"*Can you send me a photo?*" - A Game-Based Approach for Increasing Young Children's Risk Awareness to Prevent Online Sexual Grooming

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ABSTRACT
This paper presents a game-based approach for raising young children's online risk awareness, to decrease the risk of becoming the subject of sexual grooming. *Hidden in the Park* is an adventure game, including a classic game board and a tablet with Augmented Reality-technology. The game mechanics are based on data from true grooming processes. The game's target group is children aged 8-10 years. This paper describes the game development, from a prototype to an approved release version that will be released as a non-profit product during 2019. We describe the creation of the game mechanics, the iterative development process, and game evaluation. 25 pupils in the target group participated, but the ages 7-12 (n=70) were included to evaluate whether the game would suit the intended target group. Results show that the game is fun and engaging but that it also raise questions concerning online activities.

Keywords
Serious Games, game-based learning, game design, augmented reality, online sexual grooming

INTRODUCTION
This paper describes the development of the game *Hidden in the Park* and a game-based approach to support raised risk awareness for young children (8-10 yrs.) in online interactions. We consider the game as engaging and fun, but it is also a serious game (SG) with another purpose than mere entertainment (cf. Susi et al. 2007). This paper will not discuss the domain of SGs itself, but rather the use of a SG to address a specific problem. The problem addressed here is online sexual grooming, which takes place in, e.g., social media platforms and online games. This issue is of importance for the games research domain since games are misused for offenses such as sexual harassment. Media coverage and research shows that games and virtual environments, e.g., *Xbox*

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Live (Microsoft 2002), or massively multiplayer online role-playing games (MMORPGs) like *World of Warcraft* (WoW) (Blizzard Entertainment 2004), *Second Life* (Linden Lab 2003), and *Minecraft* (Mojang and Microsoft Studios 2009) are used for sexual offenses (Chesney et al. 2009; Herd 2017; Reeves 2012; Sanders et al. 2011; Young & Whitty 2012).

The game is based on research on offender strategies in online sexual grooming processes, and some of the results have been used as the foundation for game mechanics and game dynamics. The development process has been highly iterative, with game evaluations with the target group as participants. The outcome of this research based process is a mixed media board game (in Swedish), that includes a table top game board and a tablet with AR-technology. The game also includes pedagogical guiding material for teachers since it is designed to be used in elementary schools. Teachers will have a post-play discussion with children about game events and players' reflections. The purpose of the game, in combination with a post-play discussion is to raise children's risk awareness when interacting with others online.

Hidden in the Park is an adventure game for 2-4 players, where each player hides a treasure and gets in return a set of clue cards to where the treasure is hidden. Players need to mind their clues not to reveal the hiding place. The game contains text messages sent to the players from an unknown character that uses different strategies to make players take photos of their clue cards and send them in return. These game events are designed to allow young players to experience choices and their consequences, and to evoke thoughts and reflections. Hence, the game is a digital tool used to address a digital problem, by simulating on-line activities. But, the game is played off-line for safe conditions and there is nothing that can be digitally distributed outside the play situation. Also, considering that games have become an integral part of young people's everyday lives, we saw a game as an obvious choice for a tool for raised risk awareness.

Four successive game versions were evaluated at three different elementary schools, with 70 children as participants. The results show that all participants perceived the game first and foremost as a fun game, but that it also evokes thoughts and reflections as intended.

The next sections describe young peoples' use of social media and our research on grooming processes, to provide some background and context to the game contents and its purpose. Then we describe the game design and development process, followed by game evaluations and results. The paper ends with discussion and conclusions.

YOUNG PEOPLES' USE OF SOCIAL MEDIA

Social media platforms and the technical apparatus needed for using them have become increasingly available to young children in Sweden. National data shows that 85% of children 9-12 years of age own a smartphone, 55% own a tablet, and 36% own a computer. Broadening the scope, 98% of 9-12 year olds have access to the internet (Swedish Media Council 2017b). In addition, 87% of 9-12 year olds play video games on computers, tablets, and (or) mobile phones. Young children's access to digital communication platforms provides contact between schoolmates, friends, etc., but also contact with individuals they have no other relation to than interacting through social media or online games. This may be a risk factor for their personal integrity unless they are made aware of the possible negative consequences of sharing personal information with people they do not actually know. Technological advances and the internet have undoubtedly introduced new communication channels and dimensions when it comes to sexual violence, and "never before has it been easier for perpetrators to make contact with children around the world, share images of abuse, and encourage each other to commit further crimes" (WePROTECT 2016, 3). However, technology in itself is not

