

Why Do People Play Location-Based Augmented Reality Games:

A Study on Pokémon GO

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Abstract

Pokémon GO brought the location-based augmented reality games into the mainstream. To understand why people play these games, we created an online survey (n=2612) with open questions about the reasons to start, continue, and quit playing Pokémon GO, and composed categories of the answers through a thematic analysis. Earlier experiences especially with the same franchise, social influence, and popularity were the most common reasons to adopt the game, while progressing in the game was the most frequently reported reason to continue playing. The player's personal situation outside the game and playability problems were the most significant reasons to quit the game. In addition to shedding more light on the Pokémon GO phenomenon, the findings are useful for both further studying and designing location-based augmented reality game experiences.

Keywords: Pokémon GO; location-based; augmented reality; free-to-play; mobile games

1. Introduction

Location-based augmented reality (AR) games are pervasive games that tie into the everyday life of the players and transform their mundane surroundings into a part of the game world (Montola, Stenros & Waern, 2009). After being published in July 2016, Pokémon GO (PGO) (Niantic, 2016) became the first location-based AR game to garner mainstream popularity and one of the most successful mobile games in general. The game peaked at 28.5 million daily unique players in the United States alone a week after its launch (ComScore, 2017), it had reached over 750 million downloads worldwide within its first year (Minotti, 2017), and had made \$1.8 billion in revenue with in-app purchases in two years (Nelson, 2018). Previously, location-based augmented reality games had mostly been research prototypes or games without significant commercial success (Paavilainen et al., 2017), but after the success of PGO, many location-based AR games are now entering the market. In this article, we will use PGO as a case to study why people play location-based AR games.

In PGO, players act as Pokémon trainers and walk in the real world, using their mobile app to navigate in the game world while trying to find, catch, hatch, train, evolve, and fight Pokémon creatures. The player's location is tracked by GPS, while the game shows an overlay map of the game world, showing the nearby Pokémon and other interest points on it. The player can tap any nearby Pokémon to change into the catch mode, where the player can throw Poké Balls at them. A successful catch will add the creature into the player's Pokémon collection, Pokédex, and the aim is to collect all the different creatures, which has been one of the main reasons to continue playing the game (Rasche, Schlomann & Mertens, 2017). PGO is based on the popular and already over two decades old Pokémon franchise, which has been one of the key reasons to play PGO according to previous studies (Rasche et al., 2017; Zsila et al., 2017).

PGO ties into many research interests from the last decade. It is a location-based pervasive game (Montola et al., 2009; Sotamaa, 2002) that utilizes context-information (Paavilainen, Korhonen, Saarenpää & Holopainen, 2009) and AR (Bichard & Waern, 2008; Lindt, Ohlenburg, Pankoke-Babatz & Ghellal, 2007). It ties into a transmedia storyworld (Dena, 2009) while including elements from exergames (Southerton, 2014), treasure hunts (Montola et al., 2009), geocaching (O'Hara, 2008), and free-to-play games (Alha, Koskinen, Paavilainen, Hamari & Kinnunen, 2014; Paavilainen, Hamari, Stenros & Kinnunen, 2013).

We look at why people play location-based AR games through PGO. With its exceptional success in this area, it is an important artifact to research from the cultural, academic, and game design perspectives. To study why PGO reached such popularity, we investigate 1) why players have started to play PGO, 2) why they continue playing it, and if so, 3) why they have stopped playing it. We employ survey data gathered from PGO players (N=2612) and a mixed-method design containing both qualitative and quantitative analyses. The contributions of this paper are three-fold: 1) we provide new information on this culturally important phenomenon, 2) the findings can be used in follow-up quantitative studies by operationalizing our findings into variables, and 3) the findings can be used when designing location-based AR game experiences.

2. Related work

Location-based games resemble other digital games in other ways, except the way they take place in a physical environment rather than only on a device screen (Leorke, 2018). According to Leorke, the discussion around location-based games has focused on two discourses: how they allow players to interact with strangers in ways they normally would not, and how they transform the surroundings into spaces for play.

Previously, individual location-based games and prototypes have been studied from different aspects, but PGO is the first to have attracted wider academic interest. Especially, the game's effects on health and well-being have been studied (Althoff, White & Horvitz, 2016; Barkley, Lepp & Glickman, 2017; Koivisto, Malik, Gurkan & Hamari, in print). Studies explaining why people play the game and especially exploratory studies investigating this are still lacking. Qualitative mapping of such an emerging phenomenon is essential for understanding it.

Rasche, Schlomann and Mertens (2017) studied the reasons to start, continue, and quit playing PGO in an exploratory survey study (N=199). The self-reported reasons to start were sorted into categories shown in Table 1.

Reasons to start	Reasons to continue	Reasons to quit
Curiosity (68%)	Completing the Pokédex (41%)	Boredom (57%)
Being a Pokémon fan (40%)	Fun or curiosity or recreation (15%)	Difficulties in reaching higher levels (29%)
Media reports (28%)	Finding new or rare Pokémon (11%)	Being disappointed (23%)
Reports from friends (27%)	Catching strong Pokémon or being the best (10%)	Technical problems (18%)
Everybody around me plays it (14%)	Joint activities with family and friends (6%)	Too few Pokémon (18%)
Being fascinated by the augmented reality function (6%)	Being active or outside (6%)	Waned interest (11%)
Combining fun and physical activity (4%)	Updates or new generations (5%)	Too few Pokéstops (9%)

Game for traveling (3%)	Higher levels (4%)	No time to play (9%)
Nostalgia (1%)	Incubating eggs (3%)	Lack of co-users (7%)
	Fighting in arenas (3%)	Too few arenas (5%)
	Nostalgia (3%)	

Table 1. Reasons to start, continue, and quit playing PGO (Rasche et al. 2017).

