

Vividness, Social Presence, and Persuasion: Reconsidering the Influence of  
Modality on Attitude Formation

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## Vividness, Social Presence, and Persuasion:

### Reconsidering the Influence of Modality on Attitude Formation

Spurred by recent technological advancements such as high definition television, virtual reality, and first-person video games, new media scholars have become interested in the concept of *presence*, defined as “the perceptual illusion of nonmediation” (Lombard & Ditton, 1997). Since the sensation of presence makes mediated experiences seem more like non-mediated ones (i.e., more “real”), it is believed to have an intensifying effect on certain outcomes of media exposure, including persuasion. Recent work in the area of presence and persuasion has focused heavily on how computer applications such as 3-D product simulations affect product purchase intention and other consumer behavioral outcomes (e.g., Grigorovici, 2003). However, few studies have addressed the role presence plays in mediated persuasion involving *sources*. The current study does this by focusing on the manner in which presence facilitates outcomes from mediated persuasive messages delivered by clearly defined sources such as spokespersons.

There is a well-established body of literature suggesting that sources play a role in both non-mediated and mediated persuasion. Textbooks on persuasion devote entire chapters to source factors (e.g., O’Keefe, 2002), and numerous study findings provide empirical evidence for the persuasive impact of sources (see Perloff, 2003 for review). In mediated persuasion, sources are a fixture of advertisements, which often incorporate celebrities, models, and experts to pitch products. Likewise, persuasive sources may appear through teleconferencing systems in organizations, as in cases where managers in remote locations come together via some form of communication technology in an effort to convince one another of particular plans of action. Sources are clearly a part of many mediated persuasion situations, but what is not so clear is *how* new media representations of sources affect persuasion in contexts like the ones mentioned

above. The Heuristic-Systematic Model (HSM), developed by Eagly and Chaiken (1993), may provide some insight into this phenomenon.

The present research applies the HSM to the study of new media effects on persuasion, particularly persuasion involving source attributes unrelated to persuasive message content. It begins with a definition of the HSM and a review of research relating the HSM to salience and media (i.e., modality). It then reconsiders modality and salience effects in light of presence scholarship. Earlier assertions that modality-induced salience governs the heuristic and systematic processing of message content are replaced by claims that attributes of modality related to vividness and social presence foster modes of processing. As social presence increases in response to salient source information, individuals are predicted to exhibit more heuristic processing, thereby strengthening the impact of heuristic cues on the formation of attitudes.

### *The Heuristic-Systematic Model*

Persuasion in this study refers to any attempt to reconfigure belief, intention, attitude, and/or behavior (Shavitt & Brock, 1994). The HSM, like the Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1981), is a dual-process model of persuasion. It specifies two concurrent modes of social information processing--heuristic and systematic--and attempts to specify conditions that trigger or govern each (Todorov, Chaiken, & Henderson, 2002). Systematic processing is defined as a “comprehensive, analytic orientation to information processing in which perceivers access and scrutinize a great deal of information for its relevance to their judgment task” (Eagly & Chaiken, 1993, p. 326). Heuristic processing, to the contrary, is thought of as a “more limited mode of information processing that requires less cognitive effort and fewer cognitive resources than systematic processing” (p. 327). When they process

heuristically, persuasive message targets focus on a subset of available information that enables them to use simple decision rules or cognitive heuristics to reach decisions.

One thing that separates the HSM from other dual process models, such as the ELM, is the notion that heuristic and systematic processing can co-occur and simultaneously exert an impact on judgments (Chen & Chaiken, 1999). Since this paper agrees with the position that attitude change can occur through both systematic and heuristic routes at the same time, the HSM is used here instead of the ELM. The extent to which people engage in different types of processing has important consequences for attitude formation and change. While research shows that both modes are capable of influencing attitudes, several studies demonstrate that systematic processing produces greater attitude persistence and attitude-behavior consistency than heuristic processing (Chaiken, Liberman, and Eagly, 1989). However, the two types of processing can work together and have an additive effect on one another (Chaiken & Maheswaran, 1994).

The choice of HSM processing mode(s) depends on both motivational and cognitive resource factors (Trumbo, 2002). On the motivational side, Todorov, Chaiken, and Henderson (2002) identify variables such as personal message relevance, need for cognition, and task importance as factors affecting processing. The primary determinant of processing mode is a person's *ability* to process information. Since systematic processing demands more cognitive resources, Chaiken and Eagly (1993) believe that it might be constrained or disrupted by situational or individual factors that reduce processing ability. These can include distraction, time pressure, and communication modality (Todorov, Chaiken, & Henderson, 2002), the latter of which is of central importance here. When stimulus-rich modalities such as TV are used to communicate a message, they can foster more heuristic processing than less rich modalities such as print. This influence is expected to occur because the additional stimuli in the more complex

modalities can disrupt cognitive ability by pulling attention away from persuasive message arguments and toward heuristic information (e.g., the visible source of the message).

### *Modality and the HSM*

HSM scholars have long considered *modality*, or type of communication transmission channel (e.g., print, audio, video), as something that affects the way individuals process persuasive information (e.g., Todorov, Chaiken, & Henderson, 2002; Eagly & Chaiken, 1993). The assumption has been that media providing visual or audio cues consume greater cognitive resources than those providing print-only information, leading targets to process based more on heuristic information than systematic consideration of message content.

The belief that audio-visual media lead to more heuristic processing is based primarily on a study by Chaiken and Eagly (1983) conducted before the HSM was formally stated. In the study, subjects were presented with a persuasive message through one of three modalities: print, audiotape, or videotape. The message was delivered by either a likable or unlikable communicator, and the likable communicator was found to be more persuasive in the audio and video modalities (than through print), while the unlikable communicator was more persuasive in the print modality (than through audio or video). It was concluded that the video and audio modalities enhanced the salience of communicator information (though salience was not directly measured), leading those characteristics to exert a stronger impact on persuasion by increasing heuristic processing.

