How Avatar Customizability Affects Children’s Arousal and Subjective Presence During Junk Food–Sponsored Online Video Games

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Abstract

The purpose of this study was to determine how children cognitively and emotionally process interactive marketing of snack food products in advergames. Children (N = 30) aged 10 to 12 were asked to play advergames with (a) avatars that were assigned to them, (b) avatars chosen from a pool, and (c) self-designed avatars. The children’s skin conductance levels were collected during play. After gameplay, at each customization level, self-reported presence was collected. The results of this study indicate that customization of game avatars can affect both subjective feelings of presence and psychophysiological indicators of emotion during gameplay, which may make the gameplay experience more enjoyable. This may have implications for game sponsors and producers. Self-reported presence had no effect on psychophysiological indicators of emotion during gameplay. Implications of this finding and limitations of this study are discussed.

Introduction

Advergaming is a growing form of interactive media marketing, with major snack food producers such as Nabisco and General Mills producing advergames targeting children.¹⁻³ Advergames, or online games with branded content, are a distinct form of online gaming in that they are completely advertiser sponsored and produced.³ While the use of advergames to target children continues to increase,² little is known about their effects. The immersive nature of advergames could make their persuasive impact different from traditional advertisements through a psychological state known as presence. This study provides an initial investigation into the processing and effects of advergame play on children.

Much effort has been devoted to making videogames more immersive.⁴ One way of accomplishing this is through customization. Video games are becoming increasingly customizable, especially in terms of avatar customization.⁵ The degree to which advergame players feel that their avatars accurately represent them may be important in determining and explaining the emotional experience elicited by the advergame. Because this experience may be even more compelling for younger children who are already more susceptible to persuasion,⁶⁻⁷ it makes sense to study customization and presence as factors affecting the persuasive impact of advergames on children.

Avatar relationships and customization

Avatars, or representations of people in virtual environments, are under the direct control of human beings in terms of design and movement.⁸ It has been argued that when an avatar is controlled by a human being, three “bodies” are present: the objective body, or the physical, observable body of the user; the virtual body, or the representation of the user inside the virtual environment, and the body schema, or the user’s mental representation of his or her body.⁹ In highly immersive environments, such as virtual reality, the virtual body can affect the body schema. Biocca argues that these connections make the design of an avatar very important.⁹ Research has also identified effects of avatar design on social behavior in online environments.¹⁰ The findings of such studies suggest that avatar customization options may affect users’ mental representations of their bodies as well as their behavior.

Both the potential effectiveness of advergaming and the importance of avatar customization seem to have been noticed by the snack food industry. A recent overview of snack food Web sites found that almost three quarters of these sites employed advergames, and 39% of the advergames studied gave players customization options.² One possible explanation for this movement is psychological in nature. A large body of findings suggests that giving individuals choices

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leads not only to better performance and more intrinsic motivation when performing tasks but also to more overall satisfaction. These findings relate self-efficacy and a sense of control to more motivation and more persistent efforts to succeed, which in turn lead to better performance in the task at hand.\textsuperscript{11,12} In fact, even trivial choices and the perception of choice are enough to elicit these reactions.\textsuperscript{11,14}

The effects of choice on performance are evident in children as well. Cordova and Lepper found that children given more choices about their representation in a learning-game environment exhibited more intrinsic motivation, more enjoyment, and more learning.\textsuperscript{13} This finding was replicated for Anglo-American children in a cross-cultural study, which suggests that choices about self-representation are important in ensuring high levels of enjoyment, intrinsic motivation, and learning in children.\textsuperscript{12} In non-learning-oriented videogames, this also seems to be the case. When a participant was offered a choice of avatar, in a sense gaining “ownership” of the avatar, arousal, presence, and identification were higher for third-person point-of-view games (games in which the player can see the avatar) than they were for first-person point-of-view games.\textsuperscript{5}

