

The Playful Experiences (PLEX) Framework as a Guide for Expert Evaluation

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ABSTRACT

The Playful Experiences (PLEX) framework is a categorization of playful experiences based on previous theoretical work on pleasurable experiences, game experiences, emotions, elements of play, and reasons why people play. While the framework has been successfully employed in design-related activities, its potential as an evaluation tool has not yet been studied. In this paper, we apply the PLEX framework in the evaluation of two game prototypes that explored novel physical interactions between mobile devices using Near-Field Communication, by means of three separate studies. Our results suggest that the PLEX framework provides anchor points for evaluators to reflect during heuristic evaluations. More broadly, the framework categories can be used as a checklist to assess different attributes of playfulness of a product or service.

Author Keywords

Evaluation Methods, Heuristic Evaluation, Playfulness.

INTRODUCTION

Back in 2004, Ben Shneiderman [35] suggested that “*when the functionality and usability have been accommodated in the design, it is time to add the extra touches and flourishes that delight and amuse users.*” Today, most HCI researchers would both agree and disagree with this statement. Positive aspects of interaction such as *fun* [8] and *playfulness* [25] are nowadays a common design goal. Yet, at the same time, most HCI researchers would disagree in that usability comes before pleasure. Interacting with a product can be a goal in itself [15]; pleasure is an inherent aspect of interaction and a primary design goal in many of today’s products.

Over the last decade, research in User Experience has contributed a number of concepts, measures and frameworks for the design of positive experiences with interactive products [e.g., 15,20,29]. A large body of work has focused on understanding what makes for pleasurable interactions with products, and both play [25] and fun [7] have been seen as critical for the emergence of inherently

positive interactions.

Our work is motivated by the one of Lazzaro [25] that focuses on what makes computer games and entertainment products fun. When we started our work we had a similar goal as Lazzaro: we wanted to understand how playfulness can be employed in creating meaningful and memorable experiences for users. Our initial assumption was that playfulness is an important, but often neglected, design quality for all kinds of products. This assumption was based on findings from research on games in general [6,16,21,22] and previous research on play [1,8,13,28,34,36,39]. Features that make games and play engaging can also make other kinds of products more enjoyable, elicit more meaningful experiences, and ultimately increase the quality of the overall user experience and, respectively, the market value of a product [5]. Playfulness, in other words, can be a positive feature in products that not only aims at pure entertainment.

In this article we describe our experiences in using a theoretical framework of Playful User Experiences (PLEX) [2,22] as a guide in expert evaluation of interactive products. The PLEX framework identifies 22 categories of playfulness based on previous theoretical work on pleasurable experiences [12], game experiences [14,18], emotions [24], elements of play [37], and reasons why people play [4,40]. While it has been successfully employed in design-related activities, such as developing design tools and techniques [26,27], as well as for concept development [3,17], its potential to guide expert evaluation has not yet been studied.

We apply the framework in the evaluation of two prototypes that explored new ways of physical interactions between mobile devices using Near-Field Communication (NFC). We raise the following interrelated questions: 1) can the PLEX framework be applied as an evaluation tool to assist and guide experts conduct heuristic evaluations [30] on aspects of playfulness for a given product or service? 2) Could the PLEX framework categories serve as principles and be used as a checklist to assess different aspects of playfulness?

The remainder of the paper is structured as follows. We start by reviewing playfulness frameworks rooted in user experience as well as computer game literature. We then introduce the PLEX framework and the evaluation studies. The article concludes with an analysis of the usefulness of the PLEX framework in guiding expert evaluation.

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PLAYFUL USER EXPERIENCES

While interest in playful interactions has peaked only over the last decade, one has to note that early work has existed within the HCI field since the '80s. Malone [28] was one of the first to propose that features that make computer games captivating can also be used in making other user interfaces interesting and enjoyable to use. He summarized his heuristics for doing this under three main categories: *Challenge*, *Fantasy*, and *Curiosity*. Similarly, Carroll and Thomas [10] argued that fun can be a distinct design goal from ease of use.

Since then, a wide range of concepts and frameworks have been proposed in an attempt to crystallize playfulness in the context of interacting with non-entertainment products. One may broadly classify those in two main categories: a) frameworks that have been derived from psychological theories of pleasure, and b) frameworks that have been derived from an empirical analysis of computer games.

Theory-Driven Frameworks of Pleasure

Most of theory-driven frameworks are rooted in the UX field with even a full edited book dedicated on *Funology* [7]. Jordan [19] was one of the first to distinguish between four categories of pleasure building on a model originally created by Tiger [38]: *Physio-pleasure* (physiological enjoyment), *Socio-pleasure* (socially related enjoyment), *Psycho-pleasure* (pleasure related to the performance of the product, e.g., convenience), and *Ideo-pleasure* (pleasure related to the person's ideologies, e.g., environmental values). Norman [32] argued that successful products engage users on the behavioral, visceral, and reflective levels.

