Camera Movement in First Person Games

An Interactive Qualifying Project Report
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by

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Abstract

Camera movement in first-person games is an overlooked point of evaluation and little research has been done with regards to how it can be analyzed and improved upon. From the results of our web-based survey, we were able to determine that the most common camera movement in first person games appears to be the vertical movement. These results do not match with the results of the graduate study that found user preferences to lean towards the U-shaped and infinity movements; however, the players found this camera movement of the games to be adequate. From this, we can conclude that although the camera movements do not match player’s preference, it does not inhibit the player’s gaming experience to their knowledge.
Acknowledgements

We would like to thank Paulo de Barros for his research that our survey supported, Robert W. Lindeman for advising the team, Michael Voorhis for providing the web server to host the survey, Joseph Cotnoir for reviewing and editing the paper as a tutor of WPI’s Writing Center, and everyone who participated in the survey.
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1. **Introduction**

1.1 **Background**

First-person games are defined based on their camera positioning, which gives the player a first-person perspective while controlling a character. In early first person games, the camera movement was one-dimensional. As games progress in both technical and artistic aspects, the camera movement slowly attempted to develop along with the growing evolution of realistic environments and mechanics. In doing so, games gained more options towards camera movements, for example, vertical motion, arch motion and infinity motion.

This project is based on the on-going work done by Paulo de Barros (de Barros, Lindeman, & Loughlin, 2009), who has also been doing research on first person camera movements. He conducted a user study, where the subjects were asked to compare a set of camera movement clips and choose which one they believed to be the most realistic. This was completed 60 times where the five videos “formed 10 different pairs by pair-wise combination” and totaling 20 pairs with the two orders in which they can be played. Those 20 pairs were then played three times each. Although repetitive, this was to ensure consistency in the subject’s choosing and to also see if they were able to tell that there were only five different videos in total. Those movements included an infinity symbol-shaped motion, a random one, a U-shaped one, a vertical one – which was chosen because of the work done by a researcher named Anatole Lécuyer which suggested that it was preferred over other types (de Barros, Lindeman, & Loughlin, 2009) – and one created from the data taken from the walking motion of people (see Figure 1). This final camera motion was to be the most realistic one.
1.2 Problem Statement

One of the things found by de Barros et al. is that no real literature exists that studies first-person camera movement. Although there is research done on camera movement, there exists no research that analyzes what is actually used in games and which camera movement is most prevalent.

The specific problem we wanted to address is that there is not enough of a consensus on effective camera movement between developers. Because of the varying camera movements, players end up with preferences as to which they would rather have in a game. However, this information is not collected since camera movement is overshadowed by the gameplay, environments, sound effects, etc. In this way, there is not as much effort put into the camera movement’s realism. This branches onto another issue of how to produce a realistic camera movement and in doing so begs the question of whether is it even beneficial for the game.

When looking at this problem in broader terms, we are left with the question: “What is the best camera movement to use in a first person game?” That led to the issue of how “best” should be defined. Is it a matter of realism or taste? If it is a matter of taste, what limits of realism can the camera reach before it becomes a hindrance to the gamer’s experience?

From his user study, de Barros et al. found that the preliminary results showed that subjects had a preference for the U-shaped motion and the infinity motion (de Barros, Lindeman, & Loughlin, 2009). For our study, we focused on what is actually used in first person games and if it is consistent with user preference.
2. **Project Design**

2.1 Planning

For our study we wanted to gather data from the gamers and gauge their preferences with regards to camera movement. To do so, we felt that a web-based survey would be adequate in gathering information from gamers, our target audience. Before planning out our survey and its questions, we needed to do some preliminary research as we had little knowledge of head bobbing and how to evaluate it.

One of the types used by de Barros et al. in their study was based on medical studies of human movement, or gait analysis. In our research search, few found that the data obtained via gait analysis is very quantitative, can be very easily incorporated into a video game, and it seemed that using it in-game would be realistic. But upon viewing it in first-person during the experiment, we found that it looked rather clumsy and unnatural. We later chose not to include this type of movement in our survey as a potential choice, though it may have been interesting to show the video separately and ask gamers how they felt about that particular movement.

