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The Impact of Social Setting on the Recall and Recognition of In-Game Advertising

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1. Introduction

Digital gaming has become one of the most popular forms of entertainment. It has evolved from a pastime predominantly favored by adolescent males into a mainstream medium that appeals to all age groups and genders (DFC Intelligence, 2011a; Entertainment Software Association, 2013). Consequently, digital games have piqued the interest of the advertising industry, which is increasingly starting to see them as a suitable medium for the incorporation of advertisements (Lewis & Porter, 2010; Mackay et al., 2009; Mau, Silberer & Constien, 2008). Aside from their ability to reach an ever-growing audience, digital games have the advantage of a long shelf-life and high replay value [i.e. the average game is played for up to 30 hours (Nelson, 2002)]. Moreover, they give advertisers the opportunity to integrate their brands as an integral part of the digital game experience, reaching out to players in a highly vivid, interactive and immersive entertainment environment (Mackay et al., 2009; Nelson, 2005; Schneider & Cornwell, 2005). Finally, integrating advertisements into their games also provides game publishers and developers with a means to subsidize the rising development and marketing costs of their games without having to increase the retail price, which ultimately also benefits the gamer as end user (Chambers, 2005).

An optimal exploitation of the incorporation of advertising inside digital games, or in-game advertising (IGA), would thus be advantageous for all parties involved. However, although the practice of IGA is predicted to grow steadily over the next several years (DFC Intelligence, 2011b), IGA revenues are still relatively low compared to advertising revenues spent on other media (such as television and the Internet) (DFC Intelligence, 2011b). Many advertisers still do not embrace digital games as a viable advertising vehicle because of the continuing difficulties in determining and optimizing the effectiveness of in-game advertisements (Boyd & Lalla, 2009).

In-game advertising research has shown that there is no such thing as a perfect, one-fits-all formula for the integration of effective and successful ads in a digital game context; IGA effectiveness often depends on a multitude of factors related to the context in which the ad is encountered, such as the genre of the game that is being played, the type of brand or advertisement that is integrated into the game environment, the prominence of the brand placement, the amount of congruity between the game and the brand, the amount of interactivity that is allowed, and the player's experiences during gameplay (e.g. Grigorovici & Constantin, 2004; Herrewijn & Poels, 2013; Herrewijn & Poels, 2014; Jeong & Biocca, 2012; Lee & Faber, 2007; Lewis & Porter, 2010; Mackay et al., 2009; Mau et al., 2008; Nelson, 2002; Nelson, 2005; Schneider & Cornwell, 2005). Therefore, it is important to study how and under which conditions IGA is truly effective. The current paper contributes to the study of in-game advertising effectiveness by investigating the impact of an important, but under-investigated factor related to the advertising context, namely the social conditions in which a digital game is played. More specifically, we examine the impact of variations in social setting on a person's awareness (i.e. recall and recognition) of brand placements that are integrated into the digital game environment.

1.1.The Impact of Social Setting on Brand Awareness

Studies looking at the effectiveness of advertising inside traditional media (e.g. print, television) already showed that a person's social environment can greatly impact the processing of advertisements in terms of brand awareness (Bellman et al., 2012; Fay & Liebman, 2012; Keller & Fay, 2012; Moorman, 2003; Puntoni & Tavassoli, 2005). Since digital games bring many opportunities for social play and can be played in a wide variety of social situations, we expect the social component to also have implications for the awareness of brands embedded into the game world. Digital games can be played alone (i.e. single-player mode), but they are often also played together with others (i.e. multiplayer mode), either over the Internet or in the same physical space (de

Kort & IJsselsteijn, 2008; Gajadhar, 2012). According to the Entertainment Software Association (2013), 62 percent of gamers play games with others, either in-person or online. In these multiplayer instances, people can work together to complete game objectives or they can compete with each other to see who is the better player (de Kort & IJsselsteijn, 2008; Gajadhar, 2012). Moreover, people often watch while others are playing games, for instance when observing the gameplay of other players in the spectator mode of multiplayer games or when watching friends or family members play on a living room console, possibly even taking turns so that everyone can get a shot at the game (Calleja, 2011; de Kort & IJsselsteijn, 2008; Gajadhar, 2012). This social component is generally described as making digital games even more enjoyable, involving and stimulating (Calleja, 2011; de Kort & IJsselsteijn, 2008; Gajadhar, 2012; Poels, de Kort & IJsselsteijn, 2012), and consequently, it has proven to be one of the main motivations to play digital games altogether (de Kort & IJsselsteijn, 2008; Gajadhar, 2012; Lazzaro, 2004; Yee, 2006). Our main objective is therefore to examine how these different modes of social play (and the varying social interactions that arise from them) influence the awareness of brands inside a digital game. We distinguish between situations in which people experience the gameplay alone (“solo play” or single-player setting) and situations in which they share their experiences with others (“social play”), either in a multiplayer setting, or in a public play setting where some people play the game while others watch. Moreover, we also take into account the differences in user control and interactivity that emerge in these “playing” versus “watching” gaming situations.

1.1.1. Solo play versus social play

Advertising studies focusing on traditional media (e.g. print, television) have demonstrated that the situational circumstances a person finds himself in while being exposed to an advertisement are a central part of the advertising context, influencing brand awareness (Moorman, 2003). These situational circumstances include a person’s social environment while consuming media and the advertisements that are encountered in this context. People can experience advertising messages

alone or in the presence of others (e.g. when watching television commercials in the company of family or friends), and research has shown that the nature of a person's social setting can greatly impact his awareness of the brands that are encountered (Bellman et al., 2012; Fay & Liebman, 2012; Keller & Fay, 2012; Moorman, 2003; Puntoni & Tavassoli, 2005). The findings of these studies, however, can be divided into two opposing camps.

On the one hand, there is the dominant view of Baron's (1986) information processing theory of distraction, suggesting a negative impact of social setting on the processing of information. According to Baron (1986), others can be seen as a source of distraction, interfering with the processing of information and ultimately affecting our performance and experience. In line with this theory are the results from Bellman et al. (2012), who show that the presence of others while viewing television commercials reduces the processing of advertisements in terms of brand recall. This mere presence or social facilitation effect was first documented by Zajonc (1965), who argued that the mere presence of others facilitates a person's performance on easy tasks, but is detrimental for his performance on more complex tasks. According to Bellman et al. (2012), paying full attention to a television commercial is a complex task, since it is performed with limited capacity and is therefore sensitive to changes in demands. The presence of others during the exposure to a television commercial puts more pressure on a person's available cognitive resources, pulling attention away from what is happening on the screen and resulting in lower brand awareness (Bellman et al., 2012).

On the other hand, there is the social influence theory, stating a positive influence of social environment on brand awareness (Fay & Liebman, 2012; Keller & Fay, 2012). Studies putting forward this model posit that when people view television commercials in the presence of others, this delivers a clear word of mouth benefit: the presence of others raises people's emotional engagement with and response to the advertising content, resulting in them talking about and sharing the advertising content and ultimately increasing the effectiveness of the ad (Fay & Liebman, 2012; Keller & Fay, 2012).

