Therefore, studying this concept in the context of online consumer decision making is highly relevant.[18]

It seems plausible to assume that different online product presentation formats are likely to vary in the extent to which they elicit perceptions of product tangibility. Richer and more interactive product presentation modes provide consumers with relevant cues about the functionality of a product, and they allow consumers to actively investigate a product and its features.[10,20] Such information is expected to be important for consumers to (a) form a clear mental representation of the product and its uses,[21] (b) get a sense of the physical characteristics of the product,[22] and (c) generate insight into the specific identifying characteristics of the product.[7] To test this premise, we will compare three product presentation formats, ranging from a rather traditional, static format (still pictures), through a moderately dynamic and rich format (360 spin rotation), to a highly rich and dynamic format that emulates actual product trial (virtual mirror). We expect that mental tangibility (H1), physical tangibility (H2), and specificity (H3) are elicited more by virtual mirrors, compared with a 360-spin rotation tool, which, in turn, is expected to generate higher levels of all three dimensions of tangibility than static pictures.

Perceived diagnosticity

Tangibility may play an important role in how consumers process products that are encountered in e-commerce environments. Kempf and Smith[23] have created a model of how consumers process and respond to product trial. They have identified perceived diagnosticity, which refers to the extent to which consumers believe a shopping experience is helpful for product evaluations,[23] as a key factor in this process. Although this construct was developed to reflect consumers' processing of physical product trial, it is also useful in the context of online shopping where it refers to the level to which consumers feel the virtual product trial delivers relevant product information, and aids in evaluation and understanding of a product and its uses.[22]

All three dimensions of tangiblility may increase consumers' perceived diagnosticity. When consumers have a clear mental grasp of a product, feel like the physical aspects of that product are accessible to the senses, and understand the specific qualities of the product, they are more likely to feel like the shopping experience has provided them with product information that assists in product evaluation. Thus, we hypothesize that higher levels of mental (H4) and physical (H5) tangibility and specificity (H6) increase perceived diagnosticity.

Furthermore, we expect perceived diagnosticity to have an impact on purchase intentions. When consumers believe that their shopping experience has increased their understanding of a product, they may feel more capable of making an informed purchase decision.[22] This reasoning is in line with prior research[24,25] that shows that when consumers feel well informed about a product, they are more likely to continue to purchase that product. Based on what has been mentioned earlier, we expect higher levels of perceived diagnosticity to increase purchase intentions (H7, for an overview of the conceptual model, see Fig. 1).

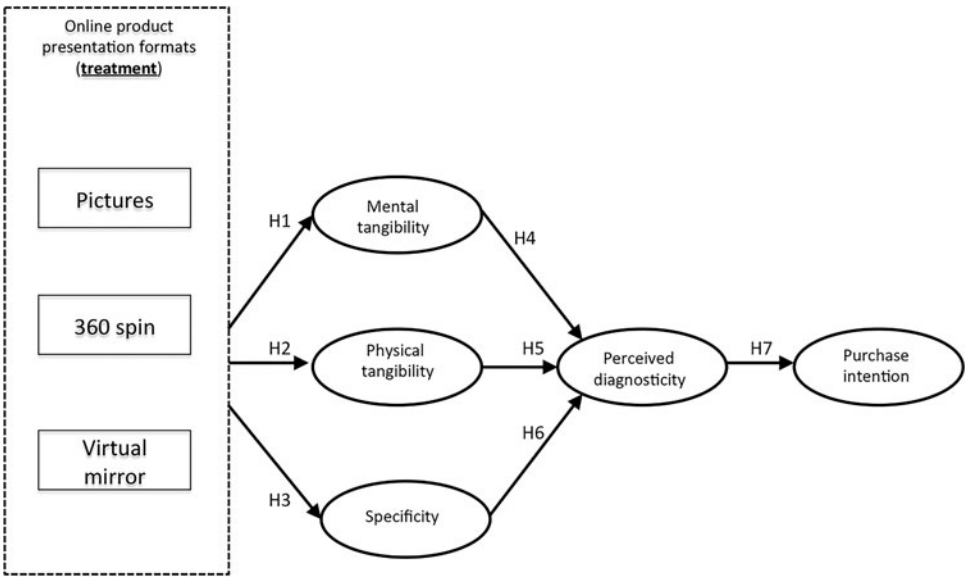

FIG. 1. Conceptual model.

Methods

Experimental design

To test our hypotheses, we conducted a between-subjects lab experiment. During this experiment, participants were asked to complete a shopping task on the Web site www.Ray-Ban.com. This task consisted of inspecting five pairs of sunglasses on this Web site and choosing a favorite pair. To control for confounding effects due to exposure to different sunglass models, we limited the number of models available to participants by pre-selecting five pairs of glasses for women, and five pairs of glasses for men.

