What Makes Games Fun? Card Sort Reveals
34 Sources of Computer Game Enjoyment

Completed Research

Owen Schaffer
DePaul University
Owen.Schaffer@gmail.com

Xiaowen Fang
DePaul University
XFang@cdm.depaul.edu

Abstract

Understanding what makes computer games fun not only helps with game design, it tells us how to design any interactive experience for enjoyment. Existing models of computer game enjoyment are either not comprehensive enough, not generated by empirical research, or both. To fill this literature gap, we conducted a card sort exploring participants’ experiences and mental models around what makes computer games enjoyable. A broad literature review identified 167 sources of enjoyment, which we printed on cards. Our research group did an open card sort to create 24 initial categories. Sixty participants then sorted the cards into the categories. After every ten participants, we revised cards and categories. Participants in the last two rounds of ten participants had inter-rater reliabilities of 0.9381 and 0.9367, as calculated with Randolph’s free-marginal multi-rater kappa. We present our final 34 categories as a new, more comprehensive model of the sources of computer game enjoyment.

Keywords


Introduction

We need to know what makes computer games enjoyable so we can engineer enjoyable designs. This is true not only for Game Designers, but for Human-Computer Interaction practitioners and anyone who wants to design for enjoyment. We define computer game enjoyment as how positively players evaluate their experience playing games on computerized devices (PCs, consoles, smart phones, etc.). People play computer games for the enjoyment they provide, but there is not a consensus about what makes games enjoyable, or the sources of computer game enjoyment.

The sources of computer game enjoyment (see Table 1 below) provide a framework to systematically design for enjoyment. Being able to systematically design for enjoyment can of course help game designers create games played for enjoyment. Enjoyment is also important when creating games with a purpose beyond enjoyment, such as serious games, persuasive games, or educational games. Designing for enjoyment is critical for gamification or gameful design, making business systems or other non-game systems more game-like. Understanding what makes computer games enjoyable is an important research question that has broad applications for the design of interactive systems and experiences. Whenever our design goals include user engagement or retention, meaning we want users to want to use the system or we want users to keep coming back to use the system again, we must design for user enjoyment.

The existing models of what makes computer games enjoyable that we reviewed were not comprehensive enough to capture the full breadth of possible sources of enjoyment, and most were not generated by empirical research. This study aims to fill that gap in the literature. Using existing models as inspiration for possible sources of enjoyment, we used a card sort to explore people’s mental models of what makes games enjoyable. Through iterative revision of the cards and categories, we developed a new, more comprehensive and content valid model of the sources of computer game enjoyment (see Table 1 below). This new model, made up of the 34 categories that resulted from the card sorting study, can be used as a practical framework to guide design for enjoyment and as dimensions to guide future research.
**Previous Research**

We reviewed a wide range of literature including Psychology, Game Design, Anthropology studies of play and games, Information Systems, and Human-Computer Interaction looking for sources of computer game enjoyment. We chose a broader literature review to gather more comprehensive content for the card sort.

Sutton-Smith (2009, p. 215, p. 219-220) discussed many sources of enjoyment in his rhetorical analysis of play: progress, fate, power over others, identity, imagination, peak experiences, and frivolity. Caillois (1961) classified games into competition, chance, simulation, and vertigo, or a combination of these elements. These theories of games and play were based on rhetorical analysis and philosophical contemplation respectively. So, they were neither generated by nor supported by empirical evidence.

Bartle (1996) proposed four player types as a model of what motivates people to play online games based on a theory that players can act or interact with the world and other players: Achiever, Socializer, Killer, and Explorer. Bartle’s model was theoretical and not based on empirical evidence. Yee (2006) created a model of motivations to play online games that had three components: achievement, social, and immersion. The construct validity of this model was assessed with factor analysis on data from a large-sample survey. However, Yee’s survey items were based on Bartle’s model, so it may not be comprehensive. Bartle’s model was not generated by empirical research, so his model and models based on it appear to be lacking in content validity. That said, fulfilling each player motivation is a potential source of game enjoyment.


