

# Syntactic Indeterminacy, Perceived Message Sensation Value-Enhancing Features, and Message Processing in the Context of Anti-Tobacco Advertisements

Jeffrey D. Niederdeppe

*Fast-paced and arousing anti-drug ads, considered to have high perceived message sensation value (PMSV), enhance message processing and reduce drug use among young adults. Studies have yet to explore the relationship between specific, PMSV-enhancing message features and outcomes related to persuasion. Messaris' (1997) concept of syntactic indeterminacy provides one plausible explanation for why message features contained in high PMSV ads might enhance message processing and subsequent changes in attitudes and behavior. The study explored this explanation by coding specific anti-tobacco ads for PMSV-enhancing features, merging these codes to a telephone survey among teens, and testing the relationship between message features and processing. The number of unrelated cuts and the use of suspenseful features (intense imagery and a second-half punch) increased message processing among older teens. An additive index comprised of these features was associated with message processing among both younger and older teens. Theoretical and practical implications are discussed.*

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Jeffrey D. Niederdeppe (M.A. in Communication, University of Pennsylvania) is a Ph.D. candidate at the Annenberg School for Communication at the University of Pennsylvania. The data were made available to the author during his time at RTI International, a not-for-profit research firm in Research Triangle Park, NC, as part of a contract with the Florida Department of Health to evaluate the Florida Tobacco Control Program (FTCP). An earlier version of this manuscript was presented at the 2004 National Communication Association Annual Convention in Chicago, IL, November 11–14, 2004. The author would like to thank Alan Sillars and two anonymous reviewers for their valuable comments on earlier versions of this paper. In addition, the author is grateful to Lisa Ramsey, Jared Yarsevich, and Amy Ward for assistance in coding, and especially to Lee Humphreys for invaluable contributions to the paper's conceptual development and implementation of coding procedures. Finally, the author would like to thank Matthew Farrelly and the Florida Department of Health for making the data available, Paul Messaris for insightful comments on an earlier version of the paper, and David Sly for the original study design and data collection. Correspondence to: Jeff Niederdeppe, Annenberg School for Communication, University of Pennsylvania, 3620 Walnut Street, Philadelphia, PA, 19146, USA. Email: [jniederdeppe@asc.upenn.edu](mailto:jniederdeppe@asc.upenn.edu)

*Keywords:* Syntactic Indeterminacy; Message Processing; Message Sensation Value; Message Features; Campaigns

Understanding message characteristics that enhance persuasion has long been of interest to communication researchers and those involved in the design of persuasive communication campaigns. O'Keefe (2003) notes that many of these studies assess effects of messages that arouse some type of response (e.g., fear appeals; perceived vividness; arguments rated as high in quality) without systematically exploring the message features that generate the induced response. Nevertheless, a growing body of research explores the relationship between specific audio, visual, or format features and outcomes related to persuasion (e.g., Lang, 2000; Morgan, Palmgreen, Stephenson, Hoyle, & Lorch, 2003; Reeves et al., 1985). Studies in this paradigm manipulate either the frequency which a particular feature is used (e.g., the number of cuts or edits) or the presence or absence of some feature (e.g., the use intense imagery).

Recent theoretical models, including the Limited Capacity Model of Mediated Message Processing (Lang, 2000) and the Activation Model of Information Exposure (Donohew, Lorch, & Palmgreen, 1998), provide a framework to understand the complex relationship between specific message features and audience responses. Research testing these theories consistently finds relationships between (a) fast-paced, arousing messages and (b) attention, recall, and comprehension. However, while these variables clearly have implications for the effectiveness of mediated messages in changing attitudes and behavior (Hornik, 2002), exposure and comprehension alone are insufficient to facilitate persuasion (McGuire, 2001). Persuasion theory argues that the long-term effectiveness of persuasive appeals is also contingent upon message recipients thinking about and generating favorable thoughts about a message (i.e., "message processing" or "elaboration"; Chaiken, 1987; Petty & Cacioppo, 1986).

Recent studies investigate the relationship between fast-paced, evocative messages and message processing in the context of anti-drug PSAs (Stephenson, 2002, 2003, Stephenson & Palmgreen, 2001). This research provides the foundation for a theory of the relationship between arousing messages and persuasion. In general, studies find that fast-paced, intense, graphic, and suspenseful messages enhance processing of anti-drug PSAs. However, this research does not identify specific audio, video, and format features that enhance message processing. As O'Keefe (2003) and Morgan et al. (2003) note, inattention to the specific features of mediated messages that contribute to persuasive outcomes provides campaign designers with little guidance to create effective messages and inhibits greater understanding of the fundamental elements of persuasive communication. This paper addresses this gap by exploring the relationship between specific stylistic features and message processing in the context of a statewide anti-tobacco campaign. In addition, the paper proposes that Syntactic Indeterminacy (SI) provides a plausible mechanism to explain why higher levels of message processing are observed in fast-paced, graphic, and arousing PSAs (Messaris, 1997).

