

# 13 Persuasive Effects of Presence in Immersive Virtual Environments

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**Abstract.** In general, current research suggests that virtual environments, compared to classical advertising media, provide users with a higher level of presence, more perceptual and psychological immersion. This paper reviews empirical findings from an ongoing research program studying information processing consequences of presence in virtual environments. Based on theoretical models and preliminary findings from recent empirical studies summarized in this chapter, a two-step theoretical model of persuasion-related effects is proposed: more presence will, probably, lead to more arousal and affect, which will have a subsequent impact on depth of processing, making the user more likely to process information affectively, more implicitly and heuristically. This, in turn, will have the effect of making him/her less aware of an embedded persuasive message, which will thus have a moderating effect on various advertising-related outcomes: less ad recall, but more positive brand attitudes and favorable purchase intentions. The paper proposes that due to their specific characteristics, immersive virtual environments could be more effective persuasion channels, than classical advertising media. This could be a very useful finding for applications in entertainment VR, e-marketing, advertising, public or health communication.

## Contents

13.1	Media environments in the “Real-Virtual continuum”.....	192
13.2	Presence implications for advertising effectiveness.....	194
13.3	Presence effects on attitude structure and information processing: affective and cognitive consequences .....	197
13.4	Transparent persuasion in immersive virtual environments: impacts on brand recall, attitudes, and buying behavior .....	199
13.5	Applications.....	202
13.6	Conclusions, limitations and further research .....	204
13.7	References.....	205

### 13.1 Media environments in the “Real-Virtual continuum”

“Virtual environments created through computer graphics are communications media” [1].

A comprehensive introduction to the area of virtual environments technology starts with this strong statement that inserts it within a continuum of communication channels (books, radio, TV, Internet, etc.). In another conceptual paper, a “Reality-Virtuality continuum” [2] is proposed as a way of building a taxonomy of different technologies circumscribed by the term “virtual environments”, based on three properties: “reality”, “immersion”, and “directness”.

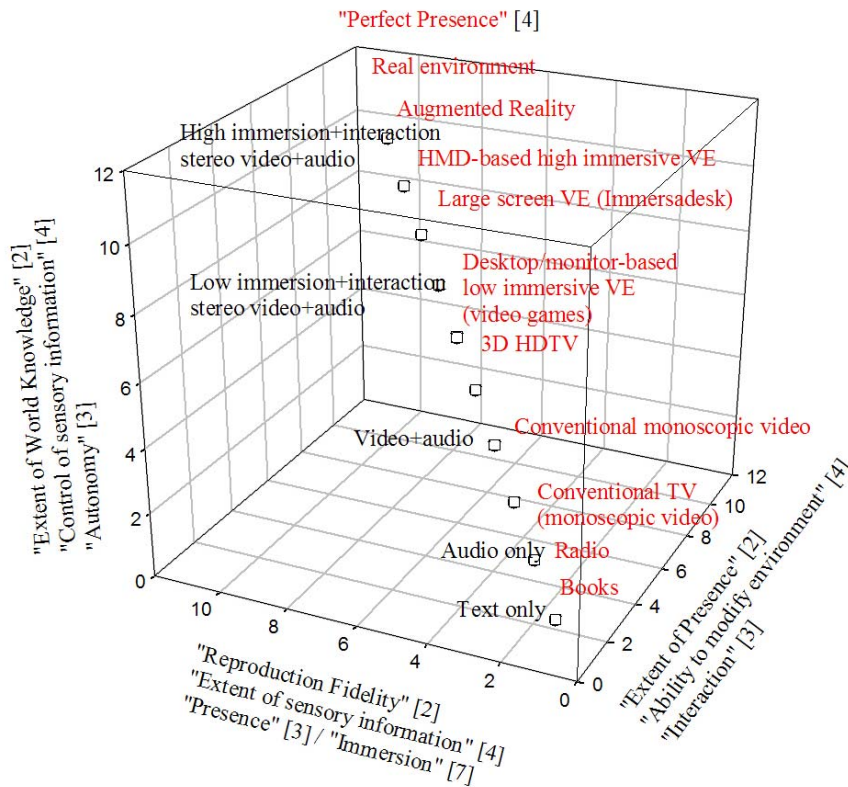
The two examples summarized above stand proof of current awareness in the research community even from an early stage, that the various technologies encompassed by the term “virtual environments” (VE) are the most recent media innovation. However, this awareness aside, there is a lack of research approaches or applications that follow this lead.

This is probably due to the fact that research in the area is in its infancy, and the current technological costs prohibit its development as a consumer medium, limiting its use to research laboratories or high-end governmental applications. Thus, except for the adoption of some of its elements into the Internet (Web 3D) or consumer video games, consumer applications of virtual environments as a new communications medium have not yet started.

This chapter starts with the assumption that virtual environments are, or at least could be the most recent consumer media and studies its features from this perspective. In fact, the sources cited above are not the only ones that conceptualized the determinants of users’ experience in VE (and extending them to categorize any media environment) as the axes of a multidimensional continuum used to categorize different media technologies as points given by their different levels on each dimension. For example, in the same line with Milgram [2], Zeltzer’s “cube” [3] used “autonomy” (the extent to which the VE is more than geometry), “interaction” (the degree to which VE parameters can be modified) and “presence” (number and fidelity of available sensory input and output channels) as the continuum’s axes, while Sheridan [4] used “extent of sensory information”, “ability to modify environment” and “control of sensors” as determinants of users’ sense of presence.

