

# Causal Links of Presence

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**Abstract.** The purpose of this paper<sup>1</sup> is to examine antecedent variables and an outcome variable of presence. Presence has been used to explain the extent to which technology users are immersed and involved in a technology-created experience. In video gaming, gamers frequently don't distinguish between reality and the game world, and they identify characters with themselves. This comes from a high level of presence. So what makes technology users have greater presence? The present study proposes a causal model which includes attitude and empathy as antecedent variables that lead to a degree of presence and then para-social interaction as an outcome of presence level. The results showed that path analysis of the model was successfully supported.

**Keywords:** Presence, Attitude, Empathy, Para-Social Interaction, Wii.

## 1 Introduction

Presence is a psychological state or subjective perception in which, even though part or all of an individual's current experience is generated by and/or filtered through human-made technology, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience [1]. Actually, there are many different conceptual and operational definitions of presence, and scholars both within the same field and in different fields use their own terminologies. Yet these terminologies are for the most part interchangeable. Many scholars commonly agree that presence is, at least on a fundamental level, the perception of non-mediation [2].

Many scholars have examined causes or effects of presence [2][3][4][5][6]. However, only a few studies have revealed causal relationships of presence with some antecedent variables. This is important to know because when we find out reliable variables that increase or decrease the level of presence, we can manipulate them. Consequently, we can find out what outcomes presence influences and how it does so, for presence is not an ultimate outcome itself. Therefore, presence has an important role as a mediated or moderated variable.

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In the development of state-of-the-art video game technology, people are more likely to experience presence. There are a few reasons why gaming is important in presence research. First, gamers are active users. According to uses and gratification theory, most game players have motivations which lead to spending more time playing games and other activities [7][8]. Since they are active players, it is easy to be immersed in the gaming situation. Second, gaming has developed very quickly and dramatically. Many aspects of gaming have increased in depth and complexity, including the game story, graphics, characters, background, and even controllers, and these are all significant factors in influencing the degree of presence. Third, interactivity has been shown to be an important function in gaming. Interaction definitely plays an important role in presence [2]. Fourth, the systems on which games are played have also been developed. For instance, the modern TV set provides game players with clear images, high resolution (even HD quality), big screens, and vivid colors in console games. Computer monitors offer the same advantages in computer games. In addition, modern surround sound stereo systems enable a fully immersive auditory experience with crystal-clear quality. These are all significant factors affecting presence. Finally, based on the previous results, game research has been successfully performed. Many studies have raised presence issues using games; for instance, aggression [9], arousal [5], social relationship [10], violence [11], etc.

In the present study, we will investigate causal relationships among attitude, empathy, presence, and para-social interaction in gaming. These variables directly or indirectly linked with one another in the previous literature. More rationales will be described in the next section.

## 2 Proposed Model

Witmer and Singer [6] assert that involvement and immersion are necessary for experiencing presence. Involvement depends on focusing one's attention and energy on a coherent set of stimuli while immersion depends on perceiving oneself as a part of the stimulus flow. More specifically, involvement is defined as a psychological state experienced as a consequence of focusing one's energy and attention on a coherent set of stimuli or meaningfully related activities and events. Although immersion is a psychological state like involvement, it is characterized by perceiving oneself to be enveloped by, included in, and able to interact with an environment that provides a continuous stream of stimuli and experiences. They propose that a valid measure of presence should address factors that influence involvement as well as those that affect immersion.

Many studies have investigated causes and effects of presence. One of the more interesting studies was Cummins' dissertation [12] which examined the effects of direct address on empathy, interactivity, presence, and entertainment value in reality television shows. He found significant causal links among empathy, presence and para-social interaction as a partial path model. In his model, he disclosed that empathy as a predictor leads to presence and subsequently para-social interaction in watching television entertainment programs.

This model can be applied in the gaming study because gaming also has entertainment value as an ultimate goal. Unlike Cummins' model, this research has

attitude as an antecedent variable. A few reasons exist as to why attitude plays an important role. First, as a driving force, attitude works as a predisposition. Although it is hard to have one universal definition of attitude, the central ideas are readiness for response and motivation [13]. This is a preparation for behavior. Second, as an evaluation, attitude leads to involvement or attention. Attitude can be defined as favorableness or unfavorableness which ultimately decides a person's further psychological disposition or behavior. Lastly, according to previous attitude and empathy literature [14][15], there was a significantly positive relationship between the two variables.