In Zsila et al. (2017), motivations to play PGO were studied by utilizing the Motives for Online Gaming Questionnaire (MOGQ) with three new factors: outdoor activity, nostalgia, and boredom. These new factors were found to be the main play motivations. In addition, recreation from the original MOGQ model was the strongest motive while the lowest scores were observed with skill development and escapism. Other significantly related factors were competition, social, coping, and fantasy. The authors suggest that the three new motivations should be taken into consideration in future studies when studying games similar to PGO.

Similarly, Yang and Liu (2017) studied motivations for playing PGO. The authors used factor analysis to identify seven motives for playing: exercise, fun, escapism, nostalgia, friendship maintenance, relationship initiation, and achievement. Except for exercise and escapism, the other motives had a positive correlation with the overall amount of play.

Hamari, Malik, Koski and Johri (2018) studied gratifications of playing PGO and how they predict intentions to continue playing and to purchase in-game items. Their results showed that game enjoyment, outdoor activity, ease of use, challenge, and nostalgia were positively associated with intentions to continue playing, whereas outdoor activity, challenge, competition, socializing, nostalgia, and intention to continue playing were associated with in-app purchase intentions.

3. Methods and data

We designed a survey featuring open-ended questions focusing on game experiences in PGO. 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. In this article, we focus on the three open-ended questions regarding starting, continuing, and stopping to play PGO (translated from Finnish):

1. Begin by explaining what made you to start playing Pokémon GO.
2. What makes you to continue playing Pokémon GO?
3. If you have stopped playing Pokémon GO, what made you to quit?

The survey was developed and tested within an iterative process. During the development, 18 test respondents gave feedback on usability, flow, and other issues that might affect the respondent experience. We distributed the final survey in 15 Finnish PGO and other related Facebook groups, and encouraged respondents to further share the survey. Two Finnish gaming news portals advertised the survey. As an exploratory study, the respondent sample was not aimed to be representative of the whole player population.

The survey was launched on September 1, 2016 at 7:00 PM and was online until September 7th, 2016 12:00 PM with a total of 2616 respondents. Two cases were removed due to false information and two cases due to technical problems in saving the responses. Therefore, the data consisted of 2612 survey responses.

Of the 2612 respondents, 2595 gave at least one reason to start the game and 2049 at least one reason to continue playing it. Of the 119 respondents who had quit the game, 117 reported at least one reason why they had done so.

The responses were typically short, ranging from a single word to a couple of sentences, longer answers being relatively rare. Many of the respondents gave more than one reason for each question.

We used applied thematic analysis (Guest, MacQueen & Namey, 2012) for the qualitative analysis, where the open-ended answers were coded by three researchers. For the three survey questions about starting, continuing, and quitting PGO a similar approach was conducted. Three researchers started to code the data individually, taking notes of the issues that rose from the answers and marked the codes and their descriptions to a code guide. At the point of saturation the researchers convened to talk, compare the codes, and merge similar codes together. Based on the final codes, the researchers created main categories for these codes. The categories and the codes they include are listed and described in the results chapter.

The three researchers coded a sample of the data (N=100) separately twice during the process with the help of the formed code guide, first after the first discussion and later at the end of the process. After both rounds, the resulting codes were compared and discussed. In the case of disagreement, a consensus was sought and the code guide edited accordingly. After changes to the code guide, previous codes influenced by the change were corrected. This approach was used to make sure that the researchers shared a unified view and could code a majority of the data alone. In addition, using several researchers helped us to pinpoint challenging and problematic points, and solving these made the process more reliable.

To support the process, we used Fleiss' kappa (Fleiss, 1971) to test the inter-rater reliability with both data samples in the starting and continuing categories. On the first round, we reached excellent agreement (at least 0.80) in 7 starting categories and 6 continuing categories and substantial agreement (at least 0.60) in 3 starting and 2 continuing categories. On the second

round, we reached excellent agreement in 7 starting and 6 continuing categories and substantial agreement in 3 starting and 4 continuing categories. No kappa value was lower than 0.60. These kappa values were seen as high enough to be confident about continuing coding the data separately, avoiding the high cost and time-consuming process of all researchers coding all of the data. Furthermore, the process helped us see which categories were the most challenging to code reliably, and we could focus on improving them.

Due to the lower number of respondents who had quit the game and given at least one reason why (N=117), the third question allowed for each of the three researchers to code all of the data. However, the three-step process of first creating a codebook and then comparing two samples of data coded individually by the three researchers was implemented similarly as with the other two questions. At each point, the researchers discussed and compared the codes to achieve a consensus. However, the inter-rater reliability test was not used.

All interview quotes in the Results chapter have been translated from Finnish. Survey participants are indicated after the quotes by an ID number, gender, and age.