Considered as the central and distinctive feature of VE, presence refers to a particular experiential reaction about how a user will engage and adapt to the constructed world. (For a detailed review of major definitions of the presence construct, see [5] and [6]). This concept originally grew out of research in “telepresence” as the main characteristic of telemanipulator technologies. Since then, its use has expanded, having been applied to study various media (books, newspapers, films, TV, computers, the Internet, etc.) thus proving that the concept of presence or “being there” in any environment is a useful determinant of any user reactions or behaviors towards it.

From this perspective, a schematic graphical representation of different media positions on the multidimensional “real-virtual” continuum can be drawn as a 3D cube (adapted from [4]) that shows VE as second best to real environments, in terms of the extent of user presence that they can afford (see Figure 13.1). In fact, [8] and [9] specifically compared VE with different media.



**Figure 13.1** Position of media technologies within the Real-Virtual continuum (adapted from [4]). Numbers in square brackets refer to references for different conceptualizations of the dimensions.

One of the downsides of expanding the use of this concept has been that presence research in general has been suffering from little concurrent and external validity due to conceptual and measurement problems: too often different conceptualizations of presence have been used in different studies measuring presence with different instruments, or using different names for the similar underlying constructs, thus making comparison between studies almost impossible. Also, there is yet no overarching psychological theory of presence that could make the various empirical studies parts of testing it. From all these and other reasons, until recently the field of presence research has been limited to individual studies dedicated to different technologies subsumed under the heading “virtual environments”, “virtual reality”, etc., from different disciplinary frameworks: video games, Web 3D, immersive displays (CAVE, Immersadesks, etc.). Virtual environments have been applied to various areas (psychotherapy, Internet shopping malls, 3D chat rooms, video games, electronic kiosks, location-based entertainment, HDTV, IMAX theatres, physical therapy, scientific visualization, etc.) but a truly “applied presence research” linked to a “general theory of presence” has yet to appear.

The present paper further analyzes the possibilities of studying VE from a marketing communications media perspective, drawing comparisons of VE with classical advertising media (TV, film, 2D Internet, etc.). Based on current findings from a research program under development, a possible way of building a “grand theory” of persuasive effects of users’ sense of presence in immersive virtual environments is proposed. The current findings suggest that VE can become a “transparent” new advertising medium with features making them a more effective channel for advertising messages, than any other medium on the Real-Virtual continuum (see Figure 13.1). As will be proposed, the recurring problems that most advertising currently faces (“advertising clutter”, limited effectiveness, etc.) may not exist in VE contexts, at least in the form being talked about in academic and industry circles as the sources of most effectiveness issues.

Throughout this paper, the use of the term “desktop or low-immersive virtual environments” refers to over-the-Internet or computer monitor based applications of VE (e.g., through the use of VRML 97 language) and the term “high immersive virtual environments” is used to refer to high-end, high-resolution, specialized displays: CAVE, Immersadesk, Head-Mounted Displays, Augmented Reality, etc. Section 2 summarizes current problems of advertising effectiveness in classical media as discussed in the literature and compares them to characteristics of VE which make them an effective direct experiential advertising channel, able to solve the classical effectiveness issues. Section 3 reviews main theoretical models and empirical findings used to describe the relationships between presence and its consequences on user information processing. Specifically, arousal and affect are proposed as mediators of depth and level of processing. In Section 4, the effects of processing level mediated by presence, arousal and affect are presented as an attempt to build a two step theoretical model of the persuasive effects of presence in VE.

Summarized findings from current research are used as support for the model<sup>1</sup>. Section 5 presents brief descriptions of the empirical studies on which the current model is based, along with suggestions for industry applications to four areas (some of which were used as stimulus in the experimental studies reported). Finally, Section 6 concludes the chapter with suggestions for further research and limitations of the current model.

### **13.2 Presence implications for advertising effectiveness**

Except for a few studies [10-13], research on immersive VE systems from an advertising and persuasion perspective barely exists. Even the few reports that specifically linked these two research areas dealt mainly with low immersive VE and the contexts and stimuli used were limited to those that facilitate a purposive consumer/user behavior, as in 3D product presentations in Internet shopping malls [10-12], or applying the concept of presence to TV presentations [13]. The importance of these studies notwithstanding, this paper studies presence and persuasion mainly using highly immersive VE. As seen in Figure 13.1, these types of VE systems can “afford” the most numerous sensory inputs to the user, compared to desktop, Internet-based 3D product presentations. In fact the main statement in this chapter is that these types of VE are the most effective as advertising medium, given their formal features and the level of user experience that they can support.

Put another way, this means adding the dimension of “advertising effectiveness” to Figure 13.1, thus being able to study inter media comparisons.

Different aspects were identified as being determinants of presence, including automatic aspects (tested by involuntary responses), environmental aspects (as for “objective” immersion [7]), and subjective aspects reported using cognitive recognition of subjective state in self-reports.

Research into the “emotional”/affective part in users’ involvement/”immersion” inside the virtual environments has just started to appear, and research in emotion and affect in classical media and advertising suggests there is a correlation between the concepts of involvement in the media environment and attitude toward the ad, brand, brand cognitions, brand recall, and purchase intention related to a commercial message embedded in the environment in a form or another.

