Edinburgh Napier UNIVERSITY

ISPR 2011:

The International Society for Presence Research Annual Conference

Edinburgh, 26-28 October 2011

Edited by Phil Turner

ISBN: 978-0-9792217-4-3

Self-Presence in Online Gamers: Differences in Gender and Genre

Rabindra Ayyan Ratan

Michigan State University, USA

Abstract

Self-presence is described as the extent to which people connect to their avatars on three distinct but interrelated levels of self: body, emotion, and identity [1]. Building on previous research about self-presence in collaborative virtual environments [2, 3], the present article examines gender and genre differences in self-presence within a convenience sample of online gamers (N = 307). Factor analysis of the self-presence questionnaire (SPQ) supports previous findings that this measure is internally consistent. Females report more self-presence across all three levels, which is consistent with some previous research on the concept of presence. First-person shooter game players report higher levels of proto self-presence than massively multiplayer online game players, which is consistent with expectations. Unexpectedly, there were no genre differences for core or extended self-presence. Skew in population sample limits the external validity of these findings, but internal validity is maintained. Overall, these results provide support for the claim that self-presence is a valuable concept for research on virtual self-representations and that the SPQ is an appropriate measurement tool for this concept across various virtual contexts.

Keywords---**Self-presence, presence, avatars, virtual reality, MMO, FPS**

1. Introduction

Both presence and self-presence have been described as psychological states in which the virtual is treated as real to some extent [4, 5], but presence relates to virtual environments while self-presence relates to virtual self-representations. Though the concept of presence has received much research attention and refinement, self-presence has not. The recent explication of the self-presence [1] built upon the early definitions of the concept [4, 5] and drew from a neuroscientific framework of the interrelated self [6] in order to describe self-presence on three distinct levels: body (proto), emotions (core), and identity (extended). The explication argues that people can feel a connection on each of these levels to their virtual self-representations. Thus, self-presence is defined broadly as the extent to which some aspect of a person's proto (body-schema) self, core (emotion-driven) self, and/or extended (identity-relevant) self is relevant during media use [1].

The explication also offers specific definitions for each of the three individual levels of self-presence. Proto self- presence is defined specifically as the extent to which a mediated self-representation is integrated into body schema [1]. Core self-presence is defined specifically as the extent to which mediated interactions between a self-representation and mediated objects cause emotional responses [1]. Extended self-presence is defined specifically as the extent to which some aspect of a self-representation is related to some aspect of personal identity [1].

Finally, the explication offers an operationalization of self-presence, the Self-Presence Questionnaire (SPQ). The SPQ includes questions that target each of the three levels of self-presence. Proto self-presence questions ask about the extent to which a mediated self-representation is integrated into body schema. For example, "When using your avatar, to what extent did you feel like you could reach into the virtual environment through your avatar?" Core self-presence questions gauge the extent of emotional responses to virtual interactions. For example, "When scary events happened to your avatar, to what extent did you feel afraid?" Extended self-presence questions measure how strongly one aspect of a self-representation is related to another aspect of the individual's identity. For example, "To what extent is your avatar's appearance related to some aspect of your identity?" The full SPQ can be found in the appendix.

An explication of a concept is not sufficient to convey its strength or applicability. Thus, the concept of self-presence and the SPQ must be applied within various virtual contexts and with diverse populations in order to establish them as valuable tools for virtual worlds research. Recent empirical studies have supported the SPQ's internal consistency and validity in collaborative virtual environments [2, 3]. But because these virtual environments were designed specifically for student

collaboration, the findings are not generalizable to more common virtual environments, such as online games. Millions of people play and use avatars within such games regularly [7] and thus they present an important context in which to examine self-presence. The present paper extends the generalizability of our understanding of self-presence by examining the concept within online games.

The expectation with respect to the internal consistency of self-presence in online games is largely the same as in the previous examinations within collaborative virtual environments [2, 3]. Namely, responses to the SPQ are expected to factor consistently with the framework of self- presence and these factors should be interrelated.

