The effectiveness of advergames compared to television commercials and interactive commercials featuring advergames

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Abstract

Advergames played on computers can be persuasive forms of advertising, especially when players are highly involved or experience telepresence (“being there” in the game). But 30-s TV commercials also deliver high levels of telepresence. Online-video interactive TV commercials, which can combine a TV commercial and an advergame, potentially deliver double the effectiveness of either form of advertising by itself. This study compared the effectiveness of advergames played on a PC to normal 30-s TV commercials, and also to interactive commercials enhanced with advergames. The results show no differences in telepresence, and therefore no differences in persuasive effect, measured by brand attitude, across these three ad types. Implications for advertisers and for future research are discussed.

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1. Advergames versus TV advertising and interactive advertising

Advergames played on computers are a new form of advertising. They have the specific purpose of marketing a single brand or product, whereas advertising in games is much like traditional product integration (Winkler & Buckner, 2006). For example, ads from multiple advertisers can appear in games on background billboards. Advergames are usually played as standalone applications, for example, on a brand’s Web site. Previous research, in response to the enthusiasm of marketers and game practitioners, has shown that advergames are an effective form of advertising, especially to children (e.g., Cauberghe & De Pelsmacker, 2010; Lee & Faber, 2007; Mackay, Ewing, Newton, & Windsisch, 2009; Mallinckrodt & Mizerski, 2007; van Reijmersdal, Rozendaal, & Buijzen, 2012; Winkler & Buckner, 2006; Wise, Bolls, Kim, Venkataraman, & Meyer, 2008). To our knowledge, however, no empirical studies have compared the impact of advergames to normal TV commercials, which can also generate high levels of “telepresence” (Kim & Biocca, 1997), the main explanation for why advergames are effective (Cauberghe, Geuens, & De Pelsmacker, 2011).

Watching online video is on the increase, encouraged by wireless devices and connected TVs (Nielsen, 2013). Online video sites like Hulu and ABC.com allow advertisers to add interactive enhancements to online video commercials, and these interactive TV (iTV) commercials often feature advergames (Jensen, 2005). The combination of a TV commercial and an advergame potentially delivers double the effectiveness of either form of advertising by itself. In this study, we compare advergames, played on a personal computer (PC), to normal TV commercials, and iTV commercials with advergame enhancements, using brand attitude as our measure of advertising effectiveness. Brand attitude, or attitude toward the brand, is a person’s overall evaluation of a branded product, based on beliefs about the product’s attributes but also on peripheral influences such as ad liking (Mitchell & Olson, 1981). A change in brand attitude tends to be a leading indicator of a change in actual buying behavior (Morris, Woo, Geason, & Kim, 2002). Besides the potential socio-economic repercussions of advergames, we also investigate two psychological motives for playing advergames (Papadimitriou, 2009): product involvement (Cauberghe & De Pelsmacker, 2010), and the experience of “telepresence” (Kim & Biocca, 1997).

1.1. Previous research

Because advergames are designed to highlight brand messages to players of varying ability, the games themselves are typically casual games, designed to be simple and easily mastered, and to be played for minutes rather than hours at a time (Winkler & Buckner, 2006). Instead of appearing in the background, brand logos and symbols feature prominently and repeatedly within advergames. For example, in a recent study, advergame players had to catch falling Pepsi cans in a basket (van Reijmersdal et al., 2012).
With advergames, as with traditional television advertising, brand processing is likely to be explicit because the brand is central to the activity taking place, and is strongly integrated into the game. Research into explicit advertising and product integrations (e.g., in movies) suggests that advergames may have a counterproductive effect on brand attitude and purchase intention. People generally resist communications they believe to be intentionally persuasive (Friestad & Wright, 1994). One of the main benefits, for advertisers, of in-game advertisements, such as billboards in a car racing game, is that they are processed implicitly. A player would have to shift focus from the central task (playing the game) to notice them. Implicitly processed brand messages are able to ‘slip under the radar’, avoiding the counter arguing and reactance that consumers engage in when they are aware of the intent of brand messages (Edwards, Li, & Lee, 2002; Russell, 2002). For this reason, the body of literature examining the effectiveness and impact of implicitly processed in-game advertising (e.g., Grigorovici & Constantin, 2004) does not help much when trying to understand the impact and effectiveness of advergames.

