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Engagement and the Moderating Role of Presence within a Video Game Experience

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Abstract - This study looks to explore the role presence plays in the link between narrative comprehension and engagement. To explore these relationships we will first present an overview of presence research to date, followed by an exploration of narrative engagement with an emphasis on narrative comprehension. We then test these relationships within the context of a video game experience and present results and implications for researchers.

In order to test these relationships we devised an experiment using a popular computer game. The above research questions were tested by running a moderated regression where the degree of narrative comprehension was regressed onto experienced affective appeal and moderated by the level of experienced presence.

Results indicate a robust regression model returning significant values for all variables in the model, including a significant interaction effect.

Implications of these results are discussed with a proposal for more work to be done in this area.

Keywords - Presence, Narrative Engagement, Narrative Comprehension

Introduction

The headline read “Destiny’ Crosses \$500 Million On Day One, Biggest New Video Game Launch Ever.” (Kain, 2014) This was exciting news for an industry that

had been hemorrhaging money just a couple of years ago. By the end of 2012 Sales were down by 22% (Tassi, 2013), however by the fall of 2014 sales had rebounded somewhat. And while large blockbuster launches are rarer than they were a few years ago the videogame is still one of the largest segments in the entertainment industry. While videogames continue their growth toward a mature industry, researchers still find the videogame to be a fertile ground for research. Research into videogames has traditionally encompassed two basic paths, the first consists of ways to make these games more appealing and to better match the market and the second is to understand the basic way in which these games affect consumers. While much of the former research is carried out via the videogame industry the latter is largely the purview of academic researchers.

It is within this context that this study looks to incorporate these two main streams of research into an initial study exploring how expected videogame enjoyment is affected by the degree to which the participant engages with it. This study explores the impact of experienced presence on computer mediated (CM) events. However, what has been overlooked in the past is the degree to which the actual story elements affect the CM relationship. Traditionally presence research has been conducted independently of the context of the CM experience assuming it has no bearing on the degree of presence experienced. To explore these relationships we will first present an overview of presence research to date, followed by an exploration of narrative engagement with an emphasis on narrative comprehension. We then test these relationships within the context of a video game experience and present results and implications for researchers.

Presence, the quest for verisimilitude

Presence as a phenomenon has been studied for over 20 years with an identifiable progression as to how the field has matured. Initial research explored the physical nature of what conditions were necessary to produce presence focusing on the physical representations of the experience such as vividness and interactivity. This soon segued into more of an exploration into the psychological understanding of what is to experience presence focusing more on the actual “being there” phenomenon experienced by people as they engaged in a CM event. However as our understanding of presence has matured the focus has turned to exploring the application of presence to different situations.

The conditions necessary to produce presence

It is understood that three factors are necessary to engender presence. These factors are environmental fidelity, interaction and consistency of presentation.

Environmental fidelity has been conceptualized several ways and has been reported as the vividness (Steuer, 1992), quality (Usoh, Catena, Arman, & Slater, 2000), sensory factors (Witmer & Singer, 1998), and sensory information (Sheridan, 1996) of the displayed environment. Environmental fidelity is the degree to which the environment is robust in its portrayal of the situation. It is not necessarily how realistically the environment is portrayed but with how much detail is presented.

Physically this detail could be rendered with a greater number of environmental elements, better textures, and more fluid mechanics. Greater detail will give greater information to the participant and hence lead to a “more complete” world.

Completeness of representation, however, is only part of the necessary conditions. Being able to interact with the displayed elements is also necessary. Interaction is conceptualized as the degree to which the participant can modify the situation. Interaction factors have been reported in terms of the degree of represented interactivity_ (Steuer, 1995), interaction (Usoh et al., 2000), control (Witmer and Singer, 1998), and modifiability (Sheridan, 1996). As such, in order to “exist” in a world one must be able to affect it.

