The Pokémon GO Experience: A Location-Based Augmented Reality Mobile Game Goes Mainstream

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ABSTRACT

Pokémon GO is a location-based augmented reality mobile game based on the Pokémon franchise. After the game was launched globally in July 2016, it quickly became the most successful mobile game in both popularity and revenue generation at the time, and the first location-based augmented reality game to reach a mainstream status. We explore the game experiences through a qualitative survey (n=1000) in Finland focusing on the positive and the negative aspects of *Pokémon GO* as told by the players. The positive experiences are related to movement, sociability, game mechanics, and brand while the negative experiences emerge from technical problems, unequal gaming opportunities, bad behavior of other players and non-players, and unpolished game design. Interestingly, the augmented reality features, safety issues or the free-to-play revenue model did not receive considerable feedback. The findings are useful for academics and industry practitioners for studying and designing location-based augmented reality game experiences.

Author Keywords

Game Experience, Game Design, Augmented Reality, Location-Based, Pervasive Game, Mobile Game, Pokémon GO, Qualitative Study

ACM Classification Keywords

Human-centered computing, Human computer Interaction (HCI), Empirical Studies in HCI

CHI 2017, May 06-11, 2017, Denver, CO, USA
 ISBN 978-1-4503-4655-9/17/05…$15.00
DOI: http://dx.doi.org/10.1145/3025453.3025871

INTRODUCTION

Pokémon GO (Niantic, 2016) is a particularly relevant mobile game for CHI and game studies communities, since it ties into many research interests from the last decade. It is a pervasive game [21, 24], more specifically a location-based mobile game [27]. It uses augmented reality technology [5, 18] and ties into a transmedia [9] storyworld like alternate and mixed-reality games [19, 20]. It brings together elements from exergames [28], treasure hunts [21], geocaching, [22] and free-to-play games [1, 23] in a way that is approachable and possible to engage casually [15, 16]. Notably, *Pokémon GO* has combined these elements into a successful commercial game and it offers an interesting case to reflect on the claims made about earlier games and prototypes [e.g. 14, 17].

We present a qualitative survey study (n=1000) focusing on Finnish *Pokémon GO* players' positive and negative game experiences. The game's unprecedented success means that it has been played by a large and diverse player base, and it has become a part of the mainstream culture. Our aim is to describe and map player experiences and reactions to *Pokémon GO*. This enables us to tease out design insights related to location-based augmented reality games, and to evaluate which features players enjoy and which they loathe. *Pokémon GO* is a novel play experience for many; its newness and first-ness cannot be repeated, yet its popularity means that it will be the measuring stick against which later games will be compared.

POKÉMON GO

In *Pokémon GO* the players are Pokémon (pocket monsters) trainers who search, capture, collect, train, evolve, and battle Pokémon creatures. GPS is used to match the player's real world location with the virtual world. When Pokémon creatures appear in the virtual world, augmented reality (AR) is used to overlay the Pokémon on the real-world viewed through a mobile camera (Figure 1). The player's goal is to capture the Pokémon by throwing Poké Balls at them.

Poké Balls, eggs, and other items can be collected from PokéStops, which are monuments and other landmarks in the real world. New Pokémon can be found by moving in the real world, or they can be hatched from eggs. Depending on the type of egg, the player must either walk 2, 5, or 10 kilometers to hatch it. The players can choose to play against each other by fighting in Gyms, which can be conquered and used to collect Pokécoins, the virtual currency of the game. Like PokéStops, Gyms are located on points of interest in the real world. Pokécoins can also be bought with real money, and can be used to buy more Poké Balls and other game items.

Figure 1. Two in-game scenes from *Pokémon GO*. Capturing the Pokémon (left), moving in the virtual world (right).

RELATED WORK

There are many research prototypes and short-lived commercial pervasive games focusing on different aspects of mobile ubiquitous gaming that used features later central in *Pokémon GO* (see [20]). Commercial titles include *BotFighters* (It's Alive!, 2001), *Shadow Cities* (Grey Area, 2010), and *Ingress* (Niantic, 2012). Research on gaming experiences in these three games has been scarce, with the notable exception of an early study on *BotFighters* [6].

