Presence and video games: The impact of image quality and skill level

Cheryl Campanella Bracken
Cleveland State University
{c.bracken@csuohio.edu}

Paul Skalski
University of Minnesota Duluth
{pskalski@d.umn.edu}

Abstract

This study investigates the impact of image quality and skill level on presence-related reactions to video games. Past research has demonstrated positive associations between image quality and presence and video game technology and presence. No study to date, however, has examined the presence effects of video games played in enhanced or high definition. This paper reports the results of two experimental studies. In the first study, a pilot investigation, 22 college students played a video game either in enhanced definition (higher image quality) or standard definition/NTSC (lower image quality). In the second study, 50 college students played a video game in either high definition (highest image quality) or standard definition/NTSC (lower image quality). Following exposure in both studies, participants completed several measures of presence and a measure of video game skill. Skill was included as a second independent variable in the study, and both image quality and skill were expected to relate positively to presence dimensions. The results of the study provide some support for both image quality and skill affecting presence, though not all results were in the direction expected.

1. Introduction

Video games have become one of the most popular forms of media in the United States and abroad. Global sales in the industry were projected to exceed $30 billion dollars by the end of 2002 [1], and half of Americans age six and older are currently estimated be playing [2]. The popularity of games has been fueled in part by advancements in gaming technology, a trend that has persisted through the earliest days of the medium [3]. Over time, games have evolved considerably in graphic richness and realism. The simplistic character representations in games like *Pac-Man*, for example, have now been replaced with the realistic human figures and environments in popular new titles like *Grand Theft Auto: San Andreas* and *Halo 2*. These and other advances in game technology have important consequences for how games are experienced. In particular, they are expected to contribute to the sense of *presence*, or "perceptual illusion of nonmediation" [4], felt by users. Presence has recently been identified as a potentially important variable in video game research that may affect use and a variety of outcomes of exposure, ranging from enjoyment to aggression [5-6]. Few studies, however, have examined the relationship between exposure to game technology and presence. Tamborini et al. [7] found that playing a game created a stronger sense of presence than observing a game, presumably due to the addition of interactivity. Though many technological features of video games are expected to contribute to the sensation of presence, one that has received no attention to date is image quality. Definition Television (HDTV), for example, sharply improves the quality of TV images and, with TV and movie clips, has been shown to relate positively to the experience of presence [8]. But what about video games, which add the crucial feature of interactivity to HDTV and other high-quality media images?

Based on this and evidence presented earlier in the paper, the following hypotheses are posited:

Hypothesis 1: Participants who play the enhanced definition or high definition version of a video game will experience a higher level of *presence* than those who play the NTSC version of the video game**.**
Hypothesis 2: Participants who score higher on a video game skill scale with report higher levels of presence than those who score lower on the video game skill scale.

2. Methodology

Two studies were conducted using the same procedures but with different games and levels of image quality. Study 1 had 22 participants, who played a video game in either lined doubled progressive scan/enhanced definition (480p lines, component video) or standard definition (NTSC, 480i lines, composite video). In study 2, 50 participants played a game in HDTV (1080i) or standard definition (NTSC, 480i lines). In both studies, the independent variables were image quality (enhanced/HDTV versus standard television) and player skill (high versus low).

3. Analysis and Results

A series of 2-way analyses of variance with the independent variables image quality (enhanced [ED] versus low image quality [NTSC]) and skill level (high versus low) were used to test the hypotheses and research questions.

Hypothesis 1, predicting that participants who played video games with higher image quality would experience a higher level of spatial presence (being there in the video game) than

those who played in lower image quality, was not supported. A main effect approached significance for immersion, with those participants who played the video game in higher image quality reporting higher levels of immersion (M = 4.37, SD = 1.27) than those who played the game in NTSC (M = 3.48, SD = 1.51). Further support for improved image quality leading to higher levels of presence was found in study 2, in which participants who played the video game in the highest image quality reported higher levels of immersion (M = 4.80, SD = 1.44) than those who played the game in NTSC (M = 3.65, SD = 1.24).

Hypothesis 2, predicting that skill level will impact players' perceptions of presence, was not supported. In both studies, in fact, players who scored lower on the video game skill scale reported higher levels of presence. In study 1, lower skill players reported higher levels of immersion (M = 4.43, SD =1.13) than players with higher skill scores (M = 3.42, SD = 1.56). In study 2, the same pattern was found for immersion, with players with a lower game skill score (M = 4.79, SD = 1.47) reporting higher levels of immersion than players with higher game skill scores (M= 3.70, SD = 1.27).

4. Discussion

The results of these studies provide some evidence that image quality impacts both the level and types of presence dimensions experienced by video game players. The results strengthen the claim that image quality influences sensations of presence (4, 8]. Further, the results support previous work with video games and presence [5,7,9] In doing so, they add to the growing body of literature on video games, image quality, and presence and begin the process of synthesizing these important bodies of research.

The current study also introduced the use of measuring players' prior video gaming skill as a variable that may impact their playing experience, including level of presence. While some evidence suggests that this is a variable worth future consideration, the results were not in the direction expected. In both studies, skill negatively impacted the immersion dimension of presence, with low skill players reporting higher levels of immersion. It may be that unskilled players are not as familiar with today's game technology, leading them to be more enveloped by its realism. Or perhaps more likely, unskilled players may need to focus more to succeed and "survive" in fast-paced game environments like the ones used in this research, given their lack of playing ability. For skilled participants, the early game levels in this research may have been easy, and this could have negatively impacted immersion by not challenging their skills enough and instead calling their attention elsewhere. For unskilled players, the game may have been a considerable challenge, leading them to pay more attention and become more immersed in the experience. As the "flow" literature suggests, the potential for immersion is maximized when there is a match between challenge and skill [10]. Future work on video games should attempt to match player skill levels with game difficulty, to maximize the potential for presence to occur.

Conclusion

The current study provides a basis for the inclusion of a gaming skill scale in future studies. The results also provide evidence that image quality in video games has an effect on participants' sensations of some dimensions of presence. Though more work in this area is needed, this investigation serves as important first step toward better understanding the impact of video game image quality and skill on presence.

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