Sources of Computer Game Enjoyment: Card Sorting to Develop a New Model

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Abstract. Understanding what makes computer games enjoyable is important not only for game design, but for the design of any interactive experience where it is important that users will want to use the design. We define enjoyment broadly as the positive evaluation of your experience. Existing models of game enjoyment are either not comprehensive enough, were not generated by empirical research, or both. We aim to fill this gap in the literature with a card sorting study exploring participants' experience and mental models around what leads to computer game enjoyment. A broad literature review identified 167 sources of enjoyment. Our research group conducted an open card sort with these items to identify 24 initial categories of enjoyment sources. Sixty participants will sort the 167 sources of enjoyment into the 24 categories, plus a "not a source of enjoyment" category. After every ten participants, we will calculate inter-rater agreement with Randolph's free-marginal multi-rater kappa. We hope this research will lead to a new, more comprehensive and content valid model of the sources of computer game enjoyment.

Keywords: Computer games · Enjoyment · Games user experience · Positive psychology · Positive emotions · Affect · Valence · Card sorting · Affinity diagram · Human-Computer interaction

1 Introduction

Game Designers and Human-Computer Interaction practitioners need to know what makes games enjoyable if they are going to engineer enjoyable designs. We define computer game enjoyment as the extent to which players positively evaluate their experience playing games on computerized devices (PCs, consoles, smart phones, etc.). Computer games are played for the enjoyment they provide, but there is not a consensus about what makes games enjoyable, or the sources of computer game enjoyment.

Understanding the sources of computer game enjoyment is important not only to improve the design of games to make them more enjoyable, but to improve any design where we want users to want to use the system, or we want users to keep coming back. In other words, whenever user engagement and retention are design goals, designers will benefit from designing for user enjoyment.

Designing for enjoyment is important when creating games with a purpose beyond enjoyment, serious games or educational games. Enjoyment is important when we are trying to make business systems or other non-game systems more game-like, a process known as gamification or gameful design. So, understanding what makes computer games enjoyable is an important research question with broad applications for the design of systems and interactive experiences.

Existing models of what makes computer games enjoyable are not comprehensive enough to capture the full breadth of possible sources of enjoyment, and most were not generated by empirical research. This research aims to fill that gap. Our aim is to generate a new, more comprehensive model of computer game enjoyment. Using existing models as inspiration for possible sources of enjoyment, we plan to explore people's mental models of what makes games enjoyable using a card sorting approach.

2 Previous Research

2.1 Specific Theories: Flow and Self-Determination

Several theories have suggested specific sources of game enjoyment. Flow theory suggests that tackling a series of optimal challenges that stretch the skills of the player without overwhelming them is one source of enjoyment (Nakamura and Csikszentmihalyi 2002). There are three flow conditions that lead to flow, which in turn leads to enjoyment: optimal challenges, clear goals, and immediate feedback.

Self-Determination Theory proposes that fulfilling psychological needs for competence, relatedness, and autonomy (Ryan and Deci 2000). Competence is the perception that you are good at what you are doing, relatedness is a sense of social connectedness and belonging, and autonomy is the sense that you have chosen to do what you are doing. Self-Determination Theory says that an environment that meets these needs facilitates intrinsic motivation, which leads to enjoyment.

Ryan et al. (2006) applied Self-Determination Theory (SDT) specifically to games to develop the Player Experience of Need Satisfaction (PENS) model. The PENS model expanded the SDT model to include Presence, feeling like you are there in the game or like you are one of the characters, and Intuitive Controls, which is how much the game controls make sense, are easily mastered, and do not distract from your sense of being in the game.

Flow Theory and Self-Determination Theory are frequently cited sources of game enjoyment, but they do not provide a comprehensive picture of what makes games enjoyable. Instead, they dig deeply into specific sources of enjoyment. Similarly, Koster (2013) proposed that the main thing that makes games fun is learning. These are all inspiring theories, but do not give us a comprehensive picture of what makes computer games enjoyable.

2.2 Theories of Games and Play

Sutton-Smith (2009, p. 215, p. 219–220) presented several sources of enjoyment in his rhetorical analysis of play: progress, fate (which I would call looking forward to

uncertain outcomes), power over others, identity, imagination, peak experiences (i.e. flow), and frivolity. Caillois (1961) proposed a classification of games into competition, chance, simulation, and vertigo, or a combination of these elements.

