Heuristic Evaluation of Playability: Examples from Social Games Research and Free-to-Play Heuristics

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1. Three Sentences

The fierce competition in video games market and new revenue models such as free-to-play emphasize the importance of good playability for first-time user experience and retention.

Cost effective and flexible evaluation method such as heuristic evaluation is suitable for identifying playability problems in different phases of game development life-cycle.

In this chapter we introduce heuristic evaluation method with updated playability heuristics, present example studies on identifying playability problems in social network games, and propose new heuristics for evaluating free-to-play games.

2. Introduction

The video game industry is a highly competitive entertainment domain where the rise of production values and development costs are acknowledged widely. Thousands of games are available on various computer, console, and mobile platforms. The emergence of the free-to-play revenue model has made the competition even fiercer as games are distributed free-of-charge.

Improving the quality of a game is a viable approach to improve acquisition, retention, and monetization of players. Playability is a term used to describe the overall quality of a game, covering both game usability and gameplay aspects (Korhonen 2016; Paavilainen 2011). Traditionally playtesting with the target audience is utilized to improve playability by identifying design problems in the game that may result in a poor player experience. However, playtesting is both time-consuming, expensive, and not necessarily viable option in the early phases of development.

Heuristic evaluation is a usability inspection method widely used by practitioners and researchers of human-computer interaction (Nielsen 1994). Known for its cost-effectiveness, heuristic evaluation is a potential method for evaluating games in different phases of the development life-cycle as it can be utilized to evaluate anything from pre-alpha prototypes to published games. By utilizing heuristic evaluation with playability heuristics, a group of expert inspectors can identify wide range of playability problems. Identifying and fixing problems at an early stage has obvious development cost benefits.

In this chapter we define playability and introduce the heuristic evaluation method with the updated playability heuristics for games. We present examples of our own research where heuristic evaluation has been used to study playability of free-to-play social network games (i.e. social games[1]). Lastly, we provide new heuristics for evaluating free-to-play games. Heuristic evaluation is suited for both game development and research purposes to study playability of games.

3. Playability

Traditional usability principles and methods have been used successfully for evaluating productivity software for decades. The ISO 9241-11 standard defines usability as follows:

"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (ISO 1998)

However, as games and productivity software have fundamental differences in their design and philosophy of use, traditional usability practices must be modified to accommodate special characteristics of games. Hence instead of usability, the term playability is often used when discussing quality of games. Unlike usability, there is no commonly agreed definition or standard for playability. While the term is widely used in different contexts, it is often taken as granted without further scrutiny. This makes the term and its use vague and ambiguous.

Several authors have defined and discussed playability from different perspectives (e.g. Järvinen et al. 2002; Fabricatore et al. 2002; Egenfeldt-Nielsen et al. 2008; Nacke 2009; Paavilainen et al. 2011; Sánchez et al. 2012; White 2014) but none of these are considered *de facto* standard. However, a common element in these definitions is that playability is considered to cover more ground than usability. For the purpose of this chapter we use the latest definition provided by Korhonen (2016) in his doctoral dissertation:

[1] Social games is a commonly used industry-coined term for video games played in Facebook and in other social network services.

"The game has good playability when the user interface is intuitive and gaming platform is unobtrusive, so that the player can concentrate on playing the game. Fun and challenge are created through gameplay when it is understandable, suitably difficult and engaging."
(Korhonen 2016)

This definition illustrates that playability is formed through game usability and gameplay aspects, which are both designed and programmable properties of the game. Game usability covers aspects such as clarity of audiovisual presentation, user interface (UI) layout and navigation logic, control and feedback, and help for example. All these are related on how the game system is used by the player through the input-output feedback loop.

Gameplay focuses on aspects which makes games different from productivity software. Goal structures, challenges, rewards, story components etc. are basic buildings blocks for games, often regarded as game mechanics. In unison, these mechanics form a dynamic system which is called gameplay. Gameplay is related to what the players do in the game and why.

Depending on the context, other components can be included in playability. For example mobile and board games have their own platform dependent factors which must be taken into consideration when discussing playability of these games. Game genres have also their own specific conventions for interaction, which should be taken into consideration as well.

It is important to emphasize that playability describes the qualities of the game, not the game play[2] situation nor player experience per se. Playability is related to player experience only through a cause-effect relationship. Poor playability (i.e. poor quality of the game) can have a detrimental effect on player experience. Good playability does not necessarily ensure good player experience and commercial success, but poor playability can surely lead to disasters.

4. Heuristic Evaluation of Playability

Heuristic evaluation is a method in which experts inspect the target system using a set of heuristics to guide the evaluation. Heuristic evaluation is widely known method for evaluating usability of a product, originally developed by Nielsen and Molich (1990). It belongs to the analytical inspection method category meaning that the evaluation is conducted completely by experts instead of users from the target audience as in traditional user testing (Nielsen 1994). With playability heuristics, heuristic evaluation can be used to evaluate games as well.