Because digital games can be played in a wide variety of social situations, we expect social environment to also have implications for the awareness of brands encountered in a digital game environment. However, the impact of social setting on brand awareness in an IGA context has been barely studied, with the exception of one study from Dardis and Schmierbach (2012). In this study, Dardis and Schmierbach (2012) look at the effect of playing alone versus playing with a partner on the recall of in-game ads. They find that playing a game together with a friendly partner enhances individuals' ad recall, and – in line with the social influence model – suggest that this is due to the positive affective feeling that stems from the presence of (friendly) others during the game experience, although they did not explicitly measure players' emotional experiences during gameplay.

Following the results of the studies described above, we formulate the following two competing hypotheses concerning the impact of solo play versus social play on brand awareness:

H1a: Gaming in a social context will lead to lower brand awareness compared to gaming in a solo context (i.e. distraction theory).

H1b: Gaming in a social context will lead to higher brand awareness compared to gaming in a solo context (i.e. social influence theory).

1.1.2. Play versus watch

Subsequently, we propose that there will also be a difference in brand awareness in situations where people actually play versus merely watch while others play a digital game. The central factor here is interactivity, one of the characteristics that distinguishes digital games from other media by giving the user control over the environment (Nelson, Keum & Yaros, 2004; Nelson, Yaros & Keum, 2006; Schneider & Cornwell, 2005). In a digital game context, players are able to directly interact with the game: they can control their own actions and perceptions (e.g. by manipulating their point-of-view), and make their own decisions in-game. Observers, on the other hand, cannot: they can encourage the player, help him by pointing things out, and get involved by the game experience, but

they do not actively interact with the game world (Nelson et al., 2006). A study from Nelson et al. (2006) looked at the influence of this kind of interactivity on the effectiveness of in-game advertising. Participants in their experiment either played a racing game containing IGA for three minutes, or they watched a three-minute gameplay video of the same game. The results indicated that playing had a negative effect on recall, as players recalled significantly fewer ads than observers. The authors suggest that the reason for the influence on brand recall might be that the cognitive resources that are required for active control of a digital game may inhibit the processing of in-game ads [i.e. limited capacity model of mediated message processing (Lang, 2000)]. Players have to spend most of their cognitive resources controlling the game (i.e. the primary task) and have less cognitive capacity left for attending to secondary information such as background ads than observers, who merely watch the actions on the screen (Nelson et al., 2006). In the study of Nelson et al. (2006), however, both players and watchers participated in the experiment alone. In our experiment, we test whether their findings also persist in a social context, where one person plays the game while another person watches in real time. We propose that:

H2: Actively playing a digital game will lead to lower brand awareness compared to merely watching the gameplay of another person.

1.2. The Impact of Social Setting on the Player Experience

Because the (in-game) advertising studies described earlier suggest that the influence of social setting on brand awareness is due to factors related to the awareness of other people (i.e. distraction theory) and the feelings and emotions this raises (i.e. social influence theory), we will also examine the potential indirect effect of social gaming context through the variation of the player experience. Player experience refers to the wide variety of player emotions and feelings while playing digital games (Gajadhar, 2012; Poels et al., 2012). Prior gaming research has shown that the nature of the social setting in which a digital game is played has a significant influence on this player

experience, both on the cognitive (e.g. memory, attention) and affective (e.g. feelings, emotions) level (de Kort & IJsselsteijn, 2008; Gajadhar, 2012; Herrewijn & Poels, 2013; Poels et al., 2012). Moreover, in-game advertising research has already demonstrated that a person's emotional experiences can have an important influence on advertising processing (Grigorovici & Constantin, 2004; Herrewijn & Poels, 2013; Jeong & Biocca, 2012; Lee & Faber, 2007).

Therefore, we will explicitly measure and include several of these player experiences in our study in order to examine the processes that may underlie the impact of social setting. In particular, we will take into account players' sense of social presence, their general emotions (pleasure, arousal, dominance) and several more specific player experiences (challenge, competence, flow, immersion, tension, positive affect, negative effect).

1.2.1. Social presence

First of all, people are fully aware of the presence of other people in a social gaming context, whether they are playing together with them or are watching from the sideline. In literature, this sense of "being with another person" is described as social presence, a construct consisting of three dimensions (Biocca, Harms & Burgoon, 2003). The first dimension of social presence is related to awareness: people have to be aware of each other and experience feelings of being together in order to truly experience a sense of social presence. The second dimension entails that people have an emotional connection with each other. This psychological involvement with the other person indicates the intimacy, feelings and degree of mutual understanding that are evoked by the social interactions. Finally, the third dimension refers to the behavior of people (and the synchronization thereof) during the social encounter, which is called behavioral engagement.

We expect that the manipulation of the social setting in which a digital game is played will significantly influence players' sense of social presence. Prior gaming research demonstrates that social presence can vary according to the nature of the social gaming context and the types of communication and related social interactions that are possible (Gajadhar, 2012). For example,

games can be played alone or together with computer agents or human co-players, either online (i.e. mediated co-play) or in the same physical space (i.e. co-located co-play). The social interactions that can happen in these different contexts will differ significantly. When people are playing a game together in the same physical space, for instance, social interactions will be more intimate, occur more frequently and make use of a wider variety of communication cues (i.e. verbal (e.g. talking), para-verbal (e.g. laughing), non-verbal (e.g. facial expressions, eye contact, touch)) compared to playing a game together online. Consequently, playing together with a co-located co-player will provide more opportunities for social interaction, theoretically evoking stronger feelings of social presence than playing with a computer agent or a mediated other. Research from Gajadhar (2012) confirms this, showing that people experience the lowest levels of social presence when playing against a non-player computer character. Playing against a mediated other leads to significantly more social presence and playing in a co-located co-play situation is perceived to be the most social, resulting in the highest levels of social presence (Gajadhar, 2012).

Consequently, we propose the following hypothesis in regard to the effect of social setting on social presence:

H3: Gaming in an increasingly social context will lead to a higher sense of social presence.

Moreover, we argue that people who play a game in a social context will experience higher levels of social presence than people who merely watch while others are playing, since they are the ones actually performing the task (i.e. controlling the game) and are therefore more susceptible to social influence.

H4: Actively playing a digital game in a social context will lead to a higher sense of social presence compared to merely watching the gameplay of another person.

1.2.2. General and specific player experiences

Not only social presence is dependent on the nature of the social setting in which a game is played, however, other player experiences are also affected. People often feel and react differently in

the presence of others compared to when they are alone (Asch, 1955; Mullen, 1983). This is not different in a digital gaming context, where people can affect each other's feelings, thoughts and focus when gaming and interacting in a social setting (Gajadhar, 2012). For example, a player may experience more frustration when being teased or mocked by his co-player, more enjoyment when they are making jokes and fooling around, or more challenge when they are actively pushing, stimulating and provoking each other. Prior research confirms that playing is perceived fundamentally different when the social gaming context is changed (e.g. Gajadhar, 2012; Ravaja, 2009; Ravaja et al., 2006; Mandryk & Inkpen, 2006).