Hypothesis 1: Factor analysis of the SPQ will indicate that the levels of self-presence (proto, core, and extended) are distinct but interrelated.

Previous research has found that males and females experience presence differently, though the direction of this difference is not consistent. In some cases, males report more presence [8], while in others, females report more presence [9]. This discrepancy may relate to the specific type of virtual environment or medium used, given that females have been found to experience more presence than males when viewing large screens but less than males when viewing small screens [10]. Regardless of the direction, self-presence is related to the concept presence and thus males and females are expected to experience the three levels of self-presence differently.

Hypothesis 2a: Proto self-presence will differ between males and females. Hypothesis 2b: Core self-presence will differ between males and females.

Hypothesis 2c: Extended self-presence will differ between males and females.

Although many online games share similarities, such as social interaction, there are large differences between the types of games that affect the players' experiences in the game and thus their experiences of self-presence. Some of these differences can be characterized systematically according to game genre, and so just as differences in game type have been found to systematically affect players' economic behaviors [11], there may be systematic differences in self-presence across game genres. Some genres create fast-paced, first-person virtual environments that are likely to induce proto self-presence, whereas others require more social interaction and exchange of identity-relevant information, and thus are more likely to induce extended self-presence. First-Person Shooters (FPS), in which players navigate 3D environments from the first-person perspective and attempt to shoot targets, qualify within the former category (Tamborini & Skalski, 2006), while Massively Multiplayer Online Games (MMOs), in which players take a third-person or bird's-eye perspective within fantasy-based environments and complete tasks to accumulate virtual resources, qualify within the latter (Williams, et al., 2006). Thus, FPS players should report more proto self-presence than MMO players, while MMO players should report more extended self-presence than FPS players. Another difference between these genres is the range of emotions they induce in players. MMOs often take place in fantasy worlds, contain rich narratives, and offer a variety of activities in which players engage, such as questing, crafting, and socializing (Williams, et al., 2008). In contrast, FPS games contain mostly action sequences comprised of moving and shooting (Tamborini & Skalski, 2006). The former provide the opportunity for players to experience a wider range of emotions than the latter and thus are more likely to induce core self-presence. Together, the above reasoning leads to the following hypotheses.

Hypothesis 3a: FPS games induce more proto self-presence than MMO games. Hypothesis 3b: MMO games induce more extended self- presence than FPS games.

Hypothesis 3c: MMO games induce more core self-presence than FPS games.

The examinations of potential differences in self-presence caused by participant sex and game genre, as described above, are based on measures of the three levels of self-presence taken from participants of both sexes and games within both genres of interest. This approach does not account for potential differences in the reliability of such composite measures of self-presence between the participant sexes and game genres. For example, it is possible that the SPQ is a reliable measure of self-presence for males but not females, or for MMO players but not FPS players. The examination of such potential differences is articulated through the following research questions:

RQ1: Is the SPQ reliable for both males and females?

RQ2: Is the SPQ reliable for both MMO and FPS players?

2. Method

The SPQ was administered as part of an online survey, which was distributed via convenience sampling to email lists dedicated to video game and virtual world research, game-related web forums, and individual

players. The solicitation requested that online gamers participate in a 10- minute survey about how people use and view their avatars. The online survey tool restricted responses to one per IP address, though no incentive for participation was provided. A link in the message took respondents to an information and consent page, and if they agreed, another link took them to the survey. Before answering the questions, participants were prompted to consider the game they play online ("with others") most often. The genre of the games were coded by an online game researcher (see Appendix) as 1) MMO, 2) FPS, or 3) Other. It should be noted that social virtual worlds, such as Second Life and Active Worlds, were coded as "Other" because they do not include structured goal-directed gaming elements and thus the uses and motivations of such worlds have been found to differ from more traditional MMOs [12]. Further, 96% of the MMO respondents play the game World of Warcraft, which is the most widely played MMO [7] and thus representative of the genre. Of the 337 respondents, only those who play an MMO or FPS game were retained for the analysis, and thus 30 were removed. This resulted in a sample of 307 participants (218 female and 89 male) between the ages of 18 and 62 (m = 26.55, SD = 6.92).