Quick, et al. (2012) created a six-factor taxonomy of game enjoyment validated with factor analysis of survey data: Fantasy, Exploration, Fidelity, Companionship, Challenge, and Competition. Participants rated how important 18 game design features were to their enjoyment of video games. However, Quick, et al. did not discuss how they came up with those 18 game design features. It appears they did not generate their items through research. If so, their taxonomy may not be very comprehensive or content valid.

Lazzaro (2004, 2009) proposed four pathways to emotion in games that she called the Four Keys to Fun: Easy Fun (Novelty & Curiosity), Hard Fun (Challenge & Fiero), People Fun (Friendship & Amusement), and Serious Fun (Altered States & Relaxation). Lazzaro (2004) claimed to have created twelve models of what facilitated enjoyment with affinity diagraming based on interviews and observations with 60 game players, but Lazzaro only presented these four keys. This suggests these four keys may be only part of the bigger picture of what makes games enjoyable. Lazzaro (2004) also identified several emotions game players experience such as Fear, Surprise, Naches (Yiddish for enjoying the accomplishments of mentees), Fiero (Italian for triumph and pride), and Schadenfreude (German for enjoying the pain of others).

Garneu (2001) listed 14 forms of fun, including Problem Solving, Beauty, Thrill of Danger, Physical Activity, and Creation. Garneu’s list was neither generated by nor supported by empirical research.

Korhonen, Montola, and Arrasvuori, (2009) drew on previous models, especially Costello and Edmonds’s (2007) pleasure framework, to create the playful experiences or PLEX framework. PLEX is made up of 20 categories of playful experiences, including Completion, Discovery, Relaxation, Sensation, Expression, Subversion, and Fellowship. Lucero and Arrasvuori (2010) developed a set of PLEX cards with one playful experience on each card. They used these cards to create playful experiences in three design projects. Korhonen et al. (2009) only assessed the PLEX framework by interviewing thirteen game players, finding that at least one player mentioned each of the PLEX categories during the interviews.

Flow and Self-Determination theories focus on specific sources of enjoyment. Flow theory suggests an optimal level of challenge is one source of enjoyment (Nakamura & Csikszentmihalyi, 2002). Three flow conditions lead to flow, which in turn leads to enjoyment: optimal challenge, clear goals, and immediate feedback. Self-Determination Theory (SDT) suggests fulfilling psychological needs for competence, relatedness, and autonomy facilitates intrinsic motivation, which leads to enjoyment (Ryan & Deci, 2000). Ryan, Rigby, and Przybylski (2006) created the Player Experience of Need Satisfaction (PENS) model. PENS began with SDT, but added Presence, feeling like you are there in the game or are one of the characters, and Intuitive Controls, how much the game’s controls make sense and are easily mastered.
Flow and Self-Determination theories are frequently cited sources of game enjoyment, but neither is a comprehensive model of what makes games fun. Instead, they dig deeply into a handful of specific sources of enjoyment. Similarly, Koster (2013) proposed that learning is the main thing that makes games fun. These are inspiring theories, but not comprehensive models of what makes digital games fun.

Positive Psychology is the empirical science of positive traits, experiences, relationships, and institutions (Seligman & Csikszentmihalyi, 2000). None of the existing theories of game enjoyment we have found included a review of the positive psychology research. Park, Peterson, and Seligman (2004) and Peterson & Seligman (2004) created a classification of 24 Character Strengths and Virtues (CSV) as Positive Psychology’s response to Clinical Psychology’s Diagnostic and Statistical Manual of Mental Disorders (DSM). The experience of using each character strength or virtue provides a different fulfilling, positive experience. Each of these positive experiences may be potential sources of computer game enjoyment. Peterson, Park, and Seligman (2005) proposed three sources of happiness: flow, pleasure, and meaning. We discussed flow above. A life of pleasure is about maximizing sensory pleasure and minimizing pain. A life of meaning is about feeling that your life serves a greater purpose beyond yourself, typically by serving other people or humanity, making the world a better place, or feeling that your life will have a lasting positive impact that will continue after you die. Flow, pleasure, and meaning may be potential sources of enjoyment, but they are not a comprehensive model of the sources of computer game enjoyment.

