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Brand logos versus brand names: A comparison of the memory effects of textual and pictorial brand elements placed in computer games

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ABSTRACT

While a plethora of studies on gamification of advertising exists, little is known about how consumers process different types of brand elements (logos and names) placed in computer games, and whether differences in information processing lead to variations in brand memory. This gap is addressed by conducting three rigorous experiments. In Study 2 we find that, in general, brand logos lead to stronger memory than brand names – something known as the picture superiority effect. Study 3 examines the condition where the picture superiority effect is neutralized. We find that when the speed of a computer game is reduced, names and logos develop similar memory. Finally, in Study 4, we examine whether the picture superiority effect can be neutralized also in the context of high-speed games. We find that in fast games if the physical distinctiveness of the brand elements is increased, both logos and names yield in similar memory.

1. Introduction

Marketers have bemoaned the efficacy of print and television ads for decades. Most often they incur heavy expenses for these ads upfront and observe low levels of benefits at a later point of time. In comparison, marketing using digital tools is an invigorating change due to the widespread reach and speedy proliferation of the Internet. One such tool that has gained momentum in recent times is the gamification of advertising, also commonly known as in-game advertising (IGA) or advergames. This refers to the practice of embedding brand elements and persuasive messages about the advertised brands in video games (Babin, Herrmann, Kacha, & Babin, 2021; Eisingerich, Marchand, Fritze, & Dong, 2019; Park & Kim, 2013; Terlutter & Capella, 2013; Yi, Lee, & Kim, 2019). For example, the movie Ironman was advertised in a game called Sims 3 by including dynamic advertising posters of the film in the game. In another instance, a U.S. based company, Cascadian Farm, that sells organic farming products placed its brand in a highly popular game called Farmville 2 available on Facebook, and allowed the players to plant *branded blueberries* in the gaming environment. Marketers have been spending a lot of money on IGA and advergames to reach out to their target audiences. Approximately 4.91 billion USD were 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).

When it comes to including brand elements in video games for a fee, marketers are not fully sure whether to place textual (i.e., brand name) or pictorial (i.e., brand logo) design elements of brands in the gaming environment. There is also a dearth of understanding in the research related to gamification of advertising whether brand logos and names experience same level of information processing so as to affect players' cognition (e.g., brand memory) similarly. At present, inclusions of these brand elements are done mostly at random without the realization that picture and text have strikingly dissimilar effects on the way individuals process persuasive information which further determine their cognitive responses to the advertised brands (Childers & Houston, 1984; Luffarelli, Mukesh, & Mahmood, 2019; Pieters & Wedel, 2004). While an instinctive choice for the marketers is to include both the brand elements (i.e., logo *and* name) simultaneously, this approach might significantly increase the promotional expenditure of the marketers due to consumption of more advertising space in the gaming environment. Also, presence of multiple brand elements may create hindrances to consumers' processing fluency or the ease with which brand-related information is processed (Lee & Labroo, 2004; Luffarelli et al., 2019). This happens because attention to different types of brand elements is interdependent, that is, increased attention to one brand element detracts attention from the other element, thereby lessening the persuasive effects of these elements (Pieters & Wedel, 2004). More importantly, in a

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highly-engaging environment such as video game, individuals spend more of their attentional capacity toward their primary task such as playing the game, and are left with less capacity or cognitive resources for a secondary task like processing brand-related information (Lee & Faber, 2007; Vashisht & Sreejesh, 2017). Hence, it is important for the marketers to choose brand elements carefully so that consumers' incidental exposure to these elements develop enduring effects on their cognition such as brand memory.

In the present research, we conduct four rigorous experimental studies to solve the afore-mentioned brand name versus brand logo conundrum. Specifically, we answer the following critical questions in the present article: Does attention toward brand elements (logos and names) vary significantly in a game as compared to TV ads and product placements in a TV program (Study 1)? If so, are brand logos and names processed differently in the low-attention situation during gameplay so as to create differences in brand memory (Study 2)? Is there any key game attribute (e.g., game speed: high or low) which interplays with different types of brand elements and alters the direction of their effects on brand memory (Study 3)? Finally, do physical properties (e.g., e.g., shape, size, color, etc.) of the brand elements have any role to play in developing varying levels of brand memory in high speed games among the players?

Our research aims to make salient theoretical contributions. First, it is a novel attempt within the well-established domain of gamification of advertising that explicitly compares the persuasive effects of different types of brand elements such as brand logos and brand names on consumers' brand memory. Second, our study brings *fresh* insights by validating and reversing the picture superiority effect in an entertainment-driven persuasion scenario such as gamification of advertising. While a lot is known about the performance of verbal versus visual cues in a variety of media and information processing contexts, for example, evaluation of print ads (Lien & Chen, 2013), understanding social marketing ads (Gallopel-Morvan, Gabriel, Le Gall-Ely, Rieunier, & Urien, 2011), or product placement in TV programs (Sun & Evans, 2021), these research conclusions related to picture superiority effect and its underlying conditions cannot be directly extrapolated to the context of gamification of advertising – a media characterized by low levels of attention toward brand-related information (Lee & Faber, 2007). In a brand-embedded game, paying attention to and processing brand-related information are players' secondary task while playing the game is primary in nature and, therefore, exposure to the brand elements (logos or names) is more accidental than deliberate (Ghosh, Sreejesh, & Dwivedi, 2021; Lee & Faber, 2007). Therefore, our research adds value by carefully examining how pictures (i.e., brand logos) and texts (i.e., brand names) are differentially processed in computer games – an untapped area among advertising researchers in the last decade.

The present research also has strong practical implications. Marketers' advertising revenue is finite; therefore, it becomes necessary for them to examine the efficacy of different brand elements. Our research helps the marketers make an informed choice regarding whether to embed brand logos or names in video games so that players' exposure to these brand elements creates maximum impact on their brand memory. Second, our research shows that depending upon the degree of appeal or attractiveness of the brand identity cues, companies should place either names or logos of their brand and, thereafter, trigger favorable cognitive responses among the consumers by manipulating game speed or imaginal complexity of these cues.

2. Literature review

2.1. Gamification of advertising

Play has always enticed and exhilarated the humankind. It is, therefore, no surprise that in today's rapidly growing digitized world, video games exist in large numbers and continue to diffuse at an increasing rate. A recent report suggests that the global video gaming market valued to approximately USD 150 billion in 2020 and is expected to reach USD 275 billion by the end of 2025 (Statista, 2020). As video/computer games flourished over time, marketers started leveraging their reach and potential by embedding persuasive product and brand messages within the gaming environment. Arguably, the first instance of gamification of advertising dates back to 1978 when a video game called *Adventureland* promoted another game called *Pirate Adventure* within it. Since then, video games have been consistently exploited by marketers to promote brand-related information in a subtle, yet convincing, manner. According to another recent survey, the in-game advertising market is expected to grow by USD 10.97 billion between 2019 and 2024 at a compounded annual growth rate of 16% (Technavio, 2021).

Impelled by the upsurge in marketers' faith in computer games as a sound promotional tool, a lot of research attention has been devoted to investigate how gamification of advertising influences consumers in meaningful ways. Specifically, past researchers have explored the effects of important attributes, for example, game-product congruity and the prominence of the brand placement (Peters & Leshner, 2013), game-induced haptics (Jin & Phua, 2015), covertness and intrusiveness of the advertising (Evans, Wojdynski, & Grubbs Hoy, 2019; Mishra & Malhotra, 2021), game interactivity (Goh & Ping, 2014), and a host of other variables. The effects of these game and brand characteristics are observed on consumers' cognitive (e.g., brand memory), affective (e.g., game and brand attitude), and conative (e.g., propensity to purchase the advertised brand) responses (Terlutter and Capella, 2013; Vashisht, Royne, & Sreejesh, 2019). For the purpose of the present research, we have reviewed below selected literature wherein consumer memory was treated as an outcome variable.