The distribution of participants was unbalanced for game genre and not representative of online gamers according to participant sex. Either the distribution channels for the survey reached more MMO players or MMO players were more likely to respond to the survey than FPS players. Regardless of the reason, only 28 participants (9%) in the sample were FPS players. Further, a disproportionately high number of females responded to the survey, perhaps also due to the distribution channels or to the nature of the inquiry. Females currently make up 42% of online gamers [13], but in the current sample 217 of 307 (71%) were female. In the MMO-player sample, 215 (77%) were female, which is the reverse of previous findings that less than 20% of MMO players are female [14, 15]. Levene's test for equality of variances is used to account for this discrepancy in sex distribution within MMO players, but results must still be treated cautiously. Further, within the FPS-player sample, only 2 (7%) were female, which is consistent with previous FPS research [16] but inhibits the ability to draw statistical inferences about participant sex differences within this genre.

Overall, these skews confound the tests of sex and genre differences for self-presence. In other words, when considering the entire sample, changes in sex are always accompanied by large changes in genre, and vice versa. The solution to this problem adopted here, which sacrifices external for internal validity, is to limit the sample population within which the tests are conducted. Specifically, the tests for sex differences, Hypotheses 2a-c, are conducted only for MMO players while the tests for genre differences, Hypotheses 3-5, are conducted only for males.

3. Results

Because the dimensions of self-presence are conceptualized to be interrelated, a principal-axis factor analysis with an oblique rotation [17] was used to determine whether responses to the SPQ aligned with the framework of self-presence. Although this analysis was designed to confirm expected factors, it was exploratory in that the factor loadings determined whether items were retained or removed. Specifically, items were retained only if the loadings were greater than 0.50 on the target factors (with the exception of the retained name-related extended self-presence question for which the structure matrix loading was 0.49) and cross loading between factors were less than or equal to 0.45. The remaining 18 items formed three distinct factors that were consistent with the proposed proto, core and extended levels of self-presence and had eigenvalues of 2.36, 6.06 and 1.62, respectively. The items retained for the analysis are specified in the Appendix.

The pattern and structure matrices can be found in Tables 1 and 2. Cronbach's alpha for proto self-presence was .88, for core self-presence was .85, and for extended self- presence was .78, indicating high internal consistency for the items within each factor. Thus, the items were averaged in order to create composite measures of each level of self- presence.

A zero-order Pearson correlation analysis was conducted with the three composite measures of each level within the SPQ in order to determine whether these factors were interrelated. The correlations, which can be found in Table 3, though not extremely strong, indicate that the levels are interrelated as well as distinct, and so H1 was supported.

A series of independent samples t-tests was used to identify differences in self-presence according to participant sex and game genre. As described earlier, the former was examined only for MMO players and the latter

Table 1. Pattern Matrix

	Factor		
	1	2	3
P_arm_elongated	-0.10	**-0.86**	0.00
P_hand_inside_game	-0.10	**-0.83**	0.04
P_part_of_body	0.03	**-0.83**	-0.02
P_extension_of_body	0.03	**-0.67**	0.02
P_reach_into_game	0.14	**-0.62**	0.04
P_happens_to_body	0.11	**-0.58**	0.00
C_sad	**0.80**	0.09	0.03
C_upsetting	**0.73**	0.05	-0.01
C_suprising	**0.69**	-0.04	0.00
C_disgusting	**0.65**	-0.11	-0.06
C_scary	**0.62**	0.03	0.09
C_happy	**0.60**	-0.12	0.06
E_appearance	-0.02	0.01	**0.81**
E_profile	0.06	-0.07	**0.71**
E_race	-0.07	-0.01	**0.70**
E_clothing	0.08	0.07	**0.64**
E_name	0.18	-0.16	**0.60**

