SOCIOTECHNICAL ENVIRONMENTS

PROCEEDINGS OF THE 6TH STS ITALIA CONFERENCE 2016

EDITED BY
STEFANO CRABU
PAOLO GIARDULLO
FRANCESCO MIELE
MAURO TURRINI

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LBMGs and Boundary Objects. Negotiation of Meaning between Real and Unreal

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The paper reports on a study grounded on higher education didactic experiences involving around 180 BSc students in the design of Location Based Mobile Games that mix digital contents and physical artefacts.

By means of data gleaned from a three-year didactic experience, we challenge the extant assumption that LBMGs should exclusively rely on the digital/mobile component. Looking at LBMGs as situated experiences, we investigate the relevant role and agency of physical elements: How do they interact with the space? With players? How do they affect players' in-game behaviours? And players' sociality?

We focus on the agency of the above mentioned physical objects, and their ability to trigger players' actions and to persuade them to behave according to designers' expectancies. We analyse how these objects translate the fictional world into a space intertwined with the real one, rather than simply overlapped, and how they foster meaning making and context awareness acting as boundary objects that activate negotiations of meaning between real and "unreal".

***Keywords**: LBMGs; Boundary Objects; Negotiation of Meaning.*

Literature review and theoretical premises

Games convey meanings. They act as contexts of representation (Frasca, 2003; Salen and Zimmerman, 2004) wherein meanings are embedded (Flanagan and Nissenbaum, 2014) and grasped by players via subjective interpretation (Sicart, 2011).

Relying on these theoretical premises this contribution explores how physical game elements can serve as boundary objects in mobile experiences. Location Based Mobile Games (LBMGs henceforth) become the

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field of investigation wherein such objects force negotiation of meaning between real and unreal.

Games are complex, dynamic systems of communication (Mariani, 2016) that require players to *make sense and meaning of objects* (or depictions of them), interactions and concepts (Salen and Zimmerman, 2004). Playing a game means experiencing (1) what the game represents and (2) what the game is a representation for (Salen and Zimmerman, 2004). By their own nature, games ask players to pretend to be somewhere else, counting and advocating make-believe (Caillois, 1958). Reproducing how real or imagined systems work, games can produce knowledge, understanding and comprehension. Moreover, inducing players to interact with specific representations, they encourage to form judgments about those systems (Bogost, 2007). Thus, games can be purposely designed to influence players by mounting arguments in a persuasive way. Unfolding processes and providing fresh perspectives, they can challenge players to question their choices and positions, change their attitudes and even behaviours (Lavender, 2011; Stokes, 2014).

Our analysis focuses on how LBMG players were invited to interact with each other, with other people, with the surrounding space, and especially on the agency (Latour, 2007) of the game elements that triggered such interactions. We study that kind of agency that Kaptelinin and Nardi (2006) define *delegated agency*, namely the ability of things or human beings to act on somebody else's behalf, namely according to designers' will. Intending agency as the 'ability to act', it can be broadly intended as the capability to produce an effect. Consequently, this ability is a property attributable to anything that exists, being objects, processes, or even ideas. Extending this reasoning to what happens into games, and looking at the interaction between players and objects as an exchange of meaning, it emerges a third pole: the designer. Every pole has its agency, even if the designer's one is embedded in the game, and it emerges through its objects/elements and mechanics.

The relationship between games and what surrounds them has been vividly established by several scholars in their foundational texts. Seminal works are Huizinga's *Homo Ludens* (1938) that investigated the bond among play, culture and society, and Caillois' *Les Jeux et les hommes* (1958) that exposed the role of make-believe in creating imaginary worlds. Then, several contemporary authors explored how games can extend, integrate and digitally-overlay physical spaces (von Borries et al., 2007). For example, Montola, Waern and Stenros (2009) and De Souza e Silva (2006)

investigated games that take the distance from the computer screen, getting the player back to public spaces as game venues.

