48 Differences Between Good and Bad Video Games: Game Playability Principles (PLAY) For Designing Highly Ranked Video Games

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ABSTRACT
Game developers are beginning to apply formal human-computer interaction (HCI) principles in game design. To aid in developing game-specific methodologies, one of the authors utilized a set of Heuristics for productivity software and adapted them to games. The resulting set was presented at CHI 2004 as Heuristics to Evaluate Playability (HEP). This recent follow-up study was designed to focus on Principles of Playability (PLAY) that can be applied earlier in the game development process, and reflects on our discussions with game developers from several studios. The goal was to create a framework of Principles that could be used to maximize game usability/playability. Fifty-four gamers rated High and Low-ranked games on 116 potential Principles. The ratings on forty-eight were found to differ significantly between High and Low-ranked games. Implications for how these Principles can help developers improve the quality of their games are discussed.

Author 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*

INTRODUCTION
Game design is becoming a critical area in the field of User Centered Design. As more human-computer

interaction (HCI) professionals become involved in the video game design process,, methodologies specifically addressing game design will become increasingly important.

There are many methodologies for analyzing Internet and enterprise software including Usability Testing and Heuristic Evaluation. The primary foci for the fields of Internet and Software Development 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 challenge, and entertainment. Often it is the challenge, paced well, that makes the game worth playing [3, 6]. It is because of these differences which are peculiar to games that a new set of design principles is necessary.

HEP Heuristics for Evaluating Playability
Based on research from the game research community [3,4,5,6], a set of Heuristics were gathered, developed and refined specifically for games. The 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.

PLAY: Principles of Game Playability
The HEP pilot study was successful enough that we decided to develop a set of Principles that would further improve game design. 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 set of design principles was created by using not only current and past research on game and usability Heuristics and design principles, but also the most up-to-date information on superior game design from working, top-level game designers. Unlike HEP, PLAY

recognizes that game design is an art *and* a science, and utilizing the information and personal principles from the current game design community assists 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.

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 list of Heuristics for instructional games [7]. In 2002, Federoff [4,5] compiled a list of game Heuristics from a case study at a game development company and compared them with current game industry guidelines and J. Nielsen's Heuristics from 1994 [8]. 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 [3]. In 2004, B. Silverman, *et al.* began research on the principles of Game Story [9]. In 2004, Desurvire, Caplan, 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 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.

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, (1) played any one of games listed 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.

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 a $p < .004$, a probability level ten times higher that is likely to be achievable using different analyses. Due to complications during data-gathering, we were unable to analyze the data for each genre independently.

CONCLUSION

The intention of the study was to adapt existing usability principles to game design. Our analysis did indeed identify a number of principles that help 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.

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 to 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.

Skill Development is Paced for Enjoyment

The principles in the skill development category focus on the player's developing mastery of a skill as an important component in a player's positive game experience. It is not, however, merely the development of a skill, but

Game Play (1/3)	The main character did things that made sense.
Skill Development (3/4)	The difference between my gaming skills and the skills required to complete a specific task in the game were always balanced
	I thought the pacing of new skills and power-ups was perfect in this game.
	Some skills were complex enough that I spent the entire game improving them.
Tutorial (1/8)	The tutorial helped me understand features that were unique to the game.
Strategy & Challenge (10/24)	There were parts of the game where I had to stop and think about what to do.
	Solving a challenge in the game required skill on my part, rather than dumb luck or just memorizing how what to do.
	The game/AI was tough enough that I had to keep trying different tactics against it.
	The game was reasonably balanced. I found there was no single faction or character that was dominant.
	The game had different AI settings so that it was challenging to all levels of players, whether a novice or expert player.
	The AI was a good challenge.
	I've replayed the game multiple times.
	I would never play this game again.
	I was always doing different things and I liked it.
	Any changes that I made in the game world persisted. For example, when I backtracked, I could tell I'd passed through!
Game/Story Immersion (17/27)	The game was fun because the characters and settings were consistent with the story.
	I really felt like part of the game.
	The sound effects made the game better.
	The sound effects were horrible.
	The graphics did a good job of creating a distinct look and feel.
	The story was told as the game progresses.
	The game's story gave me a good understanding of what I need to do and why.
	The character I am playing is a character I'd like to be like!
	I thought the story was deep.
	I liked the story behind the game.
	The game was a lot better if you knew the story.
	The enemies or monsters were believable given the context of the story.
	The story had nothing to do with the enemies you were up against.
	During the game, you had to do things that didn't make any sense.
	There were plenty of things you could do in the game.
	I played because I wanted to help the characters in the game.
	The story made the game better.
Coolness/Entertainment (5/12)	There was something I can't describe about this game that made it great.
	The game used humor well.
	I jumped out of my seat a couple of times playing this game.
	I felt that I had total control over the character.
	My character and the other characters' personalities developed further the longer I played the game.
Usability & Game Mechanics (7/9)	You can play the game without reading the manual.
	The controls were set up like other games I've played.
	The user interface didn't cause me any problems. Everything was laid out well.
	The layout of the screen was done poorly. I couldn't always see all of the information I needed.
	I did not experience the interface as intruding on the action, or disrupting me in any way.
	I could always tell what my score/status was.
	The game kept track of goals and tasks that I needed to do.
Controller/Keyboard (4/13)	The controls were easy to use.
	There was some way of showing special rules and commands in-game (an index, help file, special screen, etc.)
	There were hotkeys available for advanced players.
	Really good players can do some incredible things in this game.

Table 1. The PLAY Principles (numbers in parentheses are the Number Significant/Total Number)

the pacing of learning that divides a good game from a bad one, as demonstrated in the principle "…the pacing of new skills and power-ups was perfect".

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 design in games has the additional responsibility of sparking a player's imagination.

Overall, the PLAY Principles 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. The PLAY Principles are also useful as a structure for HCI practitioners as a foundation for thinking about the additional user experience needs of gamers. With this HCI-focused set of Principles, games can be developed in a manner that achieves game developers' highest goal: to create a highly entertaining engaging, immersive, challenging and fun game experience.

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