Motivations and Practices for Cheating in Pokémon Go

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ABSTRACT
Since the emergence of video computer games in the early 70's, the concept of "cheating" has been a hot issue in video gaming research. Adding mobility and location-based capabilities to computer games introduces a whole new set of behaviours, motivations and justifications that challenge gaming communities to reconsider what constitutes "cheating", and what is simply an acceptable extension of game play. Using the specific case of Pokémon GO, we investigate players' perceptions on cheating in this mobile location-based game. In our research, we identified 10 ways that players circumvent the rules of Pokémon GO. Through analysis of online forums, field observations, interviews, and a focus group with local players, we realised that players' attitudes vary as to what constitutes "cheating", and whether playing outside the rules is acceptable. We found players "cheat" to enhance game experience, to compensate for limitations in the game's design, or to keep up with other cheaters. While this has been observed in online gaming before, our study contributes to research by relating these specifically to the game's mobile location-based nature. We offer implications for design of location-based games.

Author Keywords
Pokémon GO; Mobile gaming; Location-based gaming; Cheating; Interaction Design; User Experience Design.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
If you live in a country where the winters are long, it is so cold you need to wear gloves to go outside, and it is constantly raining, then playing Pokémon GO from the comfort of your couch makes a lot of sense. To do this, you need to manipulate the phone's GPS signal to circumvent mobile location-based aspects of the game. Is this cheating? Philosophical responses to this question are beyond the scope of this paper, however, what we do present are some interesting insights from players of Pokémon GO about behaviours, motivations and justifications for going outside of the rules as established by the game developers. This contributes to an understanding of how and why people might "cheat" in mobile location-based games.

Games typically operate within invisible boundaries defining game spaces as separate from the real world, referred to as "magic circles" [6]. However, mobile location-based games blur this boundary, and in doing so create new opportunities to challenge adherence to the rules of the game. Rules are an essential element of all games, distinguishing one game from another. Players can either follow the rules of the game, refuse to follow the rules (a spoil sport), or appear to follow the rules while secretly not doing so (a cheater) [7,14]. A cheater acknowledges the rules of the game and tries to subvert them, a spoil sport is seen by society as much worse, as a spoil-sport "shatters the play world itself" [14]. Cheating has been around since ancient times and usually involves the cheater taking advantage of a person, a situation or both [7]. Some players believe that if the rules are broken the entire gaming system is considered as falling apart, meaning "the game is over" and then real life takes over again [14].

Cheating in video games is as old as video games themselves and is constantly evolving and adapting as new gaming platforms appear [7]. Objectively, if we consider the concept of cheating as closely coupled to rules, then in computer video games, explicit and formal representations of the rules of the game are embedded in the code itself [26]. In this way, *"computer games provide a relatively straightforward context for distinguishing what is and what is not rules-appropriate play"* [26].

However, the concept of cheating in video games often relies on context and interpretation. Therefore, *"only they* [the players] *can tell us what it means to cheat in a videogame"* [7]. Apart from defining activities that constitute cheating in a particular video game, it is also important to consider what is gained or lost when a player engages in cheating behaviours. Cheating can be perceived as a threat to both other players and the game industry [14].

Even though cheating is widespread in all kinds of video games, including offline single player games, massive multiplayer online games, social network games and mobile games, research has mostly been focused on online games due to their popularity [2,3,4,7,8,10,11,18,42,44,46]. Some research looks at deception in mobile phone use [34,35], but

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research on cheating in mobile and pervasive games is limited [9,12,22,23,41]. Since cheating behaviours are often related to personal experience and the motivations behind them are fragmented and context related, it can be difficult to sort and categorize them [7,11]. However, collecting players' perceptions on how and why they cheat is a starting point in understanding these behaviours for mobile gaming.

RELATED WORK

Cheating in video games is well researched, but research into cheating in location-based games is limited. To understand the context, we present research into cheating in video games in general. We then present some insights into cheating in location-based games. First, however, we begin with some of the related work on Pokémon GO.

Pokémon GO

Recent HCI research has used the playing of Pokémon GO as an opportunity to study different aspects of players' experience of location-based mobile gaming, including effect on physical activity [31], social interactions [27], player experience, engagement and immersion [28, 30, 32], family bonding [37], behaviours [1,17,40], as well as effect of geographic location on gameplay [5]. This is due to Pokémon GO's significant wide-spread commercial success. Within 4 days of its release in July 2016, Pokémon GO had been downloaded more than 40 million times [29], and had an estimated 9.55 million active users daily in the US alone [43]. In July 2017, it had around 65 million active users per month and 5 million users daily [36]. Although popularity is falling off now, the success and wide spread popularity of Pokémon GO made it an excellent case study for understanding how and why people cheat in this kind of mobile location-based game, because it was a hot topic in the online forums, and plenty of players could be found locally to talk to and observe in play.

Cheating in Gaming

Studies on cheating in video games usually describe and classify cheating behaviours and investigate motives or explore countermeasures to combat cheating behaviours.

Cheating behaviours in video gaming are not easy to study. Creating tools for cheating at games can be a game in itself, as evidenced in a long history of "spoiler" communities and hoaxes that people participate in "just for fun" [16]. When asked about cheating behaviours players will respond with *"clear denunciations that cheating is wrong and they would 'never do anything like that.'"* [6]. And yet, many players do cheat, in differing ways and with different personal justifications. An important part of understanding this research space is being open and flexible about what constitutes cheating in the gaming world, and being aware that, *"For some (if not many) players, the game world is a space apart where normal rules don't apply"* [6].