4. Results

Table 2 lists the background information and the playing habits of the respondents. As the respondents were mostly from PGO groups on Facebook, it can be presumed that our respondents were somewhat more active than all PGO players on average. At the time of the survey the game had been out for two months.

	N	%		N	%
Gender			Playing frequency		
Female	1628	62.3%	Several times a day	1394	53.4%
Male	927	35.5%	Once a day	483	18.5%

Other	57	2.2%	A few times a week	516	19.8%
Age			More rarely	100	3.8%
Under 18	147	5.6%	I don't play anymore	119	4.6%
18–24	721	27.6%	Level		
25–34	1067	40.8%	Under 10	96	3.7%
35–44	489	18.7%	10–14	265	10.1%
45 or more	188	7.2%	15–19	641	24.5%
Walked distance			20–24	1323	50.7%
Under 50 km	464	17.8%	25–29	276	10.6%
50–99 km	671	25.7%	30 or more	11	0.4%
100–199	946	36.2%	Used money		
200–399 km	476	18.2%	Yes	939	35.9%
400 km or more	55	2.1%	No	1673	64.1%
AR mode			How much money (if used)		
On	200	7.7%	Under 10e	225	6.6%
Off	2017	77.2%	10e–19e	226	8.6%
Depending on situation	388	14.9%	20e–49e	307	11.7%
I don't know	7	0.3%	50e–99e	118	4.5%
			100e or more	63	2.4%

Table 2. Background information and playing habits.

4.1 Reasons to start playing Pokémon GO

We divided the reasons for starting to play PGO into 11 different categories (see Table 3). Altogether, these categories included 53 separate codes, each category including 2–11 codes. On average, one player reported starting reasons from 1.6 categories.

Category	N	%	Codes
Previous experiences	1138	43.9%	Pokémon, Ingress, developer, geocaching, anime, gaming, geek culture
Interest	813	31.3%	Curiosity, interesting, fun, funny pictures, visuals, novelty
Social influence	738	28.4%	Partner, children, friends, siblings, parents, relatives, others
Popularity	709	27.3%	Hype, popularity, expectations
Positivity	326	12.6%	Exploration, exercise, outdoors, utility, non-violent, treatment, exploitability, gamification
Technology	131	5.0%	Location-based, AR, pervasive, technology
Situation	118	4.5%	Something to do, opportunity, platform, free, weather, convenience
Keeping up	96	3.7%	Keeping up, profession
Social features	85	3.3%	Sociability, helping, looking for company, competitive
Mechanics	51	2.0%	Searching, collecting
Nature of the game	28	1.1%	Adventurous, challenge, no competition, easy to play

Table 3. The reasons to start playing Pokémon GO.

The most frequently brought up reason to start playing was **previous experiences**. As many as 43.9% of the respondents reported experience with fandom for similar types of games or hobbies as a reason to pick up the game. Out of these, experience with Pokémon was by far the most frequent reason to start playing, mentioned by 39.6% of the respondents. The idea of the game brought up nostalgic feelings of childhood moments playing Pokémon games and watching the animation series on TV. Some explained having dreamed of being a Pokémon trainer, and the game felt as the closest thing to fulfill that dream. In a smaller margin were previous experiences with geocaching, Ingress or other location-based games, or playing games in general.

Nostalgia, I have been a Pokémon fan since the beginning. Finally I can get close to the childhood dream of being a real life Pokémon trainer. (ID 2113, male, 22)

Almost a third of the respondents reported more abstract feelings of **interest** as an explanation for acquiring the game. These included curiosity and the game seeming to be generally interesting or fun. The novelty value was brought up, and being different from other games was seen to be beneficial. Seeing funny pictures of the game or the likable visuals increased interest.

At first I was opposed to taking part in a fad, but then I had to note that the game simply sounded so fun that I had to start playing. (ID 159, female, 24)

Social influence was seen as a strong motivation to start playing. Parents mentioned either wanting to be more informed about their children's activities or wanting something common to do together with them. Similarly, a friend's or a partner's recommendations or wanting to spend time with them while playing were reported.

I wanted to have something shared to discuss with my children. (ID 66, female, 46)

The popularity of the game played a significant role among the reasons to start playing. The hype around the game and the visibility of the players had a major effect, and some had waited for the game ever since they had heard about it before the launch.

Everybody was talking about it. (ID 588, female, 53)

The **positive** characteristics and potential effects were an important motivation to start playing. Especially getting physical exercise and spending time outdoors while playing were appealing. In addition, the respondents liked the idea of being encouraged to explore their surroundings and new areas. Some mentioned the game was a way to deal with real life's misfortunes or a way to help with depression.

The game can get even the lazy to go outside, that is why I started. (ID 62, female, 20)

I love to roam in nature, so catching Pokémon is a great excuse to go for a walk. (ID 28, female, 22)

The novel **technology**, such as location-based characteristics or AR, was a reason to try the game. Playing the game in a real environment and using AR features were seen as something that would add value to the game experience, and the combination of the Pokémon franchise and technology were seen to be interesting.