The advantage of the method is that the evaluations can be completed in a few hours and the results are often reported to the developers within the same day. The evaluations can be repeated in fast cycles and provide feedback for the revised versions of the design. This supports the agile development process, which is typical for game development projects (Medlock et al. 2005;

[2] Gameplay (compound word) is a reference to the dynamic interaction of game mechanics; game play (non-compound word) refers to the activity of playing a game (White, 2014, p. 224)

Clinton 2010). Heuristic evaluation is subjective in nature and inspectors' own evaluation expertise, previous knowledge of similar games, and gaming experience and skills have an essential role and will affect the quality of the evaluation. This bias known as evaluator effect is compensated by using multiple inspectors (Korhonen 2016).

The heuristic evaluation process can be divided into five phases. A step-by-step reference guide is presented in Table 1, which follows the procedure documented by Korhonen (2016).

Procedure step	Main tasks	Practical guidelines
#1 Preparation	Choose inspectors, select playability heuristics, reserve space for evaluation, and prepare the game (and devices).	3-5 inspectors with evaluation method expertise. Inspectors should be familiar with similar games in the genre.
#2 Individual evaluation	Evaluate game menus and different configuration and settings screens. This resembles productivity software evaluation focusing on UI evaluation.	Observe particularly issues concerning game usability heuristics.
	Play the game and get familiar with the main features and objectives of the game, focus on gameplay evaluation.	Observe gameplay heuristics and additional modules if needed for multiplayer, mobile, context-aware, or free-to-play, for example.
	Compare how well the interface elements support playing the game. Does the interface allow smooth and unobtrusive interaction with the game?	Observe both game usability and gameplay heuristics. Remember to document positive findings as well.
#3 Debrief within inspector team	Combine playability problem reports and discuss with other inspectors about the problems. Prepare a list of corrections for the playability problems. Prioritize problems.	Prioritize playability problems with severity ratings (e.g. cosmetic, minor, major, critical), assign violated heuristics to problems and remove duplicates. Include positive findings.
#4 Report findings	Present findings to the stakeholders.	Discuss with the developers about different options to correct problems. Remember to present positive findings as well.

#5 Aftermath	Analyze problems which were not covered by the heuristics and expand the existing heuristics if needed. Debrief the whole procedure with inspectors and prepare for the next evaluation cycle.	Understanding the nature of the problems is essential for preventing the creation of redundant heuristics. Documenting and sharing the findings is important so that the same mistakes are not made in future development projects.

Table 1. Heuristic evaluation procedure.

For an analytical evaluation there are two critical aspects in the beginning: the choice of inspectors and the choice of heuristics. Evaluations typically include three to five inspectors, who examine the game by playing it. Generally it is recommended to use double experts, who are well versed with the method and understand the game genre and its conventions. If double experts are not available, a mix of method experts and domain experts is feasible. If there are no experts available, this can be mitigated by using a larger group of novice inspectors. The chosen playability heuristics (see next section) should cover both game usability and gameplay aspects at least. Depending on the game, there might be additional aspects to be inspected as well, such as mobility, multiplayer, context-aware, or free-to-play features.

The procedure of conducting the evaluation is straightforward and focuses on inspecting the game with the help of playability heuristics. The inspectors individually observe the design holistically and take notes on any aspects of the game that might cause playability problems by violating the heuristics. To understand the playability problems we can apply Lavery et al. (1997) approach which requires attention to three things: 1) a context in which the playability problem arises, 2) the actual immediate and eventual difficulties of the player, and 3) the assumed causes of these difficulties. While the heuristics are used to guide the inspectors to focus on different aspects of the game, inspectors should report all encountered playability problems – including those which are not covered by the heuristics. Identifying problems outside the heuristics is dependent on the inspector's expertise and experience, hence double experts are recommended.

The evaluation of the game can be further divided into three rounds. The first part is dedicated to explore the interface elements that are external to actual gameplay. Typically these include the menu, configuration, and settings screens. The second part concentrates on gameplay. Depending on the level of completeness of the game, the inspectors might be able to evaluate only a certain portion of the game, such as the tutorial, character creation, inventory, combat system, etc. During this round the focus of the evaluation should be on whether the game is understandable and if the game behaves as it is expected. In this part it is important to record problematic aspects in the game immediately because the inspectors will learn and adapt quickly to bypass minor problems. In the third round the inspectors should examine the gameplay interface in respect to goals and other game mechanics. The focus should be on whether the UI supports gameplay and

whether it provides accurate and sufficient information for the player. The individual evaluation produces a list of playability problems that the inspectors have encountered during the evaluation.

In addition to identifying playability problems, it is imperative to report positive findings as well. There are two reasons for this. Firstly, reporting well designed features prevents "fixing" them accidentally, which might cause new problems. Secondly, reporting only negative aspects from the game design might have discouraging effect on developers.

