



Beauty is more than screen deep: Improving the web survey respondent experience through socially-present and aesthetically-pleasing user interfaces



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ABSTRACT

Web surveys are rapidly becoming standard issue in many researchers' toolkits; however, measurement error has been shown to affect web surveys to a greater extent than paper-and-pencil surveys (Couper, 2000; Manfreda & Vehovar, 2002). Principles of aesthetic design and social presence have been applied to web surveys to reduce the prevalence of such error with promising results, which were further investigated in this research. A sample of 181 first-year psychology undergraduate students participated in this study. Participants were randomly allocated to view one of eight web survey interfaces, which varied by aesthetic quality and social presence. Exploratory structural equation modeling using the partial least squares method revealed that classical aesthetic quality and social presence were both positively related to perceived ease of use of the web survey interface and positive state affect; social presence and perceived ease of use were positively related to trust in the web survey researcher; classical aesthetic quality was negatively related to negative state affect; and, expressive aesthetic quality was negatively related to perceived ease of use and positively related to positive state affect. Interestingly, expressive aesthetic quality was also positively related to negative state affect. These relationships between aesthetic quality and social presence should inform best practice web survey design recommendations, and future empirical work should extend and test the generalizability of these findings.

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1. Introduction

The advent of computers and the internet have increased the ability of researchers to collect data in a timely, cost-effective, and efficient manner (Couper, 2000; Shannon, Johnson, Searcy, & Lott, 2002). One of the consequences has been the spread of web surveys, which is an example of a technology-based research solution that has gained considerable popularity over the past decade (Kaczmirek, 2008; Schonlau, Fricker, & Elliott, 2002). According to estimates by Inside Research, US private sector spending on web surveys increased from \$4 million in 1994 to \$1.6 billion in 2007 (Couper, 2008). Yet, popularity aside, numerous challenges threaten the integrity of research conducted using web surveys.

Of note, web surveys seem to suffer from lower response rates (Manfreda, Bosnjak, Berzelak, Haas, & Vehovar, 2006), biased sampling (Couper, 2000), and increased response and measurement error (Kaczmirek, 2008), when compared with pencil-and-paper surveys. Fortunately, emerging research suggests ways to amelio-

rate these problems. Specifically, visual characteristics of the web survey user interface (Christian & Dillman, 2004; Christian, Dillman, & Smyth, 2007; Mahon-Haft & Dillman, 2010) and also the level of 'humanization' or social presence (Tourangeau, Couper, & Steiger, 2003) of the interface may influence the web survey response process and outcomes such as data quality. Further research in this area is needed to better understand the effects of these web survey characteristics and develop empirically-supported guidelines to inform the design of web surveys; in particular, the effective use of visual aesthetics and social presence.

Given the degree of design customization afforded by many web survey providers and the dearth of research conducted in this area to date (Mahon-Haft & Dillman, 2010), the present study investigated the effects of design characteristics of the user interface on respondents' subjective experiences of participating in a specific web survey. Specifically, this article describes the results of exploratory structural modeling to identify relationships between respondents' evaluations of web survey interface aesthetic quality and social presence, trust in the web survey researcher, and the overall 'user experience' (defined here as perceived ease of use of the web survey user interface and state affect).

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2. Theoretical background

Visual characteristics of web surveys have been shown to influence behaviors such as question skipping, early terminations, and biased responding (Mahon-Haft & Dillman, 2010), but there has been little research on the associated causal mechanisms. Few studies have considered the role played by the respondent's psychological state on participation in paper-and-pencil surveys (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Schmidt & Hunter, 1996), and only a handful of researchers have applied these extant findings to web surveys (e.g., Christian & Dillman, 2004; Christian et al., 2007; Mahon-Haft & Dillman, 2010). In contrast, research on human-computer-interaction (HCI) has indicated that three factors are likely to influence how individuals respond to computers generally, and by implication how they will respond to web surveys. Specifically, HCI researchers have demonstrated that visual aspects of computerized user interfaces (such as aesthetic quality) (Chen, 2009; Lavie & Tractinsky, 2004), the perceived usability of interface elements (Chadwa, Craft, Cairns, Ruger, & Heesch, 2005; Hassenzahl, 2004; Lindgaard, 2007), and trust in online entities (Alsundani & Casey, 2009; Cugelman, Thelwall, & Dawes, 2009) all influence the quality of interaction between technology and people. In addition, the computers-as-social-actors (CASA) literature (a paradigm within HCI) suggests that social responses (such as trust) can be purposefully elicited through user interface design characteristics. Specifically, technology 'humanification' using stimuli such as photographs and vivid pictures (Lee & Nass, 2005), interactive elements (Biocca & Delaney, 1995; Steuer, 1995), social content such as praise and encouragement, and an 'extroverted' writing style (Moon & Nass, 1996; Nass, Moon, Fogg, Reeves, & Dyer, 1995) have all been shown to elicit social responses to computers. To the extent that these effects apply to technologies such as web surveys, they are also likely to affect responding behavior.

