

Player-Centered Game Environments: Assessing Player Opinions, Experiences and Issues

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Game developers have identified, explored and discussed many of the key issues that arise for players interacting in game worlds. However, there is a need to assess the thoughts and opinions of game-players on these issues, through structured, empirical studies. This paper reports the results of two player-centered studies aimed at investigating these issues from the player's perspective. The first study, a focus group, supports some of the issues identified by game developers; consistency, intuitiveness and freedom of expression, and identifies new issues; immersion and physics. The second study, a questionnaire, examined the relationship of these issues to game-type preference and game-playing experience. This paper represents important initial exploratory research that supplements the existing literature by focusing on the player's perspective and exploring which issues and context have the most impact on player enjoyment.

1 Introduction to Interactions in Game Worlds

Acquiring the player's perspective on game design issues is crucial in enhancing the gaming experience, by understanding, and ultimately meeting, the desires and expectations of the player. Although many game developers gather player feedback in some form, there is limited published literature on game design in terms of the aspects of game environments that affect player enjoyment. Furthermore, the majority of this literature is based on the personal experience and thoughts of game developers. This literature focuses on several major themes; consistency, intuitiveness, learning and freedom of player expression. Consistency is considered to be crucial for keeping players immersed in the game world [2]. If the game world seems to behave consistently and in ways that the player understands then the player has less difficulty immersing themselves in the environment and suspending disbelief [4]. Inconsistencies in games, such as getting stuck in a wall when adventuring in a dungeon, remind the player that it is just a game [2]. The second theme, intuitiveness, suggests that interactions with the game environment and objects in the game environment should be intuitive and meet player expectation. People who are less-experienced game players can be baffled by the physics of the game world and often need to relearn how to interact with the world like a child [4]. Game worlds are populated with objects that are visually similar to objects that we use every day, but

these objects are functionally different. Not only can these interactions be counter-intuitive for the player, but they can often confuse and frustrate the player [2]. An important benefit of making game worlds more intuitive is that they become easier to learn. The player is more likely to develop an intuitive understanding of the game elements if they are consistent with real world elements [3]. When the game environment is intuitive, the learning curve for the player is substantially decreased, which means that the player spends less time learning the game and more time playing the game [3]. The final theme identified in the literature is freedom of player expression or the possibility of emergent gameplay. In most games, the designers manually define a number of outcomes or interactions and allow the player to pick one, which restricts the player's freedom in interacting and removes the possibility of emergent gameplay [4]. A more pleasing experience for the player is theorized to result when the player has greater freedom in terms of deciding how to interact with the environment.

Although a great deal of insight can be gained from the thoughts and experiences of game developers, there is also a need to assess the thoughts and opinions of game players regarding the factors that affect their enjoyment of games. Previous empirical studies have provided insight into the player's perspective on non-player characters in games [5]. However, there is no published work on empirical studies conducted by game developers or researchers to ascertain player perspective on interacting in game environments. Therefore, the aim of the research reported in this paper is to investigate the aspects of game environments that affect player enjoyment from the player's perspective. The method employed in this study was to conduct a focus group with experienced game-players to identify the issues that they felt most affected their enjoyment of a game. The focus group was followed up by a questionnaire, which aimed to assess how these issues vary in importance across players with different game-playing experience and game-type preference.

2 Defining the Player-Centered Issues

The goal of this study was to collect the opinions and experiences of a group of experienced game players with respect to the issues that impacted upon their enjoyment of game environments. The method employed in this study was a focus group, consisting of four experienced game players who were brought together to discuss their experiences. The group members were aged between 21 and 25 and consisted of one female and three males. Each member of the group considered themselves to be an experienced game player and reported playing games on a daily basis with a minimum of five years experience playing games. The focus group involved several general points of discussion, but the group was mostly encouraged to freely discuss their experiences. An audio recording was taken during the focus group, which was later transcribed and analyzed using grounded theory [1]. This analysis gave rise to five major themes, consistency, immersion and suspension of disbelief, freedom of player expression, intuitiveness and physics.

