A Proposed Accessibility Model of In-Game Advertising Effects

DISSERTATION

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By

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Abstract

The extant research on in-game advertising (the placement of brand names into the environment of a video game) has largely focused on the effects of specific manipulations on explicitly measured cognitive, affective, and conative outcomes. A model synthesizing this research with the transactive model of attitude accessibility is proposed, and two studies were conducted testing relationships between brand manipulations and explicitly measured outcomes as mediated by attitude accessibility. Manipulations of brand reality, interactivity with branded objects, and functional congruity all significantly affected the accessibility of participants’ attitudes towards the target brand. Accessibility mediated the effects of brand reality on attitude towards the brand, and the effects of brand congruity on purchase intention. Ramifications for future research on the growing industry of in-game advertising are discussed.
This document is dedicated to Martin Striz, one of the best friends I will ever know, who left this world just months before completing his own dissertation.
Acknowledgments

To my wife, Jessica, for suggesting that I consider a graduate degree in communication and not whatever it was I was thinking about doing six years ago.

To Dave, who remembered to click the right button this time even though I didn’t.

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To Brad, for giving me encouragement when I least expect it.
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Fields of Study

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Chapter 1: Introduction

The study of advertising draws on concepts and frameworks from a variety of other disciplines while introducing new variables specific to the studying of brand and product promotion (Nan & Faber, 2004; Thorson & Rodgers, 2012). This is particularly true of research in the subfield concerned with the use of advertising within video games, which has been largely atheoretical and concerned with the effects of specific manipulations on a set of typical cognitive, affective, and conative outcomes.

The proposed studies seek to integrate the existing findings in this field into a comprehensive model, using attitude accessibility as an explanatory mechanism for the effects of popular manipulations such as brand-game congruity and brand familiarity on recognition, attitude towards the brand, and purchase intention.

Advergames & In-Game Advertising

The academic interest in video game advertising is split into one of two categories depending on the nature of the game and brand message being conveyed. The first is concerned with advergames, or games typified by short, simple gameplay and control schemes designed specifically for brand promotion, often only a single brand per game (Mallinckrodt & Mizerski, 2007). Much of the extant research on video game advertising has focused on advergames as these traits also make them well-suited for on-line and lab experiments; such games can be constructed or modified fairly quickly due to their
simplicity, participants can play the entire game in minutes, and require little time to understand game mechanics or controls. Advergames are typically used as an attraction for a brand’s website, particularly for children (Cauberghe & De Pelsmacker, 2010). Unlike conventional console or computer games which frequently retail for $50-$60, advergames are most always free-to-play, thereby demanding less investment from the player both in time and in money spent.

The second category, and the one with which the proposed model is primarily connected, is in-game advertising, or the insertion of brand messages or branded objects into commercially available games designed for entertainment rather than promotional purposes. Such messages are often targeted at males aged 18-34, both the key demographic for most advertising and the group most likely to purchase electronic games (Youn & Lee, 2012). In-game advertising is usually ancillary to the game action, appearing as signage (Yang, Roskos-Ewoldsen, Dinu, & Arpan, 2006), but may also take the form of branded objects with which the player must interact to advance the game’s story. This form of advertising has received somewhat less research as compared to advergames because the environments of commercially available games (especially for game consoles) are difficult to experimentally manipulate, and researchers must account for the frustration that can result from requiring participants to learn more complex control schemes in a single laboratory visit. Despite these difficulties, research of in-game advertising is important due to the unique nature of game consumption: whereas the average advergame may be played in three to five minutes, and the average film containing a brand placement may be consumed over 90 to 120 minutes, the average
commercially-available video game is consumed over a span of over 30 hours and requires more cognitive capacity due to its highly interactive nature (Nelson 2002; Van Reijmersdal, Jansz, Peters, and van Noort, 2010).

Cognitive, Affective, and Conative Outcomes

The study of advertising in video games borrows most of its outcome variables from general studies of advertising. These variables fall under three major types: cognitive, affective, and conative (van Reijmersdal et al., 2010).

Cognitive Outcomes

The most-used cognitive outcomes are explicit memory measures of brand placements included in the stimulus. This may take the form of free recall (with prompts such as “List all brand messages you remember seeing while playing the game”) or recognition measures, in which participants are provided with brand names and asked to indicate whether that brand appeared while playing the game.

Free recall measures have several validity issues, starting with coding. When looking at such data, participants clearly have varying ideas as to how to respond. Prompts such as “What brand name was on the back of your car?” have been responded to with the intended brand placement, the model of the car (even with nothing on the car itself signifying the model), or any of a number of other brands. Another coding issue is that of determining how much similarity between the actual stimulus brand and the response is required to be considered a match. Is a word with substantially different spelling but phonetically similar a hit? Is transposing two letters “close enough?” Published studies employing free-recall measures rarely provide sufficient information on
how such responses are coded. Such inconsistencies may obscure real effects and hinder the ability to make direct comparisons between studies.

Also, free recall measures tend to find systematically low levels of recall. In two prior studies on brand placement in *Forza Motorsport 4* (Dickinson, Hanus, & Fox, 2013; Dickinson, Hanus, & Fox, 2014), participants correctly recalled the target brand placement less than 30% of the time across conditions, even after continuously displaying the brand on the screen for as long as 10 minutes. Other studies have found recall for brand names to be similarly low (Dardis, Schmierbach, & Limpieros, 2012; Nelson, Yaros, & Keum, 2006). A notable exception is Gross’s (2010) study of advergames, in which explicit recall measures were well over 80% across all conditions.

Recognition measures are not without their own issues, however. Studies comparing recall and recognition measures provide evidence suggesting that “hit rates” for recognition are greater than those for recall independent of number of exposures or exposure time (Singh & Rothschild, 1983). Recognition rates are also largely unaffected by time, despite expected memory loss (Lucas, 1960; Singh, Rothschild, & Churchill, 1988).

Recall and recognition measures may also generalize to different real-world behaviors regarding persuasion and purchasing. Recognition measures map more closely onto purchase decisions, especially for low-involvement products, as store shelves and shopping web sites display multiple recognizable brands simultaneously. Free-recall measures may serve as a proxy for elaboration on thoughts about the brand, which would
be more likely to influence word-of-mouth discussion about the brand (Singh, Rothschild, & Churchill, 1988).

Word-fragment completion tasks are also occasionally used as an implicit measure of brand recall (Yang et al., 2006), and in one instance used to demonstrate activation of words related to consumption of the product, such as “milk” for an advergame promoting Oreo cookies (Gross, 2010). Implicit measures appear more sensitive to exposure in video games than explicit recall or recognition measures, and given the potential for effects on implicit memory to persist longer than effects on explicit memory (Shapiro & Krishnan, 2001), and affect later behavior (Fazio & Olson, 2003), their use should be expanded in researching video game advertising.

**Affective Outcomes**

Affective outcomes in video game advertising studies are typically limited to explicit measures of attitude towards the brand using semantic differential or Likert-type scales. A few studies also include attitude towards the game, and posit that affect transfer from the game can also improve attitudes towards placed brands (Nelson et al., 2006; van Reijmersdal et al, 2010). This notion of positive affect towards the game transferring to affect towards the placed brand appears somewhat unique to gaming; other research suggests that high levels of liking a program cause *negative* effects on attitude towards a placed brand (Cowley & Barron, 2008).

**Conative Outcomes**

If the ultimate goal of advertising is to influence a purchase decision, it is surprising that most studies limit their outcome measures to solely cognitive outcomes,
affective outcomes, or some combination of the two. When employed, conative outcomes are usually restricted to single measures of purchase intention for the placed brand (Lee, Park, & Wise, 2013; Li, Daugherty, & Biocca 2002, Schlosser, 2003; van Reijmersdal et al., 2010). There are no apparent examples in the current literature of conative outcomes related to the game in which the placement appears; such outcomes would not make sense for free-to-play advergames, but evidence that in-game advertising affects likelihood of buying the game could yield interesting results for console and PC games, which tend to retail for $50 or more.

Other Factors: Individual Differences and Presence

Two individual differences have been identified as significant predictors of advertising outcomes in video game research: attitude towards advertising, and prior gaming experience (Youn & Lee, 2012). While general attitude towards advertising is not frequently measured, Nelson, Keum, and Yaros (2004) found that participants who had a positive attitude towards video game advertising in general tended to see greater potential for in-game advertising to influence purchase intention.

Studies employing measures of prior gaming experience have found a direct relationship between experience and recall/recognition rates. The limited capacity model of mediated message processing (LC4MP; Lang, 2000) offers an explanation for these effects: playing a video game may be a cognitively taxing experience, however those who are already familiar with common traits of video games (control and user interface schemes, game mechanics, etc.) will require less cognitive resources than those who do not have such prior experience. Therefore, more experienced players will have spare
cognitive capacity for completing tasks secondary to the game action, such as processing brand placements on the periphery of the game’s virtual environment. (Chaney, Lin, & Chaney, 2004; Lee & Faber, 2007). Inversely, those with little video gaming experience must devote extra resources to understanding control schemes and game mechanics, consequently impeding the effectiveness of brand placements (Youn & Lee, 2012). This pattern has been borne out by research: experienced gamers are more likely to recognize brand placements after exposure regardless of location (Schneider & Cornwell, 2005), whereas novice gamers were much more sensitive to manipulations of placement prominence (Lee & Faber, 2007).

**Presence**

Also connected to the LC4MP model is the concept of presence, or the perceptual illusion that a mediated environment is nonmediated (Lombard & Ditton, 1997). Presence has been conceptualized as a focus of attention on central stimuli in the mediated environment; limited capacity models of attention would predict that this consequently results in less cognitive capacity being available for processing peripheral stimuli (MacInnis & Jaworski, 1989). Findings based on this hypothesis have been inconsistent: higher levels of presence were found to impair brand recall in one study (Grigorivici & Constantin, 2004), whereas at least two other studies failed to replicate this effect (Nelson et al., 2006; Dickinson et al., 2013).

Presence, generally considered a positive outcome of engaging with a video game, has also been connected to affective outcomes. The persuasive effects of some brand placements have been found to be stronger when the player experiences a higher
level of presence (Nicovich, 2005), and in particular when players like the game that includes the placement (Nelson et al., 2006).

**Typical Manipulations**

The direct manipulations most frequently employed in research of both advergames and in-game advertising fall under two major categories: traits of the placement, or traits of the placed brand itself.

*Traits of Placement*

One of the few segments of video game advertising research that consistently employs an existing theoretical model is that concerned with placement location in the game. Studies based on the LC4MP (Lang, 2000) claim that playing a video game causes substantial cognitive load, thereby reducing resources available for processing peripheral information.