the problem. On the contrary, technology is a very powerful and easily accessible facilitator for social frameworks and social interaction. The core problem instead is user behaviours on social media (Swedish Agency for Youth and Civil Society 2012). Contributing to this, is the fact that there is no distinction between being online or being offline; with a smartphone in pretty much everyone's pocket, children are constantly reachable, for better or for worse. The social networks, games and forums that young people use online, are the same channels used by offenders, and "Coercion and sexual extortion are increasingly being used to victimise children. Offenders use these methods to obtain further child abuse material, for financial gain or to get physical access to the victim." (IOCTA 2017, 12).

While online sexual exploitation is a real risk, not least while children play online games, the aforementioned data shows that interactivity online also is a natural part of many young people's everyday life; it is a place where they meet their friends, and their social status is partly related to how many online friends they have. Internet is an arena where young people explore their sexuality and construct their identity, and sharing of pictures that are perceived as sexualized is not to be unexpected (EC3 2012). But, as the European Cybercrime Centre also points out (EC3 2012, 19), this suggests "a requirement for more nuanced approaches to awareness raising which encourage children and young people to understand the implications of their choices, and equip them to manage risk and unwanted approaches in online environments".

Although it is more common that children from the age of 12 years and older are subjected to online contacts of a sexual nature it is common that even younger children are contacted (BRÅ, The Swedish National Council for Crime Prevention 2007). Younger children are less knowledgeable about safety aspects online, which indicates the need for awareness raising measures for younger ages (EC3 2012). These are good reasons for choosing 8-10 year olds as the target group for the game-based approach described in this paper.

Considering the target group, the cognitive maturity of young children poses a major challenge for coping with online risks (Livingstone & Haddon 2009). They need to grasp the relation between choices and potential consequences. Such cognitive reasoning skills however, only mature at the age of 10 or 11 years of age (Piaget 1972; Wadsworth 2004). Before that, children's reasoning and logic tends to be tied to available experience, and most children have difficulties in applying logic to abstract, or hypothetical problems. However, children are good at grasping complex sets of rules and understanding causes and effects, e.g., in games such as Pokémon (Nintendo 1999). A tangible object, like the game described in this paper, serves as a tool for allowing children to gain concrete first-hand experiences of choices and their consequences, and to relate the experience to online contacts. In other words, the game bridges the limited cognitive maturity of younger children, and abstract reasoning about potential online risks. The game elements that provide choices and consequences are based on research on true online grooming processes, which is described in the next section.

RESEARCH UNDERLYING THE GAME-BASED APPROACH

In general terms, online sexual grooming is the process by which a child is befriended by a would-be abuser in an attempt to gain the child's confidence and trust. In online interactions, like online gaming, children run the risk of being abused and some contacts may also lead to physical meetings where children can become subject to further abuse.

Previous research on online grooming is limited and there is a lack of deeper knowledge of such processes. Previous results are also problematic due to the data sets that have been used. The most commonly used data sets are publically available chat logs from

the Perverted Justice Foundation (http://www.perverted-justice.com) (e.g., Aitken, Gaskell & Hodkinson 2018; Black, Wollis, Woodworth & Hancock 2015; Williams, Elliott & Beech 2013), where trained adult decoys have posed as children, in order to catch online predators (the organisation ceased active decoy operations at the start of 2019). There are also data sets where police officers and researchers pose as children (Bergen et al. 2013; O'Connell 2004; Mitchell, Wolak & Finkelhor 2005). The results based on such data do not provide the best descriptions of strategies and progression in grooming processes, basically since chat logs with decoy/adult-offender dialogues do not reflect child-offender dialogues (cf. Susi & Torstensson in press).

When we decided to use a game-based approach to address risk awareness we needed to investigate true child-offender grooming processes to gain knowledge of offender behaviours and strategies. The knowledge would then be transformed into game mechanics. Our approach was to analyse chat logs from closed online forums that contained contacts between children and later convicted sex offenders. This material was obtained through collaboration with the Swedish national police authority and the owners of a large Swedish social networking site. The data set consists of about 12 000 pages of dialogues from closed forums, of which 500 pages were thematically analysed and categorised in order to search for offender strategies and progression of grooming processes. We also analysed about 100 pages of dialogues from the Perverted Justice website.