Positive emotions have also been explored in Positive Psychology research. Fredrickson (2009) discussed ten positive emotions, including serenity, interest, hope, pride, and inspiration. Shiota (2014) presented a taxonomy of functionally discrete positive emotions that showed the evolutionary basis and benefits of eight emotions (see also Shiota, Neufeld, Danvers, et al., 2014). The positive emotions in Shiota’s taxonomy included enthusiasm, contentment, nurturant love, amusement, and awe. Condon, Wilson-Mendenhall, & Barrett (2014) suggested there may be atypical positive instances of emotions that are typically considered negative. They called atypically positive instances of fear, anger, and sadness pleasant fear, pleasant anger, and pleasant sadness. For example, the thrill of a rollercoaster may be pleasant fear, and anger felt towards a villain in a game could be pleasant anger. Each positive emotion is a potential source of enjoyment.

The existing models of what makes computer games enjoyable were not comprehensive enough. Other than flow theory’s concept of optimal challenge, we have yet to see research on game enjoyment take full advantage of positive psychology research. While each model, theory, and taxonomy we reviewed seemed incomplete on their own, taken together they were an excellent starting point for our research.

**Method**

**Preparation of Materials**

To develop a more comprehensive model of the sources of game enjoyment, we began by conducting a broad literature review to generate a list of 167 potential sources of enjoyment and their definitions. We drew on all of the sources described in the literature review above, as well as a wide range of psychology, games, play, and human-computer interaction research, and we developed some original items as well. We listed each source of enjoyment with its definition and references in a spreadsheet, which was then used to create cards for the card sort.

We created several selection criteria to use during the literature search. To be included as a potential source of enjoyment, it had to be either an enjoyable experience, or a motivation or need that is enjoyable when fulfilled. We preferred items that were about the interaction between the player and the game rather than only about the player or the game in isolation. We preferred motivators rather than hygiene factors, approaching desirable experiences rather than avoiding negative experiences. The potential sources of enjoyment needed to be specific and clear enough that systems could be designed to create the experience, such as to manipulate them for experimental studies. Finally, they could not be enjoyment itself or another way of measuring enjoyment, because that would be circular logic: enjoyment leads to enjoyment.

We then conducted independent open card sorting sessions to categorize the sources of enjoyment. We printed 167 cards, each with one source of enjoyment and its definition. In separate sessions, three members of our research team worked on their own to sort the cards into groups and label the groups of cards with category names. Synthesizing these results gave us 24 initial categories of enjoyment sources. Each category was given a description based on the definitions of the cards sorted into them.
So, we began with 167 initial cards with sources of enjoyment and their definitions printed on them, and 24 initial categories with descriptions. We printed the categories with a border box drawn around them to easily differentiate the categories from the cards.

**Participants**

Sixty students at a university in the Midwest region of the United States participated in this study, 17 females, 41 males, and 2 gender-neutral or non-binary people, with a mean average of 23.47 years of age. To recruit participants with experience playing digital games, we screened participants before the study and only recruited participants who said they typically played video or computer games at least once per week. In the background questionnaire at the end of the study, 58 of the 60 participants (96.67%) reported that they played video or computer games at least once per week. Participants reported that they had played video or computer games for an average of 16.21 years. Participants were recruited with flyers, social media posts, and verbal announcements, including recruiting students playing games in a gaming room run by a student organization of game players.