### *Modality Reconsidered as Vividness*

While early research considered modality to be a determinant of salience and subsequent processing activity, the usefulness of “modality” as a way to distinguish media influence is becoming increasingly problematic due to technological advancements that have occurred in

recent years. Considering the modality of “television,” for example: is High-Definition Television (HDTV) the same as regular television? Does a 70-inch screen provide the same information as a 19-inch screen? In both cases, the answer is probably “no,” even though all of the above technologies would be considered examples of a single modality, television. Thus, modality is a highly limited conceptualization of differences between media, thereby limiting our understanding of how such media affect information processing.

A better approach, advocated by new media researchers, is to consider technology from the perspective of human experience rather than hardware. As Steuer (1995) notes, such an approach more easily allows for the specification of units of analysis and variance potential. To reach this goal, the concept of *presence* has been advanced. Presence has been defined as “the perceptual illusion of non-mediation” (Lombard & Ditton, 1997). It includes the sensations of feeling present *in* a mediated environment (aka *telepresence*; Steuer, 1995) and feeling present *with* another (aka *social presence*; Biocca, Harms, & Burgoon, 2003). Presence has been mainly thought of as a likely outcome of exposure to advanced media technologies such as virtual reality (VR). However, it can be felt in response to any medium.

Steuer (1995) identifies two major dimensions along which communication technologies vary in their potential to induce presence: vividness and interactivity. These dimensions shift the focus of modality to two variable characteristics of technology rather than the single categorical construct of technology modality. Notably, the dimensions of vividness and interactivity are in line with the human-centered presence approach, since each dimension is discussed in terms of how it might affect characteristics of users, i.e., the sensio-motor functions. Since vividness has broad applicability to both new and traditional media (vs. interactivity, which applies more

exclusively to newer media), the present study focuses on vividness effects, saving interactivity for future research.

*Vividness* refers to “the ability of a technology to produce a sensorially rich mediated environment” (Steuer 1995, p. 10). The vividness of a medium depends on two primary factors: *sensory breadth*, defined as the number of sensory dimensions simultaneously presented, and *sensory depth*, understood by Steuer as the resolution within each perceptual channel, and what might be expanded to include the completeness with which each perceptual field is enveloped, since it refers to “the way in which an environment presents information to the senses” (Steuer, 1995, p. 42). As one or both of these dimensions increase, content becomes more vivid. In the case of sensory breadth, presenting content through television makes the content more vivid than print content because two senses are engaged through television (sight and hearing) vs. one in print (sight only). In addition, television can be increased in depth by manipulating variables such as screen size and resolution. Thus, differences in vividness can occur both between media and within media.

Using the concept of “vividness” instead of modality in discussing how forms of media affect HSM variables allows for better representation of the types of variations in technologies described above. In fact, Chaiken and Eagly (1983) even discuss an early conceptualization of “vividness” and how it may vary between modalities as an explanation for the effects they observed. But they did not pursue this notion very far, due in part to the “heterogeneous” nature of the vividness literature at the time, which they saw as a limiting factor in how applicable their work was to the concept. This work adopts a narrower conceptualization of vividness than has been used in the past, confining it to variations in media technologies, as new media scholars

now use the term (Steuer, 1995; Li, Daugherty, & Biocca, 2003). This type of vividness makes it easy to relate media technologies to the experience of presence in users.

The present research tries to contribute to our understanding of characteristic differences in media technology that govern persuasive outcomes by considering how vividness-induced presence can influence subsequent modes of processing in persuasive communications. A basic advantage of including presence in studies of new media is that it serves as a manipulation check of technology effectiveness. Since presence is expected to occur in response to media vividness as well as other media attributes such as interactivity (Lombard & Ditton, 1997), it is a very important variable in technology effects studies like the present one. Technology attributes may vary greatly, but the concept of presence has just a single unit of analysis (i.e., the user) and only varies in the extent to which it is experienced. As a result, presence-related findings can be generalized to a full range of media experiences. If presence is shown to relate to attitude, for example, then the same relationship should hold whether presence is induced through screen size or screen resolution or interactivity. The concept of presence is therefore enormously useful and also vital to the understanding of how certain media affect outcomes of exposure (such as attitude). Central to this understanding for the present study is the role of social presence. Though Chaiken and Eagly (1983) suggested that modality made source information more salient, they did not explicitly measure salience. Furthermore, source salience might be better understood as a function of vividness and *social presence*, a measurable, multidimensional construct that involves several dimensions of a user's response to a source.<sup>i</sup>

### *The Mediating Role of Social Presence*

Social presence is “the moment by-moment awareness of the presence of another sentient being accompanied by a sense of engagement with the other (i.e., human, animate, or artificial



being)” (Biocca, Harms, & Gregg, 2001, p. 2). It can vary from superficial to deep depending on the degree of spatial presence, psychological involvement, and behavioral engagement felt with another (e.g., a persuasive source). The type of persuasion situation in the present study is one that would be limited in its potential to induce social presence, since the communication is essentially one way (i.e., a persuasive source communicating a message), but some variation in social presence should still be expected, partly as a function of media vividness. As a person becomes more aware of a source as a result of vividness and other factors (e.g., individual differences in susceptibility), the source should attract more attention and feel more “in” the environment, thereby increasing social presence. In terms of the dimensions of social presence, vividness should generate more source attention and an increased perception of spatial presence or “being with” the source (Biocca, Harms, & Gregg, 2001), resulting in the formation of a more complete mental model of the social entity (Biocca, Harms, & Burgoon, 2003). *Source attention* is defined as the degree to which an entity (i.e., a persuasive source) is focused on relative to other aspects of the environment and situation. *Spatial presence* is defined here as the sensation of being physically “with” (e.g. in the same room or “space” as) an entity. Taken as a whole, increased attentional allocation to the source and spatial presence with the source are expected to make the source information more prominent in memory, leading to an increase in heuristic processing affecting attitude formation.

