Examining the Deferred Effects of Gaming Platform and Game Speed of Advergames on Memory, Attitude, and Purchase Intention

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ABSTRACT

Advergames are digital games through which advertisers promote their brands. While many studies have explored the influence of the gamification of advertising, little is known about the effects of important advergame attributes such as gaming platform (device used to play games) and game speed (overall pace of games) on consumers' immediate and delayed memory, delayed attitude, and delayed intention to purchase the advertised brands. We address these gaps by conducting two experiments with fictitious brands (Study 1) and real brands that vary in the degree of familiarity (Study 2). Results reveal that a PC-based advergame generates better delayed memory than a mobile-based advergame, while gaming platform does not affect immediate memory. Also, it interacts with game speed only in the delayed situation. Brand familiarity moderates the effects of gaming platform and game speed on brand attitude and purchase intention in such a way that unfamiliar brands are more effective than familiar ones.

Keywords: Advergame, brand familiarity, game speed, gaming platform, memory.

1. Introduction

Advertisers are always searching for ways to break through the clutter and discover new means of delivering their brand messages to consumers. With the rising popularity of the promotional strategy called branded entertainment, contemporary advertising formats, such as advergames, allow advertisers to attain this agenda. The term ‘advergame’ denotes the insertion of advertisements within an entertainment media such as video games (Cauberghe & De Pelsmacker, 2010). These games are “specifically created to function as advertisements to promote brands, where the entertainment content mimics traditional game forms” (Kretchmer, 2005, p. 7). For example, in an attempt to showcase one of its cereal brands (*Fruit Loops*) over fresh fruits, Kellogg’s developed an advergame that allowed the players to earn more points by throwing the branded cereal instead of fruits in the mouth of a monster. Simply put, advertisers design advergames in such a way that the brand messages are conveyed to the consumers through the gameplay (Nelson & Waiguny, 2012).

Due to their subtle nature and persuasion technique through a classic storytelling approach, advergames are immensely popular in the marketplace. Approximately 4.91 billion USD was spent in 2016 on gamification of advertising, and this expenditure is projected to grow to 11.94 billion USD by the end of 2021 (Gough, 2018). This upsurge in spending has attracted academics to explore the advertising effectiveness of games. A large number of studies exist that aptly document the effects of gamification of advertising on consumers (e.g., Cauberghe & De Pelsmacker, 2010; Vanwesenbeeck, Walrave, & Ponnet, 2017; Waiguny, Nelson, & Marko, 2013; Yang, Asaad, & Dwivedi, 2017; Mishra & Malhotra, 2020).

Despite this research emphasis, two critical advergame attributes remain largely unexplored to date, namely gaming platform and game speed. Gaming platform refers to the device on which advergames can be played, such as PC, smartphone, tablet, and specific gaming console (e.g., Microsoft Xbox 360). These gaming platforms significantly vary in screen size and audio-visual quality, which may contribute to differences in perception of media richness and information vividness (Kim & Sundar, 2014; Maity, Das, & Kumar, 2018). According to the tenets of the media richness theory (Daft & Lengel, 1986), the depth of information processing varies substantially across rich and lean media. Therefore, it is likely that consumers' processing of game- and brand-related information would substantially differ across these gaming platforms, which may further lead to variations in their memory of the advertised brands (Tulving & Craik, 2005). However, to the best of our knowledge, no research in the domain of gamification of advertising exists to date that captures and scientifically explains these variations.

Game speed is another characteristic that may have an influence on the way consumers process embedded brand information in advergames. It refers to the "overall pace of the game that includes the steering speed, the pace with which the objects placed in the game move, and the type and difficulty level of the game task in the advergame" (Vashisht & Sreejesh, 2015, p. 63). Variations in game speed may contribute to differences in the allocation of attentional resources to activities such as playing the game and processing brand stimuli – a phenomenon that requires in-depth investigation (Terlutter & Capella, 2013). In this context, the limited capacity model of attention (LCM) (Kahneman, 1973) seems to be pertinent in explaining the effects of game speed on consumers. This theory imparts that cognitive or attentional resources are finite in individuals, and they spend these resources disproportionately among primary and secondary tasks assigned to them. If more resources are spent in processing information related to the primary tasks (e.g., playing an advergame), individuals are left with fewer resources for the secondary task (e.g., processing brand-related information). Consequently, we may expect consumers to process brand stimuli in high- and low-speed games differentially and eventually exhibit differences in brand memory across game-speed conditions. Although a few initial attempts have been made to examine relationships of this nature (e.g., Vashisht & Royne, 2016), research on this topic is crucially underdeveloped and requires further investigation.

In addition to the gaps above, we also find that most studies have measured consumers' memory and behavioural responses immediately after the gameplay while ignoring the deferred effects of advergames. There is usually a delay between gameplay and product search, evaluation, and choice in real life. Researchers argue that the immediate measurements of ad effects may overestimate the effects since the ads are very salient, and their memory traces are highly accessible immediately after the exposure has happened (Chattopadhyay & Nedungadi, 1992). Therefore, it becomes necessary for marketers and academics to examine whether ad-evoked memory, attitude, and intentions endure over time if they are to influence behaviour (Chatterjee, 2008).

In the present research, we conduct two experiments to address these gaps in the literature. In the first experiment, we manipulate the gaming platform (PC vs mobile) and game speed (high vs low) and examine their effects on consumers' immediate and delayed memory of fictitious brands. Following this, the second experiment is conducted to validate the robustness of the findings in the context of real brands that vary in terms of familiarity. Specifically, we examine the moderating role of brand familiarity in the relationships between the advergame characteristics mentioned above, delayed brand attitude, and delayed purchase intention.

Our research has several important theoretical implications. First, we advance the growing domain of research on gamification of advertising by incorporating an unexplored, yet fundamental, game attribute such as gaming platform that vary in media richness. In this way, the present article also contributes significantly to the media richness theory by departing from the frequently studied modes of communication (e.g., print, TV, and social media ads) and bringing fresh research insights from an entertainment-driven persuasion context such as advergames. Second, we contribute to the gamification literature by examining the persuasive effects of another critical and less-explored characteristic such as game speed. The research findings also validate the postulations of the LCM in a novel task situation such as gameplay. Third, we significantly contribute to the body of knowledge related to product placement and branded entertainment by examining the *deferred* effects of advergames on brand memory, brand attitude, and purchase intention. At the same time, we ground our research in the domain of advertising, investigating the comparative effects of ad exposure on immediate and delayed cognition, affection, and conation (e.g., Aravindakshan & Naik, 2011; Kwon, King, Nyilasy, & Reid, 2018).

The present research also has critical practical implications. The advertising budget is limited, and it becomes necessary for advertisers to investigate the efficacy of different promotional techniques. We help advertisers make an informed decision regarding whether to place more emphasis on PC-based or mobile-based advergames. Also, a comparison between immediate and delayed memory for ads has important takeaways for advertisers related to media-scheduling strategies. If memorability for the advertised brand is low, advertisers need to continue advertising in digital games. If it is high, they might be able to reap positive economic outcomes even after discontinuing the advergames. Finally, our research helps marketers who intend to promote unfamiliar and well-known brands through advergames. It provides insight into how consumers evaluate these brands and exhibit purchase intention, and eventually guides the marketers to use advergames for brand promotion strategically.

2. Literature Review and Theoretical Framework

2.1 Gamification of Advertising

Play has always fascinated and attracted humankind. With increased digitalisation and proliferation of the Internet, it is no wonder that digital games are prevalent and continue to diffuse at a growing rate. According to a recent survey, the worldwide gaming audience was

1.82 billion in 2014 and expects to grow to 2.73 billion by the end of 2021 (Statista, 2020). Arguably, the first advertisement appeared in 1978 in a digital game called *Adventureland* that promoted another game called *Pirate Adventure* within it. Since then, marketers have consistently used gamification of advertising as a tool to attract consumers of all ages toward their brands.