**Procedure**

Each participant was briefed, signed an informed consent form, and was asked to sort the cards into the category that they felt it belonged to or fit best with. Before the participant sorted the cards, the researcher read each of the categories and their descriptions aloud. Each participant sorted the cards into the categories on their own in one-on-one sessions with the researcher. Follow up questions were asked about what made participants want to sort some of the cards as they did, and notes were taken about any confusing cards or categories that could be improved. After a short debriefing interview, participants filled out a demographics and gaming habits questionnaire. Participants were given a $20 gift card as an incentive to participate, thanked, and released.

We conducted a formative card sorting study, similar to the method used by Moore and Benbasat (1991), which has been used to create new measures of enjoyment and flow in computer games (Fang, Zhang, and Chan, 2013; Fang, Chan, Brzezinski, and Nair, 2010). Card sorting let us take the cards we created from the literature review and generate a new model grounded in participants’ experience playing games. We iteratively improved the cards and categories, and the final categories formed a new model of the sources of computer game enjoyment.

To gather as much information as possible to improve the categories, the first forty participants were given more options to express themselves during the card sorting. They were asked to put cards in more than one category if a card fit best in more than one category (sticky notes were used to create copies of cards for this purpose upon request). They were asked to create new categories if cards were a potential source of computer game enjoyment but did not fit in any of the existing categories. And they were asked to sort cards into a category called “Not a Potential Source of Computer Game Enjoyment” if they thought the card could not be a source of enjoyment for people playing computer games. The first forty participants were also asked at the end of the card sorting if there were any sources of computer game enjoyment that they felt were missing from the cards and categories in front of them, and they were able to create new cards and categories if they felt anything was missing.

The last twenty participants were not given the option to create new cards, create new categories, sort cards into more than one category, or sort cards into a category called “Not a Potential Source of Computer Game Enjoyment”. The last twenty were not given those options so that we could calculate inter-rater reliability among those participants. The results from the fourth round of ten participants appeared to be more consistent than previous rounds, and we wanted to test that consistency in the fifth and sixth rounds.

**Analysis and Iterative Revisions**

Initially, there were 167 cards and 24 categories. Because this was a formative study with the aim of developing a new, more comprehensive model of the sources of computer game enjoyment, we revised the cards and categories and their definitions and descriptions after every round of 10 participants. In the first round of ten participants, we made changes between participants for more rapid iteration, but after the first ten participants changes were only made between the rounds of ten participants.
After every round of ten participants, the results of the sorting were manually entered into a spreadsheet. R Studio was used to create a frequency table of the number of participants who sorted each card into each category. We color-coded the cells of that frequency table in a spreadsheet, with 1-2 participants colored red to indicate likely noise, 3-5 participants colored orange to indicate a weak signal or a split between categories, and 6-10 participants colored green to indicate a strong signal, because more than half of that round’s 10 participants had sorted that card into that category. Next, we sorted the rows of the table to group together the cards that were being sorted under the same categories, and grouped together the participant-created cards and categories.

Looking through the sorted, color-coded frequency tables made it much easier to analyze the results and make changes to the cards and categories between each round of ten participants. Cards that were not consistently sorted into the same category by participants were either dropped, their names and definitions were revised, or the categories and their descriptions were revised. If a card was split between two categories, we either dropped the card if it was too ambiguous or we edited the card or categories or their definitions or descriptions to make it clear where the card fit. Redundant or duplicate cards and categories were dropped or combined.

Throughout this revision process, notes taken during the sessions of participants’ responses to follow-up questions were useful to identify and revise ambiguous or confusing text in the cards, categories, definitions, or descriptions. The aim was to improve the categories so that they were as comprehensive and clear as possible. To that end, cards and categories and their definitions and descriptions were added, removed, and revised as needed after every round of ten participants. We next considered each of the participant-created cards and categories for inclusion. The same selection criteria used during the literature search (see Preparation of Materials above) were applied to decide if the new cards or categories would be included, plus we avoided redundancy with existing cards or categories. In some cases, existing cards or categories were changed to more clearly include participant-created cards and categories. We kept a typed log of all changes and reasons for them. By the final round of ten participants and at the end of the study, there were 94 cards and 34 categories (43.7% less cards and 41.7% more categories).

