Lost on Earth: How Play While Navigating Affects a Location-Based Game Experience for Tourist Families

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ABSTRACT

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Author Keywords

city tour; location based games; navigation; pervasive games; intrinsic motivation;

INTRODUCTION

BACKGROUND

A body of research has focused on using mobile technologies to create game experiences in the context of museums and cities. Previous studies concerning engaging children and families have looked into experiences inspired by treasure hunts, where the players search for written or visual clues in order to find specific items in a museum exhibit [13] [16]. Jensen investigated, how children can be motivated to engage in a joyful museum experience, by interacting with an agent and taking pictures of art works on a tablet device [13]. Similarly, Larsen & Svabo investigated treasure trails in pamphlets, where children were dependent on their parents reading out the questions, interpreting the answers and writing them down, making it a family-activity rather than a child-activity [16]. Since much tourism is about being together and having time with ones family [16], these type of activities are often compelling for tourist families.

Mobile devices are an ideal platform to use in this context, because they are increasingly becoming popular among families, as mentioned by Jensen [13]. In this study, we address these experiences and refer to them as mobile Location-Based Games (LBGs), as they make use of the physical space to create enjoyable game experiences. Upscaling such experiences at museums to the city context, we did not find any studies on LBGs targeted tourist families. However, we did find several LBGs, where the mobile device is used for interaction at points of interest (POIs), similar to those in museums, e.g. getting information about artefacts, interacting with them or taking pictures as typical behaviours of tourists.

Avouris & Yiannoutsou reviewed fifteen LBGs and categorized them as either games designed for player enjoyment (ludic), education (pedagogic) or a combination of both (hybrid). Most of the LBGs for the aforementioned audience fell under the hybrid category. The authors found that LBGs take place in a *physical space* (e.g. going to a specific physical location) and require some interaction by the player in the *virtual space* (e.g. doing riddles/puzzles, interacting with an avatar or following a map). This results in an interplay between the physical and virtual space, creating what is known as the game space/narrative space [1]. They also found that narrative was an underlying element in all LBGs [1]. From this, we propose that LBGs are *game experiences* that connect the *physical space with the virtual space* and make use of an underlying *narrative* element. In the following sections, we define these terms in detail in the scope of hybrid LBGs.

Location-based Game Activities

In order to describe the game activities of LBGs, it is first important to look into what constitutes a game. There are a range of different definitions of games, however McGonigal proposes four defining traits of games which fit our definition[17]. Games must have a *goal*, *rules*, *a feedback system*, and *voluntary participation*. The goal of the game is the specific outcome which players aim to achieve and what gives players a sense of purpose. The rules set limitations or remove obvious ways of getting to the goal and push players to be creative and use strategic thinking. An example of

these fundamental traits can be seen in the game Scrabble. In this game, the goal is to spell out long words with lettered tiles, while the rules are that players only have seven letters to work with at a time and they must be based on words that other players already have created. The feedback system informs players about their progress in achieving their goal e.g. through points, levels, a score, or a progress bar. This gives a promise to the player that the goal can be achieved and thereby provides motivation to keep playing. Voluntary participation requires that all players accept the goal, rules, and feedback. This establishes a common ground for the players to play together, and the freedom to enter or leave the game ensures that stressful or challenging work is experienced as a safe and pleasurable activity. McGonigal further uses the following definition from Suits to define games: *'Playing a game is the voluntary attempt to overcome unnecessary obstacles'*[17]. In relation to the traits previously mentioned, this definition primarily focuses on the goal, rules, and voluntary participation of a game.

Hybrid LBGs are designed both with the purpose of player enjoyment, by using elements from ludic LBGs, as well as educating them about cultural heritage, by using elements from pedagogic LBGs[1]. In the following, these different types of LBGs will be elaborated on, however due to the scope of this project, less emphasis will be put on purely pedagogic games.

Although the focus of ludic LBGs is enjoyment, learning is often an implicit element, since players might develop skills such as exploration and orientation e.g. by navigating a city. This is especially seen in treasure hunts, where players typically move to certain physical locations and use the physical space at the location for some interaction in the virtual space. Gentes et al. describe treasure hunts as experiences that encourage people to pay attention to details in the city and read the cityscape by looking for clues. An example of this can be seen in the LBG *Team Exploration*, where players work together to compare pictures in the virtual space to real physical locations in Paris in order to figure out which areas of a map the pictures were taken at[10]. The goal of the game is to reach the final location, which is shown on a map, once all pictures have been located. The limitation is that it must be done within a certain amount of time, however in the evaluation of the game, players mentioned that this limitation turned the experience more into a race, which made it difficult for players to enjoy the city instead. Gentes et al. describe this as a tension that exists in treasure hunts between the attention players allocate to the discovery of a place and the hunt itself[10]. Furthermore, the evaluation showed that players wish they had some proof that they had been at certain locations, e.g. by being able to save a picture of the location in order to make the visit more meaningful. As these pictures would act as proof for progression, this indicates that the ability to save information about the places visited is a fitting way of incorporating feedback systems into treasure hunts. Treasure hunts also typically allow players to collect virtual objects at certain physical locations[1], such as in *Insectopia*, where the players collect virtual insects, which represent points and act as both the goal of the game as well as an indication of progression and feedback system[19].

