Blurring Boundaries between Everyday Life and Pervasive Gaming – An Interview Study of Ingress

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ABSTRACT

We present findings from an interview-based study of the pervasive mobile multiplayer game Ingress. Our study focuses on how boundaries between (1) everyday life and play and (2) 'real' and game space blur in pervasive gaming. We present findings on how the game is integrated into everyday life and affects players' mobility patterns, and on how players experience the relation between real world and game world, the game 'bleeding' into the everyday (blurring boundaries at least partially) even though it is not explicitly experienced as hybrid. Furthermore we discuss how notions of play versus ordinary life still affect some players, and how some players are willing to take and create risks and treat the game as consequential in their everyday interactions with (enemy) players. This further blurs the boundaries of the magic circle, but also creates tensions between casual and serious styles of play. Our findings add to the empirical literature on pervasive games by focusing on player experience in a large-scale pervasive game.

Author Keywords

Mobile Gaming, User Study, Mobility, Experience, Ingress, Location-Based Games.

ACM Classification Keywords

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

INTRODUCTION

Location-aware pervasive games are described as turning the physical map of a city (or village) into a game board, creating a hybrid experience of space [6, 14], turning the entire world into a playground [18, 25] and enhancing the real world with a virtual layer. They frequently integrate real-world social interactions as part of the gameplay [1, 10, 18, 25]. While many core features have been described analytically [10, 13, 18, 20, 25] or can be deduced from blog posts and articles [1, 2, 24, 29], there still is comparatively little empirical research. Only few studies so far have focused on player experience in large-scale pervasive games and there is a general scarcity of empirical studies [23, 28]). Most published studies tend to focus on elaborately staged and orchestrated Mixed Reality Games [3] that experiment with novel configurations of performance, participation, audience, and frequently are event-based or locally run or on small-scale Augmented Reality games developed by researchers [1]. While mobile-phone based pervasive games have become commercially available and some find worldwide usage, these have garnered surprisingly little attention in terms of empirically grounded publications.

In our qualitative study, which combined participant observation with interviews, we investigate player experience with Ingress, a mobile multiplayer game with around 7 million players worldwide [29]. We interviewed players from three cities and attended various local events. As very few games have reached such high levels of pervasive integration in daily life, Ingress offers us a unique opportunity to observe how the boundaries between (1) everyday life and play and (2) 'real' and game space blur in pervasive gaming. In our analysis, we investigate the blurring of everyday life and game activities: that is, how players adapt their everyday habits and how they negotiate and interrelate the mobility demands of the game-world and their everyday 'serious' life. We found further evidence of the game becoming consequential for everyday life in how players are willing to both undergo and create risk and danger. The second focus of our analysis concerns the blurring of 'real' and game space: we sought to investigate how far Ingress -- which shares various, but not all, features of what the literature defines as 'pervasive games' -- creates a hybrid experience of space, that is, how players perceive the relation between the game-world and their physical real-world surroundings, onto which the game is overlaid. In addition, we present general findings on the role of sociality and emerging tensions between casual/friendly and serious styles of play.

BACKGROUND – INGRESS AS A PERVASIVE GAME

According to traditional theories of play [11], play is demarcated in space and time. In traditional play, the 'magic circle' creates a separate, temporary world with its own rules, set apart from normal life. and one steps in and out of its boundary or frame. But, as Nieuwdorp [20] explains, in

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pervasive games, the membrane of the magic circle becomes permeable, resulting in fluid exchanges and switches between the game-world and everyday life (or non-play reality). For sake of clarity, we will use 'everyday life' in the following whenever we refer to non-play reality (i.e. 'serious life' [25]) and 'real-world' when we refer to the physical environment and actions (in particular as players frequently use this term).

Pervasive games blend the activities of play and everyday life, blurring and expanding the magic circle of play spatially, temporally, and socially [18, 20, 23]. Play can take place everywhere and anytime (spatial and temporal expansion), there are no fixed sessions, and it is not always evident who is playing and who is not. Most theories of pervasive games identify a combination of spatiality, temporality, sociality and mobility as key characteristics [10, 18, 25].

Since its beta release in 2012 by Niantic Inc, a Google start-up, Ingress has become a global success, with 7 million players [29]. This makes it one of the first large-scale worldwide location-based pervasive mobile games [2]. It utilizes game elements and strategies from the genres of pervasive and mixed reality games [3, 18], location-based gaming [12], MMORPGs (massively multiplayer online role playing games) and gamification strategies for collecting badges and titles (cf. Foursquare [8, 16]). There are no ad placements and in-app purchases. It is beyond the scope of this paper though to discuss the business model behind Ingress (see e.g. [12]). Niantic recently launched Pokémon GO, which appears to be aimed at a wider audience and has created a global craze. Data from Ingress was used to seed Pokémon GO, enabling it to be rolled out large-scale with rich location data, whereas Ingress initially depended on user-generated content (the portals).

Ingress is based on a sci-fi backstory where a mysterious exotic energy has been unleashed on earth from an unknown source with unknown purpose. Two *factions*, the '*Resistance'* (blue) and the '*Enlightened'* (green) fight over it. The Enlightened embrace the power this energy may offer for the human race. The Resistance fight against the power to protect humanity. There is elaborate background material available online, with news reports, videos etc., but the gameplay does not necessitate detailed knowledge of it. Players can dominate an area by capturing portals located in real-world public spaces. A portal is the energy source and, in the real world, may be, for example, a historical monument or a mural on a wall. Players can submit new portal suggestions to Niantic, submitting a name, description and photo (when on location). A number of rules determine what is allowed as a portal (e.g. nothing on private property), and favor non-chain enterprises and local monuments, including alternative cultural heritage such as graffiti [27].