The last two rounds participants, the last twenty participants, were not given the option to create new cards and categories, to sort cards into more than one category, or to sort cards into a “Not a Potential Source of Computer Game Enjoyment” category. This made it possible for us to calculate Randolph’s (2005) free-marginal multi-rater kappa values of inter-rater agreement between participants in these last two rounds. This kappa is more appropriate than Fleiss’ kappa because participants were free to assign any number of items to each category. As a multi-rater kappa, Randolph’s kappa can calculate agreement between any number of raters, while Cohen’s kappa can only measure agreement between two raters. The values of this multi-rate kappa measure range from 0.0, the agreement expected due to chance, to 1.0, perfect agreement above the amount expected due to chance. Our a priori chosen target for the multi-rater kappa values was 0.7, as noted in our earlier research-in-progress paper on this project (Schaffer & Fang, 2017).

Results

Sources of Enjoyment in Computer Games

The final 34 categories resulting from the iterative card sorting and revision of the cards and categories are presented in Table 1 below with the description of each category and the cards sorted into each category.
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation &amp; Teamwork</td>
<td>Working together with others toward shared goals.</td>
<td>Love, Niceness; Love; Protecting Loved Ones; Social Integration; Elevation; Mudita (Sanskrit)</td>
</tr>
<tr>
<td>Leading &amp; Directing Others</td>
<td>Guiding the actions of others, such as leading a team or directing a play.</td>
<td>Leading Others; Directing Others</td>
</tr>
<tr>
<td>Competition &amp; Social Superiority</td>
<td>Competing with others to show your superiority. Feeling superior to others or higher than others in the social hierarchy. Working towards goals that conflict with the goals of others.</td>
<td>Competition; Social Status</td>
</tr>
<tr>
<td>Control, Choice, &amp; Autonomy</td>
<td>Feeling able to direct, determine, or influence desired outcomes, including how you reach those outcomes. Feeling that you have freely chosen to do what you are doing, the way you are doing it, when you are doing it, and the criteria that will be used to evaluate your actions.</td>
<td>Control; Autonomy; Method Autonomy; Criteria Autonomy; Scheduling Autonomy (Timing Autonomy)</td>
</tr>
<tr>
<td>Creating, Customizing &amp; Improvisation</td>
<td>Bringing new objects, ideas, or behaviors into existence, modifying existing ones, or expressing yourself in a creative way. Could include creating and customizing characters, items, powers, or environments. Creating and creative expression, whether carefully crafted or improvised in real time.</td>
<td>Making, Building, or Crafting; Creative Expression; Customization; Improvisation</td>
</tr>
<tr>
<td>Presence, Role-Playing, &amp; Identification with Player Character</td>
<td>Feeling like you are actually there in the game. Feeling transported into the virtual world of the game. Imagining you are or pretending to be your character in the game. Feeling similar to or wanting to become more like your character in the game. Feeling like you are your character in the game.</td>
<td>Presence; Role-Playing; Embodied Presence with Characters or Player Avatar; Perceived Similarity with Characters or Player Avatar; Wishful Identification with Characters or Player Avatar</td>
</tr>
<tr>
<td>Effortless Focusing of Full Attention</td>
<td>Doing an activity that takes up all of your attention, so that none is left over to think about anything other than what you are doing. Easily focusing your full attention on your actions.</td>
<td>Effortless Focusing of Full Attention; Focused Immersion</td>
</tr>
<tr>
<td>Interest in Theme or Topic</td>
