

Understanding the Role of Cognitive and Affective Trust in Consumer-Artificial Intelligence Relationships

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Introduction

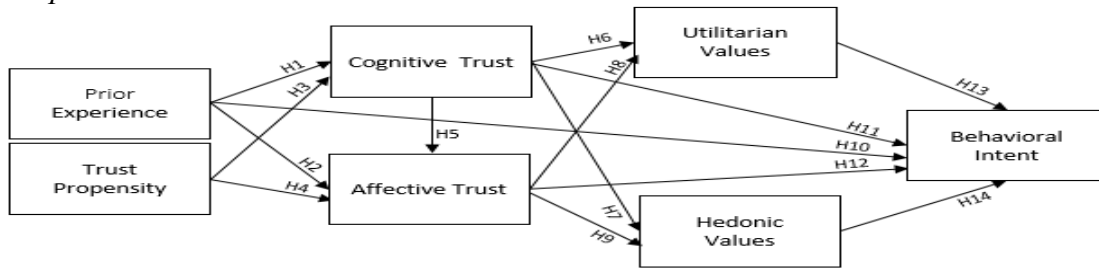
Artificial Intelligence (AI) refers to “machines that exhibit aspects of human intelligence” (Huang & Rust, 2018, p. 155). Exponentially growing AI technology is broadly integrated into consumers’ daily lives, changing the nature of service interactions and the relationships between customers and service providers (McLean et al., 2021). PwC estimated AI’s contribution to the global economy will increase by 14%, reaching 15.7 trillion USD by 2030 (Rao & Verweij, 2017). Primary AI applications in consumer contexts include digital assistants (DAs) encompassing text or voice-driven conversational agents and bots and social robots (SRs). Despite growing awareness and adoption of AI, human-AI relationships continue to face problems of inherent low trust and wide skepticism among consumers (Davenport et al., 2019). A pervasive perception of AI is a thinking machine with no ability to feel, which contributes to pervasive low trust in AI (Gray, 2017). While research on human-AI relationships is growing and abundant, empirical research focusing on the affective aspect of human-AI relationships is still lacking (Wang et al., 2016). Furthermore, little is known about whether the mechanism of human-AI relationship building is similar or different between DAs and SRs. Thus, the current study aims to examine both cognitive and affective dimensions of trust in human-AI relationships and further examine antecedents (prior experience and trust propensity) to trust as well as consequences (utilitarian value, hedonic value, and behavioral intent) of trust in human-AI relationships and compare the relationship building mechanism between DAs and SRs.

Conceptual Development

The Social Response Theory (SRT, Nass & Moon, 2000) and Theory of Mind (TM, Gray et al., 2007) offer useful theoretical insights to conceptualize human-AI relationships. According to the SRT, humans interact with computers as social actors and reciprocate in their interactions. As a result, trust is an important foundation of human-AI relationships. The TM identifies two dimensions of mind, namely experience and agency, which helps construe how DAs and SRs may differ in their relationship building with users. Across multiple disciplines, trust is defined as “a subjective belief, a subjective probability, the willingness of an individual to be vulnerable, reliance on parties other than oneself, or a person’s expectation.” (Kim et al., 2008, p. 545). Researchers identified two distinctive dimensions of trust; cognitive trust grounded in reliability and dependability based on rational assessment (Moorman et al., 1992) and affective trust grounded in interpersonal care and concern based on emotional assessment (Rempel et al., 1985). Researchers further argued that cognitive and affective trust differ not only in their antecedents, but also in behavioral outcomes (Ng & Chua, 2006). For example, Wang et al. (2016) demonstrated that cognitive trust was primarily associated with consumer utilitarian value, whereas affective trust was mainly associated with hedonic value. See Figure 1 for hypotheses.

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Figure 1
Conceptual Model

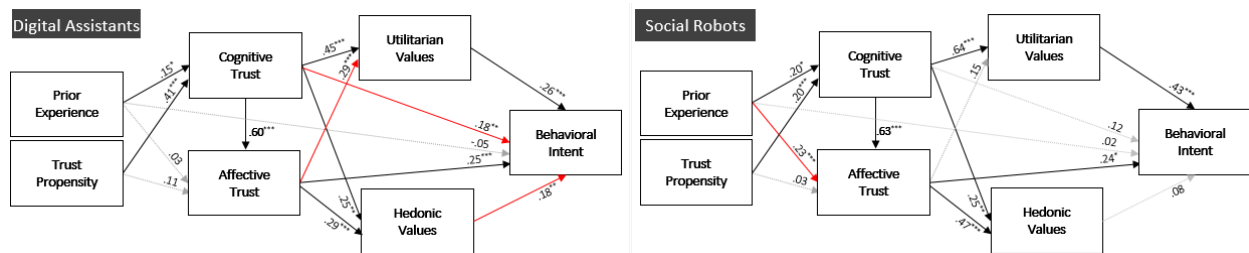


Method and Results

An online survey was conducted at a large U.S. university. We used screening questions to gather the data from actual users of DAs and SRs. There were 216 participants for DAs and 108 participants for SRs. Demographic characteristics were consistent between DA users ($M_{age}=19.3, SD=1.76$) and SR users ($M_{age}=19.3, SD=1.56$). Exploratory factor analyses (EFA) conducted on multi-item measures confirmed the dimensionality of the original scales and had adequate reliabilities. Composite scores were calculated and used for further analyses.

A path analysis was performed to examine the conceptual model for DAs and SRs, respectively. Maximum likelihood estimation indicated an acceptable model fit for both DAs and SRs. For both DAs and SRs, prior experience and trust propensity were positively related to cognitive trust. Conversely, the way the antecedents were related to affective trust differed. Prior experience was significantly related to affective trust only for SRs. Trust propensity was not related to affective trust for either DAs nor SRs. The positive relationship between cognitive trust and affective trust as well as between cognitive trust and utilitarian values were significant and consistent between DAs and SRs. Affective trust was positively related to hedonic values for SRs only. Factors related to behavioral intent differed; for DAs, cognitive trust, affective trust, utilitarian values, and hedonic values were significantly related. For SRs, only affective trust and utilitarian values were significantly related to behavioral intent.

Figure 2
Path Analysis for DAs and SRs



Note. *red lines indicated significant differences between two models.

Discussions, Conclusion, and Implications

The results showed that DAs have established more robust relationships with consumers than SRs, resulting in more paths to behavioral intent. While both cognitive and affective trust were vital to building a human-AI relationship, cognitive trust was a foundation of relationship building for both DAs and SRs. Differences were observed between DAs and SRs, specifically affective trust and utilitarian values. There were various paths that lead to behavioral intent for DAs; ranging from feeling emotionally connected to DAs (affective trust) to thinking DAs to be competent in the given tasks (cognitive trust) to perceiving their interactions with DAs to be useful (utilitarian values) or enjoyable (hedonic values). On the contrary, paths to behavioral intent for SRs were more limited. Consumers need to either emotionally feel connected to SRs or perceive SRs to be useful. The wider adoption of DAs into consumers' lives helps explain the current findings illuminating more robust human-DA relationships than human-SR relationship despite SRs' greater humanness and physicality. The findings provide new insights into the dynamic ways that cognitive and affective trust build human-AI relationships and offer relevant implications to promote human-AI relationships. Building competent AI applications that reliably perform is paramount to the success of AI. Considering that prior experience contributed to building affective trust, we recommend incentivizing a trial use of AI applications.

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