In the third phase the inspectors work together to consolidate a master list of playability problems based on the individual findings. It is useful to examine the game together so that problems can be easily pointed out and discussed, which increases the validity and reliability of the results. In the master list each playability problem is presented with a description of the problem, which should identify the location of the problem in the game, why the issue was determined to be a problem, and how it could be corrected. It is also useful to annotate the problem with a reference to a heuristic that the design violates. This helps game designers in understanding why the issue is brought up and help them in correcting the problem. In addition, problems should be rated on their severity. One common approach is to prioritize problems as cosmetic, minor, major, or critical. Prioritization provides information for developers to determine which problems the inspectors think are the most critical ones to fix and helps them to schedule and allocate resources accordingly.

The complete evaluation report with playability problems and positive findings is then presented to the development team. Discussing the findings and solutions is imperative as it helps both developers and inspectors to understand the problems and the design vision. There are cases where heuristics are violated on purpose and acknowledging false positives (non-problems) is useful for any upcoming evaluations.

The final phase is the inspectors' internal debrief focusing on the whole process. It should be reviewed how well the evaluation covered the necessary aspects and met the objective of the evaluation. Also, if there were any playability problems which were not covered by the heuristics, these problems should by studied further and expand the existing heuristics if needed. This helps the team to find similar problems in the future and expands the knowledge on playability problems. We encourage the practitioners to modify and expand whatever heuristics they start with to better accommodate their specific work environment and design space.

Lastly It must be noted that the inspectors do not represent the target audience of the game. They might not represent the target demographic but more importantly they are not playing the game with a similar mindset as an average player would. Focusing on evaluating the game can produce false positive findings, which might not be actual playability problems for the players. Therefore heuristic evaluation should not be considered as an alternative to playtesting, but as a

complementary method in situations where playtesting is not feasible. Heuristic evaluation can be used prior to playtesting to catch basic playability problems, so playtesting can focus on more important aspects in the design. Best results are achieved when heuristic evaluation is used iteratively in conjunction with playtesting during the whole development process.

5. Playability Heuristics

A heuristic is "a commonsense rule (or set of rules) intended to increase the probability of solving some problem"[3]. Heuristics are used in experimental methods, such as a game evaluation, as an aid to serve learning and discovery, or problem-solving.

Playability heuristics are intended to provide a close enough solution for problems that inspectors discover in the evaluated game. Well-defined heuristics are a valuable asset for game development as well, and can be used as a reference library for common problematic areas in game design.

The history of playability heuristics is approximately fifteen years. In 2002, Federoff (2002) conducted a case study in a game company and defined heuristics that can be considered as a first heuristic set for evaluating video games. A couple of years later Desurvire et al. (2004) published playability heuristic set based on Federoff's heuristics. Afterwards other authors published their versions of playability heuristics covering gameplay and/or game usability aspects of the game (Korhonen and Koivisto 2006; Shaffer 2007; Pinelle et al. 2008; Desurvire and Wiberg 2009). In the following years, more playability heuristic sets started to emerge focusing on different aspects of playability. Social interaction of players within the game received attention, and heuristics for multiplayer games were published by Korhonen and Koivisto (2007) and Pinelle et al. (2009). Playability heuristic sets including game usability and gameplay could be considered as a primary branch of playability heuristics in which the core aspects of playability are covered.

It became apparent that there are many video game types for both entertainment and other purposes with unique characteristics to be considered in game evaluations. Mobile games were one of the first types of games in which playability could be affected by the mobility of the players, changing conditions in the surroundings and, of course, mobile devices as a gaming platform. Playability heuristics for mobile games were published by Karvonen (2005) and Korhonen and Koivisto (2006). Educational games were studied actively as well and playability heuristic sets were published for these games (Thomas et al. 2003; Kiili 2005; Hinske et al. 2008; Mohamed & Jaafar 2012).

[3] www.webster-dictionary.org/definition/Heuristic

Games such as pervasive and social games alter the way players play video games and bring up new aspects that need to be covered in game evaluations. For example, in pervasive games the utilization of context information in the game design brings up issues which will greatly influence playability of these games. There are few articles that cover playability of pervasive games (Röcker & Haar 2006; Jegers 2008; Paavilainen et al. 2009), but the recent interest of augmented reality games will probably result in a validated set of playability heuristics for pervasive games in the near future. For social games Paavilainen (2010) has presented 10 high-level heuristics to guide the design and evaluation, focusing on the special characteristics of the social network integration in game design. The specific game types or genres could be considered as a second branch of playability heuristics.

Recently, the development of playability heuristics is moving to more specialized areas and authors have published playability heuristics for specific interaction modalities or gaming platforms. Köffel et al. (2010) presented a set of playability heuristics for advanced tabletop games, while Hara and Ovaska (2014) have presented heuristics for the interaction design of motion-controller games. These kinds of heuristics could be considered as a third branch of playability heuristics and can be used in conjunction with the core playability heuristics.

Choice of the heuristics plays a critical role in an evaluation. We present playability heuristics originally developed by Korhonen and Koivisto (2006; 2007) and updated and expanded by Korhonen (2016). These heuristics have gone through a careful analysis of game design literature to make heuristics understandable and complete for game evaluations. Further, they have been validated in several game evaluations by tens of external inspectors (Korhonen, 2016).

