A New Design And Analysis Methodology Based On Player Experience

Abstract
This study will provide an improved approach to game design and analysis by offering the gaming community with a framework based on user experience and founded by measuring and operationalizing, during game-play, the different intrapersonal game attributes in successful commercial games across five popular game genres.

Author Keywords
Game Design and Analysis; Player Experience; Intrapersonal Game Attributes; Challenge; Fantasy; Mystery; Goals; Control.

ACM Classification Keywords
Design; Human Factors; Measurement.

Introduction
After a close examination of the frameworks currently used for video game design and analysis, we found a significant need for a quantifiable metric. Frameworks like MDA [3], Educational Framework [1] and DPE [4] have provided us with a qualitative approach to game design, redesign and analysis. However, these frameworks provide no quantitative standard of
evaluation and leave much of the analysis to the
designer’s judgment.

Constructing a design and analysis framework based on
a player’s experience provides us with that elusive
standard of evaluation. This study will attempt to
establish this metric using a player’s experience and
feedback.

**Game Attributes**

To establish the appropriate parameters for this study,
we first needed to determine a finite list of relevant
game attributes that would affect the player’s
experience. Our previous study identified the following
critical intrapersonal game attributes: *fantasy, challenge, goals, control, mystery,* and *auditory stimuli* [2]. We then mapped each attribute to a list of
questions that quantify the feature and help establish
the presence and impact of that attribute in a particular
game.

**Genres And Games**

The genres we used for this study are: *First-Person
Shooter, RPG, Racing, Sports,* and *Arcade.* From
previous work, we concluded that these five genres are
representative of a wide and varied spectrum of game
playability, and perspective [2].

For these five genres, we selected ten games (2 per
genre) to use in our study. First we selected all the
games available in the Console Game lab at the College
of Digital Media at DePaul University. Later we used an
initial genre classification based on our definition of
each genre. Then for each game we retained the genre
classification and rating from four major game review
websites (IGN.com, GameStop.com, GameInformer.com
and GameSpot.com). Next we play
tested each of the games to determine the final factor,
which is the suitability for our study.

We then rated each game with a “suitability factor,”
rated on a 1-10 scale. To incorporate this “suitability
factor” with the other game ratings, we took an
unweighted average with the other available ratings by
the aforementioned review websites to establish an
overall average. Finally, we selected the two games
with the highest overall average per genre.

While attempting to validate our genre classifications,
we asked each subject to classify (in their opinion) the
genre to which the game they played belongs. After the
study we have found that the players’ classifications
were identical to our classification in all 100 sessions.
This absolute agreement between our and the players’
classifications not only validates our classification but
also ensures that our conception of these genres match
the subjects’ perception, especially when we ask them
about previous experience playing games in this genre.

**Subjects**

For this study, we recruited 60 subjects, divided evenly
between games. Out of that total, ten were expert
game designers, each covering at least one game in a
genre. The population from which we are choosing
these subjects was both student game designers with
previous experience and professional game designers.

**Methodology**

As discussed above, we recruited ten expert subjects
and 50 regular subjects. For each of the regular
subjects, we held an individual gaming session where
the subject played a predetermined subset of one
These subsets were established to represent a continuous level, game or match during which a player can experience a full complement of the game features and has a clear beginning and end. The specific nature of the game subsets was determined during the play testing process. Ease of establishing a clear subset was a factor in whether a game was suitable for our study or not. An example of a subset would be an entire level in a First-Person Shooter game or an entire game of basketball or football in a Sports game.

For each gaming session, a subject played exactly one subset of that game. First we asked each subject a small list of pre-test, demographic questions. After each session we also asked the subjects a list of ten post-test questions about their experience. Each subset was also broken down into intervals during play testing. Those intervals are considered break points in the game where we paused the game in order to ask the subject a few questions about the nature of the game play experience.

**Results**

Given the sheer quantity of the sessions and questions (demographics, in-game and post session survey), the result dataset was very significant. The demographic data for our subjects is summarized in Table 1.