One of the explanations in the literature [13] is that “when the users feel present in the virtual environment, they are also likely to feel persuaded”, or, because of the high level of

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<sup>1</sup> Due to the format and limitations of the present chapter, a decision was made not to present detailed statistical information along with each finding. However, both raw and analyzed data are available on any request from the reader. The empirical studies on which the present paper is based are currently being submitted for publication in a professional journal, as part of an empirical paper.

affect involved in the “sense of being present”, they could not take the “central route” to persuasion as dual process models would imply [22].

### *13.2.1 Advertising effectiveness issues in classical media*

Classical advertising media have been facing effectiveness issues caused by our increasing advertising filled media environments, or viewers’ “resistance to persuasion” and advertising awareness abilities caused by recognition of commercial message frames embedded in media content.

It is suggested that one of the variables that influence viewers’ resistance to persuasion in commercial messages in classical media is viewers’ high advertising awareness skills: they have readily available cognitive scripts that warns them a particular message is commercial, that is, intent to persuade [13, 19, 24]. The subsequent effect, it has been thought, is that viewers have built a cognitive shield against commercially persuasive attacks. This effect has been aided by the current advertising clutter present in our media environments, as well as viewers’ literacy of commercial media frames.

Generally supporting the Affect Infusion Model (AIM) [25] with empirical evidence related to program-induced moods on attitude toward the ads and thoughts about the ads embedded in the programs, studies of advertising in classical media can prove a useful comparison term, as well as a theoretical tool for testing the classical models’ applicability to VE. In a study testing the influence of program context and content on various consumer-related variables [21], it was found that the relationships between arousal and moods were induced by programs and their effects on emotion/mood towards the ads following them. Indeed, it is now a well supported finding in studies of classical advertising media [14-18, 21] that program-induced moods mediate attitude towards the ad (Aad), brand recall (BR), attitude towards the brand (Ab), and subsequently, purchase intention (PI). [26] and [27] examined the manner in which affective responses to television program content may interact with the affective tone of the ad to influence Aad.

It was found in an experiment that thoughts about the program and overall program evaluations (“program liking”) mediate the effect of program-induced affect on Aad, and emotional responses to the ad moderate the relationship between program liking and Aad.

Specifically, there was a certain program liking-Aad linkage that was strengthened if the ad and program were similar (congruent) in emotional content (same valence).

Most of the studies reported in this brief summary are inscribed within the Dual Mediation model (DMM) of the attitude toward the ad and brand, as affected and mediated by intermediate constructs, like “ad cognitions” (Cad), feelings or affect toward the ad (Aff), brand cognitions (Cb), etc. Extensions of this model were subsequently made to include “ad affective responses” and three other additional model paths (Aff interactions with Cad, Aff with Aad, and Cad with Cb).

In Section 4 it will be argued that persuasion embedded in VE could be more unobtrusive than advertising in classical media, and thus not being perceived by users as interrupting the “flow” of the program: “many viewers anticipate commercial breaks and employ methods of judging their length” [13]. Also it has been found that advertising awareness has a powerful impact on constructs such as Attitudes towards the Ad, Cognitions towards the Ad, Purchase Intentions, etc., thus making it the main moderator of advertising effectiveness [14, 15, 18, 19, 21]. Another line of research [24] linked accessibility of constructs in memory (usually, primacy and recency of similar previous persuasion incidents) with perceptions of intent to persuade, and reported findings supporting the “Persuasion Knowledge Model” (PKM), after which viewers develop a “persuasion knowledge” strategy based on their recognition of the advertising frames, and

use this strategy to cope with advertising situations. Usually, the form that the coping strategy has taken is that of the cognitive shield described at the beginning of this section.

Most probably, this strategy has the subsequent effect of motivating viewers to take the “central route” [22] and thus processing information systematically, as dual process models of persuasion would suggest; what this amounts to, in terms of advertising effectiveness, is that when this happens, viewers can more easily reject the persuasive attempts.

The short review of the advertising research bases of the current model suggests that linking results from different models can be useful for testing advertising effectiveness in a VE context. Specifically, the model proposed in the current research (see also [20] for details) makes use of DMM, PKM, and AIM as well as dual process models of information processing, in trying to study advertising effectiveness issues in VE, and thus extending these models to the new medium.

### *13.2.2 Immersive virtual environments as direct experiential media: solving the issues?*

Presence or the sense of "being there" has been discussed in the literature as an essential, defining aspect of VE. Most researchers believe that the experience of presence should be correlated with or may be a causal factor of human information processing performance [13]. And since direct experience has been found to be more persuasive than mediated experience [47], it can be argued that the mediated experience positioned most closely to the real environment, as shown in Figure 13.1, will manifest its effects on information processing as approximating those in the real environment. As shown before, this type of medium is represented by VE systems.