The most important part of our project was the choices of camera movements the players would be selecting. Based on Paulo de Barros’ work, we also decided on five different camera motions: vertical movement, U-shaped movement, arch-shaped movement, infinity movement, and no movement. For visual depictions of these camera movements, see Figure 1. The reason why we chose these motions was on personal experience with first person games since our survey would focus on the camera movements within these games, unlike Paulo de Barros’ research, which focused on how well the participants, could distinguish between different camera motions and their opinions on them.
After choosing these camera movements, we composed a timeline of expected dates by which we would meet certain goals. Essentially, our initial research and planning would be complete within our first term, the survey and database would be developed and ready to deploy by the end of the second, and the analysis would occur during the third. Due to this organization we were able to better adjust our efforts and keep our time frame in mind so we would not fall far behind.

2.2 Process

After our preliminary research had been done we began to construct our own study. Along with determining the questions we would include on our survey, we accumulated a list of all major first person games, sorting them by platform (See Appendix A). They were sorted in this way because some games had been released on multiple platforms and we were not sure if we
would account for that originally. We also browsed online for gaming sites that seemed to fit with our project – ones aimed at other gamers, as we wanted to gain data from the players themselves, and game developers, who we hoped to inform. We were not able to register for all of the sites in the end, and we were banned from some, but we found enough that there was room for a few unexpected failures. (For the original list of gaming sites, see Appendix B)

Once our questions and choices were prepared we could begin to develop the website in HTML. By the beginning of the project’s second term a prototype for the site was completed which contained button and menu selection with a truncated list of games but no other functionality due to a lack of a database in which data could be recorded.

The next iteration of our survey’s website used PHP and MySQL to record the user’s answers to the database we developed towards the end of the term. The MySQL database gave an identification number for each game and all possible answers to the survey questions, and also included a form for submitting queries to the database for our own analytical use. The questions were refined and an introduction page was developed which included a description of the survey and a disclaimer informing the user that their information would not be distributed publicly. Additionally, the site’s appearance was modified as well. The color was changed to match the standard red and grey of WPI, and images were added to the first page and the survey page as well. Animated GIFs of ninjas created in Photoshop (Figure 2) and animated with Adobe Fireworks were also added to supplement the choices on one question and enhance the visual appeal.
After the construction of our survey was complete and we had gained approval to conduct the study from the IRB we moved our survey onto a WPI server. We were then able to test it out to make sure that our database was functioning properly and that the survey’s questions and directions made sense before finally releasing the website link to the public.

2.3 Survey

For our survey, we compiled a master list of all possible questions that concerned the relationship between first person camera movement and the player. After doing so, we did a pilot study on the questions with local gamers. For the list of questions and more details on the survey, see Appendix C. Categorizing our questions into groups, we filtered out the questions we were going to use, which specifically dealt with the camera movement’s pattern and realism, player’s preference, and any nausea-producing elements. To connect further the responses we received with each individual player, a demographics section was added, which asked for the player to input their gender, age, how often they played first person games and if camera movement affected them prior to the purchase of a first person game.
After obtaining IRB approval, we tested out the survey site two weeks before we launched it out to the WPI community by means of an email. Afterwards, we posted a generic message on the forums from the compiled list of gaming sites and social networking sites such as Facebook. For the list of sites, see Appendix B. Although we ran into some problems with joining some of the gaming sites and restrictions on posting, we managed to get 446 responses and all the information we collected was gathered in the database.

2.4 Problems Encountered

Throughout the course of the project we encountered a number of problems which either set us back or caused an inconvenience for the process overall. Specifically, we were barred from registering for a number of forums and were banned from some after we linked to our survey, our database crashed after we e-mailed the survey to the student body, and our survey takers often guessed somewhat blindly at which type of camera movement best fit their game of choice.