The most common manipulation of placement in video games is simply screen location: either the brand appears on the edge of the viewable game area, or closer to the center of the screen. As manipulations of central vs. peripheral display require the brand to appear in a particular location on the screen, they are difficult to test in the context of in-game advertising. Modern three-dimensional video games afford players the ability to freely look around and move through the environment, making the exact presentation of a brand at any given point on the screen difficult to predict. Therefore, these studies are mostly limited to advergames (Lee, Park, and Wise, 2013), or other structurally simple games constructed specifically for experimental purposes (Nelson et al., 2006).
Two other manipulations of placement type may be more valid for today’s three-dimensional games. The first is interactivity with branded objects. Interacting with branded objects in an actual video game has not received much attention in research, but some studies have manipulated website advertising to use static brand placements or interactive three-dimensional branded objects. Evidence suggests that interacting with a branded object increases a person’s ability to imagine oneself using the product, and also increases purchase intention (Schlosser, 2003), and that interacting with an object improves feelings of presence and attitude towards the brand (Cui, Wang, & Xu, 2013).

The second manipulation relevant to modern games is functional congruity, or centrality of the brand to the game action (Gwinner & Eaton, 1999; Lee & Faber, 2007). There is no known research treating this as separate from interactivity from the branded object, however it is conceivable that a static brand placement could be central to the game action in some situations, such as serving as a landmark needed to navigate an environment.

**Traits of the Placed Brand**

**Congruity.** Manipulations of brand selection in studies tend to rely on one of two traits: congruity or reality. Congruity is the degree to which the placed brand’s products relate to the game’s content and consists of four different dimensions, three of which vary depending on the selected brand (Lee & Faber, 2007). Image congruity refers to a match between the image of the brand’s product category and the image of the game’s focus; lifestyle congruity is the relationship between the perceived lifestyle associated with the product and the lifestyle of those who engage in the game’s content; and advertising
congruity is the extent to which advertising of the product category seems appropriate for the game action (Lee & Faber, 2007). (The fourth dimension of congruity presented by Lee and Faber is “functional congruity,” addressed in the previous section.)

Findings regarding congruity effects have been mixed, both for cognitive and affective outcomes. Most research suggests that incongruous brands are more likely to be recalled than congruous brands (Dickinson et al., 2013; Huang & Yang, 2012; Lee & Faber, 2007). Contrary to these findings, Gross (2010) found that brand recognition was more likely for those who played an advergame whose action was congruous with the placed brand.

Results of affective outcomes suggest that congruous brand placements will have more positive effects on attitude towards the brand. Wise and colleagues (2008) found that affect transfer from the game to the placed brand (Orbitz, a travel-planning web site) was stronger when the game was travel-related than sports-related. A similar study using a browser-based racing game also found that participants had better attitudes towards congruous brands. My own research found no differences on attitude towards the placed brand immediately after exposure between congruous and incongruous brands, and revealed a negative effect of congruity on attitude towards the brand two weeks after exposure (Dickinson et al., 2013).

Real and fictitious brands. The second common manipulation of brand selection is the use of a real or fictitious brand. Fictitious brands are frequently employed in brand placement studies to control for the effects of participants’ prior familiarity with and attitude towards a brand. Influencing an existing attitude towards a brand to a measurable
degree during a brand placement study often proves difficult. Consequently, the use of an unfamiliar brand can help to understand the process of belief and attitude formation (Mitchell, 1981). Such a manipulation is not out of place in research using video games, which frequently employ fictitious brands for comedic effect or to simply make an environment more realistic, however care should be taken to distinguish a brand which is merely fictitious from one which is also unfamiliar. Some fictitious brands featured in video games have actually achieved a certain level of popularity in and of themselves; as an example, the Burger Shot and Cluckin’ Bell fast food chains have become familiar to a generation of gamers through repeated inclusion in the Grand Theft Auto series.

However, a growing body of research indicates that the use of real brands (or, at the least, brands already familiar to the sample population) may be necessary to find predictable outcomes of in-game advertising. Nelson and colleagues (2006) found that real brands placed on a billboard in a racing game were more likely to be recalled than fictitious brands, and that effects of the placement on attitude towards the brand were significant only for real brands. Presence was also found to mediate the relationship between attitude towards the game and attitude towards the placed brand, but again only when the placed brand was already familiar. In my own research, real brands were more likely to be recalled than fictitious brands, and also positively affect self-report of presence (Dickinson et al., 2013). However, in a follow-up study including only fictitious brands, recall levels were low and there were no significant differences between congruous and incongruous brands on any advertising outcomes, further indicating the importance of brand familiarity (Dickinson et al, 2014).
Nelson and colleagues (2006) do not offer a theoretical reasoning behind the discrepancy in effects for real brands and fictitious brands. The theoretical model which follows proposes *attitude accessibility* as an explanatory mechanism for this discrepancy.
Chapter 2: An Accessibility Model of Video Game Advertising Effects

Development of the theoretical model depicted in Figure 1 began with two major goals. First, the model is intended to reflect extant research as much as possible. Recognition is positively affected by game skill, functional congruity (moderated by game skill), prior brand experience (i.e. use of real brands), and interactivity with the branded object.

Attitude towards the brand is positively affected by functional congruity, prior brand familiarity, interactivity with the branded object, and accessibility of attitude towards the brand. The commonly-employed model of attitude towards the brand also being influenced by affect transfer from the game is retained (Nelson et al., 2006; Wise et al., 2008). Presence is included as a mediator of this relationship (Li et al., 2002; Nelson et al. 2006; Nicovich, 2005), influenced by prior brand experience (Dickinson et al., 2013; Nelson et al. 2006).

Despite a relative lack of research on conative outcomes, the proposed model posits direct effects of the standard manipulations on purchase intention, with the possibility that this effect may be mediated by attitude accessibility and attitude towards the brand.

The proposed model’s primary contribution to the literature on in-game advertising is the introduction of attitude accessibility, or the ease with which an attitude
can be activated from memory (Fazio, Chen, McDonel, & Sherman, 1982). Advertising research has found accessible attitudes towards a brand to be consistent predictors of future purchase behavior (Berger & Mitchell, 1989; Kardes, 1988; Kokkinaki & Lunt, 1999; Yi, Phelps, & Roskos-Ewoldsen, 1998). Yet there is little extant research of in-game advertising employing accessibility measures, and only a small number of studies exploring accessibility in the context of brand placement in traditional mass media (see Yang & Roskos-Ewoldsen, 2007).

The transactive model of attitude accessibility (Roskos-Ewoldsen, 1997) posits that the accessibility of one’s attitude towards an object is directly affected by four processes: frequency and recency of attitudinal judgments of the object, expectation that one’s attitude towards an object will be useful at a later time, and elaboration on that object. An accessible attitude towards an object, in turn, creates an orienting effect that draws the individual’s attention to that object or a representation of it (Roskos-Ewoldsen & Fazio, 1992). As greater attention is paid to an attitude object, deliberative processing of stimuli involving that object increases, which in turn elicits a deliberative behavior.

The proposed model of in-game advertising effects incorporates elements of the transactive model into existing research in the field, primarily as a mediator of the effects of common manipulations and individual differences on cognitive, affective, and conative outcomes. The oft-used manipulation of brand familiarity (by use of real or fictitious brands) would seem to directly affect frequency and recency of prior exposure to a stimulus brand (in that there is no prior exposure to a novel, fictitious brand; Nelson et al, 2006). Functional congruity maps closely onto the concept of expectation of future use; if
a branded object is central to the in-game action, the player will need to draw on previous knowledge of and attitudes towards that brand to locate and use the object to advance the gameplay (Lee & Faber, 2007; Wise et al, 2008). The ability to interact with a branded object, as opposed to seeing a brand placement as a static advertisement in the game’s virtual space, is also likely to elicit greater elaboration on the brand and its usefulness (Grigorivici & Constantin, 2004; Lee et al, 2013).

The proposed model also posits that these three manipulations exist independently of each other. Branded objects could be introduced into a game such that the player cannot interact with them, but are still central to the game action (for example, a billboard being used as a landmark, or a branded object being used by a non-player character instead of the player.) Conversely, interactive branded objects could be included in a game without having any relevant effect on the game action. Any of the brands employed in a game could be real or fictitious.

Exposure to the target brand is explicitly included in the model to account for the varying effects of real and fictitious brand exposure on affective outcomes. Familiarity moderates this relationship such that being exposed to a brand during gameplay will only have persuasive effects if the brand is one with which participants are already familiar (Nelson et al., 2006; Dickinson et al., 2013, 2014).

The first two proposed studies in the research program both focus on the effects of specific manipulations on cognitive, affective, and conative outcomes as mediated by attitude accessibility. The first study explores the effects of the brand reality/familiarity manipulation on attitude accessibility, whereas the second study attempts to manipulate
interactivity and functional congruity independently. Both studies examine changes in recognition of the brand, attitude towards the brand, and purchase intention employing a modified version of a commercially available video game.
Figure 1. Proposed model of in-game advertising effects.
Chapter 3: Study One: Accessibility as a Mediator of Brand Reality’s Effects on Recognition and Attitude

According to the transactive model of attitude accessibility (Roskos-Ewoldsen, 1997), prior elaboration on one’s attitude towards a brand should positively influence accessibility. Given that such elaboration is not possible for brands an individual is encountering for the first time, this should result in more accessible attitudes towards real, familiar brands and less accessible attitudes towards fictitious, unfamiliar brands. This outcome appears consistent with explicitly measured outcomes of the brand familiarity manipulation employed in prior research, in which exposure to real brand exhibit stronger effects than fictitious brands (Nelson et al., 2006; Dickinson et al., 2013; Dickinson et al., 2014).

**H1:** Attitudes towards real, familiar brands will be more accessible than attitudes towards fictitious, unfamiliar brands.

**H2:** Real, familiar brands are more likely to be (a) recognized and (b) recalled after gameplay than fictitious, unfamiliar brands.

**H3:** Purchase intention for real, familiar brands will be more likely than purchase intention for fictitious, unfamiliar brands.
The effect of exposure to brands through gameplay should cause a more favorable evaluation of those brands, however consistent with Nelson and colleagues (2006) this effect should exist only for real brands.

**H4:** Real brands to which participants were exposed during gameplay should elicit more positive (a) attitude towards the brand and (b) purchase intention than brands to which participants were not exposed.

