Exploring the Usability of Game Heuristics for Different Game Platforms

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ABSTRACT
Within the improvement and expansion of game industry, there has been a need for a set of rules to accomplish some fundamental requirements for the fun factor in games. Many heuristics have been proposed so far, but none of them could provide the whole need for covering the issues related to usability and/or playability of video games. One of the answers for the reasons can underlie the objectivity of the researches and can be the adaptation problem to the rapid changes in the game platforms. This report introduces a question, whether existing heuristics can be used to in the evaluation process of different platform experiences. If the answer is no, the possibility of whether the different control mechanisms on different platforms have an impact on that will be searched. With the result of these questions, the heuristics can be extended for different platform usages.

Author Keywords
Heuristics, playability, play testing, design guidelines, video games, computer games, games, evaluation, usability, user testing, game platform, action controllers

ACM Classification Keywords
H.1.2 [Models and Principles]: User/Machine Systems - ***human factors***

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

J.7 [Computer Applications]:Computers in Other Systems – ***commanf and control***

General Terms
Human Factors, Design, Measurement.

INTRODUCTION
According to a research conducted by Entertainment Software Association (ESA) [3], approximately 72% of American households play computer or video games. With this number of people, the reason for playing games have been searched and according to the findings of Korea Creative Content Agency(KOCCA) [5], among 1700 game users the main reason for playing video games is fun (See Figure 1). To accomplish the fun factor in games, much more research has been conducted and the only aim of developers has become trying to keep the player in the Game Flow [8]. Heuristics for playability and usability to assure flow and provide fun have been proposed. These are some set of rules as a guidance to be used in game development and evaluation processes. However, because the verification of heuristics is performed with user test studies, many of heuristics are more subjective. Among these, for the aim of this paper, Heuristic Evaluation for Playability (HEP) [2] can be one of the most general and accepted set. In HEP, four game heuristic categories are focused and because of this categorization, the effectiveness of the rules is stabilized.

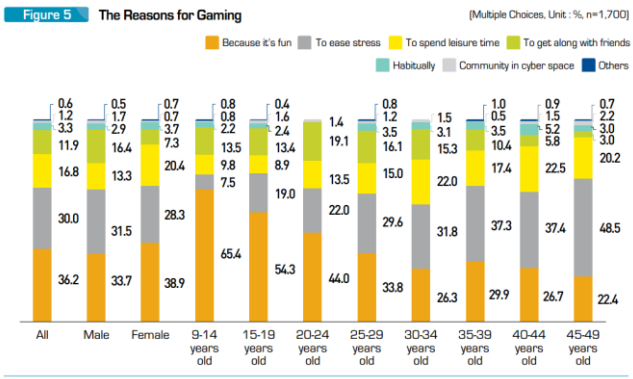

Figure 1. The Reasons For Gaming [2]

Game Platform Evolvement
In recent years, with a rapid development, more game consoles or platforms have been introduced to the users. It is stated by ESA [3] that 55% of gamers play games on their phones or handheld devices. A study conducted in 2011 by Bernstein has declared that gaming goes mobile [1]. The claim has been supported by the industry data showing that games are more that 75% of the revenue of the top 100 apps downloaded at app store. Beside of the rapid

changes in mobility, some other game platforms have been created and proposed to users. Game consoles, TV Set-top Boxes are some of them. According to Park Associates [6], in 2011, computers/laptops are still the top platform but mobile phones are almost top platforms too (See below Figure 2).

