Size Does Matter: Effects of In-Game Advertising Stimuli on Brand Recall and Brand Recognition

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Abstract

Rapid growth in the global gaming industry has created substantial opportunities for marketers. The potential and effectiveness of in-game advertising have attracted increasing attention from academics. Drawing on product placement literature, this study explores the influence of size (small, large), order (primacy, recency) and level of absorption (low, high) on consumer memory (brand recall and recognition) of well-known brands placed in a racing game. Using a controlled experiment, 285 participants were recruited to play the sports video game *Trackmania 2 Canyon*. Results indicate a positive effect of size, but order and level of absorption had no effect on brand recall and brand recognition. In particular, large size brands are recalled and recognised significantly better. Findings offer important implications for marketers in a global gaming industry that is steadily growing.

Keywords − In-game advertising, product placement, brand recognition, brand recall, size, memory

1. Introduction

In a world where the television industry is fragmented and less popular as a leisure activity, "games are rapidly becoming the world's favorite pastime" (Newzoo, 2017: 5) and as such are a means to "target audiences in an indirect and engaging way" (Marti-Parreño, Bermejo-Berros, & Aldás-Manzano, 2017: 55). Although gaming in the past was a niche activity (Hamari & Keronen, 2017), it is now a mass-market activity appealing to various age, gender and social groups. The traditional profile of the gamer, a lone young male, no longer holds. A report by ESA (2017) highlighted that adult females account for a higher percentage of gamers than males aged less than eighteen years old (31% versus 19%).

With global spend reaching $109 billion dollars in 2017 (Newzoo, 2017) the gaming industry offers substantial opportunities for marketing communications and advertising. For example, a study by market research company Nielsen in collaboration with game maker Electronic Arts Inc. (EA) found that in-game advertising increases real-life spend on Gatorade by 24% (Guzman, 2010). Politicians have been drawn to in-game advertising as a means to reach certain target markets exemplified by Barack Obama's billboard advertisement in the race car game Burnout Paradise (Elsworth, 2008).

In 2002 Nelson published the seminal in-game advertising article and it "represents the beginning of this rich area" (Daugherty, 2004: 1). Given the potential of in-game advertising, it is surprising that academic studies on the topic remain limited (Harwood & Garry, 2015; Park & Kim, 2013). As far back as 2009, Taylor (2009) highlighted the developing role of product placement in new media and new contexts such as computer games, and emphasised the need for further research. Wilson and Till (2011), in their study of Broadway theatre goers, echoed the request for academics to turn their focus on product placement in media other than film and television.

Previous studies indicate that product placements do not deter gamers (Molesworth, 2006; Nelson, 2002). In-game product placements enhance realism in sports games, aside from generating income revenue (Molesworth, 2006; Nelson, 2002; Nelson, Keum & Yaros, 2004). Studies exploring the impact of product placement in games primarily focus on individual differences with respect to attitudes: attitude to placement (Huang & Yang, 2012; Nelson, Keum & Yaros., 2004; Winkler & Buckner, 2006), attitude to advertising (Mau, Silberer & Constien, 2008; Winkler & Buckner, 2006), attitude to the brand (Hwang, Ballouli, So & Heere, 2017; Steffen, Mau & Schramm-Klein, 2013; van Reijmersdal, Lammers, Rozendaal & Buijzen, 2015; Vashist, 2018) and attitude to game (Steffen, Mau & Schramm-Klein, 2013; Nelson, Yaros & Keum, 2006).

Balasubramanian, Jarrh and Patwardhan (2006), in their comprehensive review noted the lack of emphasis on 'execution factors' such as prominence. Prominence in product placement relates to a high visibility factor by "virtue of size or position on the screen or its centrality to the action in a scene" (Gupta & Lord, 1998: 49). Although few studies consider prominence from a focal versus peripheral perspective (Lee & Faber, 2007; Schneider & Cornwell, 2005), no studies have to date investigated the actual size of the placement in a game (Leclerq, Hammedi & Poncin, 2017).

To address the literature gap (see Acar, 2007; Hofacker, de Ruyter, Lurie, Manchanda & Donaldson, 2016), this study operationalizes brand prominence in terms of the size of product placements in games. In other contexts such as film and television, prominence by virtue of size contributes to brand recall (Bressoud, Lehu & Russell, 2010; Homer, 1995; Wilson & Till, 2011). In addition, prominence also relates to the position of products' placement creating a primacy versus recency effect. Accordingly, the main objective of this study is to explore the effect of size (small, large) and order (primacy, recency) on consumer memory (brand recall and brand recognition) of well known brands placed in a racing game.