Most studies looking at the impact of social setting on the player experience so far seem to observe that in the presence of others, players experience more challenge and positively-valenced emotional experiences (e.g. positive affect, competence) (Gajadhar, 2012; Lim & Reeves, 2010; Mandryk & Inkpen, 2006; Ravaja, 2009; Ravaja et al., 2006; Weibel et al., 2008). These heightened positive emotions may be attributed to the human motivation for social interaction, affiliation and the need to belong. Consequently, playing together with another person is experienced as more positive in comparison to playing alone, and this effect is even stronger when the other person is co-located instead of mediated (Gajadhar, 2012; Lim & Reeves, 2010; Mandryk & Inkpen, 2006; Ravaja, 2009; Ravaja et al., 2006; Weibel et al., 2008).

Concerning the impact on players' focus on the game, the literature is more divided. Sweetser and Wyeth (2005) argue that the presence of others during gameplay serves as a distraction, pulling attention away from the activity of playing the game. However, so far, no empirical proof is found to support this theory. On the contrary, most studies show that playing in an increasingly social context increases the focus on the gameplay, leading to higher levels of immersion, flow and arousal when others are present, both in a collaborative and competitive setting (Gajadhar, 2012; Mandryk & Inkpen, 2006; Ravaja, 2009; Ravaja et al., 2006).

Following the results of these studies, we expect different social settings to lead to variations in both the general emotions and the more specific player experiences of the participants.

Consequently, we propose the following hypotheses:

H5: Gaming in an increasingly social context will lead to higher positively-valenced player experiences.

H6: Gaming in an increasingly social context will lead to an increased focus during gameplay.

Further, we expect that actively playing a game will lead to more intense player experiences than merely observing the gameplay. People who only watch while others play a game can be involved in the gameplay and can experience the whole range of emotional experiences described earlier while cheering the player(s) on and giving comments and advice. However, observers do not actively control the game, and will therefore not experience the same intensity of focus and emotional valence as players. Related to this, we also predict that observers will experience more negative affect (i.e. boredom) than players, since they are not in charge of controlling the game.

H7: Actively playing a digital game will lead to more intense player experiences (i.e. emotional valence, focus during gameplay) compared to merely observing the gameplay of another person.

H8: Actively playing a digital game will lead to less negative affect compared to merely observing the gameplay of another person.

1.3. Player Experience as Mediator

Finally, if social setting indeed has a significant impact on people's awareness of brands integrated into the game environment on the one hand and their player experiences on the other, these player experiences may act as mediators of the relationship between social setting and brand awareness.

As already mentioned, prior advertising studies (Bellman et al., 2012; Dardis & Schmierbach, 2012; Fay & Liebman, 2012; Keller & Fay, 2012) suggest that the influence of social setting on brand awareness is due to the awareness of and interaction with others (i.e. social presence). However, this mediating impact of social presence was never explicitly measured or tested before. We propose the following hypothesis:

H9: Social presence will mediate the relationship between social setting and brand awareness.

Furthermore, studies following the social influence model (Dardis & Schmierbach, 2012; Fay & Liebman, 2012; Keller & Fay, 2012) argue that it is the increased emotional engagement (i.e. general emotions and specific player experiences) caused by the presence of others that is responsible for variations in brand awareness. Prior in-game advertising research strengthens this argument by showing that emotional experiences can indeed influence brand awareness (Grigorovici & Constantin, 2004; Herrewijn & Poels, 2013; Lee & Faber, 2007).

These studies have focused mainly on player experiences that are highly dependent on players' focus on and interest during gameplay such as arousal, immersion and flow. Results seem to show that these player experiences have a negative effect on people's recall and recognition of brands integrated into the game environment (Grigorovici & Constantin, 2004; Herrewijn & Poels, 2013; Lee & Faber, 2007). This effect can be attributed to the limited capacity model of mediated message processing (Lang, 2000). Game environments often present players with experiences that are highly immersive, involving and arousing (Grigorovici & Constantin, 2004). The limited capacity model states that a person's ability to process information is limited and such highly demanding environments tend to consume more of people's cognitive resources, resulting in people focussing their attention primarily on the most essential information and tasks at hand (i.e. the actual gameplay) while being distracted from secondary information (i.e. in-game advertising) (Grigorovici & Constantin, 2004; Klimmt & Vorderer, 2003; Lang, 2000).

A study from Herrewijn and Poels (2013) also demonstrates the importance of emotional valence, showing that positively-valenced player experiences (e.g. competence) can significantly increase the awareness of brands in a game environment. They base their explanation for this effect on the hedonic contingency theory (Lee and Sternthal, 1999; Wegener et al., 1995), which states that people who are in a positive state of mind are interested in sustaining this positive emotional state. As a consequence, they will analyse persuasive messages more closely for their hedonic consequences, resulting in a more elaborate processing of information.

Following these results, we formulate the following two hypotheses:

H10: Player experiences related to the player's focus during gameplay will mediate the relationship between social setting and brand awareness (i.e. limited capacity theory of mediated message processing).

H11: Player experiences related to emotional valence will mediate the relationship between social setting and brand awareness (i.e. hedonic contingency theory).

2. Method

In order to investigate the effects of social setting on brand awareness, we employed an experimental study that manipulated the social environment in which participants played a digital game containing IGA as a between-subjects factor, resulting in four experimental conditions. In the first condition, people played the experimental game alone, without a co-player and without being observed (i.e. single-player condition). In the second condition, two people played the experimental game together, in active collaboration (i.e. they had to work together to complete the game level) (i.e. multiplayer condition). The final two conditions contained people who also participated in the experiment together, but only one person actually played the experimental game (i.e. public play: player condition), while the other person had to watch (i.e. public play: observer condition).

2.1. Participants

121 people (82 male, 39 female), 18 to 24 years of age ($M_{age} = 20.7$, $SD_{age} = 1.8$) and of Belgian nationality participated in the experiment. The single-player condition included 31 participants, the three other conditions (multiplayer, public play: player and public play: observer) all contained 30 participants. In the multiplayer and public play conditions, people participated in pairs. All pairs consisted of friends who were of the same gender. Finally, all participants were required to have basic experience with playing digital games.