Several research studies aim to classify types of cheating in online games, creating taxonomies useful for understanding and preventing future cheating [12,44]. There is a lack of common definition for what constitutes online cheating. Researchers talk about the fine line between cheating and good play tactics [12]. However, Yan and Choi [44] offer the definition *"Any behaviour that a player may use to get an unfair advantage, or achieve a target that he is not supposed to is cheating"*. They also offer a taxonomy of cheating that includes: cheating by collusion; cheating by abusing procedure or policy; cheating related to virtual assets; cheating by compromising passwords; cheating by denying service from peer players; cheating due to lack of secrecy; cheating due to lack of authentication; cheating related to internal misuse; cheating by social engineering; by modifying game software or data; and cheating by exploiting bugs or design flaws [44]. Duh and Chen [11] discuss the importance of maintaining the concept of "online fairness", and abiding by the rules of a game to maintain levels of challenge and success for those who put the hard work in to achieve game goals.

A comprehensive overview on cheating behaviours in video games is presented by Consalvo [7]. It covers both the history of cheating in video games, current player perspectives on defining and negotiating cheating, and what it is that players gain from cheating and how they reconcile this personally and ethically. Consalvo defines cheating as *"taking advantage of a person, a situation, or both"*, and adds that common to most definitions of cheating is that it *"creates an unfair advantage for the cheater"* [7]. Consalvo reports that players have differing ideas about what constitutes cheating and whether to engage in it or not. She defines three categories of players' definitions of cheating on a continuum. Firstly, players who view anything other than a solo effort in completing a game as cheating. Secondly, players who regard items such as walkthroughs, guides and asking others for help as acceptable, but cheat codes, unlockables and altering game code as cheating. This type of play is the most common and accepted form of going outside of standard game play [6]. Thirdly, players who think it is only cheating if you take unfair advantage of others in a multiplayer game [7].

Cheating is not just about subverting or beating the system (the game), it is also about enhancing the player experience. Cheating can be used to keep playing through boredom, difficulty, limited game scenarios, rough patches, or just bad games [7]. A common cause of cheating is the desire to progress through games when stuck at a particular level. Player enjoyment is *"tied to completion or a deeper knowledge of a particular game"* [7]. If a game is too difficult it results in a stressful experience and players are pushed towards cheating to overcome this. Play can be enhanced by the fun achieved by being able to "play God" in the game [6,7], where players desire control over every part of the game. Players can gain pleasure from exploring different aspects of game, including hidden ones, or collecting game items and bending the rules at their will [7]. Cheating can also be used to speed up the narrative of games [7]. This is done to "fast-forward" through unpleasant or boring parts of the game [6].

The reasons behind cheating are also investigated by Doherty et al. [10]. They compare their results with Consalvo's [7] cheating categories and argue that cheating behaviours can be sorted and classified, but that it is players' motivations that differ, influenced by their personal experience and emotions. Chen and Wu [4] add to the understanding of player motivations to cheat by discovering that people are more likely to cheat in video games if they believe they are unlikely to be caught. They rely on their anonymity in multiplayer games. They also assume that cheating is a normal behaviour in the player community.

With respect to the ethics of cheating, Consalvo states that players *"actively made ethical judgments about gameplay that extended beyond the coded rules of the game"* [7]. In [6], Consalvo begins to build a framework for considering ethics in relation to games and players, exploring the notion of the gaming world as being a "space apart" from the codes of conduct and ethical considerations of daily life. Kimppa and Bissett [18] stress the importance of not ignoring cheating in online games, because these games are of value to the players, making it an issue of moral significance. They discuss the difficulties in assessing what constitutes cheating, as many behaviours players consider cheating is not directly against the rules of the game. Negative impact on other players is generally agreed as cheating, but other situations are more problematic. Countermeasures to cheating are proposed for developers of multiplayer games to combat different kinds of cheating. These include accepting complaints from other players and taking technical measures to stop cheaters, such as code patches, checksums, restricting information packets and shutting down their accounts [18].

Cheating in Location-Based Gaming

Research on cheating in location-based games is limited. There are a few studies, but they mostly approach the topic from a technical point of view, aiming to counteract it.

A common form of cheating in location-based games is to "fake" the current location of the player, and gain player advantage from doing so. Projects like TrustPos [41] aim to find solutions to prevent cheating in location-based games. This includes using the internal network itself to continuously check if the GPS location is trustworthy or faked. He et al. [12] also study solutions to prevent cheating through faking location, by using the Foursquare app as a case study. They analyse cheaters trying to gain location-based rewards by faking their current location and bypassing the location verification mechanism installed to stop this. They propose a technical solution to improve anti-cheating measures, suggesting that service providers *"explore effective location verification technologies, and…limit profile crawling and analysis to mitigate the threat of location cheating"* [12]. In a study of Ingress, and the influence of AR on mobile games, Li et al. [23] found that the GPS nature of Ingress contributes to the localness of the gaming community, and that cheating behaviours in Ingress are mostly based on social interactions of players communicating and working with the enemy team.

Pervasive games, such as Pokémon GO, expand the spatial, temporal and social dimensions of gaming through the use of both Augmented Reality (AR) overlaying digital and physical worlds [45], and location awareness which correlates movement in the game world with movement in the physical world [38]. This facilitate players experiencing and interacting with the physical world in new and engaging ways, bringing the excitement of games to the real world [38]. At the same time, this opens up new opportunities to subvert game rules and conventions. Pervasive games explore the edge of the "magic circle" by exploiting the ambiguity of where the circle sits, and going beyond basic game boundaries, leading to a situation *"where the game interface is completely ambiguous: Any action could be a game action, and any sensory observation by any participant could be seen as part of the game"* [25].

