Game Usability Heuristics (PLAY) for Evaluating and Designing Better Games: The Next Iteration

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Abstract. Game developers have begun applying formal human-computer interaction (HCI) principles in design. Desurvire et al [2] adapted a set of Heuristics for productivity software to games. The resulting set, presented at CHI 2004, was *Heuristics to Evaluate Playability* (HEP). Generalization of these heuristics is required to make them applicable to a multiple of game genres and game deliveries. This follow-up study focused on the refined list, Heuristics of Playability (PLAY), that can be applied earlier in game development as well as aiding developers between formal usability/playability research during the development cycle. Heuristics were formed based on their efficacious scores on the popular game review website, metacritic.com. Fifty-four gamers rated High and Low ranked games on 116 potential heuristics. Implications for how these Heuristics will help developers improve game quality are discussed. PLAY has been found useful in design evaluation and elf-report survey format.

Keywords: Usability, Heuristics, playability, play testing, design guidelines, video games, computer games, games, evaluation, usability, user testing, HCI design principles.

ACM Classification Keywords: H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems-*evaluation/methodology*.

1 Introduction

Game design is becoming a critical area in the field of User-Centered Design. As more HCI professionals become involved in the video game design process, methodologies specifically addressing game design have become increasingly important.

There are many methodologies for analyzing productivity software including Usability Testing and Heuristic Evaluation. The primary foci for the fields of productivity software are to make the user interface non-obtrusive, easy to use, and to help facilitate the task, as the applications are primarily task oriented. For games, however, the goals often include additional concepts such as providing an immersive environment, a sufficient challenge and entertainment. Often it is the well-paced challenge that makes the game worth playing [4,8]. Because of these differences, peculiar to games a new set of design principles is necessary.

1.1   HEP Heuristics for Evaluating Playability

Based on research from the game research community [4,6,7,8] a set of Heuristics were gathered, developed and refined specifically for games. The HEP Heuristics fell into four general areas: Game Play, Game Usability, Game Mechanics and Game Story. In a study presented at CHI 2004, [2], it was shown through empirical data that these Heuristics were efficacious in assisting in game design development. This was the first step in determining that these were useful.

1.2   PLAY: Principles of Game Playability

HEP has been found useful but only in limited circumstances. The game arena is vast including game genre, game delivery, game improvement and new game development. PLAY, a broad list of Heuristics, was developed to be of use as a generalized foundation that could then be modified for each specific game. Further Heuristics that are efficacious can be developed specific to the game using a conceptual framework [3]. This new set of principles is created specifically to help game developers during the entire design process, particularly at the beginning of the concept phase when changes to the design are less costly. The PLAY principles were created by using current and past research on game usability Heuristics and design principles, as well as the most up-to-date information on superior game design from working top-level game designers at LucasArts, Sega, Microsoft Game Studios, THQ, and Disney. Unlike HEP, PLAY recognizes that game design is an art *and* a science. Utilizing information and personal principles from the current game design community assists in a valid list of Game Principles (PLAY). The intent of PLAY is to develop a full set of principles and to validate these principles empirically.

1.3   Development of Game Genre-Specific Principles for Game Playability (PLAY)

The development of the first set of known Game Heuristics began in 1982, with Malone's [9] list of Heuristics for instructional games. In 2002, Federoff [6,7] compiled a list of game Heuristics from a case study at a game development company and compared them with both current game industry guidelines and J. Nielsen's Heuristics from 1994 [10]. Since 2001, game designers Falstein and Barwood have been cataloging a list of proven game design principles submitted by game designers, called the 400 Project [4]. In 2004, B. Silverman et al. began research on the principles of Game Story [11]. In 2004, Desurvire, Kaplan, and Toth [2] developed a set of Heuristics (HEP) based on the foregoing research and tested them empirically.

Based on this work, a more refined and updated list of Game Playability Principles (PLAY) was developed for three genres: Real-Time Strategy (RTS), Action Adventure and First-Person Shooters (FPS). This new list was based on the existing HEP, and further modified based on discussions with developers from Activision, THQ, Relic, Pandemic, Avalanche, Disney, and Microsoft Game Studios [Moriwaki, Donovan, Dunn, Jarrett, Dowdeswell, Stahl, Blackburn, DiPaola, Fulton, Keeker, and Paglyuan, personal communications].