Analogously, scholars as Murray (1997) and Frasca (2001) investigated agency as the way computer users participate in games as simulations; the latter vetted the role of the medium in consciousness-raising. Rather than focusing on digital games and being aware that, in Game Studies, the concept of agency origins in the video game field, we expand the reasoning on situated pervasive games, as LBMGs. We consider significant to study how they involve players into less-mediated processes wherein experiences are built by continuously engaging players with the world and operating acts of sense-making (Wright, Wallace and McCarthy, 2008). It is indeed often underestimated that non-digital and hybrid location-based games require player to move in the urban spaces and temporary detach from the usual way to move, explore, look at things but also attribute sense. In such a dynamic interplay, ordinary physical elements can be overlaid with further layers of meaning, contributing to building new awareness, and become tools people use to empower themselves (Wertsch, 1998).

However, the reasoning on physical game elements as objects that trigger players' action and activate meanings is still partly unexplored. To dig into the potential of these objects it is necessary to rehearse some foundations and how they are challenged by certain contemporary games, as LBMGs.

Play was historically defined by Huizinga ([1938] 1946, p. 13) as a 'free activity standing quite consciously outside ordinary life as being not serious', but at the same time absorbing the players intensely and utterly. Such influential formulation, however, has been extensively questioned – mainly the statement that play is separate from ordinary life (Montola, 2005; Juul, 2005; Montola, Waern and Stenros, 2009). Considering the technological growth and the increased presence of smart devices, it is not surprising how games become pervasive and more and more *present* in people's everyday life (Montola, Waern and Stenros, 2009). As a typology of pervasive games, LBMGs expand in the real context. Using context-aware mobile devices constantly connected to the Internet, LBMGs bridge the real and the digital: they are played in physical spaces that become hybrid because of the use of mobile technologies as interfaces (De Souza e Silva, 2006) that locate users and provide contextual digital information. By walking in urban spaces players dim the borders between physical and digital, and the physical sphere enters the mobile game.

Boundary objects

The role of physical game objects in LBMGs is frequently overlooked and neglected since designers mostly focus on hybridizing the real world with the fictional one through the mobile device, overlapping contextual information as well as tasks and game mechanics on reality.

In this study, we analysed games designed with the specific task of seamlessly integrating physical game elements in the play experience, mixing LBMGs, commonly technology-sustained (Montola, Waern and Stenros, 2009), with the praxis of urban games, usually empowered by physical game objects. Students were asked to imagine play experiences able to take full advantage of the two worlds players encounter: the physical one wherein they move and act, and the digital one provided by the mobile device. Therefore, physical game elements became (1) objects able to trigger players' actions and (2) boundary objects, namely elements plastic enough to adapt to the two worlds without losing a *common identity* across them (Star and Griesemer, 1989, p. 393) or at least maintaining coherence in both the realities.

Designing LBMGs students could make use of:

- objects already present in the environment (e.g. benches, lamps, trash bins, …),
- objects brought into the playground, and
- bespoke objects specifically designed to serve games.

Referencing to Star and Griesemer's (1989) preliminary classification of boundary objects, game elements in LBMGs pertain to all the four categories. They can be urban elements that designers and players can 'borrow from the pile for their own purposes' (Star and Griesemer, 1989, p. 410), transforming the urban space into their (i) *repository.* Game elements can also be vague enough to allow an easy fitting in both the worlds, being configured as (ii) *ideal boundary objects*. Furthermore, designers can attribute different meanings to the same objects according to the world wherein they are employed – (iii) *coincident boundaries* – and finally they can be (iv) *standardized forms,* objects that convey the same information regardless of the context, or quoting Latour (1986) *immutable mobiles*. In this sense game objects bound the two worlds, acting as mediators and interfaces.

Then, according to Johnson (1997), interfaces influence our daily lives defining how we perceive our surroundings in terms of space and social

interaction. On that account, particularly significant is the conceptualization of *social interface* advanced in 2006 by De Souza e Silva to define 'a digital device that intermediates relationships between two or more users' (pp. 261-262). The author highlights the role of the cultural context in defining interfaces, since the social meaning of an interface is not totally dependent of the technology itself, but is the result of how that interface is embedded in social practices.