The analysis showed some similarities but, more importantly, significant differences when comparing adult-child dialogues and adult-decoy dialogues. The most noticeable difference is the amount of threats and extortion found in the true chat logs. While online grooming processes may progress over shorter or longer periods of time in both data sets, the true chat logs reveal that many contacts start with straight-on threats to make a child comply with offender requests of a sexual nature. In cases where children have sent a photo or complied with some kind of a sexual act, extortion is very common to gain more photos etc.

Another important difference is complexity with regard to the dialogue structures (cf. Torstensson & Susi 2015). Previous studies describe the process in terms of sequential and progressive phases, or themes and sub-themes. The true chat logs reveal that those dialogues have far more integrated themes with lots of shifting between different subjects, which also reveal multiple inter-twined behaviours. It is also apparent that adult decoys 'agree' with most sexual requests while children instead in most cases object to such requests. Nevertheless it is not unusual that children respond agreeably to the common question "*Can you send me a photo?*", which may not be a good idea in the long run.

In sum, there are obvious differences in decoys' and children's behaviours, simply because they have very different motives for chatting with other people. But, there are also similarities in offender strategies in both data sets, like flattery, coercion, and bribes. We decided to use these themes, with the important addition of threats, as game mechanics, which is discussed in more detail in the following sections.

GAME DESIGN DECISIONS

Besides using certain offender strategies as game mechanics, it was important the game would include elements that mimic or 'fabricate' everyday online interactions. In Goffman's (1974/1986) words, fabrication is "the intentional effort of one or more individuals to manage activity so that a party of one or more others will be induced to have a false belief about what it is that is going on" (Goffman 1974/1986, 83). Our game is a fabrication where the participants are placed in a game setting that stimulates social interaction. Initially, players are led to believe that the sole objective of the game

is to hide and find treasures. But, as the game progresses a new agent/character will appear, introduced by means of SMS sent to players. At first, this agent seems friendly and helpful, but this layer of agency will eventually shift to become deceptive and threatening. What at first seems like a caring 'person' who flatters and seemingly wants to help players by offering and providing access to in-game beneficiary resources, will be perceived as someone less trustworthy and deceitful as the game progresses. The superordinate educational idea is also a second frameshift that takes place in the post-play discussion led by the teacher, where the fabricated frame's interactions with this agent is transferred to the educational frame of a discussion on risk behaviour online. The follow-up discussion is carried out immediately after the game session, while the session is still fresh in the players' minds and will cover topics such as what happened in the game, decisions made and their consequences, and risks such as taking and sending photos. Hence, the fabricated framework of playing a game collapses and the real purpose of the game turns out to be the basis for a discussion on a serious matter: raised risk awareness in online interactions.

Besides the false belief, an important feature of the game is that it accords well with the target groups' everyday media experiences in its visual, sonic and interactional patterns. Tables 1 and 2 below show statistics on the most popular games among Swedish children, according to the Swedish Media Council (2017a, 2017b). The data is categorised in two different age groups but it covers the target group for the game presented in this paper.

5-8 year olds, all	**Male**	**Female**
Minecraft 25%	Lego* 36%	Minecraft 16%
Lego* 23%	Minecraft 32%	Subway Surfers 13%
Pokémon* 13%	Pokémon* 17%	Toca Boca* 9%
Subway Surfers 8 %	Fifa* 9%	Pokémon* 9%
Fifa* %	Angry Birds 8%	Pippi Långstrump/ Radio Apan 7%

Table 1: The most popular games among 5-8 year olds (The Swedish Media Council 2017b). Games marked with * are not specified by specific titles in the data and are represented on a superordinate level instead of specific game titles.

9-12 year olds, all	**Male**	**Female**
Minecraft 32%	Minecraft 34%	Minecraft 29%
Pokémon Go 22%	Pokémon Go 28%	Pokémon Go 16%
Roblox 7%	Roblox 11%	Hay Day 11%
Subway Surfers 6 %	Fifa* 11%	Slither.io. 9%
Hay Day 6%	Clash of Clans 8%	Moviestar Planet 9%

Table 2: The most popular games among 9-12 year olds (The Swedish Media Council 2017a).

To strengthen the connection to children's media, the game characters are inspired by the design of emoji and other graphical components, and they draw heavily on the look and feel of other media artefacts relevant for the target group. Hence, the game includes features reminding of other popular games among young children.