<td>Having a long-term positive attitude towards the theme or topic of the game that attracts and focuses your attention. For example, enjoying a game about baseball because you are interested in baseball. Other themes or topics could include vampires, World War II, dancing, playing guitar – whatever the game is about.</td>
<td>Personal Interests or Individual Interests; Topic Interest</td>
</tr>
<tr>
<td>Story</td>
<td>Experiencing a story and the dramatic unfolding of events. The story includes narrative elements such as the plot and setting and narrative techniques such as foreshadowing and backstory.</td>
<td>Narrative; Back-story or Background Story; Foreshadowing</td>
</tr>
<tr>
<td>Learning, Improving</td>
<td>Fulfilling a desire to improve your knowledge, skills, or abilities. Exploring or investigating a world, an</td>
<td>Learning; Exploration; Discovery</td>
</tr>
<tr>
<td>Skills, Exploring, &amp; Discovering</td>
<td>opportunity for action, or a new situation. Finding or knowing things that were not known before.</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Optimal Variety &amp; Novelty</td>
<td>An optimal level of variation and newness among your actions or in your ongoing experience. An amount of variety and novelty that is neither so low that it is boring nor so high that it is overwhelming.</td>
<td>Optimal Novelty; Optimal Variety</td>
</tr>
<tr>
<td>Self-Worth &amp; Integrity</td>
<td>Maintaining a positive evaluation of yourself. Having experiences that improve how you see yourself. Presenting yourself in a genuine and authentic way. Feeling that your actions are consistent with how you see yourself. Doing what you say and saying what you do.</td>
<td>Self-Worth or Self-Esteem; Integrity</td>
</tr>
<tr>
<td>Achievement &amp; Completion</td>
<td>Triumph you feel when you accomplish desired outcomes through great effort. Finishing or completing a major task, and the feeling of closure and accomplishment that finishing the task gives you.</td>
<td>Completion; Achievement; Fiero (Italian)</td>
</tr>
<tr>
<td>Making Progress</td>
<td>Making progress or moving forward towards desired outcomes.</td>
<td>Making Progress</td>
</tr>
<tr>
<td>Your Perception of Your Own Ability, Competence, &amp; Effectiveness</td>
<td>Feeling that you have the skills and abilities needed to reach desired outcomes. Believing your actions will be effective. Feeling skilled at what you are doing.</td>
<td>Your Perception of Your Own Ability; Self-Efficacy (Effectiveness); Competence</td>
</tr>
<tr>
<td>Danger, Uncertain Outcomes, Suspense, Surprise, &amp; Bravery</td>
<td>The thrilling fear of danger and risk, whether the threat of harm is real or a fictional simulation. Suspenseful anticipation of uncertain, chance, or surprising outcomes and the surprise of finding out the outcome. Unexpected or sudden events. Feeling afraid of the dangers and risks involved with taking action and taking action anyway.</td>
<td>Bravery [Valor]; Thrill of Danger; Suspense; Pleasant Fear; Anticipation of Uncertain Outcomes; Surprise</td>
</tr>
<tr>
<td>Vitality &amp; Feeling Energetic</td>
<td>Feeling vigorous, high-spirited, and alert. Doing an activity or having an experience that makes you feel energetic and alive.</td>
<td>Vitality and Feeling Energetic; Energizing Experiences; Vitality [Zest, Enthusiasm, Vigor, Energy]</td>
</tr>
<tr>
<td>Optimal Pacing</td>
<td>Doing an activity at a speed or rate that is neither too fast to be overwhelming, nor too slow to be boring. An activity speed that stretches your ability to keep up.</td>
<td>Optimal Pacing</td>
</tr>
<tr>
<td>Optimal Challenge</td>
<td>Doing an activity that is difficult enough to stretch your skills to their limits without being so difficult that it overwhelms you.</td>
<td>Optimal Challenge</td>
</tr>
<tr>
<td>Clear Goals &amp; Step-By-Step Guidance</td>
<td>The experience of knowing what to do next throughout an activity. Receiving information about both overall goals and the goals of each step of the activity. Feeling supported or guided so you always know what to do.</td>
<td>Step-By-Step Guidance; Clear Overall Goals; Clear Proximal Goals</td>
</tr>
<tr>