In an early work, Nelson (2002) found that brands advertised in a car-racing game had immediate and delayed effects on consumers' memory. Interestingly, it was revealed that brands were recalled more when they were a major part of the game-play (e.g., branded cars *manually* chosen by players instead of automatic selection), or when they were new, local, and pertinent to the consumers. Along similar lines, it was found in another study that memory was stronger for those brands which were more familiar and frequently shown to the consumers while playing a game (Cauberghe & De Pelsmacker, 2010; Martí-Parreño, Bermejo-Berros, & Aldás-Manzano, 2017). Likewise, existing studies have examined the effects of several other key factors on brand memory such as game speed and brand prominence (Vashisht & Royne, 2016), type of brand (real versus fictitious) and spectator (watching versus playing) (Nelson, Yaros, & Keum, 2006), telepresence or immersiveness of consumers in the gaming environment (Besharat, Kumar, Lax, & Rydzik, 2013; Wang & Yao, 2020), consumers' kin-aesthetic involvement or mechanistic control in the game (Herrewijn & Poels, 2014), gaming device and game access platform (brand websites or social media) (Sreejesh, Ghosh, & Dwivedi, 2021), game difficulty level (Dardis, Schmierbach, Sherrick, & Luckman, 2019), game outcomes with respect to winning or losing (Ghosh, 2016), and the nature of the game itself manifested through the presence or absence of violent cues (Yoo & Peña, 2011).

While these studies validate that there are various game, brand, and individual-level attributes which, if effectively manipulated or controlled, strengthen consumers' brand memory, contradictory research outcomes also exist. For example, in a study involving a first-person shooter game, players exhibited poor product and brand recall due to the immersive nature of the game (Chaney, Lin, & Chaney, 2004). The researchers concluded that the players were so engrossed in playing the game that the brands presented in billboards were considered as *peripheral* information and were not fully processed to yield strong recall. In fact, many other studies conducted later directly support this notion that playing the game is individuals' primary task while processing brand-related information is secondary in nature (Ghosh et al., 2021; Lee & Faber, 2007; Vashisht & Royne, 2016). More important, these studies employ the limited capacity model of attention (Kahneman, 1973) and conclude that individuals allocate a large part of their

cognitive or attentional resources to complete the primary task and are left with very less amount of resources to complete the secondary task. Eventually, in a resource-constrained situation, brand cues undergo low levels of processing and result in poor memory (Ghosh et al., 2021).

Few researchers attempted to overcome this inherent challenge of in-game advertising and devised strategies that enable the players to spend more cognitive resources and deeply process the embedded brands, for example, reducing the speed of the game (Ghosh et al., 2021), presenting the brand elements (logos and names) in the central part of the computer screen (Lee & Faber, 2007), and increasing the size of these elements in the game (Chaney, Hosany, Wu, Chen, & Nguyen, 2018). While these research findings are meritorious in their own right and suggest unique ways to improve processing of brand elements embedded in computer games, some basic questions remain unanswered: *does the level of information processing inherently vary between logos and names so as to create differences in brand memory? If so, is there any manageable game or brand attribute that reduces these differences and make both logos and names equally effective in developing strong brand memory?* To the best of our knowledge, no research addresses these critical questions barring two studies that made an attempt in the similar direction, albeit under different research settings. First, Siemens, Smith, and Fisher (2015) tested the effects of message modality (brands which were seen vs. brand which were heard in a game) on consumers' memory measured in terms of brand recall, and concluded that no such differences exist. However, they compared the effects of audio versus visual brand placements and did not examine pictorial versus textual stimuli. Second, a study by Nuitjen et al. (2013) although compared recognition effects of pictorial and textual brand elements placed in a shooter game, the stimuli used in the experiment for comparison purposes were dissimilar in nature. Logo and name of two different brands (e.g., pictorial logo of Shell vs. brand name of MTV) were compared instead of the same brand (e.g., picture of Shell vs. brand name of Shell). While such an anomaly may initially appear to be inconsequential, it becomes difficult, while conducting paired comparison tests, to control for the latent effects arising due to consumers' varying pre-dispositions and perceptions for these *different* (*and real*) brands. Our research addresses these research gaps and answers the afore-mentioned questions by moving beyond the context of message modality and precisely comparing between the effects of pictorial (logo) versus textual (name) information of the *same brand* on consumers' brand recall. This way, we not only advance past research dealing with memory effects of games but also provide granular insights about the processing of different types of brand-relation information in computer games.

2.2. Pictorial versus textual information and their influence on memory

Information presented in pictorial and/or textual format is a core characteristic of consumers' information environment, especially when marketing stimuli for mass distribution (e.g., point of purchase displays, advertisements) are considered. There has been a lot of debate about the effects of textual and pictorial stimuli on consumers' cognitive response such as memory. Most of this debate predominantly centers on which of these two formats commands more attentional resources (Pieters & Wedel, 2004). According to the theories of visual attention (e.g., Kahneman, 1973; Treisman & Gelade, 1980; Wolfe, 1994, 1998) focussed attention to pictorial or textual stimuli is driven by the salience of the stimuli, called bottom-up factors (e.g., size, shape, colour, orientation, curvature, motion, and luminance), and consumers' prior knowledge of the stimuli (e.g., brand familiarity, product involvement, and product motivation), known as top-down factors. These two sets of factors explain the amount of attentional resources consumers spend on a particular stimulus (e.g., brand element) which further determine their brand memory.

In general, memory for pictures is found to be better than for words, a phenomenon known as the *picture superiority effect*. A large number of studies conducted in the past (e.g., Childers & Houston, 1984; Ensor, Surprenant, & Neath, 2019; Pieters & Wedel, 2004; Shephard, 1967) reveals that in various information processing contexts, pictures, as compared to texts, receive more visual attention due to their inherent characteristics which lead to deeper cognitive processing and enhanced memory. The superior performance of pictures over texts could be explained by the dual-coding theory (Paivio, 1969, 1971). This theory posits that there are two independent pathways in memory: (a) the *logogen pathway* for the verbal or textual representation, and (b) the *imagen pathway* for the imaginal representation. When any particular stimulus is presented to an individual, it is encoded and stored in the pathway that corresponds to the original modality of presentation of the stimulus. For example, an individual would encode and store the word "bottle" in the logogen pathway and the image of a bottle in the imagen pathway. Most importantly, representation of a stimulus in the logogen pathway can elicit representation in the imagen pathway and vice versa, such that the word "bottle" can produce an image of a bottle in the imaginal pathway, and the image of a bottle can elicit a textual representation in the logogen pathway. Using the dual-coding theory Paivio (1969, 1971) posits that the picture superiority effect occurs because pictures are more probable to produce representations in the logogen pathway than words are to elicit representations in the imagen pathway. Due to the differential effects of these two pathways, individuals are more likely to name or recall a picture than a word. Another group of researchers (e.g., Ensor, Bancroft, & Hockley, 2019; Bower, 1970; Janiszewski, 1998; Nelson, 1979) demonstrate the picture superiority effect, albeit using a different theoretical explanation that compares the conceptual and physical distinctiveness of pictorial and textual stimuli. It is posited that pictures are better recalled than words because of higher physical variability (e.g., shape, size, prominence, etc.) between pictures and pictures than between words and words. Also, due to being more conceptually distinct, pictures undergo higher semantic elaboration and deeper cognitive processing than words (Craik & Lockhart, 1972; Ensor et al., 2019). Eventually, due to this stimulus differentiation, pictures are more reliably encoded than texts which form distinct memory traces and help in better remembrance and recall (Bower, 1970).

In the past, academics have built on this pre-eminence of pictorial over textual stimuli to predict consumers' psychological and behavioural responses in a variety of media consumption and decision-making scenarios. Some of these interesting situations are evaluation of narrative print ads while forming attitude about advertised products (Lien & Chen, 2013), evaluation of augmented reality-facilitated museum experience (He, Wu, & Li, 2018), selection of product assortment and formation of choice sets (Townsend & Kahn, 2014), development of negative attitude and emotions toward cigarette smoking (Gallopel-Morvan et al., 2011), and assessment of negative social media expressions about a brand (Hansen, Kupfer, & Hennig-Thurau, 2018). While these academic enquiries firmly establish the picture superiority effect across a multitude of settings, we argue that these settings are fundamentally different when compared with consumers' processing of brand-related information in games. This is predominantly because paying attention to brand elements and deeply processing them while playing a highly engaging game are not primary, but consumers' secondary tasks, as explained earlier (Lee & Faber, 2007; Vashisht & Royne, 2016). Therefore, we coherently argue that the research outcomes underscoring the dominance of pictorial over textual stimuli should not be directly extrapolated to the context of gamification of advertising without robust empirical validation. For the purpose of comparing memory effects of brand names (text) and brand logos (pictures), we first start with the empirical examination of the basic proposition upon which such a comparison is grounded, that is, consumers pay significantly less attention to embedded brands in a game than those placed in a TV program as well as TV ads.