The game is a mixed media turn-based board game using AR-technology for parts of the gameplay. The game is played by two to four players, but it can also be played by four to eight players in teams of two. There were two equally important fundamental requirements for the game; it could not have any frightening or sexual content, for ethical reasons, but it should still address the problem of potentially negative consequences of sharing information. It also had to be a fun game, although it would deal with a serious matter. Other requirements included that it would be thematically suitable for 8-10 year old players, and would suite to be played in school environments. A teacher would handle the process of setting up the game, and to lead a follow-up dialogue with the children in which the real objective of the game, risk awareness, should be in focus. The game could not be technically difficult to use and it should not include too much text since all young children are not proficient in reading. Pedagogical guiding material to support the post-game discussion also needed to be included.

Already in the beginning we decided to use a board game as the vehicle for the experience, for many reasons. Children in general are familiar with the basic structure of a board game, and have expectations concerning the gameplay derived from that knowledge. Furthermore, a board game provides many opportunities for face-to-face communication and interaction during gameplay. We wanted to facilitate the social aspect since we aimed to create a social framework and encourage interaction and group dynamics. An analogue board game design also has the inherent benefit of showing the game status at any given point in time, through the position of each movable piece. Furthermore, we wanted the game to be something unexpected, a game that would stand out from other games. Inspired by Monopoly Junior Electronic Banking (Hasbro Gaming n.d.) we decided to use a combination of a classic board game layout in combination with AR and a tablet.

While Monopoly Junior Electronic Banking uses an electronic device as a bank, we wanted a tablet that includes more features. AR-technology is used to display a 3D-version of the physical game board, in which each player hides a treasure by touching the screen and in return get some clue cards leading to the hiding place. The tablet is used for rolling a dice and to show were all the game pieces should be located, in parallel to the physical game board to help players keep track of the correct positions. The tablet is also used for simulating SMS messages sent to the players by an unknown character, which allows players to make choices whether or not to reveal information. The game furthermore contains five short but fun single-player ‘mini-games’ that are played using the tablet. One example is ‘Hurdles’, where the player’s in-game animal avatar (lion, elephant, turtle, etc.) is controlled on a rail shooter type track, jumping over a set of hurdles. These mini-games were made purely as entertainment, but they are simultaneously used as rewards or bribes within the larger game setting.

Play time is a critical issue considering the game is intended to be played in schools, and the tablet made it possible to control the game’s pacing and to actually pre-program the game to come to an end within a certain time frame. To some extent the design carries with it that the game allows for weakly dominant strategies (Rollings & Adams 2003, 244). Players may learn the game mechanics successively and might find different strategies to win the game. In some cases, games at large allow for dominating strategies of various degrees, that is, strategies that once apparent to the player could either make her or him invincible, which are strongly dominant strategies or at least not

losing the game, which are weakly dominant strategies (Rollings & Adams 2003, 244). The former is often considered to be a result of bad design choices and should be avoided while the latter might actually be very useful such as forcing a move in chess (ibid. 244). A game that allows for weakly dominant strategies on the other hand allow for the game to be fun, entertaining and intellectually challenging while a game that allows for strong dominant strategies is not. The game we designed allows a semi-weakly dominant strategy, strictly to accord with the pedagogical social framework in which the game is meant to be played. To not lose the game, a player should not take any pictures of his or her clue cards since taking a picture will start a chain reaction in the game that subsequently will expose the player's clue cards to all other players.

HOW THE GAME IS PLAYED

The game is an adventure game, where each player hides a treasure in a park and in return gets a set of clues to the hiding place. The outspoken objective of the game is to find another player's hidden treasure with coins, and the player who finds another player's treasure wins and collects all the coins. The implicit objective is to create a situation within the game that raises questions and thoughts, thus providing a basis for a discussion about risks when sharing personal information online.

The game consists of a game board, four game pieces and four corresponding suites of (4) clue cards. The game pieces and the clue cards have different colours, one for each player. To play the game, an application needs to be installed on a tablet (or smartphone). The game board is placed on a table of suitable size for the number of players, the clue cards are placed along the sides of the game board in a specified order so that each player or team of players, will have their clue cards in front of them (Figure 1).

Figure 1. All parts of the game set up on a table.

The game pieces are placed on the start square on the game board. The teacher then provides a short instruction to how the game is played.

"*Today you will play an adventure game called Hidden in the Park. Each player will hide a treasure of coins in a park, and in return get some clue cards to the hiding place. You need to mind the clues, for they can reveal where the treasure is hidden. These are the clue cards (teacher shows the clue cards).*

The tablet is used for a variety of things, for example, to hide your treasure, guess where someone else has hidden his or her treasure and to roll the dice. The tablet will tell you what you need to do. You also have game pieces on the board to move forward

after you have rolled the dice. The first player who finds another player's treasure wins the game."