2.2. Materials

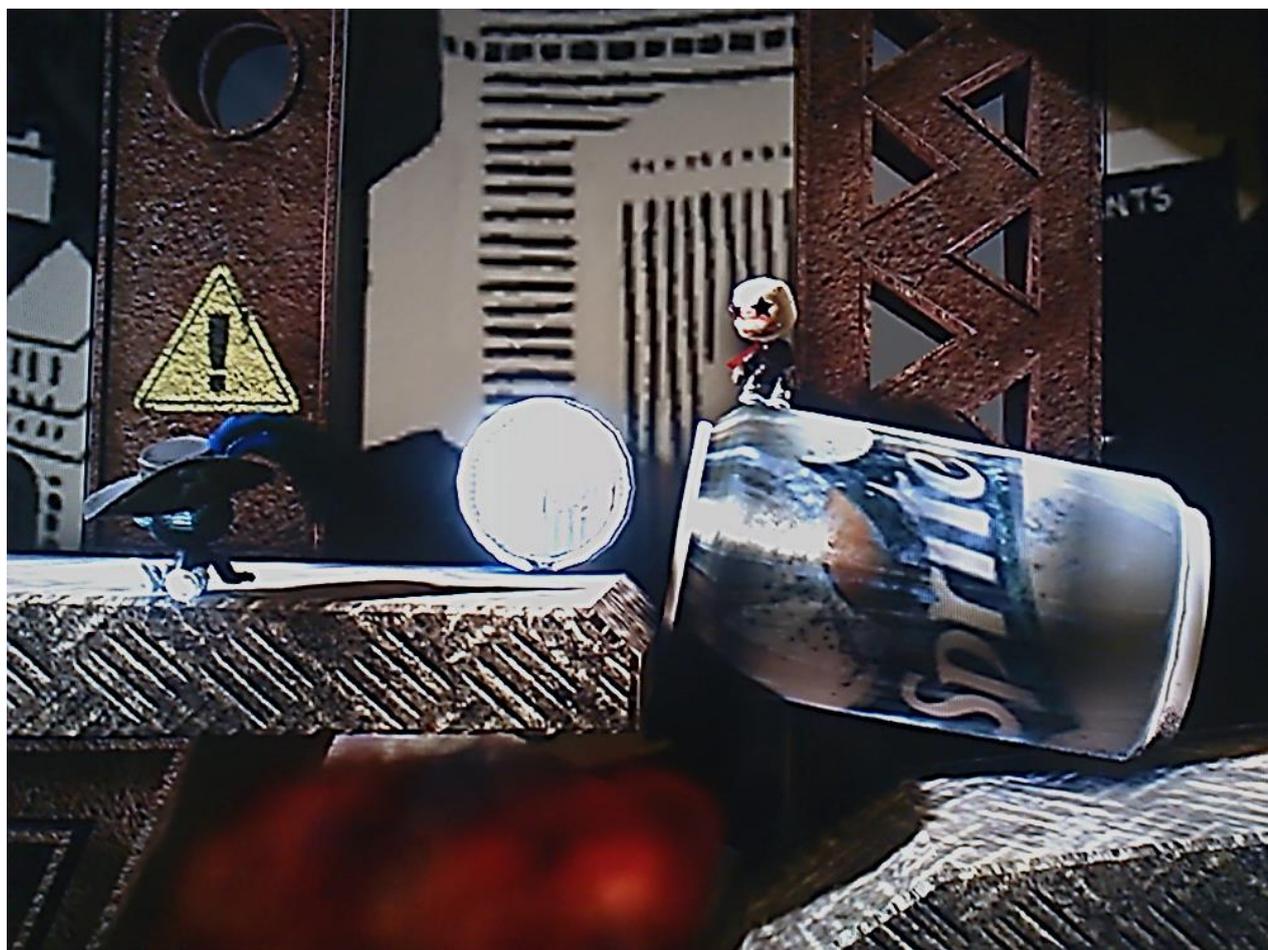
The game *LittleBigPlanet 2* (Media Molecule, 2011) was used in the experiment. *LittleBigPlanet 2* is a Sony PlayStation 3-exclusive puzzle platformer game that focuses heavily on social interaction and social play: the campaign mode can be played alone, or with up to three other people, online as well as in the same physical location. We chose to work with an existing and popular digital game [both in sales (“LittleBigPlanet 2”, 2014) and ratings (“LittleBigPlanet 2”, n.d.)] in order to increase the ecological validity of our study: we wanted the game to be fun and appealing, and the encounters with IGA to resemble the real-world situation.

As for the integration of in-game advertising, we incorporated background placements advertising the logos of four different brands (for an example, see *Figure 1*). These brands were real, existing brands from two product categories, i.e. clothing brands and soda brands that were selected based on a pre-test with 37 people (23 male, 14 female, $M_{age} = 22.0$, $SD_{age} = 3.1$). Per product category, we additionally included brands with varying degrees of familiarity, namely one well-known brand and one lesser-known brand. For the well-known brands, we selected brands that were familiar to 100 percent of the respondents, namely *Sprite* (soda) and *Nike* (clothing). For the lesser-known brands, we decided to integrate brands that were known by approximately 50 percent of the respondents: *Mountain Dew* (soda) and *Paul Frank* (clothing) [i.e. 50 percent of the respondents of

the pretest were familiar with the brands (although they had never used the brands themselves), while the other 50 percent of the respondents had never heard of the brands before]. The choice to integrate existing brands from disparate product categories and representing varying degrees of brand familiarity was made in order to recreate an encounter with IGA that resembled the practice in the real-world as closely as possible. In-game advertisements often feature several brands in the same game, and this way we could also investigate whether social setting has a different impact on various types of brands.

Figure 1

Example of a brand placement used in the experimental game level (LittleBigPlanet 2)



The experimental level featured a city environment, creating a realistic and plausible atmosphere for the inclusion of advertisements. The clothing brands (*Nike, Paul Frank*) were

integrated into the game by means of poster ads that were attached to walls, while the soda brands (*Sprite*, *Mountain Dew*) were integrated in the form of passive product placements (i.e. soda cans as part of the decor). These types of IGA (i.e. billboards/posters and product placements) are the most common forms of advertising inside digital games (Nelson, 2005; Herrewijn & Poels, 2014; Skalski, Bracken & Buncher, 2010). The brand logos featured on the brand placements all had the same size.

2.3. Procedure

The experiment took place in a lab room at the [name of university deleted] in [regional origin deleted]. In this game lab we had a *Sony PlayStation 3* console at our disposal, connected to a large flat-screen television. During the experiment, participants first played a tutorial level without IGA that explained how to play the game (e.g. run, jump, grab objects). This tutorial level took about eight to ten minutes to finish. After completing this tutorial level, the experimental level started, containing several in-game ads. Only the social setting in which the game was played differed between conditions, meaning all participants played the exact same level. The spatial lay-out, difficulty, story and objectives of the game all remained the same, as did the frequency of the in-game ads. The experimental level had an average play time of eight minutes.

Right after finishing the experimental level, participants were asked to fill out a questionnaire asking them about their player experience, i.e. the emotional experiences that were triggered during gameplay. This questionnaire measured the amount of social presence participants experienced, as well as several general emotions and more specific player experiences. Finally, after finishing the player experience questionnaire, participants were asked about their awareness of the brands that were integrated into the game, as well as their socio-demographic and gaming characteristics.

2.4. Measures

2.4.1. Social presence

Social presence, or the sense of being with another person, was measured by making use of the Social Presence module of the Game Experience Questionnaire (IJsselsteijn, de Kort & Poels, 2008). This scale includes statements regarding empathy with the other (e.g. “I empathized with the other”, “I felt connected to the other”) and behavioral involvement (e.g. “My actions depended on the other’s actions; I paid close attention to the other”) to which agreement is measured on a five-point intensity scale ranging from “not at all” (0) to “extremely” (4) (*Cronbach’s* $\alpha = .83$). This scale has been successfully used to measure social presence in a digital gaming context (e.g. Gajadhar, 2012).