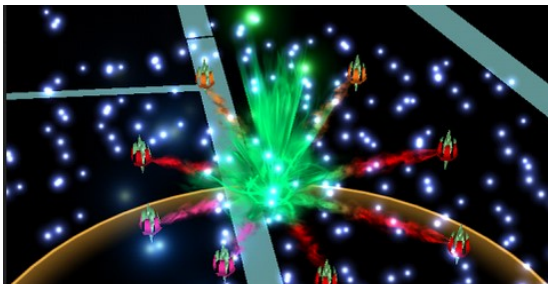

Figure 1. Portal controlled by the Enlightened (green) faction as seen on the Scanner map interface. Image ©: Niantic, Inc.

In the following we abbreviate Enlightened as E and Resistance as R. Players view their surroundings on the Scanner map interface (figure 2). They can hack (attack) portals, destroy enemy portals, and capture them by deploying resonators (game items for controlling portals) and installing shields that protect from attacks. They can furthermore connect two portals controlled by the same faction with links (for this one needs the 'key' to the portals) and create fields (linking at least three portals), which turns an area (map space) green (E) or blue (R) (see figure 3). Players need to be within physical 40 meters range to interact with a portal. Hacking portals is a dominant activity, to obtain gear for one's own inventory that can then be used to attack portals, protect them, and to gain points (so-called farming)

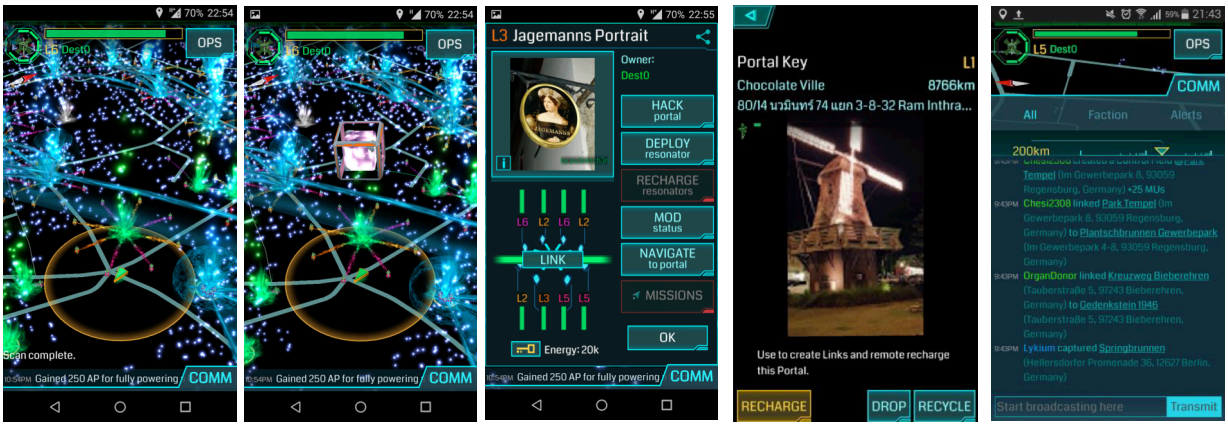

Figure 2. A) 'Scanner' map with a portal the player is close to. The yellow circle around the users' location (blue arrow) is 40 metres diameter) B) While hacking the portal, objects are gained into one's gear inventory C) the portal page D) A portal key from Thailand, that we received from another player as souvenir. E) The game-internal COMM chat. Images © : Niantic, Inc.

or to refresh energy levels. Portals have levels from 1 to 8 depending on their protection level. Hacking higher-level portals provides higher-level gear (resonators, shields, etc.). Similarly, players achieve levels that enable them to more easily capture a portal and create ones of higher level.

In principle, solitary play is possible, but many game mechanics encourage collaboration, e.g. creating or capturing high-level portals requires the shared effort of several high-level players. The game rules and mechanisms become sophisticated in detail and complex social organizational structures have evolved to organize events, train newcomers, and even collaborate across factions on special occasions. Community emergent rules are typical for pervasive and hybrid reality games [25], and we heard of various unofficial gameplay rules, developed by the cross faction community or within a faction, often only of local validity.

Players use several platforms for communication. Reflecting other work on Ingress [5, 27], we heard that the in-game chat, COMM (integrated into the Scanner interface, see figure 2 A and E), and Google Hangouts are most frequently used. Players consider COMM as too insecure for discussing faction matters due to the possibility of spying by the opposite faction – Hangouts are therefore the preferred mode of communication and new players are contacted and vetted (by a faction leader) before they are invited to join communication channels [cf. 5]. But COMM serves as a convenient tool for finding players nearby, requesting help, as entry point for the social aspect of the game and a place for newcomers to establish contacts.

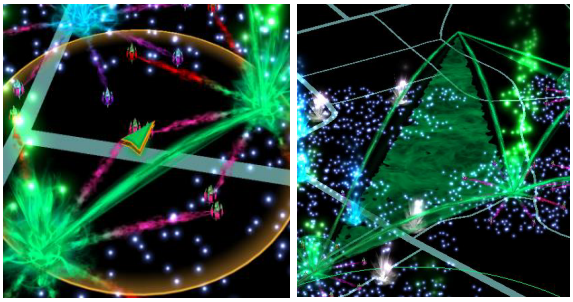

Figure 3. Representation (left) of a portal link and (right) a portal field. Images ©: Niantic, Inc.

Categorizing Ingress

Following Montola et al's categories [18], Ingress can be categorized as *spatially expanded* (one can play anywhere), but not site-specific (it is not location specific, the backstory generic). The game is *localized* and made *site-adaptable* though, via player's suggestions of new portals. Since the game world is persistent and ongoing, Ingress can be described as *temporally extended*. Players can go dormant without penalty, and it thus supports *casual play*.

