Affordances in Video Games: A Study of Perspective

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Abstract

Within the realm of video game research, affordances are opportunities for action within the game (i.e., what a player perceives they can do within the game). Previous research on visual perspective has discovered that point of view (POV) and perceived affordances affect overall gameplay. The present study investigated the impact of POV, (i.e., playing a game in first-person vs third-person perspective during video game play) on eye movements, overall perceived immersion, and perceived affordances. Its purpose was to build upon previous research regarding affordances in video games and examining if first or third-person perspective affects perceived immersion and perception of affordances. In a repeated measures design, twenty-eight undergraduate participants were randomly assigned to play the computer game Minecraft in both first and third -person while asked to complete building task. Participants did so for both POV's. After playing the game for 15-minutes, participants completed the Game User Experience Satisfaction Scale (i.e., GUESS scale): a psychometrically validated survey which measures video game satisfaction on multiple scales. Results partially support that participants had higher levels of immersion, longer durations of eye-tracking fixations, and less formal affordances in first-person POV.

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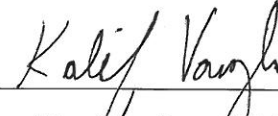
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Affordances in Video Games: A Study of Perspective

Since the 1980s, there has been an increased global interest in the entertainment medium of video games. In its infancy, local arcades would be one of the only places to play the games, swarming with people of all ages vying to get high scores on the same machines. Currently, video games are so accessible they are available on most electronic devices, from personal consoles to laptops to smart phones. With the growing industry, there comes a need for analysis of what elements culminate to create the best video game—one that will be highly played and revered for decades—such as camera position and immersion. To evaluate those values, J.J. Gibson's theory of affordances and their role in video games as well the use of eye tracking is valuable.

Gibson's Ecological Approach and Video Games

Affordances are a part of Gibson's Ecological approach to perception in cognitive psychology. Gibson defines affordances in various ways, in essence describing them as the properties that an agent believes an object possesses and the actions they can act upon it (Lobo, Heras-Escribano, & Travieso, 2018). This theory, influenced by the philosophy of empiricism and Gestalt psychology, believes that the human mind is a part of the environment, opposing the previously dualistic model that the brain and environment are separate and therefore should be studied separately. The Ecological approach to perception emphasizes embodiment, which entails that the environment and an agent both influence each other and their affordances. This means that an agent can perceive an affordance of an object, imagine what actions they can perform upon the object, and then alter the affordances of that object through their actions. This

concept in particular has an important impact on evaluating the effectiveness of video games and video gameplay.

In video games, one of the properties that contributes on game enjoyment is perceived immersion—a feeling associated with absorption into a video game world or a strong connectedness to a character that they play (Denisova & Cairns, 2015). One factor that can affect immersion is interactivity within the video game environment. What a player can interact with can become a point of contention between video game players and developers. Players may perceive or expect more affordances with objects in the virtual environment than the developers predict, leading to players becoming frustrated by their inability to affect the world, thus breaking immersion. This concept was proposed by Gaver (1991) in his discussion of how to apply the basic principles of Ecological psychology to improve the user-technology relationship. His research proposed that developers need to predict what players will perceive about the game and create an environment that acknowledges those expectations, thus either allowing the player to interact with objects or else notifying them early about their inability to use them.

Mateas (2001) built upon this concept in his research, detailing how video games are meant to give players a sense of agency through their ability to enact change upon the virtual environment. In video games, there should be two types of affordances: material and formal. Material affordances are all the possible actions that a player can perform, and formal affordances are the actions the player choses to take. However, developers do not always code material affordances in a way that makes it obvious to the player. This can result in the player becoming frustrated if they believe actions are possible when they are not, due to the fact that greater affordances promote exploration and creativity within a game (Gaver, 1991).