<table>
<thead>
<tr>
<th>Sessions</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>81</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
</tr>
<tr>
<td>Age</td>
<td>21.89</td>
</tr>
<tr>
<td>High School Graduates</td>
<td>70</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>9</td>
</tr>
<tr>
<td>Bachelors Degree</td>
<td>19</td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>2</td>
</tr>
<tr>
<td>Playing Degree (Years)</td>
<td>14.85</td>
</tr>
<tr>
<td>Playing Frequency (Times a Week)</td>
<td>4.95</td>
</tr>
</tbody>
</table>

Table 1. Demographic data for all sessions.

This study will discuss the metric for game attributes in optimal (commercially successful) games based on the in-game questions. The answers for those questions (aggregated in Table 2) were used to determine the metric for our new methodology in game design and analysis.

For the challenge game element, we recorded the number of attempts a player took to finish a level (or number of possessions in a sports game or number of races in a racing game). The next four (directions, objectives, short-term and long-term goals) were provided by the player as the number of those elements available to them at any given time during the game. The next five (fantasy and sound elements) show the percentage of players who were able to accurately detect and describe those elements as part of their game-play. And finally, the mystery element was dictated by the percentage of players that were able to accurately describe their progress and what happens next in the game.

Immediately we noticed that most of these values correspond to the CCG Framework from our earlier study [2], with Fantasy, Sound and Mystery being the new additions. The consistency with the CCG Framework for Challenge, Control and Goals suggests validity for both frameworks given the two different methodologies for these studies. As for the three additional attributes, we contend those numbers should be further investigated and tested for consistency across those genres.
Table 2. This table represents the averages for the different responses received on those game attributes for each genre.

<table>
<thead>
<tr>
<th>Game Element</th>
<th>Arcade</th>
<th>FPS</th>
<th>Racing</th>
<th>RPG</th>
<th>Sports</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenge (Attempts)</td>
<td>1.70</td>
<td>2.50</td>
<td>3.55</td>
<td>1.90</td>
<td>6.03</td>
<td>3.14</td>
</tr>
<tr>
<td>Directions</td>
<td>26.15</td>
<td>8.20</td>
<td>4.15</td>
<td>5.50</td>
<td>16.50</td>
<td>12.10</td>
</tr>
<tr>
<td>Objectives</td>
<td>3.85</td>
<td>4.33</td>
<td>2.65</td>
<td>2.25</td>
<td>4.80</td>
<td>3.58</td>
</tr>
<tr>
<td>Short-term Goals</td>
<td>7.85</td>
<td>4.63</td>
<td>3.10</td>
<td>2.63</td>
<td>4.40</td>
<td>4.52</td>
</tr>
<tr>
<td>Long-term Goals</td>
<td>2.10</td>
<td>1.60</td>
<td>2.15</td>
<td>1.75</td>
<td>2.18</td>
<td>1.96</td>
</tr>
<tr>
<td>Fantasy Characters</td>
<td>90%</td>
<td>85%</td>
<td>75%</td>
<td>80%</td>
<td>60%</td>
<td>78%</td>
</tr>
<tr>
<td>Fantasy Environment</td>
<td>60%</td>
<td>100%</td>
<td>85%</td>
<td>90%</td>
<td>85%</td>
<td>84%</td>
</tr>
<tr>
<td>Background Music</td>
<td>60%</td>
<td>50%</td>
<td>75%</td>
<td>55%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Environment Sounds</td>
<td>65%</td>
<td>95%</td>
<td>75%</td>
<td>90%</td>
<td>90%</td>
<td>83%</td>
</tr>
<tr>
<td>Feedback Sounds</td>
<td>100%</td>
<td>100%</td>
<td>95%</td>
<td>100%</td>
<td>100%</td>
<td>99%</td>
</tr>
<tr>
<td>Mystery</td>
<td>95%</td>
<td>80%</td>
<td>90%</td>
<td>50%</td>
<td>75%</td>
<td>78%</td>
</tr>
</tbody>
</table>

Acknowledgments
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References