The general principles were grouped into several categories: Game Play, Skill Development, Tutorial, Strategy & Challenge, Game/Story Immersion, Coolness, Usability/Game Mechanics and Controller/Keyboard. This study tested the validity of these principles against existing games.

2   Procedure

We compiled three sets of questionnaires, one to correspond to each of the three different game genres (Action Adventure, FPS and RTS). Each set contained common questions and genre-specific questions.

The questionnaires also contained a list of games divided into two categories: High Rank and Low Rank. Game rankings were taken from www.metacritic.com, a website that aggregates rankings from several online game reviewers. High Rank games were games with scores of 80 or higher. Low Rank games were games with scores of 50 or lower.

Participants were recruited at an annual gaming conference. A booth was set up in front of the conference's computer gaming room. The standard procedure was to address people as they walked by the hall or headed towards the computer gaming room.

Participants were told that they could take the survey if they had played (1) any one of games listed in the High Rank category and (2) any one of the games from the Low Rank category. Because most people do not play games known to be poorly rated, participants were allowed to suggest their own Low Rank game.

Each survey took approximately 15 minutes to complete, at the end of which the participant was given a candy bar.

3   Results

Fifty-four subjects participated in the study. Two subjects failed to choose a Low Rank game and their data was excluded from the analysis.
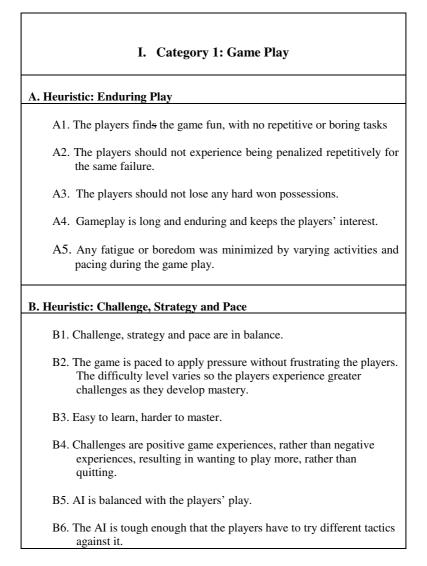
Over all, the High and Low Rank games differed along 48 of the 116 Principles. Paired-samples t-tests showed that these principles were rated differently between High and Low Rank games at $p < .0004$ (i.e., $p = 0.05/116$). Suggestively, 16 additional parameters were found to be differentiators at $p < .004$, a probability level ten times higher that is likely to be achievable using different analyses. Data for each genre was not gathered separately.

4 Conclusion

The intention of the study was to adapt existing usability principles to game design. Our analysis was able to identify a number of principles that helped to differentiate between good and bad games. (See Table 1 for a list of all 48 significant game design principles.)

Among the principles that differentiated between High and Low-ranked games were several that are particularly valuable because they exemplify the differences between video games and productivity software.

Table 1. Play Heuristics: Category, Heuristic and Explanation

I.   Category 1: Game Play

A. Heuristic: Enduring Play

A1. The players finds the game fun, with no repetitive or boring tasks

A2. The players should not experience being penalized repetitively for the same failure.

A3. The players should not lose any hard won possessions.

A4. Gameplay is long and enduring and keeps the players' interest.

A5. Any fatigue or boredom was minimized by varying activities and pacing during the game play.

B. Heuristic: Challenge, Strategy and Pace

B1. Challenge, strategy and pace are in balance.

B2. The game is paced to apply pressure without frustrating the players. The difficulty level varies so the players experience greater challenges as they develop mastery.

B3. Easy to learn, harder to master.

B4. Challenges are positive game experiences, rather than negative experiences, resulting in wanting to play more, rather than quitting.

B5. AI is balanced with the players' play.

B6. The AI is tough enough that the players have to try different tactics against it.