<td>Goal Attainability</td>
<td>Believing that desired outcomes can possibly happen. Receiving information that suggests it is possible to reach your current goal.</td>
<td>Goal Attainability</td>
</tr>
<tr>
<td>Continuous Feedback</td>
<td>Receiving continuous information about the results of your actions. This could include information about how close you are to reaching your desired outcomes, how well you are doing the activity, or how you could get better at doing the activity.</td>
<td>Constructive Feedback; Continuous Feedback; Performance Feedback</td>
</tr>
<tr>
<td>Collecting &amp; Accumulating</td>
<td>Gathering up and owning objects within the game.</td>
<td>Collecting</td>
</tr>
</tbody>
</table>
Table 1. Sources of Enjoyment in Computer Games: Final 34 Categories, Category Descriptions, and Cards Sorted into Each Category.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategizing, Problem Solving, &amp; Critical Thinking</td>
<td>Thinking through the best way to do an activity. Finding solutions to problems or puzzles by thinking them through. Deciding on the best course of action while taking into account different perspectives and new evidence with an open mind.</td>
<td>Open-Minded Critical Thinking; Strategizing; Problem Solving</td>
</tr>
<tr>
<td>Body Movement &amp; Exercise</td>
<td>The experience of moving your body. Moving your body enough to increase your heart rate.</td>
<td>Kinesthetic Movement; Cardiovascular Exercise</td>
</tr>
<tr>
<td>Significance, Meaning, Purpose, &amp; Legacy</td>
<td>Knowing why your actions are important, significant, or meaningful. Feeling that your actions are giving your life meaning or helping fulfill your life’s purpose. The sense that your actions will have a lasting, meaningful impact.</td>
<td>Meaning or Purpose; Purpose of Action; Legacy; Task Significance</td>
</tr>
<tr>
<td>Subversion &amp; Lack of Real-World Consequences</td>
<td>Breaking the social rules, norms, and expectations of the real world in a game world knowing that your actions will not have any negative real-world consequences. Feeling secure that your actions in the game world will not have negative consequences for yourself or others in the real world.</td>
<td>Lack of Real-World Consequences; Subversion</td>
</tr>
<tr>
<td>Relaxation &amp; Serenity</td>
<td>A calm state free from physical or mental tension or concern. Conserving or regenerating your energy. Resting to recover from feeling stressed or overwhelmed. A peaceful, comfortable feeling of satisfaction with the way things are now. Being free of worries and unpleasant thoughts.</td>
<td>Relaxation; Serenity or Contentment; Silence of the Mind; Letting Go of Negative Thoughts</td>
</tr>
<tr>
<td>Savoring</td>
<td>Paying attention to and appreciating positive experiences. Reflecting on past, present, or future enjoyable experiences to increase their intensity or duration.</td>
<td>Savoring</td>
</tr>
<tr>
<td>Humor &amp; Laughter</td>
<td>Laughter and playful joy resulting from humor, or unexpected incongruity in a safe social context.</td>
<td>Humor or Comedy; Laughter</td>
</tr>
<tr>
<td>Sensory Pleasure, Sexual Desire, &amp; Appreciation of Beauty</td>
<td>Pleasure from the direct experience of any of your five senses: sight, sound, smell, taste, and touch. Appreciating the beauty of nature, art, and music. Sexual excitement, such as by attractive characters in a game.</td>
<td>Sensory Pleasure; Sexual Desire &amp; Eroticism; Appreciation of Beauty</td>
</tr>
<tr>
<td>Schadenfreude (German), Cruelty, &amp; Pleasant Anger</td>
<td>Enjoying the suffering of others. Causing others mental or physical pain. Feeling anger that is justified or socially acceptable, such as feeling anger towards a villain in a game.</td>
<td>Pleasant Anger; Schadenfreude (German), Sadism, or Cruelty</td>
</tr>
<tr>
<td>Intuitive Controls</td>
<td>Playing a game with controls that are easy to learn, easy to use, make sense, and are easily mastered.</td>
<td>Intuitive Controls</td>
</tr>
</tbody>
</table>

