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A Look at How Levels of Vividness and Social Presence Affect Trust in a Decision Aid

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ABSTRACT

Building on past research on trust and social presence, this study explores how multimedia vividness and social presence affect trusting beliefs and subsequently trusting intentions of a computer-based decision aid. An experiment involving 550 subjects examines the effect that decision aid personality and increased levels of vividness (text, voice, and animation) have on social presence, and downstream trust-related constructs including trusting beliefs and trusting intentions. The effect of a user's computer playfulness on social presence is also investigated. Past research on trust and social presence provide the theoretical foundation for the study and suggest that increased vividness may moderate the effect of decision aid personality on perceptions of social presence, with social presence consequently affecting trusting beliefs.

Keywords

Trust, trusting beliefs, trusting intentions, social presence, computer playfulness, vividness, personality.

INTRODUCTION

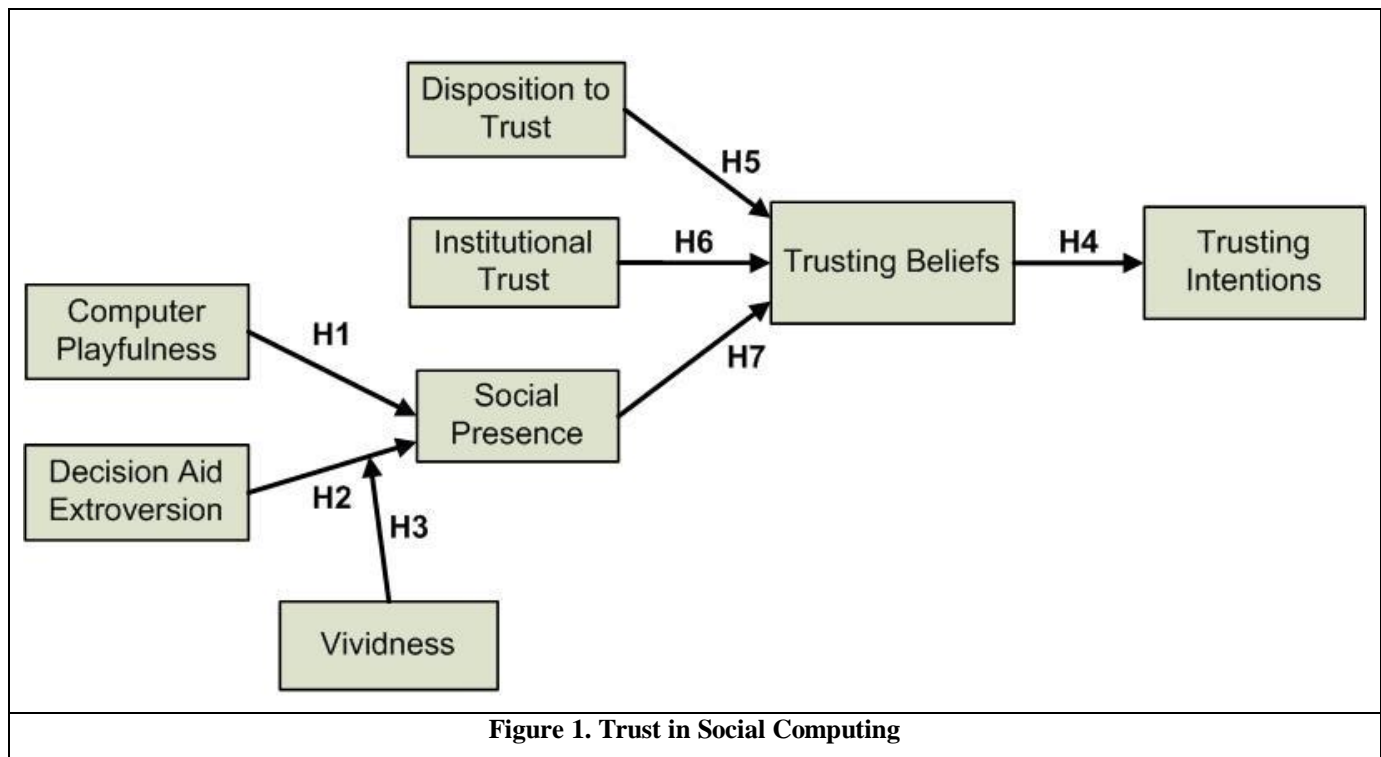
Interface design has advanced to support end-users with media-rich and highly interactive computing environments. Interface designers have employed multimedia technology, information presented in various formats simultaneously (e.g. text, audio, animation, etc.), in many types of information systems (IS) (Lim, O'Connor, and Remus 2005), including computer-based training, web sites, and communication environments. The use of human-like social cues within IS has also been studied (Nass and Moon 2000). It is the hope of designers that multimedia technology and humanistic qualities in IS will enhance the user's experience, and create downstream effects on user's confidence in recommendations and IS usage (Hess, Fuller, and Mathew In press).