The major steps of the initial gameplay are:

- Start the application on the tablet and place it on the centre of the game board. The tablet shows a short introduction video, followed by a choice for number of players. A text instruction and voice then says "Turn the tablet to face player Orange". Player orange then chooses one of several animal avatars to represent her or him in the game. This step is repeated for each player.
- The next step is to hide a treasure in the park, using the AR-technology in the tablet. Each player picks up the tablet, and aims it towards the physical game board. The game board appears as an animated 3D-world, with more elaborated graphics than on the physical game board. The tablet screen/3D-world is divided into squares and each player chooses one of them as the hiding place for his or her treasure, and touches the screen to record the chosen square (Figure 2).
- The players now take turns to roll a digital dice (in the tablet) and move his or her piece the number of steps shown by the dice. The tablet shows the animal avatars corresponding number of steps and position on the board, to help players to keep track of the correct positions.

Figure 2. The tablet shows the board game as a 3D-world at the start of the game when each player chooses a hiding place (a square) for his or her treasure.

During gameplay, the players will face situations where they have to make a choice, such as whether or not to pay coins for a short-cut or to play a mini-game. The most serious choice for a player is whether to comply to an anonymous SMS (that appears as an image of a mobile) requesting the player to take a photo of a clue card, and send it to the requester. The game mechanics behind the text messages is described in the next section.

RESEARCH BASED GAME MECHANICS

The central game mechanics are based on some of the most common offender strategies identified in grooming processes: flattery, coercion, bribes, and threats. It should be noted however, that the game has no frightening or sexual content. We decided to transform the offender strategies into SMS messages that appear in the tablet, as a metaphor for chat-like conversations in social media platforms. The messages are sent by an unknown character in the game.

The tablet made it possible to also construct different dialogue sequences and scenarios. Their order of appearance is semi-random, but a progression is built into the narrative for pedagogical and gameplay reasons. Initial messages are mainly short and *flattering* ("It's going well for you!) to introduce the phone as a game mechanic, and they require no response. In other situations, depending on the individual players' choices, the message content progresses in different ways. The underlying purpose is to make players take photos of their clue cards (with the tablet's camera function), and send them as MMS in return to the unknown requester. When players are asked to take a photo, they can choose "yes" or "no" in response. The unknown character however, uses *bribes* (e.g., "Do you want to play a mini-game?") and *coercion* ("Oh, pleeease, just one photo!") to persuade players into taking photos.

The bribes are tied to the in-game economy of using coins to get access to shortcuts, or the possibility to play a mini-game that might provide the player with more coins. If the player accepts a bribe the player can be asked to send a photo in return. This is the exchange part, intended to show that something that may seem as a gift, actually comes with a request of returning the favour. If a player does not accept a bribe, the unknown character can try to coerce the player to comply.

Once a player has sent a photo, this is sometimes used as leverage to get another one via a *threat* ("If you don't send another photo, I'll show your previous one for everybody!"). These tactics are included in different dialogue sequences, and deployed based on the current game-state and the individual players' different choices. Figures 3-5 below show examples of dialogue structures in messages. Note that players do not type messages, they only have the option to choose "Yes" or "No", which is a deliberate design in order for the game system to have full control over the dialogue structure, and free typing would prolong the overall time to play the game.

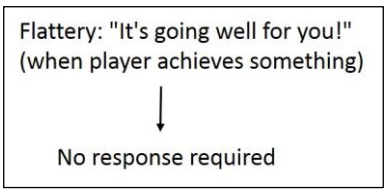

Figure 3. An example of flattery.

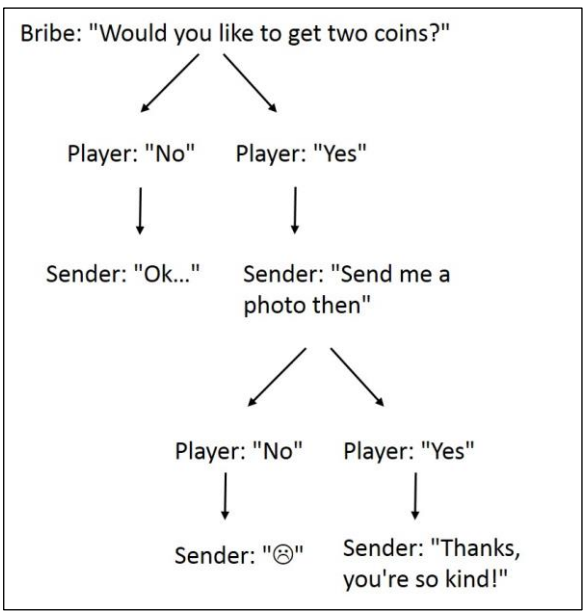

Figure 4. An example of a bribe.