**Inter-Rater Reliability**

We used Randolph’s (2005) free-marginal multi-rater kappa as a measure of inter-rater reliability or inter-rater agreement between the ten participants in each of the last two rounds of card sorting. As shown in Table 2 below, the multi-rater kappa values indicated very consistent agreement among the ten participants in each of the last two rounds. Both values, 0.938 and 0.937, were higher than our a priori target of 0.7. We far exceeded our target of 0.7, which is a conventional rule of thumb for adequate inter-rater reliability.

<table>
<thead>
<tr>
<th></th>
<th>Round 5 (P41-P50)</th>
<th>Round 6 (P51-P60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free-Marginal Multi-Rater Kappa</td>
<td>0.938115</td>
<td>0.936672</td>
</tr>
</tbody>
</table>

Twenty-fourth Americas Conference on Information Systems, New Orleans, 2018
Table 2. Randolph’s Free-Marginal Multi-Rater Kappa, a measure of inter-rater reliability.
Could only be calculated for Rounds 5-6.

We were only able to calculate the inter-rater reliability for these last twenty participants because we did not allow them to create new cards or categories, sort cards into more than one category, or sort cards into a “Not a Potential Source of Computer Game Enjoyment” category. However, we did not need a larger sample size for statistical significance because inter-rater reliability is a descriptive statistic not an inferential statistic. It describes how much agreement above the amount expected by chance was found between the ten participants in each of those rounds.

Conclusion

Our iterative card sorting and revision of the cards and categories resulted in 34 categories (see Table 1 above). Participants were able to distinguish between these categories to sort the same cards into the same categories with a high degree of consistency. This suggests that what makes digital games fun may be more complex and varied than many existing oversimplified models with a handful of components. Because these 34 categories of enjoyment sources are more varied and specific than oversimplified models, this makes them more useful as a framework to design for enjoyment.

There were several limitations of this study. Because it was a formative study, it was focused on generating a new model than on testing its effectiveness. Further research will be required to test how well this model works as a tool to design for enjoyment or as a set of factors to predict enjoyment. Also, the initial categories for the card sort were based on open sorting of the initial cards by only three members of our research team.

Design guidelines must be specific enough to be useful, not abstract or vague theories. The 34 categories of enjoyment sources presented in Table 1 above can be used as a practical framework or set of design guidelines to design for enjoyment. Each source of enjoyment is a desirable experience that leads to enjoyment, or a motivation or need that is enjoyable when it is fulfilled.

Rather than trying to maximize every source of enjoyment throughout every design, we suggest that each category be thought of as a different ingredient in your recipe, tool in your toolbox, or color on your paint palette. You can design user experiences by combining different sources of enjoyment depending on your design goals. Perhaps one moment your users are relaxing and making friends. Then there is a surprise or some fictional danger. Next they are cooperating towards a shared goal and making progress together. Then they are getting feedback and learning how they can do the task better next time. And so on. In this way, the sources of enjoyment provide a framework of enjoyable experiences. Practitioners can design systems that create these enjoyable experiences because the sources of enjoyment are specific enough to guide design. Also, the series of enjoyable experiences described above could be for a mobile business application, for a serious game to help people quit smoking, or it could just as well be for an online game.

These 34 sources of enjoyment can also be used as a framework to guide future research. Each category can be used as a different dimension to evaluate how well different designs provide that source of enjoyment. Future research could test how much each category of enjoyment sources contributes to computer game enjoyment. Research could also focus on what, if any, individual differences there are across players in which sources of enjoyment are most effective at increasing their enjoyment.

Because it is grounded in the experiences and mental models of actual game players, we believe the categories presented in Table 1 above are more content valid than previous models based on theory or philosophical guess-work. We hope practitioners and researchers will use this new, more comprehensive model of the sources of computer game enjoyment to help make games and other designs more enjoyable.

REFERENCES

Card Sorting Reveals Sources of Computer Game Enjoyment


