THE INTERPLAY BETWEEN SPACE AND MICRO-NARRATIVES IN LOCATION BASED MOBILE GAMES

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This paper reports on digital storytelling through the analysis of the design of two location-based games using micro-narratives. The two games were commissioned to two historic regions of Greece, Tzoumerka and Movemvasia. In both we applied the notion of linking micro-narratives to specific locations. The objective of both games was to introduce the players through the short stories to the history of the places to which the stories referred. The stories offered to the players a view to sites of interest as lived-in spaces i.e. spaces where the characters of the story interacted and lived in the past. Game play consisted of situating the story in the location it was taking place (i.e. connecting the story to a specific location), giving points to the players when a correct association was made. The role of the player in relation to the narratives differed in the two cases. In the first game (taking place in Tzoumerka), the player was the reader, who had to identify the setting of the story, while in the second game the player had a specific role in the story and thus had to solve problems that could advance the story.

1. INTRODUCTION

Location-based games are playful activities situated in specific real-world locations. They are played using mobile devices and part of the gameplay consists of interacting with the physical environment. They involve human activity, as they necessitate moving in physical space. In addition, the content of these games may relate to rich information about the location where the game takes place. Various terms have been used to describe location-based mobile games. They have been referred as pervasive games, hybrid reality games, augmented reality games, GPS games, mixed reality games, each term emphasizing different aspects of them.

A recurring view of what constitutes the game-space of location-based games involves the consideration of their dual character of overlapping physical and digital spaces. Some of the activity takes place in the physical domain and involves actions such as locomotion, identifying a physical object, scanning a tag, taking pictures or recording sounds. At the same time, part of the activity takes place in the digital domain where the players interact with digital characters and information, they contribute to generation of information in digital form or engage in problem-solving activities like solving puzzles. The two spaces are linked and related to the game mechanics, the learning objectives, and the social activity that takes place during game play (Avouris & Yiannoutsou, 2012). This genre of games has gained broad attention and has drawn the interest of a wider audience by the success of games like Pokémon Go (Paavilainen et al. 2017).

A related area of recent development has been that of location-based narratives, i.e. use of locative media to tell stories (Farman, 2013). As Millard et al. (2013) observe, with the growing ubiquity of mobile devices, digital storytelling has escaped the confines of the desktop, intertwining in new and interesting ways with the physical world. An analysis of location-based narratives by Yiannoutsou & Avouris, (2010) identified new ways of supporting contextualized, non-formal learning related to space and the different relationships these narratives can have with game play. The relation between games and stories has been discussed in the games literature extensively (Juul, 2005, Neitzel, 2005,

Jenkins, 2004, Elias et al. 2012). Game designers have observed that interactivity of game playing is almost the opposite of narrative, since "*narrative flows under the direction of the author, while interactivity depends on the player for motive power*" (Adams, 1999). As Elias et al. (2012) observe "*there is a certain tension between some of the elements that make for a good game and those that make for a good story. Playing a game involves choices, and those choices can go in different directions; repeated plays of the game will be different. But with a good story, the outcome will feel in some way inevitable - other alternative outcomes will not represent as good a story*". Despite these obvious tensions, in todays' digital games, the story element is often very strong. On the other hand, in location-based narratives, there is often a strong playful aspect (Yiannoutsou & Avouris, 2010), like in location-based detective stories (e.g. "*Who killed Hanne Holmgaard*?" (Paay et al 2008), often related to players enacting roles of the story.

In this paper, we reflect on our experience of designing location-based playful narratives in the form of games that aim at supporting players to explore a specific place and discover the different aspects that constitute its character (history, nature, architecture, people etc). The two games follow the tradition of MuseumScrabble (Sintoris et al., 2010), an indoors location-based game designed for a local history museum. In that game, the objective was to link concepts, introduced through short phrases to specific exhibits of the museum. The exhibits were identified through their associated RFID codes, and the players earned points by interrelating the concept to the relevant exhibit. However, there was no narrative in the case of this game. The players of the game, provided us with positive feedback, in terms of both immersive game playing experience and getting acquainted with local history (ibid). In the games we designed next, we expanded the main game concept to include stronger narrative elements. The two games we present here ("*Story-Hunt in Tzoumerka*" and "*If …in Malvasia*"), kept the original idea of linking physical objects to concepts, however in this case, the concepts where short stories (micro-narratives) that were linked to sites of interest. Both games are multiplayer games, where teams of players share a mobile device and compete against each other. The idea behind both games is similar: identify objects in the real world and associate them with "concepts", expressed as short stories. Next, we provide a short description of the two games and discuss the role of micro-narratives in the player experience.