However, correct coding of affordances can lead to improved gameplay and reception, sometimes through the use of signifiers. Signifiers are related to affordances, as they bring attention to affordances that might have been hidden or not easily perceived in the environment (Norman, 2013). Cardona-Rivera and Young (2014) conducted a study regarding the use of signifiers in Elder Scrolls V: Skyrim. The study regarded a location in the game called Bard's Leap Summit: a waterfall that had a lake at the bottom that players were not aware existed. Once reaching the edge of the waterfall, participants were greeted with a screen overlay which displayed the name of the location, encouraging them to also take the leap. Doing so gave the player an increase in skill as well as a piece of video game lore. The use of signifiers in this way is substantial, as they notify the player of the affordances available to them, making the material affordances more apparent.

One game that makes abundant use of affordances in Minecraft: an open-world sandbox game by Mojang (Mojang, 2009). Open-world games give the player few limitations on where they can go and what they can do, allowing the player to traverse the entire environment with few restraints. Sandbox games utilize the ability for the player to interact with almost every aspect of the game to their whim, giving the video gameplay experience a tremendous amount of customization. Games such as Minecraft therefore produce a large sum of affordances, as they can interact with the video game world in ways similar to how they might in the real world. Though the graphics, monsters, and building options in Minecraft certainly leave no doubt that it's in the virtual environment, it does present researchers with one of the best games to evaluate affordances within a video game.

Video Games and Eye Tracking

However, there is a gap within the research regarding measurement of affordances beyond self-report surveys. An important, untapped tool is the use of eye-tracking technology as a direct biometric measure of in video game research and performance, going beyond its most common use as a means to play the game. For instance, companies such as Tobii, A.B. have been using eye-tracking technology to improve the gaming experience of players by using eye movements to mimic natural movement during video gameplay ("Tobii About Page," 2019). Others have shown that eye-tracking can be used to predict character movement, as in games such as Super Mario Bros, or to predict player strategy, as in the visuospatial game Hex (Muños et al., 2011; Wetzel, Spiel, & Bertel, 2014).

One study that adopted eye-tracking technology and video games was by Change, Chen, Tsai, and Lai (2017). However, this was regarding visual search capabilities of video gamers. The researchers used an eye-tracking device to measure how long participants would search, where their vision would stray, and what types of visual search tasks were easier or faster for them. Their results showed that spatial recognition and graphical pattern recognition was much higher in video gamers than a control non-gamer group. According to Change et al. (2017), the visual search capabilities of video gamers were more adept at puzzles requiring the ability to mental rotate objects and the ability to spot differences. However, do video gamers have a difference in visual search patterns when playing games? Furthermore, how large of a role does POV have on visual search, thus affecting perceived affordances?

A study conducted by Denisova and Cairns (2015) analyzed the effect of POV during gameplay has upon immersion. Their study randomly assigned participants to play Elder Scrolls

V: Skyrim in first- or third-person perspective, controlling for preference. Researchers hypothesized that first-person POV would have a more enhanced feeling of immersion due to the feeling of the camera being where a person's sight would be in the real world. It gives the player a greater sense of ownership, clarity of visuals, and higher projected accuracy. Third-person perspective, on the contrary, would have a lowered feeling of immersion due to a general disconnectedness from the character model. One of the most significant points of discussion in the study was acknowledging that third-person allows for greater spatial awareness. As such, since first-person perspective should follow the natural movement of the character model, with a mouse or controller conducting the visual movement, the player should have little reason to have their eye-movements stray beyond the center part of the screen. Third-person perspective should therefore have more eye-movements beyond the centermost section of the screen.

Based on the previous research, the present study has three basic hypothesizes to study the role of POV has on perceived affordances and overall feeling of immersion within a video game. The first hypothesis is participants in first-person perspective will report higher rates of immersion and interactivity as measured through the GUESS scale than compared to third-person perspective. The second hypothesis is participants in first-person perspective will have more overall fixations within the center of the computer screen as compared to the third-person perspective as measured by the eye-tracking software. Finally, it is hypothesized that participants in first-person perspective will have a lower number of formal affordances (i.e., actual actions performed) based on research by Denisova and Cairns (2015), as their reported immersion should be lower than that of third-person POV.