The proposed model draws from existing attitude accessibility models (Roskos-Ewoldsen & Fazio, 1992; Roskos-Ewoldsen, 1997) to posit that attitude accessibility mediates the effects of the brand familiarity manipulation on explicitly measured outcomes. Specifically, when an individual holds a highly accessible attitude towards a brand, the individual will be more likely to orient towards placements of that brand. This orientation will, in turn, contribute to greater motivated processing of the brand, and consequently greater deliberative behavior (i.e. purchase intention).

**H5:** The relationship between brand reality/familiarity and orientation to the brand as measured by (a) recognition or (b) recall will be mediated by attitude accessibility.

**H6:** The relationship between brand reality/familiarity and attitude towards the brand will be mediated by attitude accessibility and orientation towards the brand.

**H7:** The relationship between brand reality/familiarity and purchase intention will be mediated by (a) attitude accessibility, (b) orientation towards the brand, and (c) attitude towards the brand.
The portions of the proposed model tested in Study One are diagrammed in Figure 2.

Method

The experiment is a within-participants design in which all participants were exposed to both real and fictitious brands of multiple product types (see appendix for initial list of brands and pretest information).

Sample

43 participants (age $M = 20.00$, $SD = 1.72$, 51.22% female) were recruited from communication courses at a large university in the Midwestern United States and awarded course credit or extra credit in exchange for their participation. 69.8% identified as White, 23.3% identified as Asian or Pacific Islander, 4.7% identified as Black, and 2.3% did not specify a race. Due to missing data as a result of a Qualtrics programming error, 18 participants were excluded from hypothesis tests regarding explicitly reported attitude and purchase intention.

Time 1

After obtaining informed consent, participants completed a reaction-time task using DirectRT software. Participants were presented with stimuli and asked to indicate as quickly as possible whether they liked (by pressing the “L” key) or disliked (by pressing the “D” key) each stimulus. Four blocks of 24 stimuli each were presented. The first two blocks each consisted of 12 instances of “Press the LIKE Key” and “Press the DISLIKE Key.” The third block consisted of 6 real and 6 fictitious brand names, each with explanatory information reinforcing the type of products created by each brand.
Each brand/product type phrase was displayed twice. The fourth block also consisted of 6 real and 6 fictitious brand names, including 3 target real brands (Disney, Google, Coca-Cola) and 3 target fictitious brands (Alkyne, Areca, and DL).

**Time 2**

Approximately one week later, participants returned to the lab and played the PC version of *Fallout New Vegas*, a combination first-person shooter/RPG taking place in a post-apocalyptic version of Las Vegas, Nevada and the surrounding area. This game was selected as it is emblematic of current “open-world” video games, a genre populated by titles such as the *Grand Theft Auto* series, of which the most recent installment, *Grand Theft Auto V*, is the fourth-best selling video game of all time (Makuch, 2016). Games in the open-world genre frequently include fictitious brands, and occasionally placement of real ones. *Fallout New Vegas* was also selected for exhibiting a combination of graphic and sound fidelity on par with most commercially-produced video games in recent years, and because of the ease with which objects can be inserted in the game and manipulated via publicly available modification tools provided by the game’s publishers: Bethesda Softworks. Prior research has employed a similarly-modified version of *The Elder Scrolls: Morrowind* by the same developer (Nicovich, 2005), however *Morrowind* is now over 12 years old and therefore no longer an accurate reflection of modern graphics and control schemes.

*Fallout New Vegas* was modified by the insertion of the publicly available “Amazon City” mod (http://www.nexusmods.com/newvegas/mods/60153/?), which rewrites part of the game map to include a visually interesting town populated with
enemies. The game was then further modified via use of the Garden of Eden Construction Kit (GECK), a map editor and modification tool made publicly available by Bethesda Softworks. Enemies were removed from the map, and six billboards were inserted into the town, each bearing the logo of one of the six target brands. These billboards were created in Adobe Photoshop using existing logos for real brands and logos consisting of stylized and colored text for the fictitious brands. (Examples of billboard design and in-game display of billboards are included in Figures 3-5.) Non-visible barriers were placed around the town to prevent participants from straying into other areas of the game world. Metal footlockers were scattered around the map containing money.

Participants were instructed to explore the town for 10 minutes and to find as much money as possible. After 10 minutes, the researcher noted the amount of money found by the player, and then administered the post-play survey including explicit cognitive, affective, and conative measures.

**Measures**

Zero-order correlations for all key variables are represented in Table 1.

**Cognitive.** Brand recall was measured by asking participants to list all brands they recall seeing while playing the game. The free recall measure was coded by a single research assistant, with responses phonetically identical to one of the six target brand names counting as a correct recall. Three variables were coded: total number of target brands recalled ($M = 1.35, SD = 1.23$), total number of real brands recalled ($M = 1.07, SD = .94$), and total number of fictitious brands recalled ($M = .30, SD = .63$).
After the recall measure, recognition was measured explicitly by asking participants to indicate whether they did or did not encounter a given brand during game play, and to indicate their confidence in their answer on an 11-point scale. All of the brands employed in the fourth block of the attitude accessibility task were employed in this measure, with the ones not appearing in the game serving as foils.

**Affective.** Attitude towards each brand was measured explicitly using three semantic differential pairs (good/bad, useful/useless, favorable/unfavorable) on a 12-point scale. Descriptive statistics for each brand are listed in Table 2.

**Conative.** Intent to purchase products from each of the placed brands was measured by three Likert-type items on an 11-point scale adapted from Lee and Nass (2004). Participants were asked to indicate their likelihood of trying the product, buying the product, and recommending the product to friends. Descriptive statistics by brand are listed in Table 2.

**Presence.** Presence was measured via the Igroup Presence Questionnaire (Schubert, Friedmann, & Regenbrecht, 2001; see appendix). This measure consists of 13 7-point, Likert-type items on three subscales (spatial presence, $M = 4.84$, $SD = 0.93$, $\alpha = .71$; involvement, $M = 4.19$, $SD = 1.13$, $\alpha = .60$; and realism, $M = 4.06$, $SD = 1.19$, $\alpha = .81$). A measure of overall presence was also calculated by averaging these three subscales ($M = 4.40$, $SD = 0.74$, $\alpha = .74$).

**Task completion.** The amount of money collected, ranging from $0 to $2,100 ($M = 821.43$, $SD = 664.62$) served as a measure of how well participants performed on their assigned in-game task. This measure was employed as a covariate in all hypothesis tests.
Results

H1: Attitude towards real brands will be more accessible than attitudes towards fictitious brands. Hypothesis 1 was tested by first calculating the harmonic-mean transformed average of response times for the three placed real brands (Coca-Cola, Disney, and Google) and placed fictitious brands (Areca, Alkyne, and DL) separately. In this method, the reciprocal of each response time is averaged, and the reciprocal of the average is then calculated. This process helps to reduce the effect of very long response times on the mean in a manner similar to a logarithmic transformation, while producing a more interpretable result as the harmonic mean is expressed in the same units as the original measure.

The resulting group means (real brands: $M = 1022.87$ ms, $SD = 238.32$; fictitious brands $M = 1366.62$ ms, $SD = 463.45$) were then compared via repeated-measures ANOVA, finding a significant difference between the transformed response times after controlling for task completion, $F(1,40) = 18.223, p < .001, \eta^2 = .313$. Participants had significantly faster response times to the real placed brands than the fictitious placed brands, therefore Hypothesis 1 is supported.

H2: Real brands are more likely to be (a) recognized and (b) recalled after gameplay than fictitious brands. Hypothesis 2 was tested by computing $d'$ independently for real and fictitious brands. Recognition of a brand inserted into the game (Google, Disney, and Coca-Cola for real brands; Areca, Alkyne, and DL for fictitious brands) was marked as a hit, and recognition of a brand not inserted into the game (Samsung, McDonalds, and BMW for real brands; JCN, Laird Verbain, and Ileum for fictitious brands) was marked as a miss. The $d'$ values were then compared using a paired-samples $t$-test, finding a significant difference between the $d'$ values, $t(40) = 3.219, p < .01, \eta^2 = .198$. Participants had significantly higher $d'$ values for the real placed brands than the fictitious placed brands, therefore Hypothesis 2 is supported.
for fictitious brands) was marked as a false positive. (See Tables 3 and 4 for recognition counts for each brand.)

\[ d' = z\{H\} - z\{F\} \]

Where \( H \) is the proportion of hits (from 0 to 1), \( F \) is the proportion of false positives (from 0 to 1), and \( z \) is the critical value drawn from a normal distribution with mean 0, standard deviation 1, and cumulative probability equal to \( H \) or \( F \) respectively (MacMillan and Creelman, 2005, pg 8).

For cases in which \( H \) or \( F \) equals 0 or 1, \( d' \) is infinite and therefore requires adjustment. For cases in which a proportion was 0, the proportion was changed to \( 1/2N \) where \( N \) is the number of possible trials within that category. As 3 trials were present in each of the four categories, this resulted in an imputed proportion of .166667. For cases in which a proportion was 0, the proportion was changed to \( 1 - (1/2N) \), or .833333 (MacMillan and Creelman, 2005, pg 8).

The resulting \( d' \) calculation ranged from -0.86 to 1.93 (real \( M = .92, SD = .739 \), fictitious \( M = .44, SD = .68 \)) with values below zero reflecting cases in which more false positives than hits were registered, and 1.93 indicating perfect performance on the recognition task (i.e. correctly identifying all hits and rejecting all false positives). The real and fictitious \( d' \) values were then compared via repeated-measures ANOVA controlling for in-game task completion, and a significant difference was found, \( F (1, 39) = 6.129, p = .018, \eta^2 = .136 \).
Total number of real and fake brands recalled in the free recall task were also compared via repeated-measures ANOVA controlling for in-game task completion, and a significant difference was also found, $F(1, 41) = 16.43, p < .001, \eta^2 = .286$. Therefore, Hypotheses 2a and 2b are both supported.

**H3: Purchase intention will be greater for real brands than for fictitious brands.** Hypothesis 3 was tested by repeated-measures ANOVA comparing the group means for purchase intention for each placed real brand ($M = 9.17, SD = 1.46$) with the average purchase intention for each placed fictitious brand ($M = 6.00, SD = 1.16$). This analysis found a significant difference between real and fictitious brands after controlling for task completion, $F(1, 23) = 58.44, p < .001, \eta^2 = .718$. Hypothesis 3 is supported.