2.1 Consistency

A strong theme arising throughout the focus group was the importance of consistency in games. Participants felt that it is highly important for objects that look the same to act the same. For example, one member was frustrated with “glass windows that break sometimes but don’t break other times”. Similar problems were identified for crates, barrels, lanterns and mirrors. These inconsistencies can cause difficulties for the player in learning the rules of the game, which appear to be constantly changing. Also, on the other end of this scale, it is important for objects that have different behavior to look different, signaling to the player that a different kind of interaction is possible. For example, “some games signal actions by having different colored walls for bits of wall you can kick out, e.g. *Bloodrayne*” and referring to the game *Dungeon Siege* “there were certain walls that looked a bit different, but you knew that you could shoot that wall out”. However, it was also expressed that this visual difference shouldn’t be in the form of something unrealistic, such as a big red circle around the section. Rather, it should be a subtle, realistic difference that the player can detect, such as a “worn-looking part of the wall” that might be more fragile.

2.2 Immersion and Suspension of Disbelief

Another major theme of the discussion was immersion and suspension of disbelief. The group agreed that audio is very important for keeping the player immersed in the game, in terms of a “powerful and moving soundtrack”, as well as sound effects. The group thought that a game is immersive if it can cause an emotional response, such as fear or happiness. The group discussed how sounds can be used to build up suspense, such as in a horror movie when “you know that something is creeping up on you, to the point that you’re afraid and shifting in your seat”. Furthermore, audio was highlighted as being important for “drawing you into the game, but inconsistent graphics can quickly knock you back out again”. The graphics don’t need to be spectacular, but they do need to be consistent, ensuring “nothing catches your eye as being wrong or out of place”. A good introduction and a strong narrative were also identified as being important for immersion. The introduction gives the player the storyline and background, tells them who their character is and what is going on. The player then feels like they are “part of the story and they want to find out more”. As they play the game, the player is given more of the storyline, “similar to reading a book, except that they need to complete certain tasks” to be rewarded with more of the story.

2.3 Freedom of Player Expression

Another theme that arose was player expression, which is the freedom that the player has in expressing their creativity and intentions by playing the game in the way that they want, not the way that the designer had intended it to be played. The group discussed linearity in games and agreed that they are often forced to solve problems and perform tasks the way the designer had imagined, which sometimes relies on the

player using trial and error. For example, many “quests aren’t even quests, they’re completely linear, you’ve been told exactly what to do, you just have to go pick this thing up and come back, you should be able to go out and do the quest your own way”. One member said that it becomes “more like trial and error than playing and that it’s not as fun as looking around at a collection of objects and working out how to use them to solve the problem”. It was also felt to be important that the player has a range of interactions that can be performed with the environment and game objects and that each game should have some kind of new and unique interaction.

2.4 Intuitiveness

The group reflected on many experiences in games where their interactions with the environment had not been intuitive. A major source of frustration came from objects in games that were simply scenery and hence could not be used or affected. For example, furniture that cannot be moved as it seems to be bolted to the floor or “a flimsy little plastic chair that can be shot with a shotgun and it’s resilient enough to take that and not be damaged”. These interactions can also cause problems for gameplay, when the player cannot use objects in the way that they would expect in order to complete a quest or solve a problem. The group discussed the unintuitive nature of problem solving in some games. The group found that the way the designers intend the problem to be solved is often not intuitive for the player and that they “resort to trial and error”. The group discussed this problem and suggested that “if it takes 10 hours to find a switch or the player needs to go to the internet to get a walkthrough then there is a serious problem with the game”. Therefore, it is important to conduct extensive testing to ensure that the players’ expectations are met and that they will be able to solve the problems in a reasonable time frame, rather than assuming the designer’s intentions will be easily determined.

2.5 Physics

The group discussed their expectations of physics in games and reflected on their good and bad experiences. There was consensus that gravity in games is important for actions such as jumping, falling, taking falling damage, trajectory when launching rockets and so on. Modeling gravity can give rise to realistic effects such as bouncing grenades around corners, falling off a platform or rolling down a hill when shot. More importantly, the “gravity needs to behave consistently, even if it’s not entirely realistic”, such as in first person shooter games like *Unreal Tournament* and *Quake*, where the game may be in low gravity mode. Momentum was also identified as an important attribute of physics that needs to be modeled in games, especially in space simulations and first person shooters. For example, if the player shoots the enemy or is shot by the enemy then “being pushed backwards is natural”. Another important aspect of physics concerns fire and explosions. Flammable game objects should burn and ignite when affected by a flamethrower or incendiary grenade. Also, when a flash grenade explodes next to a character it should adversely affect their sight and hearing, or when an explosion occurs the player “should be able to jump into a pool of water to

be protected” from damage. Water was also identified as a substance that needs to be modeled more accurately in games. For example, there was considerable discussion about how most weapons shouldn’t work under water, especially flamethrowers and fire-based weapons. Other attributes of water that the group decided were important were the effects of the flow and currents of the water, as well as visual effects such as ripples.