Method

Participants

Twenty-eight Northern Kentucky University undergraduates were recruited and received credit through Sona to participate in this study. Ages ranged from 17 years old to 44 years old, with a mean of 21 years of age. Of the participants, a majority (60.7%) were female and Caucasian (78.6%). In a pre-game survey, participants reported their level of expertise, the frequency of gameplay, the last time they played, and their preferred system of gaming (for a review of the demographic information of the participants, see Table 1). Participants were excluded if they could not see the computer screen without the use of glasses, as the eye-tracking was not able to record data with glasses on. Participants were not excluded on a basis of gaming experience.

Materials

A pre-test survey was given to obtain demographic data. Participants played Minecraft— a sandbox game designed by Mojang—on a gaming iBuyPower i-Series 316 V21 computer with Dell monitors. To play this, participants used an iBuyPower gaming mouse and keyboard. Eye fixations were recorded by Gazepoint eye-tracking program and hardware. Participants were also provided with Skullcandy over-the-ear headphones to wear during gameplay. Researchers used a two-monitor system, separated by a wooden divider, so that participants did not see their eye-tracking or screen recording. A post-test modified version of the Gamer User Experience Satisfaction Scale (GUESS) survey was distributed (see Appendix B for the actual modified version of GUESS scale survey). The GUESS scale is a psychometrically validated survey that

measures engrossment, enjoyability, and creative freedom on a 1 (*Strongly Disagree*) to 7 (*Strongly Agree*) Likert scale (Phan, Keebler, & Chaparro, 2016).

Procedure

After giving informed consent, participants completed a pre-testing survey, which included demographic information and self-reported evaluations. When finished, they were instructed on how to sit, given their height and visual capabilities. Then, the researcher calibrated the Gazepoint Eye-Tracking hardware to the participates eye gaze patterns after which the software to record eye movements on the computer monitor.

Minecraft was brought onto the participant's screen, randomly placed into first- or third-person perspective at the beginning of the program's day cycle, and researchers ran through the basic controls with the participants. Participants played the game without any specific goals or tasks for four minutes and were then instructed to complete a simple building task, lasting a maximum of five minutes. Participants had to construct a "house," a term meaning a structure in Minecraft consisting of at least four walls and a roof. Participants had to destroy blocks, locate them in their inventory, then place those blocks in house format. Players were given agency to decide how large the house was and what materials it was made from, with the only requirements being that it had to be at least a 3x3x3 cube. Participants were timed, and their design choices recorded. The purpose of asking the participants to build a house was to investigate formal affordances. The researcher recorded three affordance-based criteria while the participant was attempting to build their house. The researcher recorded if participants could navigate and build within the time limit, if there was creativity within their building process, and if they could perform without assistance. At the end of the building task, the participants completed a post-

testing survey, a variation on the GUESS scale, to gauge their reception of perceived immersion, enjoyment and gameplay. After completing the survey, the game was reset to the beginning of the day cycle, the perspective was switched, and participants completed the same gameplay procedure again in the new POV. Again, the participant played Minecraft with no task for four minutes and then were asked to build a house while the researcher recorded the results of the three affordance questions. Once the five minutes had passed the game was turned off and the participants were asked to complete the GUESS scale a second time. Then the participants were notified that the study was complete, and they were allowed to leave the testing facility.

Due to the experiment being a repeated measures design, in order to prevent carry-over effects the participants were counterbalanced so 14 participants first played Minecraft in first person-perspective then in third-person perspective. Another 14 participants played Minecraft in third-person perspective and then in first-person perspective.

Results

GUESS Scale

The modified GUESS Scale measured three factors of game satisfaction: immersion, enjoyment, and creative freedom. Of the twenty total questions (see Table 2), seven had significance.

