# Persuasive Content: Understanding In-Game Advertising Retention in Players and Onlookers

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## ABSTRACT
The continued interest in advertising and entertainment brings about important questions about the effectiveness of advertising when it is competing for attention with entertainment content. This research provides the results of an efficacy analysis of in-game advertising within the controlled environment of a race game, an environment in which advertising blends in naturally. The experiment was designed to understand the effectiveness of in-game advertising for both players and onlookers. It takes into account both the player's retention and the onlooker's attention as an inroads to understanding how in-game advertising works on those who participate in electronic entertainment and those who watch it. The results indicate that such advertising is more effective for onlookers than for players.

## Categories and Subject Descriptors
K.8.Games

## General Terms
Documentation, Design, Human Factors

## Keywords
In-Game Advertising, IGA, Video Games, Onlookers.

## 1. INTRODUCTION

It is no secret that the video game and mobile game industry have continued to grow sharply in the last decade. As part of this growth advertisers have attempted various methods for integrating advertising content. The most common of these advertising techniques is in-game advertising, or IGA. As games are accounting for an increasing amount of the entertainment consumed, IGA has become a popular means of promoting services and products [1]. Game developers have provided means for embedding advertising in digital game environments for decades [2]. While IGA is not new, there remains little research on its efficacy. Commonly, research focuses on attitudinal studies such as the recent study by Poels et al. [3] and the often cited study by Nelson et al. [4]. The limited amount of research on IGA efficacy is particularly alarming when estimates indicate the expected global market to reach $1 billion USD by 2014 [5].

In an effort to understand best practices in the application of in-game advertising, this paper aims to research how well IGA is retained. There are a variety of approaches to embedding in-game advertising: The most basic of these is the interstitial advertisement. Interstitial ads are embedded messages provided as static images or as video content that are clearly distinct from the game experience. Interstitial ads abound in mobile games and web games as a low cost solution with few technical challenges. Providers of such content are simply using the spaces around game content to insert advertising. Although it has not been well researched or documented, the fundamental understanding of such ad campaigns is that they are similar to traditional forms of advertising used in other media. The interstitial ad is often understood as the game equivalent of the television commercial or movie trailer, garnering several such comparisons.

The second category of in-game advertising is a form of product placement. This type of advertisement integrates advertisement into the game experience, providing a much more fluid coupling of advertiser message and game play experience. Product placement has existed for more than five decades [6] as common practice in mass media marketing. Product placement in-games, however, has a much shorter history and far less documented research. It is understood, for example, that effectiveness of product placement can be linked to prominence in movies in television [7]. Practically, prominence is affected by cinematographic decisions that lead the player to pay attention to specific elements within the experience of a television scene or other linear media.

However, games are an interactive medium, often allowing players to control what they see. Moreover, games are goal-oriented experiences, where players may choose to pay attention only to what helps them meet their goals. To date, we merely understand that in-game advertising can annoy players if not properly contextualized within a game world [8]. We also understand that prominence has a multimedia effect, as visual representation of in-game advertising with verbal mention of the advertised product is more effective than only visual or only verbal [9].

Outside of cinematographic experiences like cut scenes and obligatory cuts in games, there is little ability to affect prominence in contemporary game experiences. The efficacy of such in-game advertising must then be called into question. If the player directs attention, will the player fail to perceive in-game advertising

experiences? Furthermore, does the player's additional task of directing the experience through in-game action affect their tendency to consume in-game advertising in a way that differs from people who are watching the game being played? In short, is in-game advertising more effective for players or onlookers? Is in-game advertising even effective for either group? Might there be specific factors that affect retention?

Research into IGA has demonstrated mixed results. Chaney et al., found in their first person shooter research that while advertisements were noticed, little brand information was retained [10]. They found that engagement has an inverse effect on brand retention. According to their research, greater engagement means less retention. Yang et al., analyzed the effectiveness of IGA in sports games and found that players had very little recognition, but did retain fragments of the brand message [11].

A key aspect of understanding effectiveness of IGA is their relationship to the game's fiction. Borrowing from formal language in the arts, we describe in-game advertising as diegetic or non-diegetic. Diegetic IGA is part of the fiction of the game world. Non-diegetic IGA is content that breaks the fiction of the game environment, typically by inserting content that is not directly related to the game environment.