Songs of North (2004) was a location-based game [17] where player safety (e.g. playing in traffic) was considered in design by implementing audio cues in the game interface [10]. The research also revealed that the requirement for physical movement (i.e. exergaming) might turn off some active gamers, but also attract new ones. *Feeding Yoshi* (2006) and *Insectopia* (2007) were both location-based games utilizing WLAN and Bluetooth resources available in the real world. In *Feeding Yoshi* players would look for public and private WLANs for gathering seeds, planting fruits, and feeding Yoshi creatures. Players in *Insectopia* gather insects which are active Bluetooth beacons nearby. In both games, some players experienced the game to be unfair because there were not enough WLAN or Bluetooth resources around [4, 25].

Epidemic Menace (2005) was an augmented reality game where players tried to catch airborne viruses [18], *REXplorer* was an educational, location-specific game that lead the players from one landmark to the next [2], while *Mobile Mythical* (2009) was a context-aware pervasive mobile game that sought to facilitate player collaboration [14, 24]. In addition to the digital predecessors, numerous game mechanics and public space interaction patterns have been pioneered in traditional playful activities, such as assassination games [21] and geocaching [22].

METHOD

We designed a qualitative survey featuring open-ended questions focusing on game experiences in *Pokémon GO*. Rather than utilizing a pre-defined survey instrument, we emphasized the respondents' own narratives and meaning-making by allowing them to answer freely. This is a fruitful approach when studying new and emerging phenomena. The survey featured closed-ended questions to reveal key demographics and playing habits.

The survey was developed and tested within an iterative process. During the development, 18 test respondents gave feedback on the survey usability, grammar, flow, and other issues that might affect the respondent experience. We distributed the final survey in 15 Finnish *Pokémon GO* and other related Facebook groups, and encouraged respondents to further share the survey in their networks. The survey was also advertised by two Finnish gaming news portals. The respondent sample was not aimed to be representative of any player population as it was designed for an exploratory study using qualitative methods.

The survey was launched on September 1st at 7:00 PM. As we reached 1000 respondents within 14 hours, we started to analyze the data based on those respondents. The survey was online until September 7th 12:00 PM with a total of 2616 respondents. This analysis is based on the first 1000 respondents, which was more than enough to reach a saturation point in qualitative analysis, and thus proved to be a sufficient sample for an explorative study.

We used applied thematic analysis [11] for the qualitative analysis, where the open-ended answers were coded by three researchers consecutively. As the informants wrote clear, brief sentences making the data easy to interpret and no major disagreements on coding arose, an inter-rater reliability test was not needed. Spot checking was conducted afterwards in order to ensure uniform coding. After the first round of coding, we merged similar codes together. The codes were then organized under main themes, presented in the next section. In this study we focus on two open-ended questions related to the positive and negative experiences (translated from Finnish):

1. "What things make *Pokémon GO* fun to play?"
2. "What things about playing *Pokémon GO* do you dislike?"

RESULTS

The median age of the respondents was 29 years (min. 8y, max. 65y). Approximately two thirds of the respondents were female and one third male. The most common living area was a suburb (59.6%), others being city centers (24.3%), other population centers (11.6%), and rural areas (4.5%). The highest avatar level among the respondents was 34. There is a clear peak on levels 21-23 with 38.9% of the players. Most were active in playing the game as 63.2% reported playing the game several times per day. 16.8% played the game once a day, while 20% played a couple of times per week or less. Only 9% were playing with AR mode turned on while 75,1% were playing AR mode off, and the rest switched between the modes from time to time. 37.7% had used real money in the game, ranging from 1 to 300 EUR, 35.67 EUR on average for the paying players.

Positive Experiences

Moving in the real world was considered fun (413 mentions). Whether it be strolling around, walking a dog, or exercising, the element of movement is an important part of the game experience. One notable aspect was the increased observation and knowledge of the surroundings.