Results for the paired samples t-tests did show a significance difference for three of the eight questions that measured the factor of perceived immersion. A paired-samples t-test indicated that scores for 1st-person perspective ($M = 4.89$, $SD = 1.91$) were significantly higher

than scores for 3rd-person perspective ($M = 2.75$, $SD = 2.17$), for the GUESS survey question about their feeling of detachment while playing, $t (27) = 4.11$ $p < .01$, $d = 1.05$. A paired samples t-test indicated that scores for 1st-person perspective ($M = 3.79$, $SD = 2.01$) were significantly lower than scores for 3rd-person perspective ($M = 4.46$, $SD = 1.95$), for the GUESS survey question about their inability to tell tiredness, t $(27) = -2.14$, $p = .042$, $d = .34$. Finally, a paired samples t-test indicated that scores for 1st-person perspective ($M = 3.79$, $SD = 1.99$) were significantly lower than scores for 3rd-person perspective ($M = 4.82$, $SD = 1.85$), for the GUESS survey question about a desire to continue playing the game, $t (27) = -2.63$, $p = .01$, $d = .54$.

Results for the paired samples t-tests also showed a significant difference for three of the five measures of enjoyment from the GUESS Scale. A paired samples t-test indicated that scores for 1st-person perspective ($M = 6.00$, $SD = 1.36$) were significantly higher than 3rd-person perspective ($M = 4.43$, $SD = 1.83$), for the GUESS survey question asking if the game was fun, $t (27) = 3.75$, $p < .01$, $d = .97$. A paired samples t-test indicated that scores for 1st-person perspective ($M = 2.64$, $SD = 1.62$) was significantly lower than 3rd-person perspective ($M = 4.11$, $SD = 2.30$), for the GUESS survey question asking if the participants felt bored, $t (27) = -2.77$, $p = .01$, $d = .74$. A paired samples t-test indicated that scored for 1st-person perspective ($M = 5.21$, $SD = 1.89$) was significantly higher than 3rd-perspective perspective ($M = 3.43$, $SD = 2.13$), for the GUESS survey question asking if they were likely to recommend the game to another person, $t (27) = 3.34$, $p = .002$, $d = .88$.

Results for the paired samples t-test showed a significant difference for one of the seven measures of creative freedom from the GUESS Scale. There was a significant difference between 1st-person ($M = 6.11$, $SD = 1.13$) and 3rd-person ($M = 5.57$, $SD = 1.57$) for a measure of

perceived ability to explore, $t(27) = 2.20$, $p = .037$, $d = .39$. There were no significant carry-over effects in terms of perspective between the two groups. That is, the GUESS scale results were not significantly influenced by if the participant first begin in first-person as compared to third-person perspective, $p > .05$ for all 20 GUESS scale items.

Eye-Tracking Fixation Data

The Gazepoint software was able to measure how long each participant fixated on a location on the screen. The eye-tracking data that was analyzed was pulled from five minutes of gameplay from time in 1st- and 3rd-person perspective, analyzing fixation for all locations on-screen. A paired samples t-test indicated that the duration of fixation for 1st-person perspective ($M = .40$, $SD = .05$) was significantly shorter than the duration of fixation for 3rd-person perspective ($M = .44$, $SD = .07$), $t(27) = -4.12$, $p < .001$, $d = .74$ (see figure 1).

The Gazepoint software was also able to plot the location of where the eyes were fixating on the computer monitor for each of the participants (Figure 2). Each point of fixation was given an X and Y coordinate, which—when combined with the duration of fixation data—could be used to create a heatmap (see Figure 2). In the analysis, the fixation points were mapped onto a graph from (0, 0) to (1, 1), where the center of screen would have been (.5, .5). The center-range was then defined as being a square centered on point (.5, .5) that was within the points (.25, .25), (.25, .75), (.75, .75), and (.75,.25). Researchers consulted Emily Clemmons, from the Informatics College at Northern Kentucky University (E. Clemmons, 2019), who used a customized program within RStudio that converted the coordinates into a label of "center" or "edge" (RStudio, 2019). Researches used that data to create a proportion of "center" locations. A paired sample t-test

failed to show a significant difference between first-person POV (M = .81, SD = .08) and third-person POV (M = .82, SD = .06), t (27) = -.84, p = .41, d = .14. There were no significant carry-over effects in terms of perspective order between the two groups. That is, the overall duration fixation times and gaze location was not significantly influenced by if the participant first begin in first-person as compared to third-person perspective, p > .05.

