Revisiting gender preference for a first-person shooter videogame : effects of non-verbal sensitivity and gender on enjoyment

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Running Head: NONVERBAL SENSITIVITY & VIDEOGAME ENJOYMENT

Revisiting Gender Preference for a First-Person Shooter Videogame: Effects of Nonverbal
Sensitivity and Gender on Enjoyment

Abstract

In this study we investigated the effects of gender (male vs. female) and nonverbal sensitivity (high vs. low) on game experience after playing a first-person shooter videogame. The results of Experiment 2 (n = 50) showed that participants with high nonverbal sensitivity experienced more positive valence and a greater level of arousal than participants with low nonverbal sensitivity. The biological sex of the participants became non-significant, after taking into consideration nonverbal sensitivity. The results of a mediation analysis showed that the emotional valence and arousal mediated the effects of nonverbal sensitivity on the enjoyment of the videogame. Implications with respect to a new understanding of gender preference for certain genres of videogames by identifying specific gender-related skills are discussed.

Keywords: Gender difference, preference of first-person shooter videogames, videogame enjoyment, nonverbal sensitivity

Highlights

- In general, men like a first-person shooter videogame more than women do.
- Empirical studies have shown that women tend to have higher levels of nonverbal sensitivity (i.e., the ability to detect nonverbal cues accurately).
- Biological sex and nonverbal sensitivity were examined together to explain the enjoyment of a first-person shooter videogame.
- Biological sex became a non-significant factor to explain gender differences in the preference of a first person shooter game, after taking into consideration nonverbal sensitivity.
- Nonverbal sensitivity had indirect effects on videogame enjoyment via emotional valence and arousal.

Revisiting gender preference for a first-person shooter videogame:

Effects of nonverbal sensitivity and gender on enjoyment

According to Strategy Analytics (Wu, 2010), the videogame market worldwide has grown by more than 50% from 2005 to 2010 with an estimated market size of \$47.5 billion in 2010. This figure is set to grow to \$70.1 billion by 2015, according to market research firm DFC Intelligence (Rishe, 2011). In spite of the rapid growth of the videogame market, studies have demonstrated that gender differences in game preference and game play still exist. For instance, some argues that the current videogame market is saturated with violent and male-oriented games that may not attract female players, given that female players prefer playing cooperative (Sanger, Willson, Davies, & Whittaker, 1997) and non-aggressive videogames (Kafai, 1996; Williams, Consalvo, Caplan, & Yee, 2009). In another study, Lucas and Sherry (2004) found that female respondents reported less orientation to game genres featuring competition and three-dimensional rotation. Similarly, Hartmann and Klimmt (2006) found that female players did not like games that lack of meaningful social interaction and have competitive elements in them, which provides some plausible explanation for gender-specific game preference.

Many researchers have since tried to provide explanations for such gender differences. Some researchers provide explanations from social factors in videogames such as gender roles. For example, Walkerdine (2004) states that videogames create another social place where gender roles may be projected, and that female players may have to play games in the masculine game environment. On the other hand, others find answers from individual differences. Kimura (1999) found gender differences played a role in certain skills such as mental rotation of three-dimensional objects, navigation through a route or maze, and target directed motor skills (e.g., guiding or intercepting projectiles). The results showed that men were better at these skills than

women. Based on these gender differences, Lucas and Sherry (2004) argue that women are at a systematic disadvantage in terms of their ability to control the gaming environment and meet their interpersonal needs for control since most popular games are action/adventure games where the player navigates a character through a three-dimensional world; dodging bullets or shooting bad guys. Although this explanation is plausible, it cannot fully explain the gender difference in game preference since another study showed no gender difference in rotation abilities when the tasks were performed in the virtual reality environment (Parsons, Larson, Kratz, Thiebaut, Blustein, Buckwalter, et al., 2004). More importantly, Spence and colleagues (2009) found that females did not seem to be any less capable than men when given training to acquire basic spatial skills. Feng, Spence and Pratt (2007) also concluded that a mere 10-hour exposure to a first-person shooter game can virtually eliminate gender differences in mental rotation and spatial attention.