Hassenzahl [15] argued that users' behaviors with interactive products are affected by their motivational orientation. In *do-mode*, people can have several goals and they can switch frequently between them. In *goal-mode*, they strive for one goal, and are less interested in exploring or being playful. The latter could happen, for instance, when trying to deliver a result before a deadline.

Practice-Driven Frameworks of Playfulness

The aspects that make games fun have been studied by many researchers, for example, Garneau [14], Hunnicke et al. [18], and Koster [23]. More recently, Lazzaro [25] has proposed that four forms of fun, which she identified in games, could be also used for creating more enjoyable user experiences in other products. Lazzaro argues that productivity applications take the motivation to use them for granted, whereas games provide intrinsic motivation for the players since the process of playing games is itself rewarding (not only the final outcome). The four forms of fun Lazzaro has identified are *hard fun* (challenging play), *easy fun* (open-ended fun "without purpose"), *people fun* (social situations), and *serious fun* (playing with a serious purpose, for instance, getting more fit by playing fitness games).

Clanton [11] distills elements from games that can be used in the interaction design of other applications. The elements can be summarized as *Conflict and Challenge*, *Point of view*, and *Fun*. Fun, however, is slightly recursive, containing elements from the *Challenge* element as well. Clanton claims that the fun dimension is lacking in most software, and that fun does not only rely on the interface.

Kim [21] has used elements from games in making social software more playful. She defines five example categories of how fun can be enhanced in social software: *collecting*, *points*, *feedback*, *exchange* and *customization*. She does not claim that the possibilities are limited to these example categories. She also mentions that she herself has a personal preference in calling the users of the social software *players* rather than *users*, in order to set a more playful state of mind when designing the product.

THE PLAYFUL EXPERIENCES (PLEX) FRAMEWORK

Costello and Edmonds [12] created a framework for making interactive installations more pleasurable and playful, based on research on what elements make games fun. They cross-referenced six earlier publications, assembling the views of philosophers, researchers and game designers to obtain what they call a '*pleasure framework*.' They derived 13 '*pleasures of play*' that can be used for design and evaluation. Costello and Edmonds [12] argue that their results suggest their framework could be used beyond interactive art to make user interfaces in general more playful and pleasurable. In an attempt to study more specific playful experiences, Korhonen et al. began their work towards adjusting and expanding the '*pleasure framework*.'

The PLEX framework [2,22] is a categorization of playful experiences based on previous theoretical work on pleasurable experiences [12], game experiences [14,18], emotions [24], elements of play [37], and reasons why people play [4,40]. As a result of this analysis, the authors examine the wide range of experiences elicited by interactive products when they are used in a playful manner. The overall focus was shifted from pleasures to experiences to indicate that not all such experiences are always pleasurable in the context of play. The assumption is that its categories capture at least the most prominent playful features of different kinds of products. To validate the initial PLEX framework [22], the authors interviewed 13 players about their experiences with three videogame titles: *The Sims 2*, *Grand Theft Auto IV* and *Spore*. All the inspected PLEX categories were mentioned on numerous occasions in the interviews and in the context of at least two different games. The interview results indicated that the different ways in which players experience games can at least partly be explained through the PLEX categories. On basis of the findings, Arrasvuori et al. added new categories to PLEX (i.e., *Humor* and *Submission*), resulting in a total of 22 categories [2]. The PLEX framework categories used in this paper are summarized in Table 1.

Table 1. The PLEX framework consisting of 22 categories.

Experience	Description
Captivation	Forgetting one’s surroundings
Challenge	Testing abilities in a demanding task
Competition	Contest with oneself or an opponent
Completion	Finishing a major task, closure
Control	Dominating, commanding, regulating
Cruelty	Causing mental or physical pain
Discovery	Finding something new or unknown
Eroticism	A sexually arousing experience
Exploration	Investigating an object or situation
Expression	Manifesting oneself creatively
Fantasy	An imagined experience
Fellowship	Friendship, communality or intimacy
Humor	Fun, joy, amusement, jokes, gags
Nurture	Taking care of oneself or others
Relaxation	Relief from bodily or mental work
Sensation	Excitement by stimulating senses
Simulation	An imitation of everyday life
Submission	Being part of a larger structure
Subversion	Breaking social rules and norms
Suffering	Experience of loss, frustration, anger
Sympathy	Sharing emotional feelings
Thrill	Excitement derived from risk, danger

The PLEX framework has subsequently been used as a basis for design-related activities, i.e., to develop design tools [26,27] and for concept development [3,17]. In this paper, we take the work developed by Korhonen et al. [22] and later by Arrasvuori et al. [2], and our aim is to explore the use of the PLEX framework for evaluation purposes.