### Models of Televised Message Attention, Recall, and Comprehension

The Limited Capacity Model posits that attention to television is governed by goal-driven behavior and involuntary processes evoked by elements of the message itself (Lang, 2000). Viewers choose to attend to specific aspects of television based on their intentions and interests but also as a result of automatic, “orienting responses” elicited by specific content (e.g., story, plot) and structural features (e.g., pacing, movement, intense imagery). Orienting responses are biologically based, involuntary reactions to the physical environment that signal to humans that they should pay attention to a stimulus. Orienting responses increase cognitive resources devoted to encoding a televised message and enhance the amount of information that an individual can process. The model warns, however, that individuals possess limited cognitive resources and suggests that over-use of extensive production features may expend these cognitive resources and reduce memory for the central message (e.g., Lang, 2000; Lang, Bolls, Potter, & Kawahara, 1999; Lang, Geiger, Strickwerda, & Summer, 1993). Nevertheless, features that require lower levels of cognitive processing (e.g., edits to different points of view within the same scene) generally increase recall and comprehension (Lang, Zhou, Schwartz, Bolls, & Potter, 2000), and thresholds for some stylistic characteristics appear quite high: cognitive overload is not apparent until viewers are exposed to ten or more scene changes (unrelated cuts) in a 30-second televised message (Lang et al., 1999).

The Activation Model proposes that individuals have biologically-based optimal levels of arousal and seek to achieve or maintain the desired level of stimulation (Donohew et al., 1998). While the Activation Model recognizes that individual goals and issue involvement are important factors, attention to a televised message is also a function of an individual’s need for sensation and the level of stimulation provided by the message. High sensation seekers (HSS), individuals who seek “varied, novel, complex and intense sensations and experiences and [are willing] to take physical, social, legal and financial risks for the sake of such experiences” (Zuckerman, 1990, p. 315), require more stimulating messages to maintain their attention than low sensation seekers (LSS). Messages perceived as novel, intense, fast-paced, and suspenseful, termed high in “perceived message sensation value (PMSV),” enhance attention, recall, and comprehension among HSS teens and young adults (see Donohew et al., 1998). High PMSV messages also seem to appeal to LSS respondents: many studies find a main effect for PMSV but no interaction between PMSV and sensation seeking (e.g., Harrington et al., 2003; Lorch et al., 1994; Palmgreen, Stephenson, Everett, Baseheart, & Francies, 2002; Stephenson & Palmgreen, 2001).

Research associated with the Limited Capacity Model and Activation Model shows that stylistic elements of mediated messages are associated with attention, recall, and comprehension (see Lang, 2000, and Harrington et al., 2003). Important differences are worth noting, however. Research testing the Activation Model employs what O’Keefe (2003) terms “effect-based” message variable definitions—PMSV identifies

the degree to which messages generate arousal and emotion, but does not identify intrinsic message features that contribute to these responses. In contrast, research testing the Limited Capacity Model manipulates specific, intrinsic message features (e.g., the number of unrelated cuts) rather than relying on effect-based characterizations. On the other hand, Limited Capacity Model research typically examines short-term outcomes (physiological responses, attention, and recall) rather than attitude or behavior change, while research testing the Activation Model has found significant effects of high PMSV messages on drug-related attitudes, intentions, and behaviors (e.g., Everett & Palmgreen, 1995; Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001). Recent studies have begun to explore the relationship between PMSV and message processing to provide clearer explanations for observed relationships between PMSV and longer term persuasive outcomes.

### **PMSV, Stylistic Features, Message Processing, and Persuasion**

Stephenson and colleagues studied the relationship between PMSV and message processing in a series of studies involving anti-marijuana and anti-heroin PSAs (Stephenson, 2002, 2003; Stephenson & Palmgreen, 2001). These studies show that (1) PMSV is associated with greater levels of favorable message processing among both HSS and LSS, (2) message processing is associated with increased persuasion, and (3) emotional responses partially mediate the relationship between PMSV and message processing. Nevertheless, these studies are of limited utility from a message design perspective because PMSV fails to identify specific audio, video, and format features that elicit sensory, arousal, and affective responses.