I have played Pokémon on Nintendo handhelds, but with the augmented reality the game seemed to rise to new heights. (ID 393, female, 25)

The **situation** the respondent was in had an effect on picking up the game. These can be divided to internal reasons, for instance wanting something to do while doing other activities, and to external reasons, for instance having a conveniently located PokéStop nearby. Some mentioned having a new phone, which made trying the game out convenient. The game being free and good weather were mentioned, as well.

It is a convenient activity for usually boring situations such as commuting, waiting for a friend in the [city] center and so on. (ID 389, male, 28)

It was easy to start because there were pokestops near my house and also lure on almost every evening. (ID 869, female, 57)

The status of PGO as general knowledge showed with the respondents. They stated they picked up the game because they wanted to **keep up** with the times. As so many were playing and talking about the game, they believed they were left out or might be missing out if they did not try the game themselves. This was especially important if the respondent had a profession where this knowledge would prove useful, for instance working with young people.

I wanted to keep up with the times. So many played the game that it felt like I'll be left out of the inside jokes, both in my social circles as in entertainment. (ID 69, female, 30)

Originally, I got interested because of my occupation. I'm a class teacher and I thought I should know what the PG phenomenon is about. (ID 68, female, 36)

Social features, such as the general sociability of the game, liking to compete or wanting to help others were brought up. Some felt that playing would be a good opportunity to meet new people, even potential partners.

The possibility to get to know new people by chance. (ID 2469, female, 38)

The game **mechanics** were a reason to be drawn into the game: the respondents had in these cases presumed they would like looking for, hunting, and collecting Pokémon. The “treasure hunt” like gameplay was seen as exciting.

Wanting to catch them all, obviously. (ID 145, male, 25)

The idea that you have to search something from the “reality” is interesting. [--] [T]he combination of “treasure hunt” and nostalgia made me to start playing. (ID 1012, female, 30)

The **nature of the game**, for instance it being casual enough and having easy access, was appealing. When the game was easy to install and get into, it helped in the decision-making. A few liked the competitive nature of the game, while some said the opposite and mentioned liking that competing was not necessary to play.

It is easy to get into this game even for the likes of me who play really little otherwise. (ID 1942, male, 30)

4.2 Reasons to continue playing Pokémon GO

We divided the reasons for continuing to play PGO into 12 different categories (see Table 4). These categories included 58 codes, each category including 2–11 codes. On average, a player reported continuing reasons from 1.6 categories.

Category	N	%	Codes
Progression	1056	51.5%	Personal goals, advancement, joy of discovery, collecting
Situation	397	19.4%	Hooked, habit, something to do, commitment, change of area, opportunity, weather, free, game status, events, technological upgrade
Positivity	346	16.9%	Exploration, exercise, outdoors, play, health, own time, relaxation
Mechanics	305	14.9%	Collecting, searching, hatching, evolving, fighting
Social features	282	13.8%	Helping, competition, sociability, looking for company
Social influence	256	12.5%	Friends, children, partner, siblings, family, relatives, others
Interest	250	12.2%	Interesting, fun, visuals, new, concept, good game
Expectations	234	11.4%	Game updates, curiosity
Nature of the game	102	5.0%	Rewarding, challenge, easy to play, variety, surprising
Previous experiences	78	3.8%	Brand, familiarity
Keeping up	14	0.7%	Keeping up, profession
Technology	6	0.3%	Location-based, functionality, AR

Table 4. The reasons to continue playing Pokémon GO.

Progression was the most common reason to keep on playing. The most common individual reason was collecting Pokémon, mentioned by 27.4% of the respondents. Achieving personal goals, the joy of discovery, and the general feel of progression were important, as well.

Gotta catch them all! This is a true ideal game for a collector, and I don't intend to stop until I've got all forms of every Pokémon. (ID 53, female, 32)

I want to find Pikachu and in the distant future get to level 40. In addition, I intend to learn all the Pokémon by heart. (ID 359, female, 23)

The importance of the player's situation grew when reasoning why to stay in the game. Playing the game was reported as "something to do" while, for instance, walking the dog or going to the store. The game had found its place in the everyday life of the players and had become a habit. Some even reported being hooked on the game. The weather or the game being free had influence, as well as the fact that the player had already put so much time or money into the game, which they did not want to go to waste. In some cases, the player's situation had changed, making playing easier.

The game does not take extra time from my everyday life, as I will go jogging or go to the university or to the store in the city anyway. (ID 345, female, 27)

Moving to the city from the countryside, it's more reasonable to play here. (ID 312, female, 21)

The **positive aspects** of playing continued to be important. Again, exercise and outdoor activities interested the players, and having a reason to go out and walk was motivating. This was especially important for some respondents who were depressed and did not have the energy to go outside otherwise. Getting to know one's surroundings by playing the game remained a motivation.

It is also a good reason to walk instead of taking public transportation, and a wonderful way to get to know new places in an otherwise familiar city. (ID 754, female, 39)

Pokémon Go makes me continue exercising, which I would not have the energy to do otherwise due to being depressed. (ID 2185, other, 17)

While the game **mechanics** stayed in the margin when describing the reasons to get into the game, they arose as one of the main reasons to continue playing. Collecting, evolving, hatching eggs and battling were mentioned.

Hatching eggs is addicting. I walk/bike nowadays more in order to hatch eggs. (ID 1925, female, 23)

The **social features** were an important reason to continue, whether wanting to meet new people while playing or playing together with friends or family. The game functioned as an easy way to connect people together and create a feel of community. Some liked to compete or compare progression with others, while others wanted to help or teach others to play the game.