2.6 Conclusions

In summary, the focus group provided supporting evidence for the themes of consistency, freedom of expression and intuitiveness identified in the game design literature. First, players need consistency in games to be able to learn the rules of the game, to know when they can interact with game elements and to avoid frustration and confusion. Second, players want to be free to play games and solve problems in the way that they want, not the way the designer had intended. Third, counterintuitive interactions often result from game objects having no function or behaving in a way that conflicts with player expectation. Furthermore, this study provided insight into two new issues that affect player enjoyment in games, immersion and physics. Immersive games draw the player into the game and affect their senses and emotions through elements such as audio and narrative. Finally, consistent physics are important in games to ensure the physical elements of the game world, such as gravity, momentum, fire and water, behave in the way that the player expects, to allow the player to perform actions in an intuitive manner and to keep the player immersed in the game world.

3 Investigating the Player-Centered Issues

In this study, the results obtained from the focus group were used as a basis for constructing a questionnaire that aimed to further investigate the issues of consistency, immersion, freedom of expression, intuitiveness and physics in game environments. Whereas the focus group provided in-depth insight into the opinions and experiences of a small group of experienced game players with respect to these issues, the questionnaire was designed to provide a survey of the opinions of a large, diverse group of game players. The questionnaire was administered online (<http://www.itee.uq.edu.au/~penny/questionnaire.htm>) and invitations to participate were posted on several online game forums. The questionnaire was completed by four hundred and fifty-five participants, of which 421 (92.5%) were male and 34 (7.5%) were female. Participants ranged in age from 11 to 56 years, $M = 24.8$ ($SD = 6.91$). The sample consisted mainly of frequent game-players, with 94% playing computer games at least monthly. The distribution of game-playing frequency and age are shown in Fig. 1. There were two main aims of this study. First, to determine how the different issues (identified in the literature and from the results of the focus group) affect the enjoyment of people who play different types of computer games, such as role-playing games or first-person shooter games. The second aim was to determine how these issues affect the enjoyment of people with different levels of experience

playing computer games. One question of particular interest is whether intuitive interactions with game environments and objects have a greater affect on the enjoyment of people with less game-playing experience. That is, do people who have less experience playing games (and aren't well-versed in the "rules" of game worlds) find that unintuitive interactions have a greater affect on their enjoyment?

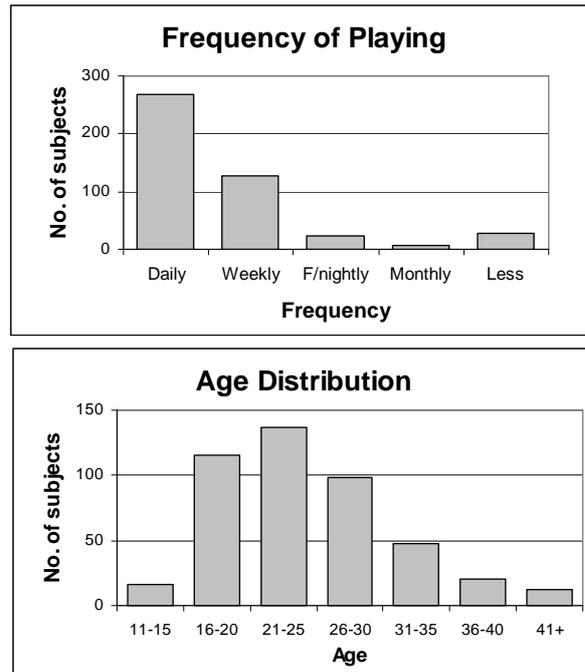


Fig. 1. The majority of subjects (94%) played games at least monthly. Participants ranged in age from 11 to 56 years, with the majority in their late teens to late twenties.

3.1 Method

There were three between-subject variables, gender, game-type preference and experience. The participants selected their preferred type of game from a list of seven common game types, with the majority of participants nominating role-playing games (41%), first-person shooters (28%) or strategy games (16%) as their preferred game type. The other four game-types, simulation, action, racing and sport accounted for twelve percent of the sample. The participants indicated their level of experience at playing computer games on a seven-point Likert scale, ranging from very inexperienced to very experienced, with the majority of participants rating themselves as experienced, $M = 5.88$ ($SD = 1.37$). The distribution of game-type preference and self-rated experience are shown in Fig. 2.