Table 2. Structure Matrix

	Factor		
	1	2	3
P_part_of_body	0.34	**-0.84**	0.34
P_arm_elongated	0.24	**-0.82**	0.30
P_hand_inside_game	0.24	**-0.81**	0.33
P_reach_into_game	0.41	**-0.70**	0.37
P_extension_of_body	0.29	**-0.68**	0.30
P_happens_to_body	0.34	**-0.62**	0.30
C_sad	**0.78**	-0.23	0.40
C_suprising	**0.71**	-0.31	0.38
C_upsetting	**0.70**	-0.23	0.35
C_happy	**0.68**	-0.38	0.42
C_disgusting	**0.67**	-0.34	0.33
C_scary	**0.66**	-0.25	0.40
E_appearance	0.39	-0.33	**0.80**
E_profile	0.45	-0.39	**0.76**
E_race	0.39	-0.23	**0.64**
E_clothing	0.28	-0.24	**0.57**
E_name	0.24	-0.21	**0.49**

Table 3. Pearson correlations between self-presence levels

	Proto	Core	Ext
Proto	1.00		
Core	0.40**	1.00	
Ext	0.38**	0.46**	1.00

** significant at the 0.01 level

N = 307

Table 4. Descriptive statistics for MMO players by sex

	Sex	N	Mean	Std. Deviation
Proto Self-Presence	Male	62	1.53	0.67
	Female	213	1.83	0.82
Core Self-Presence	Male	62	2.33	0.85
	Female	213	2.72	0.73
Ext Self-Presence	Male	62	2.01	0.83
	Female	213	2.37	0.86

Table 5. Descriptive statistics for male players by genre

	Sex	N	Mean	Std. Deviation
Proto Self-Presence	MMO	62	1.53	0.67
	FPS	25	2.15	0.92
Core Self-Presence	MMO	62	2.33	0.85
	FPS	25	2.41	0.75
Ext Self-Presence	MMO	62	2.01	0.83
	FPS	25	2.00	0.87

Table 6. Cronbach's alphas for self-presence levels

	Males	Females	MMO	FPS
Proto Self-Presence	0.87	0.88	0.88	0.85
Core Self-Presence	0.87	0.84	0.86	0.78
Ext Self-Presence	0.79	0.77	0.78	0.74

only for males. Compared to male MMO players, female MMO players reported significantly more proto self-presence, $t(120) = 3.00$, $p < .01$, core self-presence, $t(273) = 3.53$, $p < .001$, and extended self-presence, $t(273) = 2.94$, $p < .01$. Thus, Hypotheses 2a-c were supported in the direction that females experience more self-presence than males. Descriptive statistics for these tests can be found in Table 4 and are illustrated in Figure 1. It should be noted that Levene's test for equality of variances was satisfied for core and extended self-presence, but not for proto self-presence, which is why the degrees of freedom are reduced for the proto self-presence t- test. Compared to male FPS players, male MMO players reported significantly less proto self-presence, $t(35) = -3.07$, $p < .01$. Again, this t-test did not assume equal variances, which explains the reduction in degrees of freedom. No differences were found between male FPS players and male MMO players for core self-presence, $t(85) = -.40$, $p = .69$, or extended self- presence, $t(85) = .03$, $p < .98$. Thus, Hypothesis 3a was supported but 3b and 3c were not. The descriptive statistics for these game genre comparisons can be found in Table 5 and are illustrated in Figure 2.

RQs 1 and 2 address the issue of whether there are differences in the reliability of the three self-presence composite measures according to participant sex or game genre, respectively. A series of reliability analyses were conducted on the composite measures of self-presence with the sample population segmented by participant sex and then by game genre. The results, which can be found in Table 6, indicate that all composite measures have acceptable Cronbach's alphas (above .74) for all segments.

