

# Moderating Effects of Social Presence on Behavioral Conformation in Virtual Reality Environments: A Comparison between Social Presence and Identification

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## Abstract

*Studies in the Proteus Effect and the Spyglass Self have demonstrated that people tend to change behaviors in the way conforming to the represented selves. In this experimental study I investigate how social presence could influence the degree to which people show behavioral conformation in virtual environments (VEs). The results (n = 56) showed that social presence moderated the effects of gender-role enactment on distance management only in the female-role condition. The participants who felt stronger social presence maintained a shorter distance when they enacted the female role in a VE. The results also showed that identification was not significantly correlated with distance management although identification and social presence were highly significantly correlated. The results imply that the overall experience of an interaction in VEs (e.g., social presence) may have a greater impact on behavioral conformation than a partial experience of one's own virtual character (e.g., identification) in dyadic interactions.*

**Keywords** – Social Presence, Identification, Behavioral Conformation, Self-Perception, and Virtual Reality.

## 1. Introduction

With dramatic evolution of technologies, people are becoming more and more engaged in various types of virtual experiences in interactive media (e.g., using video games, or virtual reality systems). Such experiences could influence users' attitudes and behaviors in the way that conforms to the portrayed selves in interactive media [1, 2]. A study by Yee and Bailenson showed that people behaved in the way that conforms to visual representations of their own character in virtual environments (VEs) such as attractive or tall [2]. Another study by Goldstein and Cialdini also found similar behavioral conformation via inferring attributes of others when people were asked to take the perspective of others [3].

In spite of growing interests in behavioral conformation in interactive media [2, 4, 5], there have been relatively a few studies examining factors that could influence individuals' degree to which they conform to stereotyping behaviors in VEs. Goldstein and Cialdini suggested that "a sense of merged identity" plays an important role in inferring

attributes of others and showing behavioral conformation accordingly [3]. Yee and Bailenson [4] also argued that "identity cues provided via a digital self-embodiment" magnifies the degree to which people conform to the expected behavior (p. 206).

In this regard, it is important to understand psychological factors such as feeling of social presence and perceived identification with virtual characters that could influence individuals' conforming behaviors in interactive media. Therefore, the purpose of the current study is (1) to examine the moderating effect of social presence on individuals' behavioral conformation in VEs; and (2) to compare social presence with identification in terms of their effects on behavioral conformation, in the context of gender-stereotyping interpersonal distance management. .

## 2. Literature Review

### 2.1. Self-Perception Theory and Behavioral Conformation

Westen [6] defines the self-concept as "the prototypic, generalized representation of self that most people verbalize when asked to do so" (p. 7). Similarly, Baumeister and Muraven [7] define the self-concept as a composite definition of the self, including "social roles, reputation, a structure of values and priorities, and a conception of one's potentiality" (p. 406). One commonality in the above definitions is the importance of social interaction in constructing and confirming the self-concept. Individuals strive to construct the desired self-concept by strategically managing the impressions they make on others (e.g., impression management [8]), which may not be fully appreciated until other people perceive the constructed self-concept as intended. In other words, the self-concept is often embedded in relationship schemas so that it is essential to get validation of one's identities from other people for realization of the self [9].

There are two major ways to construct the self-concept: reflected appraisal and social comparison [10]. First of all, Cooley coined the term, the Looking-glass Self to emphasize the importance of reflected appraisals in self-concept formation [11]. According to the Looking-glass Self, people construct the self-concept by receiving feedbacks from significant others as if people adjust their physical

appearance by looking at the reflected image of selves in the mirror. Second of all, people also construct their self-concept by comparing themselves with other people by observing others' behaviors. In a similar vein, self-perception theory posits that people infer their attitudes and beliefs by observing their own behaviors as if making inferences from a third-person perspective [12]. For example, an individual may develop pro-social self-concept via (1) being told that the individual helps other people well by parents, (2) observing friends' behaviors of helping other people, or (3) observing one's own behaviors of helping other people. In turn, people may show behavioral conformation in accordance with constructed self-concept (e.g., [3, 13]).

Interestingly, self-perception theory was used as a psychological mechanism to explain behavioral conformation in face-to-face environments [3], as well as VEs [2]. Specifically, Goldstein and Cialdini found that participants who were asked to take the perspective of an interviewee helping a stranger in need actually viewed themselves more self-sacrificing and helped the researcher more by completing extra surveys [3]. Based on the results, Goldstein and Cialdini argue that people could infer their own attributes even by observing others when they feel a sense of identification with others by taking perspectives or enacting roles. They term this the Spyglass Self, similar to the Looking-glass Self. A similarity between the two is observing others' behaviors. The major difference is that, in line with self-perception theory, people identify themselves with others to infer attributes and behaviors in the Spyglass Self. On the other hand, the identification process is not necessary in the Looking-glass Self.