Finally, the experience must be free of glitches and unexpected changes in the above elements, in other words the displayed environment must be consistent in how it is portrayed. Consistency of representation is the degree to which all sensory input remains homogeneous. As such, the degree of interactivity and the fidelity of representation will stay uniform. Inconsistent representational elements would remind the participant of the artificiality of the environment and in essence “break the moment.” Representational consistency has been reported in terms of the absence of distraction factors (Witmer and Singer, 1998) and consistency across all displays (Usoh et al., 2000).

These early understandings of presence, however, quickly led to the realization that presence itself is more likely a psychological experience that is mediated by the environmental representation (Nicovich, 2012). As such, research in this area quickly looked to what it actually meant to “be present.”

Presence as a state of mind.

The general consensus of presence is that it is a sensation of “being” in an environment. (Heeter, 1992; Heeter, 2000; Heeter, 2003; Lessiter, Freeman, Keogh, & Davidoff, 2001; Lombard & Ditton, 1997; Nicovich, 2012; Schloerb, 1995; Schlosser, 2003). Much of the early work on presence focused on this understanding. Lombard and Ditton (1997) discuss presence as the perception of non-mediation. They argue that the degree to which a medium can produce an environment that is accurate in its representations leads to an experience that seems real. Alternatively, Heeter (Heeter, 1992, Heeter, 2003) defines presence as the process of discerning and validating the existence of oneself as part of, but separate from, the environment. The environment, therefore, must react to the participant’s actions. However, Haans and Ijsselsteijn (2012) argue that there must be a separation between environment and the perception of oneself in order for presence to be experienced. It is this separation that allows us to place ourselves into a surrounding.

Presence, however appears to be both more and less than the interaction of the represented environment and perceived being in that environment. Lombard and Ditton (Kim and Biocca, 1997) state that there are three places one can feel present, the natural world, the mediated world, and the imaginative world. If this is so, then presence is more than just the psychological reaction to environmental stimuli. For much of the work exploring presence, the idea that one must be paying attention is a key element. Lombard and Ditton assume this with their definition of

the illusion of non-mediation. Heeter (2003) indicates this with her notion of self-understanding in an environment and Klimmt and Vorderer (2003) take the approach that the experience is a result of interpersonal characteristics (motivation and memory) and experienced presence.

Our understanding of presence, therefore, is a collection of interacting elements. Essentially presence is a psychological reaction that comes about through an understanding of where we are in relation to a “space” or “environment”. This environment, however, must contain the elements necessary to engender this reaction.

Presence in the field

Since its inception as a concept researchers have been attempting to connect the experience of presence with the conditions necessary to create it. Much of the research that has been conducted within the past few years has been an attempt to determine what kind of equipment will engender a sense of presence. It is this latest stage of research that indicates that the concept is maturing into the application phase. No longer are we arguing whether or not presence exists, nor are we arguing what kind of conditions must be met in order to engage in it. We are now looking at applications in which presence can be useful. As such, Presence recently has been applied to the fields of robotics (Escolano, Antelis, & Minguez, 2011; Kristoffersson, Coradeschi, & Loutfi, 2013; Tiberio, Cesta, Cortellessa, Padua, & Pellegrino, 2012), medicine (Tonin, Carlson, Leeb, & del R Millán, 2011) and teleconferencing (Leithinger, Follmer, Olwal, & Ishii, 2014; Maimone, Bidwell, Peng, & Fuchs, 2012). This is not really a surprise as more and more of our lives are being lived through artificial means for both pleasure and work. It is a natural progression to determine what, if any, impact a reaction of presence will have on these tasks.

Connection and context

Presence as a phenomenon has looked at the nature of “being” in an environment but it hasn’t explored the question of “why are we there to begin with?” In other words what is the reason for engaging the displayed environment? People (with very few exceptions) don’t end up in a CM environment by accident. The most likely scenario (and the one most useful to marketers) is that the interaction is voluntary and most likely anticipatory. Perhaps expectation of the event plays a part in determining the reaction to the event.