The playability heuristic set contains several modules to cover different aspects of the game. Two core modules, *game usability* and *gameplay*, reflect the two most important aspects of playability. These heuristics are common to all games and can be used to evaluate any type of game. In addition, there are modules for *multiplayer*, *mobility*, and *context-aware* games, which can be used when those aspects are evaluated in the game (Korhonen 2016). Tables 2-6 list and describe the heuristics. When the heuristics are used in game evaluations, inspectors will benefit from a short summary of the heuristics, which gives more information for discovery and problem-solving. The more detailed descriptions of the heuristics with short summaries and background information can be found from Korhonen (2016).

Code	Game Usability Heuristics
GU1a	Audio-visual representation supports the game
GU1b	A view to the gameworld supports smooth interaction and the camera behaves correctly
GU2	Screen layout is efficient and visually pleasing
GU3	Device UI and game UI are used for their own purposes
GU4	Indicators are visible
GU5	The player understands the terminology
GU6	Navigation is consistent, logical, and minimalist
GU7	Game controllers are consistent and follow standard conventions
GU8	Game controls are convenient and flexible
GU9	The game gives feedback on the player's actions
GU10	The player cannot make irreversible errors
GU11	The player does not have to memorize things unnecessarily
GU12	The game contains help

Table 2. Game Usability heuristics

Code	Gameplay Heuristics
GP1	The game provides clear goals or supports player-created goals
GP2	The player sees the progress in the game and can compare the results
GP3	The players are rewarded and the rewards are meaningful
GP4	The player is in control
GP5	Challenge, strategy, and pace are in balance
GP6	The first-time experience is encouraging
GP7	The game story, if any, supports the gameplay and is meaningful
GP8	There are no repetitive or boring tasks
GP9	The players can express themselves
GP10	The game supports different playing styles
GP11	The game does not stagnate
GP12	The game is consistent
GP13	The game uses orthogonal unit differentiation
GP14	The player does not lose any hard-won possessions

Table 3. Gameplay heuristics

Code	Multiplayer Heuristics
MP1	The game supports communication
MP2	There are reasons to communicate
MP3	The game supports groups and communities
MP4	The game helps the player to find other players and game instances
MP5	The game provides information about other players
MP6	The design overcomes the lack of players and enables soloing
MP7	The design minimizes deviant behavior
MP8	The design hides the effects of the network
MP9	Players should play with comparable players (Supplements GP6)

Table 4. Multiplayer heuristics

Code	Mobility
MO1	The play sessions can be started quickly
MO2	The game accommodates the surroundings
MO3	Interruptions are handled reasonably
MO4	The graphical design is accommodated to current brightness (Supplements GU1a)
MO5	The player should be aware of some device features while playing (Supplements GU3 and GU4)
MO6	Mobile devices have their own conventions for input (Supplements GU7)
MO7	The tutorial should respond to immediate demand (Supplements GU12)

Table 5. Mobility Heuristics

Code	Context-Aware Heuristics
CA1	Perception of the current context
CA2	Players should have an equal chance to play
CA3	Adjustable play sessions
CA4	Communication outside the gameworld (Supplements MP1)

Table 6. Context-Aware heuristics

6. Playability Problems in Social Games

In this section we present case studies where heuristic evaluation was used to study playability of social games (Paavilainen et al. 2012; 2014; 2015). The purpose of these studies was to gain understanding on playability problems and design of social games. Social games are interesting from the playability perspective as they are integrated to social network services and feature the free-to-play revenue model. These two factors make it possible for the players to find new games easily for free due to the viral nature of the network and the lack of up-front payment. This also means that the players can easily ditch poor quality games and find new ones, emphasizing the role of good playability in the hopes of retention. Monetization is achieved via in-app purchases selling virtual goods, in-game currency, and extra content. In-app purchase transactions are done during game play or on a dedicated website outside the game.

Social games started to appear in 2007 after Facebook released an application programming interface, which allowed 3rd party developers to create content on the social network service. Since then thousands of social games have appeared on Facebook and some of them became extremely popular featuring millions of daily players due to the ease of access and viral distribution (Paavilainen et al. 2013). For social games the target audience is typically very heterogeneous and many of the players have little or no prior experience with video games. Therefore social games are usually rather simple casual games with a social twist - with exceptions of course.

We used a large number of novice inspectors to examine multiple social games with heuristic evaluation. The inspectors received training to use the original heuristics created by Korhonen and Koivisto (2006; 2007) to guide the evaluation. We analyzed all reported playability problems and organized them based on frequency and violated heuristic. Further methodological details can be found in the published studies (Paavilainen et al. 2012; 2014; 2015). In the following we present examples of both most common and domain-specific playability problems in social games.

6.1 Common Playability Problems in Social Games

The list of common playability problems in social games (Paavilainen et al. 2014) is presented in Table 7. The violated heuristic along with examples of individual playability problems found from the evaluated social games are listed for each problem category.