Finally, the study also investigates the influence of participants' absorption levels on memory.

2. Literature Review and Hypotheses Development

2.1 Product Placement

Research on product placement in traditional media (television and films) continues to grow (e.g. Coker & Altobello, 2018; Gillespie, Muehling, & Kareklas, 2018) and has evolved to encompass music videos (Schemer, Matthes, Wirth & Textor, 2008), novels (Brennan, 2008; Storm & Stoller, 2015), social media (Liu et al., 2015) and computer games (Nelson, 2002). Schneider and Cornwell (2005: 323) define product placement as "the inclusion of a brand name, product, or logo within a scripted medium and is ostensibly integrated with this medium". In their review, van Reijmersdal, Neijens & Smit, (2009: 429) define product placement as "the purposeful incorporation of brands into editorial content". Product placement is not necessarily the inclusion of the actual product but can also be the insertion of a billboard with the brand's advertising message (Gupta & Lord, 1998; Marti-Parreño, Bermejo-Berros & Aldás-Manzano, 2017).

In the context of in-game product placement research (Huotari & Hamari, 2017), car racing games remain the main focus to date (e.g. Gangadharbatla, 2016; Lee & Faber, 2007; Mackay, Ewing, Newton & Windisch, 2009; Nelson, 2002; Schneider & Cornwell, 2005) although a small number of studies focus on first person shooter games (e.g. Chaney, Lin & Chaney, 2004; Mau, Silberer & Constien, 2008; Seaborn & Fels, 2015; Yoo & Peña, 2011) and sports games such as tennis (Hwang, Ballouli, So & Heere, 2017). Results show that the genre of game has a differential impact on the effectiveness of product placement strategy. For example, in a study using a role playing game, van Reijmersdal, Jansz, Peters and van Noort (2010) found that attitude toward the game is positively affected by product placement.

However, contrasting findings were revealed in Mau, Silberer and Constien's (2008) first person shooter game study in which attitude towards the game is affected by the use of product placement in the game.

Studies of product placement in games tend to employ brand recall and/ or recognition as cognitive outcome variables when testing for effect (Müller-Stewens, Schlager, Häubls & Herrmann, 2016; Siemens, Smith & Fisher, 2015)). In Nelson's (2002) study, players were required to recall brands immediately after playing the game and then at a later date. Results showed the negative impact of time on recall with the game completion recall of 25 to 30 percent of brands being reduced to 10 to 15 percent five months later. Siemens, Smith and Fisher (2105) car racing experiment resulted in 21 percent recall although this increased to 26 percent for cued recall. Familiar brands tend to be recalled at a higher rate than unfamiliar brands (Marti-Parreño, Bermejo-Berros, & Aldás-Manzano, 2017).

In a study using a first person shooter game, Chaney, Lin and Chaney (2004) found that fifty per cent of the players were unable to recall any of the brands or products. Poor results were found in another first person shooter game study with only one in four brands being recalled and two in four brands being recognised (Yoo & Peña, 2011). In an experiment, Lull, Cruz, Gibson and Bushman (2018) show that playing a violent video game impairs memory of the in-game brands. Moreover, players of a tennis game had low levels of recall regardless of whether the game was in 'easy' or 'hard' mode (Hwang, Ballouli, So & Heere, 2017). However, speed has an effect with high-speed games resulting in lower recall levels (Vashisht & Royne, 2016). In addition, it has been shown that repeatedly playing a game has no effect on brand recall (Cauberghe & De Pelsmacker, 2010).

Such low recall for product placement relates to the limited capacity model of information processing (Yoo & Peña, 2011). The interactivity of the media i.e. the act of

playing the game leaves little cognitive ability to 'take in' peripheral information such as the product placement. This is confirmed in studies that show spectators of games have recall levels up to five times greater than those actually playing the game (Gangadharbatla, 2016; Nelson & Devanathan, 2006). Furthermore, players' game experience has no effect on recall rates (Gross, 2010). According to Chaney, Lin and Chaney (2004: 43), "gamers at every experience level are just as likely to be immersed in the game with limited processing ability for peripherals such as billboards".