Subjects were randomly assigned to one of the following three treatments: They viewed the sunglasses on the site via pictures, a 360-spin rotation tool, or a virtual mirror. In the pictures condition, participants viewed the sunglasses by looking at static pictures. In the 360-spin condition, participants could use their mouse to rotate images of the glasses on screen and could, thus, view the sunglasses from different angles. In the virtual mirror condition, participants could virtually try the five pairs of glasses via the virtual mirror application on the Web site, with the use of a web cam. This application projected a selected pair of glasses over the web cam image of participants' facial features, which allowed participants to see how the glasses looked on their own face, in real time, and from various angles. After participants selected their favorite pair from the pre-selected set of sunglasses, they filled out a post-test questionnaire.

Measurements

The post-experimental questionnaire was designed using multi-item scales validated in prior research. All scale items were measured on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree) using three items per construct. The scales for mental tangibility, physical tangibility, and specificity were based on the work of Laroche et al.[7,16] Perceived diagnosticity was measured using a scale developed by Jiang and Benbasat[10] and Kempf and Smith.[23] Finally, purchase intention was measured based on the work of Verhagen and Van Dolen (Table 1).[26]

Sample

The experiment was conducted at a mid-sized university in Netherlands. In total, 366 undergraduate students participated in the lab experiment. Of the participants, 48.6 percent (178) was male, and 51.4 percent (188) was female; the mean age in our sample was 22.68 years ($SD = 5.19$ years). The majority of the participants (316, 86.3 percent) rated themselves as ''somewhat experienced'' to ''very experienced'' with online shopping, whereas 50 participants (13.7 percent) rated themselves as ''inexperienced'' or ''very inexperienced'' in terms of online shopping. Most of the participants (339, 92.6 percent) knew the Ray-Ban sunglass brand before taking part in the study, and about one-third of the participants was in possession of a pair of Ray-Ban sunglasses (124, 33.9 percent).

Data Analysis and Results

Test of measures

The data were analyzed using IBM SPSS and IBM SPSS AMOS 20. A Confirmatory Factor Analysis was conducted to assess adequacy of the measurement model. Goodness-of-fit statistics exceeded the cutoff values recommended (CMIN = 165.73, df = 80; CMIN/df = 2.07; GFI = 0.95; AGFI = 0.92; NFI = 0.97; CFI = 0.98; TLI = 0.98; IFI = 0.98; RMSEA = 0.05).[27,28] As all Cronbach's alphas exceeded 0.70, measurement reliability also was considered acceptable. Furthermore, evidence for convergent validity was provided by the significant loadings of each item to its latent construct.[29] The standardized factor loadings of all items ranged from 0.70 to 0.98 and were, thus, higher than the recommended cutoff value of 0.70.[30] The average variance extracted (AVE) exceeded 0.50 for each of the constructs, and all AVEs were larger than the squared cross-construct correlations, thereby showing adequate convergent and discriminant validity.

Test of structural model

To test the effects of our experimental conditions, a unifactor multivariate analysis of variance (MANOVA) (pictures vs. 360 spin vs. virtual mirror) was conducted, using the tangibility dimensions *mental tangibility*, *physical tangibility*, and *specificity* as dependent variables. This analysis showed significant differences between the product presentation formats for each of the dependent variables. First, perceived mental tangibility significantly differed for participants in the picture, 360-spin, and virtual mirror conditions [$F(2, 363) = 42.36$, $p < 0.001$, $\eta^2 = 0.19$]. Post hoc analysis showed that participants in the virtual mirror condition perceived higher levels of mental tangibility ($M = 5.69$, $SD = 0.81$) compared with participants in both the picture ($M = 4.29$, $SD = 1.48$) and the 360-spin condition ($M = 5.08$, $SD = 1.19$; $p < 0.001$ and $p < 0.001$, respectively). There was also a significant difference in perceptions of mental tangibility between the picture and 360-spin conditions ($p < 0.001$), in the expected direction. According to these results, H1 was accepted.

Second, physical tangibility significantly differed for participants in the picture, 360-spin, and virtual mirror conditions [$F(2, 363) = 72.67$, $p < 0.001$, $\eta^2 = 0.29$]. Post hoc analysis showed that participants in the virtual mirror condition perceived higher levels of physical tangibility ($M = 5.06$, $SD = 1.57$) compared

Table 1. Descriptive Statistics of Study Variables ($n = 366$)

	Total (n = *366*)	*Pictures* (n = *122*)	*360-spin* (n = *122*)	*Virtual mirror* (n = *122*)
Mental tangibility	5.02 (1.32)	4.29 (1.48)	5.08 (1.19)	5.69 (0.81)
Physical tangibility	3.73 (1.81)	2.79 (1.53)	3.34 (1.50)	5.06 (1.57)
Specificity	4.76 (1.32)	4.10 (1.45)	4.69 (1.11)	5.48 (0.97)
Perceived diagnosticity	5.11 (1.22)	4.30 (1.24)	5.20 (1.05)	5.84 (0.78)
Purchase intention	3.98 (1.41)	3.39 (1.42)	3.93 (1.35)	4.63 (1.17)

Note: Standard deviations are shown in parentheses.

with participants in both the picture ($M = 2.79$, $SD = 1.15$) and the 360-spin condition ($M = 3.34$, $SD = 1.50$; $p < 0.001$ and $p < 0.001$, respectively). There was also a significant difference in physical tangibility between the picture and the 360-spin condition ($p < 0.05$), as expected, thereby confirming H2.