2.4.2. General emotions as player experiences

When people play digital games, they will also experience several general emotions (Poels & Dewitte, 2006). General emotions are largely uncontrollable and spontaneous emotional reactions that are continuously present to some degree, like pleasure, arousal and dominance (Mehrabian & Russell, 1974; Poels & Dewitte, 2006). Pleasure refers to the pleasantness or enjoyment of a certain experience (Ravaja et al., 2005), arousal gives an indication of the level of physical and mental activation associated it (Ravaja et al., 2005), and dominance concerns the feeling of control and influence over others and surroundings (Gilroy et al., 2008; Klimmt et al., 2007). The general emotions the participants felt while playing the game were measured by using the Self-Assessment Manikin (SAM-scale) (Lang, 1980). The SAM-scale uses three nine-point visual scales on which participants had to indicate how much pleasure, arousal and dominance they felt while playing the game. Scale values ranged from 0 to 8, with ascending scores corresponding to higher pleasure, arousal and dominance ratings. This method is being used and has been validated in both advertising (e.g. Morris et al., 2002; Morris, 1995), gaming (e.g. Chanel et al., 2008; van den Hoogen et al.,

2008; van den Hoogen, IJsselsteijn, & de Kort, 2009) and in-game advertising research (Herrewijn & Poels, 2013).

2.4.3. *Specific player experiences*

Apart from the general emotions, digital gaming also has the potential to evoke a wealth of specific player experiences, such as challenge, competence, tension, flow, immersion, positive affect and negative affect (Poels et al., 2012; Jennett et al., 2008; Gilleade & Dix, 2004). These player experiences were measured by making use of the Game Experience Questionnaire (GEQ) (IJsselsteijn et al., 2008). The GEQ includes statements to which agreement is measured on a five-point intensity scale ranging from 0 (“not at all”) to 4 (“extremely”). Challenge measures the stimulation players perceive and the amount of effort they have to put into the game (e.g. “I felt challenged”, “I felt stimulated”; *Cronbach’s* $\alpha = .59$). Since the Cronbach’s α value of this scale was rather low, we decided not to include it in our analyses. Competence refers to how successful and skilful people feel while playing a game (e.g. “I felt successful”, “I felt skilful”; *Cronbach’s* $\alpha = .88$). Tension measures the degree to which players feel frustrated and annoyed (e.g. “I felt frustrated”, “I felt irritable”; *Cronbach’s* $\alpha = .66$). Flow indicates the experience of being absorbed into the game world, while being cut off from reality (e.g. “I forgot everything around me”, “I felt completely absorbed”; *Cronbach’s* $\alpha = .68$). Immersion measures the experience of being surrounded by the game, as a result from the interest in and appeal of the sensory and imaginative qualities of the game (e.g. “I was interested in the game’s story”, “I found it impressive”; *Cronbach’s* $\alpha = .78$). Positive affect probes players’ fun and enjoyment of the game (e.g. “I felt good”, “I enjoyed it”; *Cronbach’s* $\alpha = .79$). Negative affect is concerned with the degree to which players are feeling bored and distracted (e.g. “I felt bored”, “I found it tiresome”; *Cronbach’s* $\alpha = .74$). The Game Experience Questionnaire has been used in several gaming studies and is of sufficient quality to accurately report player experience (e.g. Gajadhar, 2012; Nacke, Grimshaw, & Lindley, 2010).

2.4.4. Brand awareness

Brand awareness was measured on three levels. First of all, participants were asked to spontaneously recall the brands they remembered encountering in the digital game (i.e. free recall). Subsequently, participants were presented with a list of brand names (i.e. brand name recognition), and a list of brand logos (i.e. brand logo recognition). In each case, participants had to indicate which brand names and brand logos they remembered seeing in-game. For each recognition measure, the four correct options were included, as well as eight filler items and an “I don’t know” option. The data that originated from these measures were combined into 1) brand awareness variables per integrated brand (*Sprite, Mountain Dew, Nike, Paul Frank*), and 2) brand awareness variables that indicate how many brands (names, logos) each participant correctly recalled or recognized in total (0 to 4).

2.4.5. Socio-demographic and gaming characteristics

Finally, participants were asked about their socio-demographic characteristics (e.g. gender, age) and their gaming profile (e.g. game expertise and frequency).

3. Results

To be able to analyze the effects of social setting on the effectiveness of in-game advertising, both directly and indirectly through the variation of player experiences, we conducted a between-subjects experiment containing four social conditions: participants either played the experimental game alone (single-player condition); together with someone else (multiplayer condition); or alone while another person watched (public play conditions: player; observer). Since respondents in the multiplayer and public play conditions participated in the experiment in dyads, we checked the relevant data for intra-class correlations (Kashy & Kenny, 2000). The correlations were non-

significant and did not show signs of non-independence. Consequently, we do not use dyadic data analysis in the current study.

In order to test the hypotheses laid down in the previous section, we first of all investigated the impact of social setting on a person's awareness of the brands integrated into the game by means of one-way analyses of variance (ANOVAs) and descriptive statistics (see *Table 1*). Results show that there are significant differences between experimental conditions for all three brand awareness variables [brand recall ($F(3, 117) = 6.626, p < .001$), brand name recognition ($F(3, 117) = 9.746, p < .001$) and brand logo recognition ($F(3, 117) = 8.797, p < .01$)]. Participants in the multiplayer group reported the lowest brand awareness, followed by participants in the single-player, public play: player and public play: observer groups. Tukey post-hoc tests show that the significant differences are particularly situated between the player and observer conditions. Observing participants recalled and recognized significantly more brands than players in the single-player and multiplayer conditions. The brand awareness levels of participants in the public play: player condition are situated right between the two extremes, only sometimes leading to significant differences with the other groups (see *Table 1*).

Based on these findings, we can accept *H2*, stating that actively playing a game leads to lower brand awareness compared to merely watching the gameplay of another person. However, we find no significant differences in brand awareness between players in the solo (i.e. single-player) context, and players in the social (i.e. multiplayer and public play: player) contexts, leading us to reject both *H1a* and *H1b*.

Table 1

The Impact of Social Setting on Brand Awareness

	Social setting				ANOVA <i>F</i> (3, 117)	<i>p</i>	Post-hoc test (Tukey)
	Single-player (A)	Multiplayer (B)	Public play: player (C)	Public play: observer (D)			
Brand awareness	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>			
Brand recall	.677 (.979)	.567 (.971)	1.133 (.973)	1.600 (1.102)	6.626	< .001	A < D** B < D***
Brand name recognition	.936 (1.209)	.567 (.935)	1.433 (1.104)	2.067 (1.285)	9.746	< .001	A < D*** B < C* B < D***
Brand logo recognition	1.226 (1.334)	.833 (1.053)	1.533 (1.137)	2.333 (1.155)	8.797	< .001	A < D** B < D*** C < D*

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Subsequently, we conducted a one-way ANOVA to examine the impact of social setting on social presence (see *Table 2*). Players in the single-player condition were not questioned about their social presence because they participated in the experiment alone. Therefore, they could not be aware of or interact with others, making it impossible for them to experience feelings of togetherness. Our results show that between the other experimental conditions, there are significant variations in social presence [$F(2, 86) = 11.430, p < .001$], with people in the multiplayer group experiencing the highest sense of social presence, followed by people in the public play: player and public play: observer groups. A Tukey post-hoc test demonstrates that these differences between social groups are significant (see *Table 2*). These findings are in line with the expectations formulated in *H3*: playing games in an increasingly social context leads to a higher sense of social presence. The multiplayer setting can be seen as the most social condition, since players had to actively interact with each other and work together to successfully finish the game. Respondents in the public play: player setting experienced significantly less social presence. Although they played the game in a social context (i.e. while being watched), the actual gameplay was experienced solo. Finally, results also provide

support for *H4*: people who actively play a game in a social context experience significantly higher levels of social presence than people who merely watch while others are playing, since they are the ones actually performing the task (i.e. controlling the game), making them more susceptible to social influence.