In VEs the Proteus Effect explains how observing one's virtual character via visual representations could influence the way an individual behaves [2, 4]. In particular, Yee and Bailenson found that participants assigned attractive avatars showed behavioral conformation by walking closer and disclosing themselves more to the confederate in a VE. In another study tall and attractive avatars outperformed other avatars in *World of Warcraft* [14]. Based on their findings, Yee and colleagues propose that visual representations of one's own virtual character have significant impact on how the individual conforms to the behavior as stereotyped in VEs (e.g., attractive and confident; tall and arrogant), which is in line with self-perception theory.

Based on the literature on the Spyglass Self and the Proteus Effect, I argue that people are likely to show stereotyping behaviors conforming to the attributes of a role identity when asked to enact the role. One of such stereotyping behaviors is gender stereotyping behavior in interpersonal distance management. In general, people maintain greater physical distance in male-male dyads than in both male-female and female-female dyads [15, 16]. This gender stereotyping behavior is known to be consistent in the face-to-face environment [17] and VEs [18]. In fact, the author found that people showed typical gender-stereotyping distance management in the way that conforms to the enacted

gender-role identity in VEs [5]. The author also showed that behavioral conformation could be magnified in the third-person-view where people were able to observe the visual representation of their own character in the VE. As discussed in the Proteus Effect and the Spyglass Self, it is possible that underlying psychological factors for the magnified behavioral conformation may be a sense of social presence or identification. In the following sections, I will review the literature about the concept of social presence and identification with respect to their potential effects on behavioral conformation in VEs.

## 2.2. Social Presence

Researchers have realized that the feeling of presence—the perceptual illusion of non-mediation [19] lies at the heart of almost all mediated experiences [20]. There are many definitions and different types of presence (e.g. physical presence, social presence, and self-presence; see [20, 21, 22]; for different perspectives on presence). Among different types of presence, social presence refers to a mental simulation of other intelligences [23]. Lee [20] defines social presence as “a psychological state in which virtual (para-authentic or artificial) actors are experienced as actual social actors in either sensory or non-sensory ways” (p. 45).

The feeling of social presence can play an important role in successful social interactions with even non-human beings, including virtual characters. For example, when people feel strong social presence of a virtual character, people tend to respond to it as if it was an actual human [24, 25]. As such, social presence is often regarded most relevant to the study of human-agent interaction. A study by Lee and colleagues provided statistical evidence for the mediating role of social presence in people's social responses to an artificial social robot [26]. They found that people showed more positive attraction and evaluation toward a social robot when they felt stronger social presence during the interaction. Taken together with the literature in Section 2.2, people may show more magnified stereotyping behaviors in the way that conforms to the enacted role identity when they have a stronger feeling of social presence in VEs. Specifically, people may maintain greater distance as a gender stereotyping behavior in VEs when they enact the male role and have a strong feeling of social presence. Therefore, I propose that social presence will moderate the effects of gender role on gender stereotyping behavior of distance management in VEs.

*H1: A stronger feeling of social presence will make a group of participants maintain greater distance in the male role condition*

*H2: A stronger feeling of social presence will make the other group of participants maintain shorter distance in the female role condition*

## 2.3. Social Presence and Identification

According to Oatley [27], the experience of entertainment media could be understood as a simulation of human actions that run on the minds of the audience. For example, when an individual experiences a virtual reality simulator, the individual understands the representations of a virtual character (i.e., avatar) within the existing beliefs, desires, knowledge, and emotions of the self by taking on the personas of the virtual character. During the successful simulation, the individual may be able to feel the emotions of the virtual character, the process of which is defined as identification [27]. In a similar vein, Cohen [28] defines identification as “an imaginative process invoked as a response to characters presented within mediated texts” (p. 250). Both Oatley and Cohen emphasize on the perspective sharing notion of identification in their definitions. That is, when an individual identifies with a virtual character, the individual is likely to share beliefs and stereotypes of the virtual character, which may result in behavioral conformation during the individual’s media experience.

The effects of identification have been studied in the context of interactive media such as video games [e.g., 29, 30]. For example, Konijin and her colleagues found that the more strongly people identified with a violent character in a video game, the more aggression they showed by using noise levels loud enough to cause permanent hearing damage to their partners [30]. The results also indicated a positive relationship between identification and presence as people were more likely to identify with the violent character when they felt more immersed in the game.