[5] and [6] reviewed studies that have explored the relationship between presence and other cognitive variables. Kim and Biocca [13] examined whether the experience of presence is correlated with differences in memory or persuasion. As found by current presence research [5, 6, 11, 13], users' sense of presence involves competition of stimuli from the physical environment and the virtual environment for cognitive accessibility in such a way that the user is less aware of the mediation and reacts to the VE as if it was a real environment. Biocca (in [13]) suggests that presence may be influenced by “the degree to which user's sensory bandwidth is engaged by the interface”. For each sensory channel, stimuli from the physical environment compete with stimuli from the virtual environment for cognitive accessibility to the user. Biocca defines this as sensory saturation or "the percentage of the sensory channel occupied by stimuli (information) from the virtual as opposed to the physical environment." [13] In the visual channel, sensory saturation is often manipulated by increasing the percentage of the field-of-view occupied by the visual display, by screen resolution, level of realism of the environment, etc. (see [6] and [13], for a review). In a study that applied the concept of presence to TV [13], sensory saturation was manipulated in the visual channel using different TV screen sizes.

There is also evidence that presence can increase memory for product-relevant information [5]. For instance, Kim and Biocca's study [13] reported the results of an experiment on the effects of the visual angle of the display (sensory saturation) and room illumination (sensory suppression) on the sensation of presence during normal television viewing. A self-report measure of presence yielded two factors, labeled "arrival" for the feeling of “being there” in the virtual environment, and "departure" for the feeling of not “being there” in the physical environment. A path analysis found that these two factors have very different relationships to viewer memory for the experience and for attitude change (i.e., buying intention and confidence in product decision).

Presence implies that the user of the medium considers the items in the mediated environment as unmediated and reacts directly as if he/she was in the real, unmediated environment. In other words, a user of a medium who feels present in the mediated

environment will thus consider his/her experience in the mediated environment as first-hand, or direct [5]. In the studies summarized above, it was found that users' feeling of not being in the unmediated environment has a significant, positive effect on factual memory and visual recognition speed.

In conclusion, a medium that is closer to direct experience in terms of user's "immersion" or engagement will have differentially powerful effects on structural bases of attitudes (such that the most effective medium could be the one providing highly and more affective, automatic, and accessible attitudes). As proposed in the next section, virtual environments represent the ideal case of this type of medium.

### **13.3 Presence effects on attitude structure and information processing: affective and cognitive consequences**

Emotions are an essential part of how people experience the world. These in turn affect, in a significant way, the way users respond to persuasive appeals in any medium so much that any theory of presence must consider emotional factors. This thesis has implications about how research should be conducted to further our understanding of presence. Validated psychological techniques for assessing emotions by subjective report, behavioral observations, and facial analysis can all be applied to increase our understanding of virtual presence. Further understanding of the interaction between presence and emotional state will improve our understanding of the construct of presence as well as better inform us about how virtual environments can be applied in creating emotional effects.

The main contention, from which the proposed conceptualization is drawn, is that emotions are a significant component of how presence is perceived. Emotions also have multiple aspects and form a significant part of all of our subjective judgments and automatic responses. Emotional responses mediate increases in heart rate and respiration.

They consciously and unconsciously influence our learning and how we understand, describe and react to the world.

Emotions or coping responses also interact directly with the person-environment process without intervening cognitions. Such theories have generated a long list of experiments and methods for exploring emotions. The physiological theories drove the experimental measurement of galvanic skin response (response of sweat glands), pupillary response, quantity of salivation, stomach pressure and stomach acidity. Cardiovascular parameters such as blood flow, blood pressure, pulse, cardiac output and electrophysiological parameters such as the electroencephalogram or event related potentials are other measures used in studies of emotion. Ethological methods are used to measure interactions by standardizing observing situations and specifying methods for scoring physical actions or expressions. For example, there have been at least fourteen standardized methods for scoring facial expressions from video/film recordings in order to measure emotional state. Subjective methods of self-assessment through questions have evaluated emotional states along category judgments (fear, anger, disgust, sadness, surprise, joy, interest) or along dimensions such as positive and negative affect. Subjective questions have also been used to measure not only emotional response itself, but also related aspects of emotional function such as mood awareness, unconscious mimicry of other's emotions, emotional changes with attempts at emotional regulation, etc.

An important line of research connected emotion to cognitive effects and is based mostly on the AIM model of cognitive effects of emotion [25, 31]. Experiments done from this theoretical perspective showed that participants in high intensity moods or emotional states processed information heuristically (or peripherally), rather than systematically (centrally). Also, the mood management model suggests ways in which affect informs

viewers' cognitive responses to medium messages based on their valence (positive/negative) but almost all the time the results confirmed the hypothesized relationship: affect infuses cognitions in affect-congruent directions.

On the other hand, arousal has always been connected to intense affect so much so, that research in the area found it difficult to delineate the two. Arousal has been defined as "the degree of general or diffuse physiological responding (e. g., speed of heart rate, amount of EDA)" ([23], p. 17). With respect to arousal processes, it has been found that it consists of a directional component and an intensive component ([23], p. 18). This latter component has been found to be associated with neural activity [42] and as having an impact on task performance. In general, most contemporary measures of arousal have been based on resistance processes, as measured by "the natural level of body voltage and changes that can be detected between two electrodes on the skin" [23].