Table 2

The Impact of Social Setting on Social Presence

	Social setting				ANOVA	Post-hoc test (Tukey)	
	Single-player (A)	Multiplayer (B)	Public play: player (C)	Public play: observer (D)			
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	$F(2, 86)$	p	
Social presence	-	2.509 (.534)	2.156 (.570)	1.822 (.549)	11.430	< .001	B > C* B > D*** C > D°

Note: ° $p < .06$, * $p < .05$, ** $p < .01$, *** $p < .001$

Next, results of one-way ANOVAs demonstrate that variations in social context also affect the player experience (see *Tables 3* and *4*).

As for the general player emotions, the manipulation of social setting had a significant impact on arousal [$F(3, 117) = 3.895, p = .011$] and dominance [$F(3, 117) = 6.825, p < .001$] (see *Table 3*). Tukey post-hoc tests show that concerning arousal, the findings are in line with *H6*: playing in a multiplayer context is more arousing than playing in a single-player context. For dominance, results are more complicated. Based on prior game research studying the impact of social setting on player experience, we hypothesized that positively-valenced player experiences such as dominance would increase in intensity in a social context. However, in contrast with *H5*, the results show that players in the single-player context felt significantly more dominant than players in the multiplayer context. A possible explanation for this may be that players did not have enough time to balance their individual playing and communication styles during the experiment, resulting in a clumsy collaboration and a decreased sense of dominance. Moreover, players in the single-player and public

play: player conditions felt more dominant than people in the public play: observer group, a result that seems logical since observers do not actively control what happens in the game world. This finding is in line with the expectations formulated in *H7*.

We did not find significant differences between social groups concerning pleasure ($F(3, 117) = 1.320, NS$)).

Table 3

The Impact of Social Setting on General Player Emotions

	Social setting				ANOVA	Post-hoc test (Tukey)
	Single-player (A)	Multiplayer (B)	Public play: player (C)	Public play: observer (D)		
General player emotions	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	$F(3, 117)$	p
Pleasure	5.903 (.870)	6.067 (1.461)	5.900 (.960)	5.500 (1.225)	1.320	.271
Arousal	3.161 (1.791)	4.533 (1.592)	3.833 (1.416)	3.733 (1.461)	3.895	.011 A < B**
Dominance	5.258 (1.413)	4.267 (1.388)	4.633 (1.299)	3.733 (1.311)	6.825	< .001 A > B* A > D*** C > D°

Note: ° $p < .06$, * $p < .05$, ** $p < .01$, *** $p < .001$

Concerning the specific player experiences, variations in social setting led to significant differences in negative affect [$F(3, 117) = 3.611, p = .015$] and flow [$F(3, 102) = 3.255, p = .024$] (see *Table 4*). Tukey post-hoc tests demonstrate that these significant differences are situated primarily between the player and observer conditions. Providing support for both *H7* and *H8*, results confirm that people who merely watch another person's gameplay experience a lower sense of flow, and more negative affect (i.e. boredom). Again, this can be explained by the fact that observers do not have actual control over the game and therefore experience play-related emotions that are less intense (i.e. flow) on the one hand, and more boredom (i.e. negative affect) on the other.

We did not find significant differences between conditions for the other player experiences [competence ($F(3, 102) = .592, NS$), tension ($F(3, 117) = .258, NS$), immersion ($F(3, 117) = .533, NS$), positive affect ($F(3, 117) = .877, NS$)].

Table 4

The Impact of Social Setting on Specific Player Experiences

Specific player experiences	Social setting				ANOVA <i>F</i>	ANOVA (<i>df</i>)	ANOVA <i>p</i>	Post-hoc test (Tukey)
	Single-player (A)	Multiplayer (B)	Public play: player (C)	Public play: observer (D)				
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>				
Competence	2.568 (.893)	2.293 (.902)	2.520 (.751)	2.413 (.949)	.592	(3, 102)	.622	
Tension	.366 (.657)	.289 (.389)	.356 (.587)	.267 (.432)	.258	(3, 117)	.856	
Immersion	1.809 (.798)	1.978 (.669)	1.817 (.812)	1.733 (.801)	.533	(3, 117)	.661	
Positive affect	2.739 (.636)	2.907 (.696)	2.807 (.670)	2.640 (.627)	.877	(3, 117)	.455	
Negative affect	.140 (.331)	.089 (.276)	.122 (.223)	.333 (.411)	3.611	(3, 117)	.015	B < D° C < D°
Flow	2.181 (.981)	2.120 (1.549)	1.860 (.905)	1.380 (.870)	3.255	(3, 102)	.024	A > D* B > D°

Note: ° $p < .06$, * $p < .05$, ** $p < .01$, *** $p < .001$

Since we hypothesized that the player experiences might underlie the relationship between social setting and brand awareness, we subsequently tested for mediation. The first two conditions for mediation have been met by showing that social gaming setting indeed has a significant influence on 1) a person's brand awareness (brand recall, brand name recognition, brand logo recognition) and 2) their player experiences [social presence, general emotions (i.e. arousal, dominance) and specific player experiences (i.e. negative affect, flow)].

For the third step, we checked whether or not these player experiences and brand awareness variables are also significantly associated with each other by means of correlation analyses. Results show that brand recall is significantly and negatively associated with social presence ($r = -.386$, $N = 89$, $p < .001$), dominance ($r = -.190$, $N = 121$, $p = .037$) and flow ($r = -.212$, $N = 121$, $p = .019$).

Brand name recognition is significantly and negatively related to social presence ($r = -.398$, $N = 89$,

$p < .001$). Finally, brand logo recognition shows a significant negative relationship with social presence ($r = -.416$, $N = 89$, $p < .001$) and dominance ($r = -.214$, $N = 89$, $p = .019$).

Next, in order to get a detailed view on the relationships between social setting, player experience and the awareness of brands integrated into the game environment, we performed a series of mediation analyses using Preacher and Hayes' (2008) bootstrapping methodology for indirect effects (see *Table 5*). Results of these mediation tests show that, concerning brand recall, brand name recognition and brand logo recognition, the impact of social setting is reduced significantly when social presence is included, leading us to accept *H9*. Furthermore, social presence seems to have a negative effect on brand awareness (see *Table 5*). This result can be interpreted in light of the distraction theory, which argues that the presence of others distracts people from what is happening on-screen (e.g. Baron, 1986; Bellman et al., 2012). The effect of social setting does not seem to disappear entirely, however (i.e. partial mediation) (see *Table 5*). The effect of playing versus observing also remains significant, proving that interactivity still has an impact, with observers recalling and recognizing significantly more brands than players.

The other player experiences do not prove to be mediators of the relationship between social setting and brand awareness, resulting in a rejection of *H10* and *H11*.