Unlike most pervasive games in the literature, Ingress does *not* provide a 'full world' illusion. It also does not integrate or otherwise involve outsiders or force players into performative action. The in-game actions (hacking and capturing portals) take place purely on-screen –Ingress thus does not constitute a full pervasive game, as one is not 'doing things for real' [18] (other pervasive games require players to e.g. shoot with water pistols or jump from a wall). Nevertheless, Ingress integrates and overlays its gameplay over the real world. This is a quality that players recognize and enjoy as 'special'. Ingress might thus be categorized as a weak version of 'pervasiveness'. Nevertheless, it has strong elements of mobility and social multiplayer interaction [1].

Ingress utilizes strategies of mixed reality games of placing virtual content at real locations [18, 26]. It has some elements of treasure hunts (collecting portals), but appears to inherit most of its game logic from role-playing worlds and MMORPGs as well as alluding to the ludic aspects of conspiracy theories and secret societies. It can be assumed that it is based on an analysis of success factors of prior games.

Studies of Ingress and other Pervasive Games

In 2012, Stenros et al. [28] called for more empirical work on pervasive games, yet today pervasive games still are fairly underexplored. We surveyed several key venues from 2010-2015, such as the DIGRA, Computers and Entertainment, and CHI-Play conferences, and the Simulation and Gaming, and Entertainment Computing journals. Most publications tend to focus on game mechanics or media-theoretical discussions. These provide an analysis of games and discuss play experiences and practices, but are often not grounded in empirical studies (cf. [23]).

Licoppe and Inada [15] presented a well-known, early empirical study of pervasive games who investigated game-related mobility in Mogi (a mobile game in Japan), that is, how players adapted their movement through the city for the game. They found that players often made opportunistic detours and took alternative routes of value for the game for their 'normal' everyday travels. Strangely, only few empirical studies have followed suit. Only Foursquare and Geocaching appear to have received detailed empirical attention. Foursquare studies often focus on reasons for checking in (or not), impression management and emergent uses, e.g. to tell friends one has safely arrived home [9, 16]. Interviews reveal that it impacts users' mobility decisions because of rewards for repeat visits and, somewhat less so, exploration, thereby changing the experience of everyday space [8, 23]. Geocaching requires significant time investment to find caches, typically at scenic locations. It rewards outdoor mobility, and is frequently utilized by players to motivate themselves (or a group) to spend time outdoors, go walking, and explore new places [21]. Neustädter et al. [19] investigated the role of community and groupware tools for geocachings continuous 'survival' and maintenance, which thrives as an independent, community-run activity.

Ingress remains a novel topic for research. Publications so far target specific aspects of the game phenomenon. Hulsey et al. [12] examine Ingress through the prism of digital economic exchange: players exchanging their private data for the gift of play. Stark [27] discusses how it facilitates dis-

covery of hidden heritage and enables users to 'curate' alternative heritage (by suggesting portals). Chess [6] provides a narrative analysis of how the game combines globalism (the overarching story) with regionalism, which drives game play and favors locally significant locations. Majorek and du Vall [17] give insights on its origin, backstory and evolution, and relation to modern MMORPGs. In contrast, our research takes an empirical approach, and investigates the player experience, which is still largely ignored in pervasive games research [28]. Despite the time that Ingress has been available, the first empirical studies emerged only very recently, for example, Blasiola et al. [5] investigated practices and perceptions of American and Chinese players of privacy and safety aspects.

Thus, there still is a need for empirical studies to confirm or refute the many statements on pervasive games in the literature in general, and concerning Ingress in particular.

STUDY APPROACH AND PROCESS

Our study in many aspects follows the guidelines set up by Stenros et al. [28], who recommend a qualitative approach and stress that it is imperative to play yourself, to gain firsthand experiences. This then creates opportunities for participant observation, ideally combined with interviews.

We began our research by studying related work. Three team members each joined a faction (2 x R, 1 x E) to play Ingress. We took a non-covert / open approach to participant observation, that is, researchers introduced themselves to other players explaining that, besides being interested in the game itself, they were conducting a study. After a series of exploratory interviews and participation at a range of events, including cooperative play with experienced players, we developed an interview guide for semi-structured interviews with regular players. These two phases are described in more detail in the following sections. All participant observation and interviews were done by the first, third and fourth authors as part of a one-semester student research project, supervised by the second and last author.

We focused on three local medium-sized towns (65,000 - 207,000 inhabitants), which allowed us to take part in events, meet for joint play, and arrange interviews. We note that some of our findings may be specific to size and type of these cities. Each has a specific balance of power: Jena is completely under control of E, Erfurt of R, and in Weimar, portal ownership constantly shifts. Attending local events enabled us to casually interact with players, recruit future interviewees, and to broaden our understanding of the game community. We interacted with 25 players in total, aged between 14 and 46. The majority (18) were male, which appears to reflect the overall game demographics [24]. These included eight university students, two high school students, and working professionals in various areas, from IT over precision optics, sales and maintenance, academics, to insurance and mechanics. All interviews were conducted in English (the 2nd language of most participants). Players were classified as medium, experienced, or beginners based on for how long they already play, their level, and role in the community (*Experienced*: 6+ months of playing actively, level 8 or higher, and very active in local faction community events. *Medium*: playing for 1-5 months and now at level 5-7, with moderate participation in local events. *Beginners*: Levels 1-4, less than 1 month of play). In addition, we held 6 short interviews with university students recruited to install the game and to describe their experience. But most of these gave up on the game quickly.

Joining different factions was hoped to increase flexibility and give us wider access to players, but created some difficulties. Our E-faction researcher had to focus on interviewing players from Erfurt, because the E-players in our town, Weimar, feared he would spy for the R-faction. They even created a separate hangout group he was allowed to join, where no game-related issues were discussed. Establishing trust towards the two R-faction researchers for participant observation took considerable effort due to their collaboration with an E-faction member. While this created an unexpected challenge for our research, it simultaneously offered us insight into the relation between factions and the extent to which local player groups take the game seriously.