From the extensive literature, the present research has the following proposed model <Figure 1>. This model explains that 1. attitude towards a game character influences empathy with it, 2. empathy with a game character influences presence, and 3. presence influences para-social interaction with a game character. Ultimately, because these relationships are interrelated, the fit of the causal model will be tested.



**Fig. 1.** Proposed path model

### 3 Method

#### 3.1 Participants

All of the participants were women and non-game players. Before they joined this project, they answered Witmer and Singer's (1998) immersive tendency measure and were found to be homogeneous. Fourteen participants joined this project. Ages ranged from 19 to 25 and the average age was 21.36 ( $SD=1.55$ ).

#### 3.2 Procedure

All participants filled out a consent form and then entered into a game lab. A researcher explained how to play the tennis game in the Nintendo Wii. The researcher showed them how to serve, do a forehand, and do a backhand. They were asked to practice the tennis game for 5 minutes as a training session. All of the lights were turned off to get a more immersive experience. The researcher helped guide them during that time. After confirming that no problems existed, the researcher restarted the game and let them play alone.

After 15 minutes of playing, the game was stopped and the participants were given a main questionnaire that asked about their attitude toward character, presence, empathy, and para-social interaction.

#### 3.3 Instruments

The questionnaire was mainly composed of four parts: attitude toward character, empathy, presence, and para-social interaction. Attitude toward character had four items: "useless/useful," "unimportant/important," "foolish/wise," and

“unpleasant/ pleasant.” This measure simply asked participants’ general feeling of favorableness or unfavorableness for their characters and five-point semantic differential scale was employed. One item (unimportant/important) was deleted. ( $M=3.45$ ,  $SD=0.67$ ) and it was found reliable ( $\alpha=.70$ ). Second, eight questions were asked to measure empathy defined as feeling the same way that an observed character is feeling. Two items were deleted and it was reliable ( $M=2.75$ ,  $SD=0.72$ ,  $\alpha=.85$ ). Third, presence was composed of two parts: involvement and immersion. Fourteen questions were provided and all of the items were retained and reliable ( $M=3.03$ ,  $SD=0.83$ ,  $\alpha=.93$ ). Lastly, para-social interaction was measured. Para-social interaction, which is the imaginary one-way relationship that viewers develop with people on television, was coined by Horton and Wohl [16]. Para-social interaction between gamers and game characters was measured by eight items and all of the items were retained and reliable ( $M=2.54$ ,  $SD=0.93$ ,  $\alpha=.92$ ).

### 3.4 Gaming System

The Nintendo Wii was chosen for this research. The Wii is what emerged from an attempt to change the way video games are perceived. The Wii has several significant differences from the other next-generation gaming platforms. For one thing, it is very small, at 8.5 cm x 6 cm x 2 cm and 3.84 lbs. It also has wireless connectivity.



**Fig. 2.** Overview of the experimental condition

The most innovative feature of the Nintendo Wii is the controller, called the Wii Remote. It contains sophisticated motion-sensing technology that enables a variety of gaming functions. Gamers can swing the controller like a tennis racket to play a tennis game, grab the controller with both hands and steer it like a steering wheel, or point and shoot in first-person shooting games. With an additional controller connected to the Remote, gamers can box an opponent by engaging in a punching and blocking motion using both hands. The Remote also contains other features that may contribute to a more immersive experience. It has a rumble feature to supply kinesthetic feedback. It also has a small speaker built into the controller, adding an auditory component to a player's movements.

A LG 42 inch LCD TV was used with the Wii. It is 46.3 x 30.2 x 11.8 (in) and 90.4 (lbs) with the stand. The resolution is 1366 x 768 (Dot) and the television system is NTSC-M, ATSC, 64 & 256 QAM. For better sound, a Panasonic SA-HT940 home theater system was used. It has 5 +1 channels.

## 4 Result

Path analysis was used to test the fit of the causal model. The AMOS program was used to obtain estimates of global fit. Various fit indices such as chi-square, the Comparative Fit Index (CFI), the Goodness of Fit Index (GFI) and the Root Mean Squared Error of Approximation (RMSEA) were examined. Hu and Bentler [17] note that CFI values range from 0 to 1.0, with values greater than .90 indicating close fit. A GFI of greater than .9 is conventionally considered to indicate an acceptable fit. With RMSEA, values less than .05 indicate close fit. In addition, the obtained chi-square value is compared with the predicted value and the resulting  $p$  value is provided. Overall, the fit of this model to the data with the AMOS analysis was good ( $\chi^2(3) = 1.82, p > .05, CFI = 1.000, GFI = .942, RMSEA = .000$ ) <Figure 3>. Table 1 presents the zero-order correlations of the study variables.