Few studies using the HSM have presented a visual model of predicted relationships (presumably due to difficulties with displaying the simultaneous processing), but this study attempts to provide models of key expected relationships, adapted from the HSM adaptation in Trumbo (2002). The model in Figure 1 contains predicted relationships for a likable source and an unlikable source.

*Predicted Relationships in Model*

This study adapts the conceptual and methodological approach of Chaiken and Eagly (1983) and adds the concepts of vividness and social presence to an examination of source effects on media-based information processing and persuasion. Instead of comparing three “modalities,” vividness will be manipulated by exposing subjects to a persuasive message presented in written, small-screen video, medium screen video, or large-screen video form. While written presentational form is maintained as a comparative base to the earlier study (Chaiken & Eagly, 1983), screen size provides the critical manipulation of vividness. Screen size is a formal feature of media that has received considerable attention from presence scholars. It has been “shown to evoke a variety of intense presence-related responses” (Lombard & Ditton, 1997) and to influence outcomes of exposure to specific source attributes (e.g., faces, Reeves & Nass, 1996). It also demonstrates that there can be considerable variation *within* forms of media (e.g., screen size and resolution with video), as well as between them (e.g., print vs. audio vs. video), thereby showing the utility of this representation of vividness.<sup>ii</sup> Thus, it is expected that vividness will relate positively to the amount of social presence experienced by subjects, such that subjects who view a source-delivered persuasive message on a large screen will experience the most social presence, followed (in order) by messages delivered on a medium screen TV, small screen TV, and in print.

Social presence should make the source information more prominent in memory, due to the attentional allocation to the source and sensation of spatial presence. This increased accessibility is expected affect heuristic processing leading to attitude contingent upon the likeability of the source. When a persuasive message is delivered by a likable source, heuristic processing should generate favorable source-related thoughts with a positive effect on attitude.

When the message is delivered by a disliked source, heuristic processing should include negative source thoughts resulting in a less-favorable attitude toward the position advocated by the source. Though the focus of this study is on heuristic processing in response to media vividness and social presence, systematic processing may also occur in response to social presence, Chaiken and Eagly (1983) would suggest that modality, reconceptualized in this study as vividness and social presence, will decrease systematic processing, since it decreases ability. Therefore, social presence is expected to be related inversely to systematic processing leading to attitude change.

## Methods

### *Overview*

A 2 X 4 between subjects factorial design was used in this investigation, with communicator likeability (likable, unlikable) as the first factor and media vividness (print, small-screen video, medium-screen video, and large-screen video) as the second. The outcome variables were social presence, heuristic processing, systematic processing, and attitude change.

### *Participants*

A total of 152 undergraduate students (mean age = 20.61) enrolled in an introductory communication course at a large Midwestern university were recruited for this study and given course credit for their participation. Participants, 48 of whom were male, were randomly assigned to one of the eight experimental conditions, each of which ended up with a total of 19 subjects. Since screen size was manipulated in this study, subjects were asked what size TV they typically watch as a baseline measure, and the modal response was “medium (19-21 inch)” (38%), followed by “large (22-27 inch)” (37%), “extra large (28-35 inch)” (13%), “small (6-18 inch)” (7%), and “other or don’t know” (5%).

*Procedure*

All procedural details were adapted from Chaiken and Eagly (1983). Upon arriving at a laboratory in groups of two, participants were assigned to separate rooms and asked to fill out a consent form. A researcher then told them that they would be participating in a study on “people’s reactions to speeches.” They were told that they were to read (or view) and give their reaction to a “randomly selected” speech on one of a variety of campus issues. After this introduction, the researcher announced the topic of the speech.

After the topic was announced, participants were asked to read a written “background interview” with the speaker containing the communicator likeability manipulation. Once the likeability manipulation was finished, participants viewed (or read) a persuasive speech and then completed a 3-minute thought listing task, used to measure mode of processing (systematic or heuristic). Following this, they were given a series of instruments measuring (in order) attitude toward the advocated position, attitude toward the communicator (as a manipulation check), and social presence.<sup>iii</sup> After completing these tasks, subjects were debriefed and dismissed.

*Experimental Materials*

The position advocated in the speech was that their “[University] should switch to the trimester system of instruction.” Consistent with Chaiken and Eagly (1983), this message was approximately 700 words long and contained five supportive arguments. Chaiken and Eagly (1983) found this topic to be moderately involving. To further test this assumption, pilot test students from a comparable subject pool were asked to indicate the extent of their agreement with a statement asking how involving the message was on a 15-point scale. The mean level of involvement was within sampling error of the midpoint of the scale ( $M = 7.59$ ,  $N = 80$ ), again suggesting that the message was moderately involving.

*Likeability manipulation.* In the “background interview,” the speaker was portrayed as a male administrator who works on scholarship coordination and recently came to the university from another university, where he had a similar position. Communicator likeability was manipulated by the speaker’s answer to a question from the interviewer asking, “How do you like being [here] compared to [your previous university]?” In the likeable condition, the speaker said favorable things about his current university and its students. In the unlikable condition, the speaker said unfavorable things about his current university and its students.