Given these findings, allowing individuals more choices concerning their avatars should increase their feelings of identification with the avatars. Identification has been defined as “a process that culminates in a cognitive and emotional state in which the audience member is aware of him- or herself as an audience member, but rather imagines being one of the characters” in the game.\textsuperscript{15} Further, if users identify with an avatar, salient characteristics of that avatar may integrate into the user’s idea of self during gameplay.\textsuperscript{16} Identification is useful in this discussion in terms of choice of avatar but is less useful in games where more highly customizable avatar options are available. Research shows that giving individuals more choices concerning their avatars will likely lead these individuals to identify more with their avatars during gameplay.\textsuperscript{5} However, in more customizable games, players have the option of building an avatar by selecting several different attributes (e.g., gender, body type, skin color). Should a player design an avatar to look like himself or herself, the process may deal less with identifying with the avatar and more with projecting ideas of the self onto the avatar. Cohen notes that identification is “a response to communication by others that is marked by internalizing a point of view rather than a process of projecting one’s own identity onto someone or something else.”\textsuperscript{13} In recalling the previous discussion of embodiment, the avatar is the virtual body, or the representation of oneself in a virtual world.\textsuperscript{9} When a user is embodied in an avatar, the user’s own mental model of his or her body is altered, even if only transiently.\textsuperscript{9} Taylor argues that “through avatars, users embody themselves and make real their engagement with a virtual world.”\textsuperscript{17} Thus, if a user is given a choice of avatar, his or her idea of self is altered by adopting characteristics of the avatar, and if the user is given the option of building an avatar to represent himself or herself, the experience may be made more real and have an effect on the user’s own mental representation of self. Either case is likely to strengthen the relationship of an individual with an avatar, but it is likely that those individuals given the opportunity to project their own identities onto the avatar will be more involved in the game than are those who merely choose an avatar.

If customization options help players interact with the game more fully by enabling them to represent themselves in the game environment, certain physiological and psychological effects may also occur. Because advergames capitalize on the association of entertainment with the brand,\textsuperscript{1,3} it makes sense to also define advergames as intending to capitalize on emotional, arousing experiences with the brand. In order to examine children’s emotional experiences with advergames, this study employed a dimensional view of emotion. The dimensional view of emotion posits that emotions contain two underlying dimensions: hedonic valence and arousal.\textsuperscript{18–19} Arousal ranges from bored or relaxed to excited or aroused, and valence ranges from highly positive to highly negative.\textsuperscript{19} Measurement of emotion is difficult because it occurs in a variety of responses ranging from behavioral to physiological.\textsuperscript{20} Among physiological measures, facial electromyography has been used to measure valence, and skin conductance has been used to measure arousal.\textsuperscript{21}

Skin conductance is a measurement of electrodermal activity indicating sympathetic nervous system activation.\textsuperscript{22–23} With an increase in sympathetic nervous system activation as an operational definition of arousal, skin conductance can be an excellent measure of arousal.\textsuperscript{23} Studies have shown that self-reported emotional arousal and skin conductance correlate well across valence level.\textsuperscript{19} Tonic, or long-term, averages of skin conductance show gain or loss in emotional arousal over time, and event-specific phasic, or short-term, skin conductance responses show emotional arousal to a specific stimulus.\textsuperscript{22} As Lim showed, the provision of avatar choice increased self-reported feelings of presence as well as physiological arousal.\textsuperscript{5} Thus, as avatar customization options increase within an advergame, a greater overall level of physiological arousal is expected.

\textbf{H1: Individuals given more avatar customization options within the advergames will exhibit a skin conductance level that is greater over time than will individuals given fewer customization options.}

If individuals do exhibit greater skin conductance levels across gameplay when using more customizable avatars, it is crucial to identify the psychological processes through which these physiological responses are occurring. Embodying an avatar within the virtual space of a game may bring about a psychological state known as presence, a feeling of being part of a mediated message.