Community and sociability. The game alone does not keep my interest, but is a splendid addition to social situations. (ID 219, male, 27)

Closely connected to social features, respondents explained continuing to play due to **social influence**. This could mean parents wanting to be up to date and informed about their children's hobby or avoiding being left out of social circles when all friends were still playing the game.

Because all my friends play. I don't want to stand out from the crowd. (ID 2464, male, 12)

Interest continued being somewhat important, meaning that the game continued to feel, for instance, interesting or fun.

[I]n its most parts very excellent implementation makes the game feel interesting and fun from day to day. (ID 2454, female, 22)

Some reported continuing to play because of future **expectations** for the game. They were curious about how the game was going to change or waiting for a specific update. Some were even threatening to quit if the game would not change “for the better”.

The game has such an inconceivable potential to develop for the better, this is unquestionably the biggest and the most important reason. (ID 1245, male, 34)

The **nature of the game** as a reason to continue included the casual nature of the game, making it easy to play, while others felt that the challenging nature was positive. The game provided surprises and was rewarding.

The casual nature of it. It is easy to play for an occasional minute or for hours and hours without much planning. (ID 1531, female, 26)

While **previous experiences**, especially with the Pokémon brand, were brought up as the number one reason to start the game, they were rarely mentioned as the reason to continue playing. Some brought up their love for Pokémon or similar activities to PGO, but these were in a small minority.

The love for Pokémon, I presume. When it’s been with you for your whole life, the game will not go away in a hurry. (ID 1019, female, 25)

A few respondents mentioned staying in the game to **keep up** similarly as in the reasons to start the game.

[A]s a teacher I want to be up to speed on the youth’s world of games. (ID 2570, female, 39)

Only a few respondents reported **technology** related reasons to continue playing, for instance liking the location-based properties or the AR features.

It's fun to take pictures of the Pokémon on a real background so to speak. (ID 2013, female, 27)

4.3 Reasons to stop playing Pokémon GO

We divided the reasons for stopping to play PGO to 9 different categories (see Table 5). These categories included 49 codes, each category including 2–12 codes. On average, one player reported reasons to quit from 1.8 categories.

Category	N	%	Codes
Situation	63	53.8%	Time, health, addiction, boredom, reached goal, deleted for space, hype down, weather, phone not working, situation changed, internet connection, money
Progression	35	29.9%	Slow progress, grinding, repetition, no new Pokémon
Problems	32	27.3%	Technical problems, battery usage, game always on, slow performance, incomplete, lack of content in area
Shortcomings	25	21.4%	Lack of new things, no endgame, missing features, missing content
Mechanics	24	20.5%	Battle system, searching, demands movement, does not encourage movement, cannot use a bike, escaping Pokémon, losing Poké Balls, poor design
Nature of the game	16	13.7%	Unrewarding, no challenge, too random, bad luck, competitiveness, lack of sociability, shallow, too simple
Changes	10	8.5%	Poor updates, change to worse, closing third-party applications
Social influence	9	7.7%	Others, children, friends, partner, cheating
The company	9	7.7%	Communication, lack of trust

Table 5. The reasons to quit playing Pokémon GO.

The player's **situation** was the most frequently reported reason to stop. Getting bored, a lack of time or money, poor or cold weather, and health problems were mentioned, while some had quit due to their phone breaking or the game not working where they lived. Some had achieved their goal and had thus decided to quit, while others felt the hype was settling down.

I don't have the time to go and sit in the park or walk somewhere just after Pokémon. (ID 78, female, 28)

During the summer it was nice to walk outside, but now during the fall I'm not that interested, and wouldn't even have the time. (ID 1088, female, 31)

While **progression** was a strong reason to continue the game, it was also a strong reason to quit. The leveling curve was seen to be too steep: the required experience points needed for a new level rose exponentially, while the earned experience points stayed the same, making it necessary to grind to advance. Similarly, when reaching a certain point in collecting the Pokémon, it became increasingly hard to find any new ones to advance towards the goal of catching them all.

Advancing started to be infuriatingly difficult at around level 20: you never get feelings of accomplishment when you never get on to the next level and there are not many brand new Pokémon either. (ID 1762, female, 23)

Players were bothered by the various **problems** in the game. Bugs, the game crashing or not registering the walked distances properly were mentioned. The respondents criticized the unequal gaming possibilities due to the Pokémon and PokéStops being concentrated to city centers. In addition, some disliked that you needed to keep the game active at all times even when playing passively. This caused the battery to drain.

I quit shortly after the publication because the game was infinitely buggy. If the game had been anything other than a Pokémon game it would probably be played by hardly anyone, and you could not publish such a buggy game. (ID 1514, other, 27)

Because the GPS did not work properly, the game did not register all the length of my walks. It felt a bit pointless to walk 5 km when the game then registered maybe half a kilometer. (ID 1665, female, 34)

The **shortcomings** of the game, especially the lack of content, were seen to be problematic. There was no endgame for players who had already advanced further, and the game was seen to be too shallow and simple. Some players would have wanted more features or more Pokémon.