2. STORY-HUNT IN TZOUMERKA

Tzoumerka is a mountainous area in north-western Greece, where a group of villages share a common identity and rich history. The villages of this region identify themselves as members of the same family, and share many common characteristics, like the square shaded by a plane tree, the stone-built houses, the central church. The area thrived during late 18th and early 19th century, when Tzoumerkan merchants travelled to Europe, selling their handmade wool capes, and other items of their craftsmanship. Today, the picturesque villages are full of stone-built buildings and are still connected with mountain paths, passing over numerous stone bridges. Churches and monasteries are decorated with iconography which is a few centuries old. (Figure 1). The National Park of Tzoumerka commissioned the game, to be played by visitors of the area.
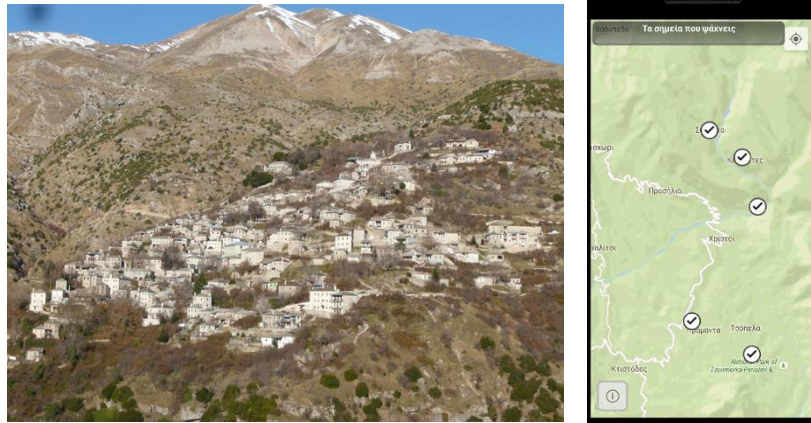
Figure 1. Syrrako, a Tzoumerka village part of the game space, and map of the game area

The game is played in the area of North Tzoumerka, which includes seven villages. It is played over the course of one day. The players have to associate micro-narratives that are inspired by local legends and local history to specific places in the area. There are six main stories, three of which are revealed during the game. The micro-narratives that were inspired by local history sources and by doing research in the area involving local people, where the following: 1. Meeting up, 2. The conflict, 3. Reconciliation, 4. The revenge, 5. The abduction, 6. The robbery.[1]

Each story is made of a number of short episodes, that the player had to link to the location of the episode. An example is shown in Figure 2.

He was returning at Tzoumerka after a long time. He was searching for the arch that did not exist anymore, He thought of his old friend, and wondered if their friendship was crumbled for good. Some things can be repaired but some others not, he thought, and turned to leave.

The school building in Kalarrytes, build by Pramanta craftsmen

Figure 2. An episode of micro-narrative "Reconciliation"

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[1] The game was built by the University of Patras and Omnipresentgames for the National Park of Tzoumerka, more info at https://omnipresentgame.com/tz

Players had to travel between villages and search for locations of episodes of the different micro-narratives. This way they experienced the short stories by connecting the fragments of the story (episodes). The same village may play a role in different stories, so since the cost of travelling between villages was high, the players tried to identify as many locations in the same village that were linked to different stories and thus collect as many points with less travelling cost. A side effect of this was that the players could interrelate stories that took place in the same village. It should be clarified that the micro-narratives, even if they are not part of the same story, they do connect in many respects, since they refer to the same historic period, so the means of transport, way of living, social structure, etc. are shared between the stories.