Pedagogic games explicitly have the purpose of educating the player through informal learning[1]. According to Avouris & Yiannoutsou, these games typically have a strong narrative as described in detail in the next section and use role playing by making players enact certain roles to comprehend complex scenarios[1]. In these games, it is assessed that it is particularly important that the physical and virtual have a strong interplay to support learning.

Hybrid LBGs are typically used at cultural heritage sites such as museums[1]. They tend to act as guides for exhibits and aim to make them more interesting. The game activities frequently incorporate a narrative through role play combined with activities such as answering questions that are related to the cultural artefact in the physical space. *CityTreasure* is an example of a hybrid treasure hunt LBG where learning is supported through riddles at points of interest (POIs)[5]. In this game, students on a field trip visit cultural heritage sites in the city of Lugano and answer riddles in the virtual space related to the POIs in the physical space. The students play in groups and are guided to the POIs through locations on a map, and as they reach the locations, they are given three riddles related to the POI. When the riddles are answered, the students will be given a new location on the map to walk to as well as feedback in the form of points if the answer was correct. The goal of the game is to gather the most points, which is driven by competition between the different groups of students playing. Furthermore, Botturia et al. reported that the game fostered collaboration within the groups to solve riddles[5]. In opposition to Team Exploration, there is no time limit in CityTreasure and by rewarding players' observations of the city through points, exploration is encouraged. Although this game does not focus on role play and narrative as the majority of pedagogic and hybrid games, it still manages to incorporate knowledge of the physical space while keeping players engaged according to the evaluation of the game[5].

Narrative in Location-based Games

Different disciplines (e.g. narratology, linguistics, literary studies, film studies and philosophy) define narrative with a great number of different characteristics[12]. A narrative can be defined as *'a perceived sequence of non-randomly connected events, i.e., of described states or conditions which undergo change (into some different states of conditions)'*[23]. The game designers Katie Sallen & Eric Zimmerman emphasize the importance of choice in a game when designing meaningful play, which emerges from the interaction between players and the system[22]. Avouris & Yiannoutsou state that a narrative in the shape of an interactive course is considered a promising direction of future LBGs[1]. An interactive narrative offers the user choices and to navigate within a multilinear branching structure of the narrative[21]. Sallen & Zimmerman write that meaningful play is the goal of a successful game design. The quality of a game design can be characterized by looking at the relationship between the players choice and the systems response[22]. To understand what characterises the quality of choice and narrative in a game design, LBGs using an interactive narrative are reviewed.

Khaled et al. highlight how an interactive narrative can be used to explore both the physical space but also the virtual space. By changing location the development of the story changes. The authors observed four test subjects and found that contrasts between the story world and real world forced the reader to pay close attention to the physical setting in order to make sense of the experience[14]. Similarly Avouris & Yiannoutsou found that LBGs emphasising on the narrative often have a strong interplay between the physical space and the virtual space[1]. Khaled et al. observed that when the users had a heightened awareness of both real world and story world, reflection on story contents occurred[14]. Blythe et al. highlights the study of Riot! where users explore a historical riot by changing location, which affects the narrative progression and which audio file the system plays. Results from 30 semi-structured interviews (the exact number of participants were not promoted) revealed a lack of choice caused disappointment when users could not freely discover a wanted file. The users chose which scene to hear, but no information about the scenes were given resulting in users making blind choices[4].

Navigation in Location-based Games

Location-based games (LBGs) utilize specific locations in their gameplay, which brings up the requirement of navigating between locations, when they take place in cities. Walking between locations brings up opportunities to gain additional knowledge of the city, and not solely at specific locations, e.g. points of interest (POIs). The potential of getting familiar with the city while walking may not be fully utilized, since LBGs often revolve around specific locations rather on what is between. Previous studies revolving around the navigational aspect within LBGs is limited. Gordillo et al. made a hybrid LBG in the city for tourists[11]. The game offered three POIs which were marked on a 2D map, requiring the participant to go there in order to trigger activities provided at the location. One distance required travelling 3 km (from Gell Park to Casa Batll), bringing the game to a pause until arrival at the point of interest. The outcome of the study is unknown, as no test was carried out. From this, we observe that the navigation mainly served as a requirement for leading the player from one POI to another and not as a part of the game activities.