These findings suggest that the current explanations based on a simple dichotomous perspective of biological gender cannot provide a clear understanding of the prevalent gender difference in videogame preference and play. Therefore, the purpose of the current study is to investigate an individual factor that may account for some of the gender difference in first-person shooter videogame preference. One such factor often studied in interpersonal communication is the ability to decode nonverbal cues, or nonverbal sensitivity. The literature shows that, in general, women tend to have a higher level of nonverbal sensitivity than men (Rosip & Hall, 2004). In the current study, we extend the notion of individual differences in nonverbal sensitivity to the ability of decoding visual cues, and examine its impact on the game experience in a first-person shooter videogame that is a male-dominant genre of videogames. In the following sections, we review the literature on first-person shooter videogames, gender

differences and nonverbal sensitivity in the context of first-person shooter videogames, followed by reporting on two experiments and discussion of their implications.

Literature Review

First-person Shooter Videogames

First-person shooter games are interesting because it is the second best-selling videogame genre in 2012, trailing action games by 0.9% (ESA, 2013). In addition, previous research has also reported many physical benefits of playing first-person shooter videogames. For example, non-gamers improved their visual attention-test scores after playing a first-person shooter videogame for one hour per day for 10 days (Green & Bavelier, 2006). Li and Levi (2011) found that playing a first-person videogame for 40 hours helped to cure amblyopia (lazy eye) in 10 adults, in addition to improving their spatial attention and depth perception skills. Similarly, Rosser and colleagues (2007) found that skill and past videogame experience correlate with significantly reduced errors for laparoscopic surgeons. Other studies have also demonstrated that players can improve their spatial attention ability through playing first-person shooter games (Green & Bavalier, 2007; Castel, Pratt & Drummond, 2005). First-person shooter videogames are therefore a good starting point for research, since they come from a genre with a marked interest split by gender, and there are potential practical benefits to be reaped besides having fun.

Schneider and colleagues (2004) define a first-person shooting videogame as one in which “the player maneuvers through a three-dimensional world, using the computer screen to see through the eyes of their character and shoot opponents (p. 367).” The second best-selling videogame genre is however preferred by males rather than females, according to a report by the British Board of Film Classification (2007). In a similar vein, Greenberg and colleagues found that across all age groups from 5th grade to college, males consistently showed a higher

preference for physical games, including shooter games (Greenberg, Sherry, Lachlan, Lucas, & Holmstrom, 2010).

According to Jansz (2005), such violent shooting games appeal especially to male adolescents and young adults because they function as private laboratories where one is allowed to experiment with one's emotions. This is important because overt expression of emotions is often seen as a nonmasculine thing to do; therefore young males often refrain from expressing their emotions publicly and consequently are insecure about the emotional aspects of masculinity. The emotion of anger that is typically experienced by males is also seen as inappropriate in most cases, so videogames may provide an outlet for their aggressive tendencies that cannot be released in real life (Jansz, 2005). Based on the literature showing gender differences in preferences for first-person shooter videogames, we propose the following hypothesis in order to confirm the existing gender difference in videogame preference:

H1: Male participants will show greater enjoyment of a first-person shooter videogame than female participants.

Nonverbal Sensitivity and Videogames

Among individual differences that may also account for gender differences, the ability to decode nonverbal cues or nonverbal sensitivity has been widely studied in the field of interpersonal communication. One of the primary functions of nonverbal communication is to clarify, emphasize, and modify the content of a message and the relationship shared between communicators. Nonverbal sensitivity is defined as "people's ability to infer the meanings and non-deceptive nonverbal cues conveyed in the face, body, and vocal channels" (Hall, 2006, p.

63). In other words, nonverbal sensitivity involves both detecting and interpreting nonverbal cues. Studies have shown that women are more accurate than men in decoding nonverbal cues (Hall, 1978; Rosip & Hall, 2004). It is possible that women are taught to be more sensitive and attentive to others' nonverbal cues as compared to men (Schmid, Schmid Mast, Bombari, & Mast, 2011), therefore they obtain more knowledge on how to decode nonverbal cues (Rosip & Hall, 2004).