Some pervasive games leverage on the idea of contextual ambiguity making it an important part of the game play. They require players to negotiate both the rules of the game and the gaming experiences [9]. These kinds of pervasive games blur spatial, temporal and social aspects of the rules in order make the player feel as if the game is pervading their everyday life. Examples of games in this area include: Prosopopeia, Uncle Roy All Around You, SFO, and The Game [9]. These games encourage reliance on community moderation, and in turn people's personal and everyday ethics govern their behaviours in the game. Cheating in such games is much more difficult to define.

In this paper, we use the term "cheating" to refer to game play activities that *"create an unfair advantage for the cheater"* [7]. However, we treat what constitutes unfair advantage as a player defined concept. While the rules of the game as set out by Niantic define a boundary of acceptable game play (or the "magic circle"). We also accept that some players see that boundary as flexible, and are more likely to regard an activity as cheating when it adversely affects the gaming experience of others, rather than breaking the formal rules of the game.

CASE STUDY OF POKÉMON GO

Pokémon GO is developed and distributed by Niantic. The game engages players to hunt virtual monsters in a real environment, using a smartphone and its GPS [15]. Pokémon are caught by throwing Pokéballs at them, which can be obtained from interactive spots, Pokéstops, based on physical landmarks linked to GPS coordinates. Each unique Pokémon caught is registered in a player's Pokédex. Each Pokémon has an Individual Value (IV) which is a numerical representation of its attack, defence and stamina potentials, in essence, its strength. Pokémon can be used to compete in battles for control of special virtual arenas located in specific physical places called Pokégyms. There are three global teams of players, and each Pokégym is controlled by a team. Upon reaching level 5 in the game, each player must choose which team he/she wants to be affiliated with. Researchers used version 0.61.0 for Android to understand gameplay.

DATA COLLECTION

Our study began with members of the research team who were not already Pokémon GO players, installing the app on their smartphones and participating in the game for several weeks to become familiar with the game play, the rules and the terminology of the game. This took place in a regional city in Denmark with a population of around 210 thousand. The study began in September, 2016 and continued until May 2017. Although Pokémon GO Plus and the Smartwatch app were released during this time, we did not encounter any players using them. The versions of Pokémon GO being used were those available during this study time, we did not control which version people used.

After getting familiar with the game, we carried out several months of qualitative data collection and analysis [21], aimed at gaining a deeper understanding of the phenomenon of cheating as it applies to mobile location-based gaming, through the specific case of Pokémon GO. We used content analysis of online discussions on the topic, field observations and field interviews with players in-situ, semi-structured interviews with key informants recruited in the field and online, and a focus group discussion to gather data on player attitudes to cheating in Pokémon GO. This resulted in a catalogue of the ways that players cheat, as well as information on their individual motivations for it.

During preliminary discussions with fellow players, we found that people were reluctant to share their cheating behaviours, so starting our investigations with online discussions, and the anonymity this offers people, was a good way to get an overview of the topic.

Collecting Online Data

Immersing ourselves in the online discussions of the Pokémon GO gaming community quickly gave us an overview of the phenomenon of cheating in this game. In a short amount of time we identified the different ways that people cheat, as well as their attitudes to this. Inspired by the method of Raptis et al. [33] we adopted a two-step process of collecting and iteratively refining data. We used the keywords "cheating", "location-based games", "Pokémon GO", "advantage", "modding" and "hacking" from the semantic field of our focus on cheating in location-based games. We used the common search engines and platforms Google, Bing, Facebook and Reddit. We collected comments and posts from March 1, 2017 to March 17, 2017, spending approximately 40 hours on online search. In total, we collected 3256 comments, which were filtered iteratively by removing duplicates, and comments deemed outside our focus. For example, we removed complaints about Niantic and cheating players where no details on the issue behind the complaint were given, such as *"we should enact the death penalty for those who cheat…they deserve to DIE. Or at least have their Pokémon taken away."* After filtering, a collection of 415 unique comments remained. This gave us an understanding of some of the common ways of cheating in location-based games, the terminology used to discuss cheating, and a sense of what people's motivations for cheating are.

Understanding gained from the online study prepared us for the field observations and interviews, helping us to structure a set of issues to investigate in the field, including looking for additional ways of cheating and collecting player thoughts on cheating. It also gave us a sensitivity to cheating activities, what they might look like, and how to speak about them with players. Through learning the terminology used in the online forums, we were able to approach players better, using the right kind of language, and better understand their answers, making conversations with players more fluent, natural and informative.

Field Observations and Interviews

Given the mobile nature of Pokémon GO, we started by observing people playing in the gaming environment of the city. We identified two places in Aalborg, often crowded with players due to a high density of Pokéstops: a central park area, and an area under a train-bridge in an industrial part of the city. Data collection involved six field observations of one-hour duration, over 6 days. Although these were short observation times, they were scheduled for peak times of playing activity in these places. We focussed on people's playing behaviours, observing different types of players and their movement around the spaces. The players, around 270 people, included single players, couples, groups of friends, and families, both males and females, with estimated ages between 6 and 60. During observations we made notes on general player behaviours, unusual actions, and types of players, resulting in 12 pages of typed notes at the end.

