A Data-Driven Taxonomy of Undergraduate Student Videogame Enjoyment

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Abstract

Understanding the design elements that lead to player enjoyment is critical to the creation of effective game experiences. An exploratory factor analytic approach was taken to discover the underlying characteristics of videogames that influence player enjoyment. Using questionnaire data from 219 undergraduate students, a taxonomy of six design features (fantasy, exploration, companionship, competition, realism, and challenge) that influence player enjoyment of video games was derived. In this paper, ten recent and well-known game design taxonomies are compared to the derived taxonomy. The abundance of similarities between the taxonomies provides evidence of universal game design features. This lends support to the belief that the influential aspects of videogame design can be scientifically identified and manipulated to beneficent ends.

Introduction

Understanding the design elements that lead to player enjoyment is critical to the creation of effective game experiences. The fields of education, training, health, and serious games can especially benefit from identifying the manipulable design characteristics that affect player perception of videogames.

An exploratory factor analytic approach was taken to discover the underlying characteristics of video games that influence player enjoyment. This paper will focus on describing the resulting taxonomy and comparing it to past game design taxonomies. A detailed discussion of the statistical analyses employed in this study will be provided in a future manuscript, which is currently being developed.

Several past taxonomies have categorized video game features and players. Some were born primarily out of expert practice and theory (Bartle, 1996; Heeter, 2007; Hunicke, LeBlanc, & Zubeck, 2004; Schell, 2008; Winn, 2008), whereas others were generated through empirical research (Fu, Su, & Yu, 2009; Hong et al., 2009; King, Delfabbro, & Griffiths, 2010; Ryan, Rigby, & Przybylski, 2006; Wilson et al., 2009; Yee, 2006). Some taxonomies focus on enjoyment (Fu et al., 2009; Hunicke, LeBlanc, & Zubeck, 2004; Schell, 2008; Winn, 2008), whereas others are more concerned with player motivation (Ryan et al., 2006; Yee, 2006), learning (Hong et al., 2009; Heeter, 2007; Wilson et al., 2009), or generally identifying game characteristics and players (Bartle, 1996; King et al., 2010). In this paper, ten recent and well-known game design taxonomies are compared to the data-driven taxonomy of undergraduate student videogame enjoyment found in this study. This comparison will demonstrate the universality of certain design elements and lend support to the belief that the influential features of videogame design can be scientifically identified and manipulated to beneficent ends.

Taxonomy of Undergraduate Student Videogame Enjoyment

To gauge student perceptions of manipulable game design features, an attitudinal questionnaire was employed. This questionnaire asked participants to rate how important 37 features are to their enjoyment of video games on a scale from one (*Not at all important*) to five (*A must-have feature*). The included features were largely derived from a previous study on the structural characteristics of videogames (Wood, Griffiths, Chappell, & Davies, 2004). Three sample questionnaire items are provided.

- The game is set in a fantasy world.
- The game allows me to search for hidden things.
- The game features 3D graphics.

The questionnaire was administered to 219 undergraduate students from a large public university in the southwestern United States. The students held a wide variety of majors and earned course credit for participation. Their median age was 21, while 67% were female and 33% were male. An exploratory factor yielded six categories that accounted for 57% of the total variance in videogame enjoyment. Ordered from most to least variance accounted for, each factor underlying undergraduate videogame enjoyment is described.

1. Fantasy: the enjoyment of fantasy-world settings and roleplaying as different species, races, and genders (13%)
2. Exploration: the enjoyment of searching for hidden things, collecting things, and exploring unfamiliar places (10%)
3. Companionship: the enjoyment of multiplayer games and playing with friends (9%)
4. Competition: the enjoyment of playing with others online, meeting new people, and displaying one's skills in public (9%)
5. Realism: the enjoyment of realistic 3D graphics and real-world settings (8%)
6. Challenge: the enjoyment of mastering difficult games, overcoming obstacles, and achieving high scores (8%)

This exploratory, data-driven taxonomy sets a foundation for investigating the critical game design elements that influence player and learner enjoyment. This taxonomy can be further validated through its robust similarities to past game design taxonomies.

Comparison to Past Game Design Taxonomies

Ten recent and well-known game design taxonomies were selected from the literature for comparison with the taxonomy of undergraduate student video game enjoyment derived from this study. The individual components of each taxonomy were examined for similarities and determined to have either no substantial relationship, a weak or partial relationship, or a strong relationship with one or more categories in the proposed taxonomy. The comparison of each past taxonomy with the taxonomy of undergraduate student videogame enjoyment is described here and visualized in Figure 1.