*Vividness Manipulation.* A 33-year-old male was recruited to deliver the persuasive message. For the audio-visual conditions, the speaker’s performance was videotaped and played back to participants on either a 50-inch screen, a 20-inch screen, or a 10-inch screen. Similar screen sizes have been shown in past research to induce different levels of presence and affect responses to social cues conveyed through mediated experiences (Lombard, 1995). To control for viewing distance and angle, subjects were seated 4 feet away from the screen and directly in front of the image. To control for audio, volumes of the three TVs were matched at pre-determined levels. The broadcast version of the message was about 5 minutes long, and subjects in the written condition were allocated 5 minutes to read the same message in printed form.

### *Measures*

*Mode of processing.* As in Chaiken and Eagly (1983), mode of processing was measured by giving subjects “three minutes” to “list their thoughts and ideas” about the “speaker and his speech.” Responses to this thought listing task were scored by two independent coders as either source (S) oriented or message (M) oriented. In addition, coders assessed whether statements were positively (+), negatively (-), or neutrally (0) valenced. This was done to allow for the creation of six composite measures representing the number of positive, negative and neutral

thoughts related to both the source and the message. Because the model was set up to examine positive and negative thoughts, and since most thoughts fell into these categories (86%, or 825 out of 959), neutral thoughts were dropped from analyses. Examples of thoughts coded as positive and negative (along with intercoder reliability scores) are S+ ( $r = .82$ ), “He was a good speaker”; S- ( $r = .92$ ), “The bags under his eyes bugged me”; M+ ( $r = .87$ ), “I like the trimester idea”; and M- ( $r = .82$ ), “The trimester thing is only to get money out of us.”

*Attitude toward the position.* Attitude toward the position was measured through four, 15-point Likert items tapping the attitudes of subjects toward the trimester system. Specifically, subjects were asked to indicate the extent to which they agree or disagree with the following statements: “[University] should switch to the trimester system,” “the trimester system is better than the semester system,” (reflected) “the trimester system would be bad for [university],” and “the trimester system is better than the semester system.” The first attitude item replicated the single item used in Chaiken and Eagly (1983), and the other three were created for this study to allow for a better test of measurement reliability. Reliability of the four-item index, which was tested using Chronbach’s Alpha, was deemed acceptable ( $\alpha = .92$ ).

*Social presence.* Social presence was measured using nine items adapted from the scale developed by Biocca, Harms, and Gregg (2001). The first five items were intended to tap the “source attention” dimension of social presence (“I focused on the speaker,” (reflected) “I did not watch the speaker closely,” “I paid more attention to the speaker than the speech,” “The speaker was the focus of my attention instead of the speech, and “I paid close attention to the speaker.”). The second set of four items was created to measure the amount of “spatial presence” subjects felt with the speaker (“I felt like the speaker was in the room with me,” I felt present with the speaker,” “the speaker seemed to be with me,” and “I was often aware of the speaker in

the room”). Each item was measured using a 7-point Likert response scale, ranging from “strongly disagree” to “strongly agree.”

Confirmatory factor analysis (Hunter & Gerbing, 1982) was used to test the social presence measurement model. It was expected that there would be two factors, “source attention” and “spatial presence,” and that these factors would be second order unidimensional (allowing them to be summed as a measure of “social presence”). Tests of internal consistency and parallelism for the two factors revealed that two items had substantial residuals (“the speaker was the focus of my attention instead of the speech,” and “I paid close attention to the speaker”). Therefore, these items were deleted. The remaining seven items passed a re-test, leaving a three-item measure of “source attention” ( $\alpha = .68$ ) and a four-item measure of “spatial presence” ( $\alpha = .92$ ). Correlations between the two factors were used to test for second order unidimensionality, and this test failed. The correlation between the factors was only .25. This may be due to a “basement effect” restriction in range in the spatial presence variable (discussed later). Given the theoretical importance of both variables to social presence, the indexes making up social presence were retained, but as separate constructs. This necessitated a slight alteration of the originally models to replace of social presence with the variables source attention and spatial presence. The revised model is discussed in more detail in the results section.

*Attitude toward the communicator.* Consistent with Chaiken and Eagly (1983), a variety of attitudes toward the communicator were assessed through twelve, 15-point Likert items asking subjects to rate the speaker on the following dimensions: likable, knowledgeable, intelligent, competent, warm, trustworthy, pleasing, sincere, friendly. Scores on the likable item was used as one check of the likeability manipulation. Another check was done using a four-item index of “likeability” made up of the items likable, warm, sincere, and friendly ( $\alpha = .91$ ).

## Results

### *Likeability Induction Check*

An independent samples t-test was employed to determine if the likeability manipulation was successful. On the single item measure, the mean rating in the likable condition ( $M = 9.89$ ,  $SD = 2.91$ ) was significantly higher than that in the unlikable condition ( $M = 5.87$ ,  $SD = 3.23$ ),  $t(150) = 8.07$ ,  $p < .001$ , two-tailed. On the multiple-item measure, the mean rating in the likable condition ( $M = 9.31$ ,  $SD = 2.91$ ) was also significantly higher than that in the unlikable condition ( $M = 5.68$ ,  $SD = 3.23$ ),  $t(150) = 8.07$ ,  $p < .001$ , two-tailed. Based on the consistent result of these two tests, it was concluded that speaker likeability was induced successfully.

### *Evaluation of Models*

Path analysis was performed on the hypothesized models (for liked and disliked source) using the least squares method. This involves estimating the sizes of the model parameters and testing the overall model fit. Parameter size was estimated by regressing each endogenous variable onto its causal antecedent, and model fit was tested by comparing estimated parameter sizes to the reproduced correlations (see Hunter & Gerbing, 1982, for a more complete description of this analysis procedure). In short, a model that is consistent with the data is one which (a) has substantial path coefficients, (b) has differences between parameter estimates and reproduced correlations (errors) that are no greater than what would be expected through sampling error, and (c) passes the test of overall model fit, indicated by a non-significant chi-square goodness of fit result. Since the impetus behind this research was to examine the role played by vividness and social presence in persuasion, the first thing looked for in each model were substantial paths from vividness to attitude. A model without a continuous path from vividness to attitude is incapable of showing support for the logic underlying this study. The



second two tests were performed only where evidence of an uninterrupted path was observed. For both the liked and disliked source revised models, only significant paths are reported to reduce the clutter caused by having all paths in the model simultaneously. Though all paths shown in Figure 1 were tested, paths not shown in the models were non significant. Missing variables had no significant relationships with any other variables in the model.