A comparative study of product placement in four different contexts revealed that video games and music placements were perceived more negatively than television and film placement (Sung & de Gregorio, 2008). This may be as a result of the longer tradition of the latter two contexts. The effect of the product placement on the consumer is somewhat different between computer games and other contexts. For example, watching a television program or a film is a passive action, whereas a computer gamer actively interacts with the game. This interactivity might severely distract from noticing the placements suggesting there might be differences in results of studies between games and traditional media (Schneider & Cornwell, 2005; Yang, Roskos-Ewoldsen, Dinu & Arpan, 2006).

Walsh, Kim and Ross (2008) study showed that participants watching a televised NASCAR race were able to correctly recall more brands than those playing the NASCAR video game. The authors concluded that, "participants in the video game group had the extra mental burden of having to manipulate the game controller to advance throughout the video game, while those in the television group had few competitors for their attention to the brands that appeared during the televised race" (Walsh, Kim & Ross, 2008: 206). This reflects real-world car racing situation where drivers are concentrated on avoiding both spin-offs and other competitors, ignoring peripheral materials. The billboards are a marketing strategy for disseminating messages to spectators who can take in the surroundings while watching the

track action. Billboards are not an attempt to reach the drivers for whom diversion of concentration will likely have negative consequences.

2.2 Size of Product Placement

In advertising research, it has been shown that consumers are more likely to pay attention to, as well as recall larger ads (Homer, 1995). Van Reijmersdal (2009: 151) notes, "a prominent placement is more deeply processed and that leads to increased memory", however, in certain circumstances prominent brand placement can lead to negative brand attitude. Cowley and Barron (2008) revealed that whether the attitude to a prominent placement is negative or positive is a factor of their degree of program liking, i.e. the higher level of television program liking shifts brand attitude negatively and a lower level of program liking shifts brand attitude in a positive direction.

The literature on the effect of size in advertising was initially published in psychology journals in the 1920s with studies employing recognition and recall tests (Hendon, 1973). Starch's "Square root law" evolved from these earlier studies to explain the size and recognition relationship. Specifically, "as one increases the size of the advertising message, the permanency of impression increases approximately with the square root of the increase in area" (Hendon, 1973: 40). It is not merely 'permanency of impression' that results from an increase in message size, but attitude toward the product or brand is also more favourable for larger advertisements (Percy & Rossiter, 1982).

In a study of Internet banner advertisements, Li and Bukovac (1999) confirm that the effect of advertising increases as the size of the banner increases. Larger banner result in both enhanced reaction time and more clicks than small banner advertisements. However, involvement in the advertisement message can moderate the effect induced by the advertisement's size. Han's (1992) study highlights that larger advertisements are better

recalled when there is a moderate level of product involvement, and no such difference exists in the low involvement situation.

In addition, prominent product placements in movies, theatre shows and social media have higher recall than that for subtle placements (Gupta & Lord, 1998; Liu, Chou & Liao, 2015; Wilson & Till, 2011). In the context of games on mobile phones, recall has been shown to be highest when the brand is embedded in the focal rather than the peripheral area (Lin, 2014). Bressoud, Lehu & Russell (2010) further confirmed the impact of size on recall for product placements in movies and noted that larger screens increase the product placement size effect. The overriding conclusion is that, "the more prominent the brand placement, the better the audience's memory" (van Reijmersdal, 2009: 151). However, marketers should take note of the findings of another movie study highlighting the negative effect of more prominent product placement on the host brand (Marchand, Hennig-Thurau & Best, 2015).

In the computer games literature, prominence has been defined in terms of whether the placement is in a subtle or a focal position. Lee & Faber (2007) employed proximity as a measure of prominence and found that in a racing game product placements in focal positions were better remembered than those placed in the periphery and the effect was greatest for those players who were less experienced. Two further games studies confirmed that brands prominently placed were recalled at a better rate than those placed subtly (Cauberghe & De Pelsmacker, 2010; Schneider & Cornwell, 2005). Nelson's (2002) study suggested that size of the product placement did not affect level of recall, however, this contradictory finding may be a result of comparing different types of product placements: billboards (large) versus guardrails (small) rather than two differing sizes of billboards.

The study of outdoor billboards by Wilson, Back & Till (2011) involved students driving though a pre-determined route through the city exposing them to 68 billboards. Findings indicate that billboard size and fewer words in the copy were contributing factors to

recognition rates. Real-life driving situation studies have shown that when driving at faster speeds traffic signs need to be larger to be noticed and effective (Hendon, 1973). Furthermore, the UK Traffic Signs Manual (2008) developed from studies over time, confirms that size requirement of signs for a 60mph road must be 100% larger than signs developed for the 20mph road. In a racing game where players attempt to manoeuvre around the track at the fastest speed possible, to gain attention, billboards need to be bigger. Thus, the following hypotheses are formulated:

$H1_a$: Large size brand placements in the game results in higher recall rates than small size brand placements.