Observation sessions were followed by field interviews in the central park area of the city, to learn more about specific cheating activities and motivations. We sought out and interacted with players in the environment who were willing to talk to us, as well as those who appeared to be engaged in unusual playing behaviours. We introduced ourselves as researchers doing a study of cheating in Pokémon GO, so that players understood the context within which they were responding, and did not need to fear recriminations when sharing their cheating behaviours with us. Interviews were conducted in both English and Danish.

The field setting was noisy and distracting, as it is a popular recreation space in the city. In addition to this, we were interviewing players who were typically actively engaged in play. Over three days we collected a total of 16 interviews with 19 players, with an estimated average age of 30 (ranging from around 10 to 50 years of age). This included 11 single adult players, 3 pairs and 2 children. Children were interviewed in the presence of their parents. To keep conversations informal, we did not ask for demographic information, nor did we video or audio tape interviews. Instead we took field notes and only took photographs with permission. Field notes were collated, and photographs printed and added to the data set.

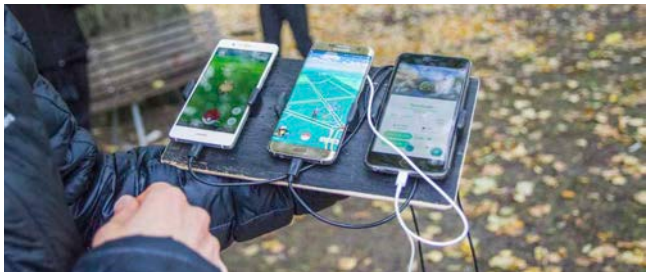

Figure 1. A player in the central park playing on three separate accounts simultaneously.

While interviewing, we observed several instances of play that could be considered cheating, including the use of three separate accounts simultaneously (Fig. 1), and the use of a map with the location of Pokémon in and near the park (Fig. 2). We will return to this in the findings section.

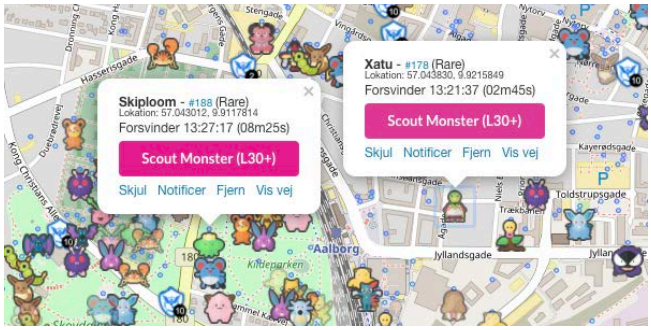

Figure 2. An "illegal" additional map

Semi-Structured Interviews

Faking GPS location so that a player appears to move in the real world when they are not, was a common form of cheating in Pokémon GO, therefore we also interviewed players in their homes. First, we conducted a set of short open interviews by phone with people who played from home, recruited online through the Pokémon GO Facebook pages. We used information from this and the field interviews to design semi-structured interview questions to expand our understanding on specific cheating behaviours, feelings and thoughts of players. We structured the interviews using Kvale and Brinkmann's [20] interview protocol, ensuring all relevant topics were covered, while being open for exploration of new and emerging topics.

To understand motivations for cheating we based questions on preceding phases of this study, and a previous study into player engagement with location-based AR games [15]. The interview protocol included: introduction to study, ways of playing, game strategies, and views on cheating. During the interviews, we encouraged participants to reflect on their experiences of playing Pokémon GO, as well as techniques used in other video games. These interviews were more focussed and longer than field interviews (approximately 40mins), facilitating discovery of new cheating behaviours not previously found.

We conducted 8 semi-structured interviews with 9 participants (see table 1). Three were conducted at the University, one in a private home and four by Skype. Children were interviewed in the presence of their parents. Interviews were audio recorded. They resulted in rich data on topics such as fairness and playing from home, and helped narrow our focus and clarify issues from previous data collection activities of the study.

ID	P1	P2	P3	P4	P5	P6	P7	P8	P9
Gender	M	F	F	F	M	F	M	M	M
Age	18	35	28	24	27	25	17	11	13

Table 1. Semi-structured interview participant details.

Focus Group Discussions

After the interviews, we held a focus group discussion with players of Pokémon GO, based on [19], to promote deeper discussions on cheating issues. Participants were recruited during field interviews in the city park (see table 2). The focus group, lasting 90 minutes, was conducted in Danish, and structured around 8 questions on cheating at Pokémon GO. It was audio recorded and photographed.

ID	FP1	FP2	FP3	FP4	FP5	FP6
Gender	F	M	F	M	M	F
Age	22	23	60	7	10	54

Table 2. Focus Group participant details.

We used two ice breaker games to get them thinking about the context of cheating. The first activity required them to write down a single word representing "Cheating in Pokémon GO". The second activity asked them to sort cards depicting the 10 different kinds of cheating (identified from the content analysis of online data), as either cheating or acceptable play. After, they were asked to explain their decisions. They were then asked to rank those cards deemed as cheating activities from least to most severe. These ice breaker games helped immerse participants in the topic and reflect on their personal perceptions of cheating. Lively conversations between participants happened during the ice breakers. We then continued with discussions prompted by questions such as "*What are the pros and cons of using game enhancing tools to play?*" and "*Can you give any examples of cases where it would be acceptable to bend the rules?*" to stimulate self-reflection and prompt them to vocalise their thoughts and motivations around cheating.

In the focus group, we found that participants were more relaxed and willing to express their thoughts on cheating than during the interviews. The focus group allowed us to form a deeper understanding on how local players delineated between bad and acceptable cheating.