\textbf{Feelings of presence in media}

In a review of the literature related to presence, Lombard and Ditton identified six conceptualizations that are central to the explication of presence: social richness, realism, transportation, immersion, the perception of media personalities as social actors, and media as social beings.\textsuperscript{24} These six conceptualizations of presence can be divided into two main categories: physical and social. Physical presence refers to feeling as though the medium is transcended, and social presence is a feeling of social interaction.\textsuperscript{25–27} A more recent review of the literature on presence yields a slightly different definition: “a psychological state in which virtual objects are experienced as actual objects in either sensory or nonsensory ways.”\textsuperscript{28} This treatment of presence allows for a slightly
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Different interpretation of the presence categories. Physical and social presence are similar, although self-presence is also identified and defined as when the experience of oneself is mediated by technology or when one experiences the virtual construction of an alter-self, such as an avatar. In the case of virtual constructions of an alter-self, an individual can construct a partially or fully physical representation (e.g., the avatar is fully or partially visible) or a fully psychological representation (e.g., no avatar is visible; first-person point-of-view game).

Some of the contributing factors to creating a feeling of presence are the number of senses engaged by the medium; form characteristics of the medium such as size, quality, vividness, motion, color, and dimensionality; aural characteristics such as sound quality and spatialization; nonobtrusiveness of a medium; user characteristics such as willingness of a user to suspend disbelief; and interactivity.

This study investigated the ability of advergames to induce feelings of presence. Advergames present a spatial world that can be explored and manipulated by the player. Thus, form and aural characteristics present in these advergames may be leading factors in creating a sense of presence for the players. In the case of children, these characteristics may be even more important. Certain user characteristics implicated in the creation of feelings of presence include willingness to suspend belief. Because children have been found to exhibit decreased prefrontal lobe activity in conjunction with higher reported levels of presence, it is likely that they are more willing to suspend disbelief and become more immersed in the medium and its content. However, the effects of interactivity and customization on children, which increased presence in adult populations, are less clear. As previously noted, many advergames employ more customizable options, including game environment, opponent, and avatar customization. In order to understand more fully the effects of advergaming on children, it is necessary to investigate whether giving children the opportunity to make choices and customize their experiences within advergames will increase self-reported presence. As discussed previously, it is likely that those who have the opportunity to embody an avatar through customization will be more involved in the advergame than those who have only the opportunity to identify with the avatar through choice. Thus, it is likely that embodiment brought about by participants building avatars to represent themselves will evoke more feelings of presence than identification brought about by participants choosing or being assigned an avatar with which to play the game.

H2: Embodiment will produce more self-reported feelings of presence than identification.

However, the effects of this induced presence may be harder to establish. Though most researchers accept that media can induce physiological, emotional, and behavioral changes in individuals, the specific effects of presence on each of these systems are less clear. The conceptual definitions of presence outlined previously are derived from the idea that presence is not only a mediated experience but also a psychological mechanism. The division of attentional resources, with some of those resources being directed toward external stimulation, creates normal levels of presence, those experienced in our everyday realities. Thus, physiological effects induced by experiences in reality might mirror, to some extent, the physiological effects of a virtual recreation of such experiences as a covariate of experienced presence. Lombard and Ditton identify likely psychological effects of increased presence as enjoyment, involvement, desensitization, and persuasion and the likely physiological effects as the increased propensity to feel more arousal or relaxation, depending on the context.

Thus, if customization can increase presence and sympathetic arousal, and presence can increase sympathetic arousal, presence may mediate the effect of customization on sympathetic arousal. Presence may be the psychological state through which sympathetic arousal increases.

H3: Self-reported presence will mediate the effects of customization on skin conductance level.

Methods

Experimental design

A 3 x 3 mixed design was used in this study, with one factor being level of customization and the other being game. This design was not fully crossed. Each participant played one game at each level of customization. Dependent variables included skin conductance and self-reported presence.

Independent variable: avatar customization

This study manipulated avatar customization by three levels: assignment, choice from a pool, and customized design via choice of avatar characteristics. The first level was playing the game with an assigned avatar. Under this condition, participants played a game given a randomly assigned avatar from a pool of previously created avatars within the respective advergame. The second level was choosing an avatar from a pool of avatars with which to play the game. Under this condition, participants chose an avatar from a pool of avatars created by the experimenter prior to participant selection. The third and final level was playing the game with a self-designed avatar. Participants were allowed 5 minutes to choose or create their avatars, but the amount of time each participant spent making his or her choices was recorded.