Nevertheless, advergames research has shown that the negative effects associated with explicit branding can be counteracted by positive affect transfer (Kim, Lim, & Bhargava, 1998). Players who enjoy playing the game have a more favorable attitude toward the brand (van Reijmersdal, Jansz, Peters, & van Noort, 2010; Wise et al., 2008). The potential for positive affect transfer is heightened when the game is seen as relevant to the advertised product category, for example, using a travel-related game to advertise a travel company (Wise et al., 2008). For this reason, all the games tested in this study were related to the advertised product. As well as highlighting the importance of product-category relevance, previous research into advergames has shown that their effectiveness increases with two other variables: perceived telepresence, and product-category involvement. It is important to measure the effects of these variables when comparing the effectiveness of advertising across PCs (advergames) and TVs (30-s commercials and iTV ads).

1.2. Effects of telepresence

Telepresence is the feeling of “being there” in a mediated environment, and forgetting that you are actually sitting in front of a PC or a TV (Kim & Biocca, 1997). Advergame enjoyment, and therefore the positive effect of advergame play on brand attitude, should increase if players experience a stronger feeling of telepresence (Cauberghe et al., 2011). Telepresence results from perceptions of interactivity and vividness (Klein, 2003: Steuer, 1992), both of which could potentially be perceived as high in advergames, but could be equally high when watching TV (Kim & Biocca, 1997). Kim and Biocca (1997) discovered that telepresence has two dimensions, which are conceptually different, rather than poles of a spectrum. Departure is the sensation of being drawn away from (“not being” in) the physical environment, while still aware of the physical environment’s existence. Only if the physical environment is forgotten will a person experience arrival, the sensation of “being there” in a virtual environment. In Kim and Biocca’s (1997) study, only departure, which is the more likely experience when watching TV, had a direct effect on buying decisions, and so we measure only the departure dimension of telepresence in this study.

Telepresence increases the effectiveness of advertising because it leads to the experience of flow (Cauberghe et al., 2011; van Noort, Voorveld, & van Reijmersdal, 2012). Definitions of flow resemble Kim and Biocca’s (1997) arrival dimension of telepresence, during which the surrounding environment is forgotten. Flow is the experience of being so immersed in an online activity that you lose all track of time (Csikszentmihalyi, 1975; Hoffman & Novak, 1996). Flow would also increase the positive effect of play on brand attitude because flow increases enjoyment directly. For example, a multi-item flow scale includes the item “it was fun” as well as “I was totally absorbed in what I was doing” (van Noort et al., 2012). Our first hypothesis, that telepresence increases persuasive effectiveness, can be tested by the significance of the effect of telepresence on brand attitude, across all three ad types tested in this study: advergames played on a PC, TV commercials watched on a TV set, and iTV commercials with advergame enhancements:

H1. Telepresence increases the effectiveness of advertising, measured by brand attitude.

1.3. Effect of product involvement

Player involvement is another variable likely to increase the positive effect of advergame play on brand attitude. Two types of involvement have been measured in previous advergame studies: game involvement (e.g., van Reijmersdal et al., 2012) and product involvement (Cauberghe & De Pelsmacker, 2010). Game involvement, which has been measured by items such as “how hard did you try to achieve a high score?” (van Reijmersdal et al., 2012), is likely to be chronically high for avid gamers, but for most people is situational, dependent on stimuli and cues in the environment (Liu & Li, 2011), such as the game itself (Cauberghe & De Pelsmacker, 2010; Celsi & Olson, 1988). Product involvement, on the other hand, tends to endure across situations, because it is based on a person’s knowledge of the product category (Cauberghe & De Pelsmacker, 2010). Product involvement increases attention to the advertised product, rather than peripheral aspects of the ad (Park & Young, 1986; Petty, Schumann, Richman, & Strathman, 1993), and increases the likelihood of considering the advertised product (a car) four times, brand attitude declined, most likely because the greater level of resources devoted to processing ad-content about a high-involvement product also increased attention to negative thoughts about repetition (Campbell & Keller, 2003). In Cauberghe and De Pelsmacker’s (2010) study, product involvement made no difference to brand attitude when games were played only twice. In our study, participants play each game only once, so we anticipate no negative effects of involvement on brand attitude. However, Cauberghe and De Pelsmacker’s study used fictitious brands, which would limit the number of personal associations with the advertised products. In our study, we do not manipulate involvement using high- and low-involvement products but instead measure involvement for four low-involvement categories, represented by real brands. Individual differences in involvement across these four categories are likely to influence how much effort a person puts into processing any of these ad types, for example, the extent of their interactivity with the iTV and PC advergames (Levy & Nebenzahl, 2008). Our second hypothesis is that product involvement also increases the persuasive effect of advergames. We test this hypothesis by the significance of the effect of product involvement on brand attitude, for players of advergames on a PC, viewers of a TV commercial on a TV set, or viewers of an iTV commercial enhanced with an advergame:

H2. Product involvement increases the effectiveness of advertising, measured by brand attitude.