In relating nonverbal sensitivity to videogames, we would first like to pay attention to the idea of “leaky” nonverbal channels. “Leaky” channels like vocal tone, facial expressions and body gestures are difficult to control and less subjective to conscious monitoring (Ekman & Friesen, 1975). Messages sent out from these leaky channels may have been unintended by the sender. A problem arises when the target of communication nevertheless receives these messages.

In the study on sex differences in reading nonverbal cues, Rosenthal and DePaulo (1979) explored the idea that when people are too good at deciphering nonverbal messages, their social relationships might actually suffer. The study showed that women who were more skilled at decoding nonverbal cues were seen by outsiders as having less successful social outcomes (Rosenthal & DePaulo, 1979). It was concluded that those with better nonverbal sensitivity (i.e., women) need to learn to ignore nonverbal cues they pick up from leaky channels. In other words, women's superiority at decoding nonverbal cues may allow them to understand others' true feelings more than necessary, which may work negatively in a simple interaction context. Or simply put, ignorance can be bliss.

If we extend this notion of individual differences in nonverbal sensitivity, we may be able to explain how women may misinterpret the intention of computer agents in the context of simple first-person shooter videogames, which may result in less interest in these games. For

example, those players who have a high level of nonverbal sensitivity may detect unequivocal behaviors from the videogame characters (i.e., enemies) and yet may have a hard time in understanding the true intention of the videogame characters because their nonverbal cues are too simple, and do not convey the kind of information those with high nonverbal sensitivity tend to expect from social actors. Due to the high level of nonverbal sensitivity, the simple nonverbal cues, if there is any, from computer agents in videogames may prevent such players from grasping the intention of the videogame characters, which, in turn, may lessen their enjoyment of the game, especially when the required skills to play are simply to shoot and kill. Based on the literature reviewed, we argue that the gender difference in the enjoyment of a first-person shooter videogame may be due to players' different levels of nonverbal sensitivity, instead of their biological gender. Therefore, we propose the following hypothesis to examine whether the gender difference in videogame preference is still valid after taking into consideration nonverbal sensitivity.

H2: Participants with high nonverbal sensitivity will experience greater enjoyment of a first-person shooter videogame than participants with low nonverbal sensitivity when the videogame play requires a high level of nonverbal decoding skills, regardless of their gender.

One of the essential elements for videogame enjoyment is successfully confronting challenges in the videogame, because players experience their own competence by attributing the success to their own skills and effort (c.f., see Sherry, 2006 for the concept of flow in videogames). As videogames continually introduce increasingly difficult tasks throughout the

gameplay, the pride of overcoming new challenges may constitute a crucial part of videogame enjoyment. In this sense, a simple shooting videogame that does not require a high level of nonverbal decoding skills may not appeal to people with high nonverbal sensitivity. To put it differently, a first-person shooter videogame may attract people with high nonverbal sensitivity (i.e., women) if the features of game play are challenging enough for their nonverbal decoding skills. More specifically, the challenges during game play will likely invoke negative emotions, which, in turn, will be changed to positive emotions when such challenges are overcome (Keeker, Pagulayan, Sykes, & Lazzaro, 2004). In fact, both game designers and researchers believe that for videogames to be enjoyable, they need to evoke some heightened level of emotional experience during the play (Hazlett, 2006).

With respect to the role of emotion in videogame play, we will take the dimensional approach to emotion positing that emotion can be categorized into two dimensions, arousal and valence (Hutton & Sundar, 2010; Lang, 1995; Russell & Mehrabian, 1977; Schneider, Lang, Shin, & Bradley, 2004): Valence measures the degree of pleasantness, and stretches over a continuum of very positive to very negative. Arousal indicates the intensity of the emotion. This dimensional approach to emotion has been used in previous videogame studies. Valence has been posited to be related to the level of motivation for game play (Bradley & Lang, 2007). As for emotional arousal, it is related to the amount of uncertainty and perceived level of control in a first-person shooter videogame (Weber, Behr, Tamborini, Ritterfield, & Mathiak, 2009). For example, when the location of the enemy is unknown, the perceived level of control decreases and arousal will increase. Taken together, we propose the following hypothesis, regarding the process of how nonverbal sensitivity may influence players' videogame experience via emotions:

H3: Effects of nonverbal sensitivity on videogame enjoyment will be mediated by participants' (a) valence and (b) arousal during their play.