#	Problem category	Violated heuristic	Examples of common playability problems
1	User-interface layout	GU2	- Screen is crowded with too many UI elements - UI elements hide important gameplay elements - UI does not scale with windowed and fullscreen modes
2	Navigation	GU6	- Players are unable to find the correct action from UI - Confirmation is not asked for in-app purchases - Minimap cannot be used for game world navigation
3	Help	GU12	- Help is not readily available for the player - Player is missing information how to complete actions - Soft and hard currencies[4] are not explained for the player
4	Visual clarity	GU1a	- Avatar's movement animation is not consistent - Small texts are difficult to read - Difficulties to distinguish game units from each other
5	Feedback	GU9	- Feedback from the game is sluggish - Certain actions have no feedback loop at all - There are no visual indicators for upgraded units
6	Camera	GU1b	- Manipulation of the camera is not possible (zoom/angle) - Moving around the camera in the game world is awkward - Some gameplay elements are off-camera
7	Challenge	GP5	- Difficulty ramps up too quickly - Game items wear out too fast - Random element plays too much of a part in the game
8	Browser/Flash	N/A	- Right click cannot be used in a game - Keyboard shortcuts do not work in fullscreen mode - Chat functions are removed in fullscreen mode
9	Goals	GP1	- Player is given too many tasks at a time - End condition for the level is not presented clearly - The game lacks long-term goal

[4] Free-to-play games commonly feature resources which are often referred as "soft" and "hard" currencies. Soft currency is earnable resource which can be collected by doing gameplay tasks. Hard currency is premium resource which can be purchased with real money.

10	Rewards	GP3	- The rewards are too small when compared to effort - Player gains ranks which have no meaning in the game - Resource consuming actions do not provide rewards

Table 7. Common playability problems in social games. The most common problems are related to game usability, but there are also important gameplay problems which need to be addressed.

Most of the top ten playability problems in social games are related to game usability. These include problems related to UI layout, navigation design, availability of help, visual clarity of game content, feedback, and camera views. These problems make the top six of all problems found. In our studies and evaluation workshops, the inspectors have stated that game usability problems are easier to find than gameplay problems. The probable reason for this is that players interact with user interface elements constantly and therefore, they are easier to discover. Gameplay related problems are hidden deeper in the game system and their discovery demands more effort from the inspectors.

As an example we present a UI layout problem (Figure 1). The game's UI is taking up a lot of space on the screen with numerous interface elements making the screen crowded. This often leads to navigation problems as the player is unsure where to find correct information or action. In addition, the crowded UI design obscures gameplay elements. This can be overwhelming and confusing for the player.

Figure 1. Screenshot from *League of Angels* (Youzu 2013) presenting a heavy user interface layout. There are over 30 clickable UI icons on the screen.

In addition to game usability problems, there are gameplay problems as well. These are commonly related to challenge, goals, and rewards. Problems related to challenge come in many forms. Either the game features no challenge like in many world building games or the challenge is too high e.g. puzzle games that ramp up the difficulty on purpose to steer the player towards in-app purchases. There might also be too many random elements present which diminish the element of skill in the game. Usually there is no definite end goal in social games but the player is swarmed with parallel tasks that require a lot of time and clicking – which can be often bypassed with in-app purchases (see next section for domain-specific problems). Meaningless tasks with a lack of challenge and motivating goals tend to result in meaningless rewards.

Some of the problems are related to platform technology, such as Flash, which is commonly used in social games running in a browser. Typically Flash prohibits the use of right mouse click (as it opens the Flash menu) and often some features (like in-game chat or keyboard shortcuts) are disabled when Flash games are played in a fullscreen mode. There is no specific heuristic to cover such a platform dependent problem, but it is an example on how the platform can have an effect on playability.

6.2 Domain-Specific Playability Problems in Social Games

In addition to common playability problems in social games, there are several domain-specific playability problems which should be taken into more detailed analysis as they can influence the common acceptance of the social games. These problems are caused by the social network integration features or the free-to-play revenue model. Through our studies (Paavilainen et al. 2012; 2015) we have identified six domain-specific playability problems. These problems are presented with the violated heuristic and examples in Table 8.

#	Problem category	Violated heuristic	Examples of domain-specific playability problems
1	Repetitive gameplay	GP8	- The core mechanic becomes boring quickly - Tasks are repetitive and meaningless - Gameplay is lacking depth
2	Aggressive monetization	FP1	- Player must pay to advance in the game - Sending gifts to friends require in-app purchases - Quest rewards must be unlocked with in-app purchases
3	Interrupting pop-ups	GU6	- Too many pop-ups when starting the game - Ad pop-ups appear randomly during gameplay
4	Friend requirements	MP6	- Player must invite friends to advance in the game

5	Click fatigue	GP8	- Major tasks require too much mindless clicking - Clicking individual rewards takes too much time - Game world requires too much micromanagement
6	Spammy messages	CA4	- Too many posts and notifications from the game (spam)

Table 8. Domain-specific playability problems in social games.