Table 1. (*continued*)

C. Heuristic: Consistency in Game World
C1. The game world reacts to the player and remembers their passage through it.
C2. Changes the player make in the game world are persistent and noticeable if they back-track to where they have been before.

D. Heuristic: Goals
D1. The game goals are clear. The game provides clear goals, presents overriding goals early as well as short term goals throughout game play.
D2. The skills needed to attain goals are taught early enough to play or use later, or right before the new skill is needed.
D3. The game gives rewards that immerse the player more deeply in the game by increasing their capabilities, capacity or for example, expanding their ability to customize.

E. Heuristic: Variety of Players and Game Styles
E1. The game supports a variety of game styles.
E2. The game is balanced with multiple ways to win.
E3. The first ten minutes of play and player actions are painfully obvious and should result in immediate and positive feedback for all types of players.
E4. The game had different AI settings so that it was challenging to all levels of players, whether novice or expert players.

F. Heuristic: Players Perception of Control
F1. Players feel in control.
F2. The player's have a sense of control and influence on~~to~~ the game world.

II. Category 2: Coolness/Entertainment/Humor/Emotional Immersion

A. Heuristic: Emotional Connection
A1. There is an emotional connection between the player and the game world as well as with their "avatar."

Table 1. (*continued*)

B. Heuristic: Coolness/Entertainment

B1. The game offers something different in terms of attracting and retaining the players' interest.

C. Heuristic: Humor

C1. The game uses humor well.

D. Heuristic: Immersion

D1. The game utilizes visceral, audio and visual content to further the players' immersion in the game.

III. Category 3: Usability & Game Mechanics

A. Heuristic: Documentation/Tutorial

A1. Player does not need to read the manual or documentation to play.

A2. Player does not need to access the tutorial in order to play.

B. Heuristic: Status and Score

B1. Game controls are consistent within the game and follow standard conventions.

B2. Status score Indicators are seamless, obvious, available and do not interfere with game play.

B3. Controls are intuitive, and mapped in a natural way; they are customizable and default to industry standard settings.

B4. Consistency shortens the learning curve by following the trends set by the gaming industry to meet users' expectations. If no industry standard exists, perform usability/playability research to ascertain the best mapping for the majority of intended players.

C. Heuristic: Game Provides Feedback

C1. Game provides feedback and reacts in a consistent, immediate, challenging and exciting way to the players' actions.

Table 1. (*continued*)

C2. Provide appropriate audio/visual/visceral feedback (music, sound effects, controller vibration).
D. Heuristic: Terminology
D1. The game goals are clear. The game provides clear goals, presents overriding goals early as well as short term goals throughout game play.
D2. The skills needed to attain goals are taught early enough to play or use later, or right before the new skill is needed.
D3. The game gives rewards that immerse the player more deeply in the game by increasing their capabilities, capacity or, for example, expanding their ability to customize.
E. Heuristic: Burden On Player
E1. The game does not put an unnecessary burden on the player.
E2. Player is given controls that are basic enough to learn quickly, yet expandable for advanced options for advanced players.
F. Heuristic: Screen Layout
F1. Screen layout is efficient, integrated, and visually pleasing.
F2. The player experiences the user interface as consistent (in controller, color, typographic, dialogue and user interface design).
F3. The players experience the user interface/HUD as a part of the game.
F4. Art is recognizable to the player and speaks to its function.
G. Heuristic: Navigation
G1. Navigation is consistent, logical and minimalist.
H. Heuristic: Error Prevention
H1. Player error is avoided.
H2. Player interruption is supported, so that players can easily turn the game on and off and be able to save the games in different states.

Table 1. (*continued*)

H3. Upon turning on the game, the player has enough information to begin play.
H4. Players should be given context sensitive help while playing so that they are not stuck and need to rely on a manual for help.
H5. All levels of players are able to play and get involved quickly and easily with tutorials, and/or progressive or adjustable difficulty levels.

I. **Heuristic: Game Story Immersion**
I.1 Game story encourages immersion (If game has story component).

4.1 Some Types of Difficulty Are Desirable

The combination of Strategy & Challenge and Usability principles were notable because they suggested that some dimension of difficulty is a desirable component of the user experience. However, designers should be aware of the manner in which they present this difficulty. Players were more favorable toward games with lower Usability difficulty and some amount of Strategy & Challenge difficulty. Characteristic of Strategy & Challenge, players preferred games that rewarded skill and did not rely on rote memory.

