

Creating Effective Online Customer Experiences

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Abstract

Creating effective online customer experiences through well-designed product web pages is critical to success in online retailing. How such web pages should look specifically, however, remains unclear. Previous work has only addressed a few online design elements in isolation, without accounting for the potential need to **adjust experiences to reflect the characteristics of the products or brands being sold**. Across 16 experiments, this research investigates how 13 unique design elements shape four dimensions of the online customer experience (informativeness, entertainment, social presence, and sensory appeal) and thus influence purchase. **Product (search vs. experience) and brand (trustworthiness) characteristics** exacerbate or mitigate the uncertainty inherent in online shopping, such that they moderate the influence of each experience dimension on purchases. A field experiment that manipulates real product pages on Amazon.com affirms these findings. The results thus provide managers with clear strategic guidance on how to build effective web pages.

Keywords

online customer experience, online design elements, online retailing, Taguchi design, web design

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With more than 350 million products listed on Amazon.com alone (360pi 2016), **success in the increasingly competitive online domain depends on sellers' ability to orchestrate verbal and visual stimuli (i.e., design elements) on product web pages** to effectively convert page visitors into buyers (Schlosser et al. 2006). Insights into which design elements make for effective product web pages are however still largely based on managers' intuitions or, at best, ad hoc A/B testing. Academic research typically focuses on a single design element or just a few across a limited number of products or brands. It also often neglects the mechanisms through which design elements affect purchase or employs theoretical perspectives (e.g., information processing) that conceptually limit their effects a priori to a single function (e.g., information transmission). Yet each encounter with a product web page—the virtual space that presents a product and illustrates its value to the customer—evokes a multidimensional experience that goes beyond a pure conveyance of factual information (Brakus, Schmitt, and Zarantonello 2009; Lemon and Verhoef 2016). The objective of this research is therefore to understand how online design elements shape multidimensional customer experiences to influence purchase and how these experiences should be customized depending on the products or brands sold.

The online customer experience at the heart of this research comprises a **customer's subjective, multidimensional psychological response to a product's presentation online**. We argue

that **this experience goes beyond cognitive (informativeness) and affective (entertainment) dimensions typically conceptualized in extant research** (Novak, Hoffman, and Yung 2000) and also **includes social** (social presence; Wang et al. 2007) and **sensory** (sensory appeal; Jiang and Benbasat 2007a) dimensions. Furthermore, we identify 13 web page design elements, such as product descriptions, photos, and comparison matrices, that each may help shape the online experience and are ubiquitous in a wide range of industries and web page formats. This multidimensional framework more closely resembles the conceptualization of offline experiences (Brakus, Schmitt, and Zarantonello 2009; Lemon and Verhoef 2016) and helps more accurately capture the mechanisms by which design elements affect product purchase.

How **effectively each experience dimension elicits purchases, however, may vary depending on characteristics of the offered products and brands** that exacerbate or alleviate the uncertainty inherent in online shopping (Bart et al. 2005; Schlosser et al. 2006). First, the degree to which consumers

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can evaluate a product solely on the basis of factual information (search qualities) rather than needing direct physical experience (experience qualities) implies the level of uncertainty associated with assessing that product online (Hong and Pavlou 2014). Second, customers may also be uncertain about the accuracy and truthfulness of sellers' product presentations, yet a brand's trustworthiness may alleviate this uncertainty (Pavlou, Liang, and Xue 2007). We leverage our multidimensional online framework of the online customer experience to investigate how these two primary sources of uncertainty determine the effects of each experience dimension on purchase (Dimoka, Hong, and Pavlou 2012).

To ensure the broad scope and generalizability of our research, we collaborate with a specialized online content agency and four Fortune 1000 firms, diverse in their industries, brands, and products (i.e., consumer packaged goods, consumer electronics, industrial electronics, and consumables). In Study 1, we conduct large-scale online experiments that involve 16 products from 11 brands, for which the online content agency created 256 unique "Amazon look-alike" product web pages. On these pages, we manipulated 13 design elements according to an orthogonal array design (Taguchi 1986) and then tested the pages among 10,470 randomly assigned respondents. With the resulting data, we estimate a joint model that isolates the relative influences of each design element on each dimension of the online customer experience, the relative effects of each experience dimension on purchase, and the moderating influences of product type and brand trustworthiness on the effects of the dimensions on purchase. A field experiment in Study 2 tests these effects with real Amazon product pages, on which we used design elements to create specific experiences to observe the effects on sales.

We offer three main contributions to the literature. First, data from 16 experiments in Study 1 expand insights into online customer experiences and identify four dimensions—namely, informativeness, entertainment, social presence, and sensory appeal—that act as the underlying mechanisms by which design elements influence purchase (Novak, Hoffman, and Yung 2000; Rose, Clark, and Hair 2012). Prior online research has mainly focused on informativeness and entertainment; however, we show that the effects of social presence are just as strong as those of informativeness, and sensory appeal offers additional insights. Second, we find that uncertainty about the offered product and its seller's brand influences the effects of the customer experience dimensions on purchase. Using actual product web pages on Amazon.com, a field experiment in Study 2 validates the lab results to show that search products benefit from a more informative experience but experience products benefit from a more social experience. Third, we establish an online customer experience "design guide," with actionable advice for marketers on how to strategically orchestrate design elements to shape effective online experiences in an era of increased web design importance (Wolfenbarger and Gilly 2003). Specifically, we depict how to evaluate the design elements that currently constitute their digital inventory, which new elements to invest in and develop,

and how to negotiate and assess contracts for premium content with online retailers.

Dimensions, Moderators, and Antecedents of the Online Customer Experience

In contrast with brick-and-mortar retail, customers assess products online not through physical interaction but through verbal and visual stimuli (design elements) deployed on product web pages. A broad stream of research conceptualizes offline experiences as consisting of multiple, separate, but related dimensions (e.g., cognitive, affective, sensory, social, physical) (Brakus, Schmitt, and Zarantonello 2009; Lemon and Verhoef 2016; Schmitt 1999; Verhoef et al. 2009). Yet research has treated *online experiences far more simplistically* (Novak, Hoffman, and Yung 2000; Steenkamp and Geyskens 2006), often a priori limited to their informativeness (see Table 1).

In line with the four basic systems—cognition, affect, relationships, and sensations—commonly studied in psychology and sociology (Anderson 1985; Pinker 1997), we conceptualize the online customer experience as consisting of four dimensions: informativeness (cognitive), entertainment (affective), social presence (social), and sensory appeal (sensory). Consistent with our multidimensional perspective, we do not expect a one-to-one relationship between any specific design element and an experience dimension (Brakus, Schmitt, and Zarantonello 2009).

We next introduce and review each dimension of the online customer experience. Then, we explain why the influence of each dimension on consumers' purchase decisions might depend on the uncertainty associated with specific products or brands. Finally, we present the design elements that managers can use to build product web pages to shape customer experiences (see Figure 1).

Dimensions of the Online Customer Experience

Defined as "the extent to which a website provides consumers with resourceful and helpful information" (Lim and Ting 2012, p. 51), *informativeness* is the primary cognitive dimension of the online customer experience. It captures a web page's contribution to helping the consumer make a pending purchase decision, which involves thinking, conscious mental processing, and, typically, problem solving (Gentile, Spiller, and Noci 2007). Informativeness captures the functional aspect and value of the experience to the customer (Verhoef et al. 2009) and is generally impersonal, outcome oriented, and objective (Schlosser, White, and Lloyd 2006). This fact-based dimension pertains to the information that remains after interacting with a web page, which can improve attitudes toward a website (Hausman and Siekpe 2009; Hsieh et al. 2014).

Customer interactions with products online can evoke affective responses and might be enjoyed for their own sake, without regard for functional considerations. *Entertainment*, or the immediate pleasure the experience offers, regardless of its ability to facilitate a specific shopping task (Babin, Darden, and

Table 1. Relevant Research on the Effectiveness of Design Elements on Product Web Page Performance.