Exploratory Interviews and Participant Observation

Once we had attained a basic understanding of the game (by playing ourselves) and established contacts with the local factions, the first phase of research began. In this exploratory phase we conducted unstructured interviews with 15 players. These were predominantly experienced (10) and medium experienced (4) players, with 9 men and 6 women (two women were interviewed together). Interviewees were recruited via announcement at our online university message board, via the regional player G+ communities and direct contacts. Interviews took 20 minutes up to an hour. All were audio-recorded on mobile phones and transcribed. We further attended local faction and cross-faction meetings and asked people we met and our interviewees to accompany them during play. Field notes of these participant observations were recorded after the game plays and meetings. In total, we had seven cooperative plays with experienced players (who, for example, helped one of our researchers to level up and explained players' tricks) and attended five locally organized events. These included a cross-faction event in Weimar, Enlightened and Resistance Faction meetings, as well as two 'farming' sessions (where players collect in-game items) in Erfurt and Jena. During these events we had the chance to establish further contacts with local communities and recruit interviewees. In this initial phase, we aimed at gaining a better understanding of a broad range of issues, and interview themes ranged from the motivation for play, the role of the game in everyday life, to competition and collaboration within the game.

Semi-structured Interviews

Based on an interview guide based on insights from the above exploratory phase, we conducted 11 semi-structured interviews, each lasting approximately 40 minutes, with 4 R

and 7 E players (9 male, 2 female). Seven were 'experienced', two 'medium' and two 'beginner' players that had been playing for at least 2 weeks regularly. This included one person from the earlier interviews who had continued, but was still a beginner according to our categorization. Interviews took from 25 to 90 minutes, on average around 40 minutes. Interviewees were recruited from the local player community during faction meetings, cooperative plays or via introduction from other players. Sampling was based on convenience, however we tried to involve a balance of R and E players and to focus on more experienced players. All interviews were audio-recorded on mobile phones and transcribed.

Analysis

The research team used affinity diagramming to process the data from both sets of interviews as well as field notes [4]. From this, a number of themes emerged. In this paper, we focus on a subset of these themes related to the relation between game-space and real-world space, and the relation of play activity and game-related mobility with everyday life. Finally, all transcripts were reviewed again by the first and second author, verifying quotations and identifying additional statements relevant to the themes discussed in the current paper. Most of the data reported on stems from the semi-structured interviews held in the second phase of research. Supporting data from the initial unstructured exploratory interviews (which did not cover the same set of issues) is used for additional evidence.

FINDINGS

We begin with general findings related to temporal extension, the role of sociality for Ingress, and tensions between casual and serious styles of play. We then move to the two core themes of our analysis, firstly, how players experience the relation between game space and physical / real space, and secondly to the integration and interrelation of the game with everyday life, in particular, how it affects mobility patterns, and how players are willing to both undergo and create danger and risk for the sake of the game.

General Findings

The simple nature of the core game rules makes Ingress relatively easy to play compared with contemporary MMORGs. Unlike many pervasive games in the literature, it does not require physical skills or extensive activity. However, most people we tried to recruit to start play were not enticed by the game story, which merely provides the starting point for play, but does not progress through play: "*no real sense of a story*", "*aimless*", "*weak story*". Some of these experienced hacking portals as meaningless or monotonous. It is beyond the scope of this paper to analyze what influences whether a novice player persists.

Consistent with descriptions from the literature [10, 18, 25], players enjoyed the temporal extension of the game, that there is no 'game over' and that one can always take a break without negative effect on gameplay. Players in particular enjoyed the social nature of Ingress, and the community (cf. [5]): "*you meet other people and do actions or events together as a team*". For many of our interviewees, the opportunity to communicate with other players in 'real life' and regularly meet new people was possibly even more important than the gameplay. Almost all interviewees mentioned the social aspects of the game and its community as part of the motivation for continuing to play. Some of the game mechanics inherently encourage social activity, e.g. collaboration of several high-level players is needed to successfully attack a valuable portal or to set up a high level portal. In many ways, Ingress appears to adopt successful elements of MMORPGs in terms of encouraging group action. Moreover, some players might import prior experience of collaboration patterns in MMORPGs (e.g. guilds in World of Warcraft) into their engagement with Ingress.

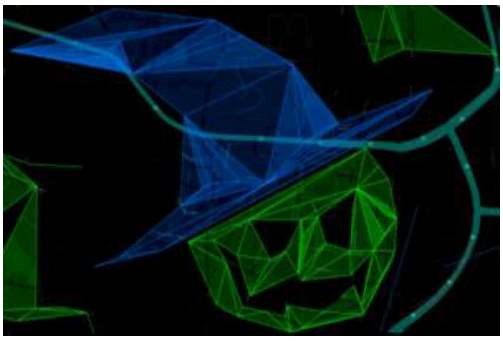

Figure 4. An example of cross-faction field art from Halloween 2014 by players from Jena, requiring collaboration of both factions. Image ©: Niantic, Inc.

Game activities were often combined with social activities (e.g. farming or leveling up together and then going for drinks). Most of our interview partners enjoy attending larger-scale events (e.g. 'City-Flip', where one faction travels to another city and strategically collaborates to turn it all green or blue) and social events (barbecues, parties): "*You don't just hear other people, but you can meet these people, go around, talk to them, drink beer*." This confirms earlier observations and recommendations on the role of sociality for pervasive games [10, 18]. Sociality extended to cross-faction meetings or events that discuss game rules, conflict resolution, or create so-called 'field art' on public holidays (figure 4). The factions do collaborate, and we found there is general awareness that in order for the game to continue, both factions must be allowed to flourish (e.g. in some cities, 'protected areas' for novice-players-only have been negotiated between factions. Furthermore we found very different styles of coordination and collaboration in the three cities' faction communities, ranging from emergent, almost anarchistic, to an almost military top-down structure. Thus, studying game communities in other areas may easily uncover novel phenomena of community organization.