Advergames are found to be useful in promoting products and services. This persuasive effectiveness is attributed to some crucial factors. First, these games trigger lower levels of persuasion knowledge and scepticism among consumers (Panic, Cauberghe, & De Pelsmacker, 2013). Second, IGAs and advergames foster a longer attention span in the consumers in a reward-driven environment, which positively affects their cognitive and affective reactions (Vanwesenbeeck et al., 2017). In the past, academic endeavours have resulted in the exploration of several important attributes, for example, the proximity of product placement (Peters & Leshner, 2013), game outcome (Ghosh, 2016), brand familiarity (Waiguny et al., 2013), and a host of other variables. The effects of these games, brand, and individual characteristics are observed on consumers' psychological responses. These responses include cognitive (e.g., brand recall, brand recognition), affective (e.g., brand attitude), and conative (e.g., propensity to buy, WOM intention) reactions (Terlutter & Capella, 2013).

While these earlier studies are meritorious in their rights, no research exists to date that investigates how different types of gaming platform available to the players influence their information processing, which may further affect memory (cognitive response), brand attitude (affective response), and purchase intention (conative response) in immediate and delayed time frames. Moreover, we also know a little about whether the speed with which the objects move in the gaming environment interacts with different types of gaming platforms. If they do, it becomes even more critical to understand the underlying processes and outcomes. The next two sections postulate these effects in the backdrop of media richness theory and the LCM.

2.2 Media Richness Theory

Media richness is defined as "the representational richness of a mediated environment defined by its formal features, that is, the way in which the environment presents information to the senses" (Steuer, 1992, p. 75). The formal features or characteristics of a communication media that contribute to its richness are (a) sensory breadth: the number of sensory channels the media utilises, and (b) sensory depth: the intensity of utilisation of the sensory channels (Steuer, 1992). If a particular media is richer than another, the information presented is perceived to be more vivid (Coupey & Sandgathe, 2000; Jiang & Benbasat, 2007). It also develops a higher quality of the visual image and evokes emotions of higher intensity among the users (Coupey & Sandgathe, 2000). More interestingly, media richness is affected by the screen size of the devices through which information is presented to the viewers (Lombard & Ditton, 1997; Maity & Dass, 2014; Maity et al., 2018). Prior research found that when advertising stimuli consisting of text and images were presented through a device with a large screen (e.g., PC), the richness of the stimuli was perceived to be higher than when the same stimuli were presented through a device with a small screen (e.g., tablet, mobile) (Maity et al., 2018). Perhaps due to this, it has also been argued that the strategies of traditional advertising may not be successful with mobile based devices (Dwivedi et al., 2020). This happens because large screens, as compared to small ones, provide benefits such as display novelty (i.e., a perception that large objects are more novel) and looming (i.e., large objects dominate the viewers' visual field and tend to "loom" over them), which generates higher levels of sensory arousal, vividness, and telepresence (Lombard & Ditton, 1997; Reeves, Lang, Kim, & Tatar, 1999).

From an information processing perspective, it is evident that information is processed differently in rich versus lean media (Daft & Lengel, 1986; Kim & Sundar, 2014, 2016; Reeves et al., 1999). The basic premise is that rich media has more sensory breadth and depth than lean media, which increases the number of human perceptual systems triggered to process information (Li, Daugherty, & Biocca, 2002). Therefore, when presented through rich media, the information undergoes a more considerable amount of cognitive processing that makes it more effective (Li et al., 2002).

We extend these findings to examine whether variations in the gaming platform on which the advergames are played would affect the memory of the advertised brands. Specifically, we argue that PCs, as compared to mobiles, would be perceived as higher in media richness since they have significantly larger screens. Also, since PCs possess dedicated input/playing devices such as mouse and joystick, multisensory stimulation is possible among the players that would make the brand-related messages more effective (Li et al., 2002). In summary, a higher level of media richness and activation of multiple perceptual systems would allow the players to spend more cognitive resources and effectively process game- and brand-related information. This would eventually affect players' memory of the advertised brands.

While these arguments seem coherent, there is strong empirical evidence which reveals disproportionate levels of memory performance in immediate and delayed task situations due to changes in information vividness and level of information processing (Loaiza, McCabe, Younghood, Rose & Myerson, 2011; Reyes, Thomson, & Bower, 1980; Rose & Craik, 2012). These researchers argue that in immediate memory-related tasks, rich media and higher levels of information processing do not have any major advantages over their counterparts, i.e., lean media and lower information processing levels. However, in delayed situations (e.g., a few days or weeks), memory-related performances are found to be significantly better among those individuals who are exposed to the former condition than the latter. The reasons behind these apparently disproportionate findings are pretty straightforward. In immediate situations, individuals employ their working memory to retrieve information irrespective of the levels of processing and information vividness. On the other hand, in delayed situations, information is typically retrieved from the long-term memory, which performs better only if it has undergone higher levels of processing during encoding (Loaiza et al., 2011; Miyake & Shah, 1999).

In summary, we argue that since a PC-based gaming platform has a larger screen and dedicated gaming controls (e.g., mouse, joystick), it would possess more sensory breadth and depth than a mobile-based gaming platform. These formal features would attribute to a higher degree of media richness and information vividness in a PC as compared to a mobile. In turn, players would engage in deeper processing of the game- and brand-related stimuli in the former case compared with the latter one, which would result in better delayed memory. However, immediately after the gameplay, differences in information processing in these gaming platforms would not affect memory performance differentially because the players would employ their working memory to retrieve the information. Based on these arguments, we hypothesise the following:

H1: A PC-based advergame creates better delayed brand memory than a mobile-based advergame.

Also, over time, deep processing is expected to generate rich memory traces and less memory deterioration (Li et al., 2002). Conversely, if the information undergoes shallow cognitive processing, memories tend to become distorted and 'noisy' as time progresses (Sakai & Inui, 2002). Therefore, we argue that the memory of advertised brands would show a more considerable amount of depletion over time in a mobile-based gaming platform because of the shallow processing of brand stimuli. In comparison, the memory would deplete less on a PC-based gaming platform in which players engage in deep processing. Therefore, we hypothesize the following:

H2: Brand memory in a PC-based advergame depletes less from an immediate to a delayed time frame than in a mobile-based advergame.

2.3 Limited Capacity Model of Attention

Kahneman (1973) developed the limited capacity model of attention (LCM) and posited that at any given point of time, an individual's total cognitive capacity or attentional resources are limited (Kahneman, 1973). The individual allocates his or her total capacity in two parts to process all activities: capacity allocated to process the primary task and spare capacity for processing secondary task(s) and understanding other peripheral objects (Kahneman, 1973; Pashler, 1999). More importantly, the cognitive capacity allocated to perform the primary task cannot be used for the secondary task. Therefore, if the primary task uses more attentional resources, an individual has less available to perform the secondary task. Like the LCM, the people's processing of commercial media content (PCMC) model (Buijzen, Reijmersdal, & Owen, 2010) provides another alternative framework to understand the allocation of the cognitive resources among primary and secondary tasks. The PCMC model suggests that in any mediated environment (e.g., TV, video game), an individual's primary goal is to consume the entertaining content (e.g., watch the programme or play the game), while the secondary goal is to process persuasive information. Accordingly, the individual allocates the majority of the cognitive resources to complete the primary task, and the left-over resources are allotted to the secondary task. If the resources required to process the secondary task are less than the allocated resources, the individual faces a cognitive overload situation and engages in less cognitive elaboration of the persuasive message.

Given limited spare cognitive capacity, the success of advergames in generating favourable consumer outcomes depends on several factors. One important consideration may be the game speed or the pace of movement of various objects, for example, racetrack, player's car, and competitors' cars in a car racing advergame. A high-speed game demand quicker shifting of players' visual focus from one gaming object to another and faster manipulation of the game controls. These activities increase their attentional or cognitive load on the players

(Vashisht & Royne, 2016). These differences in the allocation of cognitive capacity between the primary and secondary tasks affect players' brand recall and brand attitude (Vashisht & Royne, 2016; Vashisht & Sreejesh, 2015).

While this small pool of studies helps to further our understanding about the potential influences of game speed on consumers' response to brands, by and large research is underdeveloped in terms of the long-term effects of game speed. It is logical that, in most cases, consumers are not compelled to make a purchase decision immediately after playing an advergame. Moreover, these games include the brand message and do not allow the players to buy directly from the games. Advertisers are well acquainted with these facts and require employment of relevant and real-time measures of brand placement effects (Nelson & Waiguny, 2012; Terlutter & Capella, 2013). Therefore, we plan to investigate how game speed affects players' brand response in immediate as well as delayed situations, and how their choice of gaming platform further stimulates these effects.