DATA ANALYSIS

The data collected included 415 online comments, 12 pages of field notes from observations, notes and photographs from 16 field interviews, audio recordings from eight interviews, and audio recording from a 90-minute focus group. For all data sources, we followed the same overall procedure. Firstly, two researchers independently analysed a subset of

the data to develop initial codes using content analysis [13]. These codes were then merged to one code list, by coders resolving disagreements through discussion until consensus was reached. Secondly, this code list was used by both researchers to complete analysis of the whole dataset.

Cheating Activities	Description
Bots, Botting	using automated programs to carry out game tasks, (e.g. Runescape bots)
Buying and selling accounts	buying/selling accounts that others have reached higher levels in (usually by botting)
Exploiting	taking advantage of weaknesses in the game and related technologies, e.g. inaccurate GPS
Hatching Hacks	manipulating the distance travelled required to hatch Pokémon eggs by attaching the phone to a moving object, e.g. dog, ceiling fan
Measuring IV	using apps or websites to get information on individual values (IV) of Pokémon, not normally visible in the game
Using maps and scanners	using maps that display Pokémon' positions or using functions that alert the user when a specific Pokémon appears nearby
GPS spoofing	manipulating the phone's GPS position through an external app or the phone's Developer Mode
Multiple Accounts	using several accounts in parallel, often to gain an advantage in Pokégyms
Sharing Accounts	sharing login information to gain an advantage by playing for others / others playing for you
Transport	using transportation to move faster or to more places than walking allows, e.g. bike, car

Table 3. Catalogue of Cheating Activities in Pokémon GO.

Content analysis of Online Data and Field Data

To analyse online data, 415 online comments were individually printed and coded as described above. The code list was then entered into NVivo. This produced a set of codes derived from online data.

To analyse field observations and interviews, notes from field observations, field interviews, and photographs from the field were analysed in NVivo to produce a set of codes derived from field observations. From this analysis, we also identified a catalogue of cheating activities in Pokémon Go (see table 3). These cheating activities informed interview questions, as well as used to create activities for the focus group session.

Open Coding of Interview and Focus Group

To analyse semi-structure interviews, audio recordings of interviews were transcribed, and then coded using open coding from the grounded theory method [39] in NVivo. This activity produced a set of codes derived from the semi-structured interviews.

To analyse focus group discussions, audio recordings were transcribed, and coded using open coding [39] in NVivo, to produce a set of codes from this data.

Affinity diagramming

As the last step of our analysis, the codes from the different data gathering activities were clustered into categories and sub-categories, using affinity diagramming [24], in order to identify higher-level themes. The codes were colour coded with respect to their data gathering method, but in this paper we report on the overall findings found by combining the codes from all data sets, while maintaining links between data sets and codes to facilitate attribution of evidence to categories. This resulted in 9 categories on why people cheat at Pokémon Go, including: renewing the game experience; crafting their own adventure game; completing difficult game tasks; exploring the limits of the game; playing the game without moving; eliminating boring game elements; making the game fair; not affecting others; and keeping up with other cheaters. These were further grouped into three overall themes which are detailed in the next section.

FINDINGS AND DISCUSSION

Our findings representing players' perceptions of behaviours, motivations and justifications for why people cheat in Pokémon GO, are organised into three main themes of 1) cheating to enhance the game experience; 2) cheating to compensate for limitations in the game design; and 3) cheating to compensate for behaviour of others. Although these cheating behaviours have been observed and reported on with respect to online video gaming, we uncover how the mobile location-based nature of Pokémon GO adds new dimensions to these activities.

Cheating to Enhance the Game Experience

Renewing the game experience, crafting their own adventure game, completing difficult game tasks, and exploring the limits of the game are reasons for cheating that apply to all kinds of video games. However, we found that Pokémon GO players used GPS spoofing, maps and botting to manipulate location-based elements of the game in order to engage in these cheating behaviours. This included playing the game without moving, and making the game advance faster than walking pace allows.

Renewing the game experience

Cheating is one way to make a boring game more exciting. As Consalvo [7] reports, it is used to increase the pleasure in an already-pleasurable experience. Cheating can be used to discover alternative paths in a game or a way to re-experience the game in a new way after having completed it using standard play. The main reason players want to renew the game experience is because they seek to recreate the

feeling of excitement when first playing the game, or they want to have "*more fun*". When players have discovered and caught almost all of the Pokémon in their area, they turn to GPS spoofing or use maps to find the last Pokémon needed, rather than walking the streets and waiting for them to randomly spawn. They want the accomplishment and pleasure of registering the Pokémon to their Pokédex when the new Pokémon is finally caught or evolved.

We encountered many players complaining about wanting excitement due to repetitive tasks in the game. Some chose to go outside the rules to increase game excitement. One way of enhancing the gaming experience was using GPS spoofing. In this way, players virtually experienced new places and biomes. They explained that this gave them access to new or rare Pokémon. As interview participant, P8, said, "*It's nice because we went to Tokyo and it was some other Pokémon than we have in our area. Well some of them were. It was exciting to play in a new place.*"

The fun of automating the process of collecting Pokéballs was reported in an online CNET article, "*The bot was a game within a game. […] it was intoxicating. A lottery system where winning was not a matter of 'if', but 'how much'. Leave it running and come back later to see what prizes had been collected*".

Crafting their own adventure game

Creating a personal adventure story within the Pokémon GO gaming environment was another way of avoiding repetitive tasks. Using maps that display the positions of Pokémon and the amount of time left before it disappears, players invented an imaginary narrative in which they were Pokémon trainers on special missions. A player from the field interviews explained, "*It is like hunting: you study your prey, its habits and try to locate where it spends most of the time.*"

As a player shared in an online in an article in Kotaku, "*The thrill of chasing down Pokémon found on poke vision or poke radar was far more fulfilling than not knowing where anything is or what direction to head"*.

