Balancing the Augmented Experience: Design Tensions in the Location-based Game Pikmin Bloom

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ABSTRACT

Within the general development of games becoming more pervasive and daily life turning more gameful, various location- and movement-based games have become prominent in contemporary culture, and are increasingly used in augmenting the physical reality. This study investigates tensions that arise in augmenting the mundane experience of walking in both urban and nature environments with location-based games (LBGs). We conducted an 8-week autoethnographic study of a newly launched LBG, Pikmin Bloom, a game that can be characterised as gamified walking. We focused on the central design tension of "augmenting walking vs. avoiding disturbing players' everyday life." Connected to this, we discuss four other tensions: (1) promise of future vs. enjoyable present; (2) too abundant vs. too scarce rewards; (3) seeking symbiosis vs. manipulating the environment; and (4) player privacy vs. immersive gameplay. This work-in-progress suggests that failing to optimally balance these tensions can have detrimental effects on the playing experience.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**.

KEYWORDS

location-based games, augmented reality, design tensions, pikmin bloom

1 INTRODUCTION

Location-based augmented reality games (LBGs) inject digital elements into the real world, resulting in play experiences that are connected to both the physical surroundings and the digital [26–28]. As LBGs mediate the interactions that players have with the physical world [29], there is research interest in understanding the various behaviours that the games motivate. These include both positive aspects such as exercise, social interaction and outdoor activity [4, 5, 8, 15, 22, 38] and negative ones including trespassing and reckless driving [2, 13]. Through connecting specific game designs and game mechanics to emergent behaviours, researchers are able to better design population level health interventions, safe urban play experiences and playing experiences in nature [32], and scaffold desired behavioural outcomes [2, 3].

In this paper, we present the work-in-progress results of a study that seeks to address two research gaps. First, we explore design tensions arising from augmenting the mundane experience of walking through LBGs. As a case study, we draw from the newly launched Pikmin Bloom—a game that has been characterised in the official marketing material as an augmentation of real life walking experiences, rather than a parallel experience. With this approach, we expand the research on how LBGs can direct player movement and motivate behaviours such as walking and social interaction in the real world (e.g., [2, 8, 9, 21]). We also contribute to research on LBG design, supporting previous studies (e.g., [16, 20, 22]) by elucidating design tensions related to augmenting walking experiences. Second, through exploring the convergence between augmented reality and physical space, we contribute to the literature on the gamification of everyday life [17, 23, 26, 27] through focusing on the design space around movement-focused LBGs. In particular, we investigate how the digital augmentation of an activity, in this case walking, influences the real world experience of the activity. Taken together, for guiding this research we formulate the following research question:

RQ: *What design tensions emerge when augmenting the mundane experience of everyday walking in urban environments and nature with movement-focused location-based games?*

The rest of this paper is structured as follows. First, we present our research methods and data collection, followed by the results. We then discuss our key findings, research contributions, limitations and future work. Overall we believe this study offers interesting novel insights into the design space of LBGs through investigating a new addition to the genre, Pikmin Bloom.

Table 1: Playing country, steps walked while playing, level and additional information of the researchers. All three played the game for 8 weeks.

Country	Steps walked	Level	Summary of the experience
Spain	320 000+	16	Played mostly during walks in the forest, while hiking or foraging, although also explored some of the game's functionalities on their way to work.
Finland	290 000+	29	Played mostly while walking to work, to hobbies or when going to the grocery store. Went for a walk because of the game a couple of times in the beginning, and also roughly five times to focus specifically on research observations. Played primarily in an urban environment.
Finland	195 000+	24	Played mostly while walking to work and other daily errands. Agreed to walking sometimes because of the game. Used the game in two trips to other cities, including in nature, and consciously participated in the first Community Day.

2 MATERIALS AND METHODS

In this work, we focused on Pikmin Bloom, a movement-focused LBG where players are primarily tasked with walking, and most of the game mechanics are connected to either the number of steps the player takes or their physical location. The game builds on movement and step data obtained from the mobile device to reward players for moving. It logs the steps taken each day and shows players how much they have walked each day and week. Players are able to plant flowers, grow Pikmin creatures and do other activities that are all tied to walking without having to look at their screen, which frees players to play along with their everyday activities.