During the second term of our project we compiled a list of game-based websites on which we would link to our survey. Out of the twenty-six sites on our list, we could not register for a number of them. Some did not send us activation e-mails for validation purposes. Some of them appeared to have forums at first but we later discovered that they did not or the forums were irrelevant to our proposed topic. There were also a few which required additional information regarding company information which indicated that the forum was intended for game developers currently in the industry. Although we attempted to fill in the required fields to the best of our ability, our registrations were rejected. Finally, though we were able to successfully sign up on several forums, we were banned from two after linking to our survey. Gamespot, one of the sites we joined, has a strict policy against advertising, and though we should have been allowed one relevant link, we were almost immediately banned after creating the topic. These dilemmas limited our reach and therefore kept us from attracting more participants to our survey. However, we managed to successfully post on and attract participants from nine of the websites on our list.
Along with the forums we also sent out an e-mail to the undergraduates at WPI asking them to take our survey. Shortly after, as discovered by another student, our database had crashed, making it impossible to submit the survey. At first we were not sure if we had caused the crash due to our own interaction with the database. That night we notified the system administrator who found that it was a problem in the software the server was using, and had it replaced by the next day, which in turn fixed the database and survey. Although the problem was remedied quickly, it most likely cost us a number of participants. As we have found through personal experience, many WPI students check their e-mail accounts frequently, so upon finding that the survey did not work, a number of them most likely did not check back later to see if it was functional.

Although a large number of people still participated in our survey, our results ended up more inconclusive than we originally predicted. One of our survey questions asked the participant to select which style of camera movement best suited their game. While we had considered that it would be difficult to compare our representations of those styles to their game, we had not considered that they probably would not have their chosen game running as a reference. As a number of comments on our survey indicated, many of the subjects were not playing their game while taking the survey, and that they merely guessed to the best of their ability, or even chose a random video for the lack of a better choice. However, it is likely that many of those people did not leave comments, so it is nearly impossible to determine the accuracy of the results for that question. Because one of the primary goals of this project was to discover trends in camera movement, this detracted from the value of our study.
3. Conclusions

3.1 Results

In total, 446 people had participated in our survey. From the demographics section, we learned that 400 of them were male and 46 of them were female. 65 participants had stated that they rarely play first person games, 156 said they sometimes do, and the remaining 225 answered that they played frequently. Forty-six of the participants were between the ages of 13 and 17, 320 were between 18 and 25, 63 were between 26 and 35, and the remaining 17 were above 35.

For the game analysis section of the survey, the most popular video picked overall, regardless of game, was Video 1 – the vertical camera movement (Table 1).

<table>
<thead>
<tr>
<th>Video (#) Style</th>
<th>Number of times it was chosen</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) “Vertical”</td>
<td>147</td>
</tr>
<tr>
<td>(2) “U”</td>
<td>136</td>
</tr>
<tr>
<td>(3) “Arch” or “n”</td>
<td>61</td>
</tr>
<tr>
<td>(4) “Infinity”</td>
<td>70</td>
</tr>
<tr>
<td>(5) None</td>
<td>32</td>
</tr>
</tbody>
</table>

There were 82 different games that were analyzed by our subjects, but only 42 of those were picked more than once. To narrow down our results even further, we only examined games under certain restrictions, for example, only games that were picked a minimum of 25 times. The next highest number below 25 was 17 (Call of Duty 5: World at War). The following were our chosen games, and the number of times they were picked by our subjects: Call of Duty 4 (59 times), Halo 3 (31 times), Half Life 2 (27
times), Team Fortress 2 (26 times), Counterstrike (25 times), Left 4 Dead (25 times), Bioshock (25 times). Although multiple survey-takers had chosen the same game to analyze, the results were not unanimous on which movement video was chosen to match that particular game’s camera movement. For some of the games, it was clear which camera movement matched it as the majority of votes went towards one movement. The interesting result, however, was when it was unclear which camera movement matched up with a balance of votes between multiple videos. Table 2 shows how many times each video was picked for the seven most popular games.