Affordances

Participants were evaluated on three additional criteria: their ability to complete the task within time, if there was creativity within their finished product, and if they were able to perform the building task without assistance from the researcher. For the measurement of creativity, participants were considered to use creativity if they used materials other than dirt and logs, if the shape or style of the house was anything other than a cube shape, or if they utilized features of the environment (like building into a hill or standing tree). For the analyses of time and creativity, by measure of a Chi Square test, there was no significant difference between the two perspectives, p > .05 for each of the questions. However, a chi square test of independence showed the participants were able to perform unassisted, 19 out of the 28 participants were able to build a house unassisted in 1st person perspective whereas 11 out of the 28 participants could in 3rd-person perspective, X^2 (1, N = 28) = 8.59, p = .003, φ = .55, participants needed significantly less assistance in 1st-person perspective than in 3rd-person perspective. Additionally for this question there were significant carry-over effects. If a participant began in 1st person perspective 9 out of the 14 performed unassisted, then in 3rd person perspective 6 of the 14 performed unassisted X^2 (1, N = 28) = 5.83, p = .016, φ = .65 . If the participant began in 3rd person perspective 4 of the 14 performed unassisted but then in 1st person perspective 10 out

of the 14 performed unassisted. Therefore, there was a significant difference in perspective order

for those who began in 1st person as compared to those who began in 3rd person.

Discussion

The present study had three main hypotheses. The first hypothesis was that participants in

first-person perspective will report higher rates of immersion and interactivity as measured

through the GUESS scale than compared to third person perspective. Overall this hypothesis was

partially supported. The results indicate that there were significant differences for measures of

immersion, enjoyment, and creative freedom. In immersion, there was a significant difference for

a report of feeling detached from the outside world, of being unable to tell tiredness, and a wish

to continue playing the game. For the measurement of detachment, there were higher results for

the first-person perspective than third, but there were higher results for third-person than first-

person for the measures of not feeling tired and wanting to continue playing.

In the measurement for enjoyment, there were two measures that confirmed the results of

the other. One asked if the participants perceived the game as fun, with higher responses for the

first-person perspective, and the other asked if the participants perceived the game as boring,

(with higher responses for third-person perspective). Through this result, it appears that the game

was more enjoyable when the participants were playing from the first-person POV. These results

are then in conflict with the last measure of enjoyment, asking participants if they wanted to

continue playing the game. According to results, participants were more likely to report a desire

to continue playing if they were in third-person perspective. This might infer that any frustration

felt in the third-person POV encouraged them to want to keep playing until they were more comfortable with the setting.

There was also a significant difference for one of the seven measures of creative freedom. This measure, for a perceived ability to explore, had higher results in first-person than in third-person. This might indicate that third-person POV, despite the larger field of vision (FOV), felt more restrictive to the player. This might partially be because of the way that the camera behaves in Minecraft. While in third-person, the camera corresponds with the physics of the environment. If a participant were to maneuver their avatar into a confined space—such as a cave—the camera would become much tighter to the avatar, greatly restricting their FOV. Once participants learned of this, it is possible they made sure to stay in areas of the virtual environment that were not as narrow or confined, as to avoid the phenomenon. However, as there is only one measure of significant difference among the seven for creative freedom, it is possible that there is not an overall significant difference between first- and third-person POV for this measure.