Context, engagement and comprehension

It is generally agreed that if one feels “like they are there” then one is engaging in presence. However this bypasses a very fundamental question. Why are they there in the first place? Certainly the reason for being in a certain place must affect the impact the experience will have on the participant. In this manner presence research has been like someone who wakes up with amnesia in a strange place with nothing to do and is expected to react with a degree of connection that we label presence. Certainly the reason that one has for participating in an experience must have an impact on how they will react to it. Just as if one is expecting to see a ro-

mantic comedy they will be more satisfied with the experience if it actually is a romantic comedy than they would be if it were a horror movie. Engaging in this larger understanding of the world (and the events contained within) has been termed “Narrative Engagement” (Busselle & Bilandzic, 2008; Busselle & Bilandzic, 2009; De Graff, Hoeken, Sanders, & Beentjes, 2009). Narrative engagement is the degree of absorption into the story that is being presented. Traditionally psychologists have made the distinction between construction (printed words) and the realization (imagined in the mind) of a story (Bruner, 1986; Gerrig, 1993; Nell, 1988; Oatley & Gholamain, 1997). As part of this process the reader will make mental models of what is expected based on the cues contained within the story. Mental models are cognitive structures that represent some aspect of the external world (Busselle and Bilandzic 2008, 2009). These models give context to the story in order to create meaning out of the presented story elements. In this way anticipation of the general of story will guide the mental models that are developed. Congruency of understanding between the presented elements of the story and the anticipated mental model that is developed is Narrative Comprehension (Busselle and Bilandzic 2009). Narrative comprehension forms the categorization of story elements into a coherent understanding of anticipated future events. Associating the events of the story with the developed mental model should lead to a more positive reaction to the story.

As such, it has been posited that narrative situations will have impact on belief structures and attitudes. De Graaf et al (2009) state that the outcomes of a narrative experience may lead to an acceptance of the beliefs implied in the story. Vivid imagery within a story may leave the reader with a realized experience that seems more real (Green, Brock, & Kaufman, 2004). These experiences and the possible acceptance of beliefs implied in the story will affect the attitudes formed by the participant in relation to the pertinent elements of the story. Stories being primarily fictional are posited to have a strong emotional component to them that should affect the emotions of the reader via an empathic response. Empathy is the sympathetic mapping of the perceived reaction of the observed character onto one’s self. It is a form of connection with that character that should also help “place” one into that story. (For a complete review of empathy with respect to narrative see Boller (1988).

Research Questions

Based on the reviewed elements above the driving focus of this study is to determine what the relationship is between narrative comprehension and presence and how they impact one’s reaction to the experience. The next step in this process is to test these relationships. Both narrative comprehension and presence are mental responses to portrayed (or realized) events. Previously presence has been seen as a mediating effect between the portrayed experience and attitude (Nicovich, 2012), however, by including the impact of narrative context and the mental models associated with narrative comprehension presence can no longer be conceptualized as a

mediating force. If the participant experiences a form of narrative engagement then a connection with the material has already been established and cannot be “un established” via a lack of experienced presence. It is our assessment that presence, in this broader context, can be at most, a moderating influence without the all or nothing effect of a mediating variable. To this end the next step is to investigate presence as a moderating influence on the relationship between narrative comprehension and reaction.

Research questions

Based on the preceding factors the following two research questions have been developed:

Research question 1: Does narrative comprehension affect ones reaction to the story that is being provided?

Research question 2: Does experiencing presence affect this relationship?

Method

In order to test the preceding questions we devised an experiment using a popular computer game. The game of *Oblivion*® (2006 Bethesda Softworks LLC, All Rights Reserved.) is a role-playing game where everything is seen from the participant’s perspective, as if he or she is looking through the camera. The main reason for choosing *Oblivion*® in particular, for this study is that it is customizable in that the world can be modified to present the elements necessary for testing. Overall the game portrays a very realistic and appealing environment including a realistic, three-dimensional sound field that includes the sounds of insects and running water and other nature sounds. This sound field helped to center the participant in the world by reflecting movement and placement of the participant within the environment.