Trust, the user's willingness to rely or depend on the interface (McKnight, Choudhury, and Kacmar 2002), is among the many factors that are believed to influence user behavior related to a system. Trust related constructs (e.g. disposition to trust, institution based trust, trusting beliefs, and trusting intentions) have been shown to play a critical role in the formation of user perceptions of a system, as well as the user's subsequent intentions and usage (Mayer, Davis, and Schoorman 1995; McKnight et al. 2002). Past research in the domain of e-commerce has shown that trust influences a user's willingness to share personal information, make a purchase, or act on information (McKnight et al. 2002). This study extends the research on trust to the domain of decision aids, specifically examining how differences in interface designs can influence trusting beliefs through their effect on the social presence of the interface.

This research explores how the design characteristics embedded in a decision aid influence users' trusting beliefs regarding the decision aid, as well as downstream trust-related intentions to rely on the decision aid. Specifically, this research explores the relationship between decision aid personality, interface vividness and social presence, and how social presence influences downstream trust. A research model is developed to provide insight into how interface design affects trust-related behaviors in this context. The next section will present the theoretical foundation, research model, and hypotheses. The research methodology is summarized and the state of the research is described.

THEORY AND HYPOTHESES

This study explores the relationship between social presence and trust in the context of user interface design. While there is a great deal of past research on trust as well as social presence separately, less research has explored how these two constructs influence one another, particularly in the present context. Figure 1 represents the research model for this study. The following sections will review the relevant literature and provide support for the hypotheses shown in the model.



Social Presence

The concept of social presence was explored by Short, Williams, and Christie in 1976, where they proposed that a particular medium's "social effects" are influenced by the degree of social presence that the media affords the user. More specifically, social presence is generally defined as the salience of an interpersonal relationship (Short, Williams, and Christie 1976). Social presence is believed to influence a variety of factors, such as the communication process, media use, media selection, social interaction, task performance, and task completion (Kumar and Benbasat 2002; Short et al. 1976). Early research on social presence examined how the medium influenced interpersonal communication. As an example, one predominant stream of research focused on how social cues were transmitted by various types of medium, and how these cues then influenced social presence and downstream outcomes.

A variety of antecedents to social presence have been identified, including vividness, interactivity, and other interface characteristics (Kumar and Benbasat 2002; Steuer 1992). IS researchers suggest that social presence may affect a user's online experience with a website (Kumar and Benbasat 2002) and have recently studied how social presence impacts trust with a website (Gefen and Straub 2003). However, there is still a lack of empirical work and understanding regarding the phenomena of social presence in the IS literature.

Effects of computer playfulness on social presence

Computer playfulness is defined as an individual difference reflecting the degree of cognitive spontaneity in computer interactions (Webster and Martocchio 1992). IS research has shown that computer playfulness is positively related to computer efficacy, involvement, and IS satisfaction, and negatively related to computer anxiety (Webster and Martocchio 1992). Thus, an individual that exhibits higher levels of computer playfulness is more likely to have a satisfying, involved experience with computing technology.

Based on the effect that computer playfulness has proven to have on related constructs, we believe that computer playfulness could similarly affect social presence. If computer playfulness increases involvement and satisfaction with the technology, it may similarly allow the user to develop more of a social connection during technology use. We propose that the salience of a user's social interaction with a decision aid should be greater with higher levels of computer playfulness. Thus:

Hypothesis 1: Computer playfulness affects social presence.

Effects of extroversion on social presence

Research has shown that users respond in a social manner to technology that exhibits human-like cues (Nass and Moon 2000). While users know a computer is not human, those same users will follow social rules, such as politeness and stereotyping, when interacting with a computer that exhibits social characteristics. The use of personality traits (e.g. extroversion/introversion) is a common means for researchers to endow technology with human characteristics. HCI researchers have created interfaces that successfully exhibit an extroverted personality, and users of these interfaces have responded with social behaviors (Nass and Moon 2000).

An extroverted personality is associated with traits such as sociableness, assertiveness, and dominance, while an introverted personality is more shy, inward, and unrevealing. An extroverted individual is more likely to establish a social, salient connection in interpersonal relationships (social presence as defined by Short et al. 1976). Similarly, a decision aid that exhibits more extroverted personality traits is more likely to increase user perceptions of social presence. Thus:

Hypothesis 2: Decision aid extroversion increases perceptions of social presence.