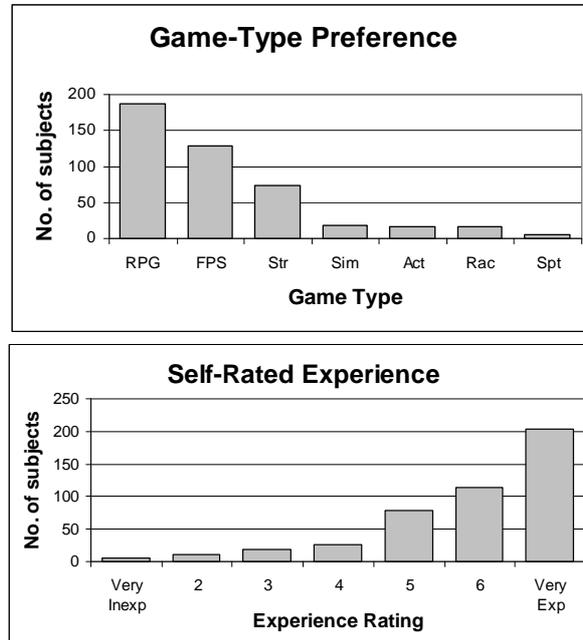


Fig. 2. The three major game-type preferences were role-playing games (RPG), first-person shooters (FPS) and strategy games (Str). The majority of participants rated themselves as very experienced.

The participants were required to complete 28 nine-point Likert scales to indicate the degree to which different aspects of games affect their enjoyment of their preferred type of game, where one indicated “much less enjoyable”, five indicated “no effect” and nine indicated “much more enjoyable” (see Appendix for questionnaire items). All measures were assessed using multiple item scales and all negatively worded items were reverse-scored. Factor analysis via principal components was conducted to identify sets of variables that could be combined into scales. On the basis of eigenvalues greater than one criterion, a five factor solution was obtained accounting for 68.6% of the variance. Cronbach’s coefficient alpha was used to assess the reliability of each scale. All scales were found to have acceptable reliabilities (.66 to .90). The five factors derived were physics, sound, narrative, intuitiveness and freedom of expression (see Table 1). The physics scale consisted of eight items related to gravity, momentum, life-like graphics and the behavior of water and fire. The sound scale consisted of three items related to a game’s soundtrack and sound effects. The narrative scale was made up of two items related to a game’s introduction and storyline. The intuitiveness scale was comprised of three items related to consistent behavior of objects, scenery and interaction with objects. The freedom of expression scale consisted of two items related to the variety of ways of interacting with objects and having new and unique ways of interacting with objects.

Table 1. Descriptive data for dependent measures

<i>Variable</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Possible Range</i>	<i>Actual Range</i>	<i>Reliability</i>
Sound	7.53	1.26	1 - 9	1 - 9	.85
Narrative	7.20	1.31	1 - 9	1.5 - 9	.68
Physics	7.07	1.09	1 - 9	3.13 - 9	.90
Expression	7.40	1.29	1 - 9	1 - 9	.79
Intuitiveness	6.31	1.06	1 - 9	2.67 - 9	.66

3.2 Results and Discussion

Regression analyses were used to examine the main and interactive effects of gender, game-type preference and experience on each of the dependent measures (physics, sound, narrative, intuitiveness and expression). The main effect terms (gender, game-type preference and experience) were entered into the regression equation followed by the two-way interaction terms (gender-by-game-type preference, gender-by-experience and experience-by-game-type preference). The main effect terms, but not the two-way interaction terms, accounted for a significant increment of variance in physics ($F(3,385) = 3.185, p < .05$), sound ($F(3,384) = 6.662, p < .05$), freedom of expression ($F(3,385) = 5.287, p < .05$), and narrative ($F(4,387) = 2.788, p < .05$). Also, the main effect terms ($F(3,385) = 4.395, p < .05$) and the two-way interaction terms ($F(6,382) = 3.810, p < .05$) accounted for a significant increment of variance in intuitiveness.