Several LBGs have used 2D maps with Global Positioning System (GPS) technology (e.g. google maps) in a city related context, in order to guide their participants to POIs [7, 11, 24, 6, 2, 20, 3]. To the best of our knowledge, no 2D maps have integrated game activities such as those that are found at the POIs. Therefore, we can assume that the 2D map does not promote any interplay between the physical and virtual domains, and the game activities such as answering questions about the physical space and gaining points either disappear or serve no purpose until the arrival to the next location. Furthermore, we have not been able to find any studies that investigate or evaluate whether navigating with a 2D map is preferable in the context of LBGs.

We have investigated the use of navigation in several LBGs, in terms of the interplay between the physical and virtual domain, use of ludic and pedagogic elements, and whether it is supported by a narrative. Some LBGs revolve around progressing a story. These types of games depend on sound, and do not depend on visuals for navigating, such as in Blyte et al. Events offered in these games are triggered based on how the player chooses to navigate, giving navigation a crucial role in the overall experience.

A qualitative study made by Blythe et al. investigated the enjoyability of a location based game revolving around progressing a story[4]. The participants navigated freely in a restricted area, and the story changed dynamically in relation to their location. In interviews, the participants stated that they found the experience enjoyable in relation to them having control of the story. The game highly promoted interplay between the physical and virtual domain, but its design may only be appropriate in a small bounded area due to the extended freedom of exploration, and could be problematic if transferred to a wider context (e.g. a city) due to longer distances between POIs. Epstein and Vergani made a similar study on a walking tour in the city Venice, which likewise incorporated the narrative space into the navigation, but instead kept a more linear narrative structure [9]. A narrator in the application verbally explained where to make turns, and at the same time made comments on the physical environment. The outcome of the study did not reveal the users' experiences concerning the navigation.

Both Blythe et al. and Epstein and Vergani encourage the user in exploring, but only in relation to the person handling the application due to the use of headphones. Our context deals with tourist families, which would require sharing information. Utilizing audio without it being communicated through headphones would be problematic in terms of navigating in areas with many sounds.

Eguma et al. devised a LBG for tourists utilizing a sightseeing navigation system to promote awareness of surroundings and enjoyability[8]. The authors proposed creating a navigational system using augmented reality (AR) to display descriptive information from air tags and upon arrival, the participants would have to seek out a character in the surroundings. The concept does however make use of a map, in terms of leading the participants to the area requiring AR for navigating. The aim of the system was letting the user become aware of the surroundings, using benefit of inconvenience, which proposes the idea of something being inconvenient to find increases the desire of finding it. The authors did not conduct a study, and therefore the outcome is unknown.

Utilizing AR combined with physical props has served as the navigational method in some LBGs. Morrison et al. conducted a comparative study on a technique called Maplens involving displaying location information on a physical map using augmented reality, comparing it to a 2D map with incorporated accessibility to read about locations, known as DigiMap [18]. This technique was investigated in relation to Flow, Presence and Intrinsic Motivation (IMI). The MapLens scored significantly less than DigiMap in most of the questions concerning Flow, Presence and IMI, but its potential was revealed in terms of social interaction since the MapLens

encouraged collaborative behaviour. Morrison et al. found that MapLens did not support playing by moving, due to its demands of effort, forethought and planning. This behaviour is supported by the study made by Kuikkaniemi et al., which compared MapLens and navigating by following QR codes [15]. The authors did not find MapLens particularly useful based on observations on the participants. The authors observed that the participants rarely used MapLens, and had technical difficulties in terms of the GPS displaying their correct position. The QR codes were a fun way of navigating both indoors and outdoors, based on non-significant observations, but with no concrete examples on why. The QR codes did not promote any environmental awareness, making the interplay between the physical and virtual domain weak.

As mentioned earlier, hybrid LBGs require a strong interplay between the physical and virtual spaces, supported by game activities and a narrative with the goal of creating an enjoyable learning experience. Based on the above findings in our research, no LBGs have integrated the requirements for a hybrid LBG into the navigation between POIs without relying on sound through headphones, thereby not being suitable for groups of players. Furthermore, it was found that LBGs have a tendency of using 2D maps for navigation between POIs, however whether or not this affects the enjoyment of the experience has not been investigated based on previous research.

Expanding The Experience

PRELIMINARY STUDY

DESIGN

EXPERIMENT

CONCLUSION

DISCUSSION

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