

Individuals in a Romantic Relationship Express Guilt and Devalue Attractive Alternatives after Flirting with a Virtual Bartender

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ABSTRACT

Interactions with virtual agents may have psychological and behavioral implications, even if the participants know that they are interacting with a virtual entity. As virtual agents are gradually becoming part of human society, it is important to understand the extent to which virtual encounters can affect our daily lives, and whether engaging in a specific behavior with virtual humans affects the way that individuals perceive and assess real humans in their surroundings. We examined the effect that seductive interplays might have on individuals in committed relationships and their way of managing a virtual threat to their relationship. One hundred and thirty heterosexual participants conversed with an opposite-sex virtual human in a virtual reality (VR) setup in either a seductive or neutral way. Shortly after, participants were interviewed by an attractive opposite-sex confederate. Results revealed that participants in the seductive condition felt increased feelings of guilt, and that participants in the seductive condition were more prone to devalue the sexual and intellectual attractiveness of the confederate than participants in the neutral condition. This study thus demonstrates, for the first time, that flirting with a virtual human may influence real-life attitudes towards real people.

CCS CONCEPTS

Human-centered computing → Human-computer interaction (HCI) → Empirical studies in HCI

KEYWORDS

Virtual human, virtual reality, flirting, romantic relationships.

1 Introduction

As Virtual reality (VR) gradually becomes more widely available to the public, encounters with virtual humans may become more frequent and meaningful. Thus, it is becoming of major importance to understand to what extent encounters with such virtual agents affects life outside the VR. In the study reported here, we tested the hypothesis that flirting with a virtual human might have consequences on real-life attitudes towards alternative romantic partners. Specifically, we hypothesized that individuals who were in a seductive condition, would experience the interaction with the seductive virtual human as a threat to their relationship, which in turn would result in increased feelings of guilt, as well as a devaluation of the degree of sexual and non-sexual attraction of a real-life confederate, as predicted by previous psychological studies outside VR [8].

2 Background

2.1 Romantic encounters with virtual humans

More than 15 years ago, Blascovich et al. suggested using VR, populated by virtual humans, as a methodological tool for social psychology [5], addressing three of the major challenges of the field: the experimental control–mundane realism trade-off, lack of replication, and unrepresentative sampling. More recently, a similar framework has been suggested by Pan and Hamilton [13], addressing not only the potential of virtual humans for psychological research but also the possible pitfalls. The study we report here follows this tradition by studying how individuals in a relationship are affected by being seduced, when the seduction is performed by a virtual agent and takes place in VR. Our methodological contribution is that, unlike most virtual agents' studies, we are interested in what happens in a real social interaction following it.

A wealth of psychological and behavioral responses to interactions with virtual humans have been shown (for review, see [16]). However, it has rarely been demonstrated that an interaction with a virtual human affects the attitudes towards a real person in a similar real-life situation. In this paper, we show such an effect for the first time in the context of flirting and sexual attraction. There was only one major study exploring the implications of a flirting scenario with a virtual human [12], in which 36 male participants, half of them socially anxious and the other half confident, interacted with a virtual woman in a bar. Both groups were examined for their level of physiological arousal during the scenario and their reported level of stress. Our study reported here has several differences in motivation, methodology, and result. Importantly, our study goes beyond Pan et al.'s study in showing that such a virtual flirting scenario may affect attitudes towards a real person outside the VR.

2.2 Flirting with another while in a relationship

Forming a close intimate relationship can be hard and complex but maintaining one can be even harder. Social psychologists have been extensively examining the latter topic. Kelley and Thibaut's [9] theory of interdependence, holds that relationship maintenance depends on the benefits that couples gain from their interactions, in a reward and cost manner. The theory is especially concerned with the level of satisfaction that individuals have in their relationship and the level of dependence they have on their spouse [14]. Both properties are consistently examined in what is referred to as the 'comparison level', such that the current relationship is repeatedly compared to previous relationships and to peer's relationships [15]. Specifically, individuals compare their partners to what they perceive as alternative partners available for them outside their relationship.

Comparison of alternative partners may also serve as a threat to the individual's level of commitment to his current partner [10]. As a result, numerous psychological mechanisms and emotions have evolved to help individuals maintain their commitment when met with a relationship threat [7]. For example, previous studies revealed an explicit higher-order mechanism that causes individuals to devalue their appraisal of available alternatives, by perceiving them as less attractive [6]. This effect was found for both physical and intellectual attractiveness [8]. Additionally, relationship related emotions of guilt may arise when a partner inflicts harm on his significant other, and cause empathic distress over the suffering of the hurt partner and separation anxiety over the possible loss or damage to the relationship [2]. Such feelings promote commitment by acting as relationship enhancers; boosting behaviors that strengthen the relationship (i.e., expressing affection, paying attention) [3].

Following these findings, we hypothesized that exposing participants to a virtual relationship threat would increase their feelings of guilt and the likelihood of devaluating the attractiveness of an attractive alternative.

3 Method

Participants. One hundred and thirty participants (65 women, 65 men) between the ages of 20 to 31 ($M=24.14$, $SD=1.75$) took part in the study. Participants were heterosexual males and females, who have been in a steady and monogamous relationship for at least

four months. All participants signed a consent form and the study was approved by the local ethics institutional review board (IRB).