APPLYING PLEX TO EVALUATE TWO NFC GAMES

Taking the PLEX framework as a starting point, we wanted to explore what the relevance and applicability of the PLEX framework is in the evaluation of interactive products and services. We wanted to answer the following questions: can the PLEX framework be applied as an evaluation tool to assist and guide experts conduct heuristic evaluations [30] on aspects of playfulness for a given product or service? Could the PLEX framework categories serve as principles and be used as a checklist to assess different aspects of playfulness? In order to answer these two interrelated questions, we conducted three studies aimed at evaluating the design potential of the Near Field Communications (NFC) technology via two mobile phone games (i.e., Snow and Veggie) and by using the PLEX framework. An overview of these studies is presented on Table 2.

Table 2. Overview of the NFC evaluation studies using PLEX.

Study	Participants	Exposed to PLEX?	Familiar w/ NFC?	Exposed to Games?
1. Expert Evaluation	4 Researchers (+8 Test Players)	Yes (No)	No (No)	Yes (Yes)
2. Interview A	3 Professional Game Designers	No	No	Yes
3. Interview B	2 Developers of Snow + Veggie	No	Yes	No

In the first study (i.e., expert evaluations), researchers actively used the PLEX framework to conduct a heuristic evaluation of the two games. The second and third studies (i.e., interviews with professional game designers and the developers of the two games) were conducted without the use of the PLEX framework to verify the findings from the previous expert evaluations. Triangulating these studies would also allow us to reflect and identify the strengths and weaknesses of the PLEX framework as a tool for evaluation. These studies could also shed some light on whether the framework can assist iterative design [9,31].

The Two NFC Games: Snow and Veggie

NFC¹ is a short-range two-way radio communication technique that best operates at a distance of 10 cm or less. The technology allows transmitting data at a rate between 106 and 848 kbit/s. Such identifiers are used in many industries already. In commerce, NFC is used in mobile payments (e.g., Google Wallet²), ticketing systems for public transport, and to track deliveries of goods to stores. In entertainment, Skylanders³ has recently become a popular video game that is played through physical toy figures using an NFC-enabled “Portal of Power.” As the communication is very short-range, the main interaction technique with NFC consists of physically touching devices or tags. Person-to-person interactions that require proximity, simulations of handing over physical objects, or handshaking are suitable and natural ways to use NFC.

We tested the opportunities to use NFC in playful interactions with two prototype games (i.e., Snow and Veggie). These two games were not developed with the PLEX framework in mind; rather, the main objective of the prototypes was to demonstrate fun aspects of using NFC in mobile phone games.

The Snow Game

Snow (Figure 1) is a two-player game that has no written words in the user interface. With this game, the aim was to study how intuitively the NFC can be used as the main mechanism to advance a two-player game. In the game, there is a 6x8 grid with two players (Figure 1, left). In each round, players can move their characters two spaces, and throw a snowball once. For example, a player may decide to move one space to the left and one space up, or try to fool his opponent by moving one step to the left and one to the right, thus remaining at the same place. After deciding how their character will move, players use a crosshair to aim a snowball where they think their opponent will make their next move to.

¹ NFC. en.wikipedia.org/wiki/Near_field_communication

² Google Wallet. en.wikipedia.org/wiki/Google_Wallet

³ Skylanders. en.wikipedia.org/wiki/Skylanders



Figure 1. The Snow Game. The UI elements (left): the red player (1) has just thrown a snowball (2) at the green player (3). Snow piles (4) form where previous snowballs have landed. Footsteps (5) indicate where the players have been before. After each round, the UI invites players to touch each other’s devices to exchange info about their moves (right).

In terms of NFC interaction, once both players have carried out these actions (i.e., moving and aiming), the UI invites players to touch each other’s phones to exchange information about their moves. Upon doing so, an animation is drawn to indicate that physical contact was established (Figure 1, right). Shortly after, an animation is shown on both devices to show the outcome of the current round of the game.

As the game progresses, snow piles form where previous snowballs have landed. Snow piles can also be used to reduce the amount of available space that their opponent has. Finally, footsteps on the snow indicate where the players have been in previous rounds of the current game. Again, this can be used to fool your opponent. The game starts when the players touch each other’s phones for the first time, and ends after one or both players are hit.