2.1. Visual aesthetics

Visual stimuli have been shown to affect emotions, attitudes, and behaviors in concert with their aesthetic qualities (Costa, Costa, & Aparício, 2004). For example, a system that is judged to have pleasing aesthetic properties seems to induce positive affective reactions, which in turn increases a user's willingness to forgive designers for minor mistakes or technical mishaps and be more engaged in learning and unguided exploration (Norman, 2004). Research has demonstrated that with a glance, users are able to formulate a reliable impression of a webpage (Fernandes, Lindgaard, Dillon, & Wood, 2003; Lindgaard, Fernandes, Dudek, & Brown, 2006; Tractinsky, Cokhavi, Kirschenbaum, & Sharfi, 2006) and reject it based on visual appeal alone (Sillence, Briggs, Harris, & Fishwick, 2006). Visual aesthetics seem to be particularly important in web survey contexts, as respondents tend to rely on design cues to help them interpret and respond to survey questions, and navigate the user interface effectively (Mahon-Haft & Dillman, 2010).

Despite growing recognition of the importance of aesthetics in HCI, principles and guidelines have tended to be created ad hoc, without reference to theory or previous empirical findings (Karvonen, 2000). Nevertheless, work by Lavie and Tractinsky (2004) has brought some clarity to this field through the development and validation of a two-dimensional conceptualization of visual aesthetics—classical and expressive aesthetics.

2.1.1. Classical aesthetics

The classical aesthetics construct is comprised of items that represent many general principles of good design (e.g., balance,

unity), and therefore, may be considered to be aligned closely with traditional notions of aesthetics, such as orderliness, cleanliness and proportion (Lavie & Tractinsky, 2004). Classical aesthetic qualities have been shown to influence the favorability of users' judgments and attitudes toward technologies, with 'classical' designs encouraging positive ratings of satisfaction and enjoyment (e.g., Chang & Chen, 2008; Kim & Moon, 1998; Urban, Amyx, & Lorenzon, 2009). This may help to explain why Lavie and Tractinsky (2004) found that respondents' judgments of various websites' classical aesthetic qualities were significantly correlated with subjective ratings of pleasure following interaction with the interface.

2.1.2. Classical aesthetics and state affect

Emotions play an important role in HCI due to their 'bottom-up' influence on subsequent decision-making and behavior (Lindgaard, 2007; Mahlke, 2008; Mahon-Haft & Dillman, 2010; Norman, 2004). More specifically, user's evaluations of electronic visual stimuli have been shown to be robust at as little as 50 ms (Lindgaard et al., 2006), and these evaluations produce emotional responses that influence conscious thought and behavior (Norman, 2004). Further, perceptions of user interface aesthetic quality are correlated with ratings of satisfaction and pleasure (e.g., Lavie & Tractinsky, 2004), and evocation of positive mental states in technology users has been shown to increase engagement in e-commerce transactions (Tractinsky & Lowengart, 2007). Mahon-Haft and Dillman (2010) applied Norman's (2004) emotional design concepts to web surveys and proposed that certain characteristics of the visual design elicit effects on response behavior via the user's emotional reactions—promoting effective web survey participation—but this has yet to be demonstrated explicitly through structural modeling.

This link between aesthetic qualities and affect may be rooted in evolutionary psychology. Specifically, there are competitive advantages inherent within the ability to recognize certain visual patterns against a complex background (Ramachandran & Hirstein, 1999). Scholars have argued that pleasurable and automatic affective responses to visual aesthetic cues are likely to motivate approach behaviors and increase the chances of survival, thus perpetuating a preference toward things and people judged to be aesthetically-pleasing (e.g., Ramachandran & Hirstein, 1999). HCI scholars such as Norman (2004) have drawn on this evolutionary perspective to explain the relationship between visual design and user behavior, in particular, by arguing that immediate and subconscious affective reactions to aesthetic stimuli shape further thinking and behavior. In light of these arguments, we propose the following hypothesis:

H1. Classical aesthetic quality of the web survey interface will be positively related to positive affect and negatively related to negative affect.

Classical aesthetic qualities may also affect how web survey items are interpreted and answered (Christian & Dillman, 2004; Christian et al., 2007). Of note, question elements that are positioned in close proximity tend to be perceived as a single group. Visual elements placed in natural orientations (e.g., straight lines, curves) tend to infer a sensation of 'continuance', and will be implicitly connected in visual, and arguably, semantic space. Elements that violate perceptual laws or infer a contrasting meaning to that provided by the question text may increase the likelihood of response error (Mahon-Haft & Dillman, 2010), and are also likely to force respondents to take more time to assess the page, lessening ease of use (Lavie & Tractinsky, 2004). Web survey design elements also influence respondents by creating a semantic context against which responses are made by helping them to understand more

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