The second hypothesis was that participants in first-person perspective will have more overall fixations within the center of the computer screen as compared to the third-person perspective as measured by the eye-tracking software. This hypothesis was not necessarily supported. It did show significant differences for the duration of fixation. Participants in 3rd-person POV tended to fixate on points of the screen for a longer period than those in 1st-person. This could show that third-person POV affects the visual search of participants in some way, requiring them to evaluate the environment longer than they did in first-person. However, it is possible that this is also due to the graphics and mechanics of the Minecraft game specifically. Since the third-person camera position is higher and farther back than the character avatar,

objects in the distance become slightly blurred to emphasize the illusion of distance. As such, the longer duration of fixation could be explained by the game itself.

The analysis for location of fixation did not show significant results. The proportions of fixations that were in the center of the screen as opposed to the edge were more than 80% for both perspectives. Perhaps this is due to the mechanics of the game, as all actions taken by the avatar are centered around the reticle at the exact center of the screen. The visual search patterns of the participants would therefore stay in the center of the screen. It is also possible that the parameters for the center and edge of the screen should have been different. Perhaps it was too large an area to be considered the center and the results might have benefitted from having three separate areas: center, middle, and edge.

Finally, it was hypothesized that participants in first-person perspective will have a lower number of formal affordances (i.e., actual actions performed). Participants needed significantly less assistance in building a house in first-person perspective as compared to third person perspective. Additionally, it showed that there was an order effect when starting in third-person, but not when starting in first-person. When participants began in third-person, they needed less assistance when the perspective changed to first-person. When participants began in first person, they needed more assistance when the perspective changed to third-person. The analyses showed that the results of two of the three measures of affordances were not significant. For the analysis of time, this means that a difference in perspective did not significantly affect the participants ability to complete the building task within the time limit. This might infer that participants were equally able to analyze and interact with the virtual environment regardless of perspective. For the analysis of creativity, it means that a change in perspective did not affect their ability to make

artistic choices, regarding the shape of the "house" they made or the materials that they used. Likely, this is because the level of creativity did not change just because the point of view was shifted. For the measurement of performing unassisted, researchers recorded if the participants needed more than one reminder of how to utilize controls, if the researcher needed to help with the aiming or placement of blocks, or if the researcher needed to tell the participant the limit of their "destroy" ability. This last measure was typically needed in one of two instances: Participants were not aware that there is a limit on what "bare hands" can do to destroy the surrounding blocks and they would continue to try to break these blocks, needing assistance. Alternatively, some participants would not wait the required time to destroy a block, thus not obtaining materials to construct the house. For the analysis of performing unassisted, it means that a change in perspective did affect their understanding of the game mechanics or the "destroy" and "place" feature.

Arguably, this study would benefit from reevaluation of procedure or analysis. Minecraft, while a useful game due to how interactive the environment, is not equivocal between first- and third-person POV. It can be debated that the game was meant to be played in first-person with third-person added for cinematic reasons (i.e., the recording of a video) or to evaluate the avatar's skin. In future studies, it would be useful to compare the results of this study to one conducted with a game that supports changing between POV but does not necessarily have the level of interactivity that Minecraft has.

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Table 1

Frequency table of the Demographic Information of the Participants Based on the Pre-Survey

Question		Frequency	Percent
Average hours playing	0-4 Hours	14	50
	5-9 Hours	7	25
	10-19 Hour:	6	21.4
	20+ Hours	1	3.6
Level of Expertise	Novice	11	39.3
	Casual	13	46.4
	Expert	4	13.4
Time of last play	Today	2	7.1
	Yesterday	10	35.7
	Last Week	9	32.1
	Last Month	1	3.6
	2+ Months	6	21.4
Preferred video game system	Computer	5	17.9
	Console	16	57.1
	Handheld	0	0
	Mobile	7	25
	Other	0	0