We adopt this language to clarify disparate research which focuses on the effects of in-game advertising and its relationship to maintaining game fictions. Several researchers have concluded that non-diegetic content is ill-received by game players [3, 8]. Interstitial ads are by nature non-diegetic, as they are designed to create a parallel channel to the game play or even interrupt the game play by creating pauses, breaks or billboards. Interstitial advertising does offer high prominence, but previous research indicates that the high prominence reduces player response to the ad content [8, 12]. The focus of this research is diegetic IGA, where the ads are closely related to the game's fiction and there is obvious potential for players perceiving the intended message positively.

The research presented here seeks to understand the relationship of player and player audience to retention of in-game advertising. To understand this relationship the researchers embarked on a cross-continent analysis of game play experiences within a highly controlled environment. Unlike previous studies, the researchers used existing brand advertisements and embedded them in a commercial grade contemporary game environment. Although using novel brands is appealing because existing brand preferences are removed, using existing brands increases the rate of recall significantly, creating a more sensitive experiment.

The researchers chose to study the effects of a race car simulation to further expand previous research [13]. The benefits of studying car racing games includes the non-diegetic integration of advertising, since advertisements are part of real world car racing. Car racing games also offer simple rules and very simple fictions. Players of car racing games do not need to learn complex rules about magic, weapons, non-player characters or other elements common to games that also use in-game advertising. Instead, players need only know how to make the car go and how to steer. The goal is self evident in the fact that it is a race.

In recent years, prominent brands like Red Bull and Jeep have invested in suites of mobile games that promote their brand by allying their products to extreme or adventure sports. Many of these games employ a variety of diegetic experiences. It is anecdotally relevant that the majority of these games are a form of racing, often depicting cars, motorcycles, sport utility vehicles, snow mobiles or other vehicles in races.

Previous research has used existing gaming environments [11] and existing brands [8] but neither has done both outside of quasi-experimental constraints. Likewise, no published research has been done on a game using diegetic integration of IGA. It seems important to apply such research to the increasingly rich game environments, as prominence is affected by the density of visual stimuli in the environment.

An important distinction between the design and placement of in-game advertising and traditional advertising is the challenge of target marketing. Players of games are more tolerant of advertising that relates to the game environment, not necessarily their specific needs outside the game environment [14]. The question of diegetic and non-diegetic content is now complicated by the viewer's position within the play relationship. The interest and attention of a player may be guided by different priorities than the onlooker of a game. Since it has been proposed that player retention of in-game advertising is affected by diegetic attributes like the player's extrinsic interest in the product offered [14], it is important to formally research the relationship of player and onlooker retention. This question is extremely relevant if one considers the number of onlookers watching game play in a home setting, at parties, and through non co-located means like videos of game play (very popular on YouTube), streaming game play (e.g. via Twitch), watching professional game playing session and onlookers in video game arcade.

The researchers combine conventions of the advertising arts with game design to create an experiment to understand relationships between players, onlookers and advertising. The researchers collaborated across three distinct disciplines, game design, user task analysis and advertising. This experiment incorporates IGA for consumer product goods with the experience of driving a car through a race course. It investigates the retention of 20 existing brands in a commercial grade car racing game experience. This research should aid game designers, developers and producers of IGA and others seeking to create persuasive play through content and mechanics.

We sought to provide a more accurate understanding of the assumption that IGA is most effective for onlookers not players. No previous study has asked the question, who recalls in game advertising better, players or the people watching them. This research may help extend an understanding of other uses of in game content designed to affect players.

## 2. METHODS

Two research teams from a Dutch University and Midwestern United States University collaborated to execute the same experiment across cultures. The aforementioned experiments will be referred to as study group NL in the Netherlands and study group US in the United States. Sixteen participants were part of study group NL, while 17 volunteers participated in group US.

The two groups were chosen because players and player cultures in the US and Europe are often experienced as very different by developers (Don Daglow has often lectured on this point; e.g. Martin, 2012) [15]. We chose Dutch players because they do not have a strong link to the games made by local studios, like British and German players have, and they are used to English-spoken

entertainment because the majority of TV and cinema content is subtitled and not dubbed.

A within-subjects design was chosen for the experiment. Each subject was exposed to both experimental treatments, which means that each subject played and viewed the video game. An advantage of a within-subjects design is that it requires less participants to be tested, although the researchers recognize the potential effects of fatigue and practice with the game.