2.1 Data collection: autoethnography

To answer our research question, we collected data using a design-focused autoethnographic approach [10], which has been used before in HCI to draw attention to and investigate design tensions connected to people's day-to-day activities with technology (e.g., [30]). The primary reason for choosing this approach over alternatives such as player interviews and objective ethnographies was that it allows the investigation of the ethnographer's first-hand experience, and while autoethnography only represents the account of an individual, it produces rich data that can yield unique insights. Three researchers installed the game on the 2nd of November 2021, when it was launched. All researchers had prior experience with other LBGs such as Pokémon GO, but no experience with Pikmin Bloom before this research. The researchers were located in two different municipalities in Finland and in a city in Spain. Over the course of 8 weeks, the researchers played with Pikmin at their own convenience. Basic information of the play experience of the three researchers is given in Table 1.

The researchers annotated their thoughts in a personal diary, marking down observations of their own playing as well as observations related to other players they encountered or saw on the map. In addition, we looked at the official communication within and outside the mobile application. The diaries varied in format and structure between the researchers: the first focused heavily on a visual diary, photographing the playing experience. The second kept a daily diary with raw observations. The third kept a structured diary, summarising their thoughts and ideas regarding the game as they emerged. These diaries were discussed in a meeting every two weeks where the researchers presented their observations to each other and derived common relevant themes.

2.2 Data analysis: a reflexive thematic analysis to discover design tensions

Similarly to recent work in the field [22], we adopted Tatar's Design tension framework [37] to elucidate relationships in game design where increasing one outcome may diminish another. As an overarching guiding principle in our analysis, we focused on our research question: *What design tensions emerge when augmenting the mundane experience of everyday walking in urban environments or nature with location-based games?*, and consequently the design tension of augmenting (adding something to) the mundane experience of walking as opposed to creating an activity that is parallel (disconnected) from the activity.

For analysing the autoethnographic data and observations, we used a reflexive thematic analysis [6], which is an open-ended approach that can make use of the expertise of individuals to synthesise knowledge. This approach can be considered suitable when the aim is to bring together insights of multiple researchers and allow meaning-making to occur while the researchers engage with the activity at focus. We incorporated discussion already to the data collection process to guide our attention towards interesting and potentially relevant phenomena through the biweekly researcher meetings. Throughout the process, we held four analysis meetings where the researchers shared their thoughts, synthesised their diary annotations and discussed common themes emerging in their reflections. These meetings lasted between 60 and 90 minutes each.

The first of these meetings took place in Zoom after two weeks of playing and served to identify preliminary thematic categories and interesting phenomena. Here the authors discussed their initial playing experiences and how Pikmin Bloom compares to other video games and LBGs that we have played. The second meeting occurred two weeks after the first, and here each of the authors presented key themes based on their experience, and through discussions and grouping of these themes, the first draft of the resulting design tension framework was formulated. The authors reported slightly different experiences, but all agreed on the main themes and their general content. The third meeting was held after roughly 6 weeks of playing, and here the researchers agreed on the semi-final framework and related content. The authors used the previously agreed framework as a starting point and discussed potential alterations to it as well as the content. A fourth and final meeting was held at the end of the data collection and there the authors finalized the framework and its reporting in the manuscript. The authors compared their analysis at this stage to previously published similar

Table 2: Analysis meetings held by the researchers, description and main outcome. .

Meetings time	Description	Outcome
2 weeks after playing	The researchers met on Zoom. Each shared their screen in turn and presented their diary and main findings. Each proposed relevant design tensions with regards to the augmented walking experience.	Formation of the first draft of design tensions and identification of interesting phenomena to focus on further.
4 weeks after playing	The researchers met on Zoom and again discussed their observations, findings and reflected on the design tensions discussed last time and proposed new ones. There was discussion on whether the design tensions should be between "normal life" and augmented life, or between design decisions. The authors also reflected on their findings based on prior literature.	The first draft of the tension framework with four relevant tensions. Agenda to further investigate the tensions.
6 weeks after playing	The researchers met to agree on the final design tension framework. Each three brought up their thoughts and ideas and suggestions. Most of the time was spent on discussing whether the framework should be exhaustive in the sense that every single design tension connected to augmented walking in all contexts should be disclosed.	Agreeing on the semi-final design tension framework. Sharing of the final diaries and reports for more detailed analysis regarding phenomena connected to the identified tensions.
8 weeks after playing	After drafting the manuscript, the researchers met one last time to discuss how the themes should be presented, and commented on the reporting of the data, ensuring that the sense-making process and data reporting were adequately presented.	Direct comments to the manuscript to ensure a balanced, honest and exhaustive reporting of the agreed thematic framework.