1.4. Effects of age and ad type

The enthusiasm of marketers for advergames as an alternative to TV commercials has two possible explanations. The first is that advergames are more effective than TV commercials. The second
is that advergames offer a new way to reach consumers who are less likely to watch normal TV commercials.

One explanation for why PC advergames may be more effective than normal TV commercials is that advergames have a second way of generating telepresence and flow: interactivity. Perceptions of interactivity lead to experiences of telepresence (Cauberghe et al., 2011; Lombard & Ditton, 1997) and flow (Cauberghe et al., 2011; van Noort et al., 2012), and as reported above, flow increases the favorability of brand attitude. Therefore, interactive advergames played on a PC should have an advantage over normal, non-interactive TV commercials. On the other hand, PC advergames should not be more effective than iTV commercials enhanced by advergames, because both are interactive. Also, since iTV ads are, in effect, double exposures: first the TV commercial then the advergame, this additional exposure should increase their effectiveness relative to PC advergames and normal TV commercials (Singh & Cole, 1993). This study’s third hypothesis proposes that:

H3. PC advergames are more effective than normal TV commercials, and iTV ads that combine TV commercials with advergames, are more effective than PC advergames, when ad effectiveness is measured by brand attitude.

Online games used to be played mainly by young men (e.g., Griffiths, Davies, & Chappell, 2004), but advergames are played by men and women of all ages (Cauberghe & De Pelsmacker, 2010; van Reijmersdal, Jansz, Peters, & van Noort, 2013). Nevertheless, there is concern that advertisers target interactive advertising such as advergames toward younger consumers (van Reijmersdal et al., 2012). Advergames are especially effective on children, as even the minority of children who understand the persuasive intent of these games seem unable to use that persuasive knowledge to defend themselves against an advergame’s effects (van Reijmersdal et al., 2012). We expect that ad type and age will interact so that PC advergames, and iTV commercials enhanced by advergames, will be more effective for younger people. Age may make no difference for viewers of normal TV commercials, or have a positive effect: in other words, TV commercials may work better for older people. Our fourth and final hypothesis proposes that:

H4. Age has a different influence, across different ad types, on advertising effectiveness measured by brand attitude. Younger age increases the effectiveness of PC advergames and iTV ads that combine TV commercials with advergames. But younger age has no effect or a negative effect on brand attitude after exposure to normal TV commercials.

The next section describes the controlled experiment that tested these four hypotheses.

2. Method

2.1. Sample and design

Two hundred and thirty-three (233) members of an Australian audience panel, varying widely in age, participated in this experiment. Each was compensated for their time and travel with a $20 (AUD) department store gift voucher. Participants were randomly assigned to one of three ad-type groups: (1) TV: normal 30-s TV commercials for the four test brands (n = 33); (2) PC: advergames developed specifically for each of the four test brands, played on a PC (n = 62); and (3) iTV: commercials for the four test-brands, enhanced by advergames played using the TV’s remote control (n = 138). Since interaction with the ads in the PC and iTV conditions was voluntary, data collection continued until there were observations from at least 30 players for each advergame in the iTV group, and 30 who played the game (without quitting) in the PC group, to balance the amount of interactive data for the four brands. A demographic quota system ensured that the sample was a close match to the Australian census in gender and age (females 53%, age range 19–84 years: M = 45.92).

2.2. Procedure

Participants watched a TV program, or played advergames on a PC, in individual viewing labs designed to feel as much as possible like viewing at home. The TV program was a new U.S. half-hour sitcom, which provided the cover story for participation: evaluating the suitability of airing this program in Australia. TV viewers were told that the program had been recorded off-air in the U.S., with ads included. The program included four ad breaks, each with five 30-s commercials. To minimize primacy and recency effects (Pieters & Bijmolt, 1997), the middle ad in each break was randomly assigned to be one of the four test ads. Each test ad was for a low-involvement product: (1) M&M’s® Chocolate, (2) Life Savers® Gummies, (3) Di Giorno® Pizza, or (4) Crest® Toothpaste. The other 16 filler commercials represented a variety of low- and high-involvement product categories, and were moderate in arousal and neutral in valence.