**H4: Brands to which participants were exposed will elicit greater (a) attitude towards the brand and (b) behavioral intention than brands to which participants were not exposed.** Hypothesis 4 was tested by repeated-measures ANOVA comparing the average attitude towards the brand for the three real brands placed in the game (Disney, Google, and Coca-Cola; $M = 9.00, SD = 1.37$) with average attitude towards the brand for the three real brands not placed in the game (Samsung, McDonalds, and BMW; $M = 7.93, SD = 1.56$). This analysis found a significant difference in average attitude towards the brand after controlling for in-game task completion, $F(1, 22) = 17.32, p < .001, \eta^2 = .441$. A second repeated-measures ANOVA compared mean scores of behavioral intention between the two groups and also found a significant difference after controlling for in-game task completion, $F(1, 22) = 10.26, p = .004, \eta^2 = .308$. 
The analyses were repeated for the three fictitious brands placed in the game (Areca, Alkyne, & DL; $M = 5.49, SD = 1.34$) and the three fictitious brands not placed in the game (JCN, Ileum, and Laird Verbain; $M = 5.41, SD = 1.25$). The difference in attitude towards the brand between the two groups was insignificant after controlling for task completion, $F(1, 23) = .129, p = .722$, as was the difference in behavioral intention, $F(1, 23) = 1.08, p = .306$. Therefore, H4a and H4b are both supported for real brands, and rejected for fictitious brands.

**H5: The relationship between brand reality/familiarity and attitude towards the brand will be mediated by (a) attitude accessibility, (b) recognition, and (c) serially by attitude accessibility and recognition.**

Hypothesis 5 was tested using the MEMORE macro for SPSS to test mediation in a within-subjects design (Montoya & Hayes, in press). This macro accepts two variables as DVs (in this case, $d'$ for real and fictitious brands separately) and pairs of variables as mediators working either serially or in parallel, testing a mediating relationship between an independent variable that is not directly coded (whether brands are real or fictional) and the dependent variable.

The specified model set the two dependent variables as the means of attitude towards the three placed real brands (Coca-Cola, Google, and Disney) and the three placed fictitious brands (Alkyne, Areca, and DL). Harmonic mean response times for the placed real and fictitious brands, and $d'$ for real and fictitious brands, were set as mediators in a serial mediation relationship.
The model and path coefficients from the analysis are depicted in Figure 6. The analysis found a significant direct effect of brand reality on attitude towards the brand, as well as a significant indirect effect via attitude accessibility ($b = .82, 95\% \text{ CI}: .01 \text{ to } 2.06$). The indirect effect via recognition was not significant ($b = .37, 95\% \text{ CI}: -.53 \text{ to } 1.52$), nor was the overall serial mediation effect ($b = -.15, 95\% \text{ CI}: -.80 \text{ to } .23$). Therefore, Hypothesis 5a is supported, and 5b and 5c are rejected.

**H6:** The relationship between brand reality/familiarity and purchase intention will be mediated by (a) attitude accessibility, (b) attitude towards the brand, and (c) serially by attitude accessibility, then attitude towards the brand. Hypothesis 6 was tested via the MEMORE macro with the two dependent variables set as the means of behavioral intention towards the three placed real (Coca-Cola, Google, and Disney) and the three placed fictitious brands (Alkyne, Areca, and DL). Harmonic mean response times for the placed real and fictitious brands, and $d'$ scores for real and fictitious brands, were set as mediators.

The model and path coefficients from the analysis are depicted in Figure 7. The direct effect of brand reality on purchase intention was not significant ($b = .19, t(19) = 0.37, p = .713$), nor was the indirect effect via attitude accessibility ($b = .22, 95\% \text{ CI}: -.23 \text{ to } .72$). The indirect effect via attitude towards the brand was significant ($b = 2.33, 95\% \text{ CI}: .85 \text{ to } 3.48$). The serial mediation effect via both recognition and attitude was not significant ($b = .51, 95\% \text{ CI}: -.02 \text{ to } 1.40$). Therefore, Hypothesis 6b is supported, whereas Hypotheses 6a and 6c are rejected.

**Discussion**
Study One explored the commonly used manipulation of real versus fictitious brands commonly employed in research of in-game advertising. In the context of the transactive model of attitude accessibility (Roskos-Ewoldsen, 1997), this manipulation could affect elaboration on the brand such that real brands that the individual has previously experienced are likely to have already been the subject of elaboration, whereas novel fictitious brands being encountered for the first time have not had such elaboration. In the context of the proposed attitude accessibility model of in-game advertising effects, exposure to real brands should elicit faster responses on reaction time tasks asking participants to express a like or dislike of the brand.

Consistent with the proposed model, all outcomes were more positive for real brands than for fictitious brands. Real brands elicited more accessible attitudes, higher rates of recall and recognition, and more positive attitude towards the brand and purchase intention than did fictitious brands. As players are trying to perform a cognitively engaging task in a video game (compared to the somewhat less engaging task of watching or listening to non-interactive mass media), players appeared to orient most often towards brands which were more likely to be familiar. Evidence from the study also supported at least one of the hypothesized mediation relationships in the model: attitude accessibility also served to mediate the relationship between the reality manipulation and attitude towards the brand.

However, some of the mediation pathways in the proposed model were not supported by Study One. The orienting effect of accessible attitudes (Roskos-Ewoldsen & Fazio, 1992) was expected to mediate the influence of the reality manipulation on
recognition of target brands. However, mediation effects involving recognition were not significant, despite a significant main effect of the reality manipulation on recognition. Attitude accessibility also did not mediate the relationship between the reality manipulation and purchase intention, whereas explicitly measured attitude towards the brand did mediate this relationship.

Taken together, these results indicate that attitude accessibility is an important outcome of the brand reality manipulation in and of itself, and also mediates the effect of this manipulation on attitude towards the brand. Study 2 will investigate how these relationships are affected by other common manipulations employed in in-game advertising research.

Limitations

Due to the loss of attitude and purchase intention data for approximately 33% of the sample, the results of the study regarding these outcomes may have been underpowered. With data from the full sample it is possible that these hypotheses may have been supported.

Additional limitations common to both studies are described in Chapter 5.
Table 1. Zero-order correlations between key variables, Study One.

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*p < .05, **p < .01, ***p < .001
### Table 2. Descriptive statistics for attitude and purchase intention towards individual brands, Study One.

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<tr>
<th>Brand</th>
<th>Attitude (SD)</th>
<th>Purchase Intention (SD)</th>
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<tr>
<td>Alkyne</td>
<td>5.72 (2.07)</td>
<td>6.21 (1.79)</td>
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<tr>
<td>Areca</td>
<td>5.35 (1.23)</td>
<td>5.85 (1.13)</td>
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<td>BMW</td>
<td>9.39 (1.64)</td>
<td>9.12 (2.39)</td>
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<td>Coca-Cola</td>
<td>7.88 (2.59)</td>
<td>8.21 (2.72)</td>
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<td>Disney</td>
<td>8.85 (1.81)</td>
<td>9.25 (1.59)</td>
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<td>DL</td>
<td>5.40 (1.29)</td>
<td>5.92 (1.12)</td>
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<td>Google</td>
<td>10.17 (1.43)</td>
<td>10.05 (2.17)</td>
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<td>Ileum</td>
<td>5.48 (1.19)</td>
<td>5.87 (1.04)</td>
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<td>JCN</td>
<td>5.53 (1.36)</td>
<td>6.07 (1.36)</td>
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<td>Laird Verbain</td>
<td>5.23 (1.36)</td>
<td>5.73 (1.03)</td>
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<td>McDonalds</td>
<td>6.99 (3.07)</td>
<td>7.51 (3.00)</td>
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<td>Samsung</td>
<td>7.43 (2.93)</td>
<td>7.61 (2.96)</td>
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<td>Brand</td>
<td>Recognized (Percentage of total participants)</td>
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<tr>
<td>Alkyne</td>
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<td>Areca</td>
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<td>Coca-Cola</td>
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<td>Disney</td>
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<td>DL</td>
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<td>Google</td>
<td>26/43 (60.5%)</td>
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Table 3. Participants who recognized each brand that was inserted in the game, Study One.

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<tr>
<th>Brand</th>
<th>Recognized (Percentage of total participants)</th>
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<td>BMW</td>
<td>8/43 (18.6%)</td>
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<td>McDonalds</td>
<td>9/43 (20.9%)</td>
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<tr>
<td>Samsung</td>
<td>3/43 (7.0%)</td>
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<tr>
<td>Ileum</td>
<td>7/43 (16.3%)</td>
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<tr>
<td>JCN</td>
<td>6/43 (14.0%)</td>
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<tr>
<td>Laird Verbain</td>
<td>6/43 (14.0%)</td>
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Table 4. Participants who falsely recognized each brand that was not inserted in the game, Study One.
Figure 2. Portion of proposed model tested, Study One.
Figure 3. Example of billboard design for fictitious brand, Study One.

Figure 4. Example of billboard design for real brand, Study One.
Figure 5. Example of billboard designs in-game, Study One.
Figure 6. Tested model and path coefficients, Study One, Hypothesis 5.

Figure 7. Tested model and path coefficients, Study One, Hypothesis 6.
Chapter 4: Study Two: Effects of Branded Product Interactivity and Functional Congruity on Accessibility

Study Two investigates attitude accessibility as an outcome of two other commonly used manipulations employed in in-game advertising research: the ability to interact with a branded object, and functional congruity (centrality of the brand to the game action; Lee & Faber, 2007). Prior research on attitude accessibility suggests that direct experience with an attitude object should improve accessibility of an attitude towards that object (Zanna & Fazio, 1981), and the transactive model posits that direct experience with an attitude object should result in greater elaboration, in turn resulting in a more accessible attitude. While there is little research on the interaction with virtual objects that employs implicit measures, advertising research suggests that interaction with a virtual object affects explicitly measured attitudes in a manner similar to that of direct interaction a real object (Li et al., 2002; van Reijmersdal et al, 2010). Therefore, the proposed model of in-game advertising effects claims that interacting with a virtual object will have similar effects on attitude accessibility.

Similarly, when one expects an attitude towards an object to be useful at a later time, that attitude will be more accessible (Fazio, Lenn, & Effrein, 1984; Roskos-Ewoldsen, 1997; Yi, Phelps, & Roskos-Ewoldsen, 1998). The commonly-employed manipulation of functional congruity should influence this expectation of future use, and
will be employed here by affecting whether a branded object (whether interactive or non-interactive) will help a player to complete an in-game task.

**H1:** A placed brand is more likely to be recalled (a) when that brand is presented as an interactive object than as a static placement, and (b) when that brand is presented as functionally congruent rather than functionally incongruent.

**H2:** A placed brand is more likely to be recognized explicitly after exposure (a) when that brand is presented as an interactive object than as a static placement, and (b) when that brand is presented as functionally congruent rather than functionally incongruent.