work (e.g. [22]) to obtain an outside view to their conceptualization and see if there were any discrepancies with the extant literature. A summary of the meetings is given in Table 2. In addition to the meetings, the authors discussed the tensions and their ideas in a common asynchronous online Slack chat throughout the 8-week study.

3 RESULTS

Here we present the outcomes of our analysis of the three researchers' first-person accounts of playing Pikmin Bloom. We present the findings by focusing on the primary tension of "augmenting vs. avoiding disturbing everyday life", and then discuss four subsequent tensions connected to it.

3.1 Principal design tension: Augmenting vs. avoiding disturbing everyday life

There is a distinction between augmenting the walking experience itself by adding something extra to it vs. creating an activity that is parallel to the walking experience. While these two can be thought of as opposites, they can also co-exist. Indeed, the walking activity can be augmented and, in addition, players can still be rewarded in parallel to the activity. In this design space, we argue that there is a tension between augmenting the activity and not disturbing players' everyday life. As LBGs are regularly played as part of daily life (see e.g., [12, 26]), players may wish to partake in gameplay that seamlessly integrates with their real world activities. Pikmin Bloom aims to accomplish exactly this, as the game can be "played" simply by having a mobile device in the pocket while going about daily activities. On the flip side, this design renders the augmentation of the walking experience itself shallow, and meaning is created post hoc by providing rewards for the steps taken and visualising where the player has walked.

Our findings revealed that Pikmin Bloom is connected to the real world in the following ways: (1) using a real world map as the game board; and (2) by the player character's movement being directly related to the player's movement in the real world. In this way the game is similar to contemporary LBGs [25, 35]. In addition, the game contains PoIs (big flowers) that correspond to real world objects, which offers some incentives for navigation-based play. However, the rewards for blooming the flowers remain small and the flowers quickly revert to their pre-bloom stage. Finally, the game allows players to attach real world photos to their daily diary. This last part is a unique mechanic not presented in other LBGs to date.

Overall, in comparison to other contemporary LBGs, the connection between Pikmin Bloom and the physical world can be considered slim. For example, the LBG Pokémon GO is connected to the real world via PoIs, a day-night cycle, real world weather appearing in-game and events such as raids and trading which bring players physically together to discuss the game [26]. Furthermore, LBGs oftentimes ask players to navigate to reach specific PoIs. The minimal emphasis of this form of play in Pikmin Bloom can be seen to have the benefit that players do not have to look at their devices all the time, meaning the game does not disturb players' everyday life. On one hand the lack of navigation gives players freedom, enabling them to focus more fully on the real world environment they are in, but on the other hand, the playing experience is less intensive and potentially less engaging.

3.2 Secondary design tensions

Connected to the main design tension, described above, we discuss four other considerations that according to our analysis might be

relevant to LBG design. We argue that these tensions are related to and contribute to the central tension.

3.2.1 Future rewards vs. enjoyable present. When and how to reward players is a fundamental design issue that game designers face. This connects to the concepts of feedback and gratification. Both can be instantaneous/fast or delayed. The design of Pikmin Bloom relies heavily on providing delayed gratification, as most rewards are based on reaching longer-term goals. For example, the game provides players the ability to retrospectively look into where they have walked and yield rewards based on where and for how long they have walked (See Figure 1 left). The game also provides rewards over time through the Pikmin creatures bringing players gifts or rewards from mushroom hunting tasks. The player is also rewarded from levelling up, a process achieved through walking and completing tasks (See Figure 1 right). At the end of the day, the player is asked about their day, putting further emphasis on retroactive reflection and less emphasis on the present (Figure 1 center). These are all examples of delayed rewards, and rewards from in situ activity remain slim due to the long feedback loop between activities and rewards.
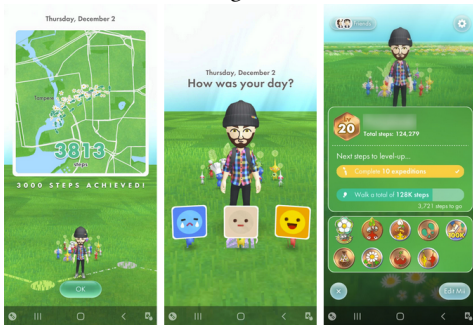
bloom figure.PNG