Morgan et al. (2003) examined the relationship between specific stylistic features and PMSV in an attempt to assimilate research associated with the Limited Capacity Model and the Activation Model. Building on a long tradition of research on emotional appeals (e.g., Hovland, Janis, & Kelley, 1953; Nabi, 1999; Witte, 1992) and more recent efforts to understand visual characteristics related to persuasion (e.g., Lang, 2000; Reeves, Lang, Kim, & Tatar, 1999; Reeves et al., 1985), Morgan et al. (2003) coded a series of anti-drug PSAs for a variety of audio, visual, and format features, and examined the association between the presence or absence of these features and PMSV. The study concluded that PMSV is roughly characterized by the use of specific video (number of cuts/edit, intense images), audio (sound saturation, music), and format features (unexpected format, surprise ending, scenes acted out), with a greater number of these features associated with higher PMSV.

Combined, Stephenson's studies (2002, 2003) and Morgan et al.'s work (2003) suggest that specific stylistic features likely influence message processing, in part mediated by emotional reactions to the ads. However, while some of the video, audio, and format features associated with PMSV are undoubtedly linked to affective responses (e.g., use of intense images; shocking ad conclusions), other features may affect message processing through alternate paths. Specifically, Syntactic Indetermi-

nacy (SI) provides a theoretical framework for explaining a relationship between unrelated cuts, edits, and message processing.

### Syntactic Indeterminacy and Message Processing

One of the unique elements of visual images is the lack of an explicit syntax (set of pre-established rules) for interpreting pictures (Messaris, 1997). As a result, montage-style edits (changes from one visual image to another, seemingly unrelated image) require the viewer to decode their meaning based on the message's context and references to pre-existing information stored in memory. "Because a visual argument cannot be entirely explicit, making sense of it may require of the viewer a greater degree of mental participation than would otherwise be the case. In a way, therefore, the viewer's interpretation of a visual argument is more a product of her or his own mind than it would be if the argument were completely explicit to begin with" (Messaris, 1997, p. xviii). Mental participation forces the viewer to actively process the message by retrieving relevant information from memory to construct meaning. Montage-style edits do not have to explicitly contribute to the message's central argument in order to facilitate message processing: the effort involved in making connections between two disparate images promotes interest in the ad even when they don't relate directly to the overall message (Messaris, 1997). Ultimately, SI involved with interpreting montage-style edits facilitates active message processing by forcing the viewer to invest mental effort into constructing meaning by accessing previously stored information from memory.

The notion of SI is similar to concepts introduced by Salomon (1981), who argued that verbal language has explicit rules for comprehension (syntax) while alternate symbolic forms of communication (visual images, non-verbal sounds) have at best only conventions for their use and interpretation. SI is also similar to concepts explored by the Limited Capacity Model (Lang, 2000). Lang (2000) distinguishes between edits ("related cuts," or cuts between images within the same visual scene), and "unrelated cuts" which transition to changes in time, location, or both (unrelated cuts are roughly equivalent to montage-style edits). Edits require relatively few cognitive resources and thus increase message attention and memory, even for very fast-paced advertisements with 24 or more edits in a 60-second sequence (Lang et al., 1993, 2000). One might interpret this finding as evidence that edits require viewers to actively construct meaning and thus enhance message processing through SI. While unrelated cuts decrease memory of the visual action that occurs immediately following an unrelated cut (Lang et al., 1993), other research suggests that ten or more unrelated cuts in a 30-second televised message are required to reduce *overall* memory of a message (Lang et al., 1999). While these findings are seemingly at odds, Lang et al.'s (1993) measure of visual memory might not adequately capture the type of message processing that occurs following an unrelated cut. Unrelated cuts may reduce memory of specific visual details immediately following the cut, but should increase processing of an ad's overall message by forcing the viewer to construct meaning from previously stored information.

### **Study Hypotheses**

Overall then, unrelated cuts and edits (to a lesser degree) appear to involve SI, which promotes active meaning construction among viewers. Thus a greater number of edits and unrelated cuts should increase SI and enhance message processing, so long as the number of unrelated cuts do not exceed Lang et al.'s (1999) overload threshold of ten or more in a 30-second interval. Based on the number of unrelated cuts and edits observed in the sample of anti-drug ads coded by Morgan et al. (2003), it is unlikely that the majority of anti-tobacco ads will contain a sufficient number of unrelated cuts to inhibit processing. Edits and unrelated cuts likely have little bearing on emotional responses. As a result, the presence of a relationship between unrelated cuts, edits, and message processing would be consistent with the argument that SI provides a theoretical link between these PMSV-enhancing ad features and processing.