Methods

Experimental Design

There are two experiments conducted in the current study. The purpose of Experiment 1 was to replicate previous research to confirm basic gender differences in a first-person shooter videogame. Experiment 2 was designed to delve beyond the simple dichotomous gender difference perspective by incorporating nonverbal sensitivity as a new factor to explain such a gender difference. In Experiment 1 ($n = 29$: 12 male and 17 female participants), a simple between-group comparison was used to examine gender differences in the enjoyment of a first-person shooting videogame. In Experiment 2 ($n = 50$), a 2 (nonverbal sensitivity: high vs. low) $\times$ 2 (gender: male vs. female) between-subjects factorial analysis of covariance design was used to test the hypotheses in a laboratory setting. Participants' previous videogame experience served as a control variable. A total of 50 undergraduate students enrolled in a university in Singapore were assigned to one of the four conditions based on their gender and nonverbal sensitivity scores assessed in a pretest. The average age was 20.96 with a range from 19 to 27.

Videogame Modification

We selected a commercially available first-person shooting videogame, SWAT 4 in order to examine gender differences in videogame enjoyment in the context of male-preferred videogame genre. The task was to kill the terrorists and rescue their hostages as a police officer. When participants killed the hostages by accident, penalty scores were logged in the game database. It took about 20 minutes to finish the videogame by killing all the terrorists.

In Experiment 1, we allowed participants to play the videogame in the original game environment without any modification. In Experiment 2, we modified the game features such that the intent of the videogame characters was ambiguous (e.g., whether to kill the player or just disappear). In addition, we modified the visual cues of the terrorists by randomly assigning clothes to all videogame characters. That is, some hostages were wearing terrorist clothes, while some terrorists were wearing civilian clothes in the videogame. The differences between the civilians and terrorists were the possession of a gun, facial expressions, and behavior (e.g., the civilians had crouching positions, were putting their arms up in the air, and/or had terrified looks). The modifications were done to increase the requirement of nonverbal sensitivity in order to play the videogame well. Participants were shown a demonstration played by a confederate prior to their actual play and instructed to determine whether they should kill the videogame characters or not, based on their nonverbal cues. Participants played the videogame on a widescreen LCD TV, using a joystick in an isolated dark room with minimal distraction from the environment. After finishing the game, participants were asked to complete a paper-pencil survey and debriefed before they left the laboratory.

Procedures for the Nonverbal Sensitivity Groups

Experiment 2 had two phases. Three weeks prior to the experiment, a large pool of 220 potential participants completed the PONS test in order to test their nonverbal sensitivity scores. The results of PONS test confirmed the gender difference in nonverbal sensitivity: female respondents showed higher scores ($M = 48.9$, $SD = 3.99$) than male respondents ($M = 47.3$, $SD = 4.34$), $t(218) = 2.58$, $p < .01$. We selected 64 participants (32 males and 32 females) from both extremes of the nonverbal sensitivity scale: 32 with high nonverbal sensitivity ($M = 51.48$, $SD = 2.43$) and 32 with low nonverbal sensitivity ($M = 43.64$, $SD = 1.73$), $t(62) = 13.13$, $p < .001$. The

selected participants were invited to participate in the experiment. However, we filtered out 14 participants who scored zero for their penalties since they spent too much time trying to detect nonverbal cues from the videogame characters. Those 14 participants waited until the terrorists shot them first, in order not to make any mistake of shooting innocent hostages, instead of trying to identify the terrorists by decoding their visual cues. In this sense, the way that the 14 participants played the videogame does not fit the purpose of the current study. All in all, a total of 50 participants was used for our final data analyses. Among 25 participants with high nonverbal sensitivity, 12 participants were males and 13 participants were females. The gender ratio was the same for the low nonverbal sensitivity condition.