3. Study 1

This study aims to examine how audience attention towards advertisements differs across different media contexts, such as placements in TV programs, in-game advertising, and TV ads. This study provides diagnostic insights into whether the inherent nature of these media creates differences in the attention toward the advertisements presented in these media. Thus, this study is designed as a one-group between-subjects experiment with media types as the manipulated variable, attention as the outcome, and media interaction and behavioural engagement with media as the covariates.

3.1. Study design and stimuli

As part of this experiment, we first developed one fictitious brand name (e.g., Isaaki) and the logo of a men's perfume. This product category has been found to be very popular in India and hence used for this experiment. While the researcher provided the fictitious brand name, the logo was developed by an advertising agency in Bengaluru, India. After developing the brand name–logo pair, we pre-tested its suitability (match) using 30 randomly selected participants who were post-graduate students in a large university in South India. In this pre-test, we asked the participants to rate the match between the logo and the brand name on a 5-point scale (1 = 'not at all matching', 5 = 'completely matching). The results revealed that for all the pairs the mean score was above 4.0, thus confirming the match between the logo and the brand name. Following this, we developed three different types of experimental stimuli with the help of the same agency. The first one was a 15-minutes pre-recorded TV soap opera program where the brand elements were embedded as rolling ad messages. The second stimuli was a TV ad presented during the commercial break while watching the TV program. No endorsers were chosen for the ads; rather, a male voice-over was used to depict the perfume brand, the bottle of which was shown in the ad. The third stimuli was a car-racing game that had two racing laps, and the players were required to navigate through the track within a specified time. The brand name and logo were presented as billboards over the racing track.

3.2. Participants and procedure

We invited 180 post-graduate students from a large university in South India for a lab experiment as part of their course credit. In this lab experiment, these subjects were randomly allocated into one of the three different experimental conditions (Condition 1: Product placement in TV program, Condition 2: TV program with a commercial break where the ad was shown, Condition 3: In-game advertising). After the exposure, we asked them to complete the survey form covering the outcome measure, covariates, and demographic characteristics.

3.3. Measurement

We measured the participants' attention levels using a single item drawn from past studies (e.g., Lee & Faber, 2007; Van Reijmersdal, Rozendaal, & Buijzen, 2012). Specifically, we asked them to report their level of attention to the brand elements shown in the media (1 = no attention at all, 7 = a lot of attention). In addition to this, we also captured the subject's media interaction, adapted from Amaro, Duarte, and Henriques (2016), and behavioral engagement with the media, adapted from Hollebeek, Glynn, and Brodie (2014), as the study covariates.

3.4. Analysis and results

Following the study's primary objective of analyzing the attention level across three media types, we examined the means of attention measure (i.e., attention to the brand elements, Wedel & Pieters, 2008) across three experimental conditions. First, analysis of the covariates did not have a statistical effect on attention ($p > 0.05$). The mean of brand attention was 5.33 (SE = 0.65) for the full-length TV program with ad break, 4.55 (SE = 0.49) for the rolling advertisement condition, and 3.44 (SE = 0.32) for the IGA condition. An ANOVA ($F = 4.11$, $df = 2, 174$, $p < 0.05$, $\eta 2 = 0.18$) indicated a significant difference between these attention levels across conditions. Further, the post-hoc analysis reported that, there was no difference between the first two conditions (LSD mean difference = 0.78, SE = 0.55, $p > 0.05$). However, there was a significant difference between the full-length TV program with ad break vs. IGA (LSD mean difference = 1.89, SE = 0.42, $p < 0.05$) and rolling advertisement vs. IGA (LSD mean difference = 1.11, SE = 35, $p < 0.05$). Thus, we confirmed that the brand attention was higher in the TV ad and program placement in TV program when compared with the IGA.

4. Study 2

The prior study established that attention toward the target brands was significantly less in the case of IGA compared to TV ads and product placement in the TV program. This research finding provides us significant insights into the fact that individuals' attention, hence, level of processing commercial content, vary significantly across media. Specifically, attention was least in the case of game. Therefore, it becomes important for advertisers to understand whether or not players process brand names and logos similarly so as to generate the same levels of brand memory. For this purpose, we use the theoretical underpinnings that posit the picture superiority effect and develop the first hypothesis to compare the memory performance of logo (picture) and name (text) of fictitious brands placed within the gaming environment of an IGA. Specifically, we hypothesize that a brand logo would be perceived as more distinctive than the brand name included in the game. This would result in the higher semantic elaboration and deeper processing of the former brand element as compared to the latter. Eventually, a higher level of cognitive processing of the brand logo would result in stronger brand memory than the brand name. Also, based on the dual-coding theory, we posit that the representation of the brand logo in the logogen pathway would be more likely to form richer memory trace and hence, better brand memory than the representation of the brand name in the imagen pathway. Therefore, we develop the following hypothesis:

H1. In an IGA, exposure to brand logos results in higher brand memory than brand names.

4.1. Study design and stimuli

Study 2 implemented a one-way (brand element: name vs. logo) between-subjects experimental design with brand memory as the dependent variable. As part of the stimuli development process, we first conducted four focus group discussions (FGDs) with students (N = 60; male = 60%, female = 40%) who regularly (i.e., at least three hours of game playing time in a typical week) played computer games, including IGAs. These subjects were undergraduate and post-graduate students of various academic programs in a large university in South India. The average age of the subjects was 20.5 years (S.D. = 2.11 years), and they had an average game playing experience of 5.3 years (S.D. = 1.7 years). The primary objective of the FGDs was to identify (a) one popular game genre for the IGA (FGDs 1 and 2) and (b) some product categories frequently advertised in IGAs (FGDs 3 and 4). The results revealed that car racing game was the most popular genre. Some of the most frequently advertised product categories were smartphone, telecommunication services, music app, energy drink, apparel, body-spray, and movie booking app.

Next, we developed three fictitious brand names for each product category and approached an advertising agency to develop logos for these brands. In total, 21 pairs of brand names and logos were prepared which were to be used in a pre-test. In this pre-test (N = 28; $M_{[age]}$ =

21.2 years, S.D. = 1.97 years; male = 68%, female = 32%) subjects from the same university were considered who were given a seven-page booklet that included the names and logos of the fictitious brands. Each page represented one product category and included respective pairs of logos and names. The subjects were required to choose one of the three pairs from each product category based upon their likeability. At the end of this exercise, we identified the most frequently chosen logo-name pair from each product category (see **Appendix A** for all the seven pairs of logos and names), which were later embedded within the gaming environment of the IGA.

We approached the earlier game development company that used the same car racing game mentioned in the first study. Two versions of this game were developed: one included the logos, and another included the names of the fictitious brands. These brand elements were inserted as billboards over the car-racing track. In another pre-test comprising of 33 subjects ($M_{[age]}$ = 21.4 years, S.D. = 1.11 years; male = 61%, female = 39%) who had an average game playing experience of 4.1 years, we tested the extent of realism and representativeness of these versions because we intended our stimuli (i.e., game) to mimic real-life computer games. Specifically, we asked the subjects to first play the games and respond to the following items: (a) the game which I played is highly realistic, and (b) the game which I played represents the type of car-racing games I usually play (1 = 'strongly disagree' to 7 = 'strongly agree'). The results revealed that the mean scores of these variables were significantly higher than the scale median ($M_{realism}$ = 4.99, S.D. = 0.99, t = 14.11, p < 0.01; $M_{representativeness}$ = 5.03, S.D. = 1.02, t = 8.11, p < 0.01).

4.2. Participants and procedure

The subjects were selected from various undergraduate and post-graduate programs of the university mentioned earlier. Although the use of the student sample(s) has been questioned in consumer research, the suitability of these kinds of subjects was found to be appropriate in earlier studies dealing with advergames and IGAs (Ghosh, 2016; Ghosh et al., 2021; Peters & Leshner, 2013).