Figure 1: Three screenshots from Pikmin Bloom taken by the authors.

All three researchers agreed that the game constantly upholds promises for the future, but the added value to the present activity of walking was small. According to Huyn et al. [19], individuals are motivated to go out for walks for four reasons: (1) self-mind arrangement, (2) novelty (3) achievement, and (4) self-introspection. Pikmin Bloom provided some additional value for novelty and achievement reasons, but importantly, according to our experience, did not disturb the value derived from the other dimensions. Another viewpoint to this matter is to look at recreational vs. functional needs of walking [11]. While Pikmin Bloom arguably did not disturb either of these needs, it also did not significantly enhance either. The added value of the game primarily comes in the form of receiving rewards later.

After a month of playing the in-game activities such as starting to plant flowers and remembering to switch off the flower planting before and after a walk started to feel arbitrary and meaningless tasks. In addition, the quantity of future rewards becomes progressively smaller, as for example continuously more steps are needed to reach the next level. However, even with a continuous bombardment of future rewards, we argue that future rewards alone are

not enough to sustain playing habits. Past work has found immediate rewards to be stronger predictors of activity persistence (also long-term) in comparison to delayed rewards [39, 40]. Anecdotal evidence and past research with the LBG Pokémon GO suggests that balancing this tension by providing an enjoyable present (e.g., social activities, fun mini-games) and future rewards (progression) can result in greater use continuance [1]. Overall, there is ambiguity regarding rewards and their implementation. On one hand, immediate pleasure reinforces long-term achievement, and reward anticipation can be a good motivator to continue playing. On the other hand, if the activity is not rewarding in itself and/or the reward is underwhelming or disconnected from the activity, playing motivation is diminished.

3.2.2 Providing too little content vs. providing too much content. Connecting to the previous tension of when to reward players, there is the question of how to reward players. In Pikmin Bloom, while steps can be collected without looking at the screen, there is a lot to do when the player does choose to look at the app. The player will likely have multiple activities to do at any given point in a day–picking up fruit collected by the Pikmin, picking up grown Pikmin, planting new ones, feeding Pikmin, sending Pikmin to expeditions, sending Pikmin to destroy mushrooms and sending and opening gifts. There is a daily limit to some of these activities such as mushroom destroying, but otherwise the player is introduced with all the activities at once, albeit in an order where first they need to collect presents and gifts first and only afterwards they can feed their Pikmin or choose to send them to do tasks. Furthermore, the activities are all point-and-click tasks, which is a more simplified design approach in comparison to other contemporary LBGs that have minigames (e.g., Pokémon GO, The Witcher: Monster Slayer and The Walking Dead: Our World).

In the researchers' experience, the fruit collection tasks, gifts, mushroom hunts and growing Pikmin tasks quickly begin to feel repetitive. They are simple, abstracted, and feel largely disconnected from the main activity of the game, walking. Furthermore, the activities get progressively less interesting. For example, at first there is a limited number of Pikmin, meaning in order to best make use of the Pikmin as a workforce, the player should stay alert and constantly open the app to send the Pikmin to new missions. However, soon the player accumulates enough Pikmin so that this loses its relevance. Returning to this design tension, LBGs should respect the players' time by providing content less frequently, but putting increased emphasis on the contents' quality. For a lighthearted mobile game, too many tasks can hinder flexible engagement and overwhelm the player. Furthermore, even in games focusing on progression instead of the gameplay, repetitive and boring tasks can ultimately be detrimental for the playing experience [24].