Players that went on their own imaginative journey using additional tools, expressed the excitement of the chase being greater than standard game play.

Completing difficult game tasks

The desire to complete the Pokédex with each unique Pokémon is another reason given for why players resort to cheating. Though the game has no definitive end, many see collecting one of each Pokémon as the purpose of the game. A player, in the field interviews, explained why he was using maps, "*It's nice because I can see what Pokémon I can get. I already have most of them so I just need some specific ones"*.

Filling the Pokédex reportedly gives players a sense of purpose and accomplishment, and the positive experience of completing a task. Others make it their personal goal to collect as many rare Pokémon as possible or Pokémon with special characteristics such as 100% or 0% IV.

Maps are used in pervasive gaming to expand spatial aspects of the game [25] and facilitate the blending of real and fictional worlds, contributing to engagement. In Pokémon GO, player produced maps are used to catch Pokémon that are regionally locked. Players manipulate their GPS to appear to be in that region. Other maps enable them to catch Pokémon with a specific IV. Players admitted that the pleasure of catching a rare Pokémon was still there, even when it was caught by cheating. As interviewee P8 explains, "*It's just because they're hard to get. Not everyone has them and they're special*".

Exploring the limits of the game

In our study, we found instances where players took pleasure in exploring hidden aspects of the game or discovering its technical limitations. Player curiosity for seeing what is possible and the pleasure gained from finding new paths drives players of computer games to dig into the program code. Some see exploring the boundaries of a game, and exposing the game's limits, by accessing the Application Programming Interface (API) as a challenge and enjoy figuring out how to successfully cheat.

To exploit code supporting the location-based nature of the game, software is written to automatically "go out" and collect Pokémon for the player. As one player explained in an online CNET article, "*I'm not going to lie. It was fun to see how easy it was to cheat and how quickly my collection was growing. If I really wanted to catch 'em all, was it so bad to just send out a bot to do it for me?"*

One participant we interviewed is the creator of one of the most used maps for cheating in Pokémon GO in Denmark. He explained that he gets pleasure from seeing and hearing how his map helps improve the gaming experience for other players. Many players reported that this kind of shared community resource was seen more as cheating the gaming corporations, rather than each other, because it helped improve the gaming experience for all. In effect, "illegal" maps extend the boundaries of the game in new directions, in direct response to real player needs for gaming satisfaction. As the map creator, P7, said, "*I see it more as a hobby, it's fun to learn from it…It's nice to know that I'm making people happy, that makes me happy as well."*

Playing the game without moving

At the very core of location-based games is the importance of the player's current location to game play. Many people enjoy playing Pokémon GO because it encourages them to go outside, exercise and/or socialize. However, we found situations where players wished to play the game, but without having to physically move. They choose to eliminate the location-based aspect of the game by using a GPS-faking application that manipulates GPS positions to represent themselves as moving in the virtual world, while remaining stationary in the physical world.

Reasons given for doing this included physical impairments (e.g. one player used a wheel chair, another had a leg injury and played from his hospital bed), bad weather conditions or

simply not having enough contiguous spare time to go into the streets and play in the intended manner. A comment sourced online from Reddit summed this up, "*I would love to play and go out and socialize, but time, children, a baby, the server, work, college and of course the fact that Pokéstops and gyms are nowhere near me, can cause GPS spoofing to be very tempting*". (anonymous)

Eliminating the location-based aspect of the game removes an important aspect of the designed game experience. This is not necessarily because players do not want to play in the intended way, but that they want to play even when they cannot play in the designed manner. As shown by Li et al. [23], the same problems arise in the playing of Google Ingress, where it is common practice to circumvent having to spend so much time moving around physically to play.

Cheating to Compensate for limitations in game design

If they can find a way to do it, players like to enhance game experience while eliminating boring game elements through cheating. This applies to gaming generally, but in mobile location-based gaming, boring game elements can involve kilometres of walking and quite a large time commitment. They feel justified in cheating if the game design itself appears inherently unfair. In this case, players report that cheating is just making the gaming world a fairer place. This kind of cheating and justification is found in video games generally, but in location-based games, a player's geographic location, the city or country they live in, can be a disadvantage in achieving fair game play.

Eliminating boring game elements

To increase fun and excitement in the game, some players choose to reduce or eliminated aspects of the game they find boring. Collecting items such as Pokéballs, needed to catch and evolve Pokémon, is an activity that many players find boring. To alleviate this, Niantic offers to sell these items to players so that they can avoid having to collect them manually. Players expressed that paying for items in the game creates an imbalance that effectively has the same impact as cheating. However, enterprising players find other, cheaper, ways to avoid walking the distances required to collect them. As participant P1 explains, *"It was mostly about making it easier, of course you can pay for Pokéballs and stuff like that, but you can also just pay a few dollars to get everything using the bots, so that's what I decided to do. I guess it's about making it more exciting, because you don't have to waste time gathering items and catching worthless Pokémon. It's automating everything so you simply get what you want*". The use of bots creates the excitement of getting them to work and discovering what the bot has collected.

Capturing rare Pokémon can move the game to a higher level, but this may be too hard for to some players to achieve as it usually requires players to walk for a very long time and distance in the hope of encountering them all. Consalvo [7] identifies a similar situation in video games, where players cheat to overcome feeling unable to progress, or to speed up certain game tasks.