One of the earliest and most well-known video game taxonomies is Bartle's (1996) classification of players found in Multi-User Dungeons (MUDs). MUDs were early, text-based

versions of today's expansive massively multiplayer online role-playing games (MMORPG) and virtual worlds, such as *World of Warcraft* and *Second Life*. In playing and designing MUDs, Bartle encountered four common player types, which he named Explorers, Socializers, Killers, and Achievers (Bartle, 1996). All four player types relate strongly to components of the videogame enjoyment taxonomy. Explorers, Socializers, Killers, and Achievers respectively correspond to the Exploration, Companionship, Competition, and Challenge dimensions.

Building upon Bartle's (1996) work and a review of learning style and motivation theory, Heeter (2008) expanded the number of MMO player types to 13. These players' motivations and behaviors fall into four primary categories: Intrinsic, Extrinsic, Antisocial, and Prosocial. Player types centered around Heeter's Intrinsic category relate strongly to the Fantasy and Exploration dimensions, and partially to Challenge. The gamers in the Extrinsic category correspond strongly to Competition and Challenge, and partially to Exploration. Prosocial players relate strongly to Companionship, while Antisocial players relate strongly to Competition.

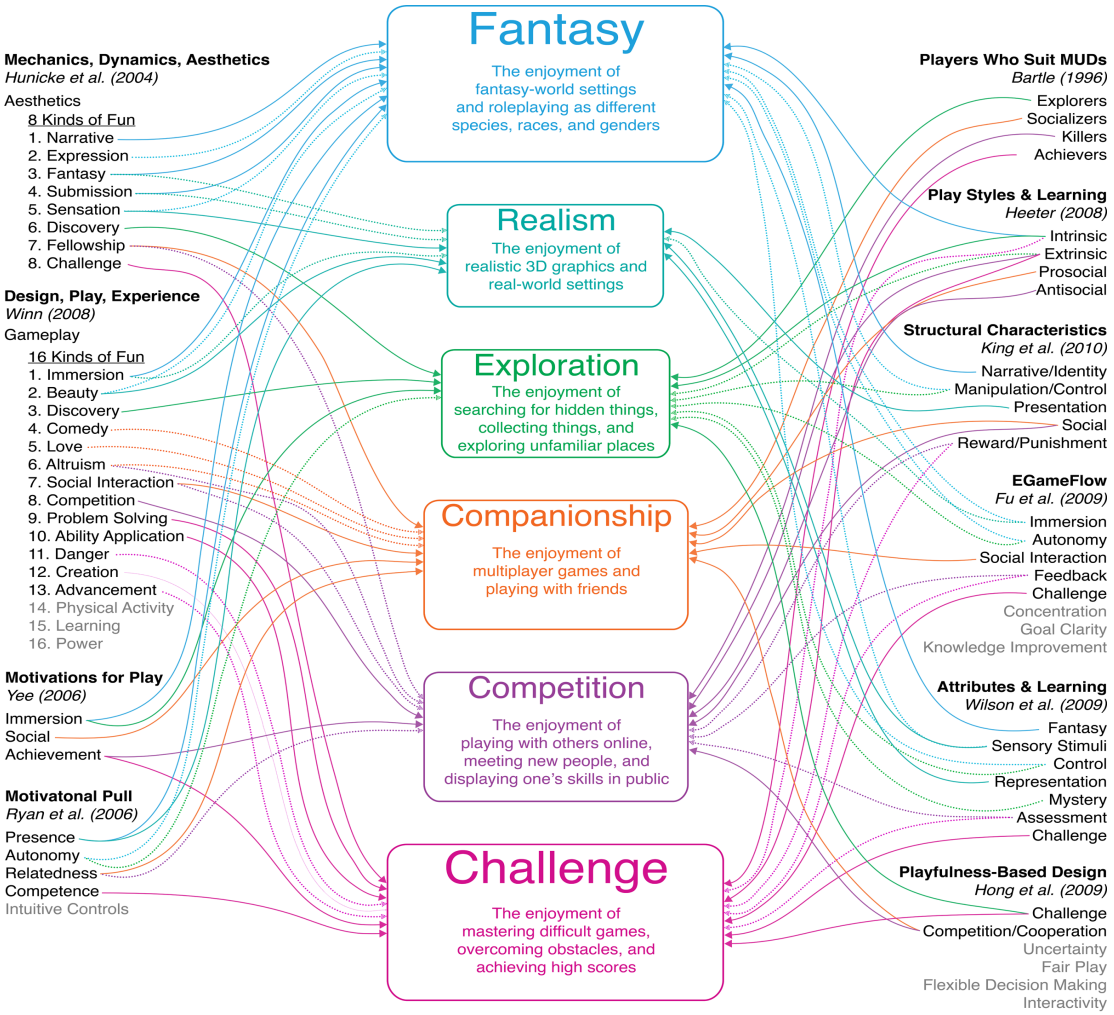

***Figure 1*. Comparison of past game design taxonomies to the taxonomy of undergraduate student videogame enjoyment. Solid lines indicate complete or strong relationships, while dotted lines indicate partial or weak relationships. No line indicates that no substantial relationship exists. Larger category sizes indicate a greater total number of relationships.**