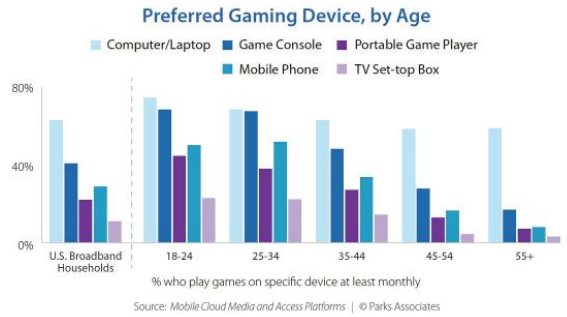

Figure 2. Preferred Gaming Device [6]

Improvement of HEP

The effect of different platform usage is not considered in HEP. While defining the heuristics, user experience differentiation can change the rule in an expanding manner. Or while evaluating the heuristics on a specific platform, may not validate the rule. Therefore, the platform choice may restrict the widely generalization of the rule set. Addition of the platform to the heuristics may lead us to think about the heuristics much more. For example, finding whether the failure of an issue in a specific platform may arise from the control mechanism of it can lead developer to improve the controls in their games accordingly. Because the capability of game platforms is diverse, each rule should have mapped to a platform layer features. As indicated by Federoff (2002), the usability of the product cannot be evaluated without taking context into consideration. Because when games are developed, they are created specifically for specific platforms [4].

Verification of Game Heuristics

Additional columns "'X' Platform Experience" and "Control Mechanism Deficiency of the 'X' Platform", where 'X' is substituted for experienced platform, were added to the list of heuristics table in HEP. This extended list was tested against the traditional user. According to answers, controls in game are revised in the game design process.

Game Plav		#..	
Heuristic and Description		…	
PC Platform	Platform Deficiency	?	?
Smart Phone Platform	Platform Deficiency	?	?
Tablet Platform	Platform Deficiency	?	?
Smart TV Platform	Platform Deficiency	?	?

Table 1 - Improved HEP Example

Especially, while creating a game with cross-platform support, this paper proposition will be very useful (See Table 1) .

PROCEDURE

The Game

Because, this paper aims to generalize the usage of HEP rules for multi-platform, a cross-platform game should be used. Therefore, "Angry Birds" has been chosen as a user study game.

The Platforms

As platform options PC, Smart Phone, Tablet and Smart TV has been used.

Analysis of HEP

Because this paper aims to observe the effect of game platform over the game via HEP, first thing to do was to distinguish the platform related issues in the heuristic set of HEP. A similar approach was followed in Röcker and Haar's study [7]. Their aim in the paper was to explore, whether HEP can be used by pervasive game developers, or if specific design guidelines for smart home environments are required. However, instead of comparing the requirements and finding a map among proposed heuristics, in this paper, the lack of accomplishment of the heuristics because of platform is observed. And accordingly, the platform controls in which the failures in the enjoyment occurred will be tried to improve in the game development process. The heuristics of the 'game story' category mainly includes game aspects which are not directly related to platform. The following table is the list of heuristics from HEP filtered by platform relation (See Table 2-3-4-5).

No	Game Play Heuristics	Platform Relation
P4	There is an interesting and absorbing tutorial that mimics game play	Platform dependent
P5	The game is enjoyable to replay	Platform dependent
P12	Player's should perceive a sense of control and impact onto the game world	Platform dependent
P13	The first player action is painfully obvious and should result in immediate positive feedback	Platform dependent

Table 2 - Game Play HEP - Platform Relation

No	Game Story Heuristics	Platform Relation
S5	The Player has a sense of control over their character and is able to use tactics and strategies	Platform dependent

Table 3 - Game Story HEP - Platform Relation

No	Game Mechanics Heuristics	Platform Relation
M4	Mechanics/controller actions have consistently mapped and learnable responses	Platform dependent
M6	Controls should be intuitive, and mapped in a natural way	Platform dependent
M7	Player should be given controls that are basic enough to learn quickly	Platform dependent

Table 4 - Game Mechanics HEP - Platform Relation

No	Game Usability Heuristics	Platform Relation
U2	The Player can easily turn the game off and on	Platform dependent
U5	Upon initially turning the game on the Player has enough information to get started to play	Platform dependent
U6	Players should be given context sensitive help while playing so that they do not get stuck or have to rely on a manual	Platform dependent
U8	Player do not need to use a manual to play game	Platform dependent

Table 5 - Game Usability HEP - Platform Relation

User Studies

There were 6 prospective players. The age distribution was 25 and 5 men and 1 woman . All of them were previously a game player, so they were familiar with games and game plays which was a good chance to make critical observation. The prepared and filtered list of heuristics from HEP was proposed after 3 minutes playability sessions to the volunteered game players. In each session, the players played Angry Birds game on 4 different platforms. After the sessions completed, according to the sense of enjoyment, two additional columns for HEP, " 'X' Platform Experience" and "Control Mechanism Deficiency of the 'X' Platform" were filled by players.