Repetitive gameplay is one of the most common domain-specific problems in social games. As social games are typically aimed at a large heterogenous audience who often play these games with little or no experience, the gameplay is often designed to be simple and casual, thus lacking depth. Such games are easy to pick up and learn, but ultimately they start to feel repetitive and boring. This is a design tradeoff where versatility and depth of gameplay are sacrificed for easy acquisition and casual feel. A related domain-specific problem is click fatigue, which is apparent especially in world building games where the player must tend her city, castle, farm, home, etc. As the player progresses in the game, these environments expand and require more tending (Figure 2). Tending the game world is usually boiled down to clicking characters and items between timed intervals, which eventually becomes time consuming and tedious as the game requires more and more tending (i.e. clicking) making the game feel frustrating and boring.

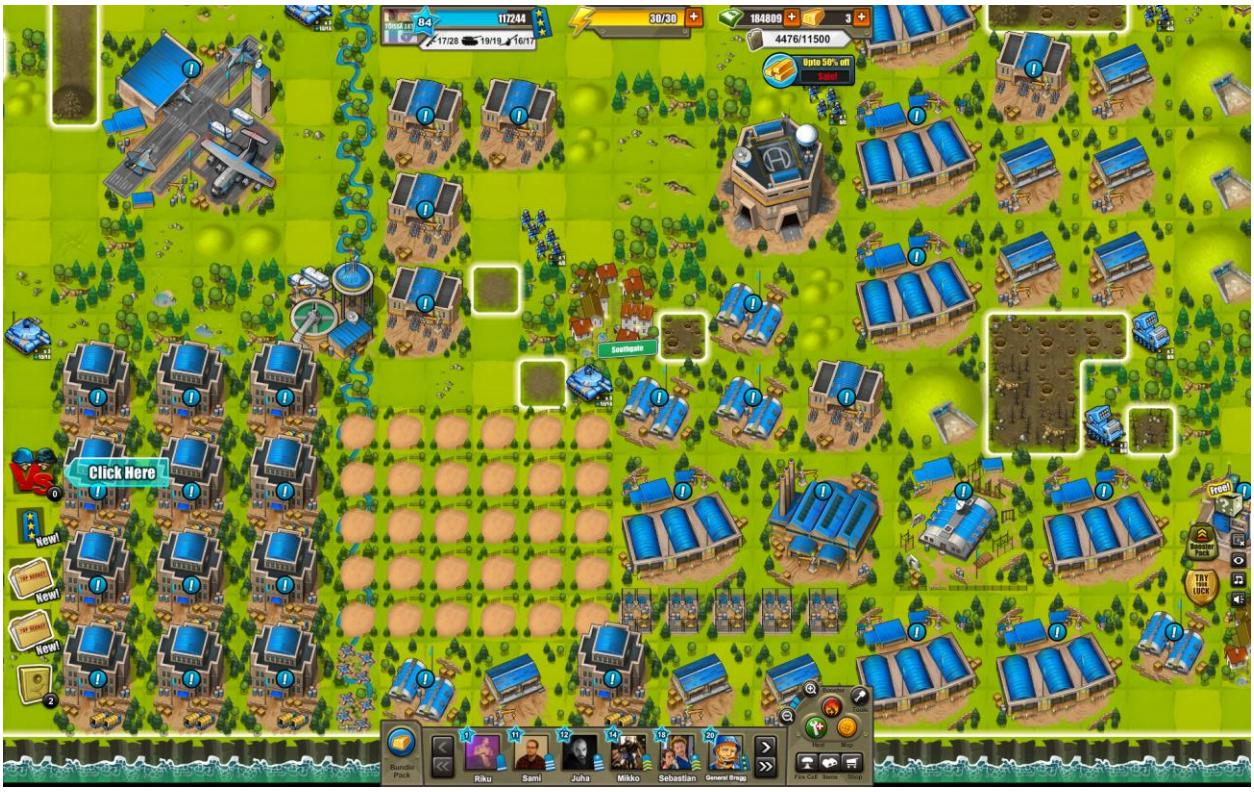

Figure 2. Example of click fatigue in a strategy game. Buildings in *Army Attack* (RockYou! 2014) produce resources that must be separately collected by clicking.

Aggressive monetization is a domain-specific problem to make a quick profit from the players. As in free-to-play games players are monetized through game mechanics, the gameplay must be designed in such a way that it drives players towards in-app purchases. Hard paywalls or gameplay rewards which can be only unlocked with in-app purchases are examples of aggressive monetization strategies. Players get frustrated as progression in the game requires in-app purchases, but the player might not know or understand this before investing considerable amount of time and energy into the game.