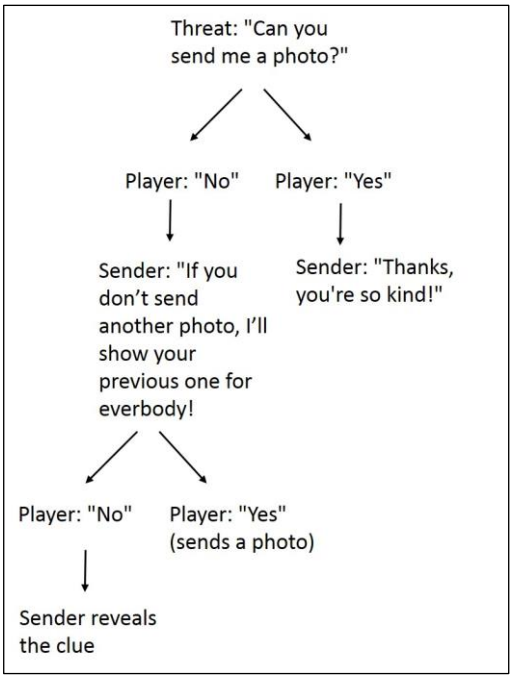

Figure 5. An example of a threat that appears once a player has taken and sent a photo.

To avoid gameplay where noone actually takes a photo, the game has a time-based function that in time will expose clue cards for all players. A message will appear saying "Oh no, someone saw you when you hid your treasures and exposes a clue card for each player!". This is a necessary function to avoid too long game sessions. Later evaluations (below) clearly showed that this function does not disturb the social framework established by the game, but rather produce a feeling amongst the players of being constantly observed by an unknown character. Eventually, players get the opportunity to use the 3D-view to try and find another player's treasure, with exposed clues as a guide to the hiding place.

Counterintuitive as it may seem, it is important that some (or all) of the players actually fall for the temptation to take photos/expose clues in exchange for coins or mini-games. This is the underlying point of the game mechanics; to experience first-hand decisions, but without any true serious negative consequences. It is this exercise that allows abstract hypothetical problems to become concrete experiences. Events like these are also what is intended to evoke thoughts and reflections for the all important post-play discussion.

GAME DEVELOPMENT

The game was developed in two successive projects. The first project included the basic research regarding grooming processes, production of a hi-fi prototype, and game evaluations involving the target group. It was decided that the target group for the game would be children aged 8-10 years. The main reasons for choosing these ages are that childrens' literacy increases dramatically from the age of 8 or 9, and as a direct consequence, the use of social media also increases radically at this age (The Swedish Media Council 2017a, 2017b). The other reason is the well established knowledge that it is mostly children aged 12 and older that are targeted by adult offenders (BRÅ 2007). For preventive measures to be of any use, they need to be deployed before that age.

The prototype development was carried out in-house by a cross-disciplinary research team with mixed competences. When the game reached a playable state, a group of eight children was involved for early game design evaluation on a few occasions. This

proved valuable, as it revealed several flaws and shortcomings in the game design. It became clear that our own grown-up ideas of 'fun' did not always match the childrens' opinions. The aesthetics was adapted to match young childrens' media world, and the language used via speech synthesis in voice instructions and in-game dialogues needed to be adapted to the childrens' linguistic level. The final hi-fi prototype was perceived as both fun and engaging by the children. The prototype was also tested on the project's reference group, consisting of practitioners within the field of childrens' rights law, the National Swedish Police (the child sexual abuse unit), the Swedish Media Council, and the Change Attitude foundation, which was a co-operating partner in the project. The prototype received very positive critique, and comments like "this is a tool that's really needed!".

In the second project, the hi-fi prototype was handed over to a professional game development company, niched towards pedagogical games, for the production of a fully functional game to be released on iOS and Android as a freeware. The game company had full responsibility for the further game development, but it was required that the research-based game structure had to be maintained. This included both dialogue structures and the choice of words in the text messages. During the game development we would conduct on location game testing with the target group, and results would be fed back directly to the development team.