Studies	Categorization of Design Elements Based on Form										Theoretical Perspective	Tested Underlying Mechanisms (Design Element Function)	Product Web Page Performance	Key Findings	
	Verbal Elements					Visual Elements									Combined Verbal and Visual Elements
	Linguistic Style	Descriptive Details	Bulleterted Features	Return Policy Information	Product Feature Crop	Lifestyle Picture	Picture Size	Product Video	Expert Endorsement	Comparison Matrix					
Cooke et al. 2002	✓								✓	Information processing	None	Product evaluation	When unfamiliar products are presented independently, additional descriptive detail improves product evaluations. When presented alongside other attractive products from a recommendation agent, descriptive detail worsens product evaluations.		
Häubl and Trifts 2000				✓					✓	Information processing	None	Purchase decision quality	The use of recommendation agents and comparison matrices decreases the size but increases the quality of customers' consideration sets and also improves purchase decision quality.		
Hauser et al. 2009	✓								✓	Information processing	None	Purchase intentions	Website content can be customized through the strategic selection of design elements to maximize purchase intentions, based on customer information-processing styles inferred from past browsing behaviors.		
Huang, Lurie, and Mitra 2009				✓					✓	Information processing	Search depth (time spent on website)	Likelihood of product purchase	Customer star ratings, expert endorsements, and multimedia presentations (e.g., product videos) are more effective for experience than search goods in driving purchase.		
Ludwig et al. 2013	✓								✓	Information processing	None	Conversion rates	Linguistic style can signal a customer's similarity to other customers of a product, which can influence purchase.		
Roggeveen et al. 2015							✓			Vividness	Sensory appeal	Product preference, willingness to pay	Product videos increase a web page's vividness and create experiences that mimic real products, ultimately enhancing customers' preferences and willingness to pay.		
Shi and Zhang 2014									✓	Information processing	None	Consumer price and promotion sensitivity	Recommendation agents vary in effectiveness, depending on the customer's past experience and decision processes.		
Song and Zinkhan 2008	✓								✓	Social presence (interactivity)	Website communication, controllability, responsiveness	Website effectiveness (satisfaction, loyalty, attitude, quality)	Content filters that hinder access to information on a website can reduce responsiveness of the site. A more conversational linguistic style increases perceptions of the website as communicative, controllable, and responsive, which enhance perceptions of website effectiveness.		
Wang et al. 2007	✓						✓			Social presence (social response theory)	Website socialness, pleasure and arousal, and flow	Website patronage intentions	Social presence, website informativeness, and entertainment are key dimensions of the online experience that interact to increase patronage intentions. More conversational linguistic styles can increase perceived social presence and encourage purchases.		
Zhu and Zhang 2010									✓	Unspecified	None	Product demand	The influence of customer star ratings on product demands is weaker for popular products and for products designed for offline use.		
This study	✓	✓	✓	✓	✓	✓	✓	✓	✓	Multidimensional customer experience	Informativeness, entertainment, social presence, sensory appeal	Product purchase	Design elements can be used to create four distinct experience dimensions (informativeness, entertainment, social presence, and sensory appeal) that vary in the degree to which they influence purchase, based on a product's search versus experience qualities and the trustworthiness of the brand.		

Notes: To derive a list of relevant research, we examined articles pertaining to online product marketing published in the last ten years in *Journal of Marketing Research*, *Journal of Marketing Science*, and *Journal of Consumer Research*. To be included, the research needed to be empirical in nature and focus on product web page design elements available to manufacturers that sell through a retailer website. We exclude studies of retailer-controlled website design elements (e.g., navigation), email marketing, online advertising, word of mouth, or search.

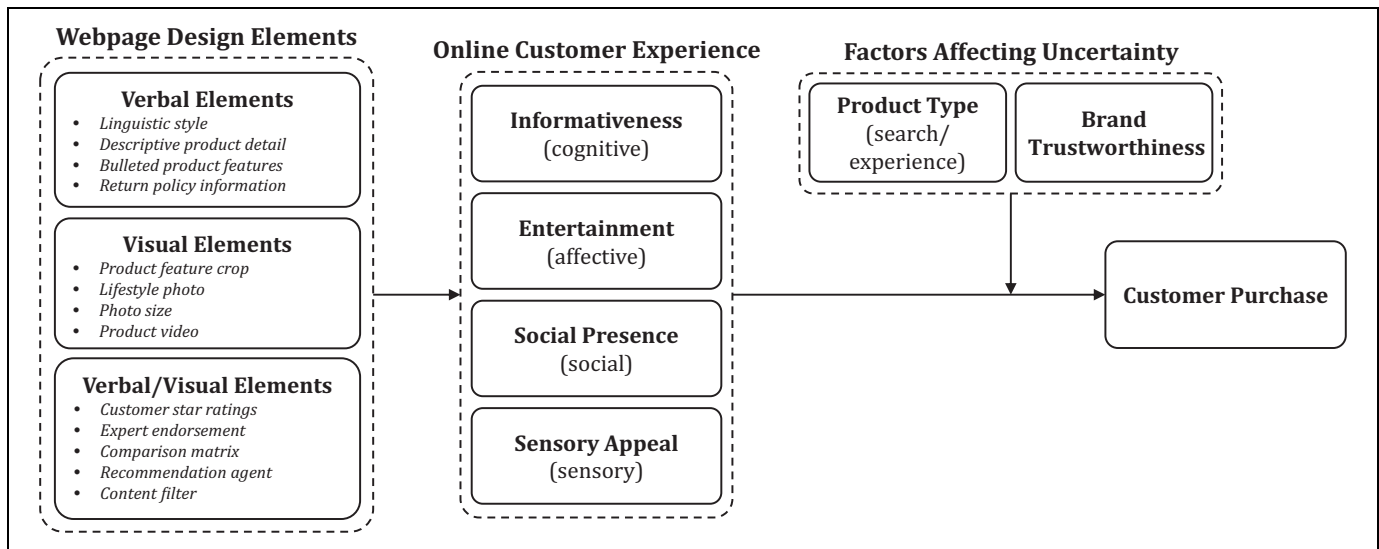


Figure 1. Designing the online customer experience.

Notes: Constructs in italics were experimentally manipulated across 16 products and 11 brands. $N = 10,470$.

Griffin 1994), is thus a key dimension of the online customer experience. *Entertainment* reflects an appreciation for the “spectacle” experienced on the web page, involves the fun and play of online shopping, and accords more than just an achievement-oriented purchase opportunity (Childers et al. 2001; Mathwick, Malhotra, and Rigdon 2001). As such, entertainment can trigger arousal in web page visitors (Hsieh et al. 2014) and reduce cart abandonment in online stores (Kukarkinney and Close 2010).

To match the benefits of offline experiences, online sellers increasingly work to provide a sense of social presence on their web pages (Wang et al. 2007). *Social presence* refers to the warmth, sociability, and feeling of human contact that a web page confers (Gefen and Straub 2003). Extant research shows that the social presence of a website can increase perceived tangibility and feelings of psychological closeness to a product (Darke et al. 2016). It can also increase pleasure, arousal, and flow during online shopping (Wang et al. 2007), as well as purchase intentions (Hassanein and Head 2007) and loyalty (Cyr et al. 2007).

Finally, the sensory component of the customer experience includes aspects that stimulate sight, sound, smell, taste, or touch (Gentile, Spiller, and Noci 2007). Zajonc (1980) suggests that sensory-level processing and retrieval occurs automatically and drives preferences. In an online environment, *sensory appeal* refers to “the representational richness of a mediated environment as defined by its formal features” (Steuer 1992, p. 81) or the way a web page stimulates the senses. Perception of beauty and aesthetically pleasing stimuli are part of sensory appeal (Schmitt 1999). Although the online environment limits the scope of sensory experiences, sensations can be evoked through imagery (e.g., pictures, videos) (Elder et al. 2017). Thus, sensory appeal can affect perceptions of product

performance (Weathers, Sharma, and Wood 2007) and purchase intentions (Schlosser 2003).

Uncertainty and the Moderating Role of Product Type and Brand Trustworthiness

Online shopping often comes with uncertainties that do not arise offline and that might affect how certain experience dimensions influence purchase (Dimoka, Hong, and Pavlou 2012; Pavlou, Liang, and Xue 2007). First, online, customers cannot touch and feel the merchandise in which they are interested, which can create uncertainty in product assessment before purchase (Kim and Krishnan 2015). This uncertainty tends to be more severe for experience products, for which the most relevant attributes are discoverable only through direct physical contact, than for search products, whose most relevant attributes are assessable from presented information without physical interaction (Hong and Pavlou 2014; Weathers, Sharma, and Wood 2007). How consumers attend to and interpret product information differs between search and experience products (Huang, Lurie, and Mitra 2009). Thus, the most effective type of experience for selling these two types of products might also differ. For example, Weathers, Sharma, and Wood (2007) show that web pages that appeal to the senses may be more beneficial for experience products, whose evaluation requires sensory information.

Second, the physical separation between customers and products requires customers to have faith in the accuracy and truthfulness of the product web page. Yet they may experience uncertainty about online sellers’ ability and integrity to convey product information, depending on the trustworthiness of the seller brand (Pavlou, Liang, and Xue 2007). Trust reflects the “willingness to rely on an exchange partner in whom one has

confidence” (Moorman, Zaltman, and Deshpande 1992, p. 315). A significant stream of research shows the importance of trust online (Urban, Sultan, and Qualls 2000), in which sellers’ trustworthiness determines customers’ research and purchase decisions (Gefen, Karahanna, and Straub 2003; Hoffman, Novak, and Peralta 1999). Trust online is also closely connected with web design (Shankar, Urban, and Sultan 2002; Urban, Amyx, and Lorenzon 2009). Several studies suggest that low trustworthiness can be overcome through purposeful web page design (Schlosser, White, and Lloyd 2006; Wang, Beatty, and Foxx 2004) or by customizing content to customers’ preferences (Urban et al. 2009). Specific experience dimensions might also be instrumental to alleviating low trustworthiness. Bart et al. (2005) show that entertaining online experiences may compensate for an initial lack of trust in a brand. Social presence may serve a similar purpose (Gefen and Straub 2003). Extant work suggests that the product- and brand-related uncertainty inherent in online shopping can influence the effects of experience dimensions on purchase. We thus focus our moderation analysis on product type and brand trustworthiness as the respective primary determinants of these two types of uncertainty (Hong and Pavlou 2014; Pavlou, Liang, and Xue 2007), instead of other product, brand, or service attributes.