The importance of affect and arousal for the present model is based on the usual, almost indistinguishable appearance of arousal along with affective processes, which makes the former a very useful measure of the latter. The importance of arousal as measure of presence effects on information processing stems from a large body of research that linked bodily responses to the attitude-behavior relationships, as shown, for instance, in Cacioppo and Petty's "biosocial theory of attitude change" ([23], p. 76). In general, two dimensions of arousal have been found to have differential effects on information processing and attitude change: arousal level (the dimension of tonic) refers to long term averages or base levels, being thus possibly effective measures of "mood", while phasic arousal (referring to the response dimension, with both frequency and amplitude) is related to short term changes as consequence of exposure to novel, arousing, or fear-inducing stimuli, as an effect of the "orienting response". As such, and connected to media research, phasic arousal is a good measure of emotion, or affect intensity to media stimuli [42]. Research has categorized arousal based-electrodermal measures in two types: potential measures (Skin Potential Response) and resistance and conductance measures. The latter (and specifically pupillary dilation and EMG measures) have been found to provide good instruments of measuring stimulus characteristics that are associated with affect processes, extent of elaboration, cognitive effort, nature of elaboration see [23, 28, 36] for details of particular studies).

In relation to classical media presentations (studied in conjunction with persuasive messages or not), a wealth of research supports the theory that TV form and content can contribute to arousal processes. In fact, most of the experimental studies testing this theory have dealt with TV presentations: [28, 45].

For example, watching television is related to mood management strategies [45]. Form features such as screen size, scene cuts and motion have been associated with phasic physiological data linked to attentional processes [30, 32, 39, 44]. As such manipulations of media program contexts in multiple studies have shown that arousing video content can maintain both physiological arousal and behavior patterns associated with them over extended periods of time (due to excitation transfer processes), by influencing subsequent information processing of situations (be they media-based or real ones) normally non-linked to the initial context which caused arousal, while unarousing stimuli produce states of "relaxation" [45].

Closer to the conceptualization from this paper, studies testing the aforementioned arousal processes effects on commercial messages embedded in TV content found that due to misattribution of arousal causes by the viewers, positive associations caused by the TV program-based excitation usually find the object of their focus in commercials presented in the program. For instance, in a study testing exposure to five TV ads in succession to either arousing or non-arousing prior programming, Mattes & Cantor [37] found that commercials seen after highly arousing segments received more favorable ratings than



those seen after less arousing segments. No excitation effect for the first commercial, presumably because even though they were experiencing residual arousal, participants were still aware of the source of arousal (films) and did not misattribute it. Third and fourth commercials revealed significantly greater enjoyment and perceived effectiveness in high arousal, compared to low arousal condition. For commercial messages embedded in an arousing and positive media environment, this has been shown to have a direct impact on various advertising and brand-related variables: attitude towards the ad, brand, etc. such that due to transfer of excitation subsequent to an arousing program, not only that the commercials watched were liked more, but participants also rated the associated brands more positively and exhibited a more favorable purchase intention.

According to the excitation transfer theory, residual excitation can intensify subsequent emotional feelings when it is not attributed to its actual source by viewers and when it happens at a certain point in three phases of arousal decay, as found in previous research [46]. This theory proves to be extremely useful for studying information processing in Virtual Environments since in cross-media comparison studies these have been found to cause significantly more and higher arousal and affect levels in users, and on the other hand, more presence in Virtual Environments has been linked to more arousal and by itself, the construct of presence implies users' "perceptual illusion of non-mediation" [5], that is, lower ability of correctly attributing arousal to its correct source. As such, further studying immersive VE from this perspective can test if the high levels of presence and arousal in VE have impacts on users' types (heuristic vs. systematic) and levels of processing, which, subsequently, can cause their being less likely to pay attention, or be aware of the persuasive intent embedded.

However, the map of the current studies in the area shows contradictory findings. While [44] has failed to find a systematic relationship between presence and arousal, research by Meehan and collaborators specifically focusing on physiological correlates of Virtual Reality seem to be confident in the validity of Skin Conductance Response (SCR) as probably one of the best measures of presence, with heart rate and EEG being less reliable (or at least showing more variation across studies). (For an extensive review, see [39]).

Despite the current lack of extensive research linking arousal processes to form and content of Virtual Environments applications, this direction will prove very useful as one type of objective measurement of presence. Even less studied is the connection between arousal processes as indicators of presence, and their effects on persuasion, and various consumer behavior-related variables. One way of proposing this connection could be by extending Zillmann's theory of excitation transfer [46], as well as the theoretical models discussed in the previous section (DMM, PKM, AIM, dual process models) from classical media (TV) to interactive 3D media (immersive Virtual Environments) and subsequently linking arousal to affective components of information processing and outcomes of viewing persuasion-based embedded messages in Virtual Reality applications.