The Veggie Game

Veggie (Figure 2) is a 2 to n number of players game. Each player has 18 (3x6) slots for vegetables divided into three crop rows (Figure 2, left). There are four different vegetables types (i.e., potatoes, carrots, tomatoes and eggplants) and each vegetable takes a certain different time to grow (i.e., potatoes grow the fastest and eggplants the slowest). The slower a vegetable grows, the larger amount of points players get for that vegetable. Once the vegetables are fully-grown, they can be sold (i.e., exchanged for points). The more fully-grown vegetables of the same kind the player has when sold, the more points are obtained.

In terms of NFC interaction, growing vegetables can be traded between two players who gain a fully-grown vegetable each. Since everyone who trades gets an advantage, the game is best won by constant trading. When vegetables are successfully traded (Figure 2, right), an animation is shown on the UI and a distinctive vibration is triggered on both devices to provide tactile feedback.



Figure 2. The Veggie Game. The main game UI (left): three crop rows where 18 vegetables including potatoes, carrots, tomatoes, and eggplants grow at varying speeds. Fully-grown vegetables can be traded with other players by selecting them and touching the devices together (right) to exchange.

Once one or more vegetables have been sold or traded, they free up space for new vegetables to grow. New vegetables are randomly assigned to each free crop space. An often-used strategy consists of growing and selling as many vegetables of the same type to get extra points. Therefore, if a player is collecting eggplants, they would try to quickly sell or exchange other vegetable types to free up crop space. However, as the player has no control on what vegetable type will start growing in a free crop space, the player may have to switch strategies on the fly. The game starts when the players touch each other’s phones for the first time, and ends when the first player reaches 15000 points.

Evaluating Playfulness With the PLEX Framework

The purpose of conducting these three studies (i.e., expert evaluations, interviews A+B) was to explore the relevance of the PLEX framework as an evaluation tool. We chose NFC-based mobile phone games as a concrete example where we could both use PLEX to spot the opportunities and challenges of using an emerging playful interaction technique, as well as to test the feasibility of PLEX in evaluating these games. These studies were not conducted to further improve nor offer a *post-mortem* analysis of the games. We evaluated two prototypes: the Snow and Veggie games. They had a similar basic NFC interaction technique: putting two devices together, in this case mobile phones, to transfer data and synchronize the game state. The purpose of the interaction, however, was different. In Veggie, the touch completed a trade with another player, while in Snow the purpose of the touch was to synchronize the game state between the two devices and switch to another game mode.

Expert Evaluation Participants and Procedure

Four researchers (Table 2), who were familiar with the PLEX framework, did a first evaluation of the games. Thus, the main source of data was expert evaluations done by the researchers using the PLEX framework. Usability experts usually conduct an expert review or Heuristic Evaluation

[30] to evaluate a product by using usability heuristics as principles to check different aspects of a product (e.g., the UI). The four experts each had at least 10 years of experience conducting usability and playability (heuristic) evaluations in both industrial and academic research contexts. To complement and do a soft validation of the experts' initial findings, a supporting method was to observe four pairs of test players (n=8) playing the same games.

The four researchers who conducted the evaluation split into two pairs. First, each pair of researchers took a different game and played the game one researcher against the other for at least 3 rounds of the game. Second, each pair of researchers took a deck of PLEX Cards [26,27] (Figure 3) and started to discuss within the pair which of the 22 playful experiences had been present while playing the game. The game was still available to the researchers during this evaluation. Third, each pair of researchers took the other game and repeated the same procedure. Fourth, 8 players split into 4 pairs (2 pairs per group of researchers) were observed by the researchers while playing both games. Fifth, both pairs of researchers shared and discussed their findings (both from the expert evaluation and the player observations), trying to find common areas in their interpretation of the results.



Figure 3. The PLEX Cards. Four of the 22 cards created to communicate the categories of the Playful Experiences (PLEX) framework: *Captivation*, *Fellowship*, *Sensation* and *Simulation*.

Expert Evaluation Results

Even though the games were simple, it was clear that many of the PLEX categories were present in both games and on many different layers of user experience. For example, *Completion* was evident in Veggie on three different aspects: first, it was present in the basic interaction of finishing a trade with another player. Second, it could also be observed when players used the strategy of trying to grow as many vegetables of the same kind as possible. Third, the category was connected to finishing the game itself. One parallel manifestation of *Completion* was that some players wanted to get only one kind of vegetable on their field, even though this was not the best strategy to win the game. As the focus of our analysis was on the NFC interaction technique, the PLEX categories that relied solely on the prototypes being games, such as *Competition*, *Fantasy*, and *Thrill*, were left out from more detailed evaluation. The categories that the experts found were the most important for the NFC interaction were: *Captivation*, *Fellowship*, *Sensation*, and *Simulation*. The PLEX Cards for these four categories are shown on Figure 3.