**H3:** A placed brand is more likely to be recognized implicitly after exposure (a) when that brand is presented as an interactive object than as a static placement, and (b) when that brand is presented as functionally congruent rather than functionally incongruent.

**H4:** Attitude towards a placed brand will be more accessible when that brand is presented as (a) an interactive object rather than as a static placement, and (b) is functionally congruent rather than functionally incongruent.

**H5:** Attitude towards a placed brand will be more positive when that brand is presented as (a) an interactive object rather than as a static placement, and (b) is functionally congruent rather than functionally incongruent.

**H6:** Intent to consume the placed brand’s product will be greater when that brand (a) is presented as an interactive object rather than as a static placement, and (b) is presented as functionally congruent rather than functionally incongruent.
**H7:** Attitude accessibility will mediate the effects of (a) interactivity and (b) congruity on attitude towards the brand.

**H8:** The effect of interactivity on purchase intention towards the target brand will be mediated by (a) attitude accessibility, (b) attitude towards the target brand, and (c) serially by attitude accessibility and attitude towards the target brand.

**H9:** The effect of congruity on purchase intention towards the target brand will be mediated by (a) attitude accessibility, (b) attitude towards the target brand, and (c) serially by attitude accessibility and attitude towards the target brand.

The portions of the proposed model tested in Study Two are diagrammed in Figure 8.

**Method**

The study is a between-subjects 2 (interactive branded object vs. non-interactive brand placement) x 2 (functionally congruent vs. non-functional) design. An additional control condition with no exposure to any brand placement was also included.

**Sample**

196 participants were recruited from undergraduate communication courses at The Ohio State University and offered course credit or extra credit in exchange for their participation. 11 participants from these 200 were rejected: one had significant amounts of data missing, eight were erroneously given the DirectRT task for Study 1 by a research assistant, and two were using smartphones to consult online dictionaries during the word fragment completion task. The resulting sample consisted of 185 participants (age $M =$
20.94, $SD = 4.02$, 57.4% male). 69.2% identified as Caucasian, 11.9% as black, 13.5% as Asian or Pacific Islander, and 5.4% identified as either another unspecified race or did not respond to the item.

*Fallout New Vegas*, as modified by the “Amazon City” mod and further modified using GECK, was again used as the stimulus game for this study. The target brand selected was Faygo, which during pre-testing was found to be the least-recognized real soda brand, while still being more recognized than any of the fake soda brands selected. A brand with moderate recognizability was selected to reduce the likelihood of a floor effect on accessibility, which could cause the effect of experimental exposure to remain undetected.

Interactivity with the Faygo brand was manipulated by placing the brand in the game either as a static billboard with the brand’s stylized logo (non-interactive) or as a soda bottle that can be picked up and used by the player (interactive).

Functional congruity was manipulated differently depending on interactivity condition. In the congruent interactive condition, Faygo soda bottles restored a large portion of the avatar’s health when used. In the incongruent interactive condition, Faygo soda bottles temporarily lowered the avatar’s charisma level (irrelevant to the in-game task). In the congruent noninteractive condition, stimpaks that restored the player’s health were located directly next to a Faygo billboard. In the incongruent noninteractive condition, a Faygo billboard was inserted into the game far away from the health-restoring stimpaks. (Examples of the Faygo brand’s in-game depiction are included in Figures 9-10).
After participants arrived and informed consent was obtained, participants were instructed to play the game for 10 minutes. At the start point, the player’s avatar only had one hit point out of a possible 220. Participants were instructed to search the area for health-restoring items, with specific instructions to check around billboards. After 10 minutes, the researcher recorded each participant’s number of hit points, and then instructed participants to wait quietly for five minutes. Participants were then presented with the implicit cognitive measure, then the implicit attitude measure, and the post-play survey.

Measures

Zero-order correlations for all key variables across groups are represented in Table 5.

Cognitive. Brand recognition was measured implicitly by providing participants with a sheet of paper listing 12 word fragments, each consisting of a five-letter word in which only the first and third letters of each word were presented. Participants were instructed to complete each word fragment with the first five-letter word that came to mind. The fragment that could be completed as the target brand (F _ Y _ _) was presented third in order. Word fragments sheets were coded independently by four coders on seven criteria: 1) total number of completed fragments, 2) whether the third fragment was completed as FAYGO (intercoder reliability $\alpha = .96$), 3) whether the ninth fragment was completed as VEGAS (part of the brand name of the game being played), 4) number of fragments completed with words relating to beverages or drinking (i.e. the behavior one would engage in consuming the target brand), 5) number of fragments completed
with words related to cooking or food (closely related to drinking), and 6) number of fragments completed with words related to health or body parts (the assigned in-game task).

Brand recall was measured by asking participants to list all brand names they could recall seeing while playing the game. This item was coded by one research assistant for whether Faygo was recalled, with any phonetically identical word counted as a success (16.2% yes, 83.8% no across all conditions). After the recall measure, explicit recognition measures consisted of a series of questions asking participants to indicate whether they did or did not encounter a given brand during game play, and to indicate their confidence in their answer on an 11-point scale. The list of brands from Study 1 was used, along with the target brand of Faygo and other real and fictitious soda brands.

Affective. Attitude towards the placed brand was measured implicitly using a reaction-time task similar to that used in Study 1, with the Faygo brand displayed twice during the task. Mean reaction time for the first presentation was 1492.32 ms (SD = 953.61), and for the second exposure was 970.72 ms (SD = 511.76). Various other real and fictitious brands, including soda brands (see Appendix for list) were employed as foils. Group means by condition are listed in Table 6.

Explicit measures of attitude towards the Faygo brand employed the same 12-point, 3-item semantic differential scale as in Study 1 (M = 6.65, SD = 1.35, α = .89).

Conative. Behavioral outcome was measured using the same 7-point, 3-item scale employed in Study 1 (M = 6.19, SD = 2.45, α = .95).
**Perceived game skill.** Participants were asked to rate their proficiency with game controllers on a 7-point scale anchored by “Never used before” and “Highly proficient” (M = 5.11, SD = 2.03).

**Task completion.** Remaining hit points at the end of game play (to a maximum possible of 220, M = 57.49, SD = 82.97) was coded as a measure of how well the participant completed the assigned task, and was used as a covariate in all hypothesis tests. In the incongruent interactive condition (in which using the branded soda bottle did not have a permanent effect), the researcher checked the area containing these items after the participant left the lab and noted whether the participant took the bottles and how many were used. Of the 36 participants in this condition, 11 took the soda bottles, and 7 used at least one bottle.

**Presence.** Presence was measured using the iGroup Spatial Presence Questionnaire in a manner identical to Study 1 (spatial presence subscale M = 4.53, SD = 1.08, α = .72; involvement subscale M = 3.93, SD = 1.13, α = .66; realism subscale M = 3.75, SD = 1.20, α = .76, overall M = 4.12, SD = .91, α = .83).

**Results**

**H1: A placed brand is more likely to be recalled** (a) **when that brand is presented as an interactive object than as a static placement, and (b) when that brand is presented as functionally congruent rather than functionally incongruent.** Hypothesis 1 was tested by binary logistic regression, with free recall of the Faygo brand as the dependent variable, and assignment to condition (coded on three variables:
interactivity, congruity, and an interaction term) as the independent variables. Age, sex, skill with game controllers, and in-game task completion were employed as covariates.

Effects on likelihood of recall were not significant for both interactivity (B = -.676, Wald $\chi^2(1) = .204$, $p = .651$) and congruity (B = .005, Wald $\chi^2(1) = .000$, $p = .997$). The only covariate which significantly predicted free recall was in-game task completion (B = .007, Wald $\chi^2(1) = 6.86$, $p = .009$), indicating that those who were able to restore more of their health were more likely to recall the Faygo brand regardless of condition. Therefore H1a and H1b are rejected.

**H2:** A placed brand is more likely to be recognized explicitly after exposure (a) when that brand is presented as an interactive object than as a static placement, and (b) when that brand is presented as functionally congruent rather than functionally incongruent. Hypothesis 2 was tested by binary logistic regression, with recognition of the Faygo brand as the dependent variable, and assignment to condition (coded on three variables: interactivity, congruity, and an interaction term) as the independent variables. Age, sex, skill with game controllers, in-game task completion, and total number of false alarms reported on the recognition task were employed as covariates.

Effects on likelihood of recognition were not significant for both interactivity (B = -.34, Wald $\chi^2(1) = .09$, $p = .765$) and congruity (B = -.822, Wald $\chi^2(1) = .528$, $p = .468$). The only covariate which significantly predicted likelihood of recognition was total number of false positives (B = .337, Wald $\chi^2(1) = 11.26$, $p = .001$). Therefore H2a and H2b are rejected.
H3: A placed brand is more likely to be recognized implicitly after exposure (a) when that brand is presented as an interactive object than as a static placement, and (b) when that brand is presented as functionally congruent rather than functionally incongruent. Hypothesis 3 was tested by binary logistic regression, with completion of the F_Y_ _ word fragment as “Faygo” as the dependent variable, and assignment to condition (coded on three variables: interactivity, congruity, and an interaction term) as the independent variables. Age, sex, skill with game controllers, and in-game task completion were employed as covariates.

Effects on likelihood of implicit recognition were not significant for both interactivity (B = -.83, Wald $\chi^2(1) = .083, p = .773$) and congruity (B = -1.64, Wald $\chi^2(1) = .274, p = .600$). In-game task completion significantly predicted implicit recognition (B = .012, Wald $\chi^2(1) = 5.14, p = .023$), such that those who performed better on the in-game task were more likely to implicitly recognize the Faygo brand. H3a and H3b are rejected.

**H4: Attitude towards a placed brand will be more accessible when that brand is presented as (a) an interactive object rather than as a static placement, and (b) is functionally congruent rather than functionally incongruent.** Hypothesis 4 was tested by linear regression using the non-transformed reaction time for the first presentation of the Faygo stimulus in the accessibility task as the dependent variable, and assignment to condition (coded on three variables: interactivity, congruity, and an interaction term) as independent variables. Demographic variables, in-game task completion, and level of proficiency with game controllers were used as covariates.
Effects on reaction time were significant for both interactivity \((b = -330.33, t (7) = -2.20, p = .029)\) and congruity \((b = -312.83, t (7) = 2.07, p = .041)\). The interaction term was not significant \((p = .659)\). Effects of all covariates were also not significant.

Both interactivity and congruity significantly contributed to faster reaction times on first presentation of the Faygo stimulus. Therefore, H4a and H4b are both supported.