Effects of Game-Type Preference. The first aim of this study was to investigate how game-type preference affects the aspects that make games more enjoyable for players. It was found that physics ($\beta = .095, t = 1.89, p = .06$), sound ($\beta = .117, t = 2.347, p < .05$) and intuitiveness ($\beta = .098, t = 1.937, p < .05$) have a greater affect on enjoyment for people who prefer first-person shooter games than people who prefer other types of games. This finding can be attributed to the centrality of these three aspects to first-person shooter games. First, physics is vital in first-person shooter games as typical behaviors include jumping, shooting and exploding, which need to be modeled with a certain degree of realism. Second, sound is important as it provides immediate feedback and information to the player about what is happening around them in this information rich environment, which includes fast gameplay, different enemies, rapid movement and numerous interactions with objects and the environment. Also, sound aids in setting the mood of the game and provides an additional level of immersion, by making the player feel frightened or excited. Finally, intuitive interactions with objects are important in first-person shooter games as this type of game requires far more direct interaction with the environment than any other type of game, such as direct manipulation of objects and interaction with scenery. Therefore, it is important that these interactions are intuitive as the player will be carrying out a greater number of interactions with greater frequency.

For people who prefer strategy games, it was found that narrative ($\beta = .112, t = 1.668, p < .10$) has a greater affect on enjoyment than for people who prefer other

types of games. It might be expected that narrative would have a greater affect on the enjoyment of people who prefer role-playing games. However, this finding could be due to the fact that every role-playing game includes narrative, but it is uncommon in strategy games. Therefore, the addition of well-placed narrative in strategy games has a significant affect in increasing player enjoyment, whereas narrative is commonplace and expected in role-playing games and therefore the players fail to recognize it as something that affects their enjoyment.

Effects of Game-Playing Experience. The second aim of this study was to investigate how experience affects the aspects that make a game enjoyable. In particular, it was expected that the ability to interact intuitively with objects would have a greater affect on the enjoyment of people with less experience playing games. However, there was no evidence to support this theory. On the contrary, it was found that of the people who prefer role-playing games, the affect that intuitiveness has on enjoyment increases as level of experience increases ($\beta = -.804$, $t = -2.841$, $p < .05$). Maybe more experienced game players expect to be able to interact with game environments and objects in a particular way, learned from their prior experience playing games, and find it annoying when the game doesn't behave in the way they have learned to expect. On the other hand, the inexperienced players have no concept of how the game objects should behave, rather they only have the concepts they have learned in real life. Additionally, it was found that the affect that sound ($\beta = .095$, $t = 1.853$, $p < .10$), freedom of expression ($\beta = .179$, $t = 3.448$, $p < .05$) and narrative ($\beta = .150$, $t = 2.829$, $p < .05$) has on player enjoyment increases as level of experience increases. As with intuitive interactions, perhaps the player's expectations of these aspects are built up as they play more games. As a result, the more experienced game players know from experience that they have really enjoyed games with good sound and narrative. It makes sense that more experienced players should find freedom of expression more enjoyable, as their experience means that they are more likely to want to experiment, try different strategies and try to play the game in their own way.

4 Conclusions

The aim of this paper was to define the issues that have an impact on player enjoyment in a game environment from a player-centered perspective, by integrating the findings of a focus group and questionnaire with the insights of game developers. The focus group confirmed three of the themes identified in the game development literature. The first theme was consistency, which related to objects behaving in a consistent manner, enabling players to learn the rules of the game, to know when they can interact with game objects and to avoid frustration and confusion. The questionnaire, however, did not provide any further insight into this theme. The second theme from the literature that was supported by the focus group was freedom of expression, which refers to the ability of players to play the game and solve problems in their own way or a variety of ways, rather than the way the designer had intended. The questionnaire refined this theme by showing that the affect freedom of expression has on player enjoyment increases with level of experience. The third

theme that was confirmed by the focus group was intuitive interactions with the game environment, which related to not being able to interact with objects or solve problems in the way that the player would expect. The findings from the questionnaire were that the affect that intuitiveness had on player enjoyment was higher for people who prefer first-person shooter games and people with more experience playing games.

Additionally, there were two new themes related to the enjoyment of players interacting in game worlds that were identified in the focus group. The first of these was immersion, which related to game aspects such as audio and narrative drawing the player into the game, enabling them to believe it is real or suspending their disbelief. The questionnaire further expanded this theme with the findings that sound has a significant affect on the enjoyment of people who prefer first-person shooter games and players with more experience. Also, it was found that narrative has a significant affect on people who prefer strategy games and players with more experience. The second new theme found in the focus group was consistent physics, which related to gravity, momentum and the basic laws of physics behaving consistently with player expectation, as well as more realistic behavior and interactivity in water, fire and explosions. The questionnaire showed that physics has a greater affect on the enjoyment of people who prefer first-person shooter games.