We argue that variations in game speed would create differential effects on memory. However, contrary to the previous findings, we postulate that this would happen only in the delayed situation and not in the immediate situation. While a slow game results in more spare capacity and a high level of processing of brand-related information, prior findings from memory literature strongly suggest that the advantages of deep over shallow processing are mostly realised in delayed memory tasks (Craik & Tulving, 1975; Loaiza et al., 2011; Miyake & Shah, 1999). On the other hand, although fast games increase players' cognitive load on the game-playing activity and leave them with limited spare capacity, we argue that their immediate memory would not suffer significantly. This is because, in immediate attention and memory-related tasks, information is retrieved from the working or primary memory, which depends significantly on phonological or orthographic cues (e.g., word span; in our case: span of the brand names embedded in the game) (Loaiza et al., 2011). These cues exhibit high retrieval strength immediately after the stimuli are exposed and processed (Reyes et al., 1980). However, over time, these orthographic cues of the working memory become weaker due to the presence of distractions or extraneous factors and suffer in terms of retrievability (Reyes et al., 1980; Unsworth, 2007). Therefore, we argue that in the immediate condition, the brand memory of consumers playing an advergame with low and high speed would not differ significantly. However, over time, a low-speed advergame would allow the players to spend more attentional resources to deeply process brand-related information than a high-speed advergame. This difference in the level of processing would eventually be reflected on delayed brand memory which would be stronger in the low-speed, as compared to the high-speed, condition. Based upon these arguments, we hypothesize the following:

> H3a: An advergame with low speed creates better delayed brand memory than with high speed.

We further argue that game speed would also interact with gaming platform to create differences in delayed brand memory. Specifically, we postulate that the immediate memory would not be significantly different for consumers playing advergames with varying speeds in different types of gaming platforms. However, their delayed memory would be stronger when the consumers play a low-speed advergame in a rich media (i.e., PC) as compared to a lean media (i.e., mobile). This favorable performance of brand memory is attributed to information vividness effects discussed earlier. Similarly, for a high-speed advergame, delayed memory of the embedded brands is expected to be stronger when consumers are exposed to the game and brand-related stimuli in a PC than in a mobile. Therefore, we hypothesize the following:

> H3b: Game speed interacts with gaming platform such that delayed brand memory is higher in a low-speed PC-based advergame than in a low-speed mobile-based advergame.

H3c: Game speed interacts with gaming platform such that delayed brand memory is higher in a high-speed PC-based advergame than in a high-speed mobile-based advergame.

Also, as mentioned previously while formulating H2, richer memory traces are formed over time following deep processing (Li et al., 2002). On the other hand, if shallow information processing happens, memory for the information exhibit weak traces, become distorted, and appear to be noisy over time (Sakai & Inui, 2002). Therefore, we hypothesize the following:

H4: Brand memory in a PC-based advergame with low speed depletes less from an immediate to a delayed time frame than a mobile-based advergame with high speed.

2.4 Moderating Effects of Brand Familiarity

The afore-mentioned hypotheses deal with the comparative effects of different types of gaming platforms and game speed on delayed brand memory in the context of fictitious brands. We also plan to investigate how the players react to real brands that varies in terms of brand familiarity. Therefore, we also examine the moderating role of brand familiarity on the effects of gaming platform and game speed on brand attitude and purchase intention in a delayed time frame.

Brand familiarity has been thoroughly investigated in the marketing literature in various consumption and decision-making contexts (e.g., Campbell & Keller, 2003; Hardesty, Carlson, & Bearden, 2002; Verhellen, Dens, & De Pelsmacker, 2016). It is conceptualised as the extent to which a consumer has indirectly or directly experienced a brand (Kent & Allen, 1994). Brand familiarity is generally attributed to factors such as a past trial, word-of-mouth, exposure to persuasive communication, and general knowledge accumulated from press releases (Campbell & Keller, 2003). On the other hand, consumers treat a brand as unfamiliar because they have never been exposed to it before, or it is newly introduced in the market (Stewart, 1992).

Researchers have conducted a plethora of studies to explore the various antecedents and consequences of brand familiarity. To build the hypotheses, we specifically focus on those studies investigating the relationships between brand familiarity, information processing, and attitude formation. In this context, Snyder and Stukas (1999) demonstrate that when consumers get repeatedly exposed to familiar brands, they do not extensively process brand-related information. The authors argue that consumers already know a lot about familiar brands and possess rich brand knowledge structures; therefore, they feel more motivated to engage in a mere confirmatory-based processing instead of deep and extensive processing of brand messages. In turn, the advertisements of familiar brands across multiple communication channels become less exciting, and consumers eventually generate less favourable attitudes toward familiar brands as compared to unfamiliar ones (Campbell & Keller, 2003; Machleit & Wilson, 1988).

In the case of unfamiliar brands and the inherent novelty in stimuli, consumers are motivated to engage in extensive information processing and make an attempt to evaluate and learn about them (Hilton & Darley, 1991; Sujan, 1985). If the advertisement of the unfamiliar brand is found to be attractive or appealing, positive evaluations about the advertisement are transferred to the brand (Machleit & Wilson, 1988). This affect transfer happens because the brand is novel to the consumers; therefore, the advertisement becomes the only source of information to form a brand attitude (Machleit & Wilson, 1988).

Based on these research findings, we argue that players would not realise the need to extensively process the message from a familiar brand. Instead, they would develop a less favourable brand attitude and purchase intention toward the familiar brand in the delayed condition due to its repeated exposure in various communication channels, including a non-commercial channel such as video games. In comparison, an unfamiliar brand would generate a more favourable attitude and purchase intention among the players because they would process the brand more extensively due to the absence of rich knowledge structures. Moreover, the positively-evaluated advergame would be their only source of information to develop a more favourable attitude toward the unfamiliar brand. Therefore, we hypothesise that:

> H5: The effect of gaming platform and game speed on brand attitude and purchase intention is moderated by brand familiarity in such a way that exposure to unfamiliar brands, as compared to familiar brands, leads to (a) higher brand attitude and (b) higher purchase intention.

Figure 1 shows the hypothesised relationships.

Two studies are conducted to examine the research hypotheses. Study 1 examines H1 to H4 in the context of a fictitious brand while Study 2 examines H5 by including real brands that vary in brand familiarity.

[Insert Figure 1 near here]

3. Study 1

3.1 Design and Subjects

In the present research, we implemented a 2 (time: immediate vs delayed) × 2 (gaming platform: PC vs mobile) × 2 (game speed: high vs low) mixed-model design with time as the repeated measure, and platform type and speed of the game as the between-subjects measures. A total of 383 post-graduate students (male = 64.3%, average age = 22.5 years) from a well-reputed business school in India participated in the study. Although the use of student samples has been generally criticised in consumer research, experimentation using a college student sample was reported as appropriate for gaming studies (Ghosh, 2016; Peters & Leshner, 2013). Four different versions (PC-based with high speed, PC-based with high speed, mobile-based with low speed, mobile-based with high speed) of an online car racing advergame[1] were used

[1] The advergame was a proprietary game developed by a professional game developer. The screen-shot of the game is available in Figure 2.

to manipulate the four experimental conditions. A total of 106, 96, 98, and 83 subjects played the first, second, third, and fourth versions of the advergame, respectively. As part of the experimentation, in the immediate condition, the subjects played the game and rated the measurement items just after the gameplay. However, they were again instructed to come back on a different day (after five days) and directed to play the same game, and the responses were recorded on a later date (after one week).

3.2 Stimuli Selection

We conducted a series of focus-group interviews and two pre-tests to identify the game genre and brands. This was conducted following prior studies in the domain of advergames (e.g., Sreejesh & Anusree, 2017). The first focus group (n = 10) revealed car racing as a popular game genre. In the second focus group (n = 11), the subjects suggested tyre and engine oil as the product categories upon which the fictitious brand names could be developed. In the third focus group (n = 10), we received six and seven fictitious brand names in the tyre and engine oil category respectively.