The results for the liked source are seen in Figure 2. The model shows that, while some observations were consistent with expectations, a few notable exceptions were observed. Overall, paths linking vividness to social presence and information processing to attitude were generally consistent with the hypotheses, but unexpected and intriguing results were observed in the paths linking social presence to information processing. Though the path from vividness to spatial presence was not robust (path coefficient = .03,  $P(-.21 < \rho < .27) = .95$ ), the initiating path from vividness to source attention was significant (path coefficient = .50,  $P(.26 < \rho < .74) = .95$ ). In addition, all paths from systematic and heuristic processing to attitude were consistent with expectations. Positive message thoughts related positively to attitude, with a path coefficient of .29,  $P(.05 < \rho < .53) = .95$ , and negative source thoughts related inversely to attitude, path coefficient = -.26,  $P(-.50 < \rho < -.02) = .95$ . Negative message thoughts also related significantly to attitude, path coefficient = -.41,  $P(-.63 < \rho < -.19) = .95$ , as did positive source thoughts, path coefficient = .24,  $P(.01 < \rho < .46) = .95$ . Thus, processing styles successfully predicted attitude.

The paths from dimensions of social presence to information processing are more surprising. First, as expected, source attention led to decreased systematic processing (i.e., message thoughts). The coefficient linking source attention and positive message thoughts was -.35,  $P(-.65 < \rho < -.05) = .95$ . Second, and also as expected, a significant relationship was found between spatial presence and negative source thoughts. The path coefficient linking spatial

presence and negative source thoughts was  $-.39$ ,  $P (-.67 < \beta < -.11) = .95$ . However, contrary to predictions, the coefficient linking source attention and negative source thoughts was  $.46$ ,  $P (.16 < \beta < .76) = .95$ . Also unexpected, but still advancing positive attitude change, the coefficient linking spatial presence and positive message thoughts was positive,  $.31$ ,  $P (.03 < \beta < .59) = .95$ .

In addition to its substantial path coefficients, the revised liked-source model fared well on the second and third model evaluation tests. The differences between predicted and obtained correlations for all unconstrained bivariate relationships were examined. None was significantly different than what would be expected through sampling error. Furthermore, this model passed the global test of goodness of fit,  $\chi^2 (14) = 12.20$ ,  $p = .591$ . Thus, analysis of this model shows several substantial path coefficients, no significant error, and a passed goodness of fit global test. The expected and unexpected specific paths are touched upon in detail in the discussion section.

The revised model for the disliked source is seen in Figure 3. For the most part, these findings were in line with predictions. The initiating paths from vividness to source attention and spatial presence were both significant (source attention path coefficient =  $.44$ ,  $P (.20 < \beta < .68) = .95$ ; spatial presence path coefficient =  $.39$ ,  $P (.19 < \beta < .59) = .95$ ). Also, paths from source and spatial attention to thought processes were generally consistent with expectations. As predicted, spatial attention increased negative source thoughts – the path linking the two variables was a substantial  $.39$ ,  $P (.13 < \beta < .65) = .95$ . In addition, supporting beliefs that presence would reduce message-related thinking, the coefficient linking spatial presence and positive message thoughts was  $-.25$ ,  $P (-.47 < \beta < -.03) = .95$ . Finally, a path from thought processing to attitude completes the sequential chain. Though negative source thoughts were not significantly associated with attitude (path coefficient =  $-.15$ ), the association between positive message thoughts and attitude was significant and in the direction predicted, with a path of  $.48$ ,  $P (.27 < \beta < .70) = .95$ .

As with the liked source model, the differences between predicted and obtained correlations for all unconstrained bivariate relationships were examined in the disliked source model, and one was significantly different than what would be expected through sampling error, a negative correlation between positive source thoughts and negative message thoughts ( $r = -.31$ ). Since these variables had no relationship to either social presence or attitude, this slight error was deemed unimportant, especially since the model still passed the global test of goodness of fit,  $\chi^2(14) = 15.42, p = .350$ . Therefore, it was concluded that the model and data were consistent with one another. Though producing several non-significant associations, the revised disliked source model showed a clear path from social presence to attitude, suggesting that spatial presence with a disliked source reduces a person's positive message thinking, which is central in shaping attitude for messages presented by this type of source. The implications of this are elaborated upon in the discussion section.

## Discussion

The study began with the assumption that the social presence induced by media vividness would facilitate heuristic processing in a way that would strengthen the impact on attitudes of heuristic source cues at the expense of systematic message cues. This would be observed in differential processing styles and attitudes for participants exposed to the same message from a liked versus a disliked source. We expected that the ability of source thoughts to increase positive attitude under conditions of a liked source and decrease positive attitude under conditions of a disliked source would be strengthened by the experience of social presence. While our results show the different exposure outcomes expected from a liked versus disliked source under the varying conditions of media induction, the route from induction to attitude through social presence and information processing types produced unexpected paths that raise

interesting questions. In particular, though the findings are consistent with claims that more vivid technology can increase dimensions of social presence, and that social presence affects heuristic processes that shape attitude, the findings also show that social presence influenced systematic processing. Specifically, in addition to affecting negative source thoughts, social presence consistently affected positive message thoughts (a form of systematic processing). Most interestingly, the contrasting paths from spatial presence to positive message thoughts in the liked and disliked source conditions suggest that some heuristic information may have been contained in the systematic processing channel. This result raises important theoretical questions about information processing models such as the HSM and will therefore be addressed first.