"*The game gets the player to move extensively in places where you wouldn't visit otherwise*." (Male, 26, ID653)

Another positive experience with *Pokémon GO* was sociability (348 mentions). The game is fun to play together with family and friends. The real-life points of interests bring players into the same areas, it even brings together strangers only connected by their interest in the game and it provides a safe and fun topic for conversation, a basis for social interaction. This is especially true in events called "lure parties", where players set lures on a group of one or more PokéStops, luring more Pokémon into the area. As each nearby player shares the benefits of the increased creature count, the lures attract players, sometimes in large numbers. Furthermore, participating in online communities made the game even more social than first expected.

"A *few of my friends are playing too and we talk about new findings and level-ups and other advancements in WhatsApp. It is nice to share. On Facebook there are lots of groups too, sharing tips and sympathizing if a nice Pokémon escapes. It is a surprisingly social game.*" (Female, 31, ID692)

A third important positive element is the globally well-known brand (131 mentions). Players noted that Pokémon fiction fits the game very well. The franchise has been around for long enough that older players had a sting of nostalgia and the possibility to put their old fan knowledge into use, while younger players are maybe just becoming fans of the Pokémon world.

"*This is probably the closest to accomplishing my childhood dream – to become a Pokémon master*." (Female, 23, ID422)

The hunting mechanics (searching, locating, capturing, and collecting Pokémon) were considered fun (517 mentions). The uncertainty and the surprise element of suddenly appearing Pokémon keep the player interested. In addition, other game mechanics such as progression, achievements, hatching, and evolving Pokémon were also mentioned. The game is easy to pick up and it supports various play styles, providing spontaneous and casual gaming opportunities while enabling more dedicated play, as well.

Negative Experiences

There are many technical problems in the game (285 mentions). Lag spikes, crashes, unresponsive servers, login problems, GPS inaccuracies, and other bugs caused frustration. The game drains the battery as the game has to be active to allow progress, and the game does not record walked distances accurately or correctly.

"*The app is a bit crappy. It freezes and lags quite a lot and the battery consumption is ludicrous*." (Female, 25, ID450)

Unequal gaming opportunities were considered problematic (148 mentions). Rural areas feature fewer Pokémon, PókeStops, or Gyms than city centers, making the game play stagnant and progression slow. Some considered that Finland has too little content altogether when compared to major cities in other countries.

"*Everyone doesn't have the possibility to hang out in [a local park] every day. It is stupid that there are PokéStops mostly only in cities. In the countryside you can only hatch eggs. Unfair*." (Female, 22, ID769)

Bad behavior from other players or non-players caused negative experiences (109 mentions). Cheating, GPS spoofing (playing remotely) and Gym stealing (claiming a Gym spot someone else has opened) were disliked. Players who swear and leave garbage around were frowned upon. There have been even incidents of threats of physical violence towards players and some non-players have condescending attitudes towards *Pokémon GO* players.

"*Cheating by other players, as then your own game play is sometimes pointless. Attention seeking little kids who yell while playing, swear, block sidewalks, and run under the bicycles.*" (Female, 32, ID770)

Frustration was also caused by the unpolished game design (194 mentions). Some players considered the game too simple and missing vital features such as chat. In addition, the battle system and sightings mechanics (for tracking Pokémon) were considered to be poorly executed. Catching the same common Pokémon all the time felt boring and the escaping Pokémon were frustrating.

Other Issues

There were a few mentions related to the hazards of playing while driving and kids not being aware of their surroundings, but otherwise safety issues were not addressed. The free-to-play revenue model did not receive notable feedback. Some players thought that free-to-play is

bad by principle and a few players stated that the game has too aggressive in-game monetization. The augmented reality feature did not receive many comments either.

DISCUSSION

Social play is one of the key drivers of *Pokémon GO*. While the game design encourages this in many ways (e.g. play areas in public space, lack of instruction given in the game giving an excuse to ask for help, sharing benefits from lure items, team structures and Gym defense, a possibility to also play alone), the most important element is the critical mass of players. The numerous precursors listed earlier show that while the game design of *Pokémon GO* is carefully crafted, it offers no new technology. Only the combination is novel – and its success. Many of the hypotheses about pervasive play voiced in conjunction with prototypes can now be properly addressed as these game elements are experienced by a large enough public.