Further, we conducted a pre-test using a sample of 30 students to assess the suitability of these fictitious brand names. A single-item question was used for this purpose (e.g., The brand name presented is suitable to present on a car racing game: 1 = strongly disagree, 7 = strongly disagree). Finally, seven brand names with a high mean score of suitability were selected (i.e., "ROK TYRE", "DYO TYRE", "STEN TYRE", "TUFF TYRE", "NEW ENGINE OIL", "POWER ENGINE OIL", and "PURE ENGINE OIL"). Thereafter, a professional game development agency developed four advergame versions in the car racing genre. Game speed was manipulated by changing the minimum and maximum speed of the car in the car-racing game. In other words, the screens per minute changed faster in a high-speed game than in a low-speed game. Accordingly, in all the game versions, banners of the aforementioned brands were placed in various locations of the car racing circuit. **Figure 2** provides a screen-shot of the advergame.

[Insert Figure 2 near here]

3.3 Procedure

A "research and experimentation" notice was placed on the institute's student forum, where the students frequently visited to check campus-related news updates. The notice contained an online link that allowed interested students with prior video game playing experience to report their willingness to participate. Within a week, we received 402 responses out of which 383 subjects participated in the experiment for a monetary reward of INR 200 each. They arrived in batches of 10 to 12 and were randomly allocated to two rooms (See Appendix A). In the first room, all the subjects received personal computers and played pre-installed games (high-speed or low-speed versions). In the second room, the subjects were instructed to install the game (high-speed or low-speed versions) in their mobile phones from an online link. In both the conditions, the subjects played for approximately 10 minutes.

At the end of the gameplay, the subjects closed their devices and filled in the online questionnaire. The data were collected in two stages. The first stage of data collection happened immediately after the gameplay. In the second stage (after five days), the subjects were again asked to assemble in the same location and play the game, and no measurement was taken at the end of the gameplay. However, after one week, they filled in the earlier online questionnaire.

3.4 Measurement Instrument

The questionnaire consisted of three sections. The first section collected the subject's name, id, and demographic details such as gender and age. In the second section, we asked questions related to the covariates (e.g., prior game playing experience, game playing ability, and perceived easiness to play the game). These three covariates were included because they could affect subjects' allocation of cognitive resources in the primary and secondary tasks during the gameplay. A single-item scale adapted from Davis (1985) was used to measure perceived easiness to play the game (i.e., "I find the game which I played is very easy to play"). Similarly, another single-item scale adapted from Bartholow, Sestir, and Davis (2005) was used to capture subjects' ability to successfully play the game (i.e., "I feel I am able to play the game successfully"). Finally, prior game playing experience was measured in terms of the number of years of gameplay. The third section of the questionnaire included a manipulation check item on game speed (i.e., "I feel the game which I played is": 1 = too slow, 7 = too fast) and questions to measure brand memory.

Following prior literature (e.g., Lee & Faber, 2007; Van Reijmersdal, Rozendaal, & Buijzen, 2012) we used three measures of brand memory, namely attention, recall, recognition. A single item measured subjects' attention toward the embedded brands (1 = no attention at all, 7 = a lot of attention). Further, we asked the subjects to recall and list the brand names that they noticed during their gameplay (Lee & Faber, 2007). Finally, the recognition measurement followed Lee and Faber's (2007) approach and asked the subjects to recognise the embedded brands from a list of 14 brands (seven target brands, seven filler brands). After the data collection, two independent judges not familiar with the study objectives coded subjects' recall and recognition scores. For all the memory measures, the scores varied between one to seven. An inter-item correlation of 0.80 was reported between the measures. The average score of these three measures was calculated and the same was applied during the analysis.

3.5 Data Analysis and Results

We first checked the success of manipulation using an independent sample t-test. The results indicated that the subjects exposed to the advergame with high speed (vs low speed) reported a higher mean score ($t_{[386]} = 23.11$, $p < 0.01$). Thus, the study confirmed the execution of game speed as the manipulated variable. Further, we checked some important assumptions of Analysis of Covariance (ANCOVA). This included normality of the dependent variable, homogeneity of variances of the dependent variable across the between-subject factors, assumption of sphericity of the within-subject factor, and suitability of the study covariates. The analysis revealed that the skewness and kurtosis of the dependent variable were within the acceptable limits of ±2 (Field, 2009), which confirmed its normality. The Levene's test for homogeneity of variances indicated insignificant results ($p > 0.05$) and supported the assumption. Further, the Mauchly's test of sphericity also supported the assumption of sphericity for the within-subject factor. Finally, we checked the relevance of the covariates, and it indicated that the covariates had sufficient correlation with the dependent variable, and none of the covariates showed differences across the independent variable categories (Hair, Black, Babin, & Anderson, 2010). Besides this, we also examined the suitability of the covariates considered during the measurement. The correlation coefficients showing the association between the covariates and the dependent variable supported a statistically significant association ($r =$ above 0.40, $p < 0.01$). Further, the mean analysis of the covariates across the levels of the independent variables supported a statistically insignificant effect in all cases ($p > 0.01$). It also showed that none of these covariates associated with the independent variables considered in this study.

In this study, we tested the hypotheses using a 2 (time: immediate vs. delayed) × 2 (gaming platform: PC vs. mobile) × 2 (game speed: high vs. low) mixed-model ANCOVA with brand memory as the dependent variable. In the ANCOVA, we considered time as the within-subject factor, and gaming platform and game speed as the between-subject factors. Besides this, following Aiken & West (1991), we also applied a series of regression analyses to examine the significance of the interaction effects using simple slope estimates.

To test H1, we first checked within-subject interaction effect of gaming platform × time on brand memory. As reported in **Table 1**, the test results supported a significant interaction

(Wilk's $\Lambda = 0.680$, $F_{[1, 376]} = 176.82$, $p = 0.000$) on brand memory. It was also confirmed by the univariate within-subject effects ($F_{[1, 376]} = 176.82$, $p = 0.000$). Further, a follow-up contrast test supported that players' exposure to different gaming platforms resulted in differences in the delayed brand memory ($M_{[PC\ and\ delayed]} = 4.34$, $M_{[mobile\ and\ delayed]} = 3.13$, $F_{[1, 377]} = 494.35$, $p = 0.000$).

Further, the contrast test results also supported that in both the gaming platforms, brand memory significantly depleted over time ($M_{[PC\ and\ immediate]} = 4.83$, $M_{[PC\ and\ delayed]} = 4.34$, Wilk's $\Lambda = 0.837$, $F_{[1, 377]} = 73.43$, $p = 0.000$; $M_{[mobile\ and\ immediate]} = 4.72$, $M_{[mobile\ and\ delayed]} = 3.13$, Wilk's $\Lambda = 0.351$, $F_{[1, 377]} = 697.27$, $p = 0.000$). However, while corroborating the findings from mean estimates, contrast test results, and Wilk's Λ values (lower value shows higher difference) (Field, 2009), it was revealed that the magnitude of depletion in brand memory was lower in a PC-based gaming platform (mean difference: 0.49) than a mobile-based gaming platform (mean difference: 1.59). In order to confirm it further, the study conducted the spotlight analysis (Spiller et al., 2013)[2], and tested the simple effect of time (immediate vs. delayed) at specified levels of platform type (mobile vs. PC). The results supported that the memory depletion across time (immediate vs. delayed) was statistically significant and higher in the case of mobile platform ($effect_{[mobile]} = -1.592$, $SE = .0919$, $p < 0.01$) than in the case of PC platform ($effect_{[PC]} = -.4904$, $SE = .0870$, $p < 0.01$).

To further examine the nature of effect of (gaming platform × time) on brand memory, we followed the method suggested by Aiken & West (1991). Specifically, we performed regression analyses and drew plots that showed the effects of this interaction on brand memory coupled with simple slope estimates (see **Figure 3A and 3B**). As shown in Figure 3A, exposure to PC (vs. Mobile) did not result in any difference in gamers' immediate memory (simple slope

[2] To examine the spotlight analysis, the study followed the approach suggested by Hayes (2018) using SPSS PROCESS and applied model 1.