Interrupting pop-up windows have been considered problematic for a long time in productivity software and websites. Our studies reveal that some social games feature interrupting pop-ups in conjunction with aggressive monetization. During game play, a sudden pop-up dialog might be advertising in-app purchase sales. This is irritating for the player as it interrupts the task at hand unexpectedly. When getting back to the game after some time, there might be several pop-up dialogs promoting sales, updates, and other content after the game loads. These dialogs create additional and unwanted navigation paths as they must be closed manually. Pop-ups are also used to ask players to invite their friends into the game. Similar to hard paywalls, some games require the player to invite friends to progress in the game. This is another domain-specific problem based on social network integration and irritating for those players who think it is awkward to invite friends to play – or simply do not have enough playing friends. Sending out numerous invites relates to the last domain-specific problem, spammy messages. Constant notifications, which are often encountered outside the game, become irritating and result to blocking and ignoring the game altogether. Notifications and reminders sent by the players and the game is a retention strategy to get players back into the game, but like aggressive monetization it can backfire and turn against itself.

These are examples of playability problems we have discovered with heuristic evaluation experiments. For us, heuristic evaluation has been a valuable tool to gain understanding of playability and design of social games. These findings have also been confirmed by player and developer interviews (Paavilainen et al. 2016) focusing on social games and other free-to-play games.

Understanding these playability problems is useful for both researchers and developers. For researchers this opens up new and more nuanced research questions while providing information on challenges of social games design related to monetization and player experience. Developers can use these findings to improve the quality of their games by paying attention to identified problem areas in game design.

7. Heuristics for Free-to-Play Games

Based on our research on social games and free-to-play games in general (Paavilainen et al. 2016), we introduce a new module including six heuristics which should be taken into account

when evaluating free-to-play games (Table 9). These heuristics are based on game developer and player interviews (e.g. Alha et al. 2014, Paavilainen et al. 2013), evaluation experiments, and game analyses done in the SoPlay, Triangle, and Free2Play research projects (2008-2015) in Game Research Lab[5], University of Tampere, Finland.

In free-to-play games the revenue model and monetization strategy is integral part of game design, and therefore affect the player experience as in-app purchase transaction are done usually during game play. For this reason there is a need for heuristics covering the monetization aspects in relation to game design. These new heuristics cover important playability issues related to monetization in free-to-play games, focusing on fair play, transparency, and ethics.

We present the heuristics here as an initial list, which has not yet been validated thoroughly. When evaluating free-to-play games, inspectors should pay close attention to these heuristics as violating them might result not only in poor player experience, but also in bad media representation in some cases as well.

Code	**Free-to-Play Heuristics**
FP1	Progression is possible without in-app purchases (supplement to GP11)
FP2	In-app purchases and transactions are clearly informed
FP3	In-app purchases provide meaningful value
FP4	In-app purchases can be made inaccessible for minors
FP5	Hard currency can be earned through game play
FP6	Gameplay is fair for both paying and non-paying players (supplement to GP5)

Table 9. Free-to-Play heuristics.

7.1 Progression is possible without in-app purchases (FP1)

Progression in the game should be possible without resorting to in-app purchases. Based on interviews and game evaluations, forcing the player to make in-app purchases to progress causes frustration. In a commercially viable free-to-play game the content must be throttled for the non-paying player to make in-app purchases appealing. However, denying progression without in-app purchases, known as hard paywall, is deemed detrimental by players and developers alike. All game content should be accessible for non-paying players at least in theory, while progression can be made faster for paying players. This heuristic is a supplement to GP11 heuristic (stagnation) and it is also related to GP2 heuristic (progression).

[5] http://gameresearchlab.uta.fi

7.2 In-app purchases and transactions are clearly informed (FP2)

This heuristic focuses on how purchases with real money or hard currency are presented for the player. The prices for such purchases must be clearly visible and all transactions should be confirmed separately. Neglecting this heuristic might cause players to make unintentional purchases, which can lead to complaints and demands for refunds. In addition, the benefits of such purchases must be made clear to the player.

7.3 In-app purchases provide meaningful value (FP3)

In-app purchases must be meaningful, thus provide value for the paying player. If the purchases do not provide meaningful value, the player has wasted real money or hard currency for nothing. For example, the player should not be lured to purchase inferior items in the game or otherwise tricked into purchasing obsolete content.

7.4 In-app purchases can be made inaccessible for minors (FP4)

It should be possible to make in-app purchases inaccessible for minors so that they cannot make unwanted purchases. This is an ethical issue brought up by both players and developers in our interviews. There have been many stories in mass media how children have caused massive credit card debt for their parents by making in-app purchases either on purpose or by accident. These news are bad press for game companies and therefore such situations should be avoided when possible.

7.5 Hard currency can be earned through game play (FP5)

Games with hard currency should give it out in a limited amount for non-paying players for progression. The rationale is that non-paying players can then get an idea from the benefits of in-app purchases which further motivates them to make actual in-app purchases with real money. In many free-to-play games there might be a small amount of hard currency available for the player right from the start, which is one way to support this heuristic. If the non-paying players can never experience the benefits of in-app purchases, they are less likely to convert to paying players.

7.6 Gameplay is fair for both paying and non-paying players (FP6)

The sixth heuristic (FP6) is related to game balance and is a supplement for GP5 heuristic. In free-to-play multiplayer games, especially those with competition between players, the paying players should not have a decisive advantage over non-paying players. Such pay-to-win scenario is frowned upon by players and developers alike. Hence the gameplay should be fair for non-paying players while still providing value for paying players as well. The extra value for paying

players can be offered in many ways without imbalancing the gameplay. Non-functional cosmetic items (e.g. exclusive character outfits of weapon textures) are popular in many successful free-to-play games while functional benefits can include for instance faster progression and the possibility to modify the game play towards one's own playing style.