3. IF … IN MALVASIA

The second game, "If … in Malvasia" (Yiannoutsou et al in press, Sintoris et al., 2016), was designed for the centre of Environmental Education of Molaoi, to engage players with the still inhabited byzantine fortress town of Monemvasia, in the eastern coast of Peloponnese, Greece, (see Figure 3). The game is played by four teams of 3-5 members each. The goal of each team (player) is to associate *missions* with specific *landmarks* located inside the fortress. There are 17 landmarks used in the game, each corresponding to one of the 17 missions. When all missions have been associated with specific locations (regardless of their correctness), the game ends.

Each team operates a mobile device. When a team performs a game-related action that changes the global game state (e.g. a team associating a mission with a landmark), this action is communicated to the other teams. This is different to the previous game, where each player did not share resources with the others and could do the same part of the narrative as other players. In this game, if a mission is accomplished by another player, it is not accessible any longer to the rest of the players.

The technology used for identifying a landmark of interest is different in this game to that of "Story-Hunt in Tzoumerka". In the previous case, the players had to identify a landmark by scanning a QR code. In this game, "hot zones" are defined. A hot zone is an area of 20m around each landmark. When a team enters a hot zone, the GPS sensor of the device reveals the landmark on the team's device. Such landmarks can be churches or other areas of interest, like a square or a part of a house.

Figure 3: The fortress city of Monemvasia, 17 different landmarks within the city were parts of missions.

The missions correspond to episodes of three different micro-narratives that relate to the role of the player during different states of the fortress: (a) Siege (role: responsible for the defence), (b) Rebuilding (role: responsible for reconstruction of the damaged city), and (c) Everyday Life (citizen of Monemvasia).

Each mission is directly related to a landmark. That means that a mission will award points only when a player associates it to the correct landmark. Missions can be chosen in arbitrary order. At any time, a player can select a different role (narrative) of the game and browse through the corresponding missions. Missions are defined through short phrases starting with the word "If". For instance, a mission in the Siege narrative is "*If you found out that the pirate De Lauria was arriving with a ship, dressed as a merchant, in order to enter and plunder the city, towards which gate would you send the soldiers in order to stop him?*" (see Figure 4). In order to accomplish this mission, the player, as responsible for the defence of the city, should identify the gate *Portelo*, that is the only gate of the city with access to the sea.

Another example casts the player in the role of a builder: "*If you were building a house, what would you do to collect rainwater in the underground cistern?*" In order to accomplish this mission, the builder should identify the special characteristic of many houses in Monemvasia, i.e. that they use drainage in their roofs to collect rainwater in individual underground cisterns.

In order to complete a mission, the player has to discover landmarks. To do so, the player needs to enter the landmark's hot zone. A discovered landmark is added to the team's inventory: this means that a picture and short relevant information about it is made available to the player to use in order to associate it with the available missions. The landmark remains available to the player until the end of the game and it can be associated with any mission. However, only correct associations result in points earned by the player.

So far, the described actions do not affect the other teams. At the beginning, all missions are available to all teams. However, when a player completes a mission associating it to the correct landmark, the other players cannot access that mission any more. The player is notified after having performed the association, on how many points they gained for their action. If they use the wrong landmark, the players can change their mind and proceed with a different landmark, paying a points penalty. The game ends when all 17 missions have been accomplished.
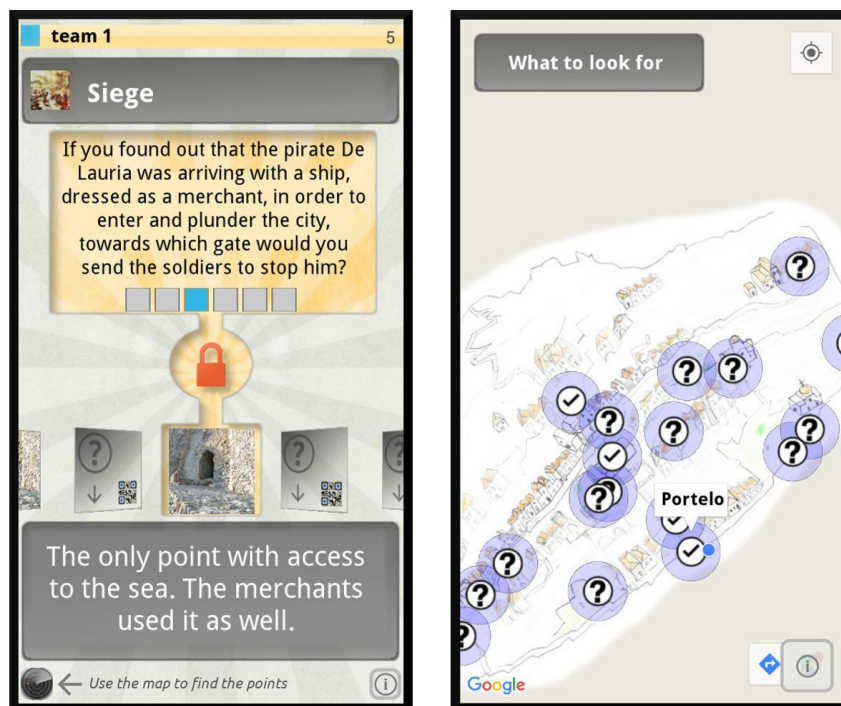
Figure 4 (a) In the "Siege" story: the 3rd mission is selected. This mission has been associated with a landmark represented by its photo and a short description at the grey box in the bottom. (b) A map of the area. The blue point is the device's current location. In the snapshot players found the landmark "Portelo" which is associated with the 3rd mission of Siege story