All three viewing conditions, TV, PC, and iTV, began with a short training session. After training, participants in the PC condition interacted with four advergames, one for each of the test brands, presented in random order. The advergames were based on current industry models. Two used a “quiz” format: Crest Celebrity Smiles, and Di Giorno Tasty Pizza Quiz. The other two advergames were simple games requiring skill: M&M’s Chocman (a variation of Pacman), and the Life Savers Gummies Grabbit Game. Table 1 gives brief descriptions of the four games. Fig. 1 shows an example of one of these advergames: M&M’s Chocman. The figure shows the PC version, which players interacted with using the arrow keys on the keyboard. In the iTV condition, viewers used the arrow keys on the TV’s remote control. If players ended the game early by pressing the “Quit” button, this was noted in the log file recording their interactivity.

The iTV condition was viewed on a TV set, to equalize screen quality with the normal TV condition, and combined the test commercials from the TV condition with the advergames from the PC condition. Throughout each test commercial, a “call to action” banner was superimposed over the top eighth of the screen, inviting viewers to click on the ad (by pressing the red button on the remote) to play the advergame associated with the ad (e.g., “Press ‘red’ to play Crest Celebrity Smiles”). Interactors had to wait until the end of the test commercial, however, before the game would start. This ensured that the duration of test-commercial exposure was equal across the iTV and the TV conditions, but also reflected normal practice online, where interactive enhancements are typically offered after the video commercial has finished playing.

After their viewing session, participants went to another room to complete a short survey either online or on paper (according to their preference). Upon completion, participants went to the reception desk, where, if they consented, an appointment was made for a telephone interview the next day to ask further questions about their experience (including day-after recall, although participants were not forewarned about this). Whether they consented to the phone call or not, all participants were then thanked and compensated with a $20 department store gift voucher.

2.3. Measures

Brand attitude was measured by the mean of four seven-point semantic differential items (Gardner, 1985): bad–good, dislike
### Table 1

<table>
<thead>
<tr>
<th>Game title (brand)</th>
<th>Game-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M&amp;M’s Chocman (Mars M&amp;M’s)</td>
<td>Skill</td>
<td>Based on Pacman. The objective was to navigate through a maze and eat all the M&amp;M’s. While traveling through the maze, the aim was to have Chocman collect points (e.g., by eating M&amp;M’s packets), and avoid losing lives by being eaten by the five Angry M&amp;M’s.</td>
</tr>
<tr>
<td>Life Savers Gummies Grabbit Game (Wrigley’s Life Savers Gummies)</td>
<td>Skill</td>
<td>Based on a catching game. The objective was to catch the falling Gummies with a giraffe character ‘catcher,’ without dropping any. Different colored Gummies earned different amounts of points. Dropping a Gummie caused the loss of a life, and the level started again.</td>
</tr>
<tr>
<td>Di Giorno Tasty Pizza Quiz (Kraft Di Giorno Microwave Pizza)</td>
<td>Quiz</td>
<td>This was a trivia quiz game. The objective was to answer questions by selecting one of the four multiple choice answers. There were nine questions in total, divided into three categories (history, true or false, quirky facts), each with three questions that varied in difficulty (easy = 100 points, medium = 200, hard = 300). A ‘guess who’ celebrity trivia game. The objective of the game was to guess who the pictured celebrity was from a choice of four celebrity names. The clues given were a written hint and a pixilated photograph with only the smile in focus. Every 5 s, the picture grew less pixilated until the celebrity was finally revealed after 25 s. The points awarded for a correct answer counted down every second from a maximum of 25 points.</td>
</tr>
<tr>
<td>Crest Celebrity Smiles (Crest Vivid White Night Toothpaste)</td>
<td>Quiz</td>
<td>This was a trivia quiz game. The objective was to answer questions by selecting one of the four multiple choice answers. There were nine questions in total, divided into three categories (history, true or false, quirky facts), each with three questions that varied in difficulty (easy = 100 points, medium = 200, hard = 300). A ‘guess who’ celebrity trivia game. The objective of the game was to guess who the pictured celebrity was from a choice of four celebrity names. The clues given were a written hint and a pixilated photograph with only the smile in focus. Every 5 s, the picture grew less pixilated until the celebrity was finally revealed after 25 s. The points awarded for a correct answer counted down every second from a maximum of 25 points.</td>
</tr>
</tbody>
</table>

![Fig. 1. Example interactive game (Chocman).](image)

quite a lot–like quite a lot, unpleasant–pleasant, and poor quality–good quality (Cronbach’s \( \alpha = .97 \)).