4.2 Skill Development Is Paced for Enjoyment

The principles in the skill development category focus on the player's developing mastery of a skill. This is an important component in a gamer's positive game experience. It is not, however, merely the development of a skill, but rather it is the pacing of learning that skill that divides a good game from a bad one, such as the principle, "…the pacing of new skills and power-ups was perfect."

4.3 Story, Immersion and Motivation

The principles in the Game/Story Immersion category addressed the value of a compelling supporting story and a realistic environment. Players preferred games with storylines that provided motivations for their actions instead of games where "…you had to do things that didn't make any sense," suggesting that the actions the players perform are not fun in-and-of-themselves, but rather in the broader context of a storyline. It appears that the role of user experience in designing games has the additional responsibility of sparking a player's imagination.

4.4 Use in Industry

Several design teams have used PLAY heuristics over the past 2 years. Overall, the PLAY heuristics are valuable in their ability to provide game design teams with an

HCI-focused framework that they can use from the initial game design conception, throughout development and into the final release phase. They can be used as modules and modified. For example, if a particular game does not have a story then the Game Story category would be removed.. The PLAY Principles have been viewed by the teams as a useful structure for both the design teams and for HCI practitioners as a foundation for thinking about the user experience needs of gamers. PLAY not only offers guidance for determining potential design issues, but has also has been reported as providing stimuli for game design solutions. With this HCI-focused set of Heuristics, games can be further developed in a manner that achieves game developers' highest goal: to create a highly entertaining, engaging, immersive, challenging and fun game experience. Upcoming research will focus on case studies, where PLAY for game usability and GAP [4], heuristics for game access, demonstrate there uses and utility.

References

1. Desurvire, H., Kondziela, J., Atwood, M.: What is Gained and Lost When Using Evaluation Methods Other Than Empirical Testing (short paper version). In: ACM conference, CHI 1992, collection of abstracts, pp. 125–126 (1992a)
2. Desurvire, H., Caplan, M., Toth, J.: Using Heuristics to Evaluate the Playability of Games. In: ACM conference, CHI 2004, collection of abstracts (2004)
3. Desurvire, H., Jegers, K., Wiberg, C.: Evaluating Fun and Entertainment: Developing A Conceptual Framework Design of Evaluation Methods. In: Facing Emotions: Responsible experiential design INTERACT 2007 conference, Rio, Brasil (2007)
4. Desurvire, H., Wiberg, C.: Master of the Game: Assessing Approachability in Future Game Design. In: ACM CHI 2008 conference, CHI 2008 International Conference on Computer Human interaction, Florence, Italy (2008)
5. Falstein, N., Barwood, H.: The 400 Project,
   `http://theinspiracy.com/400_project.htm`
6. Federoff, M.: User Testing for Games: Getting Better Data Earlier. Game Developer Magazine, 35–40 (June 2003)
7. Federoff, M.: Heuristics and Usability Guidelines for the Creation and Evaluation of FUN in Video Games. Thesis, University Graduate School of Indiana University (December 2002)

8. Fulton, B., Medlock, M.: Beyond Focus Groups: Getting More Useful Feedback from Consumers. In: Proceedings of the Game Developer's Conference (2003)
9. Malone, T.W.: Heuristics for designing enjoyable user interfaces: Lessons from computer games. In: Thomas, J.C., Schneider, M.L. (eds.) Human Factors in Computing Systems. Ablex Publishing Corporation, Norwood (1982)
10. Nielsen, J.: Heuristic evaluation. In: Nielsen, J., Molich, R.L. (eds.) Usability Inspection Methods. John Wiley & Sons, New York (1994)
11. Silverman, B.G., Johns, M., Weaver, R., Mosley, J.: Authoring Edutainment Stories for Online Players (AESOP): Introducing Game play into Interactive Dramas. In: International Conference on Virtual Storytelling. Springer, Toulouse (2003)