We noticed different levels of how 'serious' players take the game, i.e. how far they treat the game as 'real' and consequential in their interactions with other players. We talked with many casual players, but also with, or heard of

players that, according to their peers, take the game too seriously. This could range from coaxing their faction into a concerted effort to extinguish any trace of the other faction (even though this results in a game situation that is boring for all players), stressing that anyone from the other faction is an 'enemy' one should not socialize with ("*I don't drink with frogs*"), up to aggressive behaviors such as following and chasing opposite faction players, threatening or insulting them via the in-game chat or shouting at them on the street. Our findings thus differ from Blasiola et al [5], whose interviewees all seemed to be aware of not crossing a borderline into 'creepy' behavior (regarding spying on others) and shared an understanding of where this line is.

The tendency of some players to take the game for absolute and to renounce notions of 'fair play' in their interactions with players of the enemy faction can be interpreted as a blurring of the magic circle's boundaries, the game starting to dominate everyday interactions. In this case, such behaviors were often described as being, in the long run, detrimental to the success of the game and the growth of its user base because this style of behavior was said to disengage other players who prefer a more casual and friendly playing style, and could result in these discontinuing.

The Relation of Game Space and Real-World Space

Pervasive games are described as hybrid, blurring the boundaries between game and reality, and bringing new meaning to the everyday environment [8, 18, 25]. The 'playeur' changes the terrain and co-constructs the experience of space via playful engagement under the rules of the game [23]. As part of our enquiry, we wanted to explore how players experience and describe the relation between real-world and game space. We thus asked participants in the semi-structured interviews whether in playing '*does it feel like the virtual and the physical are merged? Or is it separate worlds?'* Since not all found it easy to respond (and in one case we dismissed a statement of 'I read somewhere that Ingress is hybrid' as non-conclusive), we also systematically analysed the interview transcripts for statements that refer to the relation between real world and virtual game space, and to the role of the physical environment. These often were made when comparing Ingress to other games, or when discussing the role of portals and mobility behaviours (a few of the quotes in the following stem from the exploratory interviews analysed for further evidence).

Montola et al. [18] describe that with mobile phone-based games it is more difficult to make players feel they are dealing with a pervasive game. We found evidence that this is the case for Ingress. Most players that we interviewed expressed that they experience the game world as separate from and only loosely coupled to the real-world space. The majority of these felt the game to be largely virtual, and perceived the virtual world on-screen to be dominant in the game experience. Yet, as we'll describe later, a few players described having a hybrid experience in their imagination, and the interview data reveals various instances of how the boundaries between game world and real world at least partially blur. Players' experience of the relation between game world and real-world, everyday space thus is not uniform and might even shift depending on the situation.

Separate Worlds and Primarily Virtual Game Play:

The majority of interviewees in the second phase of our study (8 out of 11) described the virtual game world and real space as separate. One player described having the impression of separate worlds: "*Actually, they are separated. (...) Because in the real world there are no signs that that is a portal and you understand it only when looking at the screen. So as long as I am looking somewhere not at the screen I understand that that is a real world and that is why I don't feel any strong connection*." Another confessed to losing awareness of their surroundings: "*yeah, it happened often, that I only looked on my phone and didn't realize what happened around me. (...) I think it is separated, although of course it deals with the reality, because the portals are located at real places*." Another describes: "*In my eyes the worlds are pretty separate, except the thing that you have to walk to reach the portals in Ingress. It is a cool VR game, but it stays a game and the reality is always kinda separated from the content of the game*".

These quotes already indicate that most players consider the game as primarily virtual because there is no physical interaction with portals. One sees, captures and defends them only on the screen of one's smartphone, which can draw players' full attention. In an early interview one player stated, comparing Ingress with other pervasive games: "*In geocaching you deal with real objects; in Ingress everything is virtual*" and argues that Geocaching is better because one really experiences the outdoors whereas "*in Ingress you are always looking at the screen*". Portals are primarily experienced as on-screen objects, with only a loose connection to the location they are attached to. One interviewed player stated: "*It is just an app on mobile. Mostly I don't look at the portal pictures. If I walk or I am on the bike I click on the portal – 'Hack'* ". This player only cares about the in-game value of portals and shows no interest in the real-world object they are connected to. Another interviewee explains that he does not really discover new places while playing, even though Ingress might lead him there, as he only cares about "*shutting down the portal - It is not really important for me what is around the portal*".

Indicators of Hybrid Imagination and Experience

As described above, the majority of interviewees experienced the game as primarily taking place on-screen. Nevertheless, most considered the ability to play in the real world, and to see familiar streets and landmarks on the screen of the mobile device a great advantage of Ingress. One player explained that Ingress is not as immersive as e.g. Second Life: "(*you) look to the street and you see you are in the real world, ... you do not lose the connection to the real world*". While this statement does not indicate a truly hy-

brid experience, it exemplifies that play being localized in real space is central to the Ingress experience.

A few players, though, profess to a more hybrid experience (2 of 11 interviewees), at least in their imagination: "*I look around and see the buildings or whatever the portal is and I think about how will it look when a green steam wobbles around it*". Another interviewee, asked about whether they experienced it as separate worlds, responded: "*there is a connection. It might be the reason why I am hooked to the game. For me it expands my understanding of reality with virtualness, which I find very intellectually stimulating*". Some other players furthermore enjoy having knowledge of a secret meaning to locations, a privileged insider perspective of being an Ingress player: "*it is absolutely another reality and I really like it. It's really fun to walk in the city and know that for some people it is just a building, but this is a really important portal I have to hack*".