These theories of games and play are based on rhetorical analysis and philosophical contemplation respectively. So, they were not generated by or supported by empirical evidence.

2.3   Player Types and Motivations to Play Games

Bartle (1996) created a model of four motivations to play online games based on the idea 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 with three components: achievement, social, and immersion. The construct validity of this model was assessed with a large-sample survey and factor analysis. However, because the items used to generate Yee's survey were based on Bartle's model, it may not be comprehensive enough. Bartle's model was not generated by any empirical research, and so his model and the models built off of it appear to be limited, incomplete, and lacking in content validity.

Brown and Vaughan (2010) proposed eight play personalities: The Joker, The Kinesthete, The Explorer, The Competitor, The Director, The Collector, The Artist/Creator, and The Storyteller. These play personalities were then expanded and popularized by Fullerton (2014) as player types, and included The Achiever and The Performer. As Brown and Vaughan pointed out, there was no scientific basis for these play personalities. However, they do suggest possible sources of computer game enjoyment.

2.4   Taxonomies of Game Enjoyment

Quick et al. (2012) created a six-factor taxonomy of game enjoyment supported by factor analysis of survey data: Fantasy, Exploration, Fidelity, Companionship, Challenge, and Competition. Their survey asked participants to rate how important each of 18 game design features were to their enjoyment of video games. However, they did not discuss how they came up with those 18 game design features. So, it appears the content of the taxonomy developed by Quick, et al. was not generated by any research, and may be lacking in comprehensiveness and content validity as a result.

Lazzaro (2004, 2009) suggested that there are four pathways to emotion that drive play 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) generated these four keys with interviews and observations of 60 people playing their favorite games, but the four keys are only part of the results of that research. Lazzaro sorted qualitative data into affinity groups that resulted in twelve models of what facilitated enjoyment. However, Lazzaro only

presented the four keys, which she called the most important pathways to emotion in games, rather than also presenting the groupings or the twelve models that led to the four keys. This suggests that the Four Keys to Fun may be only part of the bigger picture of what makes games enjoyable.

Lazzaro (2004) also identified and defined several positive emotions people experience while playing their favorite games, 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 Beauty, Problem Solving, Thrill of Danger, Physical Activity, and Creation. This list was not generated or supported by empirical research.

Korhonen et al.(2009) drew on previous models, especially building on Costello and Edmonds's (2007) pleasure framework, to create 20 categories of playful experiences they called the playful experiences or PLEX framework, 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, and used these cards to inspire the design of playful experiences for three design projects. Korhonen et al. (2009) only assessed the PLEX framework by interviewing thirteen game players and finding that they mentioned each of the PLEX categories during the interviews.

These theoretical frameworks and taxonomies can inspire questions to ask participants, but are not comprehensive models of what makes computer games enjoyable.

2.5   Positive Psychology

Positive Psychology is the empirical science of positive traits, experiences, relationships, and institutions (Seligman and Csikszentmihalyi 2000). None of the existing theories of what makes games enjoyable we have found have included a review of the positive psychology research literature.

Park et al. (2004) and Peterson and 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). While the CSV focuses on the traits or qualities of people, one of the criteria used to develop the CSV was that each strength or virtue needs to be fulfilling. So, 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 et al. (2005) suggested three sources of happiness: flow, pleasure, and meaning. We have discussed flow already (see Sect. 2 above). A life of pleasure or hedonism is about maximizing sensory pleasure and minimizing pain. A life of meaning or eudemonia 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. Peterson, Park, and Seligman found that these three sources of happiness were empirically distinguishable and that an orientation towards flow, pleasure, and meaning

each individually predicted life satisfaction and combined as a three-way interaction to predict life satisfaction. These three sources of happiness are most likely sources of positive experiences or enjoyment as well, but they are far from a comprehensive model of enjoyment sources.