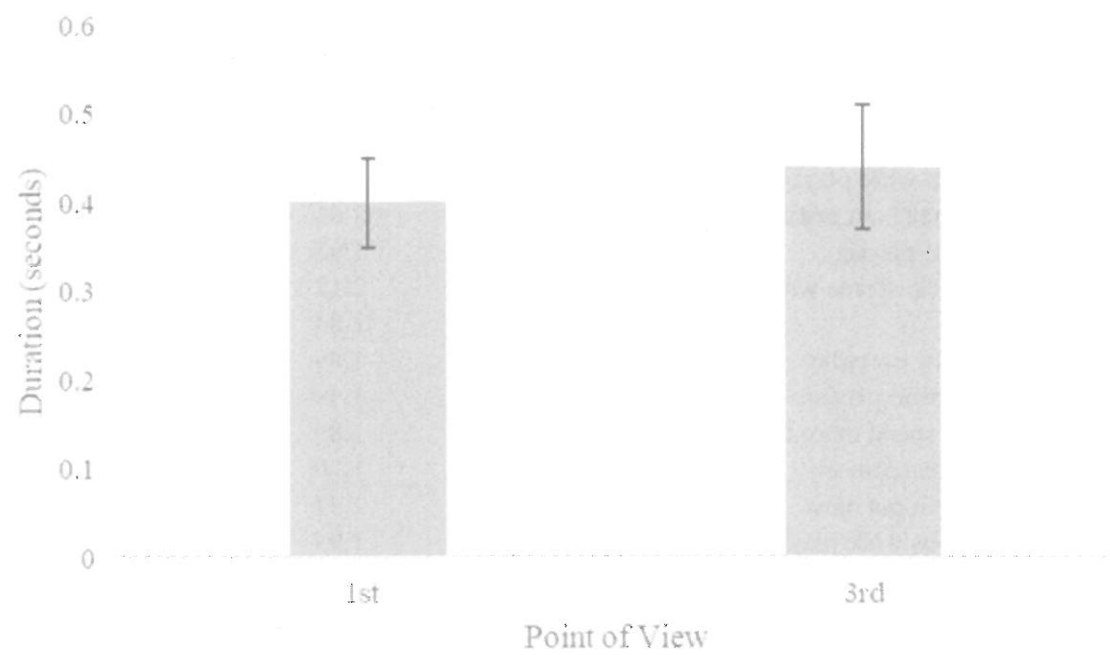| Table 2					
Responses to the GUESS Scale questions					
Question	POV	*M*	*SD*	*t*	Sig.
I feel detached while	1	4.89	1.91	4.11	0.00*
playing	3	2.75	2.17		
I don't check events in the	1	4.32	1.70	-1.05	0.30
real world while playing	3	4.57	1.95		
I cannot tell I am getting	1	3.79	2.01	-2.14	0.04*
tired while playing	3	4.46	1.95		
I lose track of time while	1	5.25	2.12	1.91	0.61
playing	3	4.29	1.84		
I forget my everyday	1	5.43	1.89	-0.62	0.54
worries while playing	3	5.68	1.49		
I tend to spend more time	1	4.89	1.89	-1.05	0.31
playing than planned	3	5.29	1.70		
I can block out most	1	5.46	1.37	1.40	0.17
distractions while playing	3	4.86	1.94		
I cannot wait to stop	1	3.79	1.99	-2.63	0.01*
playing once I've stopped	3	4.82	1.85		
I think the game is fun	1	6.00	1.36	3.75	0.00*
	3	4.43	1.83		
I enjoy playing the game	1	5.43	1.97	0.08	0.94
	3	5.39	1.81		
I feel bored while playing	1	2.64	1.62	-2.77	0.01*
	3	4.11	2.30		
I am likely to recommend	1	5.21	1.89	3.37	0.00*
this to others	3	3.43	2.13		
I want to play this again	1	5.50	1.86	1.00	0.31
	3	5.14	1.90		
I feel it allows me to be	1	5.64	1.75	0.46	0.65
imaginative	3	5.46	1.77		
I feel creative while playing	1	5.39	1.87	-2.02	0.053
	3	6.04	1.14		
I feel I am given enough	1	5.29	1.84	-0.39	0.70
freedom to act how I want	3	5.39	1.73		
I feel I am allowed to	1	5.40	1.56	0.17	0.87
express myself	3	5.36	1.85		
I feel I can explore things	1	6.11	1.13	2.20	0.04*
	3	5.57	1.57		
I feel my curiousity is	1	5.50	1.86	-0.63	0.53
stimulated from playing	3	5.75	1.60		
I think the game is unique	1	5.61	1.71	1.95	0.06
or original	3	5.21	1.83		

Figure 1: A comparison of the mean duration of fixation for 1st-person POV and 3rd-person POV.