On closer analysis of transcripts, we found further indicators of a hybrid relation**,** where the game-world and the real world provide mutual value and meaning, in interviewee responses on other topics, in particular the role and selection of portals. For example, some portals were chosen or created because they are places of personal interest, for example, a wedding venue. Several players (4 out of 11 interviewees) described a mutual relation in that the physical object makes the in-game portal more valuable, and simultaneously a portal may add value to a building. One player still experiences the location of his first portal hack as special. Some keep keys of portals that are special to them (due to the value of the object represented or a personal relation and story of acquisition): "*I am keeping the keys to have a long distance connection to that space*". These statements were fairly independent of whether participants described the game as primarily virtual. We also found that some experienced players tended to use portal names instead of a street address, when fixing a meeting in town.

While having all game action take place on-screen means one is not 'doing things for real' (a defining feature of most truly pervasive games) [18], in some cases Ingress enforced radical mobility, doing something exceptional for real. One player described an adventure of climbing a mountain to capture a portal and establish a field over a vast territory, and considered this one of the most memorable adventures of their life. Others had gone on night trips into a dark forest that they otherwise would not have dared.

Everyday Life and Game-Related Mobility and Activity

As noted in other work, pervasive games break up the magic circle through spatial and temporal extension [18, 20, 25]. It is one of their core features that they permeate the everyday. Of particular interest is game-related mobility [8, 15], that is, the mutual adjustment of mobility to the 'augmented ecology' of the game. One needs to be moving to play a pervasive game. Users need to move to play and to play while moving [18, 25]. Unlike related games, such as Shadow Cities, Ingress requires players to be within a 40-meter distance to hack portals, and players cannot 'fake' their location. They need to visit portals, and to invest time in play. This is reflected in one interviewee answer: "*The game makes you walk*". Another player emphasizes how the game pushes players to deviate from routine: "*With Ingress, you walk out and explore new places, you leave your environment*". These are aspects that differentiate Ingress from other games our interviewees were previously familiar with. Some players stated that at the time of the interviews, in summer, they would not be playing other games, which would not allow them to be outside.

It has frequently been observed that pervasive game players adapt their mobility patterns for the sake of the game – the game even becomes a pretext for mobility [8, 15]. Players travel to new places just to play and they see their everyday environment differently when they can encounter the unexpected [15, 25]. Although this is an expected effect, it is not well documented so far, as very few games have reached high levels of pervasive integration in daily life. Studying Ingress offers us the opportunity to investigate how players integrate the need to be mobile and visit portals into their everyday habits, and how they change their habits or develop novel routines.

We found ample evidence of Ingress being integrated into everyday life, and adaptions of players' mobility patterns. Besides players adjusting their routines to the game's requirements and traveling for the sake of play, we noticed an interesting shift in terms of means-end relations with some players who appeared to see Ingress as an enjoyable nudge towards going outdoors more and exercising, and some also found it a motivation and means to explore new places. This was something players often mentioned when asked to describe what they like about Ingress or to compare it to other games. An experienced player considers "*Ingress a remedy for people who are addicted to massive multiplayer games. Ingress is much better than just to sit all the time in front of the PC in an apartment.*"

Using Ingress to get to know new cities was mentioned by three people (out of 11) in our semi-structured interviews and also by three players in the exploratory interview phase. While a few players thus explicitly utilize Ingress as a mechanism for serendipitous sightseeing, a substantial number (6 out of 11 in the semi-structured interviews, as well as 3 people in the shorter exploratory interviews) mentioned they like that it gets them to know their home city better, noticing and getting to see things/places you would normally not see as a welcome side effect they like about the game: "*you get to see places you would normally overlook and not take notice of*" and "*You move, you see places you wouldn't see if you don't play - especially on my way here to the station I normally walk there and listen to music and don't look right or left because I know the way, but if you play Ingress and you look at the portals and see some walls some pictures you wouldn't have noticed*".

In the following, we first describe our findings regarding how our interviewees tended to adjust their habits to serve game-related purposes and then move on to discuss how some players begin to utilize the game to intentionally change their habits or employ it as a tool for their own purposes. We then discuss how the game affects on everyday life through players willingness to undertake and create danger and risk. While our findings repeat themes reported in earlier publications [15, 25], they add depth and detail.

Integration Into and Adjustment of Daily Habits

Similar to others' work on pervasive games [15], we found numerous examples of how players adjust their mobility patterns, including detours and alternate routes, as well as adopting novel habits. Many players integrated the game into their existing habits and combined it with other activities.

Many interviewees told us that after playing for a while, they would choose different routes to their destinations based on the number of 'profitable' portals along the path. This was the case for at least four of our interviewees (out of 11), others at least hinted at some adaptation of routine. Many experienced and ambitious players plan their route for the day in the morning, based on new events on the 'Ingress Intel Map' (a web application). One player mentioned it now takes him much longer for his usual route than previously. Others adopted completely novel habits - a medium experience player from our early exploratory interviews who doesn't play during the work day reported now taking a 15-30 minute walk for playing before going to bed.

The majority of players interviewed (8 out of 11 in the semi-structured interviews) chose to combine Ingress with other activities, rather than playing it separately. The most common activities were walking somewhere, being on public transport (where Ingress serves as pastime), and, further down in frequency, cycling, jogging, as well as discovering places and shopping. One player uses their daily commute, but reports not taking any detours: "*When I go to work by train I use the way to the station to hack portals and get items*". We found Ingress was frequently used to fill the time while waiting for public transportation, on a bus, as well as to take a break from work (some players have portals accessible from their work location and thus just need to go to the window or out of the door).