#### *Implications for Information Processing Theory and Research*

One of the most intriguing findings in this study is the reversal in positive message-related thinking from the liked to the disliked source condition. When subjects felt spatially present with a liked source, it increased their positive message thoughts and subsequent positive attitude change. When they felt spatially present with a disliked source, it decreased their positive thoughts about *the exact same message*. Since the only thing that differed for participants in these two conditions was the source cue, this suggests that some *heuristic* processing was interwoven in the *systematic* message processing channel, as assessed through the thought listing task. In other words, the systematic thoughts in the present research appear to be “tinged” by the heuristic source information and operating simultaneously with it. Perhaps this source information was operating as a form of “implicit cognition,” in unconscious fashion (see Greenwald & Banaji, 1995, for discussion of implicit social cognition). If so, this would help to explain the sizable reversal in positive message thoughts stemming from spatial presence between the two conditions (difference = .56). This finding would also be consistent with the

HSM, which says that systematic and heuristic processing can operate simultaneously and have a joint effect on attitude (Chen & Chaiken, 1999). Notably, since message cues did not vary in this study, effects represented by the paths from spatial presence to systematic processing (i.e., positive message thoughts) must represent the influence of the source manipulation.

Indeed, an ongoing debate in persuasion research contests which of several models of information processing are correct. Some of these debates have pitted the HSM and ELM dual-process models against one another (Chen & Chaiken, 1999), while another has even suggested that there is only a single, “unimodel” route to persuasion (Kruglanski & Thompson, 1999). The findings in the present study suggest that both systematic and heuristic processing can occur in response to the same stimuli, perhaps simultaneously, and points to the usefulness of considering information processing as taking place in two separate channels. Doing so offers increased explanation for the reasons underlying attitude change and thereby increases understanding, even though questions about the exact nature of processing remain. Do modes of processing occur one at a time and detract from one another, or can they work together and have additive effects as suggested by the HSM literature? Answering this question will not be easy, but it could be a very valuable. Evidence that systematic and heuristic processing can be simultaneously increased by social presence would be important to scholars studying modes of information technology, both for practical and theoretical purposes. For example, knowing that a positive heuristic cue (e.g., a social agent) can add to a systematic cue’s effect (e.g. a persuasive health message) would obviously be useful. Also, theory on new-media persuasion would benefit from knowledge of specific reasons for attitude change due to technology. Although not done in our study, research using online measures independent of informational cues could provide direct tests of systematic and heuristic processing differences (Todorov, Chaiken, & Henderson, 2002).

*Social Presence as a Mediator of Technology Effects on Attitude*

The findings in this study support the global assertion that social presence mediates the effect of technology-created vividness on attitude. Media vividness increased feelings of spatial presence with a disliked source, which in turn shaped attitude in a negative manner by decreasing positive message thoughts. Consistent with predictions, attention to a disliked source also increased negative source thoughts, though negative source thoughts did not affect attitude (perhaps because considerable variance in attitude was consumed by the link from positive message thoughts to attitude). Overall, spatial presence with a disliked source had a negative impact on information processing, since it decreased the type of processing (positive message thoughts) that was *critical* for attitude change among subjects exposed to this type of source.

In the revised liked source model, vividness affected social presence, information processing, and attitude in a more unexpected manner. The unbroken paths from vividness to attitude went from source attention to both positive message thoughts and negative source thoughts and then on to attitude. Vividness did not affect spatial presence as it did in the disliked source model, but spatial presence effects were consistent with those predicted. Greater spatial presence with the liked source predicted more positive message thoughts. Moreover, consistent with the model, spatial presence decreased negative source thoughts. This finding is consistent with the one for positive message thoughts. Spatial presence with the liked source increased thoughts that had a *positive* effect on attitude (systematic processing), and decreased thoughts that had a *negative* effect on attitude (heuristic processing). Spatial presence and information processing therefore shaped attitude change in a positive manner, as predicted.

The negative effect of source attention on information processing types was unexpected, however, and prompted post-hoc evaluation. One potential explanation is that the liked source

liked had some undesirable features (e.g., physical appearance, delivery) that were accentuated by close attention – something that vividness should amplify. To test this idea, subject ratings of how “pleasing” the source was in the liked condition were submitted to a univariate analysis of variance, with a test for linear trend. These results provide some support for this idea. Subjects in the large screen TV condition found the source least pleasing ( $M = 7.47$ ,  $SD = 3.04$ ), followed by subjects in the medium screen ( $M = 7.89$ ,  $SD = 3.35$ ), small screen ( $M = 9.61$ ,  $SD = 3.27$ ), and print conditions ( $M = 9.85$ ,  $SD = 2.60$ ). Given the lack of overlap between source attention and spatial presence (as shown by the low factor correlations), it seems plausible that subjects who paid close attention to the source were conscious of the one-way nature of the situation and therefore more critical of the “removed” (i.e., non-present) source. When subjects *did* feel a sense of spatial presence with this source, they felt less negatively about him (i.e., less affected by the negative heuristic cue) and more receptive to his ideas, as seen in the positive path from spatial presence to positive message thoughts.