8. Conclusions

In this chapter we have presented heuristic evaluation with updated playability heuristics. We have also given examples of studies where heuristic evaluation was used to identify common and domain-specific problems in social games. Lastly we have introduced a new heuristic module with six heuristics for evaluating free-to-play games.

Heuristic evaluation is a viable method for identifying playability problems, cost-effective, and more flexible than playtesting with the target audience. As development costs and production values are getting higher, it is important to identify playability problems early in the development phase when playable prototypes become available. Identifying and fixing problems early allows playtesting to focus on more important issues than catching basic playability problems which can be found easily with heuristic evaluation. It is important to note that heuristic evaluation does not replace playtesting, but it is a flexible complementary method that can be utilized quickly when needed.

Heuristic evaluation is also a formidable research tool to study and understand playability. We have used heuristic evaluation in number of experiments to study playability and game design of social games. Through these experiments we have identified the most common playability problems for social games, and also domain-specific problems that stem from the social network integration and free-to-play revenue model. These findings are beneficial for both researchers and developers alike.

The updated playability heuristics presented in this chapter can be used in a flexible manner to evaluate games. The game usability and gameplay modules can be used to evaluate all kinds of games while the additional modules cover the specific characteristics of multiplayer, mobile, and context aware games. As games evolve to new domains, new heuristics are needed as well. Our research has indicated the need to include heuristics covering monetization aspects in free-to-play games. The newly proposed six heuristics for evaluating free-to-play games focus on fair play between paying and non-paying players, transparency of transactions, and ethics for protecting minors. This is an initial list for researchers and practitioners to take on as a basis for evaluating free-to-play games. We encourage practitioners and researchers to explore these heuristics further and possibly amend the heuristics.

A good set of heuristics is a valuable asset for the development team as it helps to understand playability holistically in a practical manner while being a communication tool ensuring

everyone is on the same page. The playability heuristics presented in this chapter work as a basis which can be extended further when new types of problems are identified or when new technologies are used for playing games. For example, new emerging domains such as augmented and virtual reality games will need their own heuristic modules to cover the domain-specific issues relevant to them.

Heuristics are not set in stone, nor are they be-all-end-all solution to improve playability. When designing a game they can and should be violated when there is good reason to do so. The emphasis is in good judgment and making a just call for violating a heuristic. This concerns especially gameplay heuristics, which are more subjective in their nature than game usability heuristics. Game design is often tradeoffs where one tries to achieve the best tradeoff possible. This requires good communication between inspectors and developers, and a thorough understanding on the causes of playability problems. Heuristic evaluation method with the presented playability heuristics is a ready-to-use tool for developers to improve the quality of their games and for researchers to study playability of games.

9. Takeaways

- Heuristic evaluation is a cost-effective and flexible tool for identifying playability problems, making it suitable for agile and iterative game development process
- Three-to-five double expert inspectors are recommended, but novice inspectors can be also used with greater numbers
- The game usability and gameplay heuristics presented in this chapter can be used to evaluate the most important aspects of any type of game
- The additional heuristic modules focusing on multiplayer, mobile, context-aware, and free-to-play can be flexible used when needed
- Iterative use of heuristic evaluation helps to improve the design so that actual playtesting can focus into more important aspects than catching basic playability problems

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Janne Paavilainen (Ms.Econ) is a games researcher at Game Research Lab, University of Tampere, Finland. For the last decade Janne has been involved in research projects focusing on mobile, casual, and social gaming. Janne's research interests are in game usability, playability, and player experience. Recently he has studied the relationship of free-to-play revenue model, service design, and player experiences in social network games while finishing his doctoral dissertation on Facebook games.

Hannu Korhonen (Ph.D.) has more than 18 years of experience in working with usability and user experience issues both in academia and industry. Although Hannu has worked in many different domains, mobile devices and services including mobile games has been the primary area for years. Hannu has developed playability heuristics, which can be used to evaluate playability of all kinds of games. In addition, he is one of the developers of playful experience (PLEX) framework which can be used for designing playfulness in different products. Recently, Hannu completed his PhD dissertation on playability evaluation of mobile games with an expert review method.

Elina Koskinen (B.A.) is master’s degree student majoring in philosophy at the University of Tampere. She did her Bachelor's thesis on ethical issues in designing free-to-play games. Elina is interested in narratives and is currently working on her Master’s thesis about designing ethical experiences in video games.

Kati Alha (M.Sc.) is a researcher and a doctoral student at Game Research Lab, University of Tampere. She has been researching games from multiple perspectives including for instance playability evaluation, playful experiments, and hybrid experiences in play since 2008. She is interested in the design of free-to-play games and has recently studied player experiences and attitudes towards free-to-play games.