**Telepresence** during each test ad or game was measured by two seven-point Likert items from Kim and Biocca’s (1997) “departure” scale: “the [television/game]-generated world seemed to me only ‘something I saw’ rather than ‘somewhere I went,’” and “during the [broadcast/game], my mind was in the room, not in the world created by the [television/game]” (both reverse-coded; Spearman–Brown reliability = .77, \( r = .63 \)).

**Product involvement** was measured by the mean of four seven-point semantic differential items (Mittal, 1995): important–unimportant (reversed [R]), of no concern to me–of concern to me, means a lot to me–means nothing to me (R), doesn’t matter to me–matters to me, and significant–insignificant (R) (Cronbach’s \( \alpha = .96 \)).

**Proven day-after recall** (Dubow, 1995) was measured to explore differences in attention and exposure duration, from participants who consented to being telephoned between 24 and 36 h after their viewing session and were available to be interviewed when contacted (\( n = 185, 79\% \) of the total \( N = 233 \)). A list of brands, including the four test brands, was read out, and participants were asked if they remembered seeing an ad or playing a game associated with any of the brands. For each test brand that the participant responded “yes” to, participants were then asked to describe the commercial or game in as much detail as possible. This ensured that this measure of recall was not affected by exposure to brand names in the post-session survey the day before. Trained interviewers compared participants’ descriptions to descriptions of the actual content in the ads. If the interviewer judged that the description was correct (participants could recall at least 3 unique points about the ad), day-after recall was coded as 1, otherwise 0.

**Table 2** lists the means, standard deviations, and correlations between these self-report measures.

#### Table 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</thead>
<tbody>
<tr>
<td>1. Age (years)</td>
<td>45.82</td>
<td>16.74</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>2. Recall (%)</td>
<td>72.70</td>
<td>30.03</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. Involvement (1–7)</td>
<td>4.62</td>
<td>1.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Telepresence (1–7)</td>
<td>3.13</td>
<td>1.35</td>
<td>.01</td>
<td>.20</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>5. Brand attitude (1–7)</td>
<td>5.42</td>
<td>.91</td>
<td>.14</td>
<td>.24</td>
<td>.22</td>
<td>.18</td>
</tr>
</tbody>
</table>

\( N = 233, \text{ except recall (} N = 185 \). \)

\( \ast \) Spearman’s \( r \) correlations. Pearson’s \( r \) correlations otherwise.

\( ** p < .05. \)

\( *** p < .01. \)

\( **** p < .001. \)

2.4 Statistical analyses

SPSS 21.0 was used for correlation analyses, analysis of variance (ANOVA) and analysis of covariance (ANCOVA). ANOVA was used to test for differences between the three groups (the 3 levels of ad-type: TV, PC, & iTV) on day-after recall (using Kruskal–Wallis non-parametric ANOVA), telepresence, and brand attitude. All three dependent variables were averages across the four test brands. Because the three groups had unequal sizes and variances we compared telepresence and brand attitude using Games–Howell tests (Kirk, 1995). The ANCOVA tested for differences between the three groups on brand attitude, with covariates telepresence and brand involvement using Games–Howell tests (Kirk, 1995). The ANCOVA tested for differences between the three groups on brand attitude, with covariates telepresence and brand involvement using Games–Howell tests (Kirk, 1995). The ANCOVA tested for differences between the three groups on brand attitude, with covariates telepresence and brand involvement using Games–Howell tests (Kirk, 1995). The ANCOVA tested for differences between the three groups on brand attitude, with covariates telepresence and brand involvement using Games–Howell tests (Kirk, 1995). The ANCOVA tested for differences between the three groups on brand attitude, with covariates telepresence and brand involvement using Games–Howell tests (Kirk, 1995).
self-selection requires two stages: (1) a first-stage probit regression model that estimates the likelihood of interaction for each participant, and (2) a second-stage regression model that estimates the effect of interaction on the dependent variable (here, brand attitude) after controlling for each individual’s likelihood of interacting. Self-selection was modeled in a separate repeated-measures (4 observations per participant) analysis using LIMDEP 9.0 (Greene, 2007).