In contrast, a noticeable number of players (3 of 11 in the semi-structured interviews) play the game separately, not combined with other activities. "*When I play Ingress I normally do nothing else, because playtime!"* Here, the notion of 'playtime' versus 'ordinary life' (as temporal division) re-emerges, reinstating the magic circle. This shows how common perceptions of play still influence how people appropriate pervasive games.

Players often mentioned 'home portals', which refers to portals in close proximity to one's home or workplace. Home portals tend to have a special value due to the convenience of hacking and a sense of ownership: "*it feels like if you are living there and if there is a portal it is supposed to be yours*". Some players have a portal just outside of their home that they regularly protect and recapture. This is a much-discussed topic in the game community with different attitudes towards it. Some players consider it unfair, as they may be defended out of the window, without going outside. We consider home portals as an indicator of the game merging with the everyday, and, when people feel ownership, of a merging of real and game space.

A very different aspect of how playing changes people's habits concerns how they look at other people and how it interferes with their non-game social contacts. Several interviewees mentioned that seeing someone stare at their smartphone, they would wonder if these also play. One player, asked how Ingress changed their habits, responded: "*I changed the way I look at people with the phone in their hand. Definitely. Every person stands somewhere and if he is looking at his phone I guess he is playing Ingress and you look at his phone a bit and look if he is playing in your faction or not - you get a bit paranoid*". Our interviewees also reported on conflicts with family and friends due to their frequent focus on the phone, or their propensity to, when walking somewhere, to stop to hack a portal they pass when the rest of the group wants to walk on.

Using the Game as a Mean to an End

Around half of the players (6 out of 11 semi-structured interviews) see Ingress as a convenient stimulus for being outside and active, which is an added reason to continue to play: "*it allows you to go outside into the nature and have more fun*". A long-term player explained: "*You spend your time more outside. It also contributes to bodily fitness*". This can be seen as an indication of how players utilize it to consciously change their routines, making them spend their time outside cycling or walking, when they would otherwise lack the motivation to do so. One player stated he utilized Ingress as his primary workout opportunity. A few players told us they e.g. wanted to reduce their weight, or to become more active, and hoped to benefit from playing: "*you get to play outside which is good for one's health instead of sitting behind the computer*". In one case, this was the initial motivation to download the game from the Google Play store and start playing. Beyond this enthusiasm, we do not know whether our interview partners really succeed in increasing their activity levels and fitness.

As mentioned, a smaller number of players found it possible to use Ingress for sightseeing purposes, utilizing portals as pivotal points for exploring a new city. Others thought it forced them too much to look on the screen for this, but still found it useful to get to know their own city better. Exploration was often named as a big advantage of the game. Many mentioned the game made them experience locations they would not see otherwise, either in visiting new cities, exploring the surrounding area or in finding small "cool spots" in their hometowns, which they would have overlooked: "*in Leipzig the game made me walk a lot and visit*

some places that I wouldn't do if I wasn't playing". An interviewee mentioned he uses Ingress for finding public art objects: "*I found really interesting that it's about public arts in a way, as well as sculptures, things that you sometimes pass by and you don't usually recognize and I found Ingress really helps me to point my attention towards these little sculptures here and there*". The following story exemplifies how the game can lead to unexpected encounters and engagement with the environment. An E-faction player visited another town for work and saw an R-portal, which was in a church. He decided to capture it, but could not get in because the gate was closed. He talked to local people and they opened up for him, showed him the church and told a lot about the place. In the end, he didn't have time to capture the portal, so he just hacked it to get the key.

Danger and Risk

Montola et al. [18] point out that one of the side-effects of spatial-temporal expansion is that players become willing to bend the rules of 'ordinary life' and take risks for the game, and may engage in behaviors hazardous to themselves and others [cf. 13, 5]. This has become a topic of media attention recently with the craze around Pokémon GO. Players may take risks willingly (e.g. play while driving) or because of diverted attention. According to Montola et al., game designers therefore have a responsibility *"to not lure players into taking unnecessary risks*", to consider legal issues (e.g. trespassing), and to avoid nuisance and offense to others [18]. As evidenced in many current articles on Pokeomon Go, this is a problem even if a pervasive game does not require 'doing things for real'.

When asking Ingress players to recall dangerous situations they had come into, a number of issues came up. The aforementioned players who take the game 'too seriously' were sometimes considered a source of danger. A few players had insulted and threatened others via COMM (the in-game chat), and some even went beyond that, directly confronting another player and following them home. One player told us that once a man drove very close to their car because they had destroyed his home portal. One player in the exploratory interviews told us her friend almost got hit by an avalanche while playing in winter.

Being immersed into the game, players pay less attention to the outside world. Some interviewees confessed to playing while driving, having a mobile phone holder installed on their dashboard, even though they know this is a legal offense. There is even a special term for this: "cargress". Players also started to take other risks. One person told us a story of how he and his friend drove at night into a forest to create a global link. They drove into the forest where they found raccoons. On recounting the story, he realized it had been potentially dangerous since they were in a very remote area with poor cellphone coverage. They had to stand on their car to create the link.

Given how well discussed the issue of risk is in the literature [13, 18] resulting from people doing something unusual they would normally not do (like exploring a desolate area of town), it is notable that this is not really addressed in a commercially successful game (the situation seems even worse for Pokémon GO where some content appears at random locations). This is very different from locally orchestrated Mixed Reality / pervasive games where game masters check for safety upfront and can interrupt game play.

DISCUSSION

In this paper we investigated how boundaries between everyday life and play and between 'real' and game space blur in the pervasive game Ingress. Our study shows how Ingress is integrated into everyday life, and how players adapt their mobility patterns, e.g. taking detours and adjusting routines so as to benefit their game performance, developing entirely new routines, and traveling for the sake of play. Being outside and having to move was considered a defining factor of the game by many players, with several declaring that they wouldn't be as active otherwise. We furthermore noticed an interesting shift in terms of means-end relations. Quite a number of players consciously utilize the game to motivate themselves to be more active and spend time outside, or exploited it as a serendipity generator for exploring new places and discovering previously unnoticed things in their surroundings.