To identify the subjects for the experiment, an open invitation was put on the general notice board of the university. In response to this notice, 211 potential subjects reported their willingness to participate in the return of movie vouchers worth INR 250. From this student pool, 120 subjects were randomly selected for the study using simple random sampling technique ($M_{[Age]}$ = 22.12, S.D. = 2.22; $M_{[game\ playing\ experience]}$ = 3.12 years, S.D. = 1.22 years; male = 62%, female = 38%) who were invited in batches that ranged between 12 and 15 in a computer laboratory in the university. Upon arrival, they were assigned to specific computer consoles that were pre-installed with any one of the two versions of the car-racing game. The subjects played the game for approximately 12 min. At the end of the gameplay, they were instructed to close their computer consoles and were directed to answer the questions presented in the questionnaire. Finally, they were debriefed, awarded the movie vouchers, and thanked for their active participation in the experiment.

4.3. Measurement

The questionnaire included items and questions measuring the effect of the experimental manipulation, covariates, dependent variable, and subjects' demographics and game playing characteristics. As part of measuring the success of the manipulation, we asked the subjects through the questionnaire to report their response to the following items: (a) the game which I played contains advertisements which were presented mostly in the form of pictures, and (b) the game which I played contains advertisements which were presented mostly in the form of words (1 = 'strongly disagree' to 7 = 'strongly agree'). Further, we also asked them to report their responses towards the covariates (e.g., game playing ability and perceived easiness to play the game). We included these covariates following the suggestions of Ghosh et al. (2021) who posited that these variables might confound with gamers' memory by affecting their ability to allocate cognitive resources efficiently during the gameplay. The scale used to measure perceived easiness to play the game was adapted from Davis (1985) (i.e., the game which I played was very easy to play). Another single-item scale (i.e., I feel I was able to play the game successfully) was adapted from Bartholow, Sestir, and Davis (2005) that measured the subjects' ability to play the game. Both these items were anchored at 1 = 'strongly disagree' and 7 = 'strongly agree'. The dependent variable, i.e., brand memory, was measured through a recognition task in which the subjects were presented with 21 logos or names developed earlier (7 target brands, 14 filler brands). Those subjects who were exposed to the logos during the gameplay were asked to recognize the target logos in the brand memory task. On the other hand, subjects exposed to brand names while playing the game were asked the recognize the target brand names. Memory scores varied between 0 (not able to recognise a single brand) to 7 (all the brands were recognized). Finally, we asked the subjects to report their demographics such as gender, age, and family income. In addition, they also reported prior game playing experience (years) and frequency of gameplay in a typical week (hours).

4.4. Analysis and results

First, we examined the success of the manipulation. The results reported that the subjects exposed to brand names reported a higher score on the respective item ($M_{[brand\ name]}$ = 4.55 vs. $M_{[brand\ logo]}$ = 2.23, t = 13.67, p < 0.01). Similarly, subjects exposed to the brand logo condition reported a higher score on the respective item ($M_{[brand\ name]}$ = 2.21 vs. $M_{[brand\ logo]}$ = 5.11, t = 28.15, p < 0.01). Thus, we confirmed the success of manipulation of the brand element conditions.

To test the hypothesis, we applied a univariate analysis of covariance (ANCOVA) with the type of brand element as the independent variable, brand memory as the dependent variable, and perceived easiness to play the game and game playing ability as the covariates. The results supported that perceived easiness to play the game did not have a significant effect on brand memory ($F_{[1, 116]}$ = 0.009, p = 0.926). Similarly, ability to play the game also did not affect brand memory ($F_{[1, 116]}$ = 2.938, p = 0.089). Further, the main effect of the type of brand element on brand memory revealed a statistically significance result: subjects exposed to brand logos (vs. brand names) reported higher brand memory ($M_{[brand\ logo]}$ = 4.46 vs. $M_{[brand\ name]}$ = 3.23; $F_{[1, 116]}$ = 94.12, p = 0.000). Therefore, H1 was supported in this study.

5. Study 3

Outcomes of the previous study would preferably help those marketers who plan to advertise in an IGA by placing brand logos instead of brand names because of various reasons, for example, higher popularity, likeability, and relevance of their logos in the marketplace. However, in many situations it might happen that consumers equally prefer both these brand elements and/or do not explicitly distinguish between them in terms of overall attractiveness. In such cases, is it possible for the marketers to place brand names in a highly engaging IGA that draws incidental, instead of premeditated, attention from the consumers but still develop high brand memory? In other words, is there a scientific mechanism through which the picture superiority effect can be neutralized in an IGA so that brand names, in comparison to brand logos, are equally recalled by the consumers? We address this research question in Study 3.

While exploring the reasons behind the picture superiority effect, it is found that pictures are better recalled than texts because they are more distinctive, conceptually as well as physically, a rationale which we have presented earlier in this article. Since pictures are conceptually more meaningful than words, they experience higher levels of semantic elaboration than words (Childers & Houston, 1984; Ensor et al., 2019;

Hung, Edmonds, & Reilly, 2016). In simple words, individuals can do a meaning-based processing of pictures (e.g., poster of a solitary seashore during the sunset) in a better manner than those of texts (e.g., "loneliness in the beach"). What is more important for us to know in the context of this article is the fact that higher semantic elaboration leads to higher levels of information processing which eventually affects brand memory positively (Craik & Lockhart, 1972; Craik & Tulving, 1975; Wyer and Srull, 2014). In other words, when individuals are exposed to a picture vis-à-vis a set of words, they are able to elaborate in their brain more about the meaning of the picture than the words. This allows them to spend more cognitive or attentional resources on the picture and deeply process it as compared to the words which, in turn, results in longer lasting memory traces (Craik & Lockhart, 1972). Based upon these theoretical understandings, we coherently argue that if there is some kind of game mechanics that allows the players to spend a reasonably decent proportion of their attentional resources to effectively process (i.e., encode and store in the memory) brand names, we would observe the nullification or neutralization of the picture superiority effect. To operationalize such a mechanics, we bring into view an interesting, yet less studied, attribute of computer games called game speed.

Game speed is conceptualized as the "pace of movement of various objects" in a computer game (p. 55, Ghosh et al., 2021). For example, in a car racing game a player's car, other competing cars, and the racing track are the game objects which, in the visual field of the player, keep on continuously changing at varying levels of speed as the game progresses. A high-speed game, as compared to a low-speed one, requires faster shifting of players' visual focus among the game objects, and quicker manipulation of various gaming controls and physical devices (e.g., keyboard, mouse, joystick, etc.) (Ghosh et al., 2021). Prior research reveals that these amplified visual and physical movements increase the amount of cognitive or attentional resources of the players who consider playing the game as a primary task and processing of brand-related information in the game as a secondary task (Vashisht & Royne, 2016). Consequently, a lesser amount of these cognitive resources is available to the players to complete the secondary task (Vashisht & Royne, 2016; Vashisht & Sreejesh, 2015).

These findings are consistent with the postulations of the limited capacity model (LCM) of attention (Kahneman, 1973; Pashler, 1999) and the people's processing of commercial media content (PCMC) model (Buijzen, Van Reijmersdal, & Owen, 2010). The LCM posits that at a given point of time, an individual's total attentional capacity is limited. Individuals allocate their total capacity or cognitive resources in two parts: resources to complete the primary task, and spare resources for the completion of the secondary task. More importantly, resources dedicated to the primary task cannot be used to complete the secondary task. Therefore, if the primary task demands for attentional capacity, individuals are left with lesser capacity or resources for the secondary task. Similarly, the PCMC model also suggests that in the context of mediated entertainment (e.g., TV, computer game), individuals allocate more cognitive resources to complete their primary goal which is the consumption of entertainment content (i.e., watching a TV program or playing the game). Eventually, they allocate the left-over resources to attain their secondary goal which is to process persuasive information embedded in the entertainment content.

Based upon these prior conceptual and empirical foundations, we argue that when the players are exposed to a fast IGA, they would be seriously restricted in terms of their spare cognitive resources to effectively process the brand elements. In such a scenario, brand logos would be more meaningfully processed than brand names due to their inherent advantages of (a) being more physically distinctive and (b) being more probable of producing representations in the logogen pathway (Paivio, 1971). Therefore, the picture superiority effect would prevail in a condition characterized by limited attentional capacity of the game players.

H2. In a fast IGA, exposure to brand logos results in higher brand memory than brand names.

