Chapter 72
Behavioral and Physiological Responses to Computers in the Ultimatum Game

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ABSTRACT

This article describes how studies in the area of decision-making suggest clear differences in behavioral responses to humans versus computers. The current objective was to investigate decision-making in an economic game played only with computer partners. In Experiment 1, participants were engaged in the ultimatum game with computer agents and regular computers while their physiological responses were recorded. In Experiment 2, an identical setup of the game was used, but the ethnicity of the computer agents was manipulated. As expected, almost all equitable monetary splits offered by the computer were accepted. The acceptance rates gradually decreased when the splits became less fair. Although the obtained behavioral pattern implied a reaction to violation of the rule of fairness by the computer in the game, no evidence was found for participants' corresponding emotional involvement. The findings contribute to the body of research on human-computer interaction and suggest that social effects of computers can be attenuated.

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INTRODUCTION

Humans have a natural tendency to perceive non-human and non-living entities in terms of human qualities – they readily attribute the power to act or to intentionally behave in a certain way to animals, natural forces, gods, and technological gadgets, and thus create human-like agents in the surrounding environment (Waytz, Epley, & Cacioppo, 2010). One of the most scrutinized inanimate social actors is the computer. In this context, experiments that investigated the mechanisms of human-human interactions (HHI) were systematically adapted to the study of human-computer interactions (HCI). Substituting participants' interaction partner with a regular computer, it was shown that people adhere to politeness norms when they respond to computers, apply gender stereotypes, and take part in mutual self-disclosure (e.g, Nass, Moon, & Carney, 1999; Nass, Moon, & Green, 1997). The term "media equation" was coined to refer to these effects (Reeves & Nass, 1996). Invoking the ethopoeia approach, they were explained to occur due to the mindlessness of the computer users who unconsciously implement accessible behavioral scripts suited for social exchange in settings that involve computers, even though social cues in such settings are sometimes minimal (Nass & Moon, 2000).

Computers with anthropomorphic characters as interfaces have been demonstrated to instantly evoke reactions normally reserved for humans (Yee, Bailenson, & Rickertsen, 2007). However, it is especially the plausibility of the characters' behavior that produces enough social cues to engender interpersonal dynamics (Tinwell, Grimshaw, Nabi, & Williams, 2011). Behavioral realism and agency are two crucial factors responsible for the meaningfulness of HCI within the Threshold Model of Social Influence, an alternative to the ethopoeia approach (Blascovich et al., 2002). Behavioral realism denotes the extent to which the computer-generated characters act in a manner consistent with the user's expectations shaped throughout socialization, so mainly in everyday face-to-face interactions. It is even thought to be more essential than anthropomorphic appearance itself, which primarily serves to aid perception of given behaviors. Agency refers to whether artificial characters are perceived to accurately depict real people in real time.

How agency afforded by avatars (virtual personifications of the users operating in real time) and agents (virtual characters driven by a computer algorithm) influences people's responses in HCI remains unclear. Ethopoeia presumes that if avatars and agents exhibit enough social cues, they will elicit comparable social responses. This is parallel to how people would be expected to respond to regular computers, as demonstrated by research described earlier. Conversely, the Threshold Model of Social Influence predicts that since avatars represent real humans, their perceived agency is always greater. Hence, their social impact should be more pronounced in comparison to the agents. An interesting line of research that accommodated the versatile comparison of reactions to avatars and agents on the one hand and to humans and regular computers on the other was founded on a simple social decision-making paradigm frequently used in psychological experiments – the ultimatum game.

Typically, the ultimatum game engages two players, called the proposer and the responder. They have an amount of money to split between themselves. The proposer offers a certain amount to the responder and the responder's task is to either accept or reject it. If the offer is accepted, the money is distributed as determined by the proposer. If it is rejected, neither of the players gets the money. From the standard economic decision-making point of view, the proposer should offer the smallest possible amount and the responder should always accept it. In such a scenario, the players would take the only rational course of action – they would make decisions to boost their monetary gains (Becker, 2013). Nevertheless, it appears that proposers are inclined to split the money fairly and offer respondents approximately 50%