Design Elements That Create the Online Customer Experience

The product web page is at the heart of the online customer experience. It consists of basic design elements, defined as verbal and/or visual stimuli that provide the building materials for any given page. To identify the most important elements, we reviewed ten years of research on website design published in *Journal of Marketing*, *Journal of Marketing Research*, *Marketing Science*, and *Journal of Consumer Research*, as well as various specialized journals. Our focus was on design elements that relate directly to the product presentation and are typically available to firms selling through retailers such as Amazon; we excluded *structural* elements, such as navigation, menus, icons, and overall organization, that operate at the *website* level and are under the control of the host retailer. Although they operate through many aliases, we identified 13 elements that we classify by their form (see Appendix A) into three groups: verbal elements that use text and typographical features, visual elements that use images and pictures, and combinations of both. Table 1 summarizes research on each of these 13 design elements.

Verbal elements. Verbal elements involve the written word. In this category, we consider *linguistic style*, *descriptive detail*, *the number of bulleted features*, and *return policy information statements*. The most basic aspect of textual elements is the way information is presented. The *linguistic style* in which verbal content is conveyed or the characteristics of the text—including word choice and use of questions, certain pronouns (you, your), and adjectives—can affect product conversions

and consumer perceptions of website effectiveness (Ludwig et al. 2013; Song and Zinkhan 2008). Song and Zinkhan (2008) provide preliminary evidence that these effects occur through the *impact of linguistic style on social presence*. To capture the degree of elaboration of the product descriptions on a web page, we examine *descriptive detail*. Providing more attribute information generally increases product evaluations and purchase likelihood (Cooke et al. 2002; Hauser et al. 2009). The *number of bulleted features* indicates how many product features appear in an abbreviated list at the top of the web page. Though prevalent on many product web pages, to our knowledge, research has not empirically investigated its effects on purchase. *Return policy information* refers to whether the web page contains information about the terms by which customers may return the product.

Visual elements. Visual elements subsume all content presented in photographic or illustrated form and can convey symbolic meaning and pictorial information (Scott 1994). We investigate feature crops, lifestyle photos, photo size, and product videos. Unlike pictures of the product as a *whole*, *feature crops zoom in on a key product feature that would otherwise not be visible*. *Lifestyle photos* connect the product with customers’ lives, such as by depicting people using it or living with it in a regular setting. They explicitly capture or imply human interaction with the product (Babin and Burns 1997). We also investigate *photo size*. Park, Lennon, and Stoel (2005) show that larger product images can increase purchase intentions. Finally, a *product video can demonstrate the product and its key features*. Videos including human voices can serve as cues for human characteristics and influence perceptions of social presence and sensory appeal (Moon 2000; Roggeveen et al. 2015).

Combined verbal and visual elements. Customer star ratings, expert endorsements, comparison matrices, recommendation agents, and content filters all combine verbal and visual qualities. *Customer star ratings* are aggregations of user-generated product ratings, depicted visually with a series of stars and next to the total number of reviews (Chevalier and Mayzlin 2006). *Expert endorsements* are also product evaluations, but assembled from distinguished experts in the category, such as product testing firms, and generally include a graphic depiction, such as a seal (Ansari, Essegai, and Kohli 2000). *Comparison matrices* are tables to compare the focal product with other products from the same category on multiple characteristics. Product information is typically presented as pictures of alternatives (columns) and text describing attributes (rows). *Recommendation agents* combine verbal and visual information to generate a list of alternatives to the focal product (Lamberton and Stephen 2016). Comparison matrices and recommendation agents can improve purchase decision quality (Häubl and Trifts 2000; Knott, Hayes, and Neslin 2002). *Content filters*, such as “show more” buttons, allow customers to dictate what, when, and how much verbal and visual content appears on the web page (Hauser et al. 2009; Mathwick and Rigdon 2004). Of the combined elements, star ratings have received most empirical

attention, though studies typically test their effects directly on purchase, without considering underlying mechanisms (Chevalier and Mayzlin 2006; Hauser et al. 2009; Ludwig et al. 2013; Zhu and Zhang 2010). Table 1 shows evidence for the effects of design elements on purchase, while the underlying mechanisms remain mostly unclear.

Testing Product Web Page Design, the Online Customer Experience, and Purchase

We extend research on design elements and the online customer experience with two studies. In Study 1, we aim to (1) understand the relative importance of each of the four online customer experience dimensions as key mediators in the relationship between web page design elements and customer purchase, (2) determine which of the 13 design elements are most useful in creating each experience dimension, and (3) assess how product type and brand trustworthiness influence the effects of the experience dimensions on purchase. In Study 2, we manipulate real Amazon product pages from the insights gleaned from Study 1 to assess the effects on actual sales.

Study 1: Design, Dimensions, and Implications of Online Customer Experiences

We partnered with four Fortune 1000 firms in multiple industries (i.e., consumer packaged goods, consumer electronics, industrial electronics, and consumables) (Appendix B) and tested our conceptual model with 16 products (4 per firm), representing 11 brands. Together with a specialized online content agency, we designed and created mock Amazon product web pages for each product that varied the 13 design elements on two levels each, according to an orthogonal array design (Taguchi 1986). On Amazon.com, vendors can select from a range of module templates and then manage the content of each module within the retailer's restrictions. Appendix C shows an example web page.¹

Experimental Stimuli

Appendix A provides a summary of the two manipulated levels for each of the 13 design elements. For verbal elements, we manipulated *linguistic style* as either a journalistic tone (Level 1) or conversational tone (Level 2). For the journalistic tone, the neutral product descriptions featured few or no adjectives, no self-relevant words (e.g., “you,” “your”) (Carmody and Lewis 2006; Song and Zinkhan 2008), no questions, and no exclamation points. For the conversational tone, the descriptions were more engaging and included adjectives, self-relevant words, words that insinuate instantaneous gratification (e.g., “fast,” “instant,” “quickly”), and self-reflective questions (e.g., “Wouldn't it be great to have high-speed Internet

everywhere?”) (Ahluwalia and Burnkrant 2004; Ludwig et al. 2013). Although linguistic style determines *how* product descriptions convey information, it does not affect the actual amount of information presented. To manipulate this facet, we used the *descriptive detail* design element. At Level 1, product descriptions contained approximately one-third the amount of information (i.e., number of attributes discussed) that they contained at Level 2. We manipulated *bulleted features* as either three (Level 1) or five (Level 2) bullets on the web page; previous research indicates that these numbers are relevant (Shu and Carlson 2014). *Return policy information* was the absence (Level 1) or presence (Level 2) of the statement “Return Policy: Items can be returned within 30 days of receipt” on the page.

For visual elements, we manipulated the *feature crop* element by either not replacing (Level 1) or replacing (Level 2) one of the product hero shots with a close-up picture of a specific feature of the product. A *lifestyle picture*, which connects the product with the real world in an actual usage situation, was either not included (Level 1) or included (Level 2) to replace one of the hero shots. At Level 2 of the *picture size* design element, all pictures were 25% larger than at Level 1. *Product video* indicated the absence (Level 1) or presence (Level 2) of a video about the product.

For combined verbal and visual elements, we manipulated *customer star ratings*, by either excluding (Level 1) or including (Level 2) the average star rating for the product.² We manipulated *expert endorsement* using a quality seal from a fictitious third-party product rating agency, to avoid any potential effects of familiarity with existing agencies, that might differ across respondents. At Level 1, there was no seal, while at Level 2, this seal replaced one of the hero shots. We manipulated the *comparison matrix* element as the absence (Level 1) or presence (Level 2) of a table that compared the focal product with similar products from the same firm and category on key product characteristics. The *recommendation agent* featured either the absence (Level 1) or the presence (Level 2) of a section that displayed links to related products, again from the same firm and category. For these two elements, we purposely used products from the same manufacturer, to avoid any influences of additional brands for which consumers might hold distinct views. The *content filter* element either did not permit (Level 1) or permitted (Level 2) consumers to control the amount of verbal and visual content shown on the page, using “show more” buttons to reveal or hide parts of the modules.

Experimental Design

Testing the effects of such a large number of elements poses a considerable empirical challenge. A full-factorial design would have required building and analyzing 131,072 experimental

¹ We designed this study to align with the context of Amazon.com, the largest online retailer; most online retailers follow a similar approach. We disguised the brand to protect the confidentiality of the participating firm.

² To assess the unique effects of this element, we included no actual written customer reviews on the page, used 4.5/5 stars for all manipulations, and held the number of reviews constant across conditions.

Table 2. Descriptive Statistics and Correlations.