The background of the sample that participated in this study should also be considered. For the focus group, the participants were experienced game-players and as such their opinions and views may differ from a group of novice players. For the questionnaire, the majority of the sample consisted of experienced game-players and a large proportion of the participants were attracted from online game forums, such as Eve Online and EverQuest. As such, the results obtained from the questionnaire may more be biased towards these groups of players. Interesting and valuable future work would lie in investigating different groups of players and comparing their results to the results obtained in these studies.

In conclusion, the focus group provided supporting evidence from the player's perspective for some of the issues that were identified in game development literature, including intuitiveness, consistency and freedom of expression. Additionally, two new issues were defined in the focus group, immersion and physics. All these issues were then examined with relation to game-type preference and game-playing experience via the questionnaire. The two studies complement each other, as the focus group provided in-depth detail about how players feel about these issues, whereas the questionnaire provided empirical data about which groups of players these issues are most likely to affect. Particular insight was gained from the questionnaire with regards to first-person shooter games and also player experience. These studies also identify a number of interesting points that are worthy of further exploration in future player-centered studies.

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Appendix: Questionnaire Measures

Each questionnaire item loaded on one of five factors (physics, sound, narrative, intuitiveness or expression) or was discarded if it did not load on a factor. The items that loaded on each factor and the discarded items are shown below.

Physics

- How does being affected by the laws of gravity affect your enjoyment of your preferred type of game (e.g. you can just in a realistic way or take falling damage)?
- How do objects that follow the laws of gravity in a realistic way affect your enjoyment of your preferred type of game (e.g. bouncing, falling, rolling down hills)?
- How does momentum affect your enjoyment of your preferred type of game (e.g. being pushed backwards when hit)?
- How does water that behaves in a realistic way affect your enjoyment of your preferred type of game (e.g. flows, wets, cools, current)?
- How do objects that are affected by water in a realistic way affect your enjoyment of your preferred type of game (e.g. weapons cannot work underwater)?
- How does fire that behaves in a realistic way affect your enjoyment of your preferred type of game (e.g. burns, ignites, heats)?
- How do objects that are affected by fire in a realistic way affect your enjoyment of your preferred type of game (e.g. flammable objects burn or explosives explode when they come in contact with fire)?
- How do life-like graphics affect your enjoyment of your preferred type of game?

Sound

- How does a moving and powerful soundtrack affect your enjoyment of your preferred type of game?
- How do sound effects that set the mood (e.g. build up suspense) affect your enjoyment of your preferred type of game?
- How do sound effects that cause an emotional response (e.g. fear or happiness) affect your enjoyment of your preferred type of game?

Narrative

- How does an introduction that sets the scene for the game affect your enjoyment of your preferred type of game?
- How does a strong storyline affect your enjoyment of your preferred type of game?

Intuitiveness

- How do objects that look the same but that cannot be used in the same way affect your enjoyment of your preferred type of game (e.g. one barrel can be broken but another cannot)?
- How does *not* being able to use game objects because they are only scenery affect your enjoyment of your preferred type of game (e.g. a piece of furniture cannot be moved)?
- How does *not* being able to use game objects in the way that you would expect to be able to use them affect your enjoyment of your preferred type of game (e.g. a bucket can be kicked but not picked up)?

Expression

- How does having a wide variety of possible ways to use objects in the game environment affect your enjoyment of your preferred type of game?
- How does having new and unique ways of using objects affect your enjoyment of your preferred type of game?

Discarded Items

- How does being able to use objects in the same way as you would in the real world affect your enjoyment of your preferred type of game?
- How does being able to use objects in the same way as you have in previous games affect your enjoyment of your preferred type of game?
- How do graphics with obvious inconsistencies (e.g. a body sticking through a wall) affect your enjoyment of your preferred type of game?
- How does only having one way to perform a task or solve a problem affect your enjoyment of your preferred type of game?
- How does needing to figure out what the game developer wanted you to do to perform a task or solve a problem affect your enjoyment of your preferred type of game?
- How does being able to perform a task or solve a problem in your own way affect your enjoyment of your preferred type of game?
- How does needing to use trial and error to perform a task or solve a problem affect your enjoyment of your preferred type of game?
- How does *not* being able to perform a task or solve a problem within a reasonable period of time affect your enjoyment of your preferred type of game?
- How does *not* being able to perform a task or solve a problem at all affect your enjoyment of your preferred type of game?
- How does needing to get help from the internet or another person in order to solve a problem affect your enjoyment of your preferred type of game?