**H5:** Attitude towards a placed brand will be more positive when that brand is presented as (a) an interactive object rather than as a static placement, and (b) is functionally congruent rather than functionally incongruent. Hypothesis 5 was tested by linear regression using the 3-item scale for attitude towards the Faygo brand as the dependent variable, and assignment to condition (coded on three variables: interactivity, congruity, and an interaction term) as independent variables. Demographic variables, in-game task completion, and level of proficiency with game controllers were used as covariates.

Main effects on attitude towards the brand were insignificant for both interactivity \((b = -1.93, t (7) = -1.46, p = .147)\) and congruity \((b = -1.78, t (7) = -1.36, p = .177)\). Therefore, H5a and H5b are both rejected.

**H6:** Intent to consume the placed brand’s product will be greater when that brand (a) is presented as an interactive object rather than as a static placement, and (b) is presented as functionally congruent rather than functionally incongruent. Hypothesis 5 was tested by linear regression using the 3-item scale for intent to try, buy, and recommend the Faygo brand as the dependent variable, and assignment to condition (coded on three variables: interactivity, congruity, and an interaction term) as
independent variables. Demographic variables, in-game task completion, and level of proficiency with game controllers were used as covariates.

Main effects on behavioral intention were not significant for both interactivity \( (b = -2.10, t(7) = 1.63, p = .105) \) and congruity \( (b = -2.32, t(7) = -1.81, p = .072) \). However, the interaction term was significant \( (b = 1.76, t(7) = 1.77, p = .036) \), indicating greater behavioral intention in the interactive congruent condition (depicted in Figure 11). Therefore, the main effects hypothesized in H6a and H6b are not supported.

**H7: Attitude accessibility will mediate the effects of (a) interactivity and (b) congruity on recognition of the target brand.** Hypothesis 7 was tested via the PROCESS macro (Hayes, 2013) using Model 4 (simple mediation), with explicitly measured recognition that the Faygo brand was displayed in the game as the dependent variable, reaction time to the first Faygo stimulus as the mediating variable, and either (a) interactivity or (b) congruity as the independent variable. Demographic variables, in-game task completion, and skill with game controllers were employed as covariates.

Consistent with the findings for Hypothesis 2a, the direct effect of the interactivity manipulation on likelihood to recognize Faygo in the explicit recognition task was not significant \( (b = .04, p = .906) \). The 95% confidence interval for the indirect effect via attitude accessibility included 0 \((-0.02, 95\% CI: -0.23 to .11)\). Therefore, Hypothesis 7a is rejected.

Also consistent with the findings for Hypothesis 2b, the direct effect of the congruity manipulation on likelihood to recognize Faygo in the explicit recognition task was not significant \( (b = .04, p = .906) \). The 95% confidence interval for the indirect
effect via attitude accessibility included 0 (-.02, 95% CI: -.23 to .11). Therefore, Hypothesis 7b is rejected.

**H8:** The effect of interactivity on purchase intention towards the target brand will be mediated by (a) attitude accessibility, (b) attitude towards the target brand, and (c) serially by attitude accessibility and attitude towards the target brand.

Hypothesis 8 was tested via the PROCESS macro using Model 6 (serial mediation with two mediators), with the scale variable for behavioral intention towards the Faygo products as the dependent variable, reaction time to the first Faygo stimulus and attitude towards Faygo as the mediating variables, and assignment to an interactivity condition as the independent variable. Demographic variables, in-game task completion, and skill with game controllers were employed as covariates.

The tested model and path coefficients are depicted in Figure 12. The only significant paths in the tested model were from interactivity to reaction time ($b = -336.09$ ms, $t(7) = -2.09, p = .038$) and from explicitly measured attitude to behavioral intention ($b = .87, t (7) = 18.02, p < .001$). The 95% confidence intervals for all indirect effects included 0. Therefore Hypotheses 8a-c are rejected.

**H9:** The effect of congruity on purchase intention towards the target brand will be mediated by (a) attitude accessibility, (b) attitude towards the target brand, and (c) serially by attitude accessibility and attitude towards the target brand.

Hypothesis 9 was tested via the PROCESS macro using Model 6 (serial mediation with two mediators), with the scale variable for behavioral intention towards the Faygo
products as the dependent variable, reaction time to the first Faygo stimulus and attitude towards Faygo as the mediating variables, and assignment to a congruity condition as the independent variable. Demographic variables, in-game task completion, and skill with game controllers were employed as covariates.

The tested model and path coefficients are depicted in Figure 13. The only significant paths in the tested model were from congruity to reaction time ($b = -335.20$ ms, $t(7) = -2.08, p = .039$) and from explicitly measured attitude to behavioral intention ($b = .88, t(7) = 18.29, p < .001$). The total indirect effect of congruity on purchase intention as mediated by attitude accessibility did not include 0 ($b = .05, 95\% CI: .001$ to .201). The 95\% confidence interval for the indirect effect as mediated by attitude towards the brand included 0 ($b = .35, 95\% CI: -.303$ to 1.11), as did the serial mediation effect ($b = -.046, 95\% CI: -.267$ to .115). Therefore Hypothesis 9a is supported, and Hypotheses 9b and 8c are rejected.

Discussion

The primary goal of Study Two was to explore the outcomes of manipulating functional congruity (the relevance of the brand placement to the in-game action) and interactivity with the branded object. These manipulations were selected not only for their common use in existing in-game advertising research, but also for their expected effects on attitude accessibility. The manipulation of functional congruity maps onto the expectation of future use identified in the transactive model (Roskos-Ewoldsen, 1997), whereas the manipulation of interactivity should effect elaboration in a manner similar to that of direct experience with the branded object. The effects of these manipulations on
standard outcomes of recall, recognition, attitude towards the placed brand, and behavioral intention were also tested.

Both manipulations significantly influenced the accessibility of participants’ attitudes towards Faygo, the placed brand. Participants who had the opportunity to interact with Faygo soda bottles had more accessible attitudes than those who simply encountered a Faygo billboard. Participants for whom the Faygo brand was congruent with the game action (either by directly using the soda bottles to restore their health, or by searching around the Faygo billboard to find other health-restoring items) also had more accessible attitudes towards Faygo than those for whom the brand was not related to their in-game task. However, there was no interaction effect between congruity and interactivity. This lack of an interaction may be due to congruity and interactivity influencing accessibility through different processes as described by the transactive model. Congruity may influence attitude accessibility via altering the expectation that an attitude will be of use, whereas interactivity may primarily affect elaboration on the placed brand. Further research may be able to combine manipulations that would plausibly affect the same processes to find such an interaction (such as, for example, crossing interactivity with real and fictitious brands may cause an interaction if both affect elaboration.)

The direct effects of the congruity and interactivity manipulations on the other dependent variables were not significant, with the exception of an interaction effect such that those in the interactive/congruent condition reported greater behavioral intent to consume Faygo. The mediating effects posited by the proposed model were largely
unsupported, with the exception of attitude accessibility mediating the relationship between product congruity and behavioral intention.

Limitations

Given the various manipulations of congruity and interactivity in this study, ensuring that participants actually encountered the brand placement proved difficult. As recording and reviewing 33 hours’ worth of participant gameplay was impractical both for technical reasons and for time constraints, the measure of how much of a participant’s health was restored at the end of 10 minutes of game play served as a proxy for the likelihood of exposure to the brand. In the congruent conditions, the Faygo placement was either directly on the item that restored the participant’s health (interactive/congruent condition) or the items were sitting directly underneath a Faygo billboard (noninteractive/congruent condition). Additionally, the Faygo billboard in the noninteractive/congruent condition was in the player’s field of view, albeit far in the distance, immediately upon the beginning of game play. Therefore, the health measure should serve as a fairly reliable measure of whether the participant had at least some exposure to the brand name in these two conditions.

Determining brand exposure for the incongruent conditions required a different strategy, as exposure to the brand was necessarily not related to task completion. For the interactive/noncongruent condition, research assistants were shown the location of the Faygo bottles and asked to code whether the bottles were taken from the box, and how many of the four bottles participants had used. For the noninteractive/noncongruent
condition, there was little way to verify whether participants had seen the billboard outside of the self-report measures employed.

A filter variable was created in SPSS to filter out participants who either did not successfully restore any of their health, or who did not take any of the Faygo bottles in the interactive/noncongruent condition. This served as a fairly conservative estimate of those who were exposed to the brand (as in the noninteractive conditions, participants may have seen the Faygo billboard without finding health items). All hypothesis tests were repeated on this subset of the sample (76 participants total) and outcomes were similar to those reported on the entire sample.

The game environment as created only had the Faygo brand placement in a single location (either a single box or billboard). Given the difficulty in determining whether brand exposure occurred with such games, increasing the number of brand placements in future studies should improve the likelihood of brand exposure, as well as improve recall and recognition.

The manipulation of functional congruity used in the noninteractive conditions (i.e. placing the billboard very close to the health-restoring items to serve as a kind of “landmark”, or placing the billboard very far from the health-restoring items) was also somewhat weak. Even despite instructions to search around signs and billboards for health-restoring items, participants may not have considered the brands on nearby billboards to be relevant to the in-game task they were performing. A stronger congruity manipulation may have elicited stronger effects on the explicitly measured dependent variables.
Given the use of only one target brand in this study, the recognition measure was less robust than that of Study One, and therefore had a greater potential for response bias. Future studies should employ multiple target brands per study to help isolate these cases.

Additional limitations common to both studies are discussed in Chapter 5.
Table 5. Zero-order correlations for key variables, Study Two.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Group mean in ms (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive congruent</td>
<td>1133.27 (450.22)</td>
</tr>
<tr>
<td>Noninteractive congruent</td>
<td>1380.87 (707.64)</td>
</tr>
<tr>
<td>Interactive incongruent</td>
<td>1380.31 (541.11)</td>
</tr>
<tr>
<td>Noninteractive incongruent</td>
<td>1742.42 (1366.02)</td>
</tr>
<tr>
<td>Control</td>
<td>1708.58 (1085.95)</td>
</tr>
</tbody>
</table>

Table 6. Group means for reaction time to first Faygo stimulus, Study Two.
Figure 8. Tested portion of the proposed model, Study Two.
Figure 9. Example of in-game brand depiction for interactive conditions, Study Two.

Figure 10. Example of in-game brand depiction for noninteractive conditions, Study Two.
Figure 11. Effects of interactivity and congruity on intent to consume the placed brand, Study Two, Hypothesis 6.
Figure 12. Tested model and path coefficients, Study Two, Hypothesis 8.

Figure 13. Tested model and path coefficients, Study Two, Hypothesis 9.
Chapter 5: General Discussion

Taken together, these two studies served as initial tests of a model of in-game advertising effects that integrates existing research in the field with the transactive model of attitude accessibility. The effects of various manipulations on attitude accessibility and other common explicitly-measured outcomes of advertising were tested.