= .138, t = 1.63, p = .103). However, it was evident that an exposure to PC (vs. Mobile) resulted in a statistically significant difference in gamers' delayed memory which was higher in PC than in mobile (simple slope = 1.24, t = 13.12, p = .000). Further, Figure 3B exhibits brand memory depletion over time where we found that when the gamers played the game in PC, their immediate memory was higher than delayed memory (simple slope = -.49, t = -5.86, p = .000). Similarly, when they played in mobile, their immediate memory was higher than delayed memory (simple slope = -1.59, t = -16.62, p = .000). Based upon these results, we found support for H1 and H2.

[Insert Figure 3A and 3B near here]

[Insert Table 1 near here]

Further, the simple slope estimation results supported that in a low-speed (vs. high-speed) game, delayed brand memory was higher among the players (simple slope = 1.35, t = 14.93, p =.000). Thus, we found support for H3a.

Thereafter, we tested H3b and H3c using ANCOVA with three-way interaction (time × gaming platform × game speed) estimates. The results supported a statistically significant estimate (Wilk's $\Lambda = 0.925$, $F_{[1, 376]} = 30.88$, p = 0.000). Following this, we conducted a pre-planned contrast test which analysed a two-way interaction (gaming platform × game speed) on delayed brand memory. Results revealed a statistically significant estimate ($F_{[1, 379]} = 69.82$, p = 0.000; $M_{[PC, low speed]} = 4.95$, $M_{[mobile, low speed]} = 4.18$). In addition, following Aiken & West (1991) method, simple slope estimates revealed that delayed brand memory was significantly higher for a low-speed, PC-based (vs. mobile-based) advergame (simple slope = .522, t = 6.13, p = .000). It was also evident from the simple slope estimates that delayed brand memory was significantly higher for a high-speed, PC-based (vs. mobile-based) advergame (simple slope = 1.623, t = 16.86, p = .000). Thus, the study supported H3b and H3c.

As shown in **Table 2**, the results further revealed that when the subjects played a low-speed game on a mobile-based gaming platform, a lower depletion of brand memory happened (Wilk's $\Lambda = 0.689$, $F_{[1, 376]} = 170.07$, $p = 0.000$) in comparison to a high-speed game (Wilk's $\Lambda = 0.369$, $F_{[1, 376]} = 644.09$, $p = 0.000$). Further, in the context of a PC-based gaming platform, the results also showed a lower depletion of brand memory when the subjects were exposed to a low-speed game (Wilk's $\Lambda = 0.909$, $F_{[1, 376]} = 37.78$, $p = 0.000$) than when exposed to a high-speed game (Wilk's $\Lambda = 0.902$, $F_{[1, 376]} = 41.005$, $p = 0.000$) (see **Figure 4**). However, it was found that in the case of a PC, the magnitude of depletion was lesser than in the case of a mobile. Further, game speed differentially affected the erosion of brand memory in a PC versus a mobile. Specifically, the accentuated effect exerted by the high-speed game was stronger in the case of the mobiles as compared to the PCs. The spotlight analysis[3] of memory depletion across time (immediate vs. delayed) for PC based low speed game reported a low memory depletion (effect = -.4901, SE = .0801, $p < 0.01$), in comparison with mobile-based high-speed game (effect = -2.001, SE = .0793, $p < 0.01$). Thus, we found support for H4.

[Insert Figure 4 and Table 2 near here]

4. Study 2

4.1 Stimuli

The stimuli used in this study were similar to those used in the previous one. However, instead of fictitious brands, we used real brands in Study 2 that varied in familiarity with the subjects. We conducted a focus group interview (n = 12) to select these brands. In the focus group interview, we directed the subjects to suggest some real familiar and unfamiliar brand names in the engine oil category. Accordingly, the group suggested five familiar and five unfamiliar brands. After that, we conducted a pre-test using 30 adult individuals who were asked to report their past familiarity with these brands (i.e., "my familiarity concerning the

[3] To examine the spotlight analysis, the study followed the approach suggested by Hayes (2018) using SPSS PROCESS and applied model 3.

given brand is”: 1= low familiarity, 7 = high familiarity), adapted from Campbell & Keller (2003). The results revealed that “CASTROL” ($M = 4.56$, $S.D. = 0.87$) and “ROYAL PURPLE” ($M = 2.33$, $S.D = 0.45$) were the most familiar and unfamiliar brands among the subjects, respectively. Their mean brand familiarity scores were also statistically different ($t = 14.23$, $p < 0.01$). We recruited a game development agency to insert these brands in the car racing advergame used earlier. **Figure 5** provides a screen-shot of the advergame used in the experiment.

[Insert Figure 5 near here]

4.2 Design, Subjects, and Procedure

We applied a 2 (gaming platform: PC vs mobile) × 2 (game speed: high vs low) × 2 (brand familiarity: familiar vs unfamiliar) between-subjects design with brand attitude and purchase intention as the dependent variables which were measured in the delayed condition. An open invitation was sent to the members of an online gaming community that sought their willingness to participate in an online experiment. A total of 210 members agreed to participate, from which we randomly selected a sample of 160 subjects (male = 64%, average age = 27.88 years) for the experiment. These subjects were contacted over the phone two days before the experiment and were informed about the experiment’s time and modality. As part of the modality, we strictly instructed one-half of the subjects ($n = 80$) to play the advergame on PCs, and the other half ($n = 80$) was asked to play on mobiles. During the experiment, each of these halves was randomly allocated into high-speed and low-speed gaming conditions. Further, each of these conditions was divided into advergaming scenarios that included familiar and unfamiliar brands. When the subjects appeared online on specified dates, they played one of the four advergame versions on their mobiles or PCs by clicking a URL. The subjects took an average time of 9.8 minutes to complete the game. Immediately after the gameplay, they filled in one part of the online questionnaire, which included items on demographics, covariates, and manipulation checks. However, the subjects also rated the items on brand attitude and purchase intention after eight days of the gameplay (delayed measurement) by filling in the remaining part of the questionnaire, which was mailed to them separately.

4.3 Measurement

The online questionnaire included manipulation check items on game speed (adapted from Study 1) and brand familiarity (i.e., "my familiarity concerning the given brand is": 1 = low familiarity, 7 = high familiarity), adapted from Campbell & Keller (2003). All items used to measure the covariates were similar to Study 1. We also controlled for prior brand image because it could affect the outcome variables. Prior brand image was captured using a seven-point Likert scale item (i.e., "the brand has better characteristics than competitors": 1 = totally disagree, 7 = totally agree) adapted from Salinas and Perez (2009). Brand attitude was measured using three items on a nine-point semantic differential scale (strongly dislike/strongly like, unfavourable/favourable, negative/positive). Similarly, subjects' purchase intention of the advertised brand was measured using three items on a nine-point semantic differential scale (unlikely/likely, definitely would not buy/definitely would buy, improbable/probable). These two scales were adapted from Till and Busler (2000). Finally, the questionnaire included demography-related items similar to the previous study.

4.4 Data Analysis and Results

We first examined the success of experimental manipulations. The test results revealed that the subjects who played a high-speed game reported a higher mean score ($M_{high} = 4.71$, $M_{low} = 2.28$, $t = 12.11$, $p < 0.01$). Mean brand familiarity scores across familiar and unfamiliar conditions also showed a statistically significant difference ($M_{familiar} = 4.76$, $M_{unfamiliar} = 2.88$, $t = 9.88$, $p < 0.01$). Thus, the study confirmed the success of manipulations.

Next, we examined the validity of the assumptions related to the normality and homogeneity of variance of the dependent variables across the independent variables' categories. The results confirmed that the data followed both the assumptions. Followed by this, we checked the effects of the covariates considered in this study. However, the examination of the correlations between the dependent variables and the covariates did not show any statistical association. Hence, we performed the analysis related to hypothesis testing without including the covariates.

To examine the study hypothesis (H5), we performed a 2 (gaming platform: PC vs mobile) × 2 (game speed: high vs low) × 2 (brand familiarity: familiar vs unfamiliar) between-subjects multivariate analysis of variance (MANOVA) with brand attitude and purchase intention as the dependent variables. Here, we primarily examined the three-way interaction effects. Followed by this, we performed a series of contrast tests to examine the simple effects.