Of the 13 super genres identified by the ESA and the NPD group [16], Car Racing was selected for the study. The main benefit of this type is its accessibility: Car Racing offered the most universally understood set of game mechanics, simplest dexterity, and standards. As a simulation super genre Car Racing relies on common extrinsic knowledge. Steering is a commonly practiced action, whether it is shopping cart or a 2-ton vehicle. A car racing game's goal, get to the finish line first, is also common in school playgrounds and international marathons. Because of this, experience with this type of game or with computer games in general is less of a factor than with other game types.

The largest super genre by sales is Action, a catch-all category for games as widely divergent as Super Mario Land and Call of Duty. This group of games offered too diverse a set of experiences and a more complicated rule set that require players to learn intrinsic knowledge about the game world, its specific interactions and limitations. Players of these games need significant context before embarking on its challenges. This is also true of role playing games, the third ranking super genre by sales. Other super genres offered widely varied experiences that would prevent identifying patterns across games or require players to learn additional rule sets before playing. Sports games, for example, often have specific rules with a clear cultural and experiential difference (e.g. American football and European football, or baseball and cricket).

Players of car racing games are simply asked to drive as quickly as they can manage toward the finish line. This was particularly important in experimental design as it eliminates some concern over player and onlooker familiarity with the genre and differences between cultural experiences. It also diminishes experience response, as the violence in action and shooter games may have repelled study participants.

The researchers evaluated a variety of car racing environments to determine which was most appropriate for the study. We used an open-source racing game called Torcs (http://torcs.sourceforge.net/) , which provides an experience that is close to that found in current console and arcade games. The game experience is depicted in Figure 1. The figure provides a sense for the graphics quality and visual complexity of the game environment.

**Figure 1. Torcs Game Environment**

The researchers modified the game to create three custom race tracks with custom in-game advertising. The advertising for the tracks was selected from a superset of more than 100 most recognized brands in Europe and North America.

The final list of brands was picked for gender neutrality, cross cultural recognition and visual distinctiveness. The brands and their identifying logos were selected and categorized by specific product group. The product groups were Scent, Soap, Candy, Internet Giants, Fast Food, Sports Apparel, Energy Drink and Motor Vehicles.

The list of logos includes two sets of brands that would appear in the game, and two sets that were identified as filler brands. The filler brands never appear in the game. Instead they only appear in the post-survey to note false positive identifications by study participants. The final list of brands selected is listed in Table 1.

**Table 1: Products Chosen by Track**

| Product Category | Track A | Track B |
|---|---|---|
| Scent | Febreeze | Air Wick |
| Soap | Nivea | Dove |
| Candy | Twix | Mars |
| Internet Giants | Google | Yahoo |
| Fast Food | Burger King | McDonald's |
| Sports Apparel | Nike | Tommy Hilfiger |
| Energy Drinks | Rockstar | Red Bull |
| Motor Vehicles | BMW | Honda |

The selected brands represent a mix of product groups commonly advertised in games, with the exception of the scent and soap product groups, which are otherwise advertised widely. The logos for each of the brands were inserted into the game tracks. Players were provided the exact same tracks in both the European study 1 (group NL) and North American study 2 (group US) research locations. An impression of the experience of a race track with in game advertising is shown in Figure 2. This image represents how players experienced the game during game play, including the 4:3 aspect ratio.


**Figure 2. In game advertising as the research participants experienced the game**

## 2.1 Design

The researchers were concerned about notions of diegetic game content. Logos for products that had less of a relationship to the world of car racing were weighted to make sure that all advertising messages had an equal amount of potential exposure. Of course, because player skill differs and the events of each play session are out of the researchers' control, actual exposure differed. Our goal was to make sure that players had an equal opportunity to see any of the eight categories of advertising logos in the game.

Each ad position on the track was first given a sequential number indicating its position on the game track. Next, each ad position was given a score, ranging from 1 (barely visible) to 4 (very prominent). The ad position scores were calculated through repeated play session of the same tracks, in which the duration of the ad's visibility was measured and weighted by its average position on the screen (middle vs periphery) and size. The ad position scores are similar to visibility rankings provided to advertisers and used to calculate the value of advertising locations within an environment.

In total, only eight advertising messages per track were needed (one advertising message for each product category). This meant that many ads were repeated along the track, just like in real life.