#### *Vivid Media Technologies and Social Presence*

As predicted, the manner in which source information was communicated to subjects affected the amount of attention they paid to the source as well as how present they felt him. For the most part, subjects who were presented with source information through video paid more attention to the source and felt greater spatial presence with him than those who received the message in print. The present conceptual framework would argue that this effect was largely a function of the enhanced *vividness* offered by the video modality. Specifically, the video presented source information of greater “depth” or “quality,” to use Steuer’s (1995) terms, and this enhanced sensory stimulation focused attention on the source and made him appear more “with” the subject. In other words, media vividness affected two variables considered to be

important components of social presence. Though vividness through screen size did not affect social presence as strongly as expected, vividness is useful for considering how differences in media technologies affect presence. This study provides support for the ability of vividness to affect variables associated with a sense of social presence.

The study also highlights the ability of social presence to shape outcomes of media exposure, and this particular finding has enormous implications. Both dimensions of social presence related to information processing, with significant paths found between source attention and positive message thoughts, source attention and negative source thoughts, spatial presence and positive message thoughts, and spatial presence and negative source thoughts. Thus, this research supports the idea that feelings of social presence can affect the heuristic and systematic processing of persuasive message information. Given the central role of social presence in much of new media research, this finding is of crucial importance and bears further exploration.

Contrary to the overall pattern of findings, vividness did not predict spatial presence in the liked source condition. While this might indicate distinct patterns for a liked source, there is a strong likelihood that this was a function of a weak vividness manipulation. Certainly, the induction of vividness through the screen sizes used in this study would be at the lower end of Steuer's (1995) "dimensions determining telepresence" continuum. Though this manipulation was expected to significantly affect social presence, it may not have been strong enough to do so with the moderately involving message content used in this study. Consistent with this idea, the highest mean for spatial presence across the four vividness conditions in this study was 2.97 (in the large screen condition), almost a full point below the midpoint of the scale. The ability of even such a weak manipulation of spatial presence to impact thought processes as predicted suggests the potential for this variable to induce great influence. If true, perhaps a stronger



manipulation of vividness might better predict all aspects of social presence and subsequent thought processes and attitude.

These findings concerning aspects of social presence are important. Social presence is expected to be more common in coming years due to the rapid evolution and diffusion of media technology (Biocca, Harms, & Burgoon, 2003). Potentially stronger manifestations of vividness leading to social presence abound. For example, vividness could be manipulated by increasing screen resolution, a feature of television expected to become more prevalent in American homes as adoption of HDTV becomes more widespread (Dupagne, 2002). It could also be manipulated through a combination of vividness variables, such as screen size *and* resolution. Similarly, other developing technologies could increase interactivity, the second dimension determining presence (Steuer, 1994) not investigated in this study. If people were able to interact with a source, this would likely increase the dimensions of social presence looked at here as well as stimulating the “higher-levels” of social presence discussed by Biocca, Harms, and Burgoon (2003), such as mutual understanding and engagement. It is expected that studies with more potent new media technologies, many of which are on the horizon or even presently in place (e.g., HDTV), will produce even more convincing evidence for the effects of technology on social presence suggested here, making this preliminary investigation valuable.

### *Limitations*

As with most studies, several issues with the procedures in this study raise reason for concern. These include issues related to the measurement of some outcome variables and the manipulation of media induced vividness. First, the two-factor structure of social presence found in this study may indicate a weak manipulation of social presence or problems with the measure itself. Validation work by Nowak (2001) on the social presence scale adapted for this study also

failed to find a unidimensional factor solution for social presence, raising questions about what a measure of social presence should (and should not) include. Given the importance of social presence to many new-media scholars, a clear understanding of the concept and its indicators in social interaction is essential. A second issue concerns the technique used to measure systematic and heuristic processing. As discussed, the thought listing task has been used in the past, but it may not be the best method of measuring this type of cognition. Future work in this area should consider more sensitive measures such as recognition memory tests and online measures. Finally, while this research used a screen size manipulation to conceptually replicate and extend Chaiken and Eagly (1983), better manipulations of vividness could have been implemented. Due to the phenomenal advancement in new media technology, stronger demonstrations of vividness are becoming a norm of everyday life, and these need to be looked at in future research in this area.

#### *Future Directions*

A central tenet of this work is that the role of sources in mediated persuasion should increase as media become more vivid and interactive. Unanswered is the length to which this should generalize. Our study looked at a relatively uncommon situation. While people sometimes watch persuasive TV speeches, attempts to convey social presence are more common in other persuasive media forms like collaborative media work environments, mobile telecommunication, hi-bandwidth teleconferencing, agent-based e-commerce, and 3-D social virtual environments. The present study suggests that increased social presence with sources will affect both heuristic and systematic information processing, both of which can affect attitude. We hold that this effect will escalate with new media, and that vividness may be a critical determinant. To remain on the “cutting edge” of technology development, new media researchers need a clear understanding of these variables and how to employ them.

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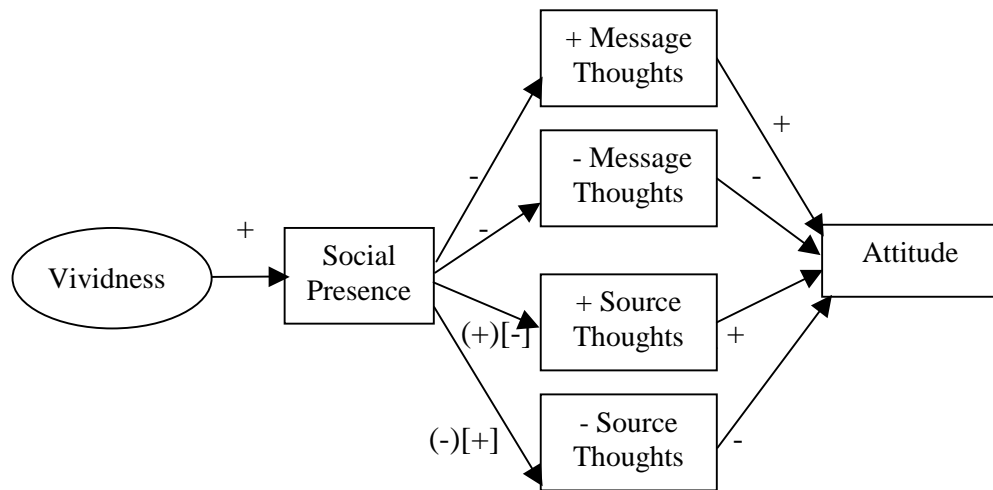
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Figure 1: Model of Hypothesized Relationships for Liked and Disliked Sources



Path signs show model predictions. Signs in parentheses are for liked source only. Signs in brackets are for disliked source only. Signs with no parentheses apply to both types of sources.