H1: More frequent unrelated cuts will lead to increased message processing.

H2: More frequent edits will lead to increased message processing, but to a lesser extent than unrelated cuts.

Anti-drug ads that are “acted out” (where viewers are shown actions corresponding to the ad’s main point) receive considerably higher PMSV scores than ads featuring a “talking head” (where viewers are *only* told about the dangers of drugs; Morgan et al., 2003). This result, combined with Stephenson’s (2002, 2003) work, suggests that ads that convey the central message visually may increase message processing. While SI was originally presented as an explanation for the persuasive appeal of montage-style edits (Messaris, 1997), Salomon’s (1981) work suggests it is reasonable to extend this logic to visual imagery in general. In practice, ads where the central theme is acted out also feature a complementary verbal or textual message.<sup>1</sup> Thus, ads that are acted out feature two channels of information to process. While words have an explicit syntax, the combination of words and images do not. Thus, ads that are acted out require the viewer to make sense of the combined visual and verbal information without a set of explicit rules for doing so. This reasoning suggests that SI would also predict a relationship between ads that are acted out and increased message processing.

H3: Ads that are acted out will lead to increased message processing.

The use of intense images and the presence of a shocking or startling end to an ad (a “second-half punch”) are also strongly associated with PMSV (Morgan et al., 2003). It seems likely that these two message attributes are strongly linked to the potential for an ad to evoke a suspenseful, emotional response. This rationale, combined with Stephenson’s (2002, 2003) link between PMSV and message processing, suggests that ads that contain intense images and a second-half punch should also increase message processing. Assessing the relationship between these two variables and message processing might be considered a test of the relationship between suspenseful, emotionally evocative ad characteristics and message processing.

H4: The use of intense images and a second-half punch will lead to increased message processing.

Ads featuring background noise (“sound saturation,” which includes background chatter, crowds cheering, etc.) increase PMSV (Morgan et al., 2003). The authors also suggest that loud, fast music should also increase PMSV, although they did not measure this attribute. A reasonable argument can be made in support of these two audio components promoting both emotional responses and SI in the context of an anti-tobacco ad. Loud, fast music and the presence of background noise might increase an ad’s emotional evocation: intense music might promote arousal, while a laugh-track or sounds of a crowd cheering might facilitate a positive emotional response. On the other hand, intense music and background noise are sources of non-verbal, auditory information that an audience member must process. Much like visual images, non-verbal, auditory information does not have an explicit syntax. Take, for example, a Florida anti-tobacco ad that shows a tobacco executive testifying in front of Congress that he does not believe that tobacco is linked to health problems (“Senate Hearings”). Throughout this executive’s repeated denials, a laugh-track is simultaneously played (although nobody is laughing on-screen). The viewer is invited to make a connection between these two sources of information and conclude that the denial is a farce. Intense music could be used to make a similar argument. If auditory information is used either to facilitate emotional responses or draw connections between two channels of information with SI, higher levels of message processing would be expected.

H5: The use of sound saturation and loud, fast music will lead to increased message processing.

Finally, PMSV is associated with increased message processing and is roughly characterized by counting the overall number of the aforementioned PMSV-enhancing features (Morgan et al., 2003). The Limited Capacity Model would predict an inverted U-shaped relationship between the number of PMSV-enhancing features and message processing. Specifically, the model would predict increased message processing until the number of features exceeds the processing threshold, where processing would begin to decline. Previous research has not explored the additive influence of the aforementioned features, providing little guidance about whether these thresholds are likely to be exceeded by anti-tobacco ads.

RQ1: Does message processing increase monotonically with a greater number of PMSV-enhancing message features, or is the relationship characterized by an inverted U-shape?

## Data and Methods

### *Overview*

This paper explores study hypotheses and research questions using data from the Florida Antitobacco Media Evaluation (FAME) Surveys, a series of telephone surveys

among Florida teens designed to assess the impact of the Florida “truth” anti-tobacco media campaign (Sly, Heald, & Ray, 2001). The study began with a content analysis of ads that were included in at least one of the FAME Surveys to identify PMSV-enhancing video, audio, and format features in each ad (Morgan et al., 2003). Next, these codes were merged with FAME survey data to test the relationship between each feature and message processing. Finally, an additive index was created by summing the number of PMSV-enhancing features contained in each ad and gauging the impact of this index on message processing.