Prior familiarity with the brand, congruity of the brand with in-game action, and ability to interact with a branded in-game object all significantly increased attitude accessibility. These findings are in keeping with the transactive model and prior research in other advertising subfields. Attitude accessibility also served to mediate some of the relationships between these manipulations and other advertising outcomes, specifically the relationships between brand familiarity and attitude towards the brand, and between brand congruity and purchase intention.

Other mediating effects of attitude accessibility as posited by the proposed model were not supported. In particular, there were no observed relationships between attitude accessibility and levels of recognition or recall in either of the presented studies, and the only manipulation to affect recognition at all was brand reality. These findings are counter to prior research suggesting that accessible attitudes elicit an orienting effect, drawing the individual’s attention to that attitude object. The brand placements employed
in both studies, and the measures used to test recognition, were largely verbal in nature. Even the interactive conditions involving soda bottles presented the objects as items in a menu with a small generic soda icon, rather than as a three-dimensional object which could be moved around the virtual space. Most of the foundational studies on the orienting effects of attitude accessibility relied on pictorial representations of objects (Roskos-Ewoldsen, 1997), therefore it is possible that textual representations of brand names may not trigger this orienting effect. Further research should continue to probe how these manipulations affect recognition and whether attitude accessibility may contribute, but the evidence in the two present studies suggests that the cognitive process by which these brands are recognized is uninfluenced by attitude accessibility.

No direct effects of the brand manipulations on conative outcomes were included in the original model; all effects were originally proposed to be mediated by attitude accessibility, attitude towards the brand, and brand recognition. While a main effect of brand reality on purchase intention was found in Study One, this effect was also found to be completely mediated by attitude towards the brand. Limited support for attitude accessibility mediating the effect of brand congruity on purchase intention was also found; while the individual path coefficient was not significant, there was a significant overall indirect effect. This evidence suggests that placing purchase intention at the end point of a mediated effect was proper.

Limitations
A significant limitation of both studies was the design challenge in using an open-world video game as the stimulus. Many prior studies of in-game placement have preferred the use of racing games (Nelson et al., 2006; Dickinson, Hanus, & Fox, 2013; Dickinson, Hanus, & Fox, 2014) or sports games (Yang et al., 2006) for their relatively small environments that players experience in a predictable manner, thereby effectively ensuring that participants are at least exposed to the brand placement. Creating a study using a game designed to offer players a massive, freely-traversable virtual space offers a more strenuous test of the model, in that players are somewhat less forced into exposure to the brand placements. However, certain trade-offs needed to be made both in terms of tailoring the game environment to research needs, and establishing a method to determine the likelihood of whether exposure to a brand actually occurred. Invisible barriers were placed around the game area to restrict participants from wandering too far away from the brand placements, which achieved the desired effect but may have led to frustration for some players who were unsure why they were not able to progress in a certain direction.

The “Amazon City” mod employed as the basis for both studies featured several stylized signs and storefronts for fictional brands that appeared in the game. This environment helped the brand placements seem more congruous with the surrounding area. However, it also may have provided some participants with too many potential stimuli to draw from during the free recall task, as many participants listed some of the “clutter” signs that were introduced by the mod rather than the target brand placements inserted for the study.
Also, using an existing environment rather than creating one from the ground up required removal of all non-player characters that could attack the player’s avatar. The interface provided by the mod tools does not allow for easy location and removal of NPCs, and despite numerous attempts to ensure that all NPCs had been removed from the environment, some participants still reported being attacked by creatures. The presence of aggressive characters in the game could have potentially influenced outcomes, particularly recall (Yoo & Pena, 2011). Future studies should use new, hand-created environments to ensure that no unwanted NPCs are in the environment.

The combinations of manipulations used in these two studies may have not been ideal. Given the difficulty in adequately crossing manipulations of congruity and interactivity, an alternate design could have employed interactivity for Study One while holding congruity constant, and crossing congruity with reality while holding interactivity constant for Study Two. Under this alternate design, Study One would employ a manipulation of interactivity similar to that used in the incongruent conditions: some brands would be encountered on billboards, others would be encountered only as irrelevant but interactive objects. Only real brands would be employed for this alternate Study One after being pretested to establish similar levels of recognizability and attitude towards the brand. Employing a reaction-time task at both times would also help isolate the effects of brand exposure in the virtual environment on attitude accessibility.

Study 2 would employ the same congruity manipulation as presented for the interactive conditions here (with soda bottles either restoring health or having an
irrelevant effect), while changing the brand between Faygo and a fictitious brand. More advanced modification tools could also change the “skin” for these soda bottles to display the logo of its respective brand, offering both a pictorial representation of the object closer to a real-world soda bottle, and reinforcing the interactivity manipulation by having the soda bottle present in the virtual space rather than as an item on a menu.

This alternate design would have several potential benefits. The explanatory text that was required to convey product type for fictitious brands would not be required, as only one fictitious brand would be used, and its product type would be clearly indicated as soda in-game. Congruity would be communicated via gameplay mechanics (the effect of drinking the soda) rather than via explicating text. Also, the nature of the brand placements employed in Study 2 would be more similar across conditions, with all brand placements appearing as interactive branded objects. The congruity manipulation would also be stronger than that employed for the noninteractive conditions in Study 2.
Chapter 6: Conclusion

The proposed model of in-game advertising effects adapted the transactive model of attitude accessibility as an explanatory mechanism for the effects of disparate manipulations such as brand reality, functional congruity, and interactivity with a branded object, and employed two studies as the beginning of a research program to explore these relationships. Evidence suggested these manipulations all directly affected the accessibility of an individual’s attitude towards the placed brand, and also that attitude accessibility mediates some of the effects of these manipulations on attitude towards the brand and purchase intention. However, the model’s prediction that attitude accessibility would also mediate the effects of these manipulations on brand recognition were not supported, suggesting the need for further research to understand the causal mechanisms by which recognition of brand exposures during gameplay can be influenced.
References


Appendix A: Study 1 Materials

Proposed List of Real & Fictitious Brands

The real brands included on the following list are the top 20 worldwide brands by market capitalization as listed by Interbrand (2014). Fictitious brands are words selected from a dictionary with the same number of letters and same initial letter as the real brands. For real brands better known by their initials, a string of letters of identical length was used that was verified to not be in use as a prominent brand name.
<table>
<thead>
<tr>
<th>Real Brands</th>
<th>Fictitious Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple (Computer)</td>
<td>Areca (Cars)</td>
</tr>
<tr>
<td>Google (Search engine)</td>
<td>Gimbal (Computers)</td>
</tr>
<tr>
<td>Coca-Cola (Soda)</td>
<td>Cero-Clew (Computer)</td>
</tr>
<tr>
<td>IBM (Computer)</td>
<td>JCN (Computers)</td>
</tr>
<tr>
<td>Microsoft (Computer)</td>
<td>Marquetry (Search Engine)</td>
</tr>
<tr>
<td>General Electric (Appliances)</td>
<td>Gemmate Einkorns (Electronics)</td>
</tr>
<tr>
<td>Samsung (Electronics)</td>
<td>Stenoky (Appliances)</td>
</tr>
<tr>
<td>Toyota (Cars)</td>
<td>Toneme (Cars)</td>
</tr>
<tr>
<td>McDonalds (Fast food)</td>
<td>Manginess</td>
</tr>
<tr>
<td>Mercedes-Benz (Cars)</td>
<td>Mortiser-Bisk (Fashion)</td>
</tr>
<tr>
<td>BMW (Cars)</td>
<td>ALV (Cars)</td>
</tr>
<tr>
<td>Intel (Electronics)</td>
<td>Ileum (Entertainment)</td>
</tr>
<tr>
<td>Disney (Entertainment)</td>
<td>Dolman (Fast food)</td>
</tr>
<tr>
<td>Cisco (Electronics)</td>
<td>Coapt (Electronics)</td>
</tr>
<tr>
<td>Amazon (Retailer)</td>
<td>Alkyne (Electronics)</td>
</tr>
<tr>
<td>Oracle (Software)</td>
<td>Ochred (Computers)</td>
</tr>
<tr>
<td>HP (Computer)</td>
<td>DL (Software)</td>
</tr>
<tr>
<td>Gillette (Razors)</td>
<td>Goliards (Retailer)</td>
</tr>
<tr>
<td>Louis Vuitton (Fashion)</td>
<td>Laird Verbain (Fashion)</td>
</tr>
<tr>
<td>Honda (Cars)</td>
<td>Hotch (Cars)</td>
</tr>
</tbody>
</table>

Table 7. Prospective list of real and fictitious brands, Study 1.
All brands were pretested by a sample of 128 undergraduate students in communication courses at The Ohio State University and were awarded extra credit or course credit in exchange for participation. Each brand in the above list was measured on five items: plausibility (“This name sounds like it could be the name of a real company”), likeability (“I like this brand name”), similarity to an existing brand name (“I am aware of a company with this name, or one similar to it”), prior brand familiarity (“I am familiar with this brand’s products”) and likelihood of purchase (“Assuming this is a real brand, I would purchase a product from this company within the next year.”) All items were on a 12-point Likert scale.

Real brands were favored when scoring high on all 5 measures. Fictitious brands were favored when scoring high on plausibility and likelihood to purchase, and when low on similarity to an existing brand name and prior brand familiarity. Three real and three fictitious brands were selected.

The following six brands were selected. Means for each item are listed.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Plausibility</th>
<th>Likeability</th>
<th>Similarity</th>
<th>Familiarity</th>
<th>Purchase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google</td>
<td>11.65</td>
<td>11.53</td>
<td>11.77</td>
<td>11.67</td>
<td>10.43</td>
</tr>
<tr>
<td>Coca-Cola</td>
<td>11.60</td>
<td>11.07</td>
<td>11.75</td>
<td>11.70</td>
<td>10.17</td>
</tr>
<tr>
<td>Disney</td>
<td>11.62</td>
<td>11.41</td>
<td>11.71</td>
<td>11.55</td>
<td>10.48</td>
</tr>
<tr>
<td>Areca</td>
<td>6.57</td>
<td>5.36</td>
<td>3.48</td>
<td>3.11</td>
<td>3.30</td>
</tr>
<tr>
<td>Alkyne</td>
<td>6.79</td>
<td>5.74</td>
<td>3.31</td>
<td>3.09</td>
<td>4.09</td>
</tr>
<tr>
<td>DL</td>
<td>7.13</td>
<td>5.54</td>
<td>3.80</td>
<td>3.04</td>
<td>3.88</td>
</tr>
</tbody>
</table>

Table 8. Real and fictitious brands selected for Study 1.
Time 1: Reaction Time Task

In the following task, you will make judgments of a number of items. We are interested in your judgments of these items. Because the judgments will involve your preferences, there are no correct answers to any of these judgments.