However, interesting changes in the nature of resources allocation and the level of information processing would be noticed in a slow IGA. In this scenario, players would have less cognitive load to keep pace with the speed of the game. This would increase the amount of their spare attentional capacity to effectively or deeply process not only the brand logos but also the brand names embedded in the gaming environment. A high level of cognitive processing of both these brand elements would eventually lead to similar memory performance. In other words, we expect that the picture superiority effect on brand memory to only prevail when the attentional capacity of the players is restricted, not when they are plentiful. Thus, we expect neutralization of the picture superiority effect in a slow IGA. Based upon these arguments, we hypothesize the following:

H3. In a slow IGA, exposure to brand logos and brand names result in similar brand memory.

See Fig. 1 for Hypothesized Study Framework.

5.1. Study design and stimuli

In Study 3, we executed a 2 (brand element: name vs. logo) × 2 (game speed: high vs. low) between-subjects experimental design with brand memory as the outcome variable. In this study, we also considered game playing ability and perceived easiness to play the game as the relevant covariates.

5.2. Stimuli

In this study, we selected a different game genre (shooting game) to confirm the earlier study findings to in a more generalizable game genre setting. To develop the game, we approached the same game development agency recruited in the earlier studies. Following the instructions, the agency developed a shooting game, where the player was required to take the role of a police officer who reached a hotel from the police station to save some hostages locked by a group of 25 criminals. The player got access to a large number of firearms and ammunitions, and could control the police cars and other game objects (e.g., doors, lights, etc.). First, to manipulate game speed, two versions of the game. In the high-speed version, the player had to react very fast to kill the criminals and free the hostages. Specifically, activities such as driving the police car, chasing the criminals, and the time to aim and shoot a criminal were done at a very high speed. If the reaction time of the player was slow, either the police officer or the hostages were killed while the game ended automatically. Alternatively, in the low-speed version of the game, the player had more discretionary time to kill the criminals and free the hostages. The speed of the car and running speed of the police officer was less as compared to the high-speed version, while the aiming and shooting time was more than the other version.

Next, in each of these game speed versions, two more versions of the IGA were developed to include different types of brand elements. In the first version, brand logos were inserted as billboards and posters inside and outside the hotel premises. Alternatively, in the second version brand names were inserted as billboards and posters. In total, four versions of the IGA were prepared: (a) low-speed with logos, (b) low-speed with names, (c) high-speed with logos, and (d) high-speed with names. The logos and names inserted in these games were similar to those used in Study 2.

After the stimuli development, we pre-tested these games to confirm the variations in their speed. As part of this pre-test, we exposed these games to two different groups of subjects (N = 44; $M_{[Age]}$ = 28 years, S.D. = 2.9 years; males = 68%, female = 32. After the subjects completed playing the game, we asked them to evaluate perceived speed of the game on a bipolar adjective scale (e.g., I consider that the game which I played was: 1 = 'slow paced' 7 = 'fast paced') adapted from Ghosh et al. (2021). The results showed that the subjects (N = 22) exposed to the fast-paced game reported a higher mean score of perceived game speed

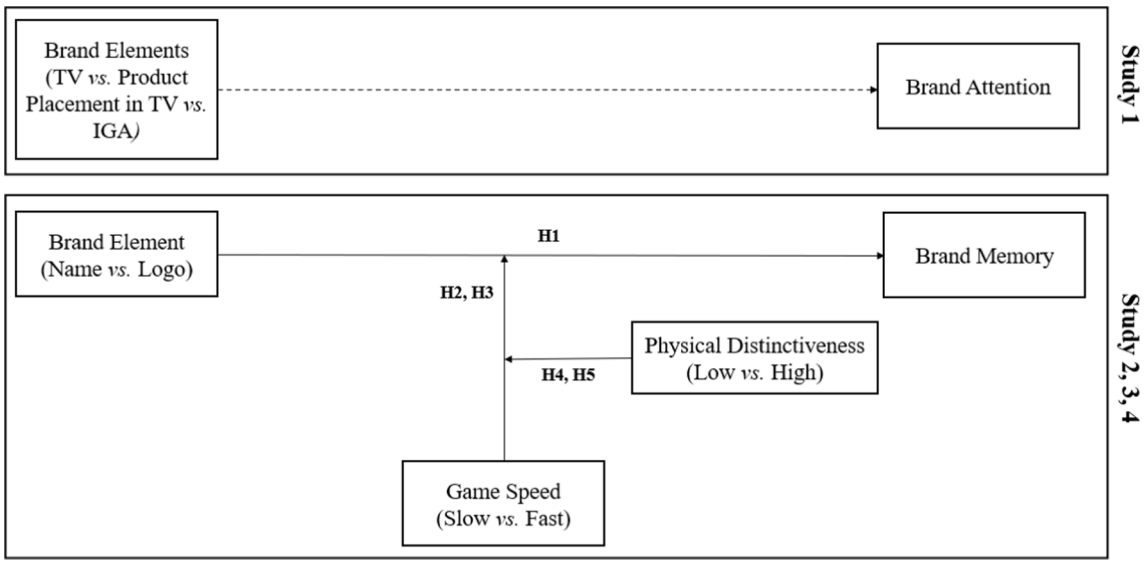

Fig. 1. Conceptual Framework. Dotted lines signify that exploratory analysis without developing a hypothesis.

in comparison to those exposed to the slow-paced game (N = 22) ($M_{[low\ speed]} = 2.11$, $M_{[high\ speed]} = 5.13$, $t = 18.11$, $p < 0.01$).

5.3. Participants and procedure

We invited the subjects who were members of a large gaming community whose purpose was to enable interaction among computer gamers and enhance their overall entertainment-related experience. We purposefully included a non-student sample in this study to increase the generalizability of the research findings. Upon invitation, 879 gamers reported their willingness to participate in the study, following which we gifted one high-end gaming laptop to the winner selected through a raffle. We randomly selected 160 gamers for the experiment and asked them to share their contact details (email id and phone number). On the day of the experiment, the subjects received an email that included detailed game playing instructions and the URL of one of the four versions of the IGA (See **Appendix B**). No mentions of the brands embedded in the game were done. They were simply required to play the game and complete the game objectives. Immediately after a subject completed playing the game, he/she could click a button embedded in the game that led to the online questionnaire. We kept track of their game playing activity to ensure that no subjects played the game more than once. At the end of the experiment, we conducted the raffle and announced the name of the winner to whom the laptop was dispatch through courier service.

5.4. Measurement

In this study, we used the same measures used in Study 2 to capture brand element manipulation, covariates, and the outcome variables. In addition to this, we also added an additional item mentioned earlier (Ghosh et al., 2021) to measure the success of the manipulation of game speed.

5.5. Analysis and results

Before the formal test of the study hypotheses, we examined the success of the manipulations. First, we examined the manipulation of brand elements (logo vs. name). The results revealed that in the brand name condition, the subjects reported higher score on the item which sought their perception of brand names as the brand element used inside the game ($M_{[brand\ name]} = 4.88$ vs. $M_{[brand\ logo]} = 2.91$, $t = 18.11$, $p < 0.01$). Similarly, subjects exposed to the brand logo condition reported a higher score on the item which sought their perception of brand logos as the brand element used inside the game ($M_{[brand\ name]} = 2.29$ vs. $M_{[brand\ logo]} = 5.32$, $t = 21.11$, $p < 0.01$). Next, we checked the success of the manipulation of game speed. The results revealed that the subjects exposed to the high-speed game reported a higher score on the measurement item related to game speed in comparison to those exposed to the slow speed game ($M_{[high\ speed]} = 5.01$ vs. $M_{[low\ speed]} = 2.01$; $t = 12.88$, $p < 0.01$). Thus, we confirmed the success of the manipulation of both the independent variables.