$H1_b$: Large size brand placements in the game results in higher recognition rates than small size brand placements.

2.3 Order of Appearance

Message order (first or last) in a sequence of advertisements has major bearing on attention and recall. Although some evidence supports a recency effect (the last presented information such as advertisement or placement is remembered better), majority literature supports the primacy effect (Gupta & Gould, 2007). For example, Terry (2005) found a primacy effect when viewers recalled a sequence of television advertisements inserted at the beginning, middle and end of a situation comedy program. Of the twelve advertisements presented at each stage, on average 6.8 were recalled for the first stage, 5.0 for the middle stage and 4.8 for the final stage. The difference between recall of advertisements from the first and last stages was significant. The primacy effect holds for both genders when there is a high level of involvement (Brunel & Nelson, 2003).

Two further studies of television advertisements during the Super Bowl confirm advertisements and brands placed in the first advertisement break make the more lasting impression (Li, 2010; Newell & Wu, 2003). The literature on product placements in movies provides evidence for and against a primacy effect. Bressoud, Lehu and Russell (2010) revealed that products placed early in a movie have a better recall rate whereas in a study comparing product placement in movies and on Broadway for both contexts product placements in the first half were not recalled significantly more than those in the second half (Wilson & Till, 2011).

In a study of game shows, the authors found strong support for a primacy effect with higher recall for those product placements positioned in the first half of the program. In the same study, there was a lack of support for a recency effect, suggesting location is particularly salient when developing product placement strategies (Gupta & Gould, 2007). In a review of factors that influence the effect of product placement, van Reijmersdal, Neijens and Smit (2009) identified six studies concerned with the beginning or end position of the placement and of these five showed a significant order effect relationship.

Drawing on primacy theory, it is suggested that the first product placement in a computer game is likely to be recalled more than subsequent product placements. Reasons for this phenomenon relate to involvement and clutter. Players of a game have more mental capacity to attend to the first message and as involvement in the game increases there is limited mental capacity to attend to the product placement (Lang, 2000). Furthermore, primacy theory suggests there is a 'clutter effect' in that "subsequent commercials suffer from the cumulative interference of the previous commercials, resulting in decreasing levels of attention and recall" (Newell & Wu, 2003: 58). Hence, the following hypotheses are proposed:

H2ₐ: Brands positioned first (primacy effect) will result in higher recall than brands positioned last (recency effect).

H2ᵦ: Brands positioned first (primacy effect) will result in higher recognition than brands positioned last (recency effect).

2.4 Affective States

The advertising literature shows that consumers' affective states (e.g. pleasure and arousal) has an impact on the processing abilities of marketing messages both in a positive and negative manner (Bakamitsos & Siomkos, 2004; Chang, 2009). Researchers on product placement also investigate the link between affective involvement and recall and attitude to product placement (Nebenzahl & Secunda, 1993). For example, Pokrywczynski's (2005) findings reveal that recall of product placements was higher for the 'more involving' movie situation. In another study of product placement in movies using Mehrabian and Russell's (1974) pleasure-arousal-dominance (PAD) framework, pleasure was positively related to recognition but the influence of arousal was not significant (Scott & Craig-Lees, 2010). Scott and Craig-Lees (2010) note that 'feel-good' movies are likely to elicit stronger product placement effects.

One of the earliest studies to consider affective state in the context of computer games revealed that high levels of engagement lead to lower recall (Grigorovici & Constanin, 2004), suggesting the more immersed a player is in the game, capacity to remember products and brands decreases. Furthermore, findings support the view that the more involved a player is in the game the fewer resources are available to attend to the product placements leading to reduced recall (Lee & Faber, 2007). These findings contradict the literature on product placements in the context of television and movies where the recall of product placements increases as viewers' involvement increases (Balasubramanian, Jarrh & Patwardhan, 2006).