The way the game incorporates outdoor activities and exercise is seen as fun; players enjoy the walking and that the exercise gives a healthy excuse for playing, and the walking acts similarly to the *Situationist* strategy of derivé, taking the players in surprising places and enabling them to see their familiar surroundings in a new way [cf. 3, 8, 17, 25]. These findings are similar to practices and motivations found in geocaching [22], which also features social walking, exploring and discovering new places, collecting, competition, and challenges to capture caches. The major difference is the massive social scale of *Pokémon GO* as players gather in swarms in lure-parties, causing stampedes as they rush to capture rare Pokémon in public spaces [13].

There are multiple elements that have contributed to location-based games breaking into the mainstream with *Pokémon GO*. While earlier location-based games were designed for active game players and were rather complex or framed with adult themes (science fiction, war, mysticism, etc.), *Pokémon GO* relies on a family-friendly franchise with urban nature exploration and pocket monster hunting themes. The Pokémon franchise is a key driver in player enjoyment. It ties into nostalgia, activation of fan skills, and it is appropriate for the game mechanics – and fits cross-generational play. The brand enables the players to understand the game mechanics easily, so that hunting Pokémon is already intuitive on a conceptual level [cf. 16] while utilizing classic retention game mechanics similar to social network games [12, 23]. *Pokémon GO* is simple in terms of game mechanics compared to many earlier location-based or pervasive games. This was reflected in the players' responses both in positive terms (easy to start) as well as negative (simplicity leads to boredom) [cf. 23].

The negative experiences related to technical issues and unpolished game design can be expected from a genre-defining game that hits the mainstream. However, the unequal playing opportunities have been recognized in earlier studies years ago [4, 25], so it is surprising that such issues have been overlooked in *Pokémon GO* (which has derived its location-based content from *Ingress*). Sociability is not always fun [29], as there is also bad sportsmanship and bad behavior while playing *Pokémon GO* – and not only from the other players, but also from non-players.

It is interesting that neither the key aspect of the marketing, namely the AR mode, nor the danger narrative offered by the media is relevant for the players. The safety issues have been discussed in global media and research [e.g. 10, 26], but our respondents did not address these problems. The AR mode seems like a gimmick as 75% of the respondents play without it. Numerous game guides suggest that turning it off makes catching easier [e.g. 7]. Although it is not used, it may be an important novelty feature when picking up the game. Furthermore, the in-game monetization that has been criticized by players in earlier studies [1, 23], received relatively little attention from our respondents. Almost 38% of the respondents had paid for the game, which is a surprisingly high percentage when compared to mobile game industry standards [30]. This is probably partly due to the sampling method focusing on active players.

Pokémon GO has certainly enabled cross-generational play. The basic act of millions of children and adults of all ages suddenly walking together and chatting about a joint interest in public, urban spaces is a remarkable phenomenon, and goes against the trends of social fragmentation and alienation that have been repeating themes in the critiques of late modern societies. It is not likely that *Pokémon GO* is capable of maintaining the initial rush of popularity in the long term. Player numbers have decreased since the hype, but it has certainly managed to prove that location-based, pervasive games are now ready for the mainstream. Both research and development cannot avoid taking notice, and we will need more wide-reaching analyses of this and related phenomena in the future.

This paper provides several contributions for academics and practitioners. Firstly, we have provided new information on the first location-based augmented reality mobile game that has hit the mainstream and popular culture at its peak moment. Secondly, industry practitioners can use these findings to design better games and game experiences. We suggest paying close attention on how to support large-scale social activities (e.g. lure-parties) while considering the public safety (e.g. stampedes). Also, unequal gaming opportunities and other negative experiences discussed in this study should be carefully examined to avoid such pitfalls. Thirdly, our findings can be operationalized for quantitative research as they could be transformed into variables and be validated for further studies.