The total scores for each ad location were ranked from lowest to highest visibility. Keeping in mind that non-diegetic ads are more likely to be recognized than diegetic ads, each product category was assigned to an ad location in order of its diegetic relationship. Low visibility ad locations were linked to product categories that were least diegetic to racing (e.g. scent). Ad locations with a high visibility were linked to product categories with a high diegetic relationship to racing (e.g. motor vehicles). The order (from least to most diegetic) was scent, soap, candy, internet giants, fast food, sports apparel, energy drink and motor vehicles.

It is important to note that the least diegetic brand groups are also the most universally familiar. Brands for soap and food apply to wider consumer demographics and advertise much more widely than high-end automotive brands.

As part of the within-subjects design, two different tracks were produced. The first track was designed for play by the first player, while the second track was to be played by the second player (first onlooker). To mitigate the effect of exposure as onlooker or player, each track contained 8 different ads from the brand categories. These tracks were labeled track A and track B and contained the specific brands as identified in Table 1.

## 2.2 Participants

Thirty-one participants volunteered for a 30-minute research session and were asked to bring a friend. A dice role determined which participant would play, with the other one watching the game. For the NL group, a second lap of the same track was played afterwards with the participant roles switched around.

For the US group, only one lap was administered because we also collected eye tracking data on the player. When only one participant of a pair showed up, they were assigned the role of player (without watcher) in the US group, hence the number of players is slightly larger than the number of onlookers in the US group.

The US researchers elected to use eye tracking data to understand where the players were looking while playing. For the US group, a Tobii Technology eye tracker was used. Eye tracking data was video recorded and analyzed after all data was collected.

As noted, the researchers used a standard pre and postsurvey test. Demographic data and play profiles were taken as part of the pre survey. Table 2 highlights a few of the key demographics of participants.

**Table 2: Demographics for the NL and US samples**

| | **Group NL** | **Group US** |
|---|---|---|
| Group size | 16 | 17 |
| Mean Age | 20 | 27 |
| Males : Females | 8:8 (50% male) | 14:3 (82% male) |
| Players: Onlookers | 8:8 | 11:6 |
| Own Personal Computers | 16 (94%) | 17 (100%) |
| Played Racing game in the last 12 months | 5 (31%) | 5 (29%) |
| Play Computer games at least 2-3 times a week | 5 (31%) | 10 (60%) |

Each participant session lasted between 20 to 30 minutes. The experiments were run at 1024 x 768 screen resolution with a 24 color depth and a 4:3 aspect ratio screen. Both participants were placed 2.5 meters from the screen when playing. The researchers delivered the same scripted overview of the experiment to each participant. Players were given basic instructions on the game controls.

Players were simply told they would be playing a racing game. There was no mention of the advertising that was displayed in the game. Players were allowed to stop playing either after the placed in the race or when they had decided the race could no longer be won (e.g. all other cars had crossed the line while the player remained behind). Once players concluded their play sessions they completed an online survey where they were asked whether they saw specific logos in the game. The survey displayed the exact same logos from the game. Participants marked whether they noticed the logo or not in the game. The survey included an additional 16 brand logos that were not in the game to identify false positives.

# 3. RESULTS

The researchers ran analyses on several aspects of the data. First, we looked at recall (spontaneous answers to the question "what ads did you see") and recognition ("circle the ads that were shown in the game," given a sheet with real and filler ads). The recall measure of ad awareness has stronger real-life implications, but recognition measures are more sensitive, which is why we report both. We also looked into the attitudes and opinions towards ads and time line of ad awareness. Finally, we report the results of the Game Evaluation Questionnaire on Group NL.

## 3.1 Recall Results

The first question of interest is whether watchers or players paid more attention to the ads as measured by free recall. For the US data, watchers did recall more ads than players (4.5 vs 3.8 ads recalled) but in a t-test this was not significant, $t(15) = 0.564$, $p = .58$. For the NL data, the same numeric pattern emerges (3.8 vs. 3.0 ads recalled for watchers vs. players), but this difference is not significant, $t(14)=1.16$, $p = .27$.

## 3.2 Recall Results By Lap

For the NL group, we have recall data for each lap as participants were asked to recall all ads seen twice. To run an analysis over the two separate laps, we computed a measure of recall improvement. For lap 2, this was the number of ads recalled minus the number of ads recalled in lap 1. For lap 1, a zero baseline was assumed, making the recall improvement identical to the actual recall.