Captivation: in the case of Veggie, but also to some extent in Snow, it was evident that the players were not only captivated by what was shown on the small screen but that the social situation in itself required constant attention from the players. The physical act of reaching out to touch other players' phones extends the game situation from the device itself to the social situation. The players of Veggie, for example, were constantly negotiating the game situation and the next possible trades with other players.

Fellowship: the main interaction using NFC in Veggie is to trade vegetables with another player. The trading as a game mechanic is an important part for both the strategy itself and for the social element of the game. The trading could have been implemented in various ways, for example, with Bluetooth, but using physical touch to complete a single trade brings an element of intimacy and fellowship. In Snow, touching the phones is required only to progress to the next game round, but likewise in Veggie, the touching aspect inevitably gave rise to a social situation where the players have to share the same physical place in order to play the game. Touching other players' phones is an intimate social act and it creates a heightened feeling of social connectedness with other players compared to game interaction that does not require touching.

Sensation: the game graphics in both Veggie and Snow were simple but the fact that the players were physically touching each other's phones brought in tactile sensations. The vibration feedback was especially important for the players and heightened the sense of physical interaction. This leads, as in *Captivation*, to regard the game situation as something more than just what is shown on the small screen of the mobile phone. Using the vibration for enhancing the physicality of touch both as feedback and as

a cue for action was considered an important feature of the NFC interaction.

Simulation: this is a strong feature in the Veggie game, but it is not really present in Snow. It could be argued, however, that all games that are not abstract have a simulation element, provided they have elements of everyday life that are familiar to people. In the Veggie game, partly what makes the trading so much fun is that the players physically reach out to other players to give vegetables, just like they would in real life. In our expert review, we found the *Simulation* category rather late, after the initial analysis. The reason for this can be that the PLEX definition used for *Simulation* [22] did not cover simulating physical interactions. This is mainly because the design guidelines and examples provided in the PLEX framework are about simulating real life inside the game screen or creating advanced virtual reality simulations.

We also found some game aspects that were not completely covered by the PLEX framework. One such feature was the game design pattern called ‘Hovering Closure’ [6], which basically occurs when a player is waiting for something to be completed, but the outcome of the closure is not certain. This adds excitement to the player experience. ‘Hovering Closure’ featured strongly both in trading the vegetables and synchronizing the game state. In the Veggie game, the players could not be fully sure which vegetable they would get before the trade was completed. In the Snow game, the whole idea of the game was to guess the other player’s next move and try to get them with snow balls, which made waiting for the game round to resolve very exciting. A single PLEX category could not explain this. However, this feature could be seen as a combination of *Thrill* and *Completion* categories. In this way, the PLEX categories could be used as molecules or Lego blocks, and by combining these new kinds of playful experiences could be described.

Test Player Results

When observing the eight test players playing the game, it also became clear to the experts that there was a possibility to bluff, lie or cheat. As mentioned earlier, when synchronizing the game state by putting the devices together, the players did not know what they would get until the NFC data transfer was completed. In the Snow game, bluffing was clearly part of the game. The intention of the game was to avoid getting hit by snowballs by either camouflaging one’s actions in the real world (i.e., not letting the other player see what buttons one is pressing) or even misleading the other player on what would be the next action. In the Veggie game, the assumption amongst all of our test players was that the players would not lie about what vegetable they were going to give to the other player. No bluffing happened in our test sessions, and bluffing could be seen in this game as lying or cheating. This game mechanic could be easily explained by a game design pattern called ‘Possibility to Betray’ [6]. However, when

referring to the PLEX framework, we could not find a single category that could be used to explain such player experience. *Subversion* (in the sense of breaking social rules and norms) could be a close match in the Veggie game, however, not as strong in the Snow game, where bluffing was not as subversive because it was an integral part of how the game was supposed to be played. However, adding *Thrill* and *Control* aspects to the feature analysis we could get a better understanding of the ingredients of the user experience of lying or cheating. Particularly in the Veggie game, having the possibility to cheat, and then not lying to the other player, built trust between the players. This contributed to experiencing *Fellowship* between the players. As stated earlier, the ‘Hovering Closure’ game design pattern (*Thrill* and *Completion* PLEX categories) was also closely related to this experience as the players needed to wait before they knew if bluffing had happened or not.

Evaluating Playfulness Without the PLEX Framework

To understand better how comprehensive the experts’ evaluation done with the PLEX framework was, we conducted two sets of semi-structured interviews on the topics of playfulness, NFC technology, and the two games that were evaluated (i.e., Snow and Veggie). Interview A was conducted with three professional game designers, while for Interview B we discussed with the two developers of the Snow and Veggie games. None of the participants were familiar with the PLEX framework, nor were they exposed to it during the interviews.

