

# Portable Presence: Can Mobile Games Be Immersive Games?

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**Abstract.** Mobile games – in particular, games played on smartphones and tablet computers – are becoming increasingly popular. Yet, there has been little research into whether players can experience immersion while playing mobile games. As the potential for immersive mobile games would be of interest to game developers, researchers and players, it is proposed to measure mobile immersion by comparing Osmos, a multi-platform ambient video game, on three different-sized devices – a smart phone, a tablet and a desktop computer.

**Keywords:** immersion, video games, telepresence, mobile platforms, screen size, mobile games.

## 1 Introduction

Immersion is widely agreed to constitute an integral part of the game play experience [1]. However, game scholars differ as to what constitutes immersion, and how it relates to – or differs from – concepts such as telepresence and flow [2]. As Jennett et al. [3] note, immersion is key to a good gaming experience: "Successful computer games all have one important element in common: they have an ability to draw people in."

In recent years, games played on smaller platforms, such as smartphones and tablets, have increased in numbers and popularity. The quality of mobile games has also improved. Ever-increasing computational power and storage, and improvements in screen quality (for example, the so-called Retina display on the iPhone and iPad), along with the entry into the mobile game marketplace of larger game companies have led to more sophisticated and realistic games [4].

What remains unclear is whether these games can be immersive. It has been argued that immersion increases with screen size [5], which would seem to argue against immersive mobile games. Although immersion in desktop and console games has been extensively studied since the 1990s [6], research is only now beginning into the immersiveness of mobile games [5, 7]. Game developers, scholars and players alike would benefit from a better understanding of the possibility and potential of immersion on smaller platforms.

## 2 Immersion in video games

### 2.1 Immersion

Janet Murray [8] calls immersion "the sensation of being surrounded by a completely other reality, as different as water is from air, that takes over all of our attention, our whole perceptual apparatus." Immersion is closely related to, and perhaps encompasses, telepresence, which has been defined as "the perceptual illusion of nonmediation" [5].

The factors that contribute to immersion in video games have been extensively studied. McMahon [9] states that immersion is dependent on three factors: a consistent game world, meaningful tasks for the player and a match between the user's expectations of the game environment and the environment's conventions. Total photo- and audio-realism is not necessary to produce a sense of immersion providing these three conditions are met, she contends.

Ermi and Mäyrä [1] state that audiovisual quality and style is important to immersion, but that the level of challenge and imagination and fantasy also contribute to immersion. They note that researchers often take for granted that a bigger screen and a better quality of audio equal greater immersion [1]. Indeed, the effect of screen size on immersion has been extensively studied.

Several studies support the contention that immersion is directly related to screen size. Lombard and Ditton [6] reported that participants who watched a film on a 52" color television screen with surround sound reported a greater sense of participation and involvement than those who watched the film on a 5" black and white television with mono sound. More recent research [5, 12] has also reported greater presence on larger screens than on small portable screens. However, not all results have supported the screen size-immersion relationship. In an experiment comparing immersion on an iPod versus a 32" television screen, Bracken [13] reported no significant difference across some factors and indeed, higher levels of immersion for the iPod across other factors. And Bellman et al. [14] found no significant differences for viewer recall of advertisements viewed on a 35" television screen, a 10" laptop computer and a 2" iPod.

As Hou et al. [5] note, most of these studies have concentrated on passive viewing and have not been replicated for more active media such as video games. Clearly, screen size is an important variable for game immersion, but other factors particular to video games, such as internal consistency, challenge and fantasy also contribute to the immersive experience. If image size is just one contributing factor for immersion in video games, immersion on smartphones and other mobile devices cannot be dismissed.

Little has been published on immersive video games on mobile platforms. Huhtala and Isokoski [7] measured immersion on an iPod/iPhone game under development. However, the primary purpose of the study was to assess the usefulness of an immersion questionnaire for game developers, and thus they did not compare immersion in video games across different size platforms, as we propose to do.