Table 2: Number of times each video was chosen for the particular game the participants analyzed

<table>
<thead>
<tr>
<th></th>
<th>“Vertical”</th>
<th>“U”</th>
<th>“Arch” or “n”</th>
<th>“Infinity”</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call of Duty 4</td>
<td>6</td>
<td>13</td>
<td>11</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>Halo 3</td>
<td>17</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Half Life 2</td>
<td>21</td>
<td>13</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Team Fortress 2</td>
<td>18</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Counterstrike</td>
<td>14</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left 4 Dead</td>
<td>10</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Bioshock</td>
<td>5</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

3.2 Analysis

Before the survey was launched, we had expectations to the results we would receive.

One expectation was the distinct gap between the numbers of males compared to the females. The age range of the majority of the survey-takers was also expected, as we
targeted WPI as well as gaming communities that generally attract an older audience. But beyond these predictable results, we had some interesting results as well.

Although we found that the camera movement in their game of choice nauseates very few gamers, there was an interesting split in the choices between demographics (Table 3). At first glance, it may seem the genders of those who felt “sick” while playing first-person games with noticeable head bobbing were spread out evenly. However, only 8% of our participants were female. Thus, the 6 females that complained of nausea actually represented 13% of that demographic portion, whereas the males that complained of nausea made up less than 2% in that demographic. The table below is the information gathered from all the people who had experienced nausea from a first person game.

Table 3: Nausea effects due to head bobbing in participants’ chosen games

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Range</th>
<th>Frequency of gaming for FP games</th>
<th>Game</th>
<th>Video #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18-25</td>
<td>Low</td>
<td>Deus Ex</td>
<td>2</td>
</tr>
<tr>
<td>Male</td>
<td>26-35</td>
<td>Low</td>
<td>Halo 3</td>
<td>2</td>
</tr>
<tr>
<td>Male</td>
<td>18-25</td>
<td>Medium</td>
<td>Bioshock</td>
<td>5</td>
</tr>
<tr>
<td>Male</td>
<td>18-25</td>
<td>High</td>
<td>Marathon 2</td>
<td>4</td>
</tr>
<tr>
<td>Male</td>
<td>18-25</td>
<td>High</td>
<td>Perfect Dark</td>
<td>1</td>
</tr>
<tr>
<td>Male</td>
<td>18-25</td>
<td>High</td>
<td>Neocron 2.2</td>
<td>3</td>
</tr>
<tr>
<td>Male</td>
<td>18-25</td>
<td>High</td>
<td>Bioshock</td>
<td>4</td>
</tr>
<tr>
<td>Female</td>
<td>26-35</td>
<td>Low</td>
<td>F.E.A.R.</td>
<td>2</td>
</tr>
<tr>
<td>Female</td>
<td>18-25</td>
<td>Low</td>
<td>Call of Duty 3</td>
<td>2</td>
</tr>
</tbody>
</table>
The same goes for frequency of playing first person games. Not only were the low frequency first-person gamers the majority of those who complained of nausea, they were the minority in our overall survey, only making up 14% of all our participants. Thus, it seems that significant camera movement is more annoying for both females and those considered “casual” gamers. Hardcore gamers are most likely already used to the head bobbing, and either ignore it, or learn to embrace it.

As stated, the vertical video was by far the most popular choice. However, this was not the case for our most popular game: Call of Duty 4 (CoD4). Participants who chose CoD4 generally agreed upon the “Infinity” head bobbing camera movement (Table 4).