Third, specificity significantly differed for participants in the picture, 360-spin, and virtual mirror conditions [$F(2, 363) = 40.67$, $p < 0.001$, $\eta^2 = 0.18$]. Post hoc analysis showed that participants in the virtual mirror condition perceived higher levels of specificity ($M = 5.48$, $SD = 0.97$) compared with participants in both the picture ($M = 4.10$, $SD = 1.45$) and the 360-spin condition ($M = 4.69$, $SD = 1.11$; $p < 0.001$ and $p < 0.001$, respectively). There was also a significant difference in specificity between the picture and 360-spin conditions ($p < 0.001$), in the expected direction. Thus, we can accept H3.

To test the remainder of our conceptual model, we used a structural equation modeling approach. The analysis demonstrated that the model fitted the data well (CMIN = 202.38, df = 83, CMIN/df = 2.44; GFI = 0.93; AGFI = 0.90; NFI = 0.96; CFI = 0.97; TLI = 0.97; IFI = 0.97; RMSEA = 0.063). The structural model showed that all of the remaining hypotheses were accepted, except for H6. As expected, higher levels of mental and physical tangibility significantly increased perceptions of diagnosticity (respectively $\beta = 0.43$, $p = 0.001$ and $\beta = 0.22$, $p = 0.01$), thus confirming H4 and H5. In total, 51 percent of the variance in perceived diagnosticity was explained by these factors. However, contrary to H6, specificity did not significantly affect perceived diagnosticity ($\beta = 0.13$, *ns*). In line with H7, we found that perceived diagnosticity increased participants' purchase intentions ($\beta = 0.52$, $p < 0.001$; $R^2 = 0.27$).

Discussion and Conclusion

The results of our experimental lab study render two main findings. First, our data demonstrate that online product presentation formats may help to make products perceived as more tangible, which, in turn, facilitates product evaluations and aids consumers in making more informed online purchase decisions. The validation of the concept of tangibility as an explanatory mechanism within our model contributes to previous works studying the effects of online product presentation on consumer decision making.[2,15] Unlike previously assumed direct effects,[10] it suggests a richer, more comprehensive view of the process, by applying the multidimensional concept of tangibility as a mediator.

Second, our results provide first evidence of the role of tangibility as a determinant of perceived diagnosticity, that is, the feeling of experiencing (more) relevant product information and being aided in online product evaluation.[22] As such, it extends prior research on tangibility in online settings where the main focus has been on how (in)tangibility leads to difficulty of evaluation and higher risk assessments.[6,7,16,17] Following central propositions in information processing theory[31] and risk processing theory,[32] however, consumers rely on both risks/costs and benefits when making judgments. As tangibility seems to be able to influence risks/costs and, as we demonstrated, also provides benefits associated with online buying, we may conclude that tangibility does play a substantial role in the online consumer decision-making process. Our findings also hold value for online practitioners, who can apply technologically advanced product presentation formats such as the virtual mirror to facilitate more tangible online product experiences and thus influence the online buying process.

Researchers should not deduce from our findings, however, that all the three tangibility dimensions are of equal importance. Mental and physical tangibility did significantly influence perceived diagnosticity, whereas specificity did not show any effect in our study. A plausible explanation for this finding may come from the fact that the products that we focused on, that is, sunglasses, are highly hedonic in nature. Consumers tend to evaluate hedonic products rather holistically; they rely more on emotional processes to arrive at an overall impression of the product rather than on using cognitive processes to evaluate precisely identified characteristics, features, and outcomes.[33,34] Also, the sunglasses under study were from a well-known brand. Brands may fulfill symbolic roles for consumers, such as status and wealth,[35] and consumers may, therefore, rely much more on subjective, symbolic instead of objective product attributes when evaluating such products.[36]

This study has limitations that lead to new directions for further research. First, this study examined only one type of product. Future research could address whether the outcomes of our research model, and the influence of the tangibility components in particular, differ when extending our study to different types of products.[37] Second, like for most lab experiments, our study findings may be subject to sample bias. Although the homogeneity of the group of respondents may have added to the internal validity of our research, future research could test whether our findings also hold for other groups of respondents. Third, the theoretical framework that we used is heavily rooted in the rational view on online consumer behavior. Consumers might not always draw on product evaluations and purchase intentions, however, when buying online. When considering the increasing phenomenon of impulsive buying,[38] for example, emotions and felt urges to buy seem to form the backbone of the buying process.[26,39] Researchers could explore the influences of online product presentation formats and perceptions of tangibility on these impulsive processes.

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