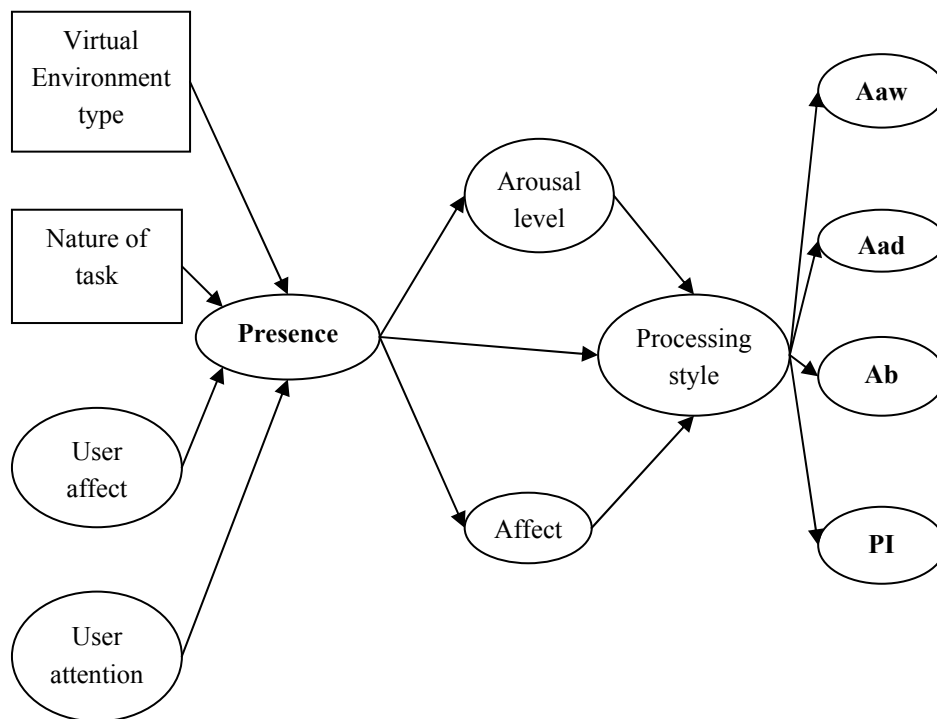
#### **13.4 Transparent persuasion in immersive virtual environments: impacts on brand recall, attitudes and buying behavior**

The theoretical model presented in this paper as part of an ongoing research program could be very useful as test bed for studying effects of entertainment and narrative-based Virtual Environments on persuasion and information-processing, as it is considered that these have two very powerful and additive qualities, compared to classical entertainment media.

First, they could provide the user with a sense of presence and immersion closest to real experiences. Second, they seem to be extremely powerful in terms of their effects on arousal and affect intensity. If supported after the model is tested in its entirety, these two

characteristics could make the theoretical line of inquiry presented here most useful for the advancement of VR as *the ultimate advertising medium*, and further its adoption as a possible effective advertising channel. The findings from the studies reported here support the assertion that the most decisive feature in defining the effectiveness of VE as a new advertising medium is its ability to provide an intensely affective experience to its user.

Three main statements are of utmost importance in the model: a). Depending on content and system type, nature of task (expressive vs. utilitarian), initial affect and attention level of users, VE are associated with presence and immersion, characterized in turn by high levels of arousals and intensive affect; b). High levels of arousal and intensive affect are associated with lower levels of ad awareness, which means that peripheral cues (heuristic processing) will play a more important role in the persuasive process; c). Heuristic processing will have the consequence of a positive brand attitude, brand affect and purchase intention, but a neuter or ambiguous attitude towards the Ad (since the awareness is low). (See Figure 13.2 below for a path diagram of the hypothesized theoretical model).



**Figure 13.2** Path diagram of the hypothesized theoretical model. *Legend:* Aaw=advertising awareness; Aad=attitude towards the ad; Ab=attitude towards the brand; PI=purchase intention. Squares refer to manipulated variables; circles refer to measured variables; one directional arrows refer to a hypothesized causal relationship

The test of the proposed model involved a series of two experiments. The first one started with a pre-test involving a 2 (Involvement) x 2 (Vividness) x 2 (Realism) x 2 (Affect) between-group design. This study tested the differential effects of several formal, content and user-centered determinants (identified in the literature) on degrees of presence in an Immersadesk VE environment. Its results were used as in constructing a Presence Index, employed subsequently in a second, main experiment for delimiting three levels of Presence: High, Medium, and Low. Involvement (a subjective measure) was operationalized as Attention + Arousal – Distraction, while Affect as Hedonic valence + Affect Intensity + Affect Duration.

The main design of the first series was a 3 (Presence: High, Medium, Low) x 2 (Forewarning: Yes, No) between groups factorial design, with advertising presence as within participants factor (the stimulus chosen was a 3D product placement of a Coke can embedded in the background of each VE content). The dependent variables were Attitude towards the ad, Advertising awareness and recall, Attitude toward the brand (advertised in the stimulus), and purchase intention. 78 students from a large eastern university in US were randomly assigned to 6 groups of 12 participants each.

The second series of experiments continued the first by adding VE content type (with two levels, “soothing” and “arousing”) and nature of task (with three values, “expressive”, “search”, and “utilitarian-shopping”) to the previous design, and removing advertising forewarning (which was used as a pre-test item). Before the actual experiment, a password-protected Internet questionnaire was administered for choosing the “soothing” and “arousing” levels of stimuli to be used. The subjective rating was also combined with an online physiological measure of arousal based on SCR. Based on ratings of a sample of 10 participants after viewing 10 different VRML environments, two of them that received the highest ratings for items such as “how soothing is the environments you’ve just seen” and “how arousing is the environment you’ve just seen” were selected as stimuli to be used.