ACKNOWLEDGMENTS

We would like to thank our survey distributors, informants, and industry partners for making this research possible. This research is funded by the Finnish Funding Agency for Innovation (Tekes, 3073/31/2015), Veikkaus, Alma Media, Tactic Games, Kyy Games, and Moido Games.

REFERENCES

1. Kati Alha, Elina Koskinen, Janne Paavilainen, Juho Hamari, and Jani Kinnunen. 2014. Free-to-Play Games: Professionals' Perspective. In *Proceedings of DiGRA Nordic 2014*.
2. Rafael Ballagas and Steffen P. Walz. 2009. REXplorer. In *Pervasive Games: Theory and Design*, Markus Montola, Jaakko Stenros, and Annika Waern (eds.). Morgan Kaufmann, Amsterdam.
3. Keith Bassett. 2004. Walking as an aesthetic practice and a critical tool: Some psychogeographic experiments. *Journal of Geography in Higher Education* 28, 3: 397-410. doi:10.1080/0309826042000286965.
4. Marek Bell, Matthew Chalmers, Louise Barkhuus, Malcolm Hall, Scott Sherwood, Paul Tennent, Barry Brown, Duncan Rowland, Steve Benford, Mauricio Capra, and Alastair Hampshire. 2006. Interweaving mobile games with everyday life. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI´06), 417-426. http://dl.acm.org/citation.cfm?doid=1124772.1124835
5. John-Paul Bichard and Annika Waern. 2008. Pervasive play, immersion and story: Designing interference. In *Proceedings of the 3rd international conference on Digital Interactive Media in Entertainment and Arts* (DIMEA´08), 10-17. http://dl.acm.org/citation.cfm?doid=1413634.1413642
6. Martin Bjerver. 2006. *Player Behaviour in Pervasive Games – using the City as Game Board in Botfighters*. Master's Thesis. Royal Institute of Technology, Sweden.
7. Chris Carter. 2016. Pokémon Go advanced strategies: Turn off AR. *Polygon.* Retrieved September 21, 2016 from http://www.polygon.com/pokemon-go/2016/7/19/12229694/turn-off-ar
8. Guy Debord. 2012. Theory of the dérive. (Orig. 1958.) *Situationist International Anthology*. Bureau of Public Secrets, Berkeley, California, 50-54.
9. Christy Dena. 2009. *Transmedia Practice: Theorizing the Practice of Expressing a Fictional World across Distinct Media and Environments.* Doctoral Dissertation. University of Sydney, Australia.
10. Inger Ekman, Laura Ermi, Jussi Lahti, Jani Nummela, Petri Lankoski, and Frans Mäyrä. 2005. Designing sound for a pervasive mobile game. In *Proceedings of the 2005 ACM SIGCHI International Conference on Advances in computer entertainment technology* (ACE´05),,110-16. http://dl.acm.org/citation.cfm?doid=1178477.1178492
11. Greg Guest, Kathleen M. MacQueen, and Emily E. Namey. 2012. *Applied Thematic Analysis.* SAGE Publications, Inc.
12. Juho Hamari. 2011. Perspectives from behavioral economics to analyzing game design patterns: Loss aversion in social games. Presentation in Social Games Workshop, CHI´11,,Vancouver, Canada, May 7-12, 2011.
13. Nash Jenkins. 2016. Pokémon Go May Have Just Shown Us What the End of the World Looks Like. *Time*, Retrieved August 22, 2016 from http://time.com/4460911/pokemon-go-taipei-stampede-snorlax-mob-xinbeitou-taiwan/
14. Hannu Korhonen, Hannamari Saarenpää, and Janne Paavilainen. 2008. Pervasive mobile games - a new mindset for players and developers. In *Fun and Games: Second International Conference*, Panos Markopoulos et al. (eds.). Eindhoven, The Netherlands, October 20-21, 2008. Springer: Berlin / Heidelberg, 21-32.
15. Jussi Kuittinen, Annakaisa Kultima, Johannes Niemelä, and Janne Paavilainen. 2007. Casual games discussion. In *Proceedings of the 2007 conference on Future Play*, 105-112. http://dl.acm.org/citation.cfm?doid=1328202.1328221
16. Annakaisa Kultima. 2009. Casual game design values. In *Proceedings of the 13th International MindTrek Conference: Everyday Life in the Ubiquitous Era*, 58-65. http://dl.acm.org/citation.cfm?doid=1621841.1621854
17. Petri Lankoski, Satu Heliö, Jani Nummela, Jussi Lahti, Frans Mäyrä, and Laura Ermi. 2004. A case study in pervasive game design: The Songs of North. In *Proceedings of the Third Nordic Conference on Human-Computer Interaction* (NordiCHI '04), 413-416. http://dl.acm.org/citation.cfm?doid=1028014.1028083
18. Irma Lindt, Jan Ohlenburg, Uta Pankoke-Babatz, and Sabiha Ghellal. 2007. A report on the crossmedia game epidemic menace. *Computers in Entertainment*, 5, 1. http://dl.acm.org/citation.cfm?doid=1236224.1236237
19. Adam Martin, Brooke Thompson, and Tom Chatfield (eds.) 2006. 2006 alternate reality games white paper. *International Game Developers Association IGDA.* Retrieved September 21, 2016 from http://igda.org/arg/resources/IGDA-Alternate-RealityGames-Whitepaper-2006.pdf
20. Markus Montola. 2010. A ludological view on the pervasive mixed-reality game research paradigm. In *Pervasive and Ubiquitous Computing*, 15, 1.
21. Markus Montola, Jaakko Stenros, and Annika Waern. 2009. *Pervasive Games: Theory and Design*. Morgan Kaufman, Amsterdam.
22. Kenton O'Hara. 2008. Understanding geocaching practices and motivations. In *Proceedings of the SIGCHI Conference on Human Factors in Computing*