Positive psychology research has also explored positive emotions. Fredrickson (2009) discussed ten positive emotions such as serenity, interest, hope, pride, and inspiration. Shiota (2014) explored how different positive emotions serve different adaptive functions, presenting a taxonomy of functionally discrete positive emotions that shows the evolutionary basis and benefit of eight emotions (see also Shiota et al. 2014). Shiota's taxonomy includes positive emotions such as enthusiasm, contentment, nurturant love, amusement, and awe. This taxonomy also lists the adaptive function of each emotion, such as contentment encouraging people to rest in safety to digest and encode routes to success, amusement leading people to develop flexible, complex cognitive-behavioral repertoires through play, and awe serving the adaptive function of accommodating new information from one's environment.

Condon et al. (2014) suggested that 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. So, the thrill of a rollercoaster ride may be an example of pleasant fear, and the anger we feel towards villains in a story could be an example of pleasant anger.

The existing models of what makes games enjoyable are not comprehensive enough. Other than the concept of optimal challenge from flow theory, we have yet to see research on game enjoyment take full advantage of positive psychology research and theories.

3 Method

3.1 Preparation of Materials

To develop a more comprehensive model of the sources of game enjoyment, we conducted a broad literature review and generated 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.

Our research team then conducted three open card sorting sessions to categorize these sources of enjoyment. The 167 sources of enjoyment and their definitions were each printed on cards. Then, in separate sessions, we individually sorted the items into groups and labeled the groups. Synthesizing these results gave us 24 initial categories of enjoyment sources (see Table 1).

3.2 Procedure

We plan to conduct six rounds of card sorting to iteratively refine and improve these categories, similar to the method used by Moore and Benbasat (1991), to ensure the

Table 1. Initial categories of enjoyment sources with descriptions

Category of enjoyment sources	Description (Shortened)	Possibly related potential sources of enjoyment
Control & choice	Feeling able to direct, determine, or influence desired outcomes, including how those outcomes are achieved	Autonomy, customization, collecting
Pride for achievement	Triumph experienced when you feel responsible for reaching desirable outcomes through great effort	Pride, Fiero (Italian), completion
Perceived ability	Feeling confident that you have the skills and abilities needed to achieve desired outcomes	Self-efficacy, competence, performance feedback
Progress	Movement or advancement towards desired outcomes	Progress, immediate progress feedback
Optimal challenge	Doing an activity that is difficult enough to stretch your skills to their limits without being so difficult that it overwhelms you	Optimal challenge, optimal pacing
Step-by-step guidance & clear goals	Feeling that your actions are being supported or facilitated so that you know what to do next throughout an activity	Guidance, clear proximal goals
Open-minded strategizing	Thinking through the best way to do an activity with an open mind	Strategy, open-mindedness
Creating & improvising	Creating and creative expression, whether spontaneously improvised or carefully crafted	Improvised play; simulation, role-playing, performing
Body movement & exercise	The experience of moving your body	Kinesthetic movement, cardiovascular exercise
Life goals, meaning, or purpose	The sense that your actions are helping fulfill your life's purpose, giving your life meaning, or contributing to how you want to be remembered after you die	Meaning or purpose, task significance, legacy
Learning & skill improvement	Fulfilling a desire to improve your knowledge, skills, and abilities	Kaizen (Japanese), practice, constructive feedback or opportunities for learning, awe or wonder
Suspense & surprise of uncertain outcomes	The suspenseful anticipation of surprise and the surprise itself	Anticipation of uncertain outcomes, hope, surprise
Variety & novelty	The degree of variation and newness among the actions you are taking or in your ongoing experience	Novelty, skill variety, variety of experiences

Table 1. (*continued*)