To study H2 and H3, we performed a 2 (brand element: name vs. logo) × 2 (game speed: high vs. low) between-subject analysis of covariance (ANCOVA) with game playing ability and perceived easiness to play the game as covariates, and memory as the dependent variable. However, both these covariates did not show a statistically significant effect ($p > 0.01$). Further, as reported in Table 1, we examined the main effect of brand element on memory which revealed a statistically significant effect ($M_{[brand\ logo]} = 4.89$, $M_{[brand\ name]} = 4.24$, $F(1,156) = 76.58$, $p < 0.01$). Further, we examined the interaction of brand element × game speed on brand memory. The results supported a statistically significant interaction ($F_{(1,156)} = 59.46$, $p < 0.01$). Followed by this, we performed two different pre-planned contrast tests (see Table 1). As shown in Fig. 2, the first pre-planned contrast test indicated that in a high-speed game, use of different brand elements resulted in significant differences in brand memory where brand logos helped develop stronger brand memory than brand names ($M_{[high\ speed,\ brand\ logo]} = 4.78$, $M_{[high\ speed,\ brand\ name]} = 3.56$, $F(1,156) = 135.5$, $p < 0.01$). Therefore, H2 was supported. Further, the second pre-planned contrast test results indicated that in a low-speed game, use of different brand elements (logo vs. name) within the game did not create any difference in the gamers' brand memory ($M_{[low\ speed,\ brand\ logo]} = 5.00$, $M_{[low\ speed,\ brand\ name]} = 4.92$, $F_{(1,156)} = 0.5407$, $p > 0.01$. Further, Thus, we also found support for H3.

6. Study 4

The previous study reveals that the traditional picture superiority effect can be neutralized and marketers can yield strong brand memory by embedding brand names, instead of brand logos, in an IGA that has low speed. However, not all marketers would be keen to use a low-speed game to promote their brands because computer games with low speed put less cognitive load on the players and, hence, may be perceived as underchallenging in nature (Ghosh et al., 2021; Nelson & Waiguny, 2012). Also, low-speed games may not always achieve playability

Table 1
ANCOVA and Contrast Test Results of Study 3.

Univariate ANOVA			Mean & Contrast Test				
Source	**F**	**p value**	**Game Speed**	**Brand Elements**	**Mean**	**F**	**p value**
Intercept	15236.08	0.00	Slow	Logo	5.00	0.5407	0.46
Game Speed	114.8056	0.00		Name	4.92		*ns*
Brand Element	76.58156	0.00	Fast	Logo	4.78	135.5	0.00
Game Speed × Brand Element	59.46188	0.00		Name	3.56		

Note: df = (1,156). Ns indicates an insignificant p-value. All other p values indicated a statistically significant effect.

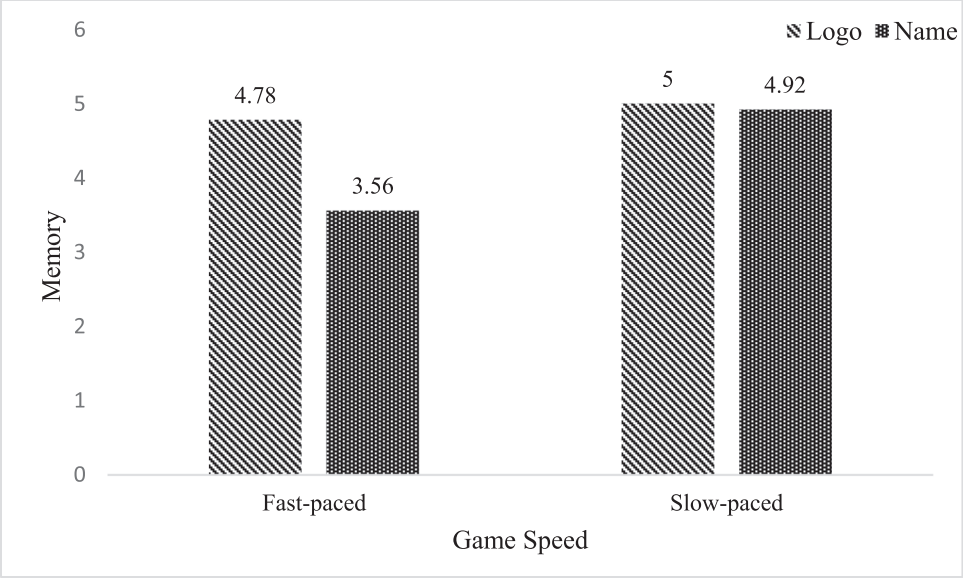

Fig. 2. Game Speed × Brand Element Interaction on Brand Memory.

expressed in the form of immersiveness, flow, and optimal experience (Fabricatore, Nussbaum, & Rosas, 2002). This is particularly true for those individuals who are highly experienced in playing computer games and whose skills outweigh the level of difficulty in attaining the game-related objectives (Csikszentmihalyi & LeFevre, 1989; Nelson & Waiguny, 2012). Therefore, while the previous study's findings are generally relevant for low-skilled players who may prefer a slow IGA, we need to answer a critical question: Is there a way which allows the marketers to use brand names in a high-speed game in such a way that these names compete equally well with logos in developing rich traces of brand memory? We address this research question in Study 4.

Specifically, we delve into the rich body of knowledge which explores the attention-capturing capabilities of pictures and texts from the perspective of baseline and incremental attention (e.g., Bundensen, 1990; Folk, Remington, & Johnston, 1992; Logan, 1996; Pieters & Wedel, 2004; Rangelov, Müller, & Zehetleitner, 2017). Baseline attention is the attention devoted to a visual object, picture or text, and is at least partially caused by the visual pop-out of the object (Pieters & Wedel, 2004). On the other hand, incremental attention is the additional amount of attention that a visual object captures beyond baseline attention due to the amplification of the physical distinctiveness of objects by using colors (other than black and white) or increasing the size of the objects (Nelson, 1979; Pieters & Wedel, 2004). Pictures are found to capture most baseline attention because of automatic, fast, and less effortful pre-attentive processes (Carretié, 2014; Loftus, 1983; Öhman, Flykt, & Esteves, 2001; Stolk, Boon, Smulders, & d'Ydewalle, 1993). The picture superiority effect is attributed to these processes pertaining to the baseline attention. However, prior research also reveals that the picture superiority effect can be reduced by manipulating the physical distinctiveness of texts by increasing their sizes and/or making them more colorful (Childers & Houston, 1984; Ensor et al., 2019). This happens because texts receive most incremental attention when they are made more physically distinctive (Ensor et al., 2019; Pieters & Wedel, 2004; Rangelov et al., 2017). An increase in incremental attention helps in more effortful cognitive processing which positively affects memory performances (Bundensen, 1990; Logan, 1996). Also, high physical distinctiveness of texts results in encoding distinctiveness, a tendency of individuals to discriminate one stimulus from another while encoding, that yields in the formation of rich memory traces (Childers & Houston, 1984; Townsend & Kahn, 2014).

Based on these findings we argue that in a high-speed game, when the brand logos and brand names are less physically distinctive (i.e., smaller in size[1]), the baseline attention of the logos would be higher than that of names which would result in more cognitive processing (encoding and storage of information in the memory). In such a case, brand logos would result in stronger memory than the brand names. However, when both these brand elements are made more physically distinctive, incremental attention to the brands names would be *activated* the effect of which on brand memory would reduce or neutralize the baseline attention effects of the brand logos. In such a situation we expect that both these brand elements would result in similar brand memory. Based upon these arguments, we hypothesize the following:

H4. In a fast IGA with less physically distinctive brand elements, exposure to brand logos results in higher brand memory than brand names.

[1] Details of the manipulation of physical distinctiveness are given in the *Method* sub-section of Study 4.

H5. In a fast IGA with more physically distinctive brand elements, exposure to brand names results in similar brand memory.

6.1. Study design and stimuli

Since our objective in this study was to examine the interaction effect of brand elements and physical distinctiveness in a high-speed gaming context, we designed a quasi-experimental setup for the study. Specifically, we pre-selected a high-speed game used in the previous study and manipulated brand elements and physical distinctiveness, and considered these manipulated variables as between-subject factors. The outcome variable and the covariates were same as used in Study 2 and 3.

To perform the study, we selected the stimuli used in Study 3: (a) a high-speed shooting game with logos, and (b) a high-speed shooting game with brand names. However, for the purpose of manipulating the physical distinctiveness (high vs. low) of the brand elements, we following the approach suggested by Puzakova and Aggarwal (2018). Specifically, in the high physical distinctive condition, the color of the billboard on which the brand elements appeared was selected in such a way that the elements were in sharp contrast with background color. For example, if the color of the logo was predominantly violet (e.g., Triple Chase – see **Appendix A**), the background was chosen as yellow. For the brand names which were in black font, a white background (i.e., color of the billboard) was chosen. In the low physical distinctive condition, the level of contrast of the colors of the logos and names in comparison to the color of the billboards was low. For example, we chose a light green background for the same brand (i.e., Triple Chase) mentioned above while the background of the brand names was light grey in color. Further, in the high physical distinctiveness condition, the size of the brand elements was larger as compared to the low physical distinctiveness condition.