## **2.2 Measuring Immersion**

Video game researchers usually measure immersion using either subjective measures, such as questionnaires, observation and interviews, or objective measures, such as psychophysiological measures [15]. However, as Huhtala and Isokoski [7] note, even objective measures are problematic in that they cannot measure immersion directly. Instead, researchers measure factors that they assume are related to immersion, such as variable heart rate, perspiration, pupil dilation or electrodermal (also known as galvanic skin response, or GSR) activity. Therefore, any attempt to measure immersion is dependent on whether there is indeed a valid relationship between the factor being measured and actual immersion. Using more than one measure – for example, measuring facial electromyography during game play and administering an immersion questionnaire following game play – can increase validity [15].

## **3 Proposed study**

The proposed study will compare immersion across three different sized platforms (including two portable devices) to explore the relationship between immersion and screen size for video games and the potential for immersive mobile video games.

The game to be used for the study will be *Osmos*, a single-player puzzle game developed by Hemisphere Games in 2009 [16]. Immersion will be measured by having participants complete Jennett's 31-item Immersion Questionnaire after playing the game [3].

In playing *Osmos*, the player controls a single-celled organism trying to survive in a world of smaller and larger organisms. If the player's organism touches a smaller organism, it absorbs it and increases in size. If it touches a larger organism, the player's creature is absorbed and the player loses the game. Although the player can deliberately move towards or away from other organisms, doing so uses energy and cause the player's organism to shrink in size and the player learns that a better strategy is to be patient. The game therefore rewards focus and concentration.



**Fig. 1.** Splash page (iPad version) for Osmos: the ambient game that will be used in the study (Source: Hemisphere Games).

Osmos was chosen because of this need for the player to focus, which is conducive to immersion [17]. Osmos has other immersive characteristics, including challenging and varied tasks, a consistent game world, and visual and audio quality. It was also chosen because the game is easy to learn, and is available on different sized platforms, such as desktop computers (Mac OS X and Microsoft Windows), tablets (iPad) and smartphones (iPhone/iPod Touch, Android). The rules of the game are identical for the different versions, making cross-platform comparisons more valid.

### 3.1 Procedure

Participants will be randomly assigned to play Osmos on one of three platforms: iPhone (diagonal screen size: 3.5"), iPad (diagonal screen size: 9.7") or an iMac desktop computer running Mac OS X 10.7 (diagonal screen size: 21.5"). To eliminate sound variability, sound for all three platforms will be delivered through identical headphones.

The participant will fill out a short demographic questionnaire and then the researcher will explain how to play the game. Two clamp-on electrodes hooked up to a galvanic skin response instrument will be attached to the participant's non-dominant hand. The participant will then be given a few minutes to practise and to get comfortable with the electrodes and the particular device they are using. They will then be left for 10 minutes to play the game. They will be asked to restart the game should they lose before 10 minutes has passed.

At the conclusion of the game, the player will be asked to complete Jennett's Immersion Questionnaire. The questionnaire consists of 31 statements (e.g., "I sometimes found myself to become so involved with the game that I wanted to speak to the game directly", "It was as if I could interact with the world of the game as if I was in the real world") which participants are asked to rate on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Participants will then be debriefed by the researcher and invited to discuss their experience in playing the game. Results will then be tabulated to yield an aggregate immersion score. Scores will be compiled and analyzed for the three groups. GSR readings will also be analyzed and compared.

### 3.2 Hypotheses

It is expected that the study will support the hypothesis that screen size has a positive effect on immersion and that, therefore, immersion scores will be higher for players of the iMac version of Osmos than for the players of the iPad and iPhone versions. However, we predict that players of all three versions of the game will experience immersion to some degree, because of the challenge and interactivity.

### 3.3 Considerations

As noted above, immersion can only be measured indirectly and any measurement is subject to interpretation. By using and comparing different ways of measurement – in-test psychophysiological measurement, post-test questionnaire and interview – a satisfactory degree of confidence can be achieved. However, the potential for error has to be admitted.

Another consideration is the difference in game mechanics for Osmos between the iPhone and iPad and the iMac due to the form factors of the different machines. On the smaller platforms, the player manipulates the organism with their fingers, while a mouse is used as an intermediary on the iMac. It is possible, therefore, that any difference between immersion could be in part explained by these haptic considerations, and not by screen size. However, a comparison of the immersiveness scores of the two touch devices – which have identical game mechanics – should help with this potential issue.

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