2 Methodology

The study relies on the outcomes of three assessments conducted in the *Augmented Reality and Mobile Experience* BSc course at Politecnico di Milano, School of Design. Between the A.Ys. 2013 and 2016, about 180 students designed 44 LBMGs aimed to raise awareness on sensitive issues and societal taboos or to increase citizens' consciousness on their role in preserving and improving the quality of the district wherein they live. To design their games as ways to look at the world anew, and understand if the interaction among physical spaces, objects, passers-by and meanings was the one expected, the design followed an iterative process, consisting of cyclical periods of design, analysis and test to assess the game validity, both in terms of gameplay and meaning transfer.

We studied these LBMGs from the initial idea to the final artefact, considering the twofold perspective of designers and players. As such, LBMGs were considered as (1) systems to transfer meanings, as (2) situated experiences reducing complex issues, and as (3) tools of societal enquiry. This contribution presents a focus on how objects can facilitate these three points.

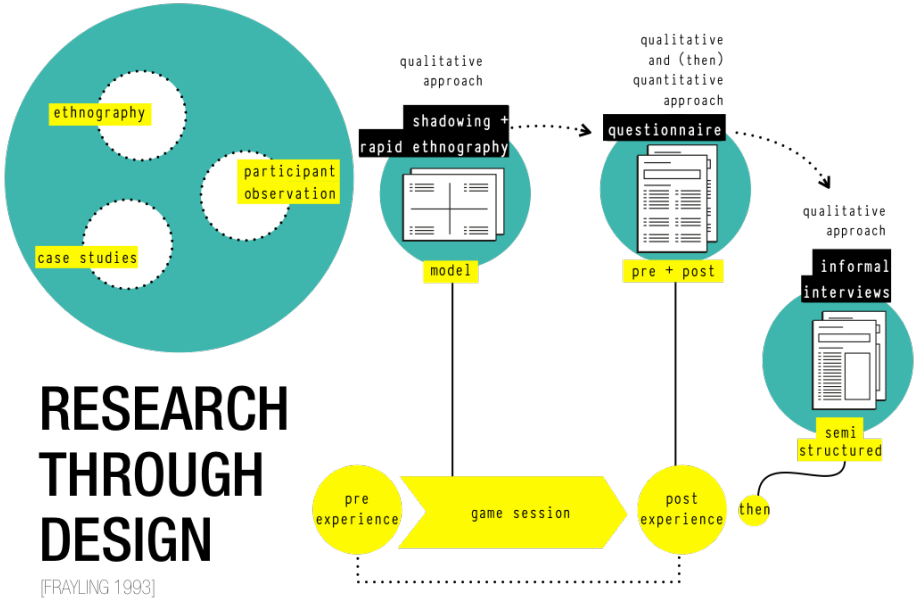

Figure 1 Strategies and tools to observe the game design process and sessions.

Recalling Frayling's research categories (1993), we conducted a through-design research, based on a sample of 44 games. We enquired how students designed these games creating consistent links between the real and the digital world initiated through game kits and physical objects spread in the urban space. We focused on how such links resulted able to activate the desired behaviours and interactions of players.

We documented and analysed these situated LBMGs as case studies. Our main strategies were ethnographic research and participant observation (DeWalt and DeWalt, 2002) in a period of three months for each academic year. The mixed methodology approach described in fig. 1 was employed to understand how players made sense and gleaned knowledge from the play activity and how the game elements triggered actions and enhanced the process of meaning making. To lessen biases and cross-check the results of our qualitative observation, we asked players to compile questionnaires (Mariani, 2016; Mariani and Spallazzo, 2016) that we analysed to

understand the relevance and pleasantness of the interactions with the game elements, the players' ability to grasp the message transferred by the game, and assess the overall quality of the experience.