Figure 1. Self-Presence means and error bars for MMO players by sex

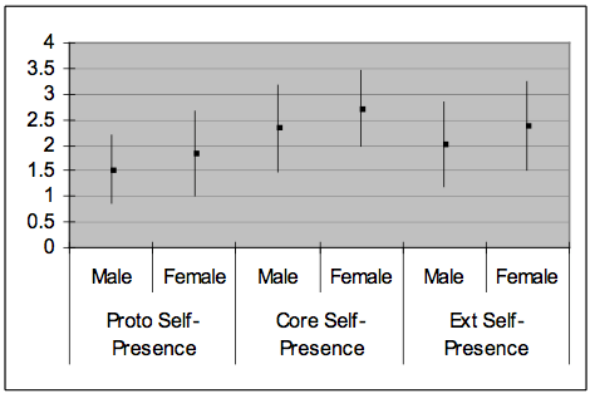
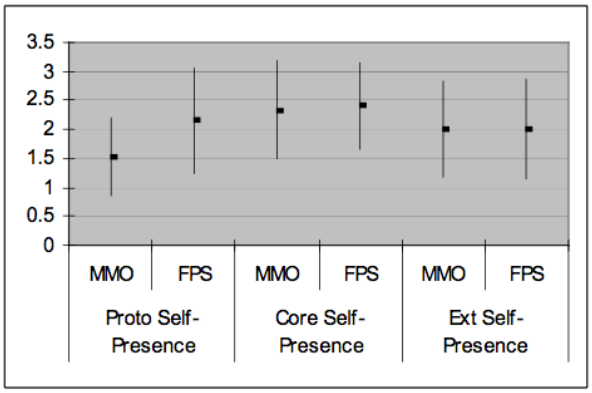


Figure 2. Self-Presence means and errors bars for male players by game genre



4. Discussion

The present article provides support for the internal consistency and validity of the concept of self-presence and the Self-Presence Questionnaire (SPQ) measurement tool in the context of online games, implying greater generalizability of the concept than the previous articles have offered [2, 3]. Responses to the SPQ aligned distinctly with the proto, core, and extended levels of self-presence and these factors were positively interrelated. Females reported more proto, core, and extended self-presence than males, which is consistent with previous research on the related topic of presence. Male FPS players reported more proto self-presence than male MMO players, which supports the construct's validity. The lack of differences in core and extended self-presence between male MMO and FPS players cannot be properly interpreted until future research examines such distinctions within a more robust sample, as described below.

Although consistent with the findings from the previous work on collaborative virtual environments [2, 3], the present support for the concept's reliability is notable because it shows that the SPQ is applicable to virtual contexts that millions of people choose to use every day [7]. While online games are designed uniquely and vary widely, these findings indicate that the levels of self-presence are manifested similarly in MMO and FPS games. Combined with the results from the previous studies [2, 3], self-presence appears to be internally consistent across virtual environments and user types. Still, future research should continue to expand this understanding of self-presence by examining it in new virtual contexts and with new populations.

The finding that female MMO players reported more self-presence across all three levels than male MMO players may suggest that females tend to experience more self- presence. However, such a conclusion should be treated cautiously because the direction of difference between males

Figure 2. Self-Presence means and errors bars for male players by game genre

and females with respect to presence has been found to depend on various factors during media use [8-10]. The most appropriate conclusion from this current finding is that self- presence may differ according to participant sex and thus this should be taken into consideration when examining self- presence in the future.