A three-way Anova with the factors Role (player or watcher), first-role (watching or playing during first exposure, lap 1) and order (lap 1 or lap 2) was conducted. No interactions were computed because of the relatively small numbers of participants. The factor Role borders on significance ($F=4.12$, $p=0.052$), with Watchers recalling more ads than Players (3.6 new ads vs. 2.4 new ads, SD 1.6 and 1.9). No other effects neared significance.

In all, the results for recall show that there is no difference between watchers and players after the first lap in terms of number of brands recalled. The data from the NL group show that once more than one lap has been made, we do find a significant difference between the two roles (onlooker vs. player).

## 3.3 Recognition Results

Recognition is an easier task and therefore a more sensitive measure of ad visibility. We expected to find more pronounced results with this measure. For the US group we indeed found a pronounced difference in number of brands recognized (13.0 vs. 8.1 for watchers vs. players), which was significant $t(15) = 2.63$, $p = .019$. However, we did not find a significant difference for the Dutch group as the number of ads recalled after lap 1 was much smaller for this group (4.9 vs. 4.1 ads recognized for watchers vs. players; $t(14)=0.89$, ns).

## 3.4 Recognition Results By Lap

For the NL group, a recognition improvement score was computed similarly to the recall improvement score above. The same three-way Anova was run and the results showed a very strong effect of Role ($F=7.79$, $p=.0094$) and a tendency towards an effect of First-Role ($F=3.36$, $p=.077$). As with recall, Watchers were better than Players (mean 5.9 vs 3.8 new ads recognized, SD 2.3 and 2.6). For First-Role, there was a trend for those participants who played first to recognize more than those who played second (and likewise for watching). There was no interaction between Role and First-Role ($F<1$). This trend seems to be caused by "first players" recognizing a larger number of ads in the second part, when they are watching (7 new ads for watching second, with 4.9 new ads for watching first). We attribute this to higher motivation for those who played first and to re-establishing an already perceived fact during second exposure in the second lap.

## 3.5 Attitude Towards Advertisements

Players were also asked how much they liked or disliked advertising in-games. Player responses about advertising in games were mixed for both study groups. As shown in Table 3, most players were neutral on its existence in games. It is somewhat useful to note that the group US had a slightly more divergent set of responses.

**Table 3: Participant preferences for in-game advertising**

| | **Group NL** | **Group US** |
|---|---|---|
| Strongly dislike | 0 | 0 |
| Dislike | 1 | 4 |
| Neither dislike nore like | 12 | 7 |
| Like Somewhat | 3 | 3 |
| Like Very Much | 0 | 3 |

## 3.6 Comments on Advertisements

Players were also asked to "write down everything" they remembered about the ads in the game. In the NL group, reactions varied from "didn't pay any attention to them" to "I saw the Twix logo and felt like eating chocolate." For one player, ads distracted from the experience ("made it feel cheap") whereas most didn't share this sentiment or even commented that the ads added to the experience ("[ad placement] is realistic on a race track"). Similar to the NL sample, participants in the US commented on how the ads contributed to the realism of the racing experience. One US participant wrote, "They were placed in standard areas around the racetrack just like in a real life course. They were placed in such a way that you weren't beating the player over the head with the fact that there was advertising but it was definitely visible in areas the driver had to look."

## 3.7 When Were Advertisements Noticed?

When asked which lap players first noticed seeing advertisements, all group US participants noticed them in the first lap of their race. The results for the NL group were different: By and large, participants who watched the game in the first round noticed the ads right way (6 noticed in lap 1, one in lap 2, one didn't answer), whereas participants who played the game in the first round did not notice the ads right away (3 noticed in lap 1; 5 in lap 2), although this difference was not significant, exact $\chi 2(2) = 4.7$, $p=.12$.

## 3.8 Game Experience Questionnaire

We compared the results of the playing and watching experience for group NL. Of the seven dimensions of the Core GEQ, we found that Challenge and Flow were significantly different for players and watchers: Challenge was higher for players than for watchers (mean 2.99 vs 2.00 on a 5-point scale, $t(30)=3.79$, $p=.00068$). Flow was also higher for players than for watchers (mean 2.74 vs. 1.99; $t(30)=3.76$, $p= .00075$). The other dimensions (Competence, Immersion, Tension, Negative Affect and Positive Affect) did not show any significant differences.