There was nothing new to do in the game and my interest slowly decreased until I quit. (ID 1282, male, 22)

At the moment the game is a walking simulator with a Pokémon theme. (ID 1516, female, 21)

The game design and some of the game **mechanics** were disliked or seen to be faulty. Especially the battle system was criticized for being over-simplified and for not feeling like a battle against another player. Searching mechanics were seen as imperfect, and the catching mechanics were sometimes frustrating when you would lose many Poké Balls on one Pokémon or when the Pokémon fled. The game stopping to measure movement if the speed was too high was criticized, claiming that the game discouraged cycling.

PVP [player versus player] is pretty passive (the other player is not actually “present” as in Shadow Cities in its time, where group fights were possible too). (ID 1652, female, 36)

It is ridiculous that as an above level 20 player under 100 cp [combat power] Pokémon don't always get caught with the first ball. (ID 2024, female, 23)

Different aspects of the **nature of the game** were brought up as the reason to quit. These included the game being unrewarding or random in its rewards, lacking challenge, being too

competitive, simple or shallow, or just not social enough. Some explained that the game should not require movement, while some felt that the game encouraged staying in one place instead of walking.

I simply did not want to go outside to walk around randomly, as it feels like the chance of finding the wanted Pokémon is the same as winning the lottery. (ID 618, female, 26)

The game evolving and changing was not always positive, as sometimes players felt that the game was **changing** for the worse. For instance, the removal of the nearby feature, which had made locating Pokémon easier made some to stop playing. Similarly, some complained about Niantic's approach to close down the third-party map services, which were used to show the locations of all Pokémon at any given time.

The changes the developer made ruined the game, for instance removing the Nearby feature was just lousy game development. (ID 207, female, 25)

Because Niantic doesn't fix the bugs in the game, makes stupid additional features and banned third party services. (ID 2079, male, 30)

The company behind the game was brought up. Niantic was criticized for their lack of communication to the public, and even claims of not seeing them as trustworthy arose.

The developers' behavior towards the gamer community was the last drop. (ID 2572, male, 23)

When quitting the game, social influence was brought up. If friends no longer played the game, some respondents explained not feeling like continuing the game alone. Other people could have a negative influence, for instance by cheating.

It is not nice to play the game in a vacuum. When other players' enthusiasm faded, so did my own enthusiasm towards the game. (ID 526, male, 30)

Everyone from my circle started to cheat in the game so I lost my interest in the game completely. (ID 1494, male, 25)

4.4 Relations to playing frequency

Two multiple-regression analyses (Tables 6-7) were conducted between the reasons for starting and continuing PGO identified in the qualitative steps of the study and the playing frequency (see Table 2).

Regarding the relationship between the reasons to start playing and playing frequency, the results indicate that the reasons to start playing both had a negligible total effect; the reasons explained only 6.3% of the variance of playing frequency as well as none of the reasons to start playing had a statistically significant relationship with the playing frequency (Table 6). In other words, the results indicate that the reasons for why players start playing do not have a more sustained effect on whether they play the game less or more.

DV: Playing frequency R² = 0.063	Beta	p
Previous experiences	-0.014	0.541
Keeping up	0.004	0.828
Positivity	0.021	0.291
Situation	-0.005	0.819
Social influence	0.015	0.492
Mechanics	0.022	0.263
Nature of the game	-0.009	0.637
Social features	0.024	0.223
Popularity	-0.021	0.309
Technology	-0.026	0.189

Table 6. The relationships between playing frequency and the reasons to start playing (R² = 0.063).

There are several significant relationships between the reasons to continue playing and the playing frequency. The reasons to continue playing explained 31.2% of the variance of the

playing frequency. The results in full can be seen in Table 7. The strong relationship (B=0.282) between progression motivations and continued playing is clearly stronger than the relationship between continued playing and other reasons to continue playing.

DV: Playing frequency R² = 0.312	Beta	p
Previous experiences	0.044**	0.019
Keeping up	0.010	0.610
Positivity	0.061**	0.001
Situation	0.087***	0.000
Social influence	-0.032	0.130
Mechanics	0.058**	0.002
Progression	0.282***	0.000
Nature of the game	0.015	0.431
Social features	0.027	0.215
Expectations	0.077***	0.000
Interest	0.076***	0.000
Technology	-0.079***	0.000

Table 7. The relationships between playing frequency and the reasons to continue playing (R² = 0.312), * = p < 0.05, ** = p < 0.01, * = p < 0.001.**

5. Discussion

The success of PGO has been the sum of several factors, but one clear reason for it is the brand. According to our findings, previous experiences, especially with the Pokémon franchise, were the main reason in achieving the player-base. Pokémon has several strengths. The brand is widely known, it has nostalgic value, and its characters are simple and attractive even if one is unfamiliar with them. The “gotta catch ‘em all” theme of Pokémon is well suited for a location-based game where the player can go to different places to find and catch different creatures.

Using existing intellectual property (IP) is a common practice in the game industry, and seems to be important in location-based games, as well. The announced upcoming location-based games use widely known IP: Harry Potter (Niantic, forthcoming), The Walking Dead (Next Games, 2018), Ghostbusters (4:33 Creative Lab, forthcoming), and Jurassic Park (Ludia, 2018). Existing IP was not usually used in previous, less successful location-based games before PGO, such as BotFighters (It's Alive!, 2001), Shadow Cities (Gray Area, 2010), or Ingress.