Table 5

Mediation Analyses with Brand Awareness as the Dependent Variable, Social Setting as the Independent Variable and the Relevant Player Experiences as the Mediating Variables.

<i>DV</i>	<i>IV</i>	<i>R</i> ²	<i>B</i>	<i>t</i>	<i>p</i>	<i>BCa 95% CI</i>	
						<i>Lower</i>	<i>Upper</i>
Brand recall	PP: Player	.219***	.450	1.669	.099		
	PP: Observer		.796	2.700	.008		
	Social presence		-.501	-2.356	.021	.023	.440
	Dominance		.024	.277	.783	-.043	.115
	Flow		.050	.483	.631	-.135	.027
Brand name recognition	PP: Player	.271***	.683	2.307	.023		
	PP: Observer		1.161	3.608	.001		
	Social presence		-.465	-2.162	.033	.015	.450
Brand logo recognition	PP: Player	.304***	.616	2.109	.038		
	PP: Observer		1.238	3.888	< .001		
	Social presence		-.466	-2.186	.032	.001	.462
	Dominance		-.025	-.268	.789	-.121	.039

Note. $N = 89$, 5000 bootstrap samples

BCa 95% CI = Bias Corrected and Accelerated Bootstrapping Confidence Intervals. Confidence intervals containing zero are interpreted as not significant.

Social setting was divided into dichotomous variables: Single-player, Multiplayer, Public Play: Player and Public Play: Observer. Since shared involvement was not measured in the single-player condition, this condition is left out of the mediation analyses. The table shows the impact of the Public Play conditions in comparison to the Multiplayer condition, which is the reference variable.

Finally, because we integrated brands from various product categories (i.e. soda brands and clothing brands) and with differing levels of familiarity (well-known brands: *Sprite, Nike*; lesser-known brands: *Mountain Dew, Paul Frank*), we additionally tested the impact of these differences in brand type on brand awareness. In order to do this, we compared the scores of the four brands by means of repeated measures ANOVAs (see *Table 6*). Results reveal significant differences in brand awareness based on brand familiarity: well-known (versus lesser-known) brands achieve better brand awareness in an in-game advertising context. Concerning brand recall [$F(3, 360) = 14.187, p < .001$] and brand name recognition [$F(3, 360) = 11.744, p < .001$], results show that the mean scores of the different brands are indeed significantly different, with well-known brands achieving the highest

levels of brand recall and recognition. For brand logo recognition, the mean recognition scores of the brands still differ significantly [$F(3, 360) = 2.870, p = .036$], although they are much closer together (see *Table 6*). Product category does not seem to have a significant impact in the context of our study, since there are no significant differences between the brands of the same familiarity level.

Lastly, we checked if there was an interaction effect of social setting and brand type on participants' brand awareness rates. In order to do so, we conducted repeated measures ANOVAs with brand type as a within-subjects factor and social setting as a between-subjects factor. However, our findings reveal no significant interaction effects [brand recall: ($F(9, 351) = 1.853, p = NS$), brand name recognition ($F(9, 351) = .914, NS$), brand logo recognition ($F(9, 351) = 1.151, NS$)].

Table 6

The Impact of Brand Type on Brand Awareness

	Brand type				ANOVA	p	Post-hoc test (Bonferroni)
	Well-known brands		Lesser-known brands				
	Sprite (A)	Nike (B)	Mountain Dew (C)	Paul Frank (D)			
Brand awareness	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	$F(3, 360)$		
Brand recall	.380 (.487)	.322 (.469)	.190 (.394)	.099 (.300)	14.187	< .001	A > C*** A > D*** B > C* B > D***
Brand name recognition	.422 (.496)	.397 (.491)	.256 (.438)	.174 (.380)	11.744	< .001	A > C** A > D*** B > C* B > D***
Brand logo recognition	.446 (.499)	.397 (.491)	.306 (.463)	.331 (.472)	2.870	.036	A > C*

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

4. Conclusions

The aim of the study was to contribute to the research on the effectiveness of in-game advertising by addressing the impact of social setting on brand awareness (i.e. brand recall and recognition). In function of this, an experiment was conducted in which participants played a digital game containing IGA. The social environment in which the gaming session took place was manipulated as a between-subjects factor, resulting in four social conditions. Participants either played the experimental game alone (single-player condition); in collaboration with someone else (multiplayer condition); or alone while another person watched (public play conditions: player; observer).

The results of the study show that variations in social gaming context indeed have a significant effect on brand awareness. People participating in the multiplayer setting recorded the lowest brand awareness, followed by participants in the single-player, public play: player and public play: observer settings. The significant effects were particularly situated between the player versus observer conditions: people who merely observed the gameplay of another person were able to recall and recognize significantly more brands. This is in line with the study from Nelson et al. (2006), who found that watching a gameplay video containing IGA leads to enhanced recall compared to actively playing the same game. We thus replicate these findings in a social play setting, demonstrating that interactivity is an important factor in an in-game advertising context. People who merely observe others play digital games do not actively control or interact with the game environment themselves. As such, it seems that the cognitive resources that are required for the active control of a digital game may inhibit the processing of in-game ads [i.e. limited capacity model of mediated message processing (Lang, 2000)]. Players have to spend more of their cognitive resources on actually controlling and playing the game and have less cognitive capacity left for attending to secondary information such as IGA. Observers, on the other hand, can concentrate more on what is happening on the screen.

However, we found no significant differences in brand awareness between participants in the solo play (i.e. single-player) context and participants in the social play (i.e. multi-player and public play: player) contexts. Concerning solo versus social play, our results thus follow neither the distraction nor social influence theory. Moreover, our results oppose those of Dardis and Schmierbach (2012), who did find that playing a game together with a friendly partner leads to an increased ad recall compared to playing a game alone. They suggest that their findings are due to players' increased emotional engagement while gaming in the presence of other people, although they did not measure this.

In order to get a detailed view of the mechanisms that underlie the impact of social setting on IGA processing, we did measure players' emotional experiences during gameplay [i.e. social presence, general emotions (pleasure, arousal, dominance), specific player experiences (competence, tension, immersion, positive affect, negative affect, flow)] in our study. We find that between social settings, there are indeed significant variations in several player experiences. First of all, participants' sense of "being with another" or social presence differed significantly between social gaming conditions. Our results show that people in the multiplayer group experienced the highest levels of social presence, followed by people in the public play: player and public play: observer groups. This is in line with prior research by Gajadhar (2012), who showed that playing games in an increasingly social context has a positive impact on people's sense of social presence. The multiplayer setting can be seen as the most social condition, since players had to actively interact with each other and synchronize their behaviour in order to be able to work together. The public play: player setting can be considered as less social; although participants in this group played the game in a social context (i.e. while being watched), the actual gameplay was experienced solo. However, this setting is still more susceptible to social influence compared to the public play: observer condition, since participants in the latter group did not have to actually perform the task (i.e. controlling the game).