Given the conceptual definition and empirical evidence, identification and social presence may show similar effects on peoples’ responses in VEs. In particular, people who identify with the virtual character more strongly are likely to show greater behavioral conformation in VEs. On the other hand, it is also possible that identification and social presence may have different influence on behavioral conformation. Identification focuses only on people’s experience with their own virtual character, while social presence includes people’s overall experience of the interaction. Although this is an interesting question, there have been few studies that directly examine how identification and social presence cause similar or different effects on people’s responses in VEs. Therefore, the following research question is proposed:

*RQ1: Is there any difference between identification and social presence in their effect on behavioral conformation in VEs?*

## 3. Methods

### 3.1. Participants

A total of 56 undergraduate students enrolled at a private university in the West Coast of the United States participated

in the experiment. The biological sex of the participants was balanced across conditions with 28 males and 28 females.

### 3.2. Procedures

A 2 (subject biological sex: male vs. female) x 2 (gender-role play: male role vs. female role) between-subject analysis of variance design was used to test the hypotheses in a laboratory environment. Two levels of the gender-role condition were manipulated by creating two versions of virtual reality scenario in that participants were randomly assigned to act out either a male or female character. The participants (n = 14 per each condition with gender balanced) wore a Head-Mounted Display and engaged in conversation with their same-gender virtual friend in a bar-like virtual reality environment.

### 3.3. Measure

The feeling of social presence and identification with the character that the participants have acted out were measured based on a paper-based self-report survey. The distance data between a participant and the computer agent were logged into a database system in real time during the interaction.

Thirteen questions about *social presence* were asked using a combination of seven-point semantic differential scales and independent seven-point scales, anchored by “not at all” (1) to “very much” (7) : remote/immediate; dead/lively; unemotional/emotional; insensitive /sensitive; unresponsive/responsive; impersonal/ personal; unsociable/sociable; to what extent did you feel mentally immersed in the experience?; how involving was the experience?; how completely were your senses engaged when you used the virtual reality system?; to what extent did you experience a sensation of reality; how engaging was the story? (Cronbach’s alpha = .91). Higher scores indicated a greater sense of social presence during their VR experience.

To measure *distance*, positional data of a participant during the interaction were logged into a database system in real time in terms of the x and y planes. Later, a series of paired “x” and “y” positions of the participant was used to compute the shortest distance between the participant and the agent, based on a formula: average of the square root of x square plus y square. The unit of physical distance is the inch.

*Identification* with the game character was measured by eight items that asked the level of the participants’ agreement with the statements such as “I feel strong ties to the virtual character that I acted out,” “I do not feel a sense of being ‘connected’ with the virtual character that I acted out,” or “In general, I am glad to act out the role in the virtual reality system.” The measure was modified from the social identity measure by Cameron [31] that was tested in five different studies with a total of 1078 respondents. The seven-point Likert scale was anchored by strongly disagree (1) to strongly agree (7). The final index is the average score on the

eight items (Cronbach's alpha = .87). Higher scores indicated a greater sense of identification with the character.

**Table 1. Means, Standard Deviations, and Correlations of the Measured Variables**

	M	SD	Female Role			Male Role		
			D	SP	I	D	SP	I
Distance (D)	61.08	23.14	-			-		
Social Presence (SP)	4.32	1.00	-.46*	-		-.11	-	
Identification (I)	4.80	1.10	-.31	.74**	-	-.16	.32	-

Note: \* $p < .05$ , \*\* $p < .01$  (two-tailed)

#### 4. Results

A 2 (gender of subjects: male vs. female) x 2 (gender role: male role vs. female role) factorial ANOVA was used to test the overall effect of gender role on behavioral confirmation. Then, I split the data set into two sub-groups based on two gender-role conditions in order to test the moderating effect of social presence on behavioral conformation separately. This was a necessary step because a shorter distance indicates stronger behavioral confirmation in the female role condition, while a greater distance means stronger behavioral confirmation in the male role condition. Within the sub-group, distance was regressed on social presence and biological sex (dummy coded). Finally, the correlation analysis was conducted to compare social presence with identification in terms of their effects on behavioral conformation.