Measures

Nonverbal sensitivity was measured by the Profile of Nonverbal Sensitivity Test (PONS Test) developed by Robert Rosenthal and colleagues (Rosenthal, Hall, Dimatteo, Rogers, & Archer, 1979). This well-known measure of individual differences in the ability to decode nonverbal messages consists of 220 audiovisual excerpts, each lasting 2 seconds, of a young woman portraying 20 different interpersonal situations, for example expressing gratitude, asking forgiveness or threatening someone. These excerpts were then edited to produce stimuli for 11 channels: full body (head to knees of the standing actor, no sound), face only (filling the screen, no sound), body only (neck to knees, no sound), and the two audio channels of low-pass filtered voice and random-spliced voice, as well as all possible combinations of these visual and audio cues (Banziger, Scherer, Hall, & Rosenthal, 2011). Respondents were asked to choose the correct portrayal from multiple choice questions. The final index was the sum of all the correct answers. Higher scores indicate a higher level of nonverbal sensitivity.

The PONS test has revealed consistently over many studies that women score on average two percentage points higher than men (Banziger et al., 2011). For instance, Ambady, Hallahan, and Rosenthal (1995) showed that women often score higher than men at judging nonverbal cues that indicate emotion and personality. The PONS test has also been validated across many cultures and it has produced accuracy rates similar to the U.S., depending on the extent of similarity in terms of modernization. Given that Singapore is classified under “developed” markets, like the U.S., by the FTSE Global Equity Index Series Country Classification, it is safe to say that the PONS test can be used in Singapore with comparable results.

The 40-item Video PONS test, containing 20 face-only and 20 body-only items, was used for the selection of high and low nonverbal sensitivity groups in this study. The Video PONS test, developed by Rosenthal et al. (1979), is a shortened version of the full PONS test. The full PONS test requires about an hour of intense concentration and repetitive work. To avoid participant fatigue, the Video PONS test was used.

Game enjoyment was measured by 14 pairs of bipolar adjectives on a seven-point scale adapted from Osgood, Suci, and Tannenbaum (1957). The 14 items included instrumental qualities such as “valuable/worthless” and “meaningful/meaningless,” as well as experiential qualities such as “pleasant/unpleasant” and “enjoyable/unenjoyable.” Higher scores indicated greater game enjoyment ($\alpha = .90$).

The affective dimensions of *valence* and *arousal* were measured using a series of manikin pictures in the SAM scales (Bradley & Lang, 1984) that are widely used to gauge participants’ emotional response. Higher scores indicate more positive valence and a higher level of arousal.

Previous videogame experience was measured as a controlled variable, by modifying the Video Game Questionnaire (VGQ; Anderson & Dill, 2000). Participants were asked to report

how often they played videogames, how many hours per week they spent playing videogames, and how violent or bloody the content is of the videogame they play the most with a seven-point Likert-scale (1=rarely, 7=often). Composite scores were obtained by summing the score of the violence and bloody level. Higher scores indicate more frequent exposure to violent videogames.

Results

Experiment 1

Experiment 1 was conducted to investigate the gender difference in videogame enjoyment in the context of male-preferred genre of a first-person shooter videogame. H1 predicted that male participants would show greater enjoyment of a first-person shooter videogame than female participants. The hypothesis was supported. Male participants enjoyed the game more ($M = 5.87$, $SD = 1.42$) than female participants ($M = 4.78$, $SD = 1.36$), $F(1, 27) = 4.34$, $p < .05$, $\eta^2 = .14$.

Experiment 2

A pre-test was conducted to ensure group equivalence in terms of nonverbal sensitivity scores. There was not any significant difference in nonverbal sensitivity between male participants ($M = 47.26$, $SD = 4.46$) and female participants ($M = 47.76$, $SD = 4.58$), $t(48) = -0.31$, $n.s.$ Table 1 shows a full correlation matrix, means, and standard deviations of the measured variables.

[Table 1 About Here]

H2 predicted that nonverbal sensitivity would have a significant impact on videogame enjoyment, regardless of participants' gender. Inconsistent with H2, the results of ANOCOVA with previous game experience as a covariate showed no significant effect of nonverbal sensitivity and gender on videogame enjoyment (see Table 2). Therefore, H2 was not supported.