	Variable	M	SD	CR	CA	1	2	3	4	5
1.	Informativeness	5.29	1.11	.90	.89	(.75)				
2.	Entertainment	4.16	1.49	.94	.93	.53	(.83)			
3.	Social presence	3.65	1.52	.95	.95	.39	.57	(.87)		
4.	Sensory appeal	3.97	1.34	.86	.85	.51	.61	.62	(.66)	
5.	Purchase intentions	3.91	1.77	.95	.95	.40	.55	.42	.43	(.88)

Notes: Means and standard deviations are based on composite scores; CA = Cronbach's alpha; CR = composite reliability. AVE values are in parentheses.

cells as web pages (2^{13} combinations of design elements per product \times 4 firms \times 4 products). With such an approach, we could have investigated all potential interaction effects among design elements, but it would have been infeasible to execute. We therefore adopted a Taguchi (1986) orthogonal array design, which reduced the required number of cells to 256 (16 combinations of design elements per product \times 4 products \times 4 firms). Thus, we can feasibly investigate the simultaneous, causal direct effects of all 13 design elements.

Method

Sample and procedure. We recruited 10,470 workers via Amazon Mechanical Turk for our 16 experiments (one per product). Respondents, randomly assigned to one of the 16 experimental cells within each experiment, were presented with the corresponding web page and instructed to explore it for at least 45 seconds. Next, they completed a questionnaire with demographic questions, items for manipulation and realism checks, and preexisting scales to measure purchase intentions and the four experience dimensions (see Appendix D).

Measures. Appendix A contains the results of our manipulation checks, which are all significant ($p < .01$), indicating successful manipulation of the design elements. In addition, we used two items to assess the realism of our web pages: "I could imagine an actual web page to look like the one I just saw" and "I believe that this web page could exist in reality" ($\alpha = .90$) (Darley and Lim 1993). Respondents' answers to these items, on a seven-point scale (1 = "strongly disagree," and 7 = "strongly agree"), indicated that our created web pages established sufficient realism ($M_{\text{composite score}} = 5.41$, $SD = 1.29$).

To assess the accuracy of our measures, we first conducted a confirmatory factor analysis. The results indicate a good fit of our measurement model to the data ($\chi^2(80) = 2441.75$, confirmatory fit index [CFI] = .98, Tucker-Lewis index [TLI] = .98, root mean square error of approximation [RMSEA] = .05, standardized root mean residual [SRMR] = .03). Moreover, in support of convergent validity, all standardized factor loadings are greater than .70 and significant at the 1% level. For each construct, the average variance extracted (AVE) exceeds .50, and the composite reliability is greater than .70. Cronbach's alpha values above .70 indicate internal consistency. In support of discriminant validity, all AVEs are greater than the squared

correlations of the focal construct with any other construct (see Table 2).

To evaluate multicollinearity among the experience dimensions, we first calculated the variance inflation factors for each construct. All values (informativeness = 1.55, entertainment = 2.18, social presence = 2.01, sensory appeal = 2.58) fall below the critical value of 5. Next, we examined the eigenvalues of their correlation matrix. The condition number ($\kappa = 7.15$) is well below the critical threshold of 30. Altogether, these results indicate that multicollinearity does not pose a concern. Last, we conducted an exploratory factor analysis, which confirmed that all items loaded onto their intended constructs (see Web Appendix A). For the remaining analysis, we calculated composite scores using the average of all scale items for each construct.

To investigate the extent to which product type and brand trustworthiness moderate the effects of the experience dimensions on purchase, we collected additional data.³ To capture a product's search versus experience focus (i.e., its type) unaffected by the web pages on which it appeared in our experiments, we first presented 452 respondents with randomly selected hero shots of the 16 products and then asked them to complete a questionnaire with corresponding search and experience quality measures (Weathers, Sharma, and Wood 2007). Each respondent rated two products. We then computed the average of the difference between the two items, which captured each product's search and experience qualities over all respondents. We similarly captured brand trustworthiness by presenting 341 respondents with the logo of one of the 11 brands in our sample, along with a list of its associated product categories. Each respondent rated a single brand on six trustworthiness items (Schlosser, White, and Lloyd 2006), which we then averaged across respondents. Appendix D shows all measurement items.

Results

To test our conceptual model, we combine the data from our 16 experiments (one for each product) and estimate a joint model

³ Though not part of our conceptual framework, in an exploratory analysis we also tested for the moderating effects of product type and brand trustworthiness on the relationships between each design element and experience dimension. Consistent with our conceptualization, only 11 of the 104 potential moderating effects were significant, confirming the nomological validity of our model (see Web Appendix B).

using covariance-based structural equation modeling with maximum likelihood estimation. This approach allows us to test the relative importance of each experience dimension as a mediator of the link between design elements and purchase intentions, while controlling for customer heterogeneity in terms of age, gender, income, and education.

Mediation tests. To confirm the relevance of each experience dimension as a mediator of the effects of design elements on purchase, we ran a series of nested models and compared their chi-square values with that of our proposed model (Table 3). Model 1 is our proposed model with all four experience dimensions as mediators. Models 2–5 test a set of three-dimension models in which we removed the paths from each experience dimension to purchase intentions, one by one. Models 6–15 test all other possible combinations of experience dimensions. Model 1 achieves good fit ($\chi^2_{(16)} = 437.77, p < .01$; CFI = .980; TLI = .880; RMSEA = .050; SRMR = .009) and performs significantly better than any alternative model; each experience dimension partially mediates some design elements. We thus focus on the results of Model 1 with all four experience dimensions in the remainder of our analyses.⁴

Effects of experience dimensions on purchase. Columns 1–4 in Panel A of Table 4 represent the effects of experience dimensions on purchase intentions. In general, entertainment exhibits the strongest effects ($\beta = .387, p < .01$), followed by informativeness ($\beta = .118, p < .01$), social presence ($\beta = .118, p < .01$), and sensory appeal ($\beta = .060, p < .01$).

Effects of design elements on experience dimensions. Panel B of Table 4 contains the effects of each design element on each experience dimension, while accounting for the effects of all other design elements. Customer star ratings emerge as a strong driver of all experience dimensions (all β s $\geq .131$, all p s $< .01$). The same is true for picture size (β s $\geq .147$, p s $< .01$). When we control for the impact of all other elements, return policy information and expert endorsement do not contribute significantly to any experience dimension (p s $> .05$).

Column 5 of Table 4 further indicates that eight design elements exert significant effects on the informativeness dimension. The strongest effects stem from including customer star ratings ($\beta = .211, p < .01$), more bulleted features ($\beta = .181, p < .01$), a comparison matrix ($\beta = .168, p < .01$), more descriptive detail ($\beta = .153, p < .01$), and larger pictures ($\beta = .152, p < .01$). Including a product video ($\beta = .058, p < .01$), a recommendation agent ($\beta = .049, p < .05$), and a lifestyle picture ($\beta = .047, p < .05$) also drives this dimension, though to a lesser extent.

Column 6 of Table 4 shows that nine design elements substantially influence entertainment. The most important are picture size ($\beta = .147, p < .01$) and customer star ratings ($\beta = .135, p < .01$), which exert much stronger effects than a

comparison matrix ($\beta = .081, p < .01$), more bulleted features ($\beta = .077, p < .01$), descriptive detail ($\beta = .064, p < .01$), or product video ($\beta = .056, p < .01$). Using a conversational linguistic style ($\beta = .052, p < .01$) and including a product feature crop ($\beta = .049, p < .05$) also drive entertainment.

Column 7 of Table 4 shows that ten elements are relevant for social presence. The most important are picture size ($\beta = .171, p < .01$), linguistic style ($\beta = .165, p < .01$), customer star ratings ($\beta = .162, p < .01$), and lifestyle pictures ($\beta = .144, p < .01$). Comparably less important are bulleted features and product feature crops (both $\beta = .042, p < .05$). The effect strengths of product videos ($\beta = .089, p < .01$), descriptive detail ($\beta = .088, p < .01$), and a comparison matrix ($\beta = .064, p < .01$) lie somewhere in between. Including content filters significantly decreases social presence ($\beta = -.087, p < .01$).

Ten elements are also relevant for sensory appeal, as Column 8 of Table 4 shows. The most important are picture size ($\beta = .190, p < .01$) and product video ($\beta = .184, p < .01$). Linguistic style ($\beta = .069, p < .01$), lifestyle pictures ($\beta = .062, p < .01$), product feature crops ($\beta = .055, p < .01$), and recommendation agents ($\beta = .048, p < .05$) exert positive but weaker effects. In between are the effects of customer star ratings ($\beta = .131, p < .01$), a comparison matrix ($\beta = .104, p < .01$), and more descriptive detail and bulleted features (both $\beta = .099, p < .01$).⁵

Moderators of the relationship between experience dimensions and purchase intentions. Panel C of Table 4 reports the moderation results of our joint model. For search (experience) products, the informativeness dimension of the experience becomes more (less) important ($\beta = .019, p < .05$), consistent with extant research suggesting that consumers extract only minimal direct information from advertisements for experience goods (Nelson 1974) and that information is more pertinent for search than experience goods (Franke, Huhmann, and Mothersbaugh 2004). To assess experience goods, product attribute information is less useful, perceived purchase risk is often high (Maity and Dass 2014), and consumers turn to alternative signals on the web page (Eroglu, Machleit, and Davis 2003). Accordingly, we find that social presence ($\beta = -.023, p < .05$) and sensory appeal ($\beta = -.022, p < .05$) are less (more) important for search (experience) products. Heightened social presence and greater sensory appeal can reduce perceived performance uncertainty (Cyr et al. 2009; Weathers, Sharma, and Wood 2007), so they are more important for purchase decisions involving experience products. For search products, consumers instead can gather sufficient factual information from the web page, so social presence and sensory appeal become less vital.