Figure 2: Significant Paths for Liked Source

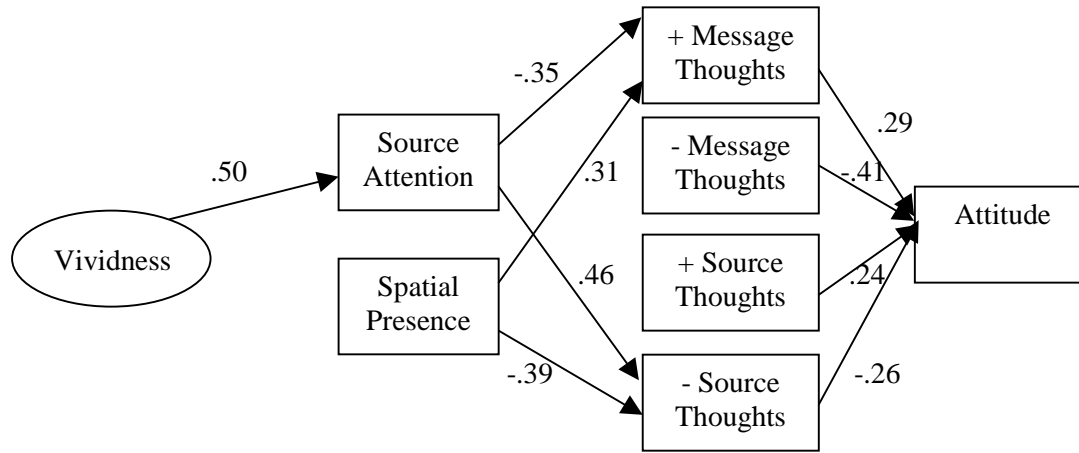
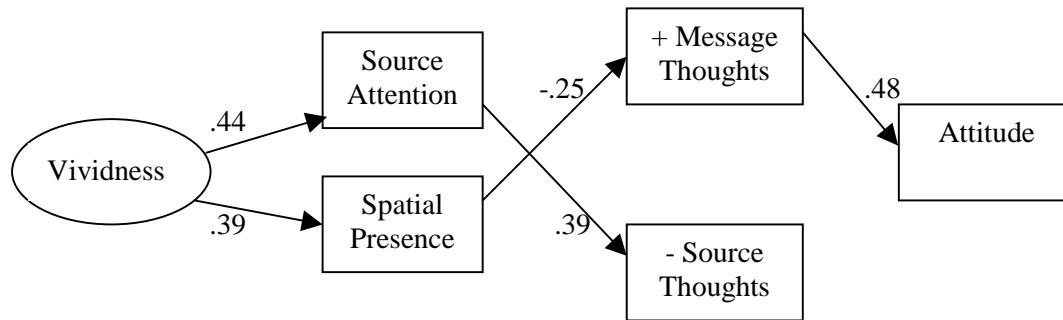




Figure 3: Significant Paths for Disliked Source



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<sup>i</sup> Chaiken and Eagly (1983) mention “social presence” in their work as one possible explanation for the effects they observed. However, their use of the term was based on a much more limited conceptualization of the concept than the one employed in this study, which draws from extensive explication, conceptualization, and measurement work by Biocca and colleagues stemming from scholarly interest in presence in the 1990s (see Biocca, Burgoon, & Harms, under review, for a review). Chaiken and Eagly did not measure either social presence or salience. This study will measure social presence to provide stronger evidence for the variable effects of media technologies on persuasion.

<sup>ii</sup> Unquestionably, this initial investigation into this area cannot distinguish all dimensions along which modality might vary. Moreover, it is potentially the case that differences observed between written and video presentations are accountable by factors other than vividness differences between the two modalities. Nevertheless, if this study not only replicate earlier research showing differences between written and video presentations, but both demonstrate additional differences within video presentations varying only in terms of screen size and show that these differences are predicted by screen size produced social presence, it will provide preliminary support for models of attitude change combining the HSM with attributes of technology determined social presence.

<sup>iii</sup> The decision to measure the variables in this order presents problems for assessing the causal order of observed outcomes stemming from the fact that the order of measurement differs from the causal sequence of events in the path model. The decision to arrange measures in the order selected for this study was based beliefs that arranging measures in the order suggested by the hypothesized causal sequence posses greater threats to validity. First, handing out the thought listing task following other measures offers great potential to prime subjects’ thought listing response (e.g., if the social presence measure preceded the thought listing task, subjects would be primed to write about the source or social presence, and not what they were thinking about during the message). Second, handing out any measure except the thought listing task before the attitude measure (the critical measure of concern in this regard) would artificially prime subjects to use that information in forming a judgment (e.g., if source-related measures preceded the attitude measure, subjects might base their attitude on them). By placing the though listing task directly before the attitude measure, subjects based their attitude on whatever they were thinking about during the message, as assessed through the thought listing task. Finally, realizing the problems associated with the measurement order used in this study, the author attempted to minimize the potential for the measurement order to distort the observation of causal sequence by asking subjects to think back to *during* or *while they were viewing* the message.

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