In a gaming situation, the term telepresence has been employed to describe "participants' immersion or transportation 'inside the game'" (Nelson, Yaros & Keum, 2006: 88). Telepresence is conceptualised as having two dimensions: one being *arrival* (being present in the game environment) and the other *departure* (not being present in the immediate physical environment). Two studies of telepresence agree with findings from the involvement studies in that there is no positive link to brand recall. Nelson, Yaros and Keum's (2006) results show that telepresence had no effect on recall of either real or fictitious brands regardless of whether the person was watching or playing the game. Furthermore, in Gangadharbatla's (2008) racing game study, telepresence had a negative effect on recall of brands. As such, players were concentrated on their primary goal of manipulating the car around the track as competitively as possible ignoring all peripheral visuals not contributing to this activity. The nature of the game may be a determining factor for the presence-recall impact. The previous studies were all from the race car genre and the situation might be different for other types of games (Terlutter & Capella, 2013). For example, in a study involving a first person shooter game, presence positively influenced brand recall (Jeong, Bohl & Biocca, 2011).

Drawing on online consumer research, the affective state of 'flow' (Wiebe, Lamb, Hardy & Sharek, 2014) might be a contributing factor to the effectiveness of product placement in the interactive world of computer games (Novak, Hoffman & Yung, 2000). Flow has been described as "an enjoyable state of focussed attention that appears to require, at the minimum, interest and an adequate level of challenge. Elements of flow include total concentration, an intrinsic enjoyment from the process of the activity, a distortion of time passing, lack of self-consciousness and the sense of complete control" (Schneider & Cornwell, 2005: 326). Similar to previously discussed studies on immersion and involvement

in computer games, a study of racing car gamers highlight the lack of significant relationship between flow and recall or recognition (Schneider & Cornwell, 2005).

In a similar vein, recall for the advertisement content of television programs is low for programs identified as absorbing in nature (Furnham, Gunter & Richardson, 2002). In the context of computer games, Wood, Griffiths, Chappell and Davies (2004) revealed rapid absorption to be of considerable importance to the experience of playing a game. In car racing games where speed is a major determinant of winning, the anticipation is that players will be drawn quickly into the game and absorbed into the action. Once absorbed, there is little or no cognitive capacity for players to pay attention to peripheral visuals regardless of position or size. Thus, we hypothesize that:

H3$_a$: Players with high levels of absorption will recall fewer brand placements than players with low levels of absorption.

H3$_b$: Players with high levels of absorption will recognise fewer brand placements than players with low levels of absorption.

3. Method

3.1 Design

The hypotheses were tested in a 2 (size) x 2 (primacy) between-subjects factorial design. Four conditions plus a control were employed to test the hypotheses. To test whether size of the brand placement had an effect on recall and recognition, involved conditions with either large billboards (N=58) or billboards reduced by 50 per cent in size (N=58). To test whether there is a primacy/recency effect, ordering of one of the brands was changed with the Coca-Cola brand shown first in the 'primacy' condition (N=62) and last for the 'recency' condition (N=58). The control group (N=49) had all billboards removed.

3.2 Stimuli

The sports video game *Trackmania 2 Canyon* was selected for the study. Racing games are appropriate to study product placements (Siemens, Smith & Fisher, 2015; Sung & de Gregorio, 2008). Trackmania 2 Canyon enables customization of the track and peripheral objects. Billboards of well-known brands were inserted into the game. One hundred and sixty post-graduate business students from two British universities were given a top of mind awareness exercise to list ten global brands. Based on the list, we selected four brands: Apple, Coca-Cola, Nike and BMW. Billboards for the brands were strategically placed around the track to ensure participants in each of the experimental conditions have equal exposure time to the stimuli.

3.3 Participants and Procedure

Participants were recruited from a large university located in the south east of England. Students were sent an invite via email and notices were displayed on campus. The research was promoted as a study on attitudes toward games with no mention of in-game advertising. A total of 285 students participated in the experiment over a two-day period. To avoid the artificial setting of large computer labs, the experiments were conducted in a seminar room, resulting in higher attention to the stimuli (van Reijmersdal, Neijens & Smit, 2009). Participants were randomly allocated to one of the five conditions. The sampling procedure resulted in a diversified sample in relation to gender (46% female, 54% male) and age (range 18-40 years, *M*=21 years). The sample meets current trends in gaming in terms of demographic profile (see Seounmi, Lee, & Doyle, 2013). Most participants were regular computer or video game players. Only a small proportion (*N*=38; 13%) revealed they rarely engage in gaming activities.