6.2. Participants and procedure

In this online experiment, we invited the subjects from a large university in South India in lieu of a movie voucher worth of $2.5 given to each of them. A total of 293 subjects agreed to participate in the experiment from which we randomly selected 184 subjects for the experiment. On the day of the experiment, we first e-mailed them detailed instructions of how to participate following which each subject received an URL of one of the four versions of the game (i.e., brand logos with high physical distinctiveness, brand logos with low physical distinctiveness, brand names with high physical distinctiveness, and brand names with high physical distinctiveness). They played the game for one round and later were redirected to the online questionnaire from an in-game link. Eventually, they were debriefed and thanked for participating in the experiment. The movie vouchers were emailed to them two days later.

6.3. Measurement

The measurement items for the manipulation check of brand elements, covariates, and the dependent variable were similar to Study 3. In addition to this, to measure the manipulation of physical distinctiveness of the brand elements, we followed Puzakova et al. (2018) and used a two-item scale (e.g., I have noticed that the brand elements presented in the game is distinctive, and the brand elements emphasized in the game carry the unique features; 1 = 'strongly disagree'; 7 = 'strongly agree').

6.4. Analysis and results

First, we examined the success of the manipulations of the independent variables. Similar to the previous studies, we found that the subjects exposed to the IGA with brand names reported higher score on the item which sought their perception of brand names as the brand element used inside the game ($M_{[brand\ name]} = 4.71$ vs. $M_{[brand\ logo]} = 2.99$, $t = 12.14$, $p < 0.01$). Similarly, subjects exposed to the brand logo condition reported a higher score on the item which sought their perception of brand logos as the brand element used inside the game ($M_{[brand\ name]} = 2.36$ vs. $M_{[brand\ logo]} = 5.32$, $t = 18.11$, $p < 0.01$). Thereafter, we tested the manipulation of physical distinctiveness of the brand elements. The results supported that the subjects exposed to the high physical distinctive condition reported higher distinctiveness of the brand elements than the low physical distinctive condition ($M_{[high\ physical\ distinctiveness]} = 5.13$, $M_{[low\ physical\ distinctiveness]} = 3.11$, $t = 17.11$, $p < 0.01$). Thus, the success of the manipulations of the independent variables were guaranteed.

To test the hypotheses (H4 and H5) we used a 2 (brand element: logo vs. name) × 2 (physical distinctiveness: high vs. low) between-subjects ANCOVA. As shown in Table 2, the results supported that subjects' game playing ability was statistically significant covariate ($F_{[1,178]} = 8.14$, $p < 0.01$). However, their easiness to play the game was reported to be insignificant ($F_{[1,178]} = 0.08$, $p > 0.01$). Subsequently, we checked the interaction of the manipulated variables on the outcome, and the results supported a statistically significant interaction ($F\ [1,178] = 70.46$, $p < 0.01$). Next, we conducted two pre-planned contrast tests. As reported in Fig. 3, in the first test, the results supported that in the low physical distinctiveness condition, exposure to brand logos (vs. brand name) resulted higher brand memory ($M_{[low\ physical\ distinctiveness,\ brand\ logos]} = 4.06$, $_{[low\ physical\ distinctiveness,\ brand\ names]} = 2.24$; $F_{[1,178]} = 197.80$, $p < 0.01$). Therefore, H4 was supported. In the second pre-planned contrast test, we found that in the high physical distinctiveness condition, brand logo (vs. brand name) did not yield significant differences in subjects' brand memory ($M_{[high\ physical\ distinctiveness,\ brand\ logo]} = 5.16$, $M_{[high\ physical\ distinctiveness,\ brand\ name]} = 4.86$, $F_{[1,178]} = 6.11$, $p = 0.051$). Therefore, we also found support for H5.

7. General discussion

Understanding the effects of different types of in-game brand elements on consumers' information processing and cognitive responses is a crucially under-researched area in the domain of gamification of advertising. This article addresses the afore-mentioned research gap by conducting four rigorous experimental studies that compared the effects of two brand elements, brand logos and brand names, on consumers' brand memory. For this purpose, we delved deep into the literature that deals with the effects of pictorial and textual stimuli on information processing (e.g., Pieters & Wedel, 2004; Childers & Houston, 1984; Lien & Chen, 2013; Ensor et al., 2019), and subsequently built the research hypotheses based on the conceptual fabric drawn from the dual coding theory (Paivio, 1969, 1971), conceptual and physical distinctiveness of pictures and words, and baseline and incremental attention of these different types of visual stimuli. Specifically, we found that in normal gaming conditions, brand logos (i.e., pictures) are perceived as more distinctiveness and produce stronger representations in the logogen pathway than brand names (i.e., words) in the imagen pathway. These advantageous attributes of logos result in stronger brand memory than names – a phenomenon known as the picture superiority effect. However, in the subsequent studies, we exhibited that there are interesting in-game mechanism or processes through which the picture superiority effect can be reduced such that brand logos and brand names yield similar memory. First, in Study 3, we showed that the picture superiority effect is neutralized when the brand elements are embedded in a game with low speed. This happens because in a slow-speed IGA, more spare attentional resources are available with the players that could be employed to process both these types of elements in a rigorous manner. Eventually, a higher level of information processing (i.e., encoding and storage of information) of the logos as well as the names reduces the inherent advantages of pictorial stimuli and results in similar memory performance compared to textual stimuli. Finally, in Study 4 we revealed that the picture superiority effect can be neutralized not only

Table 2
ANCOVA and Contrast Test Results of Study 4.

Univariate ANOVA			Means and Contrast Tests				
Source	**F**	**p value**	**Physical Distinctiveness**	**Brand Elements**	**Mean**	**F**	**p value**
Intercept	29.44	0.00	High	Logo	5.16	5.408	0.021
Playing Ability (c2)	8.14	0.00					
Easiness to Play the Game (c2)	0.080	0.77 *ns*		Name	4.86		
Brand Element	136.91	0.00					
Physical Distinctiveness	421.67	0.00	Low	Logo	4.06	197.80	0.00
Brand Element × Physical Distinctiveness	70.46	0.00		Name	2.24		

Note: df = (1,178). Ns indicates an insignificant p-value. All other p values indicated a statistically significant effect. c1 and c2 indicates the covariates.

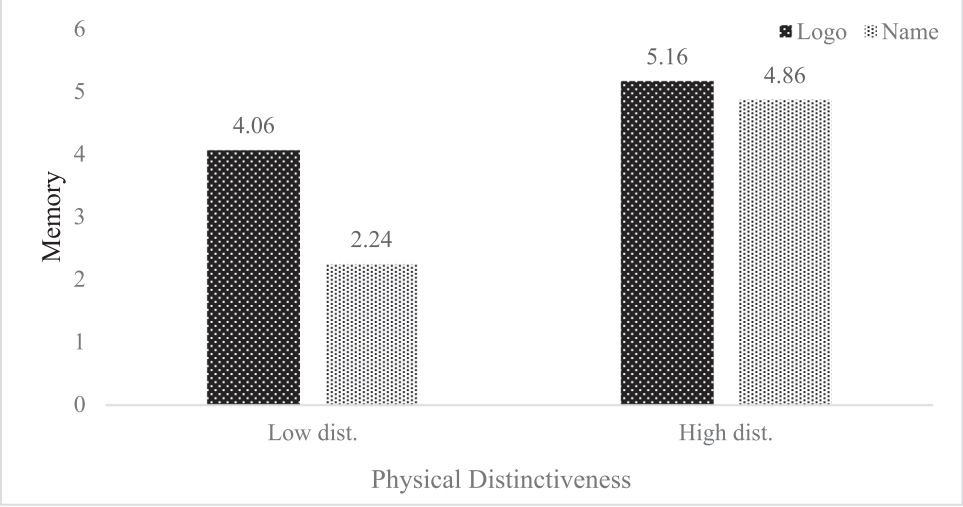

Fig. 3. Brand Elements × Physical Distinctiveness Interaction on Brand Memory.

by reducing game speed but also by increasing the physical distinctiveness of the brand names in a high-speed game. Specifically, we found that when the size of brand names and brand logos are increased, the effects of incremental attention to the brand names on memory help in neutralizing the effects of baseline attention of brand logos. Simply speaking, when textual stimuli with larger size become more physically distinctive than before (i.e., with smaller size), the additional amount of attention they receive from individuals followed by the *extra* level of information processing cancel out the advantages of pictorial stimuli in terms of their baseline attention effects such as automatic, fast, and less effortful pre-attentive processes. Thus, brand logos and brand names can yield similar memory even in a high-speed IGA.