Dependent variables: skin conductance level and presence

Sympathetic arousal was measured by obtaining participants’ skin conductance. Two 8-mm Ag/AgCl sensors were placed on each participant’s left palm after the area was wiped with distilled water to control for hydration. Data was collected, time-locked to exposure to each stimulus message. The skin conductance signal was sampled 20 times a second at 167 Hz and averaged over each second of data collection. Presence was measured using three semantic differential scales in which participants rated to what degree they felt like they were there (there, not there), how much they felt like they were in a real place (real, not real), and to what extent they felt like the other characters were real people (real, not real). The three-item presence index in this study was found to be reliably measuring the same concept, r = 0.853.
Stimulus derivation: advergames

The three advergames used in this study were both located on Web sites for major food producers and intended for children. All contained avatar customization options, including gender, hair, clothing, and equipment. The games advertised Kellogg’s Go-Tarts, Nestle’s Wonka Donutz, and Fruit by the Foot, a brand extension of Fruit Roll-Ups. All three games prominently displayed their sponsored brand symbols throughout gameplay. Screenshots of these games are shown in Figure 1.

Participants

Thirty children (19 males, 11 females) aged 8 to 12 years were recruited from a Midwestern college town via word-of-mouth and snowball convenience sampling procedures. Participants were paid $10 for their participation.

Procedure

All children were accompanied to the laboratory by their parents. Upon arrival, the parents provided informed consent and the children provided informed assent. Each child participant was seated in a large, reclining chair with a clear view of a large computer screen. The researcher prepped them for physiological data collection and attached physiological sensors. Participants played the three selected advergames for 5 minutes each, completing the presence scale after each game. Upon completion of data collection, the researcher removed the sensors, then debriefed, thanked, compensated, and dismissed the participants to their parents.

Data analysis

All psychophysiological data were analyzed as change from the first second of gameplay. Change scores were calculated for each gameplay period by subtracting physiology data for each second of playing a game from the first second value for that game. Even though 300 seconds of physiological data were collected for each game, these data were averaged into 99 time points, which is the maximum number of repetitions that SPSS software will accommodate in repeated-measures ANOVA. All psychophysiological data were examined for outliers using the explore function in SPSS. Outliers (~2%) were replaced with the mean of the individual’s closest cells if two or more were in succession. Truncation was used for isolated outliers.

In order to determine whether presence mediates the effect of customization on arousal, a bootstrapping statistical model was used. Rather than relying on an assumed sampling distribution, bootstrapping generates an empirical sampling distribution by randomly and repeatedly resampling from the data, which creates more accurate confidence intervals. Time spent building or choosing the avatar was used as a covariate to control for the possibility that the time spent creating or choosing the avatar confounded the model.

Results

Hypothesis 1 predicted that individuals given more avatar customization options within the advergames would exhibit greater skin conductance during gameplay relative to the other two conditions (assignment/choice). A 3 x 99 (customization x time point) repeated measures ANOVA yielded a significant level of customization by time interaction, F(196, 4588) = 1.29, p = 0.01, $\eta^2_{p} = 0.04$, such that skin conductance levels for individuals who built an avatar diminished the least over time, and those assigned an avatar diminished the most. H1 was supported. See Figure 2.
Hypothesis 2 predicted that embodiment would produce more self-reported feelings of presence than identification. Self-reported presence data were examined using a 3 × 3 (customization × game) repeated measures ANOVA comparing the average scores on the presence index across participants for each level of customization. Self-reported presence differed by level of customization, \( F(2, 28) = 3.5, p = 0.04, \eta^2_{\text{part}} = 0.2 \), such that the most presence was reported when an avatar was embodied and the least was reported when an avatar was assigned. H2 was supported.

Hypothesis 3 predicted self-reported presence would mediate the effects of customization on skin conductance level. Average skin conductance scores for each level of customization and presence index scores for each level of customization were submitted to bootstrapping tests of indirect effects. The customization-presence-skin conductance mediation model was not significant, \( F(3, 98) = 0.94, p = 0.42, R^2 = 0.03 \). For path results, see Table 1. H3 was not supported.