Triggering player's action

In understanding players' interaction during the gameplay, we recall Wright and colleagues' (2008, 184) reasoning on the aesthetic experience between individuals and technology, as well as the holism that characterises an activity where every game element, physical or digital, is interconnected and explicable when referenced to the whole. They play a key role in terms of transferring meanings because the way they are comprehended triggers player's actions. Players' different attribution of meanings to objects results into the construction of different strategies of actions. In doing so, each object and its interpretation impact on the overall coherence and consistency of how the game conveys its messages. The initial assumption is that players create sense negotiating the meanings of the game objects, accordingly to their personal and cultural background; a tendency further nurtured by the nature of these games that prompt players to decode, interpret and transfer their understanding from the in-game context to the real world. Assuming that objects, player and setting contribute to activate a metaphorical dialogical or relational approach (Wright, Wallace and McCarthy, 2008, 184) to produce sense, in the following we study game objects focusing on their relation with (1) surroundings and (2) players.

The first level of analysis of physical game elements in LBMGs regards their relation with (1) the space wherein they are set and how they are perceived by players and non-players.

Relying on the LBMGs object of this study, we identified three main typologies of game elements:

(a) *Ordinary objects*, perfectly integrated in the space, which become relevant and acquire a different meaning for players only.
(b) *Common objects* potentially perceived by both players and non-players as out of context.
(c) *Bespoke objects* clearly recognized as *outsiders.*

The first typology of game objects (a) identifies those physical elements, already existing in the space or placed in purpose, that do not declare themselves as part of a game. In the *Fellowship of the Umbrella* (game by Bianchini, Mor, Principalli and Sciannamé, 2014), a game designed to

sensitize players about physical disabilities and connected issues, a common trash bag left on the bin is interpreted by non-players as a forgotten object, while it gains an important role in the fictional, fairy-tale-based world wherein players are immersed. The trash bag is indeed the tool that allows the *Powerful Beech* – one of the characters – to move: by wrapping the bag around her legs the player can indeed move as in a sack race, physically experiencing the fatigue of moving (fig. 2).

Figure 2 The description of the character and its features.

This kind of objects produce different effects depending on the user: while they do not have any influence on non-players, they acquire meaning for players and act as boundary objects. They configure themselves as *coincident boundary objects* (Star and Griesemer, 1989), objects acquiring different meanings according to the world wherein they are employed.

The second typology of game elements (b) identifies common objects potentially perceived as out of context. In the game *Drop.it* (game by Bandeira, Marcon, Namias and Paris, 2016) ordinary ampoules filled with water hang from trees and must be collected by players. Ampoules are objects that no one would notice as unusual in a kitchen or restaurant but that clearly do not commonly hang from trees. As such, they are perceived as out of context by both players and non-players, but only players can fully understand their contextual sense and role, while non-players can interpret the ampoules as a prank or an artistic happening. An even more evident example comes from the cited game *The Fellowship of the Umbrella* (game by Bianchini, Mor, Principalli and Sciannamé, 2014) that lets players find a

mask with snorkel – a tool for the *Magician* – in the Bovisa Campus of Politecnico, rich of beautiful lawns but with no beaches and even less the sea. Despite undoubtedly perceived as out of context, this kind of game elements does not declare themselves as part of a game activity and, while acting as *boundary objects* for players, are not powerful enough to make non-players feel to be immersed in a playground. In other words, this kind of objects can enhance players' immersion in the hybrid world of the game, linking the real and the digital. However, it does not act in the same way on non-players that don't necessarily perceive the surroundings as a playground.

The last category (c) collects those game elements specifically designed and realized for the game and easily recognizable as part of it. An example comes from the game *The Origins of Forging* (game by Belloni, Bucalossi, Mazzoleni and Menini, 2016) that brings players back to the times of Greek Gods in a discovery of the mythological roots of craftsmanship. As a setting for the game, designers populated the playground with cardboards representing – among others – wild animals such as wolves and bears. In this case the game elements are perceived in the same way by players and non-players, producing an identical effect in both worlds: the unique difference is that players must interact with the cardboards in order to proceed in the game, while non-players just perceive to be immersed in a playground where "something" is happening. The game elements of this category convey the same information regardless of the context: quoting Latour (1986) they are *immutable mobiles* that bound the two worlds, becoming means to proceed in the game for players, and traces for non-players.