In addition, for more (less) trustworthy brands, informativeness is a more (less) important dimension of the online experience ($\beta = .022, p < .05$), while entertainment becomes less (more) important ($\beta = -.028, p < .01$). This finding aligns well

⁴ Web Appendix C contains the results of the univariate effects for each of the 16 experiments.

⁵ Web Appendix D presents the indirect effects of design elements on purchase intentions through each experience dimension.

Table 3. Study 1 Results: Model Comparison.

Model	Experience Dimensions Included as Mediators						N	χ^2	d.f.	CFI	TLI	RMSEA	SRMR	AIC	Δ Chi-Square	Δ AIC
	Informativeness	Entertainment	Social Presence	Sensory Appeal	Information	Trust										
1	✓	✓	✓	✓	✓	10,470	437.770	16	.980	.880	.050	.009	513310.390	—	—	
2		✓	✓	✓	✓	10,470	574.109	17	.973	.850	.056	.011	513444.729	136.339 (1)**	134.34	
3	✓		✓	✓	✓	10,470	1593.168	17	.924	.576	.094	.015	514463.788	1155.399 (1)**	1153.40	
4	✓	✓		✓	✓	10,470	565.179	17	.974	.853	.055	.010	513435.799	127.41 (1)**	125.41	
5	✓	✓	✓		✓	10,470	469.428	17	.978	.878	.050	.010	513340.048	31.658 (1)**	29.66	
6	✓					10,470	2982.424	19	.857	.287	.122	.031	515849.044	2544.655 (3)**	2538.65	
7		✓				10,470	912.065	19	.957	.785	.067	.014	513778.685	474.295 (3)**	468.29	
8			✓			10,470	2686.159	19	.872	.358	.116	.027	515552.779	2248.39 (3)**	2242.39	
9				✓		10,470	2572.495	19	.877	.386	.113	.024	515439.115	2134.725 (3)**	2128.73	
10	✓	✓				10,470	683.774	18	.968	.831	.059	.012	513552.394	246.004 (2)**	242.00	
11	✓		✓			10,470	1850.985	18	.912	.535	.099	.018	514719.605	1413.216 (2)**	1409.22	
12	✓			✓		10,470	2031.622	18	.903	.489	.103	.019	514900.242	1593.852 (2)**	1589.85	
13		✓	✓			10,470	650.085	18	.970	.840	.058	.011	513518.705	212.316 (2)**	208.32	
14		✓		✓		10,470	702.009	18	.967	.826	.060	.011	513570.630	264.24 (2)**	260.24	
15			✓	✓		10,470	2057.166	18	.902	.482	.104	.020	514925.786	1619.397 (2)**	1615.40	

* $p < .05$.
 ** $p < .01$.

Notes: ✓ indicates an existing path between the experience dimension and purchase intentions. AIC = Akaike information criterion. The $\Delta \chi^2$ and Δ AIC refer to differences of a specific model relative to Model 1. Results based on a model without moderating effects.

with previous research showing that information and arguments provided by credible sources are more persuasive to consumers (Petty, Cacioppo, and Heesacker 1981). Thus, the more trustworthy a brand, the more consumers actually engage with the information on its product web pages, and the more they find this information relevant and helpful to their purchase decisions. By contrast, entertainment is more important for brands perceived as less trustworthy. When brand trustworthiness is low and consumers experience more uncertainty (Pavlou, Liang, and Xue 2007), entertainment has a greater impact on purchase, a finding that aligns with previous research (Bart et al. 2005).

Discussion: Creating Effective Customer Experiences

Finding that a product's type and brand trustworthiness affect the impact of each experience dimension on consumers' purchase decisions implies that marketers should use design elements strategically to evoke specific types of experiences for different products and brands. To aid this effort, in Figure 2 we present a design guide that illustrates and summarizes when to rely on which type of experience and how to build it through design elements. Although customer star ratings and picture size are relevant for all experience types, we highlight specific design elements that are particularly strong facilitators of distinct experience dimensions. To this end, we provide percentage differences in the effect sizes of each design element on each experience dimension, relative to its effects on all remaining dimensions.

Informative experiences are dominated by outcome-oriented information and are most effective for search products and brands that are generally well-trusted. Bulleted features exert their strongest effects on this experience type (83% stronger than their effects on any other experience dimension). A comparison matrix can also shape this dimension especially well (62% more effective than for any other dimension), as can more descriptive detail (54% more effective) and recommendation agents (nearly equally effective at driving sensory appeal, but 150% more effective than driving any other dimension).

Entertaining experiences are pleasurable in their own right, apart from any anticipated performance implications. We find that these experiences are especially important for less trustworthy brands. Although most design elements exert some effect on this dimension, no one design element appears uniquely or more suited to shape it than any other dimension.

Social experiences convey a degree of human presence in the encounter. These experiences are especially effective for experience compared with search products. Linguistic style and lifestyle pictures drive this dimension particularly well (respectively, 139% and 134% more effective in shaping it than the other dimensions).

Sensory experiences activate consumers' senses and are especially beneficial for experience products. Product videos exert their strongest effects on this dimension (106% stronger than on any other dimension). Product feature crop is another important element to this dimension (29% stronger effects than on the other dimensions).

Table 4. Study 1 Results: Effects of Design Elements on Experience Dimensions and Purchase Intentions.

		Experience Dimensions			
		(1)	(2)	(3)	(4)
A: Effects of Experience Dimensions on Purchase Intentions^a					
Structural Path		Informativeness	Entertainment	Social Presence	Sensory Appeal
Experience dimension → purchase intentions		.118** (12.004)	.387** (35.422)	.118** (11.154)	.060** (5.246)
B: Effects of Design Elements on Experience Dimensions					
Structural Path		Informativeness	Entertainment	Social Presence	Sensory Appeal
(5)	(6)	(7)	(8)		
<i>Verbal Elements</i>					
Linguistic style → experience dimension		.035 (1.830)	.052** (2.686)	.165** (8.573)	.069** (3.583)
Descriptive detail → experience dimension		.153** (7.998)	.064** (3.298)	.088** (4.571)	.099** (5.170)
Bulleted features → experience dimension		.181** (9.443)	.077** (3.986)	.042* (2.206)	.099** (5.131)
Return policy information → experience dimension		.031 (1.627)	-.005 (-.257)	.006 (.336)	.009 (.445)
<i>Visual Elements</i>					
Product feature crop → experience dimension		.007 (.371)	.049* (2.529)	.042* (2.205)	.055** (2.844)
Lifestyle picture → experience dimension		.047* (2.437)	.037 (1.916)	.144** (7.514)	.062** (3.205)
Picture size → experience dimension		.152** (7.946)	.147** (7.591)	.171** (8.916)	.190** (9.906)
Product video → experience dimension		.058** (3.016)	.056** (2.882)	.089** (4.633)	.184** (9.550)
<i>Combined Verbal and Visual Elements</i>					
Customer star ratings → experience dimension		.211** (11.023)	.135** (6.947)	.162** (8.442)	.131** (6.830)
Expert endorsement → experience dimension		.023 (1.223)	.016 (.823)	.036 (1.896)	.019 (.972)
Comparison matrix → experience dimension		.168** (8.782)	.081** (4.166)	.064** (3.325)	.104** (5.416)
Recommendation agent → experience dimension		.049* (2.534)	.019 (1.001)	-.024 (-1.249)	.048* (2.475)
Content filter → experience dimension		-.014 (-.751)	-.011 (-.588)	-.087** (-4.532)	-.023 (-1.183)
C: Moderation of Effects of Experience Dimensions on Purchase Intentions^b					
Structural Path		Informativeness	Entertainment	Social Presence	Sensory Appeal
(9)	(10)	(11)	(12)		
Experience dimension × product type (search/experience) → purchase intentions		.019* (1.981)	.002 (.183)	-.023* (-2.105)	-.022* (-1.960)
Experience dimension × brand trustworthiness → purchase intentions		.022* (2.211)	-.028** (-2.598)	.000 (.042)	.005 (.417)

*p < .05.

**p < .01.

^aControlling for direct effects of design elements and consumer demographics.

^bDirect effect of product type (search/experience) on purchase intentions: $\beta = .152^{**}$ (19.385); direct effect of brand trustworthiness on purchase intentions: $\beta = .044^{**}$ (5.441).

Notes: Columns denote affected experience dimensions; β represents the standardized coefficient; z-values are in parentheses. Model fit: χ^2 (d.f.) = 1475.63 (106), CFI = .94, RMSEA = .04, SRMR = .02.