**Table 4: Call of Duty: Choice of camera movement and frequency of play**

<table>
<thead>
<tr>
<th></th>
<th>Low Frequency</th>
<th>Medium Frequency</th>
<th>High Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>U</td>
<td>1</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Arch</td>
<td>1</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Infinity</td>
<td>3</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Our second, third and fifth most popular games, Halo 3, Half Life 2 and Counterstrike respectively, seemed to follow their own trend; it seemed to be almost split evenly between the vertical camera movement, and the “U” shaped movement. For the most part, the rest of the games chosen had a similar consensus as the entire survey itself: vertical camera movement was the most chosen. Also, for each the seven games that we considered to be popular, at least half of the subjects were high frequency gamers (also following the “trend” of all of our data). Therefore, it seems safe to assume that the results are at least somewhat accurate.

While it may not be entirely true that the majority of games have completely vertical camera movement with no side-to-side movement at all, it shows that the camera movement is very simple, and the side-to-side movement is likely not noticeable enough for players to be distracted by it. Thus, game developers may be striving for simplicity in their camera movements, unless the game style calls for noticeable head bobbing (such as Mirror’s Edge). It should also be noted that for the games in which our subjects complained of nausea, almost half of them were the “U” movement. That may indicate that games with too much side-to-side movement are annoying for players, but vertical movement is not.

3.3 Where To Go From Here

At this point, although we have generally achieved what we had initially set out to do, there still remain many more opportunities to further our research. A few prospects include broadening our research, improving the way our survey was conducted, incorporating our findings with the graduate study as mentioned previously and corresponding with game developers, or anyone within the gaming industry.
After conducting this web-based survey, we realized that the foundation of our results were completely dependent on the survey takers, where many variables are uncontrolled. This creates a larger chance for unreliable data that we cannot always filter out of our results. For more reliable feedback, a controlled study could be considered. In this way, the subjects can be monitored as they play their chosen game in real time. This would lead to more accurate answers when the subjects fill out the survey, as one of the confounds to our data that we encountered was the inability for our subjects to accurately remember the camera movement of the game they chose. With this change in our study, the subjects will play the game of their choice, where they will focus more on the camera movement, knowing that they will be asked questions on it. With the camera movement fresh on their minds, choosing a similar camera movement will be easier for the subjects, as well as answering the associated questions.

The second suggestion is to broaden our research. To do so, third-person camera movement can be considered. From the comments of some of our survey takers, they noticed a camera movement in video games with a third person perspective, which attempted to mimic a walking motion. Through studying these camera movements, the findings could provide ways to improve the first person camera movements or provide similar results.

From our results, we can categorize games through the varying camera movements, which can be incorporated in de Barro’s research. As his research found what camera movements users preferred, these results can be analyzed with the ones we compiled, which reveals the camera movements that predominate in first person video games. From our results it would seem that the gaming industry does not meet up to user preferences, although the head bobbing found in commercial games still do not inhibit the gaming experience for the player. However, this shows an improvement that could be made for the player’s ability to enjoy the game. Since camera movements vary from game to game, de Barro’s research and our results would put an emphasis on the camera movements of games and the importance of it. Holding conferences with game
developers would be the most direct way to get our information to them, which would hopefully set higher standards on the camera movement for future games.
4. References

deb Barros, P.G., Lindeman, R.W., Loughlin, T.J. "Characterizing Head Movement in First
Person Games." Poster Presented at ACM SIGGRAPH Symp. on Interactive 3D Graphics and
Games, Boston, MA, USA, Feb. 27-Mar. 1, 2009.

Appendix A – List of First Person Games (Divided by Platform)

X-Box/PC:

1) Halo 1-3
2) Elder Scrolls III: Morrowind
3) Elder Scrolls IV: Oblivion
4) Half Life 1-2/Counterstrike/Orange Box
5) Call of Duty
6) Unreal Tournament
7) Rainbow Six
8) Bioshock
9) Medal of Honor
10) Battlefield
11) Far Cry
12) Serious Sam
13) Timesplitters
14) Deus Ex
15) Mirror's Edge
16) TimeShift
17) Dead Space
18) Left 4 Dead
19) The Chronicles of Riddick: Escape From Butcher Bay
20) Doom
21) Doom 3
22) Crysis
23) Quake
24) Red Faction
25) Turok
26) Marathon