# 4. Conclusions

In a PC based racing game, we found that onlookers (aka watchers) were significantly better at recognizing brand logos

presented on in-game billboards than the players. We also found a numerical effect in that direction for recall of brand logos. The same basic finding was obtained for a group of US based participants and a group of Dutch participants.

A qualitative overview of the participants' attitudes towards in-game advertising revealed that neutral and positive attitudes set the tone. This finding held across the groups from the two countries.

In a standardized evaluation of the game content, watchers and players did not differ on five of the seven dimensions, with players showing higher values for Challenge and Flow.

## 4.1 The Elaboration Likelihood Model (ELM)

A possible explanation for why observers might be more likely than players to process and remember ads embedded in games can be found in predictions of the Elaboration Likelihood Model (ELM). ELM is a theory of how message source factors influence persuasion [17]. It proposes that when people are either not motivated or not able to process key arguments of a message thoroughly (e.g., if they are distracted), they will instead evaluate the message based on peripheral cues like source expertise/attractiveness, number of arguments (as opposed to quality of arguments), etc. Cue-based processing is referred to as peripheral route processing. Conversely, when people are motivated and able to process key arguments in a message, they will, and this is central route processing. Attitudes formed via central route processing will be more resistant to counter-persuasion, more enduring and more predictive of behavior than those formed through peripheral route processing.

In our research, we expect that players are more motivated and more focused (less likely to be distracted) than observers on core game mechanics (i.e., driving the car as quickly as possible without crashing). Thus, it would make more sense that observers, who are less motivated and less focused, pay more attention than players to non-game essentials (i.e., peripheral cues like embedded billboard ads). However, advertising effects that occur via peripheral route processing, compared to central route processing, are typically short-lived and susceptible to counter-persuasion. So this explanation of our findings would entail that watchers recall and recognize more ads, but that the effects of this advertising will be short-lived.

## 4.2 Limited Capacity Model (LCM)

An alternative explanation can be given in terms of the Limited Capacity Model [18]: This model states that people only attend to small parts of the mediated message because they do not have the capacity to process all of it. Players are busy trying to keep their vehicles on the track and do not process the billboards (or any other peripheral items like the scenery) in any depth. Watchers, on the other hand, have more spare capacity as they do not have to control the car and their awareness of the billboards is much higher.

The LCM can tentatively explain the steep increase in ad recognition for participants who played first and watched second in the NL group: The ads may have not been consciously processed the first time, but the logos were primed nonetheless. On second exposure, in less challenging conditions, these primed logos were consciously processed when the participant was watching, leading to a boost in recognition compared to the watched first – played second group.

A difference between the ELM and LCM explanations of our finding is the robustness of the effect of advertising on onlookers: The ELM predicts a peripheral route effect, which is relatively weak. The LCM predicts a regular effect. Our tentative explanation of a boost in recognition for the played first group would predict a particularly strong effect for that group.

## 4.3 Predictions

These predictions can be tested by comparing the effect of billboard ads to ads presented in a format that facilitates central route processing, such as in cut scenes. The explanations can be further validated by the use of the eye tracker on the onlooker (watcher), to establish whether the billboards are indeed peripheral items that are rarely fully attended to. We intend to empirically test these predictions in the near future.

Because gaming is often a social activity and because of the recent trends of streaming live games and sharing video extensive footage of game play (e.g. Twitch), onlookers are a sizable and growing audience that has been largely neglected in previous research on in-game advertising. This study shows that in-game advertising may do well to target this group, as they are paying much more attention to advertising message than the players do.

## 4.4 Limitations and Areas for Future Research

A major limitation of the current study is the sample size: Although 16 people per cultural group is not very low, we have to further distinguish between on-lookers and players, reducing our numbers per cell to under ten. This may well be the reason why some of our effects were shown for one country and not for other and makes it hard to draw strong conclusions about the differences between the countries.

Second, we would have liked to increase the playing time. Traditional high-end (AAA) games and casual games are all played for many hours by the core user group (for the US, 42% of the population plays for at least three hours per week; ESA, 2015) [19]. These core players are also most likely to be onlookers to a friend player, either live or via a video service.

In a future study, we would like to measure the effectiveness of the advertisements by measuring purchases or purchase intention. However, we have found in other studies that this is not straightforward: People often have strong preferences for one brand over another and a few exposures in a game are not going to change that. Another way forward is to ask people about their affective responses towards brands, but these are also not so easy to change.

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