Figure 2: Heatmaps for eye-tracking of first person POV (left) and third-person POV (right)

Appendix A

Pre-Survey

1. Age _____

2. Gender
   a.   Male
   b.   Female
   c.   Other_____
3. Ethnicity
   a.   White
   b.   Black/African American
   c.   Asian
   d.   Hispanic/Latino
   e.   Other_____
4. Average hours spent playing games per week
   a.   0-4
   b.   5-9
   c.   10-19
   d.   20+
5. Level of Video Game Expertise
   a.   Novice
   b.   Casual
   c.   Expert
6. Last time having played video game
   a.   Today
   b.   Yesterday
   c.   Last week
   d.   Last month
   e.   2+ months ago
7. The system used the last time you played a video game
   a.   Computer (Laptop, Desktop)
   b.   Console (Xbox, PlayStation, etc.)
   c.   Handheld Gaming Device (Nintendo Switch, PSP, etc.)
   d.   Mobile Device (Smartphone, Tablet, etc.)
   e.   Other (arcade, etc.)
8. Genre of last video game played
   a.   Action/Adventure
   b.   Driving/Racing
   c.   Fighting
   d.   Music/Dance
   e.   Puzzle/Imitation Card or Board Game
   f.   Role-Playing

g. Simulation
h. Sports
i. Strategy
j. Trivia/Gameshow
k. Other

9. Preferred video game system
   a. Computer (Laptop, Desktop)
   b. Console (Xbox, Playstation, etc.)
   c. Handheld Gaming Device (Nintendo Switch, PSP, etc.)
   d. Mobile Device (Smartphone, Tablet, etc.)
   e. Other (arcade, etc.)

10. Preferred genre of video game
    a. Action
    b. Adventure
    c. Driving/Racing
    d. Fighting
    e. Music/Dance
    f. Puzzle/Imitation Card or Board Game
    g. Role-Playing
    h. Simulation
    i. Sports
    j. Strategy
    k. Trivia/Gameshow
    l. Other

11. Preferred perspective for video gameplay
    a. First Person
    b. 2D/Scroller Camera Angle
    c. Third Person/Fixed Camera

Appendix B

Modified GUESS Scale Questions

			Neither Agree				
Strongly Disagree	Disagree	Somewhat Disagree	nor Disagree	Somewhat Agree	Agree	Strongly Agree	N/A
1	2	3	4	5	6	7	0

Please write the number that corresponds to your answer next to the question.

___	1. I feel detached from the outside world while playing the game.
___	2. I do not care to check events that are happening in the real world during the game.
___	3. I cannot tell that I am getting tired while playing the game.
___	4. Sometimes I lose track of time while playing the game.
___	5. I temporarily forget about my everyday worries while playing the game.
___	6. I tend to spend more time playing the game than I have planned.
___	7. I can block out most other distractions when playing the game.
___	8. Whenever I stopped playing the game I cannot wait to start playing it again.
___	9. I think the game is fun.
___	10. I enjoy playing the game.
___	11. I feel bored while playing the game.
___	12. I am likely to recommend this game to others.
___	13. If given the chance, I want to play this game again.
___	14. I feel the game allows me to be imaginative.
___	15. I feel creative while playing the game.
___	16. I feel the game gives me enough freedom to act how I want.
___	17. I feel the game allows me to express myself.

—	18. I feel I can explore things in the game.
—	19. I feel my curiosity is stimulated as the results of playing the game.
—	20. I think the game is unique or original.
—	