Interview A Participants and Procedure

Interview A (Table 2) was conducted with three professional game designers from the Finnish gaming company Rovio⁴ (the developers of Angry Birds). The three game designers had at least 7 years of experience designing and implementing (mobile) video games. The participants were unfamiliar both with PLEX and the NFC technology (i.e., they had heard of NFC but had never used it).

Two researchers conducted the interviews. First, the researchers introduced the Snow and Veggie games to the professional games designers. The researchers let the participants freely play a few rounds of each game amongst themselves and assisted the participants when needed. Then the actual interview was conducted with all three participants as one group.

Interview A Results

It became evident that the professional game designers considered the physical touching of devices as a playful feature. One of the participants referred to it as “an emotional experience”, with others commenting “it is like a handshake”, or “it is like a virtual kiss.” The touching was

⁴ Rovio. <http://www.rovio.com>

seen more meaningful in the Veggie game where the interaction was used to give things to other people, whereas in the Snow game, it was just used for synchronizing the game state and also making the game flow more clear as transitioning to the next round of the game required physical interaction.

Since the interviewees were professional game designers with a history of Bluetooth development for multiplayer gaming, they commented on the limited bandwidth of NFC to transfer information, feeling that Bluetooth would have been technically more efficient. This was further pointed out when the game designers were wondering “*did NFC bring any added value to this?*” They then continued that “[o]n the other hand, the game never hangs. You have to communicate when making your move. The other player never hangs.” This further points out that actions in the real world (e.g., *Simulation*) were a key aspect of the technology. Further, this gives players a strong feeling of *Control*. With NFC, the users are fully in control as they have to initiate communications with physical actions.

The participants also noted that a big advantage of using NFC instead of, for instance, Bluetooth, was that it does not feel so technical. One comment in the interviews regarding the use of NFC in the games was that “*it felt natural.*” One question here is where we draw the line when defining playfulness in design. Simple and intuitive interaction design that hides technicalities can be considered as a playful feature, or just plainly as good interaction design.

Participants also mentioned that simultaneous actions were perceived as engaging. In the Veggie game, players had to reach out and touch their devices at the same time to complete the trade. One participant described simultaneous actions as similar to “*turning keys in two different locations to launch an atomic bomb.*”

One key aspect pointed out by the participants was that of bringing the game out of the digital world. The game designers mentioned: “*In addition to forming connections you can use it in other ways as well: like handshaking after the tennis game.*” The tennis game is similar to the Snow game, and as the players are repeatedly shaking hands, this would be a very obvious way of using this. They further commented: “*Players are doing something together*” - which is very much a continuation of the constant need to physically connect the phones.

As a conclusion, the professional game designers thought that concrete actions that simulate real life behavior were the key aspect of the games (i.e., *Simulation*). In addition, *Control* was a key aspect as the game designers thought the action was very well communicated by the real world actions. One of the participants summarized our interview in the following way: “*what matters is that you physically do something with another player at the same time.*”

Interview B Participants and Procedure

Interview B (Table 2) was conducted with the designer and programmer of the Snow and Veggie games from the Finnish gaming company Kuuasema⁵. Both game designers had at least 5 years of experience in game development. Finally, as a reminder, the developers were neither familiar nor exposed to the PLEX framework.

Interview B was conducted approximately one year after the development of the prototype games. Hence, the two developers (i.e., the design and the programmer) did not have the games fresh in their minds. Unlike the four researchers and the three professional game designers, the developers did not play the game before the interviews. However, we briefly went through the key aspects of each game before the interviews. As the creators of the games, they were familiar with the NFC technology and had a clear idea of its potential for interaction. The interview was conducted with both participants simultaneously. The same two researchers from Interview A conducted this interview.

Interview B Results

We discussed several issues that were more related to usability than playfulness. For instance, one important feature that the participants talked about was being able to skip the burden of settings up a connection and just point at the device that you would like to interact with. *Ease of use* was also mentioned as something that makes games more fun, although not necessarily more playful. Good usability will not necessarily make a game or application more fun to use but can contribute to a positive user experience [19].

In general, a philosophy that the game development studio wanted to drive forward was taking the games out of the mobile phone screen - this means expanding the gameplay from looking only at the mobile phone screen toward real world interactions. They mentioned that the NFC technology was feasible for them in this sense, as it stimulated real-life communication (i.e., *Simulation*).

We asked the developers why they decided to add vibration feedback for the trading action in Veggie. Vibration was initially added to provide feedback for a successful trade, and enable *blind* user interaction. However, a nice side effect was that it made the trading feel even more physical.