3.2.3 Controlling vs. forming symbiosis with the environment. This tension is connected to the narrative dimension of LBGs. Stories and fictional narratives are an important part of LBGs, and Pikmin Bloom is no exception in this regard. The fictional world includes various non-human organic elements, primarily Pikmin themselves as life forms that resemble plant-animal hybrids, petals that the player can plant as they walk, flowers that can be grown and mushrooms that are destroyed by the Pikmin. Hence, the game's premise is very much intertwined with the concept of nature. Based on the

official communication and the presence of nature elements, Pikmin Bloom could be seen as a game that aims to nurture a meaningful relationship with nature, similarly to other existing games showing design potential for engagement with environmental topics (see e.g., [14]). However, as in the original Pikmin games for Nintendo consoles, Pikmin are little more than soldiers and beasts of burden. More broadly, natural elements in the game are valued from the perspective of the human player, either for utilitarian purposes, as Pikmin, petals, flowers, and mushrooms represent resources or obstacles to overcome, or for aesthetic reasons, for example the variety of petals and blooming flowers.

These player-centric values are generated through command, creation, contemplation, and destruction. In the game, nature is something to command, since Pikmin can be ordered around with a whistle, always ready to serve, and befriending them is a matter of feeding and using them for progress. Their growth is in the player's hands, but if the player forgets to feed them for a long time, there will be no consequences. In the game, the plant world is artificially and intentionally created, as players turn the empty land into a virtual garden, bringing beauty to contemplate. Finally, the only nature that grows without human interference, mushrooms, is there to be destroyed for rewards with no other reason being given. Therefore, nature is presented as something to be profited from and controlled rather than something to learn from and respect—an approach that we find highly problematic in light of previous literature [7, 14]. While interactions with the Pikmin creature remain distant, the game allows players to name the Pikmin and make them unique in that way. The number of Pikmin that the player can hold is also part of the game's monetization model, meaning there is a micro transaction barrier for obtaining more workers than the arbitrary starting limit of 300.

It hence seems that the story elements of Pikmin do not support a seamless integration with the surrounding world, but rather a controlling, even manipulative approach towards the (virtual) environment. Prima facie this contradicts the imagery shown in the game's trailer where players are walking in nature and bringing nature to cities via planting flowers. Based on prior research that has pinpointed games to have potential for meaningful explorations of nature [14, 32], we argue that LBGs too should align their story elements with the rest of the design decisions and marketing material.

3.2.4 Player privacy vs. immersive gameplay. Player privacy is particularly pertinent to LBG design because as the games are played in the real world, anonymity from other players is not possible in the same sense as it is in most fully online multiplayer games. Furthermore, in order for players to enjoy multiplayer elements in LBGs, they may need to participate face to face in some activities (e.g., [4, 22]). In Pikmin Bloom, players can opt to be hidden from other players when they start planting flowers (the only multiplayer mechanic in the game besides gift sending), but will see flowers planted by other players nonetheless. Players can also choose to not accept any friends for gift sending, but opting out of these aspects for privacy reasons limits the potential enjoyment of the social functions of the game.

In addition to privacy from other players, there is the issue of privacy from the developer. In Pikmin Bloom players are required to give the game access to their Google Fit/Apple Health/Fitness statistics. For Android players, downloading Google Fit is a prerequisite for playing. The game collects the user's movement throughout the day (where they were), some health data (i.e. steps taken), players' own evaluation of their mood during the day (sad, neutral, happy), photos players have taken, interactions with other players and players' subjective reports and stories they decide to write in their diary. Essentially, the game combines full location data with social and personal health and image data into a diary, which is owned by the developer. To make use of the full functionality of the game, there is no way to avoid giving this information to the developer. By collecting high fidelity movement data from players, the developers are able to provide more immersive and multimodal experiences for them, but this comes at the risk of increased disclosure of players' private information. The collection of private user data through (and in exchange of) play, and LBGs in particular, is a recent concern amplified by the existence of network and positioning systems. These concerns include issues of both developer [18] and co-player surveillance [31].