4. COMPARISON OF THE TWO GAMES

The two games share many common characteristics; they are composed of short stories (micro-narratives) that relate to the history of the corresponding place. The micro-narratives are not related to each other, but they are linked as they refer to the same historic period. Each micro-narrative is presented to the player as a set of story fragments. The player, by dealing with the fragment, experiences the place and builds the corresponding story. In the Tzoumerka case a fragment is an episode of the micro-narrative, while in the Monemvasia case, it is a mission to be accomplished by the player who takes a relevant role.

In both cases accomplishment of the mission/episode is done by linking a physical object, e.g. a landmark, to the corresponding fragment. This linking action situates the story by relating the story's fragments to places and to physical objects. It is expected that this can be conducive to learning. In addition, both are multiplayer games, played through mobile devices, that the players use for interacting with physical objects.

In the first game, objects are identified by scanning RFID tags placed on them. In the second game, as it was not possible to place visual tags on the landmarks, the position of players in relation to points of interest is determined by using proximity information based on GPS data. In both games, players can see the approximate location of the landmarks using a map representation.

On the other hand, the games have many differences. The geographical location is quite different, as in the first game, playing is extended in a much wider area. As a result, it necessitates much higher physical activity (some players walked, ran or used means of transport to move between villages of the Tzoumerka region), while the second game is played in a more confined area.

The structure of the story also is quite different in the two games, as in the first one the player takes the role of reader of the story, while in the second game, the player takes different roles, and has to make decisions, relating to "if..."-style scenarios.

The interplay of story and place was an item to study. A question was whether players follow the story that leads them to various locations, or do they follow the locations and unfold different stories that take place in them? This has been examined, using data from player activities in these two games. As it was observed, in both games, the players tried to minimize physical activity relating to moving between different locations, thus did not follow the stories, but composed the stories from fragments as they moved between locations. Furthermore, in both games, players used the map to move towards a specific location, and stories functioned as viewpoints to pay attention to specific characteristics of a site of interest. In Story-hunt, episodes were used as hints to find where the QR code was hidden. Drawing from this experience we expect to articulate a framework for designing content for location-based games in the future.

Story-hunt in Tzoumerka		If … in Malvasia	
Stories	6	Stories	3
Episodes	(parts of story)	Missions	(parts of story)
Role:	reader	Role:	Defender, builder, citizen
Location technology:	QR tags	Location technology:	GPS

Table 1: Outline of differences between the two games.

DISCUSSION

In this paper we outlined the main characteristics of two location-based games with strong narrative elements. In both games, local resources were used by the game designers for composing short stories (micro-narratives), that were used as background of the playing activity. These micro-narratives were fragmented in episodes/missions and the players had to identify the physical location of the corresponding fragment. Then they had to link the fragment of the story to the location thus earning points. The story fragment had a strong relation to a location or physical object and played a critical role for game play and for exploring space. The locations defined the area of activity of players. The game designers had to set the game space by defining the locations integrated in the game and relate the story fragments that constitute the micronarratives to the specific locations. Stories, especially in Story-hunt are not the sum of the different episodes belonging to the same story. Instead they are composed by a) the players' movement in space, the association of the episode with a specific location which aims at empathy and enactment (i.e. identifying with the feelings of a specific character when she is looking at the iconography of a monastery depicting the Last Judgement) and c) the weaving of the connections between episodes. In this sense the player does not simply follow a story, she enacts and co-creates the story through her actions.