According to our research, social reasons were important both in starting and continuing PGO. Social interaction is a common motivation to play (e.g. Yee, 2006; Hjorth & Richardson, 2017). While it has been argued that PGO fails to harness the social networking power compared to earlier location-aware games (Licoppe, 2016), our data shows that encounters do happen. Although the game lacks in-game communication channels and means to locate other players through the game, it acts as a social catalyst and increases the effect with features such as rival teams and lures that are shared by all players in the area. The requirement to play outdoors makes the players visible to each other, and including real-world locations into the game gathers crowds to the best play areas or to a sighting of a rare Pokémon. These features can assist the emergence of in-group closeness (Humphreys, 2016). According to Vella et al. (2017), PGO strengthens existing social ties, acts as an icebreaker, and creates a sense of belonging. Furthermore, social influence and the visibility of the players affects the hype through the bandwagon effect (Colman, 1950): when people hear about the game frequently and see it being played, they may want to try it too.

Many respondents started or continued playing PGO as a form of exercise. Although studies of the long-term effects of PGO on health habits are needed, it has been studied that mobile apps that combine playing and physical activity may lead to substantial short-term

activity increases and have the possibility of reaching sedentary populations (Althoff et al., 2016). PGO works as a gamified exercise app, since it offers motivational affordances (Hamari, 2015) for players to walk more than they normally do. PGO has other positive influences as well, such as self-treatment for depression or other difficult situations in life. Similar self-reported effects have been found by Kari, Arjoranta and Salo (2017), as well.

Interestingly, the game being free of charge and using novel technology were rarely mentioned influencing the decision to pick up or continue the game. However, it can be speculated that both of these influence the decision more strongly than people have expressed. For one, games being free-to-play is already a widely-spread model, and might not be mentioned even if it was a significant motivation to pick up the game. It can be speculated that having a purchase price would have decreased the player base substantially.

The lack of responses around technology might be explained by the respondents not always expressing the technology-related reasons in specific terms, but instead describing the game feeling “interesting”, “fun”, or “novel”. A portion of these answers might refer to AR and location-based technologies since they were not mainstream game technologies before PGO. On the other hand, the location-based technology and AR features were in focus to reach the hype of the game, which was one of the main reasons to start the game.

Progression was by far the most common motivation to continue playing the game, and it also had the strongest positive correlation to playing frequency. Collecting all the Pokémon has been an important part of the Pokémon franchise since its beginning. PGO offers a wide variety of creatures to collect, some of which are rare and need a lot of effort to catch, making completion a long task even for the most active players. In addition, the individual Pokémon have different attributes, and catching the best of each creature extends the possibilities for

collection. Advancing in player levels and collecting badges also serve the feeling of progression, increasing the feeling that there is always the next goal to achieve. PGO has since added even more content to collect, such as new Pokémon and male and female genders for each creature.

PGO differs from most successful mobile free-to-play games in that it does not restrict how long sessions the players can play. In free-to-play game design literature, allowing this type of “binge playing” is not recommended, and play sessions are advised to be limited unless paid to continue (Luton, 2013). Instead, PGO has included enough long-term goals that even with constant playing it would take a long time to achieve them all. This then works as a retention mechanic: the player wants to return to the game to continue collecting items and to advance in the game (Paavilainen, Koskinen, Korhonen & Alha, 2015).

The player’s situation influenced the decision to continue, and while this is mostly out of the game developer’s reach, PGO supports this by fitting well into the player’s everyday life. The game follows the casual game design values well: acceptability, accessibility, simplicity, and flexibility (Kultima, 2009). It allows both short and long sessions anywhere and anytime, and the game can be played while doing something else. Furthermore, the launch during the summer increased the probability of both good weather and people being on vacation and thus having more time to keep playing.

The mechanics of the game were perceived to be fun enough to maintain the players’ interest. Hunting and catching the Pokémon in the real world and hatching eggs by walking a certain distance were novel mechanics that still match well with the franchise and earlier Pokémon games. As the mechanics encourage walking outdoors, exercise and other positive effects of playing remained reasons to keep playing.

As a service-based free-to-play game, PGO must maintain its audience's interest and continue to offer new content for the advanced players. This constant evolution is something already expected by the players. Expectations for the changes and witnessing the development first-hand were mentioned as interesting enough to continue playing. In addition to content such as the new Pokémon creatures, the mechanics have evolved since the survey, and Niantic has periodically arranged special events that offer, for instance, more certain types of Pokémon or extra experience points. These can keep the experience fresh. In the meanwhile, some long-promised features, such as one-on-one battles have yet to arrive.