Note. \*\* indicates  $p < .01$ , \* indicates  $p < .05$ .

Fig. 3. Obtained path model

Table 1. Zero-order Correlations of the Study Variables

	Attitude	Empathy	Presence	Para-social interaction
Attitude	1			
Empathy	0.633*	1		
Presence	0.517	0.603*	1	
Para-social interaction	0.490	0.474	0.559*	1

Note. \* indicates  $p < .05$ , two-tailed.

## 5 Discussion

This study aimed at disclosing causal links of presence composed of attitude, empathy, and para-social interaction. More specifically, the causal model proposed that attitude influences empathy, empathy influences presence, and presence influences para-social interaction. Since they were not independent of each other, path analysis was performed to test the causal model. To test the proposed model, participants played Nintendo Wii tennis games. Since the Wii system has unique interactive functions, we expected gamers to experience a greater sense of presence. Results indicated that all hypotheses were supported and the data were judged to be consistent with the model.

Each causal link has significant implications. First, the relationship between attitude toward a game character and empathy with it is significantly positive. Attitude is simply a favorable or unfavorable manner toward the game character in this research. This link confirmed that the more positive the attitude toward a game character, the greater empathy with it. Containing affective, cognitive, and behavioral components, attitude influences a person's psychological traits, attributions, characteristics, and behaviors. Does having a positive or negative attitude toward the game character influence intent to play the game? What if gamers have negative attitudes toward the game character? Are they going to play it? They may want to change their characters or even the game. For emotional reconciliation, the role of attitude toward the character may be as important as stories, images, and so on. Of course, attitude also plays an important role in presence research because the degree of involvement and immersion in the game environment partially comes from people's characteristics. This will be further described in the empathy and presence relationship. A question about attitude toward the character will be developed as above. Therefore, we need to know gamers' or technology users' attitude toward an object when we have individual characteristics variables.

Second, empathy and presence have a significant positive relationship. It means that the greater the empathy with a game character, the greater the sense of presence. Many presence studies have been interested in particular technological attributes as causes of presence; for instance, screen size, resolution, interactivity, and so on. However, as Cummins [12] pointed out, this relationship revealed that individual characteristics can influence presence as well. More specifically, an individual's ability to engage in empathic processes was a significant predictor of presence. Empathy in this research was defined as feeling the same way that an observed other is feeling (Hoffman, 1975). Of course, an observed other means the game character here. Since gamers had a positive attitude toward the game character, they were drawn into the empathic development, and subsequently empathic engagement increased immersion and involvement in the game. In order to have homogeneity, the present research filtered out samples using gender and game experience as well as Witmer and Singer's immersive tendency scale [6]. Even after this filtering process, individual characteristics predicted the level of presence experienced. Future studies will find out more promising attribute variables for presence.

Lastly, there is a significant positive relationship between presence and para-social interaction, meaning that the greater the experience of presence, the greater the para-social interaction with a game character. Simply speaking, para-social interaction

means gamers' perceived or psychological interaction with game characters. Lombard and Ditton [2] explained that para-social interaction had mostly been discovered with TV characters and less empirical evidence of it existed with computer characters. As a matter of fact, little research has empirically examined the relationship between presence and para-social relationship. Therefore, this study demonstrates evidence that presence leads to para-social interaction with the game character. In addition to the outcome of presence, para-social interaction should be investigated concerning what this will bring about as a predictor and an influence of presence.

This study has some limitations by nature. First, the causal links are too simple. There were neither moderated variables nor multiple exogenous and endogenous variables. Although it is an advantage that the simple relationships clearly explain the outcomes, it cannot explain various causes and effects of presence. Second, the sample size is too small to perform path analysis. However, generally speaking, the reason that we need relatively big samples (about 200) is to detect a difference between the model and the data because standard errors are large in the small sample size. In this research, although small samples were provided, the path model was successfully supported. Finally, it is necessary for future research to find out various cause-and-effect variables of presence that are not limited to the technology (or its functions) but psychological attributes, characteristics, and traits.

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