Interface Vividness

Multimedia vividness "refers to the ability of a technology to produce a sensorially rich mediated environment" (Steuer 1992) and is determined by *depth* and *breadth*. Breadth represents the number of different sensory channels utilized (visual, auditory, smell, etc.), and depth represents the resolution or detail of a particular sensory channel (Steuer 1992). While there is growing research interest in interface vividness, there is a lack of consensus regarding the effect of vividness on user behavior with an IS. For example, some researchers have found that vividness influences user experience with IS (Fortin and Dholakia 2005), while others have found no effect (Hess et al. In press)

We suggest that vividness enhances the social cues presented in the interface, and thus will moderate the relationship between social cues and users' perception of social presence. Vividness, however, in the absence of social interface characteristics, should not necessarily enhance user perceptions of social presence. In this study, social cues are presented by endowing the decision aid with known extroverted/introverted personality traits, and vividness should increase the effect that decision aid personality has on social presence. Thus:

Hypothesis 3: Vividness moderates the relationship between decision aid extroversion and perceptions of social presence.

Trust

The concept of trust has also received a great deal of attention in IS research. In this study, we conceptualize the process of trust formation consistent with McKnight et al. (2002), where trusting beliefs related to competence, benevolence, and integrity influence the formation of both general and more specific trusting intentions. Consistent with McKnight (2002), we define trust as a willingness to depend or be vulnerable to others. In the current context, behavioral intentions include the willingness of the user to depend on the information provided by the decision aid. Thus, as established in past research on trust:

Hypothesis 4: Higher levels of trusting beliefs increase a user's trusting intentions.

Past research has also indicated more stable beliefs may also lead to trust. For example, within the management literature, Mayer et al. identified propensity to trust as an antecedent which can influence trust formation (1995). Similarly, McKnight and his colleagues identified the concept of disposition to trust as an antecedent to trusting beliefs. McKnight defines

disposition to trust as “the extent to which a person displays a tendency to be willing to depend on others across a broad spectrum of situations and persons” (McKnight et al. 2002). Thus, as established in past research on trust:

Hypothesis 5: An individual’s disposition to trust affects trusting beliefs.

McKnight and his colleagues (2002) also identified institutional-based trust as an antecedent to trusting beliefs. Institutional-based trust is defined as “the belief that needed structural conditions are present to enhance the probability of achieving a successful outcome in an endeavor like e-commerce” (McKnight et al. 2002). These perceptions have a unique impact on trusting beliefs. In the current context, institutional-based trust is focused on the user’s general disposition towards computer-based decision aids. Thus, as established in past research on trust:

Hypothesis 6: Institutional-based trust affects a user’s trusting beliefs.

Finally, this research examines how different levels of social presence influence trusting beliefs and subsequently trusting intentions. Social presence as defined by Short et al. (1976), the salience of an interpersonal relationship, may have a significant impact on trusting beliefs. As social presence is increased, a user may perceive an increased level of comfort or familiarity with the situation due to the salience of the interpersonal relationship. Similarly, past IS research has shown that social presence influences trust with a web site (Gefen and Straub 2003). As social presence increases, the user may perceive an increased ability to make judgments which would influence an individual’s trusting beliefs. Therefore the degree of social presence may have significant implications for trusting beliefs. We extend this research to examine how social presence may influence a user’s trusting beliefs regarding a computer based decision aid. Thus:

Hypothesis 7: Social presence affects trusting beliefs.

METHODOLOGY

A 2x3, between subjects research design was used, varying the level of multimedia vividness (text only-T, text and voice-TV, text, voice and animation-TVA) and the personality of the decision aid (extraverted, introverted). Personality was manifested in the decision aid through the phrasing of the text, the range and frequency of the computer-generated voice, and the gestures of the animation. Subjects were randomly assigned to treatment conditions. The decision task and the decision aid interactivity were identical in each treatment. Participants were undergraduate students recruited from a sophomore-level business course with a research study participation requirement. A post-experiment survey was administered to assess the constructs in our research model.

Experimental Task

The subjects performed an apartment selection task as it is believed to be a personally relevant choice problem for college students. The different levels of vividness were developed using the Microsoft® Agent Technology. In the T treatment, the decision aid provided subjects with instructions through text balloons. In the TV treatment, instructions were provided in text balloons while a computer-generated voice read the text. In the TVA treatment, human animation provided instructions through text balloons and voice. This animation used gestures and changed facial expressions while providing instructions. Figures 2 and 3 provide screenshots of the T and TVA interfaces (TV appears the same as T).