8. Theoretical contributions

First, we tap an area in the domain of gamification of advertising that remained out of focus since the very beginning of academic research in this domain, that is, an explicit comparison of the influence of different types of brand elements embedded in the games on consumers' cognitive responses. While a plethora of research exhibits the effects of several game-, brand-, and player-related characteristics on consumers, surprisingly very less was known till date about whether or not consumers process a brand logo and a brand name in a similar manner and, if they do, how their memories are affected differentially. Our research helps to answer this important question in a scientific manner. In this way we also contribute to the theories that explain the picture superiority effect such as the dual coding theory (Paivio, 1969, 1971) and the stimulus differentiation theory (Bower, 1970) by departing from more *formal* situations of information processing such as evaluating advertisements in TV, print, or social media. Specifically, we compare brand recall effects in a casual and resource-constrained information processing scenario where consumers' exposure to brand elements are purely accidental in nature. Along these lines, we enrich the pertinence of the afore-mentioned theories in a reward-driven persuasive environment that is also characterized by subliminal advertising strategies.

Second, we put to test important theoretical postulations concerning the comparative effects of pictorial and textual stimuli in a novel information-processing context such as computer games. While prior researchers have used more formal setups (e.g., reading and memorizing words and pictures in behavioural laboratories) and traditional advertising contexts such as print and TV ads (e.g., Choi, 2019; McQuarrie & Phillips, 2008; Rayner, Rotello, Stewart, Keir, & Duffy, 2001) to compare between these stimuli, no research existed that examined the validity of these postulations in a casual and reward-driven environment such as game playing, where attention to brand-related information is purely incidental in nature. In other words, it is less probable that the players would purposefully process brand logos and names while playing a game. Despite this, it is found that the extant theoretical underpinnings comparing pictorial and textual stimuli hold good in the context of gamification of advertising.

Finally, we contribute to the extant body of knowledge concerning the effects of game attributes by examining a less-investigated attribute such as game speed. While a lot is already known on other game characteristics, for example, game genre, game-brand congruence, flow experience in a game, and game outcome to name a few (see Terlutter and Capella (2013) for a list of these attributes), a smaller number of studies has been conducted as of now to explore how speed of a game affects the consumers. We address this research gap by exhibiting those differences in game speed allow the players to differentially deploy more or less of their attentional or cognitive resources to processes brand-

related information embedded in the gaming environment which eventually decides their brand memory.

9. Managerial implications

Our research also has salient managerial implications. At a broad and strategic level, it helps the marketers that the marketers decide whether to place brand names or logos in a computer game. No systematic knowledge was available till date regarding this aspect of gamification of advertising, and marketers have been randomly embedding either brand names *or* logos in computer games. Sometimes, in an anticipation of a safer bet, they also include both these elements at an extra cost without even knowing that multiple elements can seriously hinder consumers' processing fluency (Lee & Labroo, 2004; Luffarelli et al., 2019). Our research suggests that in normal gaming conditions, including a brand logo results in stronger memory than a brand name. Such a finding would benefit those brands whose logos are more known or popular in the marketplace and, therefore, placing the logos in an IGA that embeds multiple logos of a variety of brands becomes important.

However, there might be other situations where the marketers want to embed the brand names either deliberately or because the they are more popular or better known than the logos. In such cases, the previous implications (i.e., placing the brand logos instead of the brand names) becomes less relevant to the marketers. Our research suggests two alternative ways to develop a high level of brand memory by placing brand names. First, the marketer may choose a slow-speed game to place the brand names. Second, they may choose a high-speed game but increase the size of the brand name. The choice of game speed is critical because not all players would be comfortable in playing a high-speed game. A slow-speed game may be more appealing to the players who has low game-playing skills either because of less game playing experience or because of under-developed cognitive abilities such as children (Kahneman, 1973; Plebanek & Sloutsky, 2017). Accordingly, the brand managers, in consultation with the game developers, may launch a slow or a fast IGA (that includes brand names) depending upon the demography of their target consumers, and eventually develop strong brand memory among the consumers.

10. Limitations and future research

Our research has its own set of limitations that can be suitably addressed in future studies. First and foremost, our research findings are directly applicable for those brands which have separate logos and brand names (e.g., Nike, Apple, etc.) but may not be so relevant for those brands where these is no explicit distinction between the two (e.g., Cadbury). Therefore, it is essential that future research should be conducted by comparing the effects of these two types of brands mentioned above and precisely examine whether brand with integrated logos and names (e.g., Toys "R" Us) lead to similar perceptual and conceptual fluencies that affect brand memory. Second, we used a brand recognition test instead of free recall to examine memory performance because all the studies used fictitious brands. Future research needs to be conducted to validate our research findings by using brand recall tests in the context of real brands after controlling for the effects of brand image and familiarity. Third, we used IGAs instead of advergames to examine the effects of logos and names on brand memory. While IGAs are more pertinent during studying consumers' memory because they include multiple brands, future research may be conducted to extend our research findings in the context of advergames in which the theme of a game is centred around the value propositions of a particular brand. Fourth, we considered consumers' cognitive responses (i.e., brand memory) as the outcome variable and ignored other types of responses such as affective (e.g., brand attitude), conative (e.g., purchase intention), and behavioral (e.g., purchase). Since we included only brand elements and no other forms of persuasive messages such as punchlines, product descriptions, and product images, others types of responses might have been less relevant. However, interested researchers should broaden our conceptual foundations and examine the effects of different types of pictorial and textual stimuli other than brand elements on consumers' affection, conation, and behavior. Finally, while neutralizing the picture superiority effect in the third study, we chose to manipulate the physical distinctiveness of the stimuli. Extant research suggests (Childers & Houston, 1984; Paivio, 1969, 1971) that other types of manipulations can also neutralize or even completely reverse the picture superiority effect by (a) manipulating the amount of incidental redundant cues, that is, the richness of a text in providing multiple cues that serves as aids to retrieve memory (e.g., more rich text: man drinking beer in a rainy evening in the rooftop versus less rich text: man drinking a strong beer in a room), and (b) including paired items in the text that increase/decrease the meaningfulness of the association between the items and thus affect memory (e.g., more meaningful association: dogs playing guitar versus less meaningful association: dogs chewing bone). Therefore, future research should be done to manipulate incidental redundant cues and relational organization in the context of brand elements to influence brand memory favourably.

CRediT authorship contribution statement

Tathagata Ghosh: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **S. Sreejesh:** . **Yogesh K. Dwivedi:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. List of brand names and brand logos used in the studies

Product Category	Brand Name	Brand Logo
Smartphone	Avoron	
Telecommunication Services	Bealtel	

(*continued on next page*)

(*continued*)

Product Category	Brand Name	Brand Logo
		
Music App	Xanai	
Energy Drink	Triple Chase	
Apparel	Gobulas	
Body-spray	Voza Voza	
Movie Booking App	Orange Movies	

Appendix B. Experimentation instructions (Study 2, 3 and 4)

Dear participant, thank you so much in advance for participating in the experiment conducted by the University (University Name). This is a game-playing experiment where you are first required to play the game on your console following which you are required to respond to the questions provided in the questionnaire, which you can locate from the shared URL. All of the information you provide will be kept private and anonymous, which means that the decisions you make in this experiment will remain private and anonymous, and your name will not be linked to your choices. Please read the directions carefully, and if there is anything you don't understand, don't hesitate to ask questions.

Instructions

1. Your response is critical to us, therefore, please stay focused on the gameplaying activity very seriously and respond to the questions very meticulously.
2. Once you complete the game, please close the device (computer/mobile) on which you played it. After that, indicate your responses to the questions presented in the online questionnaire.
3. While answering the questions, you are not allowed to play the game.
4. You are not allowed to discuss anything related to the gameplay with any other individuals during the time of this activity.
5. Once you complete the activity, please complete the reward claim form so that you can collect your rewards.

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