ANALYSIS

The results from user studies revealed that how much the game 'Angry Birds' succeeded in HEP on these four different platforms. By pointing the failures in some platforms for a heuristic, the method proposes a chance to adapt the game to all the platforms successfully.

RESULTS

Validating the Heuristics with Additional Features

First of all, this improved method proved the need for platform choice addition to HEP. Because, the failure or success of the game can alter according to played platform for the same heuristics. Moreover, by this method, the needed improvements in game development in terms of control mechanisms on different platforms have revealed. While evaluating the user study, some device habits of the participants have interfered to the decisions. Because 'Angry Birds' firstly released on smart phones, the tendency to play on phones was easier for participants. In addition, as an alternative and newly introduced platform, TV was interesting experience for participants. However, most of participants have decided that, playing the game on touch screen devices is the most enjoyable experience.

Examining The Relations Between Heuristics and Additional Features

Most of the participant mentioned that the failures in the heuristics in some platforms are caused by the control mechanism. They stated that because 'Angry Birds' game firstly developed and published for iOS platform, the later porting attempts to different platforms have not been successful as in iOS. The proposed and improved HEP list results are as below :

- **P4 :** *There is no tutorial on TV platform about game play. So a tutorial for this platform should be added.*
- **P5 :** *On TV platform, because the control is hard, replay is not really enjoyable. So the control mechanism on TV should be improved to verify this heuristic.*
- **P12 :** *On TV platform, the sense of control is hard to perceive. Because TV usage is generally in a comfortable home environment, while sitting on the couch, the player should be able to play the game easily. So gesture control should be improved.*
- **P13 :** *After learning how to play with tutorial(especially for TV platform), it is not painful for first action.*
- **S5 :** *Because TV platform and PC platform are not so sensitive as touch control on smart phone or tablet, it is hard to be able to use tactics.*
- **M4 :** *On TV platform , the mechanics have not consistently mapped. On PC platform, when exceeds from the game play scene on a browser, the controls fails. It is good to fit device screen as phone or tablet.*
- **M6 :** *On TV platform, the controls are not intuitive. This causes an unwilling state to progress in game. Some easy interaction gestures or speech control can be added.*

- **M7 :** *On TV platform, controls are easy to learn but not so flexible to implement. Moreover, the control cause fatigue on hand and arm. Gesture control should be improved. On PC platform, the flexibility is not good as touch screen devices like smart phone or tablet.*
- **U2 :** *On TV platform , the menu including exit option is hard to learn. You should move your hand to the top of screen. It should be intuitive by adding a user interface on game play screen.*
- **U5:** *On TV, there is lack of game play tutorial.*
- **U6:** *Especially for platforms where it is hard to control, context sensitive help should be improved.*
- **U8:** *On TV, there is a need for manual to play.*

Figure 3: User Study Process

CONCLUSION

User testing has revealed that 'Angry Birds' game is not successful on all platforms. It is concluded that while evaluating with HEP, the verification of a heuristics sometimes differs on different platforms. The reasons behind these failures on different platforms have been pointed out by participant statements as platform deficiency. Because these deficiencies prevent players to have fun and enjoyment during game play, according to the deficiencies, 'Angry Birds' game can be improved. By handling with deficiencies especially for TV platform, the game can support multi platform assuring all the heuristics in HEP completely. In the case of the deficiency problems are platform control related; some platform based controls could be revised and improved. For example, some actions in game like accessing the main menu are controlled by device based configurations like clicking, or some number of finger combination on touch screens, or buttons on phones. So, these accessing and controlling mechanisms should be made independent from platform and be added to user interface. Furthermore, some action-control-platform mapping can be proposed to quickly decrease the deficiency possibility beforehand.

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