The participants also mentioned the naturalness of the interaction, which also came up in the first interview. Physicality and novelty of the transaction also added to the *coolness* value that could be seen as a playful feature. It was interesting that simply having novel features was seen as potentially playful. However, the lifetime of such features would not last long since novelty would wear off. Novelty can be a positive aspect that contributes to user experience [1] or customer delight [33], however, we would argue that it can contribute to playful experiences but is not playful in

⁵ Kuuasema. <http://www.kuuasema.com>

itself. We should not conflate novelty to playfulness, even though both produce similar emotions of delight.

Another issue that was brought up as a feature that makes using NFC more playful was the connection between action and reaction. It becomes a lot more fun, if you can see effects of your actions immediately and get feedback. NFC enables quick interaction, which in turn enables seeing the results of the interaction immediately. Rewarding is extremely important in game design as well, and constant feedback loops can produce *flow*-like experiences [13]. The developers of the games also mentioned that play is always voluntary, and a requirement for something to be playful is that it should also be easy and rewarding to do.

The conclusion of this second interview was that the NFC technology itself is not playful, but it is an enabler for playfulness. According to the interviewees, handing things over physically is not playful, but the novelty value of the action can make it playful, or so can the context where it is used in, which in this case was the game.

Comparing the Expert Evaluations and Interviews (A+B)

The most important difference between the expert evaluations and the two interviews was that the *Simulation* experience was brought up immediately in interviews A and B. In the expert evaluation, *Simulation* did not come up until very late in the process, in fact only after all the experts did the initial analysis. As was mentioned earlier, the reason for this was likely due to the description of the *Simulation* category in the PLEX framework that leaves physical simulations out and concentrates on simulating real-life inside the game screen. As the description did not clearly consider this kind of case, PLEX created an unnecessary box, outside of which it was not easy to think.

In the interviews, we spent a significant amount of time discussing issues that we do not consider as playful. The biggest topic was the ease of use, which was argued to make the games more playful. However, while usability contributes to the overall user (or player) experience, we argue that it does not make it playful in itself. In this aspect, using a framework like PLEX could have directed the discussions to the topics that were more important for the task at hand. Issues that could be potentially playful features that were only mentioned in the developer interviews were the short action-feedback loop (flow-like experiences) and the possibility to observe other people playing the games. The short action-feedback loop could be analyzed as being part of the *Control* category, but at the time of analysis this aspect was not part of its description.

Fellowship was the only PLEX category that was not mentioned by the developers, but was identified in the expert review of the games. Of the potential combinations of PLEX categories, bluffing was not cited to be playful, however, the game designer participants in the first interview (A) bluffed in the game and were obviously having a lot of fun doing it.

Most of the findings using the PLEX framework might have been identified using other models for analysis or even without a model, but PLEX gives the evaluators anchor points for discussion and taking the evaluations further. The background information in the PLEX framework definitions also focuses the evaluations to certain aspects, which in this case were the potential playful features. The advantage of early design phase evaluations is to map out the design space and uncover aspects which otherwise might have been missed in the evaluation. The drawback is that the PLEX framework may be used too strictly and force existing features to be interpreted on the basis of the predefined categories (e.g., *Simulation*). PLEX, like other frameworks, should not be used as a straightjacket but rather as a scaffold for discussions and ideation.

DISCUSSION

In the three studies presented in this paper, we wanted to assess whether the PLEX framework can be used for evaluation purposes. We observed a number of weaknesses but also a number of strengths of the framework, which we attempt to summarize below.

One of the primary weaknesses of PLEX, which was at the same time seen by the experts as a key strength, was its simplicity. PLEX is a uni-dimensional framework of 22 categories of playfulness. While it provides rich accounts of diverse types of playfulness, it says little about how these may be instantiated in design elements, about how different types of playfulness may interact, or more importantly, about the temporal dynamics [20,29] of playfulness (i.e., how a playful experience may unfold within the course of an interaction episode). On the one hand, the simplicity of the PLEX framework is a strength. For instance, we found that through allowing for freedom in interpretation, the PLEX framework proved to support group dynamics, as experts contributed complementary perspectives on the playfulness of the examined interactions. On the other hand, the lack of additional structure next to the categories of playfulness often limited experts' analyses, and, in some cases, important observations were missed. We propose that PLEX can be more effective when complemented by other frameworks. For instance, McCarthy and Wright's [29] 6 stages of sense-making in experience, can complement PLEX well. This framework attempts to conceptualize the development of experience, from *anticipation*, to *interpretation*, *reflection* and *recounting*, and, as such, it may assist the evaluators to decompose playfulness as it may occur in these different stages of experiencing.