Analysing the discussed typologies of physical game elements in respect to the concept of *ma*gic *circle* (Huizinga, 1938; Caillois, 1958) – namely the "space" wherein the game takes place – we can outline three different behaviours. The first typology (a) does not blur the borders of the *circle* since players are kept separated by non-players, who are completely unaware that a game is in progress. Despite the urban space is transformed into a playground, the game keeps those features of secrecy and separateness described by Huizinga (1938). Different considerations must be done about the second typology of game elements (b) since they undermine the concept of *circle*. These objects are indeed perceived as out of context and even if not evidently related to a play activity, they may alert non-players that something out of ordinary is happening. The game elements belonging to the third category (c) demolish the *magic circle*

expanding it spatially (Montola, Stenros and Waern, 2009). These objects clearly declare 'this is a game' (Bateson, 1956) and, while absolving a functional role for players, they act as gates for non-players, evidences of the fictional world superimposed on the real one.

Drawing the attention to how game elements interact with players, namely the second level of analysis identified (2), we deduced a list of four main *typologies of interaction*:

a) *Direct interaction* with physical objects, without metaphorical meaning.
b) *Mediated interaction* with physical objects that have effects in the game digital dimension.
c) *Metaphorical interaction* with physical objects that are substitute or metaphors of fictional elements.

In the first typology of interaction (a), physical objects serve a concrete function in the real world, being mechanically employed to guide players to proceed in the game. For example in *The Origin of Forgings* (game by Belloni, Bucalossi, Mazzoleni and Menini, 2016) players are asked to collect and assemble objects, in *The Treasures of Captain Torment* (game by Boni, Frizzi and Taccola, 2015) they move together within a cardboard boat, or in *SOS-Rescue Squad* (game by Panza, Pozzi, Rota and Veschi, 2016) they circumscribe rooms with tapes to keep passers-by far away: in doing so, the physical game objects have plain, evident functions and are used according to their original purposes. Mediated interaction (b) refers to the modification of the digital dimension by means of physical game elements. Examples are objects built to be employed or even destroyed to obtain information and advance in the game. *The Rapture* (game by Conti, Saracino, Serbanescu and Valente, 2015) uses physical objects as a styrofoam car, coloured balloons and a piñata that must to be destroyed to gain codes that, once typed into the digital interface of the game, allow to proceed in the story. Analogously in *SOS-Rescue Squad* objects fabricated via rapid prototyping are used as starters, serving as receptacle of codes that, once recomposed, unlock elements in the digital dimension.

The third typology of interaction (c) is based on the concept of metaphor: objects are representative or symbolic of something else with an important fictional role. Well known are the examples of how bananas and coffees respectively become guns and poisons in several *Assassination games* – recalling the pervasive game genre proposed by Montola, Stenros and Waern (2009, 34-35). In *SOS-Rescue Squad*, a bench encircled with tape

takes the distance from its usual, social function and assumes the role of a space of non-sociality.

To conclude, physical objects as masks or identity objects can have an important function in communicating to other people that "this is a game" and it is happening here and now (Bateson, 1972). Playing the role of elements typical of performances, these masks serve a social function: who is wearing them belongs to a group or "community" (Caillois, 1958). As a consequence, they evidently state the presence of the magic circle. Moreover, these recognizable identity objects increase the possibilities to achieve *immersion* (Murray, 1997), nurturing players' awareness of being involved in the game world and its story (McMahan, 2003).

Discussing objects: ally or enemy?

In this contribution, we stressed two ways to look at LBMGs objects as activators and influencers of behaviours, and triggers of meaning-making. Accordingly, we discuss here how the agency of these objects impacted on different aspects of the gameplay, activating (1) social engagement, (2) negotiation of meaning and (3) in-game behaviours.