The virtual scenario. The virtual environment in which the experiment took place was a bar populated by an agent who was an opposite-sex bartender who conversed with the participant. There was background music playing and noises of people talking as if in a real bar. Depending on the condition, the bartender was either seductive or neutral. This was manipulated by several means: i) semantic content of the conversation – a predefined script was pre-recorded for each condition, illustrating a different style of converse for each condition (e.g., in the seductive condition the agent would occasionally compliment the participant in a flirting manner, wherein the neutral condition no compliments were made), ii) eye contact – in the seductive condition the agent's gaze was fixated on the participant as a means of making eye contact. In the neutral condition it randomly shifted to different points in the room [1], and iii) gestures – in the seductive condition the agent made occasional gestures that are related to flirting and proximity seeking, such as leaning forward towards the participant [11].

The virtual bartender implementation is based on a generic software platform that we have developed in the lab, on top of the Unity engine. The functionality includes automated verbal and non-verbal communication based on a simple state machine with states such as idle and speaking. For each state, there were pre-recorded animation sequences and facial movement sequences, played according to the state and experimental condition.

Manipulation Check. A four-item questionnaire on a scale of 1-5 was designed to test if participants felt as if the virtual human was flirting with them (e.g., "To what extent did you feel as if the bartender was flirting with you?"; $\alpha = 0.78$).

Interview with a confederate. Participants were given seven minutes to engage in a conversation with an attractive confederate of the opposite sex. The conversation was led by the confederate who was instructed to raise a set of predefined subjects to discuss (e.g., "What do you think about gender roles in relationships?"). The confederate was trained to act uniformly for all participants.

A Guilt questionnaire was composed of 5 statements on a scale of 1-5, designed to assess the participants' feelings of guilt regarding the virtual interaction (e.g., "I feel guilty"; $\alpha = 0.86$).

Attraction to the confederate questionnaire. A questionnaire on a scale of 1-5, designed to test the participants' degree of attraction towards the confederate [4]. The questionnaire was divided into two parts: five questions regarding sexual attraction (e.g., "to what extent do you find the confederate attractive?"; $\alpha = 0.81$) and five questions regarding non-sexual attraction (e.g., "to what extent do you find the confederate to be intellectual?"; $\alpha = 0.78$).

Procedure

After informed consent procedures, each participant was instructed to sit in a designated chair where the virtual scenario was to take place and were instructed to first look around the environment, and upon the agent's arrival, answer all questions, and refrain from asking questions. The scenario was manipulated by the experimenter, using a 'wizard-of-Oz' method (i.e., each sentence was manually triggered by the experimenter, according to a pre-defined sequence). Participants were randomly assigned to either a neutral or seductive condition.

After the virtual scenario, the participants completed a manipulation check questionnaire and were then instructed to move to a different seat where the interview with a confederate took place. While the confederate conversed with the participant, the experimenter waited outside the room, and when the interview was over (seven minutes later), the confederate left the room and the participants filled the remaining guilt, attraction towards the confederate and general demographic questionnaires.

4 Results

Flirting and guilt. The experimental manipulation was effective; there was a significant difference in the scores for the seductive ($M = 4.12$, $SD = .927$) and the neutral ($M = 3.05$, $SD = 1.363$) conditions; $t(128) = 5.268$, $p < .001$, Cohen's $d = 1.02$, 95% confidence interval (CI) for Cohen's d [-1.143, -.564].

Also, participants in the seductive condition felt significantly more guilty ($M = 1.26$, $SD = .594$) than the participants in the neutral condition ($M = 1.09$, $SD = .341$) $t(128) = 1.993$, $p = .049$, Cohen's $d = 0.35$, 95% confidence interval (CI) for Cohen's d [-.337, -.001]. The difference was only significant in one question out of four, but this was the only statement which directly referred to guilt (e.g., "I feel guilty regarding the virtual interaction"). There was no significant difference between the conditions in the responses for the three other questions.

Confederate devaluation. We hypothesized that participants in the seductive condition would value the confederate as less attractive than those in the neutral condition. This hypothesis was confirmed for two of the evaluations, but not for all. Results showed that participants in the seductive condition perceived the confederate as less attractive ($M = 3.71$, $SD = .996$) than those in the neutral condition ($M = 4.03$, $SD = .770$) $t(128) = -2.070$, $p = .041$, Cohen's $d = 0.36$, 95% confidence interval (CI) for Cohen's d [.014, .632]. For the evaluation of non-sexual attraction, the result was marginally significant, showing that participants in the seductive condition perceived the confederate to be less intellectual ($M = 3.40$, $SD = .825$) than those in the neutral condition ($M = 3.69$, $SD = .865$) $t(128) = -1.972$, $p = .051$, Cohen's $d = 0.34$, 95% confidence interval (CI) for Cohen's d [-.001, .586].

5 Discussion

The results of this study are consistent with previous findings regarding how committed partners manage threats made by attractive alternatives, therefore implying that a virtual relationship threat might be comparable to an actual one. Importantly, the virtual flirting significantly affected the participants' attitudes towards a real person, outside the VR.

The implications of our study are twofold. First, we believe our novel design could open the door for future studies exploring relationship maintenance processes and people's reaction to relationship threats. Second, although caution should be recommended before assuming a full equivalence between real and virtual flirting, the transfer from VR to the real world in our study imposes an important question to the extent to which VR experiences may affect real-world attitudes towards real humans, even in the highly intimate context of flirting and sexual attraction.

As VR and virtual agents are becoming increasingly popular, our findings raise opportunities, for further research and applications, as well as social and ethical concerns.

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