One of the hallmarks of this series of games (*Morrowind*®, *Oblivion*® and *Skyrim*®) is a very complete and compelling story that engages the participant from the beginning of the game. The participant learns about their role in the game and their task through scripted cut scenes and initial game play. The story of *Oblivion*® is that the king of the land has been slain (which is witnessed by the player) and those who have committed the crime did so in order to take over the land by opening the gates of *Oblivion*® to allow those denizens to attack Cyrodiil (The land where the game takes place). The player’s role in this story is to stop the attack by closing the gates. However the first task presented to the player is to escape prison and get free (the player is never told why they are in prison to begin with, however it is reflective of the “rising from obscurity to prominence” story element that is common in fantasy adventure literature). It is the process of escaping prison that teaches the player about the controls for the game and the basic abilities of the character that they create. Also during this time the player will create a character to control. The player will choose attributes for the character, these attributes will

allow for different abilities of the character. In turn these abilities will allow for different skills to be employed depending on how the player likes to play the game. Once free of prison the player can start immediately upon the main quest to complete the game or find their own way across the land seeking adventure wherever they may find it. Oblivion provides about 150 – 200 hours of play between main quest and side quests. Images of the game are in table 1.

Images of Oblivion

	
<p>The soon to be Deceased King</p>	<p>How to sneak up on a goblin</p>
	
<p>Town of Anvil</p>	<p>View of Imperial City</p>

Table 1

To play the game participants entered the testing lab and chose one of 27 computers. Their first task was to complete the pre questionnaire for the game. Once they completed the survey they then entered the game and played for two hours. At the end of two hours the players were instructed to stop and take the post survey. The room was kept dim and players wore headphones or ear buds to isolate them and encourage them to focus on their screen. Unlike most testing situations, however, the players were not prevented from assisting each other. *Oblivion*® is a complex game and often more accomplished players would help novice players through difficult patches. Even though *Oblivion*® is a solo game video game, playing

is often communal with players interacting with each other over game play. By not isolating the participants this type of communal setting was represented.

College undergraduate students were recruited to participate in this experiment. The sample consisted of 303 students. The average age was 20.4 with 60% male and 40% female. Thirty-four percent of participants considered themselves to be computer game novices, 28% considered themselves to be intermediate level players and 34% considered themselves to be either advanced or professional level players. Of the participants who reported almost thirty-two percent had played *Oblivion* before with the rest having no direct knowledge of the game.

Scale Reliability Analysis

To test the degree of presence experienced elements of the SOPI-ITC Sense of Presence Inventory scale were employed (Lessiter et al., 2001). To test scale cohesiveness a reliability analysis was performed returning a Chronbach's alpha statistic of .88 indicating an adequate scale (Nunnally & Bernstein, 1978). This scale is a general feeling of presence scale. The complete instrument was not used in this experiment as for an initial study we determined that a measure of holistic presence was more applicable.

Since videogames are a form of entertainment we decided that the most likely type of engagement with the situation would be enjoyment. And since stories tend to be fictional designed to promote an empathic response to the events and characters an affective outcome measure was selected. To test the degree of appeal of the experience the affective response scale by Stuart, Shimp, & Engle (1987) was used. This scale returns a three-item scale of emotional response to the experience. Reliability analysis of this scale returned a Chronbach's alpha of .93, also indicating an adequate scale (Nunnally & Bernstein, 1978).

The last variable to be examined was that of narrative comprehension. This indicator is a composite of two questions asked on the survey. Participants were asked if they liked to watch similar kinds of movies and if they liked to read similar kinds of books. As expected these two questions are fairly highly correlated (.75, $p = .00$) however it was necessary to be able to tap into the story characteristics for those participants who didn't play videogames or hadn't played *Oblivion*®. By asking these two questions we could determine the degree of narrative comprehension through their familiarity with similar stories in movies and books.

Relationship testing

The above research questions were tested by running a moderated regression where the degree of narrative comprehension was regressed onto experienced affective appeal and moderated by the level of experienced presence (results are in table 2). In this respect we could determine first if knowledge comprehension actually affected one's affective response and then to see if their degree of experience with presence impacted this relationship.