Systems (CHI´08), 1177-1186. http://dl.acm.org/citation.cfm?doid=1357054.1357239

23. Janne Paavilainen, Juho Hamari, Jaakko Stenros, and Jani Kinnunen. 2013. Social Network Games: Players' Perspective. *Simulation & Gaming*. 44 ,6, 794–820.
24. Janne Paavilainen, Hannu Korhonen, Hannamari Saarenpää, and Jussi Holopainen. 2009. Player Perception of Context Information Utilization in Pervasive Mobile Games. In *Proceedings of the 2009 DiGRA Conference*, 1-8.
25. Johan Peitz, Hannamari Saarenpää, and Staffan Björk. Insectopia: exploring pervasive games through technology already pervasively available. 2007. In *Proceedings of the international conference on Advances in computer entertainment technology* (ACE'07), 107-114. http://dl.acm.org/citation.cfm?doid=1255047.1255069
26. Maeve Serino, Kyla Cordrey, Laura McLaughlin, and Ruth L. Milanaik. 2016. Pokémon Go and augmented virtual reality games: a cautionary commentary for parents and pediatricians. *Current Opinion in Pediatrics*, 28, 5, 673-677. https://dx.doi.org/10.1097/MOP.0000000000000409
27. Olli Sotamaa. 2002. All the world's a botfighter stage: Notes on location-based multi-user gaming. In *Proceedings of Computer Games and Digital Cultures Conference*, Frans Mäyrä (ed.). Tampere University Press, Tampere, Finland.
28. Clare Southerton. 2014. 'Zombies, Run!': Rethinking immersion in light of nontraditional gaming contexts. In *Transmedia Practice: A Collective Approach*, Debra Polson, Ann-Marie Cooke, J.T. Velikovsky, J.T., and Adam Brackin (eds.). Inter-Disciplinary Press, United Kingdom.
29. Jaakko Stenros. 2016. *Playfulness, Play, and Games: A Constructionist Ludology Approach.* Doctoral Dissertation. University of Tampere, Finland.
30. Swrve. 2016. *Monetization Report 2016. Lifting the Lid on Player Spend Patterns in Mobile*. Retrieved September 21, 2016 from https://www.swrve.com/images/uploads/resources/swrve-monetization-report-2016.pdf