The analysis of the three-way interaction of gaming platform × game speed × brand familiarity on brand attitude and purchase intention showed a statistically significant effect (Wilk's $\Lambda = .917$, $F_{[2, 151]} = 6.79$, $p < 0.01$). Further, the examination of the univariate test results also supported a significant three-way interaction effect on both brand attitude ($F_{[2, 152]} = 4.82$, $p < 0.05$) and purchase intention ($F_{[2, 152]} = 2.34$, $p < 0.05$). As reported in **Table 3** and **Figure 6**, the contrast test results indicated that when the subjects played the low-speed advergame on PCs, they showed higher brand attitude and purchase intention (Wilk's $\Lambda = .091$, $F_{[2, 152]} = 754.90$, $p < 0.01$) when exposed to unfamiliar (vs familiar) brands. It was also evident from the spotlight analysis[4] conducted, where we found that when the gamer exposed with a low-speed game in PC, an exposure with a familiar (vs. unfamiliar) brand reported lower brand attitude (effect: -4.43, SE = .170, $p < 0.01$) and purchase intention (effect: -4.69, SE = .168, $p < 0.01$). Similarly, when they played high-speed game advergame on PCs, exposure to unfamiliar (vs familiar) brands led to higher brand attitude and purchase intention (Wilk's Λ =

4 To examine the spotlight analysis, the study followed the approach suggested by Hayes (2018) using SPSS PROCESS and applied model 3.

.652, $F_{[2, 152]} = 40.27$, $p < 0.01$). It is also supported by spotlight analysis[5] of both brand attitude (effect: -1.24, SE = .170, $p < 0.01$) and purchase intention (effect: -.828, SE = .168, $p < 0.01$). However, the comparison of Wilk's Λ estimates indicated that brand familiarity exerted a greater influence in a low-speed advergaming situation.

[Insert Figure 6 and Table 3 near here]

Further, the spotlight analysis results revealed that when the gamers exposed with high-speed games in mobile platforms, an exposure of familiar (vs unfamiliar) did not show statistically significant effect on both brand attitude (effect: .2432, SE = .170, p = .15) and purchase intention (effect: .350, SE = .160, p = .03) at 1 % level[6] (see **Figure 7**). However, an exposure of a low-speed game in mobile platform with favourable (vs. unfavourable) brand exposure reported statistical significance on both brand attitude (effect: -2.19, SE = .170, p = .03), and purchase intention (effect: -2.53, SE = .168, p = .03). Therefore, we supported H5 and inferred that the interaction effects of gaming platform and game speed were moderated by brand familiarity, where exposure to an unfamiliar brand developed a better delayed brand attitude and purchase intention as compared to a familiar brand.

[Insert Figure 7 near here]

5. Discussion

Understanding the cognitive and persuasive effects of branded entertainment, such as advergames, is a vital research agenda among academics and practitioners. In the pursuit of achieving this agenda, researchers have explored the influence of various game, brand, and individual characteristics on consumers' cognitive, affective, conative, and behavioural responses (Terlutter & Capella, 2013). However, little emphasis has been given to date on examining the effects of two essential facets of digital games, namely gaming platform and

5 Spotlight analysis examined effect of high-speed game with PC condition across familiar (vs. un-familiar) conditions.

6 The effect on purchase intention at 5% level reported as significant. Similarly, in Table 3, the MANOVA test results supported a significant contrast test with 5% level.

game speed. The present research employed two studies to understand how these advergame attributes affected consumers' immediate and delayed brand memory (Study 1), delayed brand attitude, and delayed purchase intention (Study 2). To establish these connections, we drew the theoretical underpinnings from the media richness theory and the LCM.

The first study posited that the platforms on which advergames were played varied in media richness and vividness of information. Media richness was attributed to two critical factors, which were screen size and degree of sensory stimulation among the players. The players perceived PCs as richer media than mobiles because they had a bigger screen and a higher level of multisensory stimulation due to the presence of input devices, which could be dedicatedly used for gaming. Larger screens, as compared to smaller ones, also provided additional benefits such as increasing the novelty of the visual stimuli and looming over the visual field of the players. In turn, players engaged in deeper cognitive processing of the embedded brand-related stimuli while playing the advergame on PCs than while playing on mobiles. Eventually, this resulted in more endurable memory, and a lesser deterioration of the memory traces over time. However, contrary to earlier research findings, we found that the benefits of deeper information processing were present only in the delayed memory condition. Immediately after the gameplay, both deeper and shallower levels of brand information processing led to similar performances on memory measured through attention, recall, and recognition.

Further, this study built on previous research on the LCM and demonstrated a three-way interaction of gaming platform × game speed × time on brand memory. Delayed brand memory was most and least robust in a slow PC-based and fast mobile-based advergame, respectively. We found that the memory trace effect induced by game speed was more durable than that induced by the gaming platform, which led to a higher level of delayed brand memory in a slow mobile-based advergame than in a fast PC-based advergame. However, game speed did not interact with the gaming platform to create differential influences on immediate brand memory.

In the second study, we had a two-fold objective. First, we wanted to increase the generalisability of the findings in the context of real brands that varied in terms of familiarity using a non-student sample. Second, we intended to examine the robustness of the advergame characteristics (i.e., gaming platform and game speed) in influencing other facets of consumer behaviour such as brand attitude and purchase intention in a delayed situation. This way, we also tested whether the advergame characteristics elicited endurable persuasive effects. Specifically, we found that the players did not prefer to see a familiar brand in an entertainment context such as advergame, which engendered less favourable brand attitude and low purchase intention than the unfamiliar brands. However, from an overarching standpoint, it was revealed that the persuasive effects of gaming platform and game speed endured over time.

5.1 Theoretical Implications

Our research has salient theoretical implications. First and foremost, it adds significant value to the growing body of knowledge on gamification of advertising by examining the effects of gaming platform – a central, yet unexplored, attribute of digital games. While past studies manipulated a large number of game and brand characteristics (e.g., game rhetoric, game-brand congruity, brand placement proximity, degree of interactivity, game genre), no research attention was devoted to a nuanced assessment of the effects of gaming platform. We fill this research gap by demonstrating that the nature of the gaming platform (PC and mobile) plays a critical role in determining consumers' psychological responses such as cognition (brand memory), affection (brand attitude), and conation (intention to purchase the brand). Second, the present research contributes to the media richness theory by bringing fresh insights from a non-traditional and entertainment-driven persuasion media such as advergames. Not only are we able to ground our research findings in the domain that deals with screen-size effects (Detenber & Reeves, 1996; Kim & Sundar, 2014; Lombard & Ditton, 1997), but we also demonstrate that these effects could be observed in an informal information processing scenario such as playing digital games. Third, we enhance the understanding of past advergame researchers by exploring another essential attribute of digital games: game speed. Although some initial investigations were carried out in the past regarding game speed (e.g., Vashisht & Sreejesh, 2015; Vashisht & Royne, 2016), research on this attribute is underdeveloped. We address this gap by exposing players to high- and low-speed advergames and observe differences in brand memory due to variations in the level of information processing. Fourth, the present research findings considerably enrich our knowledge of the deferred effects of advergames on consumer behaviour. Unlike previous researchers, we focus on measuring the long-term influences of advergame characteristics on consumers' memory, attitude, and intention to purchase the advertised brands. We reveal that while the immediate effects of playing an advergame are not prominent, exposure to brand stimuli leads to the maturation of cognitive, affective, and conative responses over time. While these outcomes are consistent with extant memory-related studies (Loaiza et al., 2011; Miyake & Shah, 1999), we chart a new direction in the emerging field of product placement research, specifically advergames, by emphasizing the need to examine the delayed effects of brand inclusions in entertainment media.