The game involved relatively simple playing controls. Each participant was given an X-Box 360 controller and a headset with instructions on how to use them explained verbally at the beginning of each session. In addition, alongside each monitor was an annotated picture of the controller displaying buttons for acceleration, braking and steering. The game was played on identical 17-inch computer screen with the game's sound on. All participants were given one practice lap (no billboards). Nelson, Yaros and Keum (2006) recommend limiting the number laps participants are allowed to complete. For the main study, to test for primacy and recency effects, participants had to complete just one lap as additional laps meant further exposure to the billboards. To instil a sense of competition, we informed participants that the top 10 fastest times would receive a prize (£10 Amazon voucher). A list of the top ten fastest laps was continually updated and displayed on a separate large screen. After completing the lap, participants were taken to another room to complete the survey.

3.4 Measures

3.4.1 Brand Recall

Similar to previous studies (e.g. Mackay, Ewing, Newton & Windisch, 2009; Nelson, Yaros & Keum, 2006; Sreejesh & Anusree, 2017; Sreejesh, Anusree & Ponnam, 2018; Vashisht & Royne, 2016; Walsh, Kim & Ross, 2008), brand recall was measured by asking participants to list all brands they remembered seeing while playing the game. Recall was a dichotomous variable (i.e. recall or no recall). In line with prior studies (e.g. Coker & Altobello, 2018; Jin, 2004; Lee & Faber, 2007), a brand recall metric was created; the highest recall score possible was four and the minimum zero. Mean brand recall was 0.81 ($SD = .86$).

3.4.2 Brand Recognition

Brand recognition was measured by presenting participants a list of twelve possible brands. Consistent with previous studies (e.g. Herrewijn & Poels, 2015), subjects had to indicate whether or not they recognise the brands appearing in the racing game. Out of the twelve brands presented to participants, only four had actually appeared in the game (targets) and the remaining brand names were foils (e.g. Pepsi, Mercedes). The highest possible recognition score was four and the minimum zero. Such a procedure only considers correct answers and controls for false reporting. For example, selecting the foil brand Pepsi does not increase brand recognition. Mean brand recognition was 1.03 (SD = .98). As noted previously studies highlight low levels of recall and recognition, however, it has been shown to increase when participants have 'active control' in deciding on the brands within the game (Siemens, Smith & Fisher, 2015).

3.4.3 Level of Absorption

Level of absorption was measured by asking participants how they felt while playing the game using 8 adjectives: absorbing, engaging, enjoyable, entertaining, exciting, interesting, involving and stimulating. The scale was adapted from previous studies (Furnham, Gunter & Richardson, 2002; Gupta & Lord, 1998; Scott & Craig-Lees, 2010) on product placement in television and movies.

3.4.4 Gaming Experience

Similar to previous studies (e.g. Chaney, Lin & Chaney, 2004), gaming experience was measured using frequency and level of expertise in playing online, computer or console based video experience. Participants were asked, on average, how often they engaged in gaming activities: "at least every day", "about every other day", "about once a week", "about once a month" and "rarely or never" (Gross, 2010). Level of gaming expertise was measured

using three 7-point bipolar adjectives (α: 0.97): beginner/expert, bad/very good, novice/very skilled (Gangadharbatla, 2008).

4. Results

4.1 Randomization and Test Effects

The control and experimental groups did not differ from each other with respect to gender, age, and attitude toward the game ($p > 0.05$). Differences between the groups regarding brand recall and brand recognition cannot be caused by differences in these background variables. Thus any differences in brand recall and brand recognition in the experimental groups is a result of playing the game.

4.2 Recall of Brand Names

To examine the effects of size on recall of brand names, the proportion of the 4 target brands correctly identified by each participant was analysed using one-way ANOVA (analysis of variance) with three conditions (small size billboards, large size billboards and the control group). As expected, the proportion of the 4 target brand names recalled was higher for those participants who were exposed to larger size billboards [$M = .89$, $F(2,284) = 22.9$, $p < .001$] than the proportion correctly completed by participants in the small size billboards condition ($M = .72$) and the control group (no participants recalled any brands). Planned contrasts confirmed that the performance of players (measured in terms of lap time in minutes) in each of the three conditions were not significant different [$M_{\text{large size}} = 1.235$; $M_{\text{small size}} = 1.287$; $M_{\text{control}} = 1.262$; $F(2,284)=0.41$, $p=.66$]. Therefore H1$_a$ was supported.