[Table 2 About Here]

H3 predicted a significant mediation effect of valence and arousal. First, we conducted ANOCOVA with previous game experience as a covariate and valence and arousal as the dependent variables. The results showed that participants in the high nonverbal sensitivity condition reported more positive valence and a greater level of arousal than participants in the low nonverbal sensitivity condition (see Table 2 for the detailed results). There was not any significant effect of gender on both valence and arousal.

The single-step multiple mediator model by Preacher and Hayes (2008) was used to examine the indirect relationships between variables: whether the relationship between nonverbal sensitivity and videogame enjoyment is mediated by valence and arousal. Using the SPSS macro for conducting the single-step multiple mediation analysis (Preacher & Hayes, 2008), the results indicate that the bootstrapped specific indirect effect through valence and arousal is significant for videogame enjoyment with 95% confidence interval (see Table 3). In summary, H3 suggesting that the effects of nonverbal sensitivity on videogame enjoyment would be mediated by valence and arousal was supported. Nonverbal sensitivity, together with mediating variables of valence and arousal, accounted for 39% of variation for videogame enjoyment ($R^2 = .39$).

[Table 3 About Here]

Discussion

In the current study, we examined the effect of nonverbal sensitivity as an individual factor that may account for the gender difference in the enjoyment of a first-person shooter videogame. In Experiment 1, the conventional understanding of the gender difference in videogame enjoyment was tested. Consistent with previous findings, male participants enjoyed a first-person shooter videogame (SWAT 4) more than female participants. The result confirmed that the

gender difference in videogame enjoyment exists in this particular context and that SWAT 4 is generally a male-preferred videogame.

We conducted Experiment 2 with nonverbal sensitivity as an individual factor that may account for the gender difference in videogame enjoyment. The same first-person shooter videogame, SWAT 4 was used in Experiment 2, after some modification in the visual cues (e.g., clothes or behavior) of the game characters in order to increase ambiguity in visual cues and make the game more challenging nonverbally. The results showed that neither nonverbal sensitivity nor gender had any significant direct effect on videogame enjoyment among the participants. However, we found a significant indirect effect of nonverbal sensitivity on videogame enjoyment via the affective dimensions of valence and arousal. Participants with high nonverbal sensitivity reported more positive affect (i.e., valence) with greater intensity (i.e., arousal) than participants with low nonverbal sensitivity, after playing SWAT 4, which, in turn, resulted in their greater enjoyment of the videogame. It is interesting to note that the gender of participants did not have any significant effect on any of the variables. Taken together, these findings suggest a few important discussion points. Firstly, the simple dichotomous explanation based on biological gender is not sufficient to explain the prevalent gender difference in videogame enjoyment. When gender itself is used as the independent variable, it is unsurprising that researchers limit their discussion to the gender difference without providing any more in-depth explanation for their finding. In fact, the simple biological distinction of male and female cannot fully explain the complexities of gender-related phenomena in modern society. It is worthwhile to take a step further and identify more fundamental individual level factors embedded in such gender differences. In the current study, the effect of gender on videogame enjoyment disappeared after taking into consideration nonverbal sensitivity, which implies that it

is not gender but other factors such as nonverbal sensitivity that account for individual differences in videogame enjoyment.

Second, nonverbal sensitivity had only a significant indirect effect on videogame enjoyment. Upon reflection, the non-significant direct effect of nonverbal sensitivity makes sense since nonverbal sensitivity is not an essential skill for game play such as navigation so that being good at decoding nonverbal cues will not directly influence players' performance or enjoyment in videogames. Nevertheless, when the game features were modified in ways that require greater skills to decode visual cues to play the videogame, the participants with high nonverbal sensitivity felt good about their play in terms of both valence and arousal dimensions. A plausible explanation for the positive and intense affect reported by the participants with high nonverbal sensitivity is that their nonverbal skill levels might be matched with the difficulty level of the game via the game modification (see Sherry, 2006). This finding implies that even simple and competitive shooting videogames may attract female players if such games can incorporate features that require good abilities to understand nonverbal cues accurately. In practice, most of videogames allow the player to set up the difficulty level of the games. However, the difficulty level has been uni-dimensional so far, ranging from easy to difficult. If game designers embed multi-dimensions for the difficulty level, videogames may be able to attract a more diverse group of players. For instance, nonverbal sensitivity could be one of such dimensions in the difficulty level, similar to what we have done in the game modification. Even within nonverbal sensitivity, there could be more sub-dimensions such as ambiguity of visual cues or time limitation. Interestingly, McBain, Norton, and Chen (2009) found that men and women did not show any difference in accuracy on the free viewing task but showed differences in their reaction times: men took more time than women to perceive visual cues accurately. Thus, game designers may