Discussion

These results indicate that customization of game avatars can affect both subjective feelings of presence and physiological indicators of emotion during gameplay. For game producers and sponsors, this means that creating more customizable games may make the experience more sympathetically arousing, which may in turn affect the strength of the emotional valence experienced, whether positive, negative, or both. Because arousal has been identified as a key component of game and media enjoyment, this information is useful for those trying to build brands. The findings of this study indicate that offering more customization options in terms of avatars may make games more enjoyable with higher highs and lower lows. It is likely that making these games more physiologically arousing will keep players coming back to play and playing longer, which gives sponsors of advergames with customization options several advantages, mainly a willing audience who will spend more time with their brands.

This study also has implications for the development of the presence literature. As revealed by the indirect effects analysis, self-reported presence does not affect physiological reactions. Much research has been dedicated to exploring the measurement of presence. Psychophysiological measures have been suggested as online measures of presence, but the results of this study do not support their use without other corroborative measures. The measurement of emotional reaction to media can be quite problematic, just as the measurement of an internal psychological state, such as presence.

### Table 1. Path Results of Total, Direct, and Indirect Effects from a Mediation Model Estimating the Effects of Avatar Customization on Skin Conductance Level (SCL)

<table>
<thead>
<tr>
<th>Path</th>
<th>Unstandardized Coefficient</th>
<th>SE</th>
<th>95% Confidence interval (bias corrected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct effect of customization on presence (a path)</td>
<td>0.49</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>Direct effect of presence on SCL (b path)</td>
<td>−0.13</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Total effect of customization on presence (c path)</td>
<td>0.17</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Direct effect of customization on SCL (c′ path)</td>
<td>0.24</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>Partial effect of time spent creating avatar on SCL</td>
<td>−0.00</td>
<td>0.01</td>
<td>(−0.24, 0.01)</td>
</tr>
<tr>
<td>Specific indirect effect via presence (ab path)</td>
<td></td>
<td></td>
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Note: Estimates based on 1000 bootstrap resamples.
is problematic. Subjective measures rely on individuals to honestly and accurately report an experience, while objective measures may not fully capture the concept they are meant to operationalize. In terms of using psychophysiological measures to operationalize a psychological state, the issue of temporal order arises; emotional states can be the effects and the causes of physiological responses.23 For this reason, it may be that presence is both a cause and an effect of psychophysiological responses to a mediated message and vice versa. To further complicate the issue, using a subjective report of presence after the state is effectively over as a possible mediator between a manipulated factor, customization in this case, and an online measure of time-locked physiological responses is less than ideal.

Further research should be dedicated to exploring the relationship of presence to physiological reactions using a continuous, or online, measure of presence. In any case, the results of this study do not support the notion that presence and the psychophysiological measures used are related. Levels of avatar customization affect self-reported presence and sympathetic arousal, but self-reported presence, or being immersed in a medium, does not affect sympathetic arousal. On a conceptual level, these constructs seem to lead naturally to one another, but these relationships have not been empirically supported.

Limitations of this study include the infinite differences of the stimulus advergames. Comparing physiological responses across a gameplay experience involves measuring different individuals’ responses to different events onscreen. Further, using psychophysiological measures across gameplay may reveal something about an individual’s information processing but builds in the measurement of motor and sensory responses to the interactive experience as well. While the interactive nature of the experience could, in theory, strengthen some physiological responses, it also affords the experiment less control over comparisons. Different experimental orders were employed to help combat this issue; however, because the design was not fully crossed, customization level comparisons were made across different games.

In conclusion, as games become more customizable and increasing numbers of brands are integrated into gameplay, understanding the relationship between customization of gameplay experiences and subsequent attitudinal and physiological effects will be invaluable to game producers and sponsors as well as to consumer-interest groups. As one of a few first looks into this relationship, this study provides support for further exploration of the effects of avatar customization and how it relates to the overall gameplay experience.

Disclosure Statement

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References


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