To examine order effects (primacy versus recency) on brand recall, we manipulated the appearance order of the Coca-Cola brand. In the 'primacy' condition, the Coca-Cola billboard was shown at the beginning of the game and the brand appeared last in the

'recency' condition. ANOVA was used to test for primacy/recency effects on participants recall of the Coca-Cola brand. Contrary to our expectations, appearance order does not have a significant effect on brand recall ($F(1,118) = .029$, $p > .001$). Participants in the primacy condition did not recall the Coca-Cola brand better than did participants in the recency condition, $M_{primacy} = 0.19$ versus $M_{recency} = 0.18$. Thus, H2$_a$ is not supported.

H3$_a$ hypothesized that the more absorbed players will recall fewer brands in the game, compared to the less absorbed players. In order to test this hypothesis, items from the absorption scale were summated. A median split procedure (MacCallum, Zhang, Preacher & Rucker, 2002) was performed to derive categorical classifications of high versus low absorption. Contrary to our predictions, level of absorption does not have a significant effect on brand recall ($F(1,233) = .006$, $p > .001$). Participants with lower level of game absorption did not recall the brands better than did participants in the high absorption condition ($M_{low\ absoprtion} = 0.79$ versus $M_{high\ absorption} = 0.80$. Thus, H3$_a$ is not supported.

4.3 Recognition of Brand Names

To examine the effects of size on brand recognition, the proportion of the four target brands correctly identified by each participant was analysed using one-way ANOVA with two conditions (small size billboards versus large size billboards). As expected, participants in the large billboards condition had higher levels of brand recognition [$M_{large\ size} = 1.20$, $F(1,233) = 7.28.9$, $p < .001$] compared to participants in the small size billboards condition ($M_{small\ size} = .86$). Therefore H1$_b$ was supported.

ANOVA was used to test for primacy/recency effects on participants' recognition of the Coca-Cola brand. Similar to brand recall and contrary to our predictions, appearance order does not have a significant effect on brand recognition ($F(1,117) = 0.92$, $p > .001$). Participants in the primacy condition did not recognise the Coca-Cola brand better than did

participants in the recency condition, $M_{primacy} = .23$ versus $M_{recency} = .31$ Thus, H2$_b$ is not supported.

H3$_b$ hypothesized that the more absorbed players will recognise fewer brands in the game, compared to the less absorbed players. ANOVA was used to test for the differences in absorption levels and brand recognition. Similar to brand recall, level of absorption does not have a significant effect on brand recognition ($F(1,233) = .908$, $p > .001$). Participants with lower level of game absorption did not recall the brands better than did participants in the high absorption condition ($M_{low\ absoprtion} = 0.\ 97$ versus $M_{high\ absorption} = 1.09$. Therefore, H3$_b$ is not supported.

5. Discussions and Implications

The experimental racing game study tested the effectiveness of two execution strategies: size and order of product placements. Past studies (e.g. Bressoud, Lehu & Russell, 2010; Hendon, 1973) report a significant effect of size in print, television and Internet banner advertisements. However, research on size and order effect in the gaming environment remains limited. Findings indicate that large size brands placed in a racing game are recalled and recognised significantly better than smaller size billboards. Further analysis of lap times between participants assigned to the small and large size condition groups showed no significant differences, suggesting that differences in recall and recognition can only be attributed to size.

Results are consistent with past studies (Homer, 1995; Li & Bukovac, 1999) from the generic advertising and product placement literature, yet this study offers new contributions from the 'branding-gaming' perspective. Specifically, how advertising stimuli affect brand recall and recognition and the connecting relationship in a gamified setting is novel. In addition, with the exception of Nelson (2002), findings confirm previous studies in the

gaming environment: prominent placements have higher recall and recognition rates (Lee & Faber, 2007; Schneider & Cornwell, 2005). Nelson's (2002) found was no difference in brand recall between large and small product placements. In Nelson's (2002) study, billboards were used as large placements and guardrails as small placements. Players of racing games focus on the actual race track where the action is taking place and guardrails are in this line of vision, and thus are more focally positioned than billboards, counteracting the size effect revealed in our study.

The second hypothesis concerns order of appearance. Recall of a series of information tends to favour the first or occasionally the last positioned piece of information. In both the television advertising and product placement literature a primacy effect is evident and as a result of more mental resources being available to viewers at the beginning of a program or movie enabling recall of placements (Bressoud, Lehu & Russell, 2010; Li, 2010, Newell & Wu, 2003; Terry, 2005). Whether an order effect also relates to the context of computer games was the subject of the second part of our experiment. Contrary to our theoretical predictions, there were no significant differences in recall and recognition of the Coca-Cola brand whether it was positioned first or last in the series of billboards. Thus, our results did not confirm either a primacy or recency effect when game playing. Findings are somewhat contradictory to a recent study positing, "brands placed at the end of the racetrack received higher recall score than others" (Gangadharbatla, 2016: 127).