GAME EVALUATION

There are many methods for evaluation of games and other technological products, but when involving children as participants there are many challenges. A lot of work has been focused on finding suitable methodologies for design and evaluation with and for children (Read & Markopoulus 2013). There are studies with evaluations of methods specifically tailored for children as participants, and studies where children participate as users of existing methods like heuristic evaluation (e.g., van Kesteren, Becker, Vermeeren & Lloyd 2003; Khanum & Trivedi 2012; Salian, Sim & Read 2013; Sim & Horton 2012). The results show that while some part of one or the other method works well, there are also problems such as childrens' limited attention span, verbalisation, and understanding of surveys and ratings, etc.

For our game evaluations we chose to use to use observations and group interviews, rather than to wrestle with problems in some existing method when participants are children. We also chose to conduct the evaluations in a setting that is familiar to the target group, that is, school environments. The game evaluations were carried out during the fall in 2018, and three elementary schools participated. We included grades 2-6 (8-12 yrs.), although the target group is 8-10 year old children. The broader age span would allow us to see if the game would best suit the chosen target group. As seen in Table 3, three boys were seven years old, but they were second graders. In sum, 70 children participated and consent forms were collected from caregivers and teachers.

Participants		
Age	Boy	Girl
7	3	
8	3	2
9	6	4
10	4	6
11	13	11
12	9	9
Sum	**38**	**32**

Table 3. The ages and number of participants in the game evaluations.

We asked teachers to decide which children would play together, since they know their pupils best. Teachers were invited to be present during the game session. There were 15 groups of players, most of them including 3 or 4 players. Two groups included eight players in teams of two (2x4 players). Each gameplay session was followed by a thematic group interview. Two researchers observed all gameplay sessions and took notes. One researcher provided game instructions and answered general questions. When questions concerned whether a player should or should not do something related to the gameplay, the researcher only replied that 'It's your choice, you have to decide yourself'. The same researcher also led the group interviews. We chose to conduct thematic group interviews right after each play session since the game would be fresh in the players' minds, and a group of children who know each other are more likely to discuss freely and also trigger each others' memories. This was a better choice than for instance, children being interviewed one by one, by a strange adult. The gameplay and interviews were audio recorded.

The focus of the observations was whether the game mechanics would work as intended, childrens' comprehension of the game and how to play, and above all, whether the game would evoke reflections and thoughts regarding game events ensuing from the text messages. The interviews focused on the childrens' perceptions and opinions about the game. The interviews had to be kept rather short so the children would not become restless or bored. The group interviews were also kept quite informal, but each of them covered a few main themes: positives and negatives of the game, graphics, the animal avatars, sound and voice acting, and in-game text messages. The audio recordings and observational notes were analysed and findings were sorted into categories such as issues to solve (e.g., graphics, language), and positive and negative opinions.

The game evaluation described here focused solely on the game, and did not include teachers' use of the game and game instructions, although there is an interest from teachers to actually use the game in class. Evaluations involving teachers were conducted at a later stage.

RESULTS

On an over all level the game is first and foremost perceived as a *fun* game, and not as a serious game or a game with some learning purpose. The main advantage of using this game-based approach in classroom situations is that pupils find the game very engaging and fun, and that it facilitates a lot of conversation during gameplay. The game's design creates dynamic interactions, with competitiveness and excitement. The most fun part of the game seems to be the mini-games. Once a player gets the opportunity to choose one of the mini-games, the other players tend to choose the same mini-game and compete for a better score.

We saw other benefits, from including tangible objects in the game concept. For instance, to take a photo with the tablet requires physical manipulation, which in turn provides hands on anchoring of cognitive processes while playing the game. The physicality provided by the tablet is a means to bridge the cognitive maturity of younger children, and the reasoning capabilities that develop at a later age (Antle 2013). In other words, to take photos and send them to someone unknown affords concrete first-hand experiences of a making decisions, and then face their potential negative outcomes.

The first evaluations however, revealed two main problems in graphics and language. The graphics had been over-worked with too much colouring and detail which led to visual perception overload and difficulties to understand the gameplay. Player attention

was drawn to irrelevant details, while important information was overlooked. The graphics needed to be simplified for a more clean expression, with less colourful details. Some in-game text instructions for how to play a mini-game were too long and cumbersome to read, especially for the younger children. There were also some words the children did not understand. The instructions were simplified, but they still required some reading effort, and in the end the instructions were replaced with a few seconds long animated instructions that indicate how each mini-game is played. After a few iterations of remaking the graphics and language, players' attention was drawn to the right game elements, and the gameplay improved significantly.