First, the likelihood of interacting with each iTV ad was estimated by a probit model with the following eight predictors, measured at the time of the study or available from the audience panel’s database: (1) ownership of a DVD player (yes = 1; no = 0), likely to increase experience with interactivity; (2) average TV viewing hours, a measure of interest in TV programming; (3) professional occupation (1/0) which could increase the likelihood of interacting because of experience with interactivity or reduce it because of a higher wage value of time; (4) education (high school = 1, trade school = 2, college = 3, postgraduate = 4), which should also increase experience with interactivity; (5) product involvement, known to increase interactivity (Levy & Nebenzahl, 2008); (6) age (in years), as younger people may be more likely to interact with advergames (Griffiths et al., 2004); (7) quiz game (1/0), as these may be less appealing for casual gamers than other types of games; and (8) female (1/0), as playing advergames may be more appealing for males (Griffiths et al., 2004). The second stage model predicting brand attitude included the same covariates used in the ANCOVA: telepresence, product involvement, and age. Age and product involvement were included in both stages as, conceptually, their effects on interaction versus post-interaction could be different and even opposite in sign (e.g., younger players may be more likely to interact, but also more likely to be unimpressed with how easy it was to play the advergames). To provide a better estimate of the resultant treatment effect of interaction (i.e., persuasion minus sifting), we used the mean values of the predictor variables for the entire sample (N = 233) (Greene, 2007).

3. Results

3.1. Hypothesis 1

H1 predicted that telepresence increases the effectiveness of advertising, measured by brand attitude. The results supported this hypothesis. First, there was a small but significant positive correlation between telepresence and brand attitude (p = .005; Table 2). Second, telepresence had a significant and positive covariate effect on brand attitude (b = .102; Table 4). There were no differences in telepresence across the three ad types (F < 1, partial $\eta^2$ = .002; Table 3).

3.2. Hypothesis 2

H2 predicted that product involvement increases the effectiveness of advertising, measured by brand attitude. Again, the results supported this hypothesis. There was a small but significant correlation between involvement and brand attitude (r = .22, p = .001; Table 2), and involvement was a significant covariate in the ANCOVA comparing brand attitude across the three ad-type groups (b = .193; Table 4). Because participants were randomly assigned to the three ad types, there were no differences in involvement between the three groups.

3.3. Hypothesis 3

H3 predicted that PC advergames are more effective than normal TV commercials, and iTV ads that combine TV commercials with advergames, are more effective than PC advergames, when ad effectiveness is measured by brand attitude. This hypothesis was not supported. There were no significant differences in brand attitude between the three ad-type groups (F < 1, partial $\eta^2$ = .007; Table 3). In a separate ANCOVA analysis, controlling for telepresence, product involvement, age, and the two-way interaction between age and group, there were still no significant differences between the three groups (Table 4).

Interaction with iTV ads was more likely for participants who were older, female, or who did not own a DVD player (Table 5), probably because, for these participants, interaction with advergames was more of a novelty. TV hours and product involvement increased interaction, whereas quiz games reduced it. Both professional occupation and education level had no significant effect. Controlling for the significant effect of self-selection ($\rho = -.712$, p < .001), the effect of interacting with an iTV commercial (enhanced with an advergame) added a significant 1.517 to the expected mean brand attitude ($M = 3.413$). However, the positive effect of interacting was not large enough to counteract the negative filtering effect of selection (i.e., interactors tended to have a highly favorable brand attitude prior to interacting), and so the resultant treatment effect (persuasion minus sifting) was not significant (b = -.056, p = .587). This result suggests that interacting with an iTV ad, enhanced by an advergame, was no more effective than watching a TV commercial or playing an advergame on a PC.

There was a significant effect of ad type on day-after recall (Kruskal–Wallis $\chi^2(2) = 34.327$, p < .001), due to the significantly higher level of recall for the PC group compared to the other two groups (TV [Mann–Whitney] Z = −5.431, p < .001; iTV Z = −4.727, p < .001; Table 3). There was a marginal tendency, however, for the day-after-recall attrition rate to be higher for the PC group (31% versus 12% for TV and 18% for iTV, Table 3; $\chi^2(2, N = 233) = 5.80, p = .055$). Participants in the iTV group, who received a double exposure (commercial + advergame) if they

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Descriptive statistics.</th>
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<tbody>
<tr>
<td><strong>Viewing condition</strong></td>
<td><strong>TV</strong></td>
</tr>
<tr>
<td><strong>Day-after recall (%)</strong></td>
<td>54.31</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>29.93</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>29</td>
</tr>
<tr>
<td><strong>Telepresence (1–7)</strong></td>
<td>3.27</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>1.43</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>33</td>
</tr>
<tr>
<td><strong>Brand attitude (1–7)</strong></td>
<td>5.56</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>.59</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>33</td>
</tr>
</tbody>
</table>