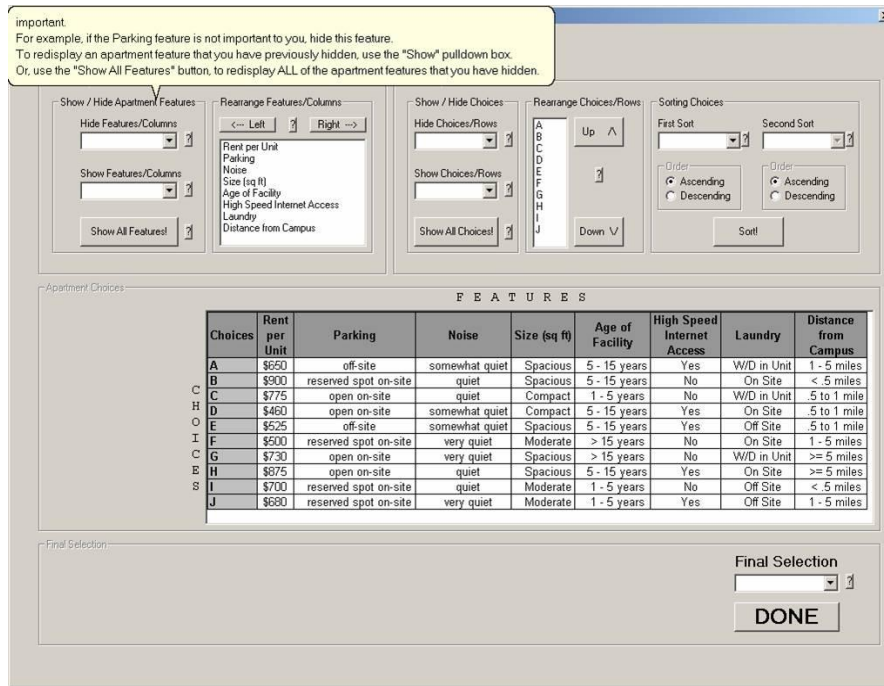


Figure 2. T interface

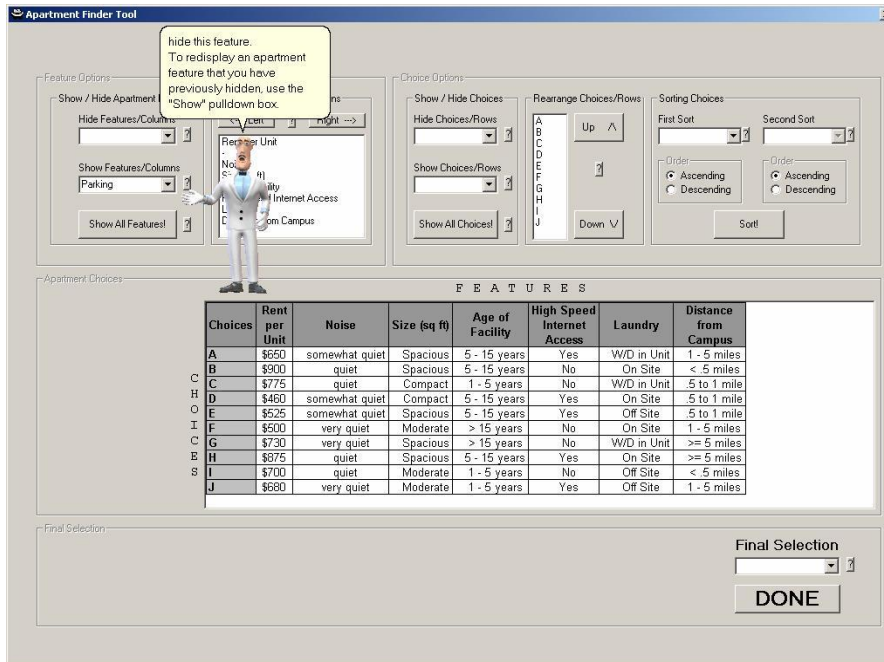


Figure 3. TVA interface

Measures

The measurement scales in the survey were adapted from previous studies. The measurement of the extraversion/introversion personality trait used a 5-item adjective scale (Trapnell and Wiggins 1990). Social presence used a 4-item semantic scale

(Short et al. 1976). Computer playfulness was assessed using a 4-item adjective scale (Webster and Martocchio 1992). All trust-related measures were adapted from McKnight et al. (2002).

Data Analysis

Analysis of the full model shown in Figure 1 will be performed using AMOS 4.0 for structural equation modeling with multiple groups and maximum likelihood estimation.

CURRENT STATE OF THE RESEARCH

A pilot study was initially conducted and the full experiment was completed with 550 subjects. The conference presentation will include a complete data analysis and discussion of the results. Limitations of the study include the use of student subjects and the cross-sectional nature of the study, and will be discussed in detail at the conference.

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