Making the game fair

Regional towns and smaller cities are sparsely populated with Pokéstops and Pokégyms compared to bigger cities. This is confirmed by Colley et al. [5]. Players situated in these locations often feel they cannot experience the game on equal terms with the big city players. In the online dataset, 82 comments (out of 415) were concerned with this issue of unfair distribution of Pokéstop locations. This was echoed throughout all datasets. Regional players justify cheating using GPS spoofing as a way to equalise access to these game resources. As expressed online on Reddit, "*The truth is that not all players are treated equally, some of us have 2-3 Pokéstop on top of their own house, while others have to travel 1 hour just to reach one of them, and some of us don't even have Pokémon spawns near their place*" (anonymous).

This is because the game developer, Niantic, chooses to place a greater concentration of "hot" locations, such as places to find Pokémon, Pokéballs, Pokéstops and Pokégyms, within highly population areas where the greatest number of people will benefit. This results in a better gaming experience for those who live in bigger cities, but disadvantages players who do not. This then makes them feel that they have to cheat to achieve the parity and the same gaming experience as city players.

A similar unfairness exists in the geographical distribution of Pokémon with high strength important for winning battles in Pokégyms. Placing a strong Pokémon in a gym makes it hard for other teams to win. As a result, many players resort to using maps or scanners to find these strong Pokémon to increase their chances when competing in the Pokégyms.

However, proximity to Pokéstops and powerful Pokémon was not the only issue encouraging players to manipulate location using GPS spoofing. With three teams for players to join, it is reasonable to expect that this would result in an approximately equal distribution of players on each team. In reality, this is not the case. Players allocated to a team with less members, feel this results in an unfair experience of the game. This is because a team with fewer players finds it more difficult gain and maintain ownership of Pokégyms. This motivates players to manipulate their phone's GPS signal so that they can reclaim gyms from home each day, without taking the time to go there.

Cheating to Compensate for Behaviour of Others

Most players agreed that some types of cheating are more acceptable than others, and how much the cheating affects others is a key determinant on whether it was acceptable. Whether players perceived Pokémon GO as a single player or multiplayer game affected their attitude towards the acceptability of cheating. Some felt that cheating was fine as long as it did not affect others, while some gave the cheating of others in a multiplayer game as a key motivator for cheating themselves.

Doherty et al. [10] suggest that ethical aspects of play are often formed by the player community of multiplayer games and not an inherent part of the games themselves. However,

in most games there is a very clear division of single player and multiplayer modes. This division does not exist in Pokémon GO, but relies on the individual player's perception of the game, making ethical considerations in Pokémon GO different from many other games.

Not Affecting Others

Players who cheated but considered Pokémon GO a single player game, generally did not feel obliged to follow game rules, as they felt it did not affect others. As participants said, "*I'm playing by myself, by my own rules*" (P1) and "*my game, my rules. Man, It's like home invasion. You cannot decide how I'm playing.*"(P6) However, we came across very few players that openly said they simply did not care, that they focus on their own experience and not what others think of their way of playing.

Generally, players that consider it a single player game tended not to see any moral dilemma in cheating because they perceive it as only affecting their own gaming experience. In contrast, players that consider Pokémon GO a multiplayer game were seemingly hesitant to cheat because they worried that their cheating would affect the gaming experience of others.

Players agreed that there are situations in which it is acceptable to bend the rules and other situations where it is not. However, what these situations were varied greatly between our participants. The main consensus was with respect to the severity of different cheating activities. For example, using maps and IV measurers were well-accepted amongst the gaming community, whether they considered it cheating or not, whereas the use of bots and GPS spoofing was generally frowned upon. This could be because maps and measurers enhance the physical location-based gaming experience, while bots and GPS spoofing undermine it.

The activity of sorting the 10 different cheating activities in order of severity in the focus group, resulted in agreement that botting was the worst offence. Participant, FP2, explained, *"You can just start your computer and have it running for two days and then you have a level 30 account that you can use to conquer or fight in gyms, and that's ruining it for others"*.

Conversely, the perception was that maps and IV measures were just a normal part of game play. A player in the field told us, *"It should be okay to measure IV, because it's important to the game. It's a part of it. You need high IV Pokémon to compete*".

Another justification to bend the rules was to get around the fact that tools in the game sometimes stop working, or Niantic changes the game play. A player commented in Reddit: "*Pokevision is fine to use as long as the tracker is broken. How else are we gonna find Pokémon when Niantic disables the tracker? I'll probably stop using it when the tracker works again.*".

Keeping up with other cheaters

An unfortunate side effect of players cheating in multiplayer games, is that it encourages others to cheat, just to keep up. People who claim they would not otherwise cheat, end up doing so, just to stay in the game and not feel at a disadvantage to the players they perceive as cheating. We found that this was a particularly contentious issue when it came to GPS spoofing, *"It's obvious that it does provide an advantage, because if you were playing as intended then you'd never be able to reach that amount* [of Pokémon], *and because you do that* [GPS spoofing] *you're now able to get a Tyranitar and place it at the highest level of the gym that you conquer. So, cheating by tracking or spoofing has a huge impact on how the game evolves."* (P5)

In fact, some players admit to cheating simply for the pleasure of getting revenge on cheaters. As a player confessed online in the GOHUB forum, "*it's soul crushing when you make the effort to play the game properly and some a***hole can take it from the comfort of their home. So I looked into a way to spoof with my iPhone to get back at this person…it was pretty satisfying to actually make a dent in this players mind. That's why I did it because it felt great to get back at this person*". (anonymous)

This response to cheat because of the actions of others was reported as happening mostly during fighting in and for the control of Pokégyms. Players who considered Pokémon GO a multiplayer game found cheating in Pokégym battles unacceptable, with botting particularly frowned upon.