We noticed that social engagement occurred within the group of players and with outsiders. Some objects resulted particularly efficient in stimulating interpersonal connection: in *The Treasures of Captain Torment* the cardboard boat forces players to squeeze in a limited space. In doing so, the object enforces the sense of community and makes the game manifest to passers-by. Players' awkward behaviours are clearly accepted as part of a ludic activity. This recognition reinforces the existence of the magic circle and its separation from the ordinary. Then, other objects force the ludic boundary to expand, by making players and non-players interact (Montola, Stenros and Waern, 2009). In *The Infection* (game by Bassanese, Bonfarnuzzo, Pham and Redana, 2015), players are even required to place stickers on non-players' body to "spread" venereal infections, going beyond our usual comfort zone by challenging our interpersonal distance.

Then, game elements, acting as boundary objects, activate negotiations of meaning between real and "unreal", transferring and translating the fictional world into the real one. The two realities become intertwined, rather than simply overlapped. We noticed three different attitudes.

Transfer. The immersion into the fictional world (Murray, 1997) can be enforced by physical objects that clearly pertain to that world. The pirate cardboard boat, spiked gloves, winged sandals (*talaria*) crafted by designers

become a concretization of the fictional world. As objects hurled in the physical world, they are boundaries between the two realms.

Translate. Designers can use objects that embed metaphorical meanings that require interpretation to be understood by players. Therefore, there is a double operation of translation: first, designers employ objects fraught with symbolic meaning, that is then deciphered by players. In the intentions of designers, a mask with snorkel symbolizes the condition of being dumb, or a bag trash put the player in the shoes of person with motor disabilities, being representations of real handicaps. The comprehension of the real purpose of these objects requires players to start a negotiation of meaning that can take the shape of a progressive disclosure, as well as of a final revelation or a *coup de théâtre* with an astonishing realization of sideways perspectives and uncommon translations.

Transfer and Translate. The attitude merges the previous ones by employing game objects that both transport the fictional world into the real one, and are fraught with meaning. The smartphone itself can be considered as example of this attitude since it's the major means of intertwining between fictional and the real worlds but has been frequently employed as whimsical object, guide in the gameplay, and narrator of the story. The styrofoam car of *The Rapture* (game by Conti, Saracino, Serbanescu and Valente, 2015) is together a concretization in the real world of the fictional one and its destruction in the game play symbolizes the blind violence of *black blocks*, that players are unwittingly personifying. In this sense, game objects can become powerful allies of designers in triggering immersion and conveying meaning.

The third point of discussion relates to the concept of persuasive design (Redström, 2006), and consists of the ability that certain objects possess to affect players in-game behaviours. Designers can craft artefacts that activate behaviours – in-game behaviours, not necessary long-lasting. This implicates on the one hand that designers have expectations for the object's ability to trigger "correct gameplay", on the other that player's experiences require to be investigated to confront how players used and interpreted objects with the designer's expectations. That means that designers' initial expectancies can be confirmed or contradicted. It is up to the designer the task of understanding if players are attributing to the diverse objects the function expected.

To distil the concepts presented in this article we can affirm that designers should consider the aforementioned options to wisely create meaningful objects, according to the desired interactions and to the

meanings to convey. Since our first year of research on LBMG that includes physical game elements situated in the space, we noticed that physical objects can assume the double role of allies or enemies, according to how they are designed and provided with meaning, as well as to how they are interpreted. We have therefore formalized our experience in a framework aimed at empowering those who design LBMG to consciously design/include these artefacts.

In-game physical objects as boundary objects act as powerful allies when they play the twofold function of bridging the fictional world with the real one, and becoming representations of the meanings designers aim to transfer. On the contrary, they can negatively affect the game by miscommunicating its contents and meanings. They can be strongly influential, because they impact on the relation among artefacts, players, and meanings embedded. Hence, designing ignoring/neglecting the potential of such objects as sources of behaviour empowerment and their communication role can conversely work to the detriment of the play experience, configuring objects as enemies. This ambiguity is a clear problem of design that can be coped anticipating players' in-game behaviours and how the in-game information can be received and interpreted. This considering that ambiguity itself is also the delight that comes from running into the unexpected that results into unforeseen behaviours and comprehension.

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