Study 2: Field Experiment to Test the Effect of Online Experience Designs on Sales

Study 1 provides a framework for designing online customer experiences and customizing them to specific product or brand factors. The lab experiments provide strong internal validity across design elements, experience dimensions, and moderators. In Study 2, we also aim to provide a compelling test of external validity. We conduct a field experiment with real products and sales on Amazon.com to test the finding from Study 1 that, for products high in search qualities (search products), an *informative experience* can increase product sales while a *social experience* may suppress them.

Experimental Design and Research Context

In this study, we collaborate with one of our partnering firms and manipulate the content on two of its product pages on Amazon.com. Using a difference-in-differences approach, we observe the resulting changes in sales volume compared with a control product page, over a period of two months. To investigate the extent to which search products benefit from a more informative versus a more social experience, we first carefully selected three search products (wireless Internet routers) with similar characteristics and sales trends in the four weeks before the launch of the experimental treatments (prelaunch) from our partner firm's inventory.⁶ For the next four weeks (postlaunch), we adapted the web pages of two products as either more informative (Treatment 1) or more social (Treatment 2) and left the third page unchanged (control condition). The difference-in-differences analyses reveal the respective changes in daily sales of the two adapted web pages, compared with the unchanged control page. With this design, we can disentangle the treatment effects of more informative or social page designs from time trends and determine whether changes in sales are attributable to the adjusted page designs or unobserved shifts in consumer preferences.

We took several steps to reduce potential confounding effects. First, to ensure homogeneous customer characteristics across the two experimental periods, all product information on the Amazon search results pages, from which consumers enter the actual product web pages (e.g., product name, hero shot, stockkeeping unit [SKU]), remained constant during the experiment. Second, the price of all products remained constant, and no promotion activity occurred during the experiment. Third, because Amazon publishes seller-submitted product content with varying time lags, we excluded the days around the launch of the treatment content from our analyses (Ma, Ailawadi, and Grewal 2013). Fourth, consumers do not visit particular product web pages at random, so we account for self-selection effects in the page views of the treatment pages

relative to the control page by supplementing our analyses with controls for observable selection variables.

The experimental design thus employs two treatment conditions and a control condition. Treatment 1 tests the effectiveness of a more informative experience by increasing the descriptive detail on the page, adding additional bulleted features, and adding a comparison matrix. Treatment 2 tests a more social experience, created through a conversational tone and the addition of lifestyle photos, in line with Study 1. The control product web page remained unchanged. To measure the performance of each web page, our partner firm provided access to Amazon Premium Analytics, from which we obtained daily sales and customer star rating data one month before the launch of the treatment pages (prelaunch) and one month after (postlaunch).

Empirical Analysis

In our difference-in-differences approach, we compare the difference in daily product sales on each of the two treatment pages between the pre- and postlaunch period with the corresponding difference in sales for the unchanged control web page:

$$P_{jt} = \beta_0 + \beta_1 I_j + \beta_2 I_t + \beta_3 I_j \times I_t + \varepsilon_{jt}, \quad (1)$$

where P_{jt} represents daily sales from web page j at time t and is a random error term, clustered across the two periods. Our design contains two treatment web pages (informative experience and social experience) and a control web page across the two periods (pre- and postlaunch). As a conservative test, we run two separate analyses that compare the informative and social experience with the control condition. In both analyses, I_j is 1 for the treatment (informative or social, respectively) and 0 for the control condition, so that β_1 represents the mean difference in sales between these two conditions. Furthermore, I_t is 1 for the postlaunch period and 0 for the prelaunch period, so that β_2 reflects the mean difference in post- relative to pre-launch sales. Finally, β_3 is the estimate of the respective treatment effect, or the change in sales due to the informative or social experimental treatment, after we control for systematic differences across conditions and common time trends:

$$\beta_3 = [E(P_{jt}|j = 1, t = 1) - E(P_{jt}|j = 1, t = 0)] - [E(P_{jt}|j = 0, t = 1) - E(P_{jt}|j = 0, t = 0)]. \quad (2)$$

In Equation 2, β_3 also represents the incremental economic impact of customizing the web page design to create a particular online experience. A key assumption of the difference-in-differences approach is that the time trends in sales are identical in the treatment and control conditions, absent the treatments themselves. If this assumption holds true, we can interpret the deviation of the difference in sales between the treatment and control conditions as causal treatment effects. To verify this parallel trends assumption, we collected data at a third period, two months before the launch of the treatments, and ran a model similar to Equation 1, except that we compared

⁶ To select the most appropriate products for this test, we audited the firm's current product categories to identify those with at least three similar search products with sufficient daily sales. From this set, we then selected three wireless Internet routers as prototypical search products.

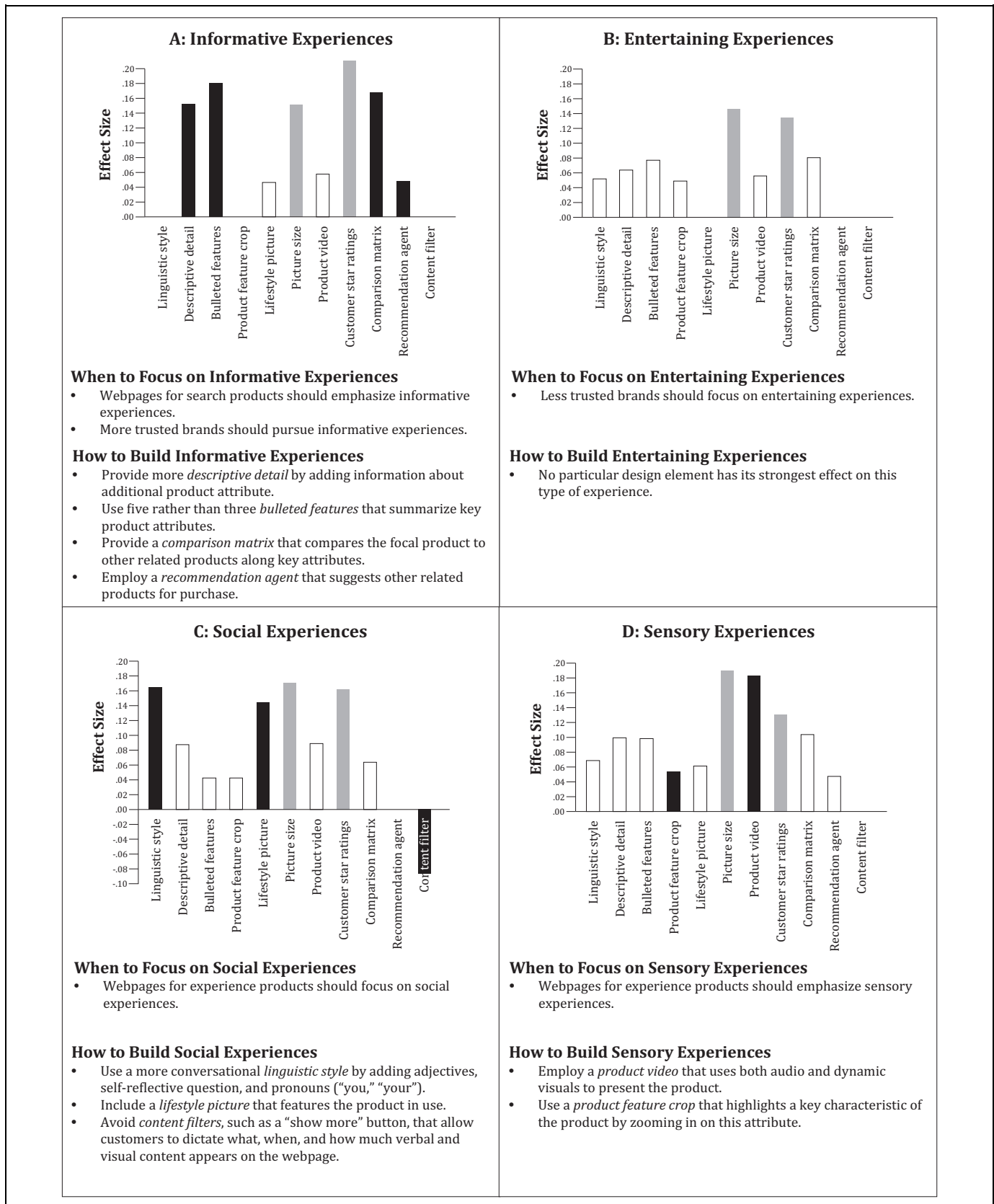


Figure 2. Design guide for creating effective online customer experience.

Notes: Only significant effects ($p < .05$) are shown; gray bars represent universally effective design elements across all experience dimensions, black bars depict uniquely more effective elements for a specific dimension than for all other dimensions, and white bars indicate the remaining elements.

this earlier period with the prelaunch period to determine the trends across the three experimental groups, before the treatments. The interaction between the period and experimental group is nonsignificant ($p > .10$), confirming the parallel trends and supporting the comparison of the treatment and control conditions.