It is the subject of future research to relate player activity to story understanding and ultimately learning about a specific place, including the need to define what this learning consists of. Other aspects that need to be studied, is the process of selecting appropriate narratives, and establishing the degree of difficulty of each mission/episode, as this relates to the gamy playing experience. Given all these requirements, it appears that there is a need for a framework for understanding authoring of location-based narratives that can support critical analysis and author education, and take the form of an authoring system. Towards the direction of such framework, there are already some interesting efforts (e.g. Hargood et al. 2018) that have been used for location-based narratives. It is a direction

of future research to study how such frameworks can support building and evaluation of games, like the ones presented here.

REFERENCES

Adams, E., (1999). The Designer's Notebook: Three Problems for Interactive Storytellers, article in http://www.gamasutra.com, last retrieved August, 17th, 2018.

Avouris N., Yiannoutsou, N., (2012). A review of mobile location-based games for learning across physical and virtual spaces, Journal of Universal Computer Science, vol 18,(15), pp. 2120-2142

Elias, G. S., Garfield, R., & Gutschera, K. R. (2012). Characteristics of games. MIT Press.

Farman J.(editor), (2013). The mobile story: Narrative practices with locative technologies, New York, NY: Routledge, 2013.

Hargood, C., Weal, M., & Millard, D. (2018). The storyplaces platform: Building a web-based locative hypertext system, Hypertext 2018, Baltimore, USA

Jenkins, H., (2004). Game Design as Narrative Architecture, in N. Wardrip-Fruin and P. Harrigan (eds.) First Person: New Media as Story, Performance, Game, MIT Press, Cambridge.

Juul, J., (2005). Games telling stories? In Joost R., Goldstein J., (Eds.). Handbook of computer game studies. Cambridge : The MIT Press. p. 219-226.

Millard, D. E., Hargood, C., Jewell, M. O., & Weal, M. J. (2013, May). Canyons, deltas and plains: towards a unified sculptural model of location-based hypertext. In Proceedings of the 24th ACM Conference on Hypertext and Social Media (pp. 109-118). ACM.

Neitzel B., (2005). Narrativity in computer games. In Joost R., Goldstein J., (Eds.). Handbook of computer game studies. Cambridge : The MIT Press. p. 227-245.

Paay, J., Kjeldskov, J., Christensen, A., Ibsen, A., Jensen,D., Nielsen, G., et al. (2008). Location-based storytelling in the urban environment. In Proceedings OZCHI: Designing for Habitus and Habitat.

Paavilainen, J., Korhonen, H., Alha, K., Stenros, J., Koskinen, E., & Mayra, F. (2017). The Pokémon GO experience: A location-based augmented reality mobile game goes mainstream. In *Proceedings of the 2017 CHI conference on human factors in computing systems* (pp. 2493-2498). ACM.

Sintoris, C., Stoica, A., Papadimitriou, I., Yiannoutsou, N., Komis, V., & Avouris, N. (2010). Museumscrabble: Design of a Mobile Game for Children's Interaction With a Digitally Augmented Cultural Space. *International Journal of Mobile Human Computer Interaction (IJMHCI)*, *2*(2), 53–71. https://doi.org/10.4018/978-1-4666-0194-9.ch007

Sintoris, C., Yiannoutsou, N., & Avouris, N. (2016). The fortress of Monemvasia as play-ground for a location based game.

Yiannoutsou, N., & Avouris, N. (2010). Reflections on use of location-based playful narratives for learning. Proceedings of Mobile Learning 2010, Porto, 149-156.

Yiannoutsou, N., Sintoris C., Mylona M., &Avouris N. (in press): If in … Malvasia. In Karen Schrier (ed) *Learning, Education and Games Vol 3: 100 Games to use in the Classroom and Beyond*.