Category of enjoyment sources	Description (Shortened)	Possibly related potential sources of enjoyment
Social bonding & belonging	Forming and maintaining strong, stable interpersonal relationships and friendships with others	Belonging or relatedness, collaboration or cooperation, helping others, compassion
Social superiority & controlling others	Feeling superior to others or higher in the social hierarchy than others. Directing the actions of others to achieve your desired outcomes	Competition, directing others, power over others, schadenfreude (german), leadership
Identity & maintaining a positive self-image	Feeling that your actions are consistent with your identity.	Distinctiveness of identity, continuity of identity, self-esteem
Perceived danger	A perceived threat of harm that makes you feel tense and makes you want to either run away or fight	Pleasant fear, pleasant anger, thrill of danger
Excitement & vitality	Vigorous, high-spirited, alert attention focused on your actions or your ongoing experience	Vitality, optimal level of physiological arousal
Safety & non-seriousness	Fulfilling a desire to be free from harm. Reducing or avoiding harm	Protecting others, familiarity, non-seriousness or lack of real-world consequences
Relaxation & serenity	A calm state free from physical or mental tension or concern. Conserving or regenerating your energy	Relaxation, serenity or contentment, escape from real-life problems, relief, catharsis
Humor, laughter, & amusement	Laughter and playful joy resulting from humor, or unexpected incongruity in a safe social context	Laughter, humor, amusement or non-serious social incongruity
Elevation & inspiration	Appreciating and being inspired by unexpected acts of kindness or compassion	Inspiration, elevation, appreciation of moral beauty, appreciation of excellence
Savoring & gratitude	Paying attention to and appreciating the joys, pleasures, and other positive experiences in your life	Savoring, gratitude, reminiscing or nostalgia
Sensory pleasure	Positively experienced sensory perceptions, including sight, sound, smell, taste, and touch	Sensory pleasure, altered states of consciousness, sexual desire or eroticism, vertigo, altered perception of time, appreciation of beauty
Not a source of enjoyment	These cards are not potential sources of computer game enjoyment	

content validity of our new model. Each of the six rounds will have ten participants who will each complete the study one-on-one with the researcher, giving us a total of sixty participants.

Participants will individually sort 167 cards, each with a potential source of enjoyment and its definition printed on it, into the 24 initial categories, plus a "Not a Source of Enjoyment" category (see Table 1 above). Each category and description of that category will be printed on cards as well. We will ask participants to create new categories if any of the sources of enjoyment do not fit in the categories presented. Participants will also be asked if they feel any sources of computer game enjoyment are missing, and in which category they would place those additional sources.

Next, participants will fill out a questionnaire to collect demographic information and computer gaming habits. Demographic questions include native language, age, and gender. Gaming habits questions include the number of years they have been playing video or computer games, frequency of playing games, and the genres of games they typically play.

3.3   Planned Analysis

After each round of ten participants, we will calculate the Randolph's (2005) free-marginal multi-rater kappa values of inter-rater agreement between participants. This free-marginal kappa is appropriate because participants are free to assign any number of items to each category. If the multi-rater kappa values are below our target of 0.7, we will revise the categories, their descriptions, and any confusing sources of enjoyment. We will continue until either our target multi-rater kappa value is met or we have run six rounds of card sorting.

This iterative card sorting method is intended to develop a more robust and comprehensive model of the sources of game enjoyment, grounded in the mental models and experience of our participants, with more content validity than existing models. We hope this new model will lead to design guidelines for Human-Computer Interaction practitioners, games user researchers, and game designers that will help make their games and other designs more enjoyable.

3.4   Limitations

The model we are hoping to develop is a general model of computer game enjoyment. We plan for this model to be a beginning and not an end, a springboard for further research. We plan to use the final categories of enjoyment sources from this study as factors to develop a questionnaire measure. The relative importance of these factors to players' enjoyment of computer games is likely to vary across game genres, across individual games, across user groups, and over time. These differences are definitely worthy of future research. However, we view this basic research to develop a general model of the sources of computer game enjoyment as a critical first step that must be taken before digging deeper into how to optimize enjoyment for different games and different groups of users.

The categories of enjoyment sources that come out of this research are not intended to be a formula for making cookie-cutter computer games or paint-by-numbers gamification, but a classification framework to help designers think in a more clear and intentional way about how to make designs more enjoyable to use. Rather than a recipe dictating to designers how to design, the categories are meant to be a way to think about and work with the different flavors of enjoyment. Suspense and surprise, humor and danger, excitement and relaxation, optimal challenge and pride for achievement, and so on – these flavors of positive experience give designers a framework or a toolkit to design for enjoyment. We hope the categories of enjoyment sources that come out of this study will also lead to further research to validate this new model and to investigate the effectiveness of each category in more detail.

4   Current Progress and Next Steps

We have IRB approval and we are in the process of recruiting participants and conducting the study. We plan to present the results from this study at the conference.

We hope this research will lead to a new, more comprehensive model of what makes games enjoyable. We would like to see this new model applied as broadly as possible, to make designs people will want to use, to engineer enjoyable experiences, and to make life a little bit more fun for everyone.

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