One type of VE content was “arousing”, and one “soothing”. The main study design used was a 3 (Nature of task) x 2 (VE content type) between participants design. The same stimuli were used (the 3D Coke can) in a CAVE environment which served as the technology. In the “expressive” condition, users were let to freely surf and walk the VE content as they pleased, while in the “search” environment they had the task of searching a specific object (different from the Coke can), while in the “utilitarian-shopping” they had to choose a specific product that matched their personal preferences from a virtual mall and click on it. A post test questionnaire was employed to assess their ratings on items measuring advertising awareness and recall, brand recall (several different real and nonexistent soda brands were used along with the Coke can), attitude towards the ad, attitude towards the brand, and purchase intention.

The results of both experiments confirmed the hypotheses of the model: in the second experimental series, participants in the “arousing” condition had a lower level of awareness for the embedded virtual product placement (the 3D Coke can) than those in the “soothing” environment and for those, a significantly more positive brand attitude was found.

Compared to those from the “soothing” condition, participants from the “arousing” condition exhibited better brand recall, but no significant Attitude towards the Ad and ad recall was found. Also, a moderately significant positive purchase intention was found, as measured by the specific soda can they were invited to pick as refreshment on their way out of the experimental room. No significant relationship for participants in the “soothing” condition was found.

As assessed by the first series of experiments, the exactly opposite relationship was found for participants previously forewarned about the presence of the advertising message inside the environment (suggesting their employment of the systematic processing – based strategy of resisting the persuasive intent), while participants in the “no forewarning” condition exhibited the same relationship pattern as those in the “arousing” condition in the second experiment (because of their use of a heuristic processing caused by the high arousal and affect levels).

At least at the stage where this research program is at the time of publication of this paper, the findings confirm that users of high presence VE content are less aware of the presence of advertising due to the high level of arousal and affect that they experienced.

Also, the finding of no significant attitude towards the ad can be explained by the fact that they were not “filtering” the processing of the content through the cognitive shield mechanism based on a central route, as explained above. The consequence is that for

participants in high presence groups (and therefore low advertising awareness) the ad-related outcomes are not significant or are in a negative direction (because they cannot perceive the advertising or persuasion frame or intent), while the brand-related ones are significant and positive. However, when they are forewarned about the presence of a persuasive message, participants from the “arousing” VE exhibit significantly lower brand attitude and less favorable purchase intention than those in the “soothing group”, because of their use of systematic processing of the content, which led to their being wary of the persuasion intent. This, in turn, led to advertising related outcomes being more significant in the model than the brand related ones: a higher advertising awareness and recall, but a lower brand attitude and a more negative purchase intention.

Further research is needed to unravel possible confounding variables, and extend the research to include more determinants of presence (formal, content-based or user-centered components of the presence construct) identified in the literature. Also, research is needed to test if the relationships found are merely a result of a novelty effect that could decrease with adoption of the VE technology in the future, as suggested by [10] for contexts of 3D product presentations in Internet (low immersive) shopping malls.

## 13.5 Applications

### 13.5.1 *Virtual product placements*

The exemplary case of marketing application of VE is what has been used as stimuli in the studies summarized in Section 10.4: 3D product placements embedded in virtual environments. Since a description was provided above, only evidence that supports their use in enhancing advertising effectiveness will be added here.

Particularly, as shown before, it is very important that the placement of the commercial messages in VE be made in a way that does not increase the possibility of high advertising awareness for users. For instance, using something similar to commercial breaks in virtual worlds is not suggested, because they can “break” the sense of presence in the mediated environment, thus increasing the prospects of users’ deployment of strategies to resist persuasion. As advertising practitioners, we would thus fall into the same effectiveness issue as in commercial TV, and even more so.

A more effective way of using VE as an effective advertising environment is by enhancing users’ experience of, and presence in, virtual products embedded unobtrusively and naturally placed in the virtual world. Based on the findings and theory presented in Section 4, presenting advertising messages marked as such would only make users’ more aware of persuasion, thus making them psychologically “depart” [13] and distance themselves from the environment, outcome which runs counter to any marketing objective we could have had for the particular VE used as medium.

The end goal is thus to motivate the user to experience the products themselves, thus providing for user choice, rather than simply cluttering the environment and the experience of presence with distracting commercial announcements.

### 13.5.2 *Persuasive narrative worlds: “Word of mouth” advertising in virtual environments*

It is often said by both researchers and practitioners that the most effective advertising medium is word of mouth. For example, if we consider a situation where we are told by a friend about the wonderful qualities of a particular brand, we don’t usually associate his statements with advertising or intent to persuade. However, the friendliness of our friend

set aside, the truth of the matter is that the situation in this example is in fact advertising. Some of the reasons why we usually fail to recognize them as such are discussed here.

First of all, and according to the theoretical model advanced in Section 4, in a situation as the one described before, our level of advertising awareness is low. That is, the cognitive scripts that associate the context with recognition of the other's intent to persuade are not triggered from memory. The environmental context cues do not signal an advertising frame because neither primacy nor recency of previous activations of this type in this particular type of context made us perceive it as such, so that we take what our friend is saying as information, and not persuasion. This is often the case with any environmental context where presence of advertising does not offer the conditions of them being perceived as such. Most real environment contexts like the one described are obvious candidates.

However, let us consider another context in the real environment, where presence of advertising is cued and recognized as intent to persuade: the case of our walk or drive by outdoor advertisements (banners, posters, etc.). In this case, the reason why we perceive this context as advertising is because both primacy and recency of activation of this associative link from memory signal that this particular context is indeed advertising filled.