Yee (2006) was also concerned with MMORPG players and motivation. He proposed a taxonomy of three main components (Immersion, Social, and Achievement), all of which relate strongly to aspects of the videogame enjoyment taxonomy found in this study. Immersion corresponds to Fantasy and Exploration, Social matches Companionship, and Achievement reflects Competition and Challenge. Additionally, Ryan et al. (2006) studied the motivational pull of a variety games along the five dimensions of Presence, Autonomy, Relatedness, Competence, and Intuitive Controls. Presence pairs with Fantasy and Realism, while Competence matches Challenge. Relatedness showed a strong connection to Companionship and a weak one to Relatedness. Meanwhile, Autonomy was weakly linked to Fantasy and Exploration. Only Intuitive Controls fails to substantially relate to a component of the taxonomy proposed in this study.

Three taxonomies focused specifically on learning games. EGameFlow (Fu et al., 2009) proposed a scale with eight factors, within which Social Interaction strongly relates to Companionship and EGameFlow's Challenge corresponds to Challenge in the in the videogame enjoyment taxonomy. Multiple partial links are found in EGameFlow's Immersion, Autonomy, and Feeback dimensions, whereas no substantial relationships are present in the Concentration, Goal Clarity, and Knowledge Improvement factors. Continuing, while the Playfulness-Based Design model (Hong et al., 2009) contains six dimensions, only two correspond to the videogame enjoyment taxonomy. Its Level of Challenge component relates strongly to Exploration and Challenge, while Its Opportunities for Competition and Cooperation component relates to Companionship and Competition. Lastly, Wilson et al. (2009) reviewed the literature and suggested seven components of games that impact learning outcomes. Their Fantasy, Representation, and Challenge components respectively relate strongly to Fantasy, Realism, and Challenge. Sensory Stimulation relates strongly to Realism and partially to Fantasy. Meanwhile, Control relates weakly to Fantasy and Exploration, Mystery relates weakly to Exploration, and Assessment relates weakly to Competition and Challenge.

Both the Mechanics, Dynamics, and Aesthetics (MDA) (Hunicke et al., 2004; Schell, 2008) and Design, Play, and Experience (DPE) (Winn, 2008) frameworks are extensive and holistic in nature. Therefore, the component of each that deals specifically with player enjoyment was analyzed. In the case of MDA, the Aesthetics component reveals eight kinds of fun in games, all of which relate to elements of the videogame enjoyment taxonomy. Similarly, DPE's Gameplay component suggests 16 forms of fun. Of these, 13 relate to the videogame enjoyment taxonomy, while three lack a substantial relationship.

Finally, in 2010, King et al. published a psychological taxonomy based on their ongoing study of the structural characteristics of videogames. This taxonomy presents five groups of game design features, titled Social, Manipulation and Control, Narrative and Identity, Reward and Punishment, and Presentation. Here, strong links are found between Narrative and Identity and Fantasy, Presentation and Realism, and Social and Companionship and Competition. Weak links occur between Manipulation and Control, Fantasy, and Exploration, and Reward and Punishment and Competition and Challenge.

Overall, the past game design taxonomies and the taxonomy of undergraduate student videogame enjoyment show very strong similarities. Of the 66 elements that compose the 10 past taxonomies, 55 (83%) have either a partial or complete relationship with one or more components in the videogame enjoyment taxonomy, while 39 (59%) have a strong relationship.

Of the 11 (17%) remaining components that exhibit no substantial relationships, it appears that these describe conditions surrounding gameplay rather than manipulable design characteristics, which were the focus of the videogame enjoyment taxonomy. For instance, Concentration, Goal Clarity, and Knowledge Improvement (Fu et al., 2009), Intuitive Controls (Ryan et al., 2006), and Fair Play (Hong et al., 2009) reflect player attributes and environmental circumstances to a greater extent than manipulable game design features.

Conclusion

In spite of their development for different purposes, with distinct populations, and using dissimilar methods, the past and present game design taxonomies show stark similarities. This suggests that research and practice in the field of game design has begun to identify genuine aspects of videogames that influence player perception. The provided taxonomy describes six key design features that affect undergraduate student videogame enjoyment. Continued research will refine and expand this taxonomy.

It is believed that there is an identifiable science that underlies the design of videogames. Future research in this area aims to distinguish the influential, manipulable design characteristics of videogames that affect player perception. In addition, it will identify the attributes of players that predict their reactions to game experiences. Ultimately, frameworks will be developed and tools will be provided to assist designers and educators in the creation of effective game experiences.

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Acknowledgements

This research was supported by the Office of Naval Research (ONR) under grant 141010143 awarded to Robert K. Atkinson.