Note: N = 233. TV = 30-s television commercials; PC = personal computer advergames, iTV = interactive television commercials (30-s commercial + advergame); SD = standard deviation.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Ancova results: effects of ad type (PC, TV, or iTV) on brand attitude.</th>
</tr>
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<tbody>
<tr>
<td><strong>Variable</strong></td>
<td><strong>df</strong></td>
</tr>
<tr>
<td>Constant</td>
<td>1</td>
</tr>
<tr>
<td>Ad type (TV versus PC versus iTV)</td>
<td>2</td>
</tr>
<tr>
<td>Telepresence (1–7)</td>
<td>1</td>
</tr>
<tr>
<td>Involvement (1–7)</td>
<td>1</td>
</tr>
<tr>
<td>Age (years)</td>
<td>1</td>
</tr>
<tr>
<td>Ad type × age</td>
<td>2</td>
</tr>
</tbody>
</table>

Error degrees of freedom = 225. $R^2 = .107$. Small effect size (partial $\eta^2$ = .010, medium = .059, large = .138 (Cohen, 1988)).
interacted with the test commercials, had a significantly higher level of recall compared to the TV group ($Z = -2.603, p = .009$).

### 3.4. Hypothesis 4

H4 proposed that the effect of age on advertising effectiveness, measured by brand attitude, would differ across the three ad-type groups. The results did not support this hypothesis. First, the interaction between ad type and age predicted by this hypothesis was not significant (Table 4). Second, the significant overall effect of age was due to its similar-sized positive effect for all three ad types (TV $b = .004$, PC $b = .005$, iTV $b = .007$). In other words, all three ad types were more likely to have a positive effect on brand attitude for older people.

### 4. Discussion

#### 4.1. Theoretical implications

This study tested the effectiveness of standalone advergames, played on a PC, compared to normal, non-interactive 30-s TV commercials, and interactive TV (iTV) commercials enhanced with advergames, using brand attitude to measure ad effectiveness. The results show that all three types of advertising are equally effective, because the effectiveness of all three is influenced by a person's age, involvement with the advertised product, and experience of telepresence.

The main reason for this lack of difference was that our participants experienced equal levels of telepresence from all three types of advertising. Telepresence increases with visual angle (the apparent size of the screen), but all three advertising types occupied visual angles that were relatively narrow ($9.8–33.7^\circ$) compared to those offered by an IMAX cinema or virtual reality goggles. Previous studies have found no effects of such narrow visual angles on either telepresence (Kim & Biocca, 1997) or advertising effectiveness (Bellman, Schweda, & Varan, 2009).

The PC group's superior day-after recall, compared to the other two ad-type groups, was not due to longer exposure, as it took the same amount of time to play the advergames in the PC and the iTV groups. However, one explanation could be that the PC group had a more engaged “lean back” mode of attention, compared to the “lean forward” mode typically used for watching television (Barwise, 2001). An alternative explanation is that PC viewing was confounded with a list-length effect (Anderson, Bothell, Lebiere, & Matessa, 1998), as the PC group only had to remember four advergames, rather than 20 commercials. There was also a marginally significant tendency for the PC group to have a higher day-after-recall attrition rate, which suggests that their superior recall rate was influenced by self-selection (Cook & Campbell, 1979).

Although advergames offer interactivity, which is an additional source of telepresence and flow (van Noort et al., 2012), these tend to be casual games offering a shallow 2D environment rather than a 3D virtual world, and therefore the interactivity offered did not help to increase feelings of “being there” inside the game, relative to “being in” normal TV commercials (Lombard & Ditton, 1997).

What TV commercials lack in interactivity they make up for in their presentation of a realistic virtual world on the screen.

#### 4.2. Practical implications

This study shows that advergames are just as effective as normal TV commercials, and can be used in place of TV commercials when advertising to audiences of light TV viewers. Light TV viewers are often heavy users of the Internet (Havlena, Cardarelli, & de Montigny, 2007), making advergames a viable alternative means of persuasive communication. Directing potential players toward advergames is a problem, but this study also shows that advergames can be delivered as enhancements to commercials inside online videos, to create interactive TV commercials. Enhancing commercials with advergames has been difficult in the past because of the technical limitations of iTV via a cable set-top box. But online television can take advantage of all the computing power and interaction capabilities of PCs, smart/connected TVs, tablet PCs, and smartphones, opening a vast range of possibilities for enhancing TV commercials with advergames.

