

# 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* [2]. They also found that narrative was an underlying element in all LBGs [2]. 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[17] proposes four defining traits of games which fit our definition. 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

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these fundamental traits can be seen in a game of 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 [17] further uses the following definition from Suits[22] to define games: *'Playing a game is the voluntary attempt to overcome unnecessary obstacles'*. 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[2].

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 details in the city and read the cityscape by looking for clues of where to go. An example of this can be seen in the LBG *Team Exploration* [10], 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. 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. [10] 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. 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[2], such as in *Insectopia* [1], 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.

Pedagogic games explicitly have the purpose of educating the player. According to Avouris and Yiannoutsou [2], these games typically have a strong narrative as described in detail in the next section. where role playing allows players to enact certain roles to comprehend complex scenarios. In these games, it is assessed that it is particularly important that the physical and virtual have a strong interconnection to support learning.

Hybrid: The City Treasure: Mobile Games for Learning Cultural Heritage

Since hybrid LBGs intend to educate players about cultural heritage [2], are designed both with the purpose of entertaining players as well as educating them about cultural heritage,

## Play

### 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 or conditions)'*[23]. Avouris & Yiannoutsou wrote a review of Mobile LBGs for learning from fifteen studies, finding that narratives are common in LBGs[2]. 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[21]. Avouris & Yiannoutsou state that a narrative in the shape of an interactive course is considered a promising direction of future LBG[2]. An interactive narrative offers the user choices and to navigate within a multi-linear branching structure of the narrative[20]. 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[21]. To understand what characterises the quality of choice and narrative in a game design, LBGs using an interactive narrative are reviewed.

Khaled et al. highlights 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[2]. 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[5].

### Navigation

Location based games (LBG's) utilizes specific locations in their gameplay, which brings up the requirement of navigating between locations. Walking between locations will bring up opportunities to gain additional knowledge of the city, and not solely at specific locations (e.g. point of interests). The potential in getting familiar with the city while walking may not be fully utilized, since LBG's often revolve on specific locations rather on what is between. Previous studies revolving around the navigational aspect within LBGs is limited. Gordillo et al made a location based game encouraging learning in the city for tourism[11]. The game offered three points of interests 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 pause until arrival at the point of interest. The outcome of the study is unknown, due to no test was carried out. From this we observe, that the navigational served minimal priority, but merely serves as a requirement for leading the player from a point of interest (POI) to another.

Several LBG's have used 2D maps with Global Positioning System (GPS) technology (e.g. google maps) in city related context, in order to guide their participants to the points of interest [7, 11, 24, 6, 3, 19, 4]. 2D maps are non-coherent to the rest of the gameplay, and continuously disrupts the game experience. The 2D map does not promote any interplay between the physical and virtual domain, and game mechanics (e.g. getting points, puzzles) either disappears or serves no purpose until arrival to next location. To the best of our knowledge, no studies have investigated or evaluated whether navigating with a 2D map is preferable in the context of location based games.

We have investigated use of navigation in several LBG's, in terms of the interplay between the physical and virtual domain, extent of ludic and pedagogic elements and whether it is supported by a narrative. Some LBGs revolves on progressing a story. These types of games depend on sound, and do not depend on visuals for navigating (e.g. Blyte et al.) Events offered in these games are triggered based on how the player choose, 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 on progressing a story[5]. 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 of 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 in the same time made comments on the physical environment. The outcome of the study did not reveal the users experience 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. 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 location based game 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 do 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, therefor the outcome is unknown.

Utilizing AR combined with physical props has served as the navigational method in some location based games. 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 behavior. Morrison et al. found that MapLens did not support playing by moving, due to its demands of effort, forethought and planning. This behavior 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.

Previous research show a tendency integrating 2D maps with GPS into location based games, but whether this method is preferable in a game context, is to our best knowledge unknown. The demands for a location based game lies in the necessity of a strong interplay between the physical and vir-

tual domain, containing ludic and pedagogic elements and is supported by a narrative. To our best knowledge, no location based game makes use of all these factors into their navigational method, making the navigation seem less prioritized.

## Expanding The Experience

### PRELIMINARY STUDY

### DESIGN

### EXPERIMENT

### CONCLUSION

### DISCUSSION

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