Results

To test the moderation impact of presence in this study a special process plugin for SPSS as developed by Andrew Hayes (2015) was used. This process allows one to actually run a moderated regression in one step as opposed to having to create a special interaction variable for the analysis. The overall regression model proved to be quite robust with a strong impact of narrative comprehension onto the appeal of the experience with the overall model returning an R-square of .68 (p= .00) and each coefficient returning a significant input into the model. However what is of interest are the returned values for the interaction variable. The interaction variable returned a significance level of .00 indicating that a moderation effect did take place. By looking at the upper and lower confidence interval values both are on the negative side of zero indicating a moderation in the negative direction. In other words as the level of presence increases, the effect of Narrative comprehension on Appeal decreases.

Moderated Regression Results

Outcome: En- gagement				
Model Summary				
	R ²	MSE	F	P
	0.68	0.53	161.71	0.00
Model				
	Coefficient	SE	T	P
Constant	4.37	0.05	89.08	0.00
Presence	0.69	0.06	11.91	0.00
Narrative Comp	0.23	0.04	5.46	0.00
Interaction	-0.11	0.03	-4.00	0.00
Conditional effect of Comprehension on Engagement (one standard deviation from the mean)				
Presence	Effect	SE	T	P
-1.11	0.35	0.06	6.34	0.00
0.00	0.23	0.04	5.46	0.00
1.11	0.11	0.05	2.39	0.02

Table 2

Discussion

It is no surprise that an understanding of a situation should lead to a higher level of reaction. This appears to be true with this experiment as well. Participants who had a strong understanding of the anticipated events within the game seemed to have a greater affective reaction, that is, they enjoyed themselves more and one would expect that a high degree of presence would enhance that reaction. In other words if I am enjoying a good story I should really enjoy participating within that story. However, if this were the case then the interaction effects between narrative comprehension and presence should be positive or cumulative. This is not the case and this is intriguing, at low levels of experienced presence comprehension has a high effect on reaction but as experienced presence rises the effect of comprehension on participant reaction lessens. In other words presence essentially takes the place of the effect of comprehension on engagement. This was not expected.

There are two possible implications from these observations. The first is that presence and narrative comprehension fulfill the same role when enjoying a video game in that one or the other can lead to an increase in affective response. In this manner they are different understandings of the scenario that both lead to the same outcome. The second implication is that they are actually opposites in terms of impact on one's experience. In this manner anticipation is replaced by experience as the situation unfolds in front of the player. In this manner reaction to expectation is replaced by reaction to experience and as such are linear and not cumulative in engendering an affective reaction. Each possibility has implications for game researchers. If presence and narrative engagement are essentially the same thing then the two streams of research will eventually converge into a single understanding of story engagement. If they are opposites then it is necessary to determine what elements of each affect the overall experience. It could be as simple as a dichotomy between more cognitive and more affective responses to realized situations. Obviously more work is needed to garner better understandings of these relationships.

Limitations and future directions

Most studies have limitations and this one is no exception. While previously validated scales were used to measure presence and affective response the questions used to measure narrative engagement were a rough proxy of the necessary conditions for understanding the presented story familiarity in the context of other media. As such a more direct scale is necessary to determine if these relationships are valid. While the relationship between narrative comprehension and narrative engagement has been examined in the past a more direct understanding of engagement needs to be investigated in order to further investigate these relationships. Also this study was done in the context of a role playing game and should be expanded out to include other story-based games. Finally other elements of a game situation need to be included and examined in order to determine their impact on

these relationships. Elements such as game violence, character interaction and realism are all elements that need to be examined in light of these relationships.

Videogames will continue to become more immersive and realistic as technology continues to advance. Video games are still a relatively young form of storytelling and, like most new art forms, have developed new ways in which to interact with their audience. As these new methods of storytelling evolve, along with technological advances in hardware and software, videogames will continue to be a fertile ground for research and understanding.

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