The finding that male FPS players reported more proto self-presence than male MMO players supports the construct's validity because FPS games contain more fast-paced realistic sequences than MMOs and thus are expected to induce greater proto self-presence. Although this difference could only be tested for males in the present study, there is no reason to expect a different outcome for females. However, the lack of differences in core and extended self-presence between male MMO and FPS players may suggest that such differences do not occur at all or only occur for females. The reasoning that MMOs should induce more core self-presence because these games offer a greater diversity of emotional experiences may be flawed in general because FPS games may offer a lesser diversity but greater intensity of emotional experiences than MMOs. The reasoning that MMOs should induce more extended self-presence because avatar customization is more integral to such games may be flawed for males because FPS avatars, though limited in customization, are often male and thus easier for males to relate to with respect to identity characteristics. Thus, future research should examine genre differences with respect to extended self-presence for females.

Although the reasoning for the expectations of genre differences in the three levels of self-presence implies that characteristics of the game affect the experience of self-presence, it is possible that that people who tend to enjoy experiencing certain types of self-presence also choose to play games that facilitate these types of self-presence. For example, some people may enjoy the feeling of proto self-presence and thus choose to play FPS games more often than MMOs. This issue of trait-related differences in the

Overall, the results presented in this chapter contribute support to the claim that the concept of self-presence and the SPQ measurement tool are applicable across various virtual contexts. While future research in other virtual contexts may contribute to this claim, such research should shift focus to other issues related to developing self-presence as a tool for avatar research. The findings and limitations of the present study can be used to infer a few new directions for self-presence research, but there are many others. For example, facets of avatar selection can be used to manipulate the extent to which people experience the different levels of self-presence and such differences could be compared to behavioral effects of using avatars, i.e., the Proteus Effect [18]. By applying self-presence in such ways, this future research could increase the value and impact of our understanding of avatar use.

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Appendix

Self-Presence Questionnaire (only items included in this study are listed here. See [REMOVED FOR ANONYMITY] for most recent version of the SPQ)

Proto Self-Presence

1. When playing the game, how much do you feel like your avatar is an extension of your body within the game?
    a. [not at all/ somewhat/ moderately/ very much/absolutely]
2. When playing the game, how much do you feel your avatar is a part of your body?
3. When using your avatar, to what extent do you feel like you can reach into the game through your avatar?
4. When using your avatar, to what extent do you feel like your arm is elongated (changed to "stretched" in Study 2) into the game through your avatar?
5. When playing the game, to what extent do you feel like your hand is inside of the game?

Core Self-Presence

1. When happy events happen to your avatar, to what extent do you feel happy?
    a. [not at all/ somewhat/ moderately/ very/extremely]
2. When sad events happen to your avatar, to what extent do you feel sad?
3. When surprising events happen to your avatar, to what extent do you feel surprised?
4. When scary events happen to your avatar, to what extent do you feel afraid?
5. When upsetting events happen to your avatar, to what extent do you feel angry?
6. When disgusting events happen to your avatar, to what extent do you feel disgusted?

Extended Self-Presence

1. To what extent is your avatar's appearance related to some aspect of your personal identity?
    a. [not at all / somewhat /moderately/ very much/absolutely]
2. To what extent does your avatar's name represent some aspect of your personal identity?
3. To what extent is your avatar's race related to some aspect of your personal identity?
4. To what extent is your avatar's clothing related to some aspect of your personal identity?
5. To what extent does your avatar's profile info represent ... identity?
6. To what extent do you identify with your avatar?

Game Coding

(number of respondents in parentheses)

Massively Multiplayer Online Games:

Aion (6), Diablo II (1), Dungeons and Dragons Online (1), Guild Wars (1), Ragnarok Online (2), World of Warcraft (268)

First Person Shooter Games:

Call of Duty* (5), Counter Strike (9), Fallout 3 (1), Half-Life: Natural Selection (1), Gears of War*(1), Grand Theft Auto* (1), Halo* (3), Left 4 Dead* (4), Team Fortress 2 (1), Uncharted 2 (1), Urban Terror (1)

Other (not included in analysis):

Active Worlds (1), FIFA* (1), Geometry Wars (1), Poker (1), Pro Evolution Soccer (1), Second Life (23), Starcraft (2)

*Specified as "any in series"