Please press the space bar to continue.

(Next screen)

We are interested in whether you LIKE or DISLIKE various brands. For example, if you were presented with the brand TOYOTA and you like Toyota, you would indicate that you like Toyota by pressing the 'L' key.

Please press the 'L' key to continue.

(Next screen)

However, if you do not like Toyota or you think Toyota is bad, you should press the ‘D’ key.

Please press the ‘D’ key to continue.

(Next screen)

All this task involves is this simple like/dislike judgment. For each item you are presented with, you should indicate whether you think the item is something you LIKE (press the 'L' key) or something you DISLIKE (press the 'D' key). In addition, we are interested in how quickly you can make these judgments. So you should try to indicate whether you think the item is something you like or dislike as quickly as possible. But it
is also important that you respond as accurately as possible. Please do not go so fast that you make a lot of mistakes.

Please press the space bar to continue.

(Next screen)

In order to respond as quickly as possible, you should place the index finger of your left hand on the 'D' key and the index finger of your right hand on the 'L' key and keep your fingers on these keys during the entire experiment.

Again, remember that it is important to respond as QUICKLY as possible, but you also need to be as ACCURATE as possible.

Please press the space bar to continue.

(Next screen)

We have sampled a broad selection of items. As a result, you may not be familiar with all the items. If the name of an item appears that you are not familiar with, you should press the spacebar rather than the 'L' or 'D' keys.

Please press the space bar to continue

(Next screen)

Before each item you will judge is presented on the computer screen, the following message will be displayed:

GET READY!

Immediately after this display disappears from the screen, a word or short phrase will appear. You should indicate whether you like (press the 'L' key) or dislike (press the
'D' key) the item as quickly as possible (however, do not respond so quickly that you make a lot of mistakes).

After you make your judgment, the word will disappear. Then, after a short delay, the ‘GET READY!' signal will appear on the screen again, indicating that the next trial is about to start.

To continue the instructions, please press the space bar.

(Next screen)

If you have any questions, please ask the experimenter. Otherwise, you are ready to begin the experiment.

When you press the space bar you will have some practice trials to familiarize you with the 'LIKE' and 'DISLIKE' judgment task. After these practice trials, the experiment will begin.

Please press the space bar when you are ready to continue.

(Next screen)

There are two things we would like you to remember as you complete this task. First, and above all, be accurate. Don't be in such a hurry to respond that you regret your decision. Second, while being accurate, try to respond as quickly as possible. So, you should try to maximize both the speed and accuracy of your responses.

Please press the spacebar to start the practice trials.

-----------

Practice Block 1
1000 ms pause before first trial

“GET READY!” signal for 450 ms

practice item is presented until participant responds (either “Please Press the LIKE Key” or “Please Press the DISLIKE Key”) Each option is presented 12 times in a random order for a total of 24 practice trials.

1500 ms pause after participant presses response key and the next “GET READY!” signal

------------------------

You have finished the first set of practice trials.

If you have any questions, please ask the experimenter.

Otherwise, you may continue the practice trials whenever you are ready by pressing the spacebar.

------------------------

Practice Block 2

1000 ms pause before first trial

“GET READY!” signal for 450 ms

practice item is presented until participant responds (either “Please Press the LIKE Key” or “Please Press the DISLIKE Key”) Each option is presented 12 times in a random order for a total of 24 practice trials.

1500 ms pause after participant presses response key and the next “GET READY!” signal
You have finished the practice trials. If you have any questions, please ask the experimenter.

Otherwise, you may continue onto the critical items whenever you are ready by pressing the spacebar.

Practice Block 3

1000 ms pause before first trial

“GET READY!” signal for 450 ms

practice item is presented until participant responds (24 items in appendix A)

1500 ms pause after participant presses response key and the next “GET READY!” signal

You have finished one block of trials. If you have any questions, please ask the experimenter.

Otherwise, you are ready to continue onto the experimental trials whenever you are ready by pressing the spacebar.

Block 4: Critical items

1000 ms pause before first trial

“GET READY!” signal for 450 ms
practice item is presented until participant responds (24 items in appendix B)
1500 ms pause after participant presses response key and the next “GET READY!”
signal

Time 2: Pre-Game Instructions to Participant

“Today you will be playing a game called *Fallout New Vegas* on the computer. Let me show you the controls for the game. (while demonstrating each control to the participant)

The left thumbstick moves your character forward, backward, left, and right. The right thumbstick changes the direction you’re facing in. When your crosshairs in the center of the screen are on an item you can interact with, like a box, you can push the A button to open the box and the A button again to take everything in the box.

What we’re going to ask you to do for the next 10 minutes is explore this small town and look for money. We’ve scattered some metal boxes around the area. Some of them may contain money, some of them may contain other items. I’ll come back in about 10 minutes to see how much money you’ve collected and move you on to the next phase of the study. You can go ahead and put on the headphones so you can have some sound while you’re playing the game.”

Time 2: Cognitive Outcomes

Recall

While you were playing the game, you may have seen certain brands of products represented in the game. These might include (but are not limited to) items on billboards
you passed, or branded objects you may have seen in the environment. Please list any brands you remember seeing during your playing of the game. Take some time to try to recall as many as you possibly can. Please type them in separated by commas (e.g. Brand A, Brand B, Brand C, etc...)

**Recognition**

We will now present you with a series of brands and ask whether these brands appeared in the game. Select whether the brand appeared or did not appear in the game. You will also be asked how confident you are in your judgment. Select a number from 0 (not at all confident) to 10 (absolutely confident) for each brand. (Following two items are repeated for each brand that was included in Time 1 and included in the game)

*Coca-Cola* (choose one):

<table>
<thead>
<tr>
<th></th>
<th>Appeared</th>
<th>Did Not Appear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not At All Confident</td>
<td>Absolutely Confident</td>
<td></td>
</tr>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10 11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Time 2: Affective & Conative Outcomes**

We will now present you with some brands and ask you to several judgments about each brand. Please select the option that best describes your judgment of the brand. (Following items are repeated for each brand)
I would recommend Coca-Cola’s products to my friends.

Strongly Disagree
Agree

I would try Coca-Cola’s products.

Strongly Disagree
Agree

I would buy Coca-Cola’s products.

Strongly Disagree
Agree

Igroup Presence Questionnaire

(All items are 7 pt Likert-type items)

When I was playing the game, I had a sense of the game world continuing behind me.

When I was playing the game, I had the sense of seeing only pictures.

When I was playing the game, I had the sense of being in the virtual space of the game.
When I was playing the game, I had the sense that I was acting within the virtual space of the game.

When I was playing the game, I felt that I was present in the virtual space of the game.

When I was playing the game, I was aware of sights and sounds in the real world.

When I was playing the game, I was aware of my real environment.

When I was playing the game, I paid attention to the real environment.

When I was playing the game, I was captivated by the virtual environment.

The virtual environment of the game seemed real when compared to the real world.

I experienced the virtual environment of the game in the same way I would experience the real world.

The virtual environment of the game seemed real when compared to a world I could imagine.

When I was playing the game, I had the sense of being in a particular place.
Appendix B: Study 2 Materials

Pre-game Instructions to Participant

“Today you will be playing a game called *Fallout New Vegas* on the computer. Let me show you the controls for the game. (while demonstrating each control to the participant)

The left thumbstick moves your character forward, backward, left, and right. The right thumbstick changes the direction you’re facing in. When your crosshairs in the center of the screen are on an item you can interact with, like a box, you can push the A button to open the box and the A button again to take everything in the box.

That’s important, because as you can see here (point at the health meter) you only have 1 hit point, so you’re very badly injured. What we’re going to ask you to do for the next ten minutes is explore this small town and look for items that will restore your health. We’ve scattered some metal boxes around the area. Some of them may have items that restore your health, some of them may have items with other effects, some of them may have money. If you find an item that you want to use, press the B button to bring up your Aid menu. You’ll see the items listed here on the screen. You can press up or down on the directional pad to select an item and then the A button to use it.

(While handing controller to the participant) ”In particular you’ll want to look around signs and billboards for those metal objects. I’ll check back in 10 minutes to see
how much of your health has restored. You can go ahead and put on the headphones so you can have some sound while you’re playing the game.”

List of Brands

The following brand names were employed for the implicit and explicit attitude measures, and the explicit recognition measure, in Study Two. This list uses many of the same fictitious and real brands as Study One, with two of the real brands from Study One (BMW & McDonalds) replaced by two soda brands: Faygo (the target brand) and Dr Pepper.

Google
Disney
Coca-Cola
Faygo
Dr Pepper
Samsung
Alkyne
DL
Areca
Ileum
JCN
Laird Verbain
Implicit Recognition Task

You will now be presented with a series of words. However, some of the letters in each word will be missing. As quickly as possible, write in the letters necessary to complete the word. There may be more than one way to fill in the blanks to make a word. If so, complete the word in the first way that comes to your mind.

S _ D _ _
B _ A _ _
F _ Y _ _
C _ A _ _
G _ I _ _
L _ R _ _
S _ R _ _
R _ A _ _
V _ G _ _
W _ A _ _
D _ I _ _
H _ A _ _

Explicit Recall Task
While you were playing the game, you may have seen certain brands of products represented in the game. These might include (but are not limited to) items on billboards you passed, or branded objects you may have seen in the environment. Please list any brands you remember seeing during your playing of the game. Take some time to try to recall as many as you possibly can. Please type them in separated by commas (e.g. Brand A, Brand B, Brand C, etc...)

Explicit Recognition Task

We will now present you with a series of brands and ask whether these brands appeared in the game. Select whether the brand appeared or did not appear in the game. You will also be asked how confident you are in your judgment. Select a number from 0 (not at all confident) to 10 (absolutely confident) for each brand.

(Following two items are repeated for each brand)

_Faygo_ (choose one):

<table>
<thead>
<tr>
<th>Appeared</th>
<th>Did Not Appear</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Not At All Confident</th>
<th>Absolutely Confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Explicit Affective Task

We will now present you with some brands and ask you to several judgments about each brand. Please select the option that best describes your judgment of the brand.
(Following is repeated for each brand)

**Fanta**

<table>
<thead>
<tr>
<th>Bad</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>_</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>Useless</td>
</tr>
<tr>
<td>Unfavorable</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>Favorable</td>
</tr>
</tbody>
</table>