Computer gaming is, as previously noted, distinct from viewing television and films, and in the racing genre players are likely to be focused on game playing from start to finish (Verberckmoes, Poels, Dens, Herrewijn & De Pelsmacker, 2016). Furthermore, our players were racing competitively, playing for one of ten prizes for fastest laps. This situation would have contributed to their continued focus on the primary task of driving the car as quickly as possible around the track leaving little cognitive resources in reserve to take in surrounding

information, irrespective of whether it was at the beginning, middle or near the finish line (Herrewijn & Poels, 2015). Although there is no evidence of a primacy or recency effect for the players, this may not be the case for those watching the action. Compared to the players, viewers of the game are in a similar position to viewers of a movie and the primacy effect evident in the context of movie watching may also hold for game viewing. As both viewers and players often enjoy games, testing for a possible primacy effect for 'viewers' and comparing with 'players' is an important area for future research.

Hypothesis three, postulating that a player who is more absorbed will remember fewer product placements, was not supported with both groups having similar levels of brand recall and brand recognition. Various measures of attention to the game have been employed in previous studies including telepresence, flow and involvement (e.g. Herrewijn & Poels, 2015; Huang, Huang, Chou & Teng, 2017; Sreejesh, Anusree & Ponnam, 2018). These studies focus on what could be termed 'being in the zone' and tend to ignore other emotional aspects of game playing. Scott and Craig-Lees (2010) suggest audience engagement is a complex variable and this study employed a number of statements to capture the 'absorbing' nature of a computer game. The feelings and emotions included: absorbing, engaging, enjoyable, entertaining, exciting, interesting, involving and stimulating. Findings show that 'more absorbed' players recall and recognise a higher number of placements compared to 'less absorbed' players, although the difference was not significant. It is worth noting that all players rated high on the absorption scale and even though some were classified as 'low absorbers', they still display a reasonable level of absorption. The bias towards highly absorbed players can be explained by the fact that car racing game require players to become absorbed in order successfully complete a lap without crashing or spinning out. Such genre of game is also one of the more favoured by gamers, suggesting it can be more entertaining and enjoyable compared to other types of games (Jin & Phua, 2015). Furthermore, the fact that

participants only had one practice lap and one timed lap meant game playing was not 'drawn out' providing an emotionally positive experience in a short space of time.

6. Conclusions and future research

Gaming presents a unique opportunity for marketers to promote their brands interactively (Badrinarayanan, Sierra & Martin, 2015), increasingly via connected smartphones and tablets (Spielmann & Richard, 2013). This study provides an understanding of factors that facilitate or impede brand recall and recognition of placements in a car racing game. Billboards in this game genre are more cost effective than other forms of advertising such as AdWords (Kaplan & Haenlein, 2009). Results indicate that although order of placement was not important, size has an effect on memory (brand recall and brand recognition). Findings are consistent with an earlier work on displays showing that physically large displays immerse users and improves memory (Tan, Gergle, Scupelli & Pausch, 2006). However, consumers are increasingly playing games on smaller screens such as smartphones and tablets. Bressoud, Lehu and Russell (2010) have previously cautioned that product placement in movies viewed on small devices, such as phones, may not be effective. The challenge for designers is to incorporate in-game advertisements that are dominant on small screens in order to facilitate recall and recognition.

Future research could consider replicating the study using different genres of games. Players welcome advertising in a car racing game because it enhances a sense of realism (Nelson, 2002). However, racing games require player's total concentration, leaving little, if any, 'down-time' to take in peripheral information. Other games such as pet genre are less complex. Similar to 'easy to watch' movies, pet genre games require less cognitive resources (Gross, 2010), enabling peripheral information processing. In addition, shooter games require players to scan the entire screen hunting down opponents whereas racing games have

narrower visual focus. Additional research could investigate order and size effects on recall and recognition for other game genres. Finally, it is worth incorporating screen size in future studies investigating in-game advertisement as larger screen display is associated with higher levels of immersion (Tan, Gergle, Scupelli & Pausch, 2006).

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