Wii:

1) Red Steel
2) Samurai Warriors: Katan a
3) Call of Duty 3
4) Metroid Prime 3: Corruption
5) Medal of Honor Heroes 2/Vanguard
6) Time Splitters 4
DS:

1) C.O.R.E
2) Metroid Prime Hunters
3) Call of Duty 4
4) Goldeneye Rogue Agent

Gamecube:

1) XIII
2) TimeSplitters Future Perfect/2
3) Call of Duty 2 Big Red One
4) Red Faction 2
5) Medal of Honor European Assault/Rising Sun
6) 007 Agent Under Fire/Goldeneye Rogue Agent/Nightfire
7) Rainbow Six 3

N64:

1) Perfect Dark
2) Doom 64
3) Quake 2/64
4) Goldeneye/World is Not Enough
5) Rainbow Six
6) Duke Nukem 64/Zero Hour

Play Station:

1) Killzone
2) Call of Duty series
3) Rainbow Six series
4) Fallout 3
5) Oblivion
6) Red Faction
7) F.E.A.R.
8) Medal of Honor series
9) Battlefield series
10) TimeSplitters series
Appendix B – List of Websites

List of Game Sites/Social Networks:

1) Gamasutra.com
2) GameSpot Forums
3) GamePro Forums
4) Gametrailers.com
5) Gamefaqs.com
6) IGN.com
7) Gamesradar.com
8) Gamespy.com
9) CheatCC.com
10) Kotaku.com
11) Gametap.com
12) GameZone.com
13) 1UP.com
14) Joystiq.com
15) GameRevolution.com
16) Destructoid.com
17) GameInformer.com
18) ComputerandVideoGames.com
19) UGO.com
20) GameDev.net
21) Indiegamer.com
22) DevMaster.net
23) Xna.com
24) Devshed.com
26) Assemblergames.com

“Top Games”/Other Sites:


http://www.gametrailers.com/player/34978.html

http://www.ebizmba.com/articles/video-games
Appendix C – Survey Questions (After Pilot Study)

[Created: December 16, 2008]

1. Gender?
2. Age?
3. How often do you play first-person games?
   Rarely  Moderately  Frequently

After choosing a game: (Alphabetized, not console-based)

1. After viewing all (#) video clips, which one matches the closest with the camera movement in the game you chose?
2. Is the camera movement realistic in regards to:
   a. The status of your character (ex. Wounded compared to not wounded)?
   b. The speed that your character moves at (ex. Carrying a heavy object, running)?
   c. The way your character moves across various terrain (ex. Walking up a hill, through water)?
   d. If a hand/weapon/legs are in view?

   SCALE:  1(Not Realistic at all)
            2
            3 (Average)
            4
            5 (Very Realistic)

3. How much do you like the camera movement?

   SCALE:  1 (I HATE IT! 😞 😞)
            2 (I’m not too fond of it 😞)
            3 (eh 😐)
            4 (I like it 😊)
            5 (I LOVE IT! 😊 😊)

4. How does a realistic camera movement take away from the player’s experience/enjoyment?
   a. Ruins the experience
   b. Decreases enjoyment
   c. No real difference
   d. Increases enjoyment
   e. Is crucial towards the experience
5. Does the camera movement cause any nausea/motion sickness for you?
   a. Yes                  b. No

6. If Yes to #5, what causes it?
   a. The speed (Ex. Moves too fast)
   b. Shaky movements (Ex. When hit, dizzy, status effects etc.)
   c. Other _______________

7. Which do you prefer?
   a. Mouse
   b. Gamepad control
   c. Other _______________

8. In regards to Question 7, how much does the type of controller affect camera movement?
   SCALE:  1 (Not at all)
           2
           3
           4
           5 (Very much!!)

9. Before buying a first person game, how much does the camera movement affect your
decision in buying the game/playing the game?
   SCALE:  1 (Not at all)
           2
           3
           4
           5 (Very much!!)

