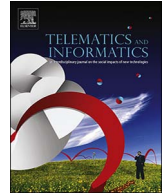


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Empirical study on Game Transfer Phenomena in the location-based augmented reality game

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ABSTRACT

Research on Game Transfer Phenomena (GTP) has demonstrated that playing video games can lead to re-experiencing images, sounds, tactile sensations, spontaneous thoughts and actions, sometimes triggered by physical objects/events associated with the game. Location-based augmented reality games posit interesting questions regarding GTP, particularly because they use physical locations, they overlay digital images in physical contexts and the gameplay shifts between the virtual and the physical world. This study aims to investigate the prevalence of GTP and the role of immersion, augmented reality and sound in a sample of English- (EnS) and Spanish- (SpS) speaking gamers of the game *Pokémon Go* (PoGo). A total of 1313 gamers ($M_{\text{age}} = 31.47$) were recruited online. GTP was less common than in previous studies; however, 82.4% had experienced GTP at least once. The SpS showed higher prevalence of GTP and played more intensively. Automatic mental processes predominated in the EnS, while behaviours and actions were more common in the SpS. The absence or presence of video game features seems important for the way GTP manifests. For instance, tactile hallucinations were more prevalent, while sensations of self-motion were less reported. Playing with augmented reality (AR) and sounds showed significant correlations with various GTP types, but not with re-experiencing images from the game. More gamers who reported the sensation that Pokémon were physically present or looked for Pokémon outside the screen while playing, as connotations of immersion, had experienced GTP. Experiencing GTP while playing may be more common in location-based augmented reality games, compared to other games.

1. Introduction

“I saw a pigeon standing on the street and had a momentary urge to throw something at it [to capture it].”

“A fire truck was coming down the street, and there was a Pokémon spawned [appeared] in the street. I thought... ‘I hope the fire truck doesn’t hit the Meowth [Pokémon]’. And then I realized what a strange thought that was.”

The ways of playing video games are in constant evolution; and the tendency is to make video games more accessible, enjoyable and immersive (Deterding et al., 2011). Location-based augmented reality mobile games use a real-time generated map of the actual physical world around the player (supported by GPS technology and the camera of the device). These games overlay digital images on

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Fig. 1. Comparison of Pokémon Go with the AR function on and off (Trinnah, n.d.).

physical world contexts that are captured through the mobile device camera (Werner, 2017). The location-based augmented reality mobile game *Pokémon Go* (PoGo) (Niantic, 2016) is one of the first of its kind and can be played with the augmented reality (AR) function turned on or off. The gameplay in PoGo consists of capturing Pokémon (small creatures), finding items at “PokeStops” (i.e., a “stop” or station related to Pokémon) that can be used, for example, when capturing Pokémon, and holding/fighting for “gyms” (Tabacchi et al., 2017).

Research into Game Transfer Phenomena (GTP) has demonstrated that playing video games can lead to re-experiencing, at least temporary images, sounds, tactile sensations, spontaneous thoughts and actions, sometimes triggered by physical objects/events associated with the game. GTP has been reported with both new and old video games, in over 400 unique titles (Ortiz de Gortari, 2016a) and even in the PoGo predecessor, the location-based augmented reality game (Sifonis, 2016) *Ingress* (Niantic, 2013). Most gamers have experienced GTP at least at some point in their life, and most have experienced GTP more than once and/or several types (Ortiz de Gortari and Griffiths, 2016; Ortiz de Gortari et al., 2016).

Location-based augmented reality mobile games posit interesting questions regarding GTP. The most important factors are: i) overlaying of images in physical contexts, ii) location where the game is played, iii) shifting between modes, and iv) using or not using features of the game.

Overlaying of images in physical contexts via the augmented reality feature: Studies about GTP have shown that gamers experience hallucinatory-like phenomena in various sensory modalities with video game content (e.g., seeing images, hearing sounds, tactile and proprioceptive sensations, misperceptions of real-life objects that share similarities with elements in the game, and perceptual distortions of objects and environments) (Ortiz de Gortari and Griffiths, 2014a). It was therefore interesting to investigate if playing PoGo, which uses AR technology, had some effect on these particular experiences (see Fig. 1).

Location where the game is played: Automatic associations between video game-related elements and physical stimuli are expected when the gameplay requires exploring public locations. GTP tend to occur in day-to-day context (Ortiz de Gortari and Griffiths, 2016), sometimes when triggered by game-related cues (i.e., physical objects or events that have been portrayed or simulated in the game) (Ortiz de Gortari et al., 2011; Ortiz de Gortari and Griffiths, 2014b). For instance, sounds have been heard when passing by an environment similar to one in the game, menus and maps have popped up in the corner of the vision when in conversation, or urges to climb buildings have been reported when seeing buildings that resemble those from the game (see Fig. 2).

Shifting between modes: Playing location-based augmented reality games requires constantly shifting between the virtual and the physical world while exploring physical locations (See Fig. 1). Digital images are overlaid on physical world environments when using the AR function, although the game is anyway viewed on the mobile screen. Most video games played on a console, computer,

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