The most common category for stopping to play was the players' situation that is not related to the game design per se. Players got bored or there was not enough time to play anymore. Holidays were over, school had started, and the weather got colder. From the developers' perspective such reasons can be hard to tackle, but the game could be made more attractive for players who want to commit less time to play. After our survey, the developers have included daily bonuses to reward short, daily visits, and started to utilize weather information as a game mechanic. Depending on the weather, certain Pokémon appear more frequently and are more powerful. Earlier studies have shown that the utilization of context information in this way makes the game interesting for the players (Paavilainen et al., 2009). Almost half of the players who quit the game mentioned technical problems, shortcomings in game design, or poor game mechanics at least once as a contributing factor for their decision. These reasons are closely related to the negative game experiences reported in an earlier study (Paavilainen et al., 2017). These playability problems (e.g. Paavilainen, 2017; Paavilainen, Korhonen, Koskinen & Alha, 2018) form a major factor to stop playing which the developers can avoid by improving the quality of the game. In a free-to-play game, this is especially

important as the players can easily switch to another game if playability is deemed poor. The third major reason to stop playing was related to progression in the game, as the ever-increasing requirements to reach new levels were considered too harsh, thus resulting in boring repetition. Implementing more short-term goals between the higher levels could benefit those who lack the time and commitment to play regularly.

Understanding why people quit playing is important. Especially in free-to-play games, the players drop out easily during the first days (Hadiji et al., 2014), and the competition is fierce. Keeping a customer is usually far more economical than acquiring new players (Seufert, 2014). Our findings provide insights on why people stop playing, and while improving the quality of the game is easy to understand, there are various personal reasons that should be studied further to see if there are aspects that could be improved with better and more inclusive game design. In addition, implementing a more nuanced and granular progression system would be beneficial, as then players could achieve “small victories” more frequently rather than grinding towards long-term level goals. After our survey, gaining experience points has been made somewhat easier to foster faster progression, cooperative raid battles and trading have been included, and new generations of Pokémon have been brought into the game for variety.

Similar motivations to the ones in our study have been found in other PGO research, as well. Previous experiences is connected to being a Pokémon fan (Rasche et al., 2017) and nostalgia (Rasche et al., 2017; Yang & Liu, 2017; Zsila et al., 2017), social influence to reports from friends (Rasche et al., 2017) and friendship maintenance (Yang & Liu, 2017), positivity to exercise (Yang & Liu, 2017), combining fun and physical activity (Rasche et al., 2017), escapism (Yang & Liu, 2017), and outdoor activity (Zsila et al., 2017), social features to relationship initiation (Yang & Liu, 2017), social (Zsila et al., 2017), and competition (Zsila et

al., 2017), popularity to media reports (Rasche et al., 2017) and everybody around me plays it (Rasche et al., 2017), and progression to achievement (Yang & Liu, 2017).

All three additional motives from Zsila et al. (2017) – outdoor activity, nostalgia, and boredom – were present in our data, as well. However, we linked boredom to a more general situation of the player that included, for instance, having something to do, being committed to the game, or having good opportunities to play the game. Although the situation is something outside of the game, it needs more attention, as it is an important reason to both continue and quit the game. Similarly, we linked fun and curiosity to a wider category of interest, whether the respondents reported the reason as fun, nice, interesting or something new or curious. In self-reported answers, it is difficult to say what the underlying reason in each case is.

Interestingly, while progressing in the game was the key reason to continue playing in our data, in the other studies this is in a smaller role. Only Rasche et al. (2017) as the other exploratory study has found it to be a major motivation to continue playing. In Zsila et al. (2017), it is not among the motivations the respondents can choose from, while in Yang and Liu (2017), the achievement category does not list collecting Pokémon as one of the items, which was the main reported reason within the progression category. In addition, our study found new motivations to play the game that have rarely been discussed in the previous literature: the game's popularity and the player's expectations for the game's future. These discoveries are important to take into consideration in the future with future studies of similar games.

Based on our findings, we recommend that the developers of location-based augmented reality games try to utilize well-known brands and IP in their games. Previous experiences with the Pokémon brand had the greatest influence for picking up the game. Games that utilize novel technology usually have a higher threshold for adoption, hence familiar characters, themes, and concepts lower the barrier of entry. For retention purposes, focus on versatile progression

mechanics is important as it was the most common reason to continue playing. On the other hand, slow progression was the second most common reason to quit the game - thus underlining the importance of good progression mechanics. Lastly, the design quality in the form of playability should be a high priority as problems related to functionality, usability, and gameplay mechanics were common reasons to quit the game.

6. Conclusions

We studied why people start, continue, or quit playing PGO. The reported reasons to start playing were categorized into previous experiences, interest, social influence, popularity, positivity, technology, situation, keeping up, social features, mechanics, and the nature of the game. The starting reasons were not associated with how much the players played the game after adoption.

Progression, situation, positivity, game mechanics, social features, social influence, interest, expectations, nature of the game, previous experiences, keeping up, and technology were reasons to continue playing. Continuance reasons were much more clearly associated with playing frequency than the reasons to start playing the game. Progression, situation, positive aspects, mechanics, interest and expectations were positively and statistically significantly associated with playing frequency, whereas technology was negatively associated, indicating that the novelty of the technology might wear off quickly.

The player's situation, various problems, shortcomings, poor game mechanics, slow or difficult progression, the nature of the game, changes, the company behind the game, and social influence were mentioned as reasons for quitting the game.

This paper provides contributions for both academics and practitioners. We have revealed key reasons why players start, continue, and stop playing PGO through a qualitative survey. Our study complements the earlier research, and has found new, important motivations for playing or

quitting the game. These reasons should be taken into account when further studying and designing location-based AR games. After exploratory studies have revealed the key reasons for playing, these categories can now be transformed into variables, and used and verified through quantitative studies.

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