Because β_1 represents a product fixed effect, it eliminates time-invariant, product-specific unobservable variables and reduces the threat of bias (Gill, Sridhar, and Grewal 2017). In addition, although each product may attract slightly different customers, suggesting that a selection bias is possible, we hold the firm-controllable page entry decision criteria (product name, hero shot, SKU, and price) constant throughout the experiment. Thus, customer characteristics across conditions should be time invariant, and we can interpret β_1 as a customer fixed effect that reduces this self-selection bias. However, some page entry criteria, such as a product's average star rating or number of reviews (Mudambi and Schuff 2010), are outside the firm's control and time variant, so they could introduce some customer differences across experimental conditions that β_1 would not capture. To address this potential bias, we add a vector of control variables X_{jt} to Equation 1, which we use to calculate the daily difference in average customer star rating and number of reviews for each treatment page compared with the control condition:

$$P_{jt} = \beta_0 + \beta_1 I_j + \beta_2 I_t + \beta_3 I_j \times I_t + \delta X_{jt} + \varepsilon_{jt}. \quad (3)$$

Results

Model-free evidence. Before the launch, sales did not differ between the control condition and the informative product page (Treatment 1), but the social product page (Treatment 2) achieved higher sales ($M_{\text{control}} = 3$, $M_{\text{info}} = 3$, $M_{\text{social}} = 734$).⁷ After the treatment launch, in support of our findings in Study 1, sales increased for the informative page ($M_{\text{info}} = 152$), decreased for the social page ($M_{\text{social}} = 394$), and decreased slightly in the control condition ($M_{\text{control}} = .1$), relative to the counterfactual trend we calculated on the basis of the time trend in the control condition and the sales levels of each experimental condition before the experiment.

Difference-in-differences analysis. To test these effects more formally, we run two separate models, one for Treatment 1 (informative) and one for Treatment 2 (social), in which we account for possible time-variant changes among customers who visit the product pages (Equation 3). In Model 1 (Table 5), the treatment effect of the informative experience is positive and significant ($\beta_3 = 151.980$, $p < .01$); increasing web page informativeness improves sales of search products. By contrast, in Model 2, the treatment effect of the social experience is negative and significant ($\beta_3 = -337.180$, $p < .01$), confirming the

detrimental effects of a social experience for search products.⁸ Together, these field results corroborate our insights from Study 1: Search products benefit from more informative experiences, while more social experiences can have detrimental effects on sales of these products.

General Discussion

In an era in which web design is becoming increasingly important (Wolfenbarger and Gilly 2003), sellers' success depends on their ability to employ design elements on product web pages to evoke effective customer experiences that not only convey information but also entertain, imply human interactions, and mimic sensory experiences from the offline world. Through 16 large-scale experiments and a field study, we show how firms can use online design elements to drive purchase behaviors by customizing experiences according to the product or brand being sold. Our findings offer important theoretical contributions to customer experience management (e.g., Grewal, Levy, and Kumar 2009; Verhoef et al. 2009) and actionable managerial implications.

Theoretical Contributions: Understanding the Online Customer Experience

Our multidimensional conceptualization of the online customer experience reveals why the effectiveness of any given design element may vary with the offered product or brand. It adds to extant research that examines the direct effect of design elements on purchase decisions without addressing their underlying mechanisms (Cooke et al. 2002; Hauser et al. 2009). It also moves beyond unidimensional, predominantly information-processing perspectives (see Table 1). Although informativeness is a key dimension by which design elements affect purchase decisions, social presence is just as important, and entertainment is even more so. Accounting for sensory appeal adds further insights. We show that the function of design elements is not limited to the cognitive information they convey, because they also carry affective (entertainment), social (social presence), and sensory (sensory appeal) value that influences purchases. We also show that only a multidimensional perspective can help determine the most effective use of design elements for a given product or brand. Further research should thus account for and test the multiple ways design elements drive purchase.

The multidimensionality of our research also led to the discovery of unexpected relationships that may guide researchers in the online domain toward identifying emerging, substantive trends and relevant constructs. For example, the effects of social presence on purchase are just as strong as those of informativeness, an insight that provides a foundation for examining recent trends such as the inclusion of chat options on websites

⁷ We transformed all values by a constant, in accordance with our nondisclosure agreement.

⁸ As a robustness check, we tested a single model in which we dummy-coded each treatment condition versus the control condition. The substantive results remained unchanged.

Table 5. Study 2 Results: Field Experiment Testing Customized Online Customer Experiences.

	Model 1:		Model 2:	
	Informative Experience Treatment		Social Experience Treatment	
Treatment effect	151.980**	(34.604)	-337.180**	(73.800)
Time dummy	-9.390	(25.815)	87.600	(92.633)
Treatment condition dummy	-.367	(24.183)	730.730**	(51.567)
Average customer star ratings	-1,576.786	(2,303.567)	-845.080	(3,482.683)
Number of reviews	-9.925	(18.049)	-28.200	(22.334)
Observations	122		122	
R ²	.29		.69	

* $p < .05$.** $p < .01$.

Notes: Standard errors are in parentheses.

to enable visitors to interact directly with firms. Firms now use chatbots, based on artificial intelligence, that can conduct conversations via voice or text. An information-processing view might regard chatbots as merely providers of product or transactional information, but our findings suggest that they can also convey social presence. Further research might examine how the linguistic style (a key driver of social presence) of a chatbot should be calibrated to optimize the customer experience.

Moreover, our consolidation of design elements, addressing the many labels used in extant work, and our test of their relative effects reveal which elements have the greatest impact on the customer experience and thus suggest priorities for research. In allowing each design element to freely influence each experience dimension, we were able to identify the core function of each element (information, entertainment, social presence, or sensory appeal). Lifestyle photos, for example, are a key driver of social presence. In our study, they were produced by the seller. Yet companies such as Rent-the-Runway encourage customers to post photos of themselves using the firm's products (clothing) directly on product web pages. Further research could examine the implications of customer- versus firm-produced lifestyle photos. Our framework may also guide research on emerging features that allow customers to try products virtually using webcams (e.g., glasses at FramesDirect.com). These and other forms of in-page product trials warrant further investigation to determine their value for each dimension of the online customer experience.

Our research also provides insights into the role of product type and brand trustworthiness online, by showing how they influence the relevance of each experience dimension for purchase decisions. Search products benefit more from informative experiences but less from social experiences. Highly trustworthy brands benefit from more informative experiences, but less trustworthy brands gain from more entertaining experiences. The finding that brand trustworthiness may increase consumers' willingness to process greater amounts of information demands further examination, especially as research suggests a decline in brand value when other sources of information become more readily available to consumers (Simonson and Rosen 2014).

Managerial Implications: Designing the Online Customer Experience

The product web page is a key tool for managers, who can strategically use design elements to create a customer experience that turns web page visitors into buyers. Our findings apply to both sellers showcasing their offerings through online retailers' websites and the retailers themselves. The production, curation, and publishing of high-quality photos, videos, and copywriting are nontrivial tasks that require significant resources.

We offer a two-step design guide to show how sellers can generate sales through effective online customer experiences. First, sellers must determine the most beneficial experience, based on the search versus experience focus of the product to be sold and the trustworthiness of their brand. The measures we employ can help firms gather this information from current and potential customers. Second, firms should leverage this product and brand knowledge and apply the design guide derived in Study 1 (Figure 2) and validated in Study 2, to select relevant design elements for their product web pages. For experience products, social experiences should be built by employing a conversational linguistic style and lifestyle photos. Sensory experiences are also beneficial and can be built through product videos and product feature crops.

Firms need to consider the customer experience in assessing their existing digital assets. Managers often default to a logic that suggests that if a design element exists in the firm's digital inventory, it should be used on the page (more-is-better approach). Yet we show that certain design elements can induce unfavorable customer experiences for specific products or brands. An essential part of the process is thus to also determine which elements *not* to use. If the firm does not already own certain design elements, our design guide suggests where it should allocate its resource investments to produce valuable new elements. For example, investing in high-quality imagery can benefit any product or brand, but the most appropriate amounts of textual detail and linguistic style depend on the product type (search vs. experience focus).

Our design guide can also inform contract negotiations between sellers and retailers. Many retailers offer premium

content options that require additional financial investments from sellers. Amazon, for example, offers multiple tiered categories (e.g., Basic A+ Content, Premium A+ Content) that provide access to additional design elements or configurations. For some products, these investments grant access to necessary design elements; for other products, investing in premium content might not be necessary or could even be disadvantageous. For example, premium content modules might support larger pictures and more visually stimulating content (e.g., scrolling pictures), but they also restrict the number of characters available to describe product features and benefits. Such designs can induce social or sensory experiences, but they likely are less effective at creating informative experiences. Thus, a lower-cost alternative may be more attractive to a seller that wants to provide mainly informative experiences.

Our design guide is also relevant for retailers. The more conversions sellers generate on a retailer's website, the greater are its earnings. Yet retailers also must provide an infrastructure to support the digital content and guarantee adequate page load and transaction speeds. Helping sellers build effective web pages as efficiently as possible is in the retailer's best interest. With our design guide, retailers can develop tutorials to help sellers improve the effectiveness of their product web pages, as well as recommend available design elements to those sellers, based on the products and brands they market. This approach could improve conversions but also lessen storage demands, by reducing ineffective content. With our design guide and a dedicated customer experience mindset, sellers and retailers can work together strategically to maximize the performance of their product web pages.