The text messages evoked a lot of spontaneous speculations about who the sender might be, "*Who's sending? The computer, mom, the game?*" (all quotes are translated from Swedish by the authors). Many players also turned to the observers and asked if they were sending the messages. Otherwise, the initial text messages did not cause other reactions than "*What's this?*". In some cases the players thought 'someone' was watching them, "*I think someone's watching us play*".

The appearance of messages with requests of photos instead caused much more discussions. On the first request, many of the younger children said "Yes" without any further thought, picked up the tablet, took a photo and sent it. At a later stage, when players were bribed with coins or mini-games to take a photo, the younger players fell easily into the trap, '*Take a photo of a clue card…? Yes, cause I want to play a mini-game!*", but the same player also said "*But who am I sending it to?*". The older children instead hesitated or questioned the requests to a higher degree.

Quite many children asked ”*Why should I take a photo?*", and a common answer from the other players was "*So you get to play a mini-game!*". It became obvious that the mini-games (and coins) worked well as bribes. Bribes work at several levels. They can be perceived as 'friendliness', but the message itself needs to be formulated so that it offers the bribed part with something desirable enough to actually accept the bribe. Also, if the player does not perceive that s/he is being bribed, the player is more likely to accept the offer. But, if a player keeps resisting to accept the offer, the messaging ends with a sad face, “☹”, which is part of a coercion strategy. Interestingly, there were several occasions where the 'sad face' seemed to make players feel a bit bad for not taking a photo. When asked again at some later point in the game, other players could ask "*Are you going to be nice to him?*" (although the sender is gender-neutral, the players tended to say 'he'). Having felt 'bad' for not taking a photo on a previous occasion, players were, to some extent, more prone to actually take a photo later on.

However, once a player has sent a photo, there may appear a threat that the photo will be exposed unless the player sends another one. In this case, the player is faced with an 'impossible' choice: to take yet another photo of a clue card or to let the previous one be exposed to the other players. This situation typically evokes reactions from the players as it dawns on them that they have actually been hit with something unpleasant as a consequence of earlier actions. Some examples are "*He's mean!*", "*That's a threat!*", and "*Who are you sending to? He was very annoying, I don't like that one!*". During the observations and interviews it became clear that the sequences of text messages, and taking photos, indeed raised questions which can then be objectified as topics for a discussion where the off-line game situation can be related to everyday on-line activities. Hence, the behavioural strategies underlying the text messages seems to work well for inducing a false belief in players; initially they think it is all about a 'new adventure game', but as the gameplay progresses they start to realise there is also something else going on.

The iterative game development and evaluation process has indeed accentuated the importance of involving the target group, as their feedback has been critical for the game design process. The game evaluation, with actual gameplay combined with observations and interviews turned out to be a successful approach. The evaluations were carried out in the childrens' familiar school settings, and the researchers were more or less forgotten as soon as the gameplay started. The observations provided information on what the players actually did, and spontaneous social and physical interactions and dialogues. The interviews provided an opportunity to probe into the whats and the whys of participants' opinions, and other matters that could not be observed. The benefit of including children 7-12 years of age, instead of only the target group (8-10 yrs.), revealed that the game indeed is most suitable for the intended target group. Firstly, children aged 11-12 quite soon noticed that taking photos may not be a good idea. In fact, most of them chose not to take any photos because they could see where that would lead. Then they started taking photos even when they knew their clue cards would be revealed, just to get to play mini-games. Therefore, the game concept does not fulfil its function for older children. Secondly, the game concept requires at least some basic reading skills, which sets the lower age limit.

CONCLUSION

The game *Hidden in the Park* is unique with its combination of classic game elements and new technology. Furthermore, it is a digital tool for addressing a digital problem, in one sense it is like 'fighting fire with fire'. It is a pedagogical tool for use in school settings, but it provides a fun play experience while also creating topics for a post-play discussion on on-line risk awareness. To the best of our knowledge there are no other mixed-media AR-games for the same purposes as the one discussed in this paper. The game is an innovative complementary tool to existing educational material, which mainly consist of written text. We consider our game as a valuable complementary hands-on tool for raised risk awareness, which corresponds well the requirement for encouraging children to understand the implications of their choices, and equip them to manage online risks (EC3 2012).

Lastly, *Hidden in the Park* is a non-profit game that will be distributed free of charge, nation-wide to elementary schools in Sweden during 2019.

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