First of all, the results of ANOVA ( $n = 56$ ) showed that the participants who played the male role maintained a greater physical distance ( $M = 70.55$ ,  $SD = 24.92$ ) between themselves and the computer agent than the participants who played the female role ( $M = 51.61$ ,  $SD = 16.84$ ), regardless of their biological sex,  $F(1, 52) = 11.26$ ,  $p < .01$ . There was not any significant effect of biological sex, after controlling for the gender role,  $F(1, 52) = 2.72$ , *n.s.*

Secondly, a multiple regression analysis was conducted to evaluate how well social presence and biological sex predicted distance within each gender-role condition. About 24% of variance in distance management could be explained by the linear combination of social presence and biological sex ( $R^2 = .24$ ) in the female-role condition, while 4% of variance in distance in the male-role condition. Specifically, there was a significant negative relationship between social presence and distance ( $r = -.46$ ,  $p < .05$ ) in the female-role condition. Consistent with H2, one unit increase in social presence will result in 0.39 inch decrease in distance, after controlling for biological sex ( $\beta = .39$ ). Biological sex was not a significant predictor once again. On the other hand, H1

was not supported. Both social presence and biological sex were not significant predictors for distance in the male-role condition. Taken together, the results showed that social presence moderated the effects of gender role on distance management in the female-role condition but not in the male-role condition. The participants who felt stronger social presence maintained a shorter distance between themselves and the computer agent during the interaction in the female-role condition.

Finally, Table 1 shows correlations among all measured variables. Consistent with the pattern of previous results, social presence was significantly correlated with identification and distance in the female-role condition ( $r = .74$ ,  $p < .01$ ;  $r = -.46$ ,  $p < .05$  respectively) but not in the male-role condition. It is interesting to see that identification was not significantly correlated with distance in spite of its high correlation with social presence.

#### Conclusions

The results indicate that enacting a gender role could influence the way people conform to gender-stereotyping behaviors in distance management in VEs. It is interesting to see that the gender role had a significant impact on how people manage physical distance during the dyadic interaction in VEs, even after controlling for the effect of their biological sex. In addition, the effects of gender role on distance management in VEs were moderated by a feeling of social presence. The participants maintained a shorter distance within the female-role condition when they felt a stronger sense of social presence during the interaction. This finding implies that social presence could magnify the degree to which people conform to stereotypical behaviors when asked to enact a role identity in VEs. The results are in line with finding from studies in the Proteus Effect [2] and the Spyglass Self [3]: people change behaviors in the way that conforms to the represented self; and the magnitude of behavioral conformation could be altered (see also [5]).

However, the moderating effects of social presence were confirmed only in the female-role condition but not in the male-role condition. Although enacting a male role made people maintained a greater distance as stereotyped, the degree of behavioral conformation was not affected by a feeling of social presence. A plausible explanation for this mixed finding is that immersed and realistic VEs may make people get closer to virtual characters up and above the Proteus Effect. Nonetheless, immersed and realistic VEs may not make people maintain a greater distance from virtual characters beyond the necessary distance for interactions because they may want to enjoy their experience in the VEs. Another plausible explanation is a ceiling effect. People need to stay within a certain distance in order to engage in social interactions. A ceiling for a distance during the interaction may prevent people from maintaining a greater distance after a certain point even if they want more space. Because of the ceiling effect of distance in social interactions, a stronger feeling of social presence may not be able to magnify male-stereotypical behaviors in distance management: people may have reached a maximum distance for social interactions already. In spite of these plausible explanations, we need more research in this area in order to provide a clearer understanding of psychological factors influencing the magnitude of behavioral conformation.

The results from a correlation analysis showed that identification was highly correlated with social presence. Consistent with previous findings (e.g. [30]), the more people identified with a virtual character, the stronger they felt social presence. However, the feeling of identification did not influence the degree to which people conformed to gender-stereotypical behaviors in distance management for both male and female-role conditions. Only social presence was significantly correlated with behavioral conformation in the female-role condition. The results imply that a partial experience of identification with the virtual character may not be sufficient enough to have a significant impact on behavioral conformation. Rather, the overall experience of the interaction (i.e., social presence) may influence the degree to which people show behavioral conformation. Especially in dyadic interactions, it is important to consider the overall experience of the interaction. If people feel a more realistic, engaging, or immersed interaction in VEs, they may show more magnified behavioral conformation in the way to reflect stereotyped behaviors of the virtual character. Indeed, a dyadic social interaction could be better understood when we consider the avatar, target interactant, communication, and overall experience in VEs all together. A sense of identification with the virtual character is a part of the overall experience of the interaction. Thus, a greater sense of identification may be sufficient to lead to a stronger feeling of social presence. Nevertheless, a partial experience of identification does not seem to be sufficient enough to have impact on behavioral conformation during the social interaction.

There are some limitations in this study. Firstly, it is possible that the study may have been unable to detect small effects due to its small sample size. Secondly, it needs more research to understand that the moderating effects of social presence were only confirmed in the female-role condition, but not in the male-role condition. Nevertheless, this study successfully demonstrated potential moderating effects of social presence on behavioral conformation in VEs and empirically compared similar concepts of identification and social presence with respect to their effects on behavioral conformation.

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