Beyond the difficulty of leading potential players to an advergame-playing opportunity, there is the problem of convincing them to actually play the game. This study used a sample of the general public, rather than experienced gamers, so all the games we tested were easy enough for first-timers to play, which also encouraged a high interaction rate. But advertisers could instead choose a skimming strategy that limited interaction only to highly confident gamers. Advergames with a high level of difficulty require more concentration on them rather than the player's physical surroundings, which would increase telepresence and flow, and, the persuasive effect of these advergames (Cauberghe et al., 2011; Steuer, 1992; van Noort et al., 2012). If the game is too easy, it is unlikely to encourage perceptions of telepresence, and worse, it could have a negative effect on brand attitude for players desiring more of a challenge (Mathwick & Rigdon, 2004). On the other hand, if the game is too hard, it can force players to quit out of the game, which could have a similar negative effect on brand attitude. Advertisers need to precisely calibrate the attraction and level of difficulty of the game to the target market, which suggests the need to conduct extensive pre-testing prior to launching a new advergame.

#### 4.3. Limitations

The limitations of our study suggest directions for future research. First, this study did not systematically manipulate dimensions of the advergames. Our results suggest that participants in the iTV condition, who were free to interact or not with the advergames, were less likely to interact with quiz games as opposed to skill-based games. But the two quiz games were also games for brands that were not available in the test market, Australia, and so prior brand use rather than game type remains...
a viable alternative explanation for these results (van Reijmersdal et al., 2010). Future studies should fully cross any manipulated advergame factors, for example to isolate the effects of prior brand use and type of game.

A second limitation is that the advergames in this experiment were developed by the research team rather than by professional game developers. For this reason, there was a contrast in production values and look-and-feel between the TV commercials and the advergames. As more iTV advergames appear online, future studies will find it easier to test professionally produced commercial-advergame combinations.

Third, this study did not test the effects of mobile advergames. The growing penetration of smartphones has increased the audience for advergames, so that over half of US consumers have played at least one mobile game and over a third play mobile games at least once a month (Feijoo, Gómez-Barroso, Aguado, & Ramos, 2012). Because of the growing importance and potentially unique aspects of mobile gaming, future research should compare mobile advergames with TV commercials and PC and iTV advergames.

Fourth, this study found a significant effect of one dimension of telepresence, departure, on brand attitude, but did not measure the process variables that explain why departure has this effect. Future research should also measure the arrival dimension of telepresence (Kim & Biocca, 1997) and flow (van Noort et al., 2012) to investigate their potential mediating effects between the experience of departure and an improvement in brand attitude.

Fifth, this study tested the effects of advergames for low-involvement products, but many high-involvement products (e.g., cars) are advertised in advergames. Future research should compare PC and mobile advergames with TV and iTV commercials for high-involvement products.

Finally, like all lab studies, this study’s findings transfer to the real world with caution. The very high level of day-after recall across the three ad-types shows how much more attention our participants paid to the commercials, compared to normal viewing behavior at home (day-after recall is typically around 20%: Dubow, 1995). However, this increase in viewing attention, especially for normal TV commercials, probably made the effects of advergames appear smaller than they are outside the lab. Altogether, it is unclear whether this study’s results would be replicated in real life. This highlights the need for future studies carried out in the field.

5. Conclusion

The results of this lab study show that advergames played on computers are just as effective as normal TV commercials, as TV offers levels of telepresence equivalent to simple interactive games. For this reason, advergames are a viable alternative when trying to reach light TV viewers. Interactive TV commercials, in online video programs, offer advertisers a way of delivering advergames to heavy users of the Internet, beyond attracting potential players to the advertiser’s Web site. However, advertisers need to carefully pretest advergames to ensure they have the right level of attraction and difficulty for the target audience. Even so, the people who play advergames tend to be those with the greatest interest in the advertised product category, which reduces their persuasive effect. The limitations of this study suggest the need for future research to compare mobile advergames with TV commercials, and to test whether these lab findings can be replicated in the field.

References

Kim, T., & Biocca, F. (1997). Telepresence via television: Two dimensions of telepresence may have different connections to memory and persuasion. Journal of Computer-Mediated Communication, 3(2).