Moreover, the manipulation of social setting had a significant impact on participants' arousal, dominance, negative affect and flow. Players in the multiplayer context felt more aroused than players in the single-player context, a result that confirms the findings of prior game research studying the impact of social setting on player experience (Gajadhar, 2012; Mandryk & Inkpen, 2006; Ravaja, 2009; Ravaja et al., 2006). People in the single-player condition reported higher levels of dominance though. A possible explanation for this result may be that players did not have enough time to balance their individual playing and communication styles during the short period in which the experiment took place, resulting in a clumsy collaboration and the players feeling less dominant. Moreover, observers experienced less dominance and flow than players, and more negative affect. This result can be attributed to the fact that observers are not in control of what happens in the game and therefore experience play-related emotions that are less intense (i.e. dominance, flow) on the one hand, and more boredom (i.e. negative affect) on the other.

We did not, however, find significant differences between social groups concerning pleasure, positive affect, competence, tension and immersion. This may be due to the choice of the digital game that was used in the experiment. The experimental game level was set in the world of *LittleBigPlanet 2* (Media Molecule, 2011) a highly humoristic and aesthetically pleasing game. Additionally, the level was designed in a way that players could not die permanently before finishing the game (i.e. players could respawn infinitely when dying in-game), creating a positive and fun atmosphere that may be responsible for the high levels of positively-valenced emotions in all conditions. It is thus possible that the contrasts in results between our study and the study of Dardis and Schmierbach (2012) can be attributed to the fact that we did not find variations in emotional valence between our solo play and social play conditions.

In order to test whether the player experiences underlie the relationship between social setting and brand awareness, we subsequently tested for mediation. Results of the mediation analyses showed that the influence of social context is partially mediated by a person's sense of social

presence, with more social presence leading to lower brand awareness. This result is reminiscent of the distraction theory (e.g. Bellman et al., 2012), stating that the awareness of and interaction with others distracts people from what is happening on-screen, interfering with the processing of information. Although we did not find significant differences in brand awareness in solo versus social play contexts, it seems that within the social play conditions there is a social distraction effect. The social interactions that are necessary in a collaborative multi-player condition seem to be the most demanding, resulting in the highest sense of social presence and the lowest levels of brand awareness. The impact of playing versus watching also remained significant though, suggesting that both social presence and player interactivity have an effect on how people process advertisements encountered in a game.

Finally, we found that IGA has a different effect when different types of brands are integrated. Our results show that well-known brands generate a significantly better brand awareness compared to lesser-known brands. This can be explained by the fact that well-known brands are accessible objects that automatically attract attention, making them easier to remember (Nelson et al., 2006).

5. Practical Implications

The results of the study have interesting implications for the practice of in-game advertising, illustrating that social context is an important factor to take into consideration when selecting a game, game genre or game scenario in which to advertise.

First of all, the findings suggest that the presence of others can have a distracting impact on people playing a digital game in a social play (e.g. multiplayer or public play) context, resulting in them focusing primarily on the gameplay and less on secondary elements such as the passive advertisements integrated into the background of the game. In such a social play situation, it might be possible to turn the negative distraction effect around by actively embedding brands as a central

part of the gameplay and game strategies of players. For instance, it might not be very effective to integrate passive poster ads into a fast-paced multiplayer shooter game, but it could be interesting to incorporate product placements that can help players coordinate or that give a certain strategic advantage. For example, branded buildings could help players communicate strategic positions and give each other directions, players could take cover behind branded vehicles or billboards while firing at the opposing team, etcetera.

Moreover, the effects that we find concerning player interactivity also create opportunities for the IGA industry. Digital games continuously contrast play and watch situations, generating possibilities for the inclusion of advertisements. For instance, players often pause their gameplay, they take turns playing and watching games with their friends, observe the gameplay of their teammates or other players (e.g. watching gameplay videos on video sharing websites, observing other players in the spectator mode of multiplayer games) etcetera, giving advertisers the advantage of reaching both passive and active audiences. Finally, digital games often feature non-interactive cut scenes, offering another opportunity for the exposure to in-game advertising (Nelson et al., 2006).

6. Limitations and Future Directions

Although the study provides relevant insights in the way social setting affects the processing of IGA, there are also some limitations to consider. First of all, the study employs a laboratory experiment in which people are asked to play a specific digital game in an artificially created social environment. The game *LittleBigPlanet 2* (Media Molecule, 2011) was chosen because it is a good example of a game that can be played in either a solo or social play setting. The campaign mode of the game can be played in single-player mode, or with up to three other players, both online and in the same physical space. However, since we only employed one digital game and chose to work with a certain subset of social situations (e.g. people in the social play situations participated in the immediate presence of a friend of the same gender), we cannot claim that the results of the study are

applicable to all types of digital games. A lot of different game platforms (e.g. *PC*, *Sony PlayStation 3*, *Microsoft Xbox 360*), game genres (e.g. shooter games, role-playing games, puzzle games) and instances of social play (e.g. single-player, multiplayer (online versus in the same physical space, competitive versus collaborative), public play) exist, all possibly affecting the player in different ways, both cognitively and affectively. It would therefore be interesting for future studies to examine the impact of social setting on the effectiveness of IGA in a variety of digital games and social play situations.

Following the results of the current study, it would be particularly interesting to further study the impact of playing versus observing. We studied this type of social setting in the simplest way possible, by letting one person actually play the game, while another person had to watch. The observer could help the player and cheer him on, but he did not get a chance to play the game himself afterwards. However, in real life, people often take turns when playing games in a co-located public play setting. It would thus be relevant to study how turn-taking behaviour affects the way in which people are aware of brand placements embedded in the game environment.

There are also some limitations associated with the choice of the brands integrated into the experimental game. In the current study, we worked with brands from two product categories (i.e. soda brands and clothing brands) that differed in familiarity (i.e. well-known and lesser-known brands). Moreover, we worked with static in-game advertising in the form of passive poster ads and product placements that were included in the background of the game environment. However, there are a lot of different types of brands (e.g. different product categories, different degrees of familiarity) that can be integrated into digital games by means of a wide variety of advertising formats (e.g. sponsorship, billboards, product placements) in a multitude of way (static versus dynamic, passive versus interactive) (Herrewijn & Poels, 2014). The results must therefore be seen in the specific context of the experiment, and cannot be generalized to all types of brands and IGA.

Furthermore, the current paper focuses on the impact of social setting on brand awareness. However, we measured IGA effectiveness in terms of brand evaluation (i.e. brand attitude and purchase intention) as well. We did not expect to find an effect of our manipulations on brand attitude or purchase intention, though, since participants only played for a short while. Moreover, the game featured real, existing brands in order to create a realistic encounter with IGA. We thought it unlikely that the limited exposure to IGA (due to the short playing duration) would lead to significant changes in the evaluations of these established brands. Our findings show that this is indeed the case: the manipulations did not lead to significant changes in attitudes or the intention to buy the products. Therefore, we did not include the results concerning brand evaluation in the current paper.

Finally, consistent with and building on the previous point, the current study is also limited in the fact that it only investigated short-term effects of social setting on the effectiveness of IGA. During the experiment, people played the level containing IGA for approximately eight minutes. However, in real life, game levels usually have a longer duration and are often played more than once. It would therefore be highly interesting to inspect whether or not the results found in this study hold or vary in the long term, and whether long-term exposure to IGA has an impact on brand evaluations (i.e. brand attitude and purchase intention).

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