Since the advertising awareness level is high, not surprisingly, the consequence is that we become wary of the intent to be persuaded, so that our "cognitive shield" is prepared for an attitudinal attack. Many times, this also makes us process information more systematically, which can seriously hinder advertising effectiveness as research in dual process models of persuasion showed [22, 38].

If, as results of current research summarized in this paper shows, high immersive VE systems can provide a much stronger sense of presence than classical media, then it is safe to say that this medium type is the most experiential mediated environment, able to provide experiences and reactions close to their counterparts in the real environment, at least on some dimensions. This can surely have deep advertising effectiveness implications when trying to design believable 3D autonomous agents ("avatars") that can simulate the low advertising awareness situations described. This could be especially true about networked and shared VE, where the avatars could be personas of our real life friends, relatives, etc.

Since the VE content (the "script" of the virtual world) can be meticulously pre-written as research in believable agents and interactive narrative suggested [48, 53] by way of a non-linear, decisional tree progression based on user's reactions, then one suggestion for advertising industry would be designing believable persuasive agents ("avatars") that can interact with the user in environmental contexts not usually associated with advertising cues. Since avatars have already been introduced in some 3D commercial web pages as simulated guides or clerks (where the user already expects it to be a persuasive context), the different suggestion made here refers to the presence of commercial comments made in non-commercial contexts (guided VE trips to remote locations, user interaction with characters, avatar guided tele-collaboration in work tasks, etc.). The commercial messages will thus have to have the same multilinear structure that the larger narrative has in order to accept user's inputs. This is extremely important, since no previous design or testing of this type exists.

### *13.5.3 Public communication applications*

Another and more ethically useful area where persuasion in VE could prove their worth is what might be called "VE based public service announcements", where messages targeted to special populations (smokers, drug addicts, etc.), by any of the means suggested before, can provide a more experiential approach to these types of messages. Since the health and public communication literature often complains about the very low and relative

effectiveness of, for instance, fear-based anti-smoking, warmth-based anti-drug or awareness raising messages in classical media, perhaps the fact that VE provide a mediated experience closer to the real one would suggest new ways of improving effectiveness. This would have to be supported by empirical tests in controlled conditions before any strong statement about applicability could be made.

In the same vein, media violence research can find a useful test bed for research and applications of learning-based VE: not only visualization of a violent interactive scene can be seen from any perspective (since the user can move anywhere in the environment and is not being limited to frontal viewing anymore), but also learning applications can be proposed, that provide strategies to help children cope with fear from violent entertainment, and means for building young viewers' awareness of the fictionalized nature of entertainment violence, thus helping prevent emotional and attitudinal transference to beliefs about the real world.

The applications suggested above can be designed as "persuasive narrative worlds" specifically having an educational objective. Thus, to take just an example, we can design an environment where the user experiences a "drug-addict world"-based virtual psychodrama or sociodrama or as part of a psychotherapeutical treatment. Within a multilinear narrative structure and educational situations, anti-drug messages can be made very vivid by incorporating negative consequences of drug addicts within the virtual world situations: e.g., a third person VE world can help the user visualize an avatar of his/her own person and how will drug taking act upon her/his own physical body, psychic and social life. The user could thus experience her/his own decay. Also, several story developments can be made available, each of them containing situations designed with different persuasive messages, depending on the user's responses and stage within the treatment, along several sessions.

### **13.6 Conclusions, limitations and further research**

As the research reported in the present paper attempted to show, using VE as a marketing and public communication communications medium can show its worth. Indeed, in Section 5 some suggestions for future applications have been made. Also, even if the most important obstacle to development of VE as an advertising medium at least currently is the large amount of investment that would have to be made, several personal communications from both academic and industry circles led the author to believe that this approach is "in the air". In fact, an unwary personal forecast would not give more than 20-25 years until we would be able to see VE as a consumer medium and VE advertising in the forms of "experienced persuasion" or "feeling products" [11] at their work. The current technological developments, putting so much emphasis on the symbiosis of previously separated media forms, suggest that one of the things that audiences demand is more and deeper media experiences.

However, one of the biggest challenges will be the ethical issues involved, since the "transparent" character of VE advertising would attract old charges of "subliminal advertising" reshaped in a new form. Also, the current negative consequences that some users currently have had after VE experiences (motion sickness, nausea, dizziness) suggest the need for research that can advice better and healthier design.

One area that the current research program intends to study in further research is cross media comparisons of the same stimulus (VE, TV, HDTV, etc.). But as one of the fathers of VE research suggested, the most interesting and ultimate between participants experiment using a behavioral measure of presence would be one in which participants would be connected to a VE system while asleep. After waking up, if they exhibit the same

situation awareness as in the real world, then this would be a powerful test of VE. Of course, even if this type of study will probably never be possible due to the ethical issues involved, the current research is trying to find feasible ways of experimental design testing multiple comparisons of the theoretical model across the two extremes of the “Real-Virtual continuum”: VE with real environment.

Since the findings summarized here are only the first steps towards testing the relationships between presence and advertising, further research will also include other predictors that could mediate or moderate them.

In the end, it is hoped that this line of research would prove worth pursuing and that the present chapter would facilitate the interest in developing a unifying crossdisciplinary “theory and measure of social presence” [54], based on which both academic research and industry practitioners could build better and more effective media experiences.

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