make a rather simple first-person shooting game more appealing and challenging to people with high nonverbal sensitivity by altering the nonverbal features of the game: either make visual cues ambiguous or shorten the time to make a decision.

Limitations

There are some limitations in this study. We selected nonverbal sensitivity as an alternative explanation for the gender difference in videogame preference based on the literature on gender differences in interpersonal communication. However, nonverbal sensitivity is not the only individual factor accounting for the gender difference. For instance, nonverbal sensitivity may not be applicable to different genres of videogames in spite that it was a significant predictor for the gender difference in the particular context of a first-person shooting videogame. In this regard, we need to be cautious not to over-generalize our findings. We also need more research to identify relevant individual factors that can provide better understandings for the gender difference.

The results of the study may have Type II errors (i.e., not being able to find significant results due to errors) because of the small sample size, especially for the gender effects. Although we used a relatively large pool of potential participants for the PONS test, we had some difficulty identifying a matching group of male participants with high nonverbal sensitivity scores due to the nature of the test. In spite of the possibility of Type II errors, a significant effect of nonverbal sensitivity together with non-significant effect of gender allows us to make a confident conclusion about the relative importance between nonverbal sensitivity and gender on videogame enjoyment. Another limitation with respect to nonverbal sensitivity is that we used a short version of the PONS test with only visual cues (i.e., face and body). Although the short version is widely used in the field as a valid test to examine the ability to detect nonverbal cues

accurately (i.e., nonverbal sensitivity), the test does not examine the paralanguage part of nonverbal communication such as pitch or intonation. It would be interesting to investigate the effect of videogame characters' paralanguage, in addition to their visual cues on players' game experiences.

Lastly, we used self-reporting measures and did not utilize other types of measures such as physiological measures for valence and arousal in the current study. We did not include physiological measures because having physiological measures may have a negative impact on videogame experiences because it hinders a sense of presence (Persky & Blascovich, 2008). Nonetheless, having one SAM item to report arousal is one of the limitations of this study although many game studies used the measurement of arousal and reported the measure as reliable (Bradely & Lang, 1994). Instead of relying on self-report arousal, future studies may include physiological measures such as Galvanic Skin Response (GSR) so that a more accurate assessment of arousal can be observed via diverse measures.

Conclusion

Videogames have been around for a long time, and they have traditionally been more popular with males than females. Much effort has been channeled towards exploring plausible reasons behind such differences, utilizing various social science perspectives and both quantitative and qualitative methods. In spite of the ongoing research efforts, we need more research to provide better and clearer understandings of the gender difference in game preference as the game industry is expanding rapidly not only in the entertainment business, but also in other areas such as the field of education. Hence, it is even more important that we attempt to bridge the gender gap, instead of merely focusing on what videogame-design elements interest females. This is to ensure that the digital divide in videogames does not widen and that women

do not lose out on reaping benefits from videogame training, be it in their education or for their careers. In a broader sense, the technical knowledge and media literacy involved with playing videogames can also help players integrate into the information society of today (Hartmann & Klimmt, 2006; Subrahmanyam & Greenfield, 1994).

As a final remark, we believe that our study made a unique theoretical contribution by taking a step towards demystifying the gender difference in game preference. It is one of a few studies that empirically demonstrated non-significant gender effects, after taking into consideration nonverbal sensitivity as an alternative explanation. In addition, our results also provide practical implications for videogame designers by identifying individual skills that can serve as one of the multi-dimensions for the difficulty levels.

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