WHY PEOPLE CHEAT IN POKEMON GO

The cheating behaviours identified in this study align with literature on cheating in online games. In most cases people cheat and justify doing so because the game does not offer enough excitement in its current state, the game itself has elements deemed unfair, or they think it does not affect others. Not surprisingly, although many players agreed the game was not always fair to all players, there were mixed feelings on whether this justified cheating or not.

This study contributes to new knowledge by identifying how cheating behaviours instantiate in Pokémon GO, with respect to the game's mobile and location-based nature. Based on empirical findings incorporating the cultural breadth of online forums and the depth of observing and talking to local Danish players, we have identified key factors explaining why Pokémon GO players engage in "mobile cheating". Cheating motivations specifically related to the location-based nature of the game include: 1) inequality of game elements in different geographic locations; 2) a desire to participate without moving; 3) efficient collection of location-based game elements; 4) making the game advance faster than walking pace; and 5) exploring the limits of emerging location-based technologies.

Inequality of game elements in different locations

The low number of Pokéstops and Pokémon in some areas is key reason for cheating. To experience the game in the same way as urban players, rural players resort to GPS spoofing,

effectively removing the location-based aspects of the game from their experience. In this way, the very design of the game creates a perceived need to cheat.

A desire to participate without moving
At the very foundation of every location-based game lies the expectation that players navigate the physical environment to participate. However, many players choose to eliminate the location-based aspect of Pokémon GO. Some do it all the time, others do it just for a single session when circumstances do not allow for physical play. They do this for a variety of reasons, including: bad weather, physical impairments, being too busy to spend the time required, caring responsibilities, wanting more effective or exciting game play, or a mix of these factors.

Efficient collection of location-based game elements
By design, Pokémon GO players need to continuously walk around to catch Pokémon and collect Pokéballs and other items that allow them to evolve their Pokémon. This is one of the aspects of the game that players report as boring and repetitive. Despite the ability to make in-game purchases of these items, players prefer to automate the collection process using botting to save time and money, leaving more time for playing the fun parts of the game. It is also very difficult to complete the collection of Pokémon, or capture rare and powerful Pokémon without immense physical effort. Some players feel justified in cheating through overly difficult tasks as they regard it as bad game design.

Making the game advance faster than walking place
Simulating movement in the physical world advances play in the virtual world at a more rapid pace. In location-based games this is usually achieved by walking faster between collectable objects and game tasks. This is not always desirable or possible, depending on the player's ability to walk faster. Instead, players resorted to GPS spoofing to virtually move faster through the game. Less technical solutions observed included riding bicycles or driving cars to collect game elements faster.

Exploring the limits of emerging location-based technologies
Several of the cheating activities (identified in table 3) involve exploring limits and exploiting opportunities offered by the technologies used to make the game play location-based. Botting, exploiting, measuring IV, using maps and scanners and GPS spoofing all require manipulating or programming functions of the phone to go beyond standard game play and extend the gaming experience both for those doing the adaptation and the general player community they share it with.

IMPLICATIONS FOR DESIGN

Findings from this study indicate that there are several things designers of location-based mobile games can do to improve players' experiences of their games.

1) Distribute important game elements "fairly" within a playing area: Unequal distribution of game elements across physical locations results in a perceived unfairness with respect to how far players need to travel to collect them. Developers should allow players to contribute by adding game elements in new locations as the game evolves, to support positive experience for players in rural areas.

2)Make it clear when actions will affect other players in the game: Even though players enjoy testing the limits of a game, it is important to clearly indicate where invisible borders in game play exist, for example, ambiguity with respect to Pokémon GO as a single player or multiplayer game. Multiplayer elements of Pokémon Go, such as battles in Pokégyms, are where cheaters are least tolerated. However, players claimed they would change their behavior if they knew they were negatively affecting experiences of others.

3) View cheating behaviors as informative and indicative of players needs within a game: Cheaters can be a precious source of information regarding weaknesses and short comings in a game with respect to player expectations. Game designers could learning from cheating behaviors to improve the game. For example, since player created maps added more fun, by removing tedious elements and supporting imagination and success in the game, it should be supported by Niantic, and become a part of normal game play.

LIMITATIONS OF THIS STUDY

The main limitation in this study is that it was conducted with a limited number of participants in a relatively small part of Denmark. However, through analysis of online sources, comments from players from different cultures and different locations could be included in the data set.

Additionally, the limited number of participants was due to the fact that cheating is a sensitive topic as it is mostly considered unacceptable behaviour by player communities. They can react strongly to people they think are cheating. This made recruiting participants willing to talk openly about their cheating behaviours a very difficult task. However, the online forums and the anonymity they offer became an important resource in accessing players thoughts and opinions on their own and the cheating of others.

CONCLUSION

In conclusion, we used Pokémon GO to study players perceptions of "cheating" in a mobile location-based video game. Although cheating in video gaming is a well-researched area, we found very few studies on cheating in location-based games. Through empirical research, we discovered players behaviours, motivations and justifications for cheating in Pokémon GO. Our contribution is an understanding of cheating behaviours specific to mobile and location-based games. This includes cheating to compensate for perceived inequality of game elements in geographic locations, cheating to play without moving, cheating to efficiently collect location-based game elements, cheating to making the game advance faster, and the challenge and enjoyment of pushing the limits of location-based technologies beyond standard play.

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