5.2 Practical Implications

The present research also has key takeaways for marketers. During the last decade, significant advancement in hardware and software have propelled the growth of mobile phones. This upsurge has forced marketers to increase their reach to consumers through mobiles. However, our research findings suggest that PC-based advergames generate higher brand awareness than mobile-based advergames. Therefore, it is high time advertisers should shift their attention to developing advergames that can be suitably played on PCs. One might coherently argue here that mobiles have many advantages over PCs such as lower price, ease of use, applicability in daily and less-complex situations, and portability. Hence, it might not be a smart choice to develop PC-based advergames in a dedicated manner. To address this scenario, advertisers should start providing users with more access to platform-independent advergames by placing them on their company websites or third-party gaming websites other than online app stores. This increases the chance of advergames being played from multiple devices, including PCs. Alternatively, advertisers should insist on game developers designing visually rich advergames with excellent graphics quality that would enhance the information vividness and positively affect memory, attitude, and purchase intention. Generally, this is not the case for advergames as they are meant for casual playing situations, unlike fully-fledged digital games. Second, the present research suggests that advertisers should place their brand elements in a slow advergame if their primary marketing objective is to augment brand memory. Slow advergames provide the players more time to process the brand stimuli, thus increasing their attention, recall, and recognition, than fast advergames. Also, since we found that brand memory was least robust in the case of a fast mobile-based advergame, marketers should avoid this particular combination of gaming platform and game speed. Third, marketers (e.g., retailers, manufacturers) often advertise upcoming promotional offers through various channels such as websites, print media, and TV. Advergames are not always considered as the best platform for seasonal offers. Since our research reveals that brand memory, brand attitude, and purchase intention endure over time, marketers should start using advergames to promote their upcoming offers well in advance, and not in the nick of time, to augment their economic payoffs. Finally, we demonstrate that the effects of gaming platform and game speed on delayed persuasiveness are moderated by brand familiarity. This finding has critical implications for managers who promote unfamiliar and familiar brands in the market. Less-known brands often struggle to increase awareness and favourable perceptions among consumers. Marketers also become apprehensive of their persuasive efforts when competing with well-known brands in the market. Our research shows that a less-known brand would have the advantage to a familiar brand when advertised using an advergame. Those who are hesitant to use advergames should spend more on this channel to yield a favourable attitude and assuredly compete with well-known brands. Conversely, marketers of well-known brands should be less complacent because consumers are less motivated to process brand messages and extensively enhance their perceptions.

6. Limitations and Future Research

While the present research offers significant implications for theory and practice, we acknowledge its limitations. First, we restricted the comparative effects to between two types of gaming platforms (mobile and PC). We ignored other types of devices on which advergames could be played, such as gaming consoles (e.g., Xbox, Nintendo) and tablets. From an information processing perspective, these gaming consoles may have some advantages (e.g., rich visual stimuli and telepresence, and hence higher levels of information processing) and disadvantages (e.g., more game controls, therefore less spare cognitive capacity and lower levels of information processing). Moreover, these dedicated gaming devices have larger screens than mobiles and PCs and may trigger a different set of psychological reactions on the players. Therefore, it will be interesting to explore how gaming consoles perform compared to PCs and mobiles in generating favourable consumer outcomes.

Second, while there are different types of game genres (e.g., action, strategy, simulations), we experimented with a car racing advergame. These game genres pose distinctive challenges to the players. Besides, they also vary in the overall speed, which might differentially affect players' level of information processing. Therefore, research in the future should be conducted to increase the generalisability of the present research framework in other genres.

Third, while we incorporated brand familiarity as a potential moderator, several other game and brand characteristics might moderate the relationship between gaming platform, game speed, and consumer-level outcomes. Future research needs to be conducted to understand how attributes such as placement proximity, game rhetoric, product category, and degree of interactivity moderate the relationships mentioned above.

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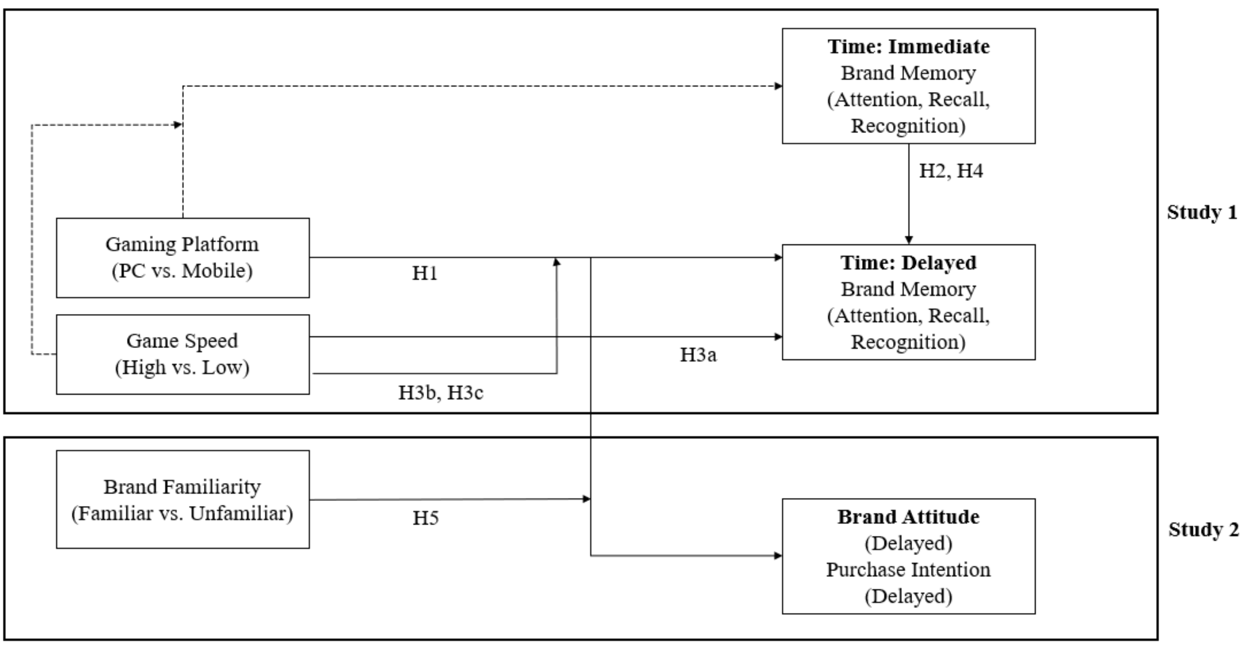
Figure 1: Research Framework



Dotted lines show insignificant effects. H2 and H4 shows depletion of brand memory from an immediate to a delayed time frame.

Figure 2: Screenshot of the Advergame with Fictitious Brands

Figure 3 [Panel A]: Effects of Gaming Platform on Brand Memory (Immediate [0] vs. delayed [1])

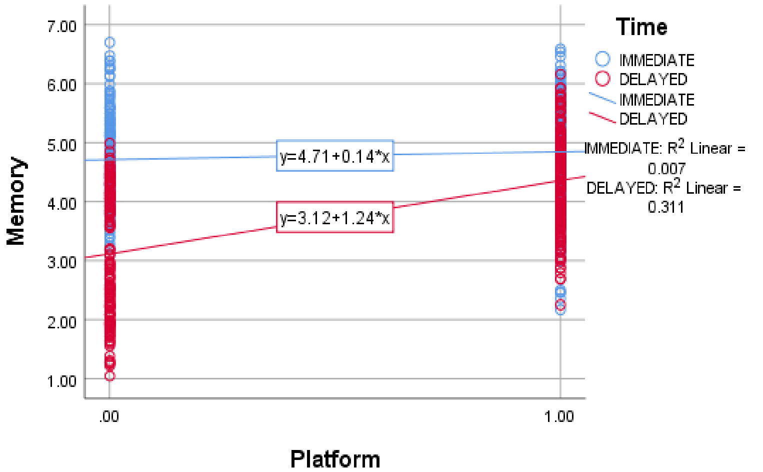


Figure 3 [Panel-B] Memory Depletion over Time across Gaming Platforms (PC [1] vs. Mobile [0])