4 DISCUSSION

4.1 What can LBG designers learn from our findings?

In this work, we focused on the design tension of augmenting walking vs. not disturbing players in LBGs. Connected to this we discovered four design tensions to balance in order to create fun and enjoyable gaming experiences:

- Present vs. future rewards
- Too little vs. too much content
- Manipulation vs. symbiosis with the environment
- Privacy vs. immersive play

While all of the four connected themes can be relevant in video game contexts beyond LBGs, we argue that they are particularly relevant here as follows. The first theme connects to how LBGs can either make an activity in itself fun, or provide rewards later based on performing actions such as walking in the real world. Second, the amount of content is directly linked to the rewards and feedback that is given to players based on their real world activity (walking in this case). In Pikmin Bloom we noticed that an overload of repetitive and uninteresting rewards can be a detriment for the playing experience. Third, the story narrative of LBGs can either support the idea of mindfully engaging with the environment, or provide players the opportunity to control and manipulate their digital surroundings. Our findings suggest that balancing this tension has to be done with care, since the story of the game connects heavily with how players perceive the game. Fourth, the final theme of privacy vs. immersive play is related to how by collecting multimodal player data, from sensors or other sources, developers are able to integrate the playing more heavily with the players' real world activities, increasing the meaningfulness and relevance of the game and rewards. However, this comes with the obvious cost of players having to disclose their personal information and ultimately yield this information to the developer in exchange for the gift of play [18].

Recent work suggests that discovery of information regarding the players' real world environment plays a major role in players' enjoyment and learning [34]. In comparison to navigation-heavy LBGs such as Ingress [35], Pikmin Bloom does not support active learning about places through the game application. Instead, the game puts emphasis on the players' real world circumstances and activities. This helps the game become blended with everyday life, a trend noticeable also in other LBGs [32]. For example, Pikmin Bloom can effortlessly be played when following a tourist guide, but provides little guidance on its own in comparison to alternatives [33, 34]. Understanding our findings in the broader design space of LBGs [16, 20, 22], Pikmin Bloom offers delayed rewards and is designed to be played as part of the players' everyday activities. Ultimately, while these types of games do not disturb the players' activities, they do not offer much extra either.

4.2 Limitations and future work

Our study has limitations that should be acknowledged. First, the ethnographic work conducted by the three researchers has to be understood in the geographical and cultural context where the game was played. Second, we only looked at a single movement-focused game, Pikmin Bloom. Even though our findings align with research with previous similar games (see e.g., [36]), some caution should be applied when generalising the findings. Furthermore, comparing our findings to previous studies in design tensions in LBGs [22], the tensions we discovered are not exhaustive.

Future work includes triangulating the findings by conducting player interviews, which are underway. These interviews can help identify potential biases in the analysis and provide further nuances to the tensions and their interconnections. Another important future research avenue is to explore an even wider range of LBGs and technologies in order to discover meaningful ways for technologies to augment everyday life. As technologies are becoming increasingly intertwined with players' daily activities, it is crucial to understand the latest consumer applications and their influence on real world behaviour. While not explicitly focused in this study, LBGs ability to direct players to play in nature emerged in the autoethnographic work. Building off our experience and findings from recent studies (e.g. [32]) we see the investigation of human-nature interaction in LBGs as a promising avenue for future work.

5 CONCLUSION

Pikmin Bloom represents a LBG design approach that does not require the player to look at a screen or interact with their mobile device during the main form of play (walking). This provides the player freedom to play without interrupting their daily activities. Instead of a synchronised action-reward cycle, the players obtain their rewards retroactively, which can make the game feel disconnected from players' lives. Hence, this type of design minimally interferes with the players' everyday life, which has both benefits and potential pitfalls. In this work-in-progress, we presented four design tensions connected to the axis of augmenting vs. not disturbing players' life: (1) present vs. future rewards; (2) too little vs. too much content; (3) manipulation vs. symbiosis with the environment; and (4) privacy vs. immersive play. Our analysis suggests that designers have to carefully balance their design within these

dimensions in order to create movement-based LBGs that are in symbiosis with players' daily lives, fun and engaging. Overall, the type of design that avoids disturbing the players' daily lives can end up not influencing the players at all, and consequently, this design contains the inherent potential detriment of the game quickly losing relevance for the players.

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