10. Other Comments?
Appendix D – Screenshots of the Survey

Disclaimer

The information gathered will be used for research purposes only and will not be publicly available.

The Main Screen (Introduction and Disclaimer)

Hello and welcome to our survey on camera movement in first-person video games!

This survey is being conducted by undergraduate students in the Interactive Media and Game Development program at Worcester Polytechnic Institute for their Interactive Qualifying Project under the advisory of Professor Robert Lindeman. The project itself was created to observe patterns in camera movement (specifically, head bobbing) in first person games as well as gamer preferences with regards to camera movement so that they may be analyzed and catalogued for future reference among game developers and journalists.

The purpose of this survey is to find out what you think about the "head bobbing" camera movement in video games that use a first person camera view, and how it affects gameplay. After answering a few demographics based questions you will be asked to choose a game what uses the first person view, and "analyze" the camera movement in it (answer questions such as: Do you like it? Is it realistic? etc.). If the camera movement changes for different "player statuses" (running, walking wounded, etc) we ask that you take the survey multiple times to analyze each status separately.

When you have completed the survey, you may then choose to submit it and take it again for a different game. Thank you for your time and we greatly appreciate your input.

DISCLAIMER:

None of the data collected in this survey will be publicly distributed. We will not ask for any personal information other than gender and age range. However, we will be analyzing your game-related data and using our databases which contains this data in the final write-up for our project.
The Demographics Section

![Personal Questions](image1)

**1. What is your gender?**
- Male
- Female

**2. What is your age?**
- Under 13
- 13 to 17
- 18 to 25
- 26 to 35
- 36 to 45
- 46 to 55
- Over 55

**3. How often do you play first person games?**
- Rarely
- Sometimes
- Frequently

**4. (On a scale of 1-5) Before buying a first person game, how much does the head bobbing camera movement in it affect your decision?**
- 1 - Not at all
- 2
- 3
- 4
- 5 - Very much

The Game Analysis Section

This is where the player chooses the game he/she wishes to survey and includes the avatar’s physical condition that would affect its movement

![Game Analysis](image2)

**5. For which game would you like to analyze the head bobbing camera movement?**
- Agent Under Fire
- Battlefield 1942
- Battlefield 2
- Battlefield 2142
- Battlefield Vietnam
- Battlefield: Bad Company
- Bloshock
- Call of Duty
- Call of Duty 2
- Call of Duty 3
- If other, what game?

**6. For this particular analysis, what is the "status" of the player?**
- None
- Tip-toeing/sneaking
- Running
- Wounded
- Carrying unusual (eg. heavy) object
- Other:

(100 characters max)
For visual purposes, the arrows were added to show the motion of each video. In the actual survey, hovering the mouse over each video will play the motion.

7. Which of the following animations most closely matches the head bobbing camera movement in your selected game? (Hover your mouse over each picture to animate it)

8. (On a scale of 1-5) How realistic is the camera movement in your selected game?

- 1 - Not realistic at all
- 2
- 3
- 4
- 5 - Perfect/near perfect
These final four questions were to see how enjoyable the camera movement was for the player, and if the player experienced any nausea while playing.

9. (On a scale of 1-5) How much do you like the camera movement in your selected game?
   - 1: I hate it
   - 2: I dislike it
   - 3: It's decent
   - 4: I like it
   - 5: I love it

10. In your opinion, how does the realism (or lack of realism) of the camera movement for your selected game affect the player’s experience/enjoyment?
   - Ruins experience
   - Decreases enjoyment
   - Makes no difference
   - Increases enjoyment
   - Is crucial towards experience

11. Does the camera movement in your selected game create nausea/sickness for you? If so, state the reason (e.g. speed, shaky movements); if not, leave blank.

12. Do you have any additional comments about your selected game? If so, write them here. (500 characters max)

If you encounter any problems, or have any questions relating to the survey, please contact finnppm@cam.ac.uk.