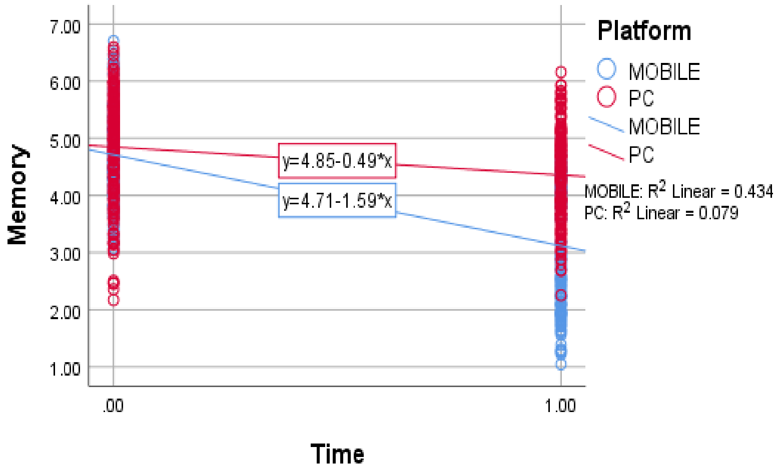


Figure 4: Three-way Interactions Effects on Immediate and Delayed Brand Memory

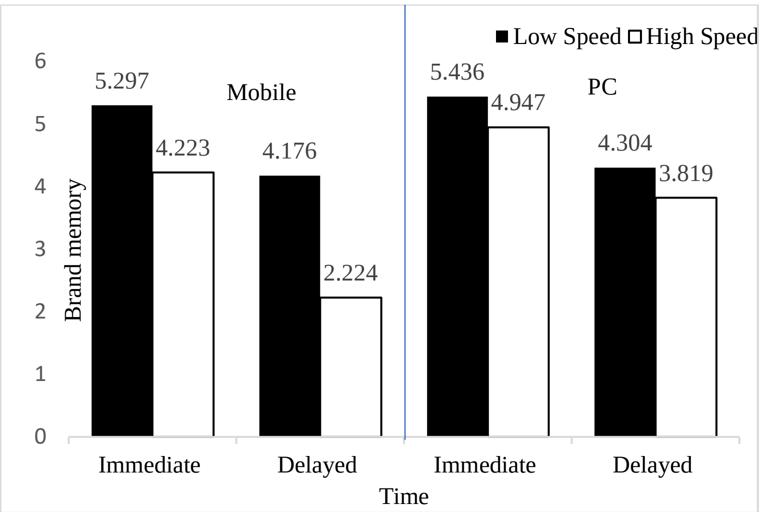


Figure 5: Screenshot of the Advergame with Real Brands

Figure 6: Effects of Gaming Platform × Game Speed × Brand Familiarity on Brand Attitude (Delayed)

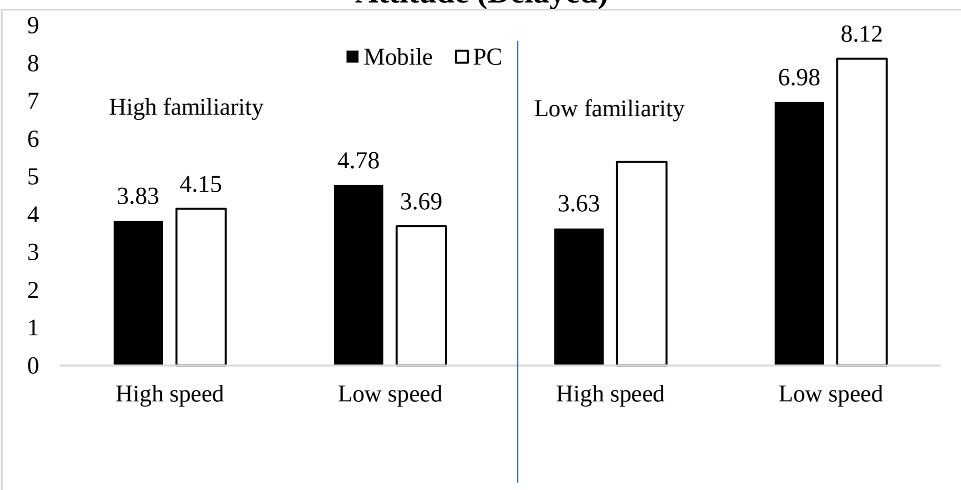


Figure 7: Effects of Gaming Platform × Game Speed × Brand Familiarity on Purchase Intention (Delayed)

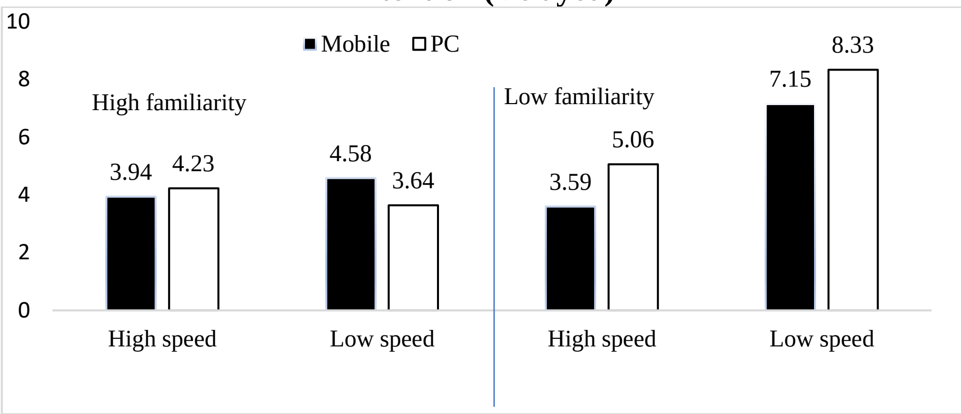


Table 1: Study 1 – Results of Mixed Measures ANCOVA

Effect	Wilks' Λ	F statistics	P value
EXP*	-	.553 (1,376)	.457
ABT*	-	11.281(1,376)	.001
EASE*	-	5.866 (1, 376)	.016
PLAT*	-	257.15 (1, 376)	.000
SPD*	-	1095.27 (1, 376)	.000
PLAT×SPD*	-	23.051(1, 376)	.000
Time	.966	13.171(1, 376)	.000
Time × EXP_	.999	.092 (1, 376)	.762
Time ×ABT_	.985	5.689 (1, 376)	.018
Tim× EASE	.996	1.619 (1, 376)	.204
Time × PLAT	.680	176.823(1, 376)	.000
Time × SPD	.926	29.903 (1, 376)	.000
Time × PLAT × SPD	.925	30.388(1, 376)	.000

Note: EXP = prior game playing experience, ABT = game playing ability,
EASE = ease of playing the game, SPD = speed of the game, PLAT = platform type.
* shows the univariate between-subject effects.

Table 2: Study 1 – Estimated Mean and Results of Contrast Tests

Type of Platform	Game Speed	Time	Mean	Contrast Estimates
Mobile	Low Speed	Immediate	5.297	Wilk's Λ = .689, $F_{[1, 376]} = 170.07$, p = 0.000
		Delayed	4.176	
	High Speed	Immediate	4.223	Wilk's Λ = .369, $F_{[1, 376]} = 644.09$, p = 0.000
		Delayed	2.224	
PC	Low Speed	Immediate	5.436	Wilk's Λ = .909, $F_{[1, 376]} = 37.78$, p = 0.000
		Delayed	4.947	
	High Speed	Immediate	4.304	Wilk's Λ = .902,

		Delayed	3.819	$F_{[1, 376]} = 41.005$, $p = 0.000$

Table 3: Study 2 – Results of Contrast Tests

Platform	Speed	Mean: Attitude*	Mean: Intention *	Wilk's Λ	F	Sig.
Mobile	Low speed	6.98 (4.78)	7.15 (4.58)	0.27	204.03 df = 1,152	0.00
	High speed	3.63 (3.83)	3.59 (3.94)	0.957	3.378 df = 1,152	0.03
PC	Low speed	8.12 (3.69)	8.33 (3.64)	0.091	754.902 df = 1,152	0.00
	High speed	5.39 (4.15)	5.06 (4.23)	0.652	40.273 df = 1,152	0.00

Note: ** values in the brackets indicate mean estimates of the high familiarity condition, and outside indicate mean estimates of the low familiarity condition. df shows degrees of freedom.*

Appendix A

Lab environment: Study 1 for PC (vs. mobile) based gaming platform