It would require further investigation to determine how successful our study participants really are in increasing their activity levels, if this has any real health benefits, and whether activities such as Ingress are effective at mobilizing people who are not likely to engage with more traditional exercise regimes (such as the typical Fitbit applications). This is well beyond the scope of our study, but might be fruitful for future research.

Our analysis reveals a shifting and fluctuating relation between real world and the game world on-screen. As anticipated from the literature on mobile-based pervasive games, Ingress does not provide a truly hybrid space experience. With a game that just overlays objects onto GPS coordinates (and without a site-specific storyline), players are very aware of the loose connection and the game action is perceived as largely virtual.

But, as Klausen [14] notes, hybridity is an emerging property and outcome of players' actions. First, players' experience of the relation between game world and real, everyday space is not uniform. Most players perceive the virtual world on-screen to dominate game action. Some even confess to only care about virtual portals and ignore the real objects these are attached to. However, some described imagining a hybrid experience. Second, the experience may shift depending on the situation, e.g. enjoying knowledge of the secret meaning of places. This points to an imaginative engagement with the game. Play being localized in real space is central to the Ingress experience and sometimes enforces radical mobility. Third, the game begins to 'bleed' or mesh into 'real life', gaining elements of hybridity on a subtle level that players might not yet conceptualize.

If players are asked how they see the relation between game space and real-world, most claim that the game is primarily virtual. But when they begin to talk about their game experience and everyday habits, they frequently mention at least elements of a hybrid experience. Many players describe how the game enhances the meaning of locations (and enjoy this secret knowledge), or – in converse – portal keys may attain special relevance due to the real-world location they relate to. The interviews reveal various instances of how the boundaries between game world and real world at least partially blur, with portal names being used for meet-ups etc. This hybrid space expands to the social sphere – players are very tied to the social structures and physical space they play in, and social interactions combine in-game activities and 'real life' social encounters [cf. 1]. The game also 'bleeds' into real everyday life in how players, in order to succeed in the game, become willing to accept risks, not only for themselves but also to others (e.g. 'cargress').

Our study thus reveals how a mobile-based game that does not offer full immersion and does not require 'doing things for real' (i.e. relies on on-screen interaction), by being localized in the real-world and becoming integrated into players everyday routines and mobility patterns, at least partially gains elements of hybrid experience. On the other hand, a subset of players retained the notion of 'playtime' versus 'ordinary life', reinstating the magic circle that pervasive games aim to dissolve. This shows how common perceptions of what it means to play still influence how people appropriate pervasive games, counteracting the very notion of pervasive gaming.

The tendency of some players to take the game for absolute and bring the conflict between factions into everyday life as well as renouncing notions of 'fair play' (as held in sports) in their interactions with other players might be seen as a negative consequence of the blurring of boundaries of the magic circle. In this case, such behaviors may even result in actions that, in the long run, are detrimental to the success of the game and the growth of its user base by disengaging more casual players or resulting in game situations that are very static and not conducive to newcomers.

Various questions for future research are left open. Further research could investigate the implications of player type and style. We found some indication that Ingress attracts a specific type of people in that many people we asked to play it did not like it and gave up quickly. Further research should also look in more detail into the difference in player experience of 'realness' of screen-based pervasive games versus games that involve physical action, and into the factors that contribute to a game turning hybrid despite not necessitating such physical action. Potential limitations of our research include that some of our findings may be specific to the type and size of city the study participants are from and to our country's cultural context. The three cities are all medium-sized and we did not talk to any players from rural areas, where density of portals will be lower. We surmise that the availability and ease of public transport (which differs across regions and countries) affects patterns of how game mobility is integrated into everyday mobility. We further already mentioned that each city appeared to have a different style of social faction organization, further differentiating behaviors. From a CSCW perspective, it would be interesting to observe the emerging social organization and power structures in different regions, and how communication channels are used differently. Another limitation of our work is our small sample size (25 participants, with 11 detailed interviews) and opportunistic sampling. Moreover, it proved tricky to gain the trust of players due to the research team having joined both factions. On the other hand, this also provided us with a first-hand insight into the sometimes very real tensions between factions, experiencing ourselves how the game affects interactions between players.

Another limitation of our study is that all interviews were conducted in summer. Some of the players at medium and even experienced level we interviewed had not yet played during winter. It would be interesting for future research to investigate how behaviors change in winter [cf. 26], or how people in countries where one normally avoids spending time outside (as it is very hot or cold) relate to a pervasive game that requires playing outdoors.

CONCLUSION

While our findings may repeat some of the themes reported in earlier publications [15, 18, 25], they add depth and detail to these. Furthermore, while they largely confirm media-theoretic analysis of pervasive game characteristics and play experience [6, 10, 13, 14, 18, 25] through empirical data, they also highlight a variation of experience and perception among players.

There still are fairly few empirical studies of pervasive games [28]. Our work appears to be one of the first studies of players' experience with the popular commercial game Ingress. We provided findings on how the game is integrated into everyday life and affects players mobility patterns, with players not only adjusting their mobility to suit the game but also utilizing the game as a mechanism to change their habits and to inject some serendipity into their lives. We discussed how players experience the relation between real world and game world, the game 'bleeding' into the everyday (with at least partial blurring of the boundaries between game and real world) even though it is not explicitly experienced as being hybrid. We further found that notions of play versus ordinary life still affect some players, and that others are willing to take and create risks and treat the game as consequential in their everyday interactions with (enemy) players, further blurring the boundaries, but also creating tensions between casual and serious styles of play.

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