Limitations and Future Research Directions

Although our research setting and design allowed us to determine the effects of various design elements on dimensions of the online customer experience and purchases, this work is not

without limitations. Our results show no effects of return policy information or expert endorsement on any experience dimension, after we account for the impact of the other elements. Additional research might explore these elements further to determine any circumstances in which they prove effective. In addition, no design element exerts a particularly strong effect on the entertainment dimension. Thus, research could analyze other design elements that might prove especially instrumental in shaping this dimension. Although purchase is our final outcome of interest, an extended version of our framework might address how product web page design elements influence consumer decision-making quality, long-term satisfaction, product returns, or social media behavior (Häubl and Trifts 2000; Simonson and Rosen 2014).

Researchers could also investigate how the effects we find translate to mobile environments and whether the same design elements induce similar or different experiences. We focus on design elements most relevant to the product presentation, and thus website elements such as navigation warrant further investigation. Research could also examine the design of landing, overview, or checkout web pages, which we do not consider in our study. Our experimental design is based on a Taguchi (1986) orthogonal array design, which is rare in marketing research. We recommend its application in similar, seemingly intractable research settings to facilitate the simultaneous manipulation of multiple experimental factors, as might be required for advertising or product design studies. We focus on product web pages, but a design perspective could also improve understanding of other domains in which verbal and visual stimuli build customer experiences, such as user manuals or mobile apps. As online shopping environments continue to approach the richness of the offline retail world, research should further investigate the value of design for providing unique experiences, customized to the specific characteristics of the products and brands sold.

Appendix A. Manipulated Constructs, Definitions, Operationalizations, and Manipulation Checks.

Design Elements	Aliases	Definition	Operationalizations		Means				
			Level 1	Level 2	Level 1	Level 2	t-Value	p-Value	
Verbal Elements									
Linguistic style	Socio-oriented, concept-oriented, functional content, social content, linguistic style, message personalization	Characteristics of the text, including word choice, elements such as questions, certain pronouns (you, your), and adjectives (Ludwig et al. 2013)	Product descriptions have primarily an unemotional tone.	Product descriptions have primarily an emotional tone.	2.97	3.51	-16.03	.00	
Descriptive detail	Item-specific information	The degree of elaboration of the product descriptions on the web page (Cooke et al. 2002)	Baseline number of words of product descriptions.	Number of words of product description is 25% more than at Level 1.	4.66	5.24	-20.01	.00	
Bulleted features	Product claims	Product features that appear in abbreviated list form on the web page (Shu and Carlson 2014)	Web page contains a list of three bulleted key product features.	Web page contains a list of five bulleted key product features.	3.72	6.13	-5.96	.00	
Return policy information	Transaction facilitation information	Visibility of product return procedures and instructions (Bower and Maxham 2012; Song and Zinkhan 2008)	Web page shows no product return policy information.	Web page shows product return policy information.	3.13	5.27	-40.20	.00	
Visual Elements									
Product feature crop	Cropped objects	Compared with photos that show the whole product, feature crops zoom in on a certain aspect of the product (Peracchio and Meyers-Levy 1994).	No picture with only a specific part of the product.	At least one picture shows only a specific part of the product.	3.72	4.76	-18.02	.00	
Lifestyle picture		A photo of the product in use (Babin and Burns 1997)	No picture shows the product in use.	At least one picture shows the product in use.	2.34	3.22	-16.21	.00	
Picture size	Static picture	The portion of the page with visual elements (Jiang and Benbasat 2007a; Park, Lennon, and Stoel 2005)	Baseline picture size	Pictures are 25% larger than at Level 1.	4.03	4.74	-28.91	.00	
Product video	Multimedia presentations, dynamic product presentation	Video of the product in use (Huang, Lurie, and Mitra 2009; Roggeveen et al. 2015; Weathers, Sharma, and Wood 2007)	Web page contains no product video.	Web page contains at least one product video.	1.83	5.06	-61.75	.00	
Customer star ratings	Online reviews, customer reviews	Aggregated user-generated product ratings posted on the product web page in the form of stars (1 to 5) and number of ratings (Chevalier and Mayzlin 2006; Ludwig et al. 2013; Mudambi and Schuff 2010;	Web page contains no consumer star rating.	Web page contains consumer star rating.	2.34	5.51	-85.98	.00	

(continued)

Appendix A. (continued)

Design Elements	Aliases	Definition	Operationalizations		Means			
			Level 1	Level 2	Level 1	Level 2	t-Value	p-Value
Expert endorsement	Third-party seals, expert evaluation, authoritative third-party recommendations, expert opinion	Product evaluations assembled by distinguished experts in the category (Ansari, Essegai, and Kohli 2000; Huang, Lurie, and Mitra 2009)	Web page does not contain a seal of a third-party expert certifying the product's quality.	Web page contains a seal of a third-party expert certifying the product's quality.	3.12	4.54	-27.08	.00
Comparison matrix	Decision aids, product comparisons, shopping agent	Table organized as an alternatives × attributes matrix that compares the focal product with a small number of alternative products along a set of attributes (Häubl and Trifts 2000)	Web page does not contain a table that allows for easy product comparison.	Web page contains a table that allows for easy product comparison.	2.64	5.46	-57.40	.00
Recommendation agent	Next product to buy, cross-selling hyperlinks, shopping agent, electronic agents, recommendation systems, infomediaries, referral services	Tool that provides a screening function by weeding through many alternatives, based on similarities to the focal product (Ansari, Essegai, and Kohli 2000; Cooke et al. 2002; Häubl and Trifts 2002; Knott, Hayes, and Neslin 2002)	Web page does not include links to related products.	Web page includes links to related products.	3.73	5.72	-38.44	.00
Content filter	Collaborative filtering agents, information control, decisional control	Tool that allows the customer to determine what, when, and how much verbal and visual content is presented (Wang et al. 2007; Weathers, Sharma, and Wood 2007)	Consumers cannot control the amount of verbal or visual content shown to them at once.	Consumers can control the amount of verbal or visual content shown to them at once.	4.32	4.94	-13.38	.00

Notes: All means and t-values are calculated using 10,470 observations.

Appendix B. Description of Firms Participating in Study I.

Firm	Annual Sales (\$B)	Number of Employees	Number of Products Online	Type of Products	Number of Online Channels	Firm Age	Headquarters	Private/Public
A	\$1.6	1,725	2,000 SKUs	Consumer electronics, home networking	16	32	U.S.	Private
B	\$3.2	13,300	1,000 SKUs	Supplements	5	44	U.S.	Private
C	\$12.0	13,000	2,000 SKUs	Consumer packaged goods, personal care, household	5	129	U.S.	Private
D	\$33.1	185,965	1,000 SKUs	Business electronics, consumer electronics	30	179	France	Private

Notes: Data provided by Private Company Financial Intelligence (privco.com) and COMPUSTAT.

1. Linguistic style (journalistic; conversational)

2. Descriptive detail (less; more)

10. Customer star ratings

7. Product video

4. Product feature crop

8. Content filter

11. Expert endorsement

12. Comparison matrix

6. Picture size (small; large)

3. Bulleted features (3 bullets; 5 bullets)

13. Recommendation agent

9. Return policy information

5. Lifestyle picture

All design elements manipulated as absent (Level 1) vs. present (Level 2), except where noted.

Appendix C. Example product web page.

Appendix D. Constructs and Measures.

Constructs (Scale Sources)

Online Experience Dimensions

Informativeness (adapted from Luo 2002)

- Information obtained from the product page is useful.
- I learned a lot from using the product page.
- I think the information obtained from the product page is helpful.

Entertainment (adapted from Hausman and Siekpe 2009)

- Not fun/fun
- Not enjoyable/enjoyable
- Not at all entertaining/very entertaining

(continued)

Appendix D. (continued)

Social presence (Gefen and Straub 2003)

- There is a sense of human contact in the web page.
- There is a sense of human warmth in the web page.
- There is a sense of human sensitivity in the web page.

Sensory Appeal (Jiang and Benbasat 2007b)

- The product presentation on this web page is lively.
- I can acquire product information on this web page from different sensory channels.
- This web page contains product information exciting to senses.

Performance Outcome

Purchase intentions (Ajzen and Fishbein 1980)

- My purchasing this product is...
 - Very unlikely/very likely
 - Very improbable/very probable
 - Very uncertain/very certain

Moderators

Product Type (Search/Experience) (adapted from Weathers, Sharma, and Wood 2007)

- I can adequately evaluate this product using only information provided by the web page about the product's attributes and features. (*Search focus*)
- I can evaluate the quality of this product simply by reading information about the product. (*Search focus*)
- It is important for me to touch this product to evaluate how it will perform. (*Experience focus*)
- It is important for me to test this product to evaluate how it will perform. (*Experience focus*)

Brand Trustworthiness (adapted from Schlosser, White, and Lloyd 2006)

- [Brand] seems to have much knowledge about what needs to be done to fulfill online transactions.
- I feel very confident about [Brand]'s online skills.
- [Brand] appears to be well qualified in the area of e-commerce.
- [Brand] appears to try hard to be fair in dealing with others.
- I like [Brand]'s values.
- Sound principles seem to guide [Brand]'s behavior.

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