A second limitation of the PLEX framework lies in the completeness as well as the overlap of the categories of playfulness. In the process of developing the framework, the PLEX authors had considered adding other categories such as *Cuteness*, *Disgust*, *Identification*, and *Tragedy*, or even merging categories such as *Exploration* and *Discovery* (as one leads to the other). However, they explicitly decided to focus attention on some experiences while implicitly

hiding others [22]. As a result, the 22 categories themselves might be too rigid and specific to cover all aspects of playfulness, while, at the same time, confusion may be raised with respect to the overlap of different categories. For instance, the experts found two playful features that could not be directly described by the existing PLEX categories. In such cases, we found that a more flexible use of the PLEX framework, one where its categories are combined and used as building blocks can better describe more complex player experiences. A seemingly simple and atomic user experience can be broken down into several categories making the analysis of the design situation richer and more comprehensive. As an alternative, other frameworks in the field of playfulness could be used to complement PLEX, such as the game design patterns [6] ('Hovering Closure' and 'Possibility to Betray'). However, game design patterns are in essence complex and difficult to grasp when used for evaluation, and must be learned by experts first.

Despite the two main weaknesses we observed in the PLEX framework when used in expert evaluation, we found that it provides a clear advantage over other frameworks and methods, primarily because it is very simple, intuitive, and fast to learn. We found that the PLEX framework provided experts a systematic and structured way to focus attention, in this case, a particular way to look at playfulness. Experts consistently identified and analyzed four kinds of playful experiences related to using NFC technology were directly mapped to PLEX categories (i.e., *Captivation*, *Fellowship*, *Sensation* and *Simulation*). To a large extent, these did not come up during the interview sessions, proving the added value of the PLEX framework. The experts reported that the PLEX framework provided anchor points for them to reflect and discuss different aspects of playfulness as they conducted their heuristic evaluations.

Next, we found the use of additional tools such as the PLEX Cards to assist experts in two ways. First, the PLEX cards assisted evaluators in becoming familiar with the 22 framework categories [26,27]. Through augmenting the description of the category with rich visual information, it supported experts in grasping the essence of a category of playfulness. By providing two alternative photos (one focusing on abstract human emotions and the other depicting concrete everyday life situations), they provided context and often led experts to focus on complementary perspectives of playfulness. Second, the physicality of the PLEX cards provided an approachable and low-tech medium that nicely fitted in the dynamics of an evaluation.

PLEX as a Checklist

In its current form, the PLEX categories allowed experts to focus on different aspects of playfulness in their analysis of the games. Due to the experts' familiarity with the PLEX framework and games research in general, it was easy for them to think beyond the textual definitions and give new meanings to the two photos shown on each of the PLEX

Cards. From that perspective, in its current form the PLEX framework categories successfully allow experts to assess different attributes of playfulness of a product or service. However, we believe that it is not only experts who should be able to conduct similar heuristic evaluations but anyone with a general interest in evaluating concepts and designs from a playfulness perspective. In order to facilitate this process, the PLEX framework should be made more accessible to the general public. For instance, and based on the results of our studies, we suggest that each PLEX category could be further specified into sub-items or sub-attributes so that people can easily identify the different components of that experience. A collection of categories and their sub-attributes could then in practice act as a checklist, supporting anyone interested in assessing how playful their design is as well as provide a starting point for redesign. People can also decide to add more playful features during the reflection that happens while evaluating the playfulness of a given design.

CONCLUSIONS

In this paper, we used the Playful Experiences (PLEX) framework to explore its potential for evaluation purposes. We conducted three studies: 1) expert evaluations, 2) interviews with professional game designers, and 3) interviews with the developers of two prototype mobile phone games (i.e., the Snow and Veggie games) with Near Field Communication (NFC) functionality. In each study, these two games were evaluated both with and without the PLEX framework as a guide for the evaluation. While the experts used PLEX for evaluation, the game developers did not use the framework, which allowed us to verify the findings from the previous expert evaluations.

Our results suggest that the PLEX framework can assist and guide both experts and non-experts conduct (heuristic) evaluations on aspects of playfulness for a given product or service. The framework, and especially the PLEX Cards, provides anchor points for evaluators to reflect and discuss during heuristic evaluations. Based on our findings, we also found that the PLEX framework is incomplete and other playfulness frameworks should be used to complement it (e.g., 6 sense-making stages or game design patterns). A series of controlled experiments would be needed to compare the effectiveness of PLEX with that of other frameworks and methods. Finally, we propose each framework category to be broken down into sub-attributes that can be used as a checklist to assess playfulness.

Our future work will aim at supporting efficient approaches to evaluating playfulness, such as a more elaborate framework of playfulness heuristics. We believe that playfulness is an important feature of a wide range of interactive products beyond games. Not only does playfulness make our interactions with products more enjoyable, it can also contribute to meaningful and memorable experiences, promote long-term liking [20], and ultimately, increase the market value of a product [5].

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