### *Content Analysis Procedures*

This study used modified versions of Morgan et al.’s (2003) coding categories and additional measures developed by Lang (2000) and Southwell (2005). While Morgan et al. coded anti-drug ads for 11 different audio, visual, and format features, this analysis focuses only on those items that were independent predictors of PMSV, including (1) intense images, (2) sound saturation, (3) acted out, and (4) second-half punch. While Morgan et al. also found that “unexpected format” was strongly associated with PMSV, the operational definition was too subjective to be deemed a formal message feature and excluded from the analysis.<sup>2</sup>

Morgan et al. (2003) also found that the presence of “music” was unassociated with PMSV among anti-drug PSAs, but other authors argue that only intense, fast-paced music should enhance PMSV (Stephenson et al., 1999). Using measures developed by Nabi (2000), coders assessed music tempo (beats per minute [bpm]) and volume (relative to other sounds in the ad). Ads that were fast ( $>120$  bpm) and loud were expected to enhance message processing.

Lang (2000) and Southwell (2005) provided guidance for appropriate coding schemes for counting the number of unrelated cuts and edits. Lang defined a cut within an ad as a change from one visual scene to another, distinguishing them from edits between two camera shots within the same visual scene. Southwell developed additional coding rules for unrelated cuts to eliminate ambiguity for some types of transitions (e.g., extreme close-ups, split-screens, cuts to sponsor). Southwell’s rules were used in the analysis.

Two independent coders separately content analyzed each of the 27 ads that were included on the FAME surveys. Several measures achieved reliability in the first iteration (unrelated cuts, edits, intense images, loud/fast music), while three measures did not (sound saturation, acted out, and second-half punch). These items were re-crafted to reduce ambiguity and independently re-coded until acceptable reliability was reached. Brief item descriptions and final Krippendorff’s alpha scores are found in Table 1.

### *Ad Characteristics and Internal Consistency*

Sample ads averaged 11.8 edits ( $SD = 1.83$ ,  $Mdn = 10$ ) and 4.4 unrelated cuts ( $SD = 0.98$ ,  $Mdn = 2.5$ ) per 30 seconds. Consistent with study expectations, only 3 of the 27

**Table 1** Ad Feature Descriptions and Inter-Coder Reliability

Item	Description	Krippendorff's alpha
Unrelated cuts	Any transition to a new physical environment (one that is not visible in, or contiguous with, the previous shot)	0.811
Edits	Any transition to a new camera shot within the same physical environment	0.956
Intense images	Inclusion of any images that are intense, grotesque, disgusting, or horrifying	0.844
Loud/fast music	The use of loud (relative to other sounds in the ad) and fast ( $>120$ beats per minute) music throughout the ad	0.839
Acted out	Youth or adults are engaged in actions or activities that directly correspond to the ad's main theme(s). This does not include individuals that simply talk directly to the camera, movement in the background that is incidental to the ad's main point, cartoon character or animal activity, or characters that stand still while the ad's point is conveyed in text, figures, or voice	0.811
Second-half punch	The presence of a shocking, startling, or very surprising end to the ad that a first-time viewer could not have anticipated. A second-half punch must occur in the second half of the advertisement	0.836
Sound saturation	The use of background noise consistently and prominently throughout the majority of the ad. Background noise might include street sounds, crowds cheering, background chatter, or sound effects, but does not include music playing or main characters talking	0.771

separate ads exceeded Lang et al.'s (1999) threshold of ten or more unrelated cuts. More than half of the ads were acted out (74.1%), and employed sound saturation (66.7%). A second-half punch (37.0%), intense imagery (33.3%), and loud/fast music (14.8%) were less commonly employed.

Analyses of bivariate correlations between PMSV-enhancing features revealed two pairs of items that were highly correlated and consistent with study hypotheses. The two features hypothesized to be suspenseful (second-half punch and intense imagery) were strongly associated ( $r=.60$ ,  $p < .01$ ,  $n = 27$  ads). Furthermore, two visual features that were thought to promote SI (edits and acted out), to a lesser degree to that of unrelated cuts, were also strongly associated ( $r=.61$ ,  $p < .01$ ,  $n = 27$  ads). To eliminate potential co-efficient instability from multi-collinearity, each pair was summed to create two scaled measures: "suspenseful features," (second-half punch + intense imagery; range 0–2,  $M = 0.70$ ,  $SD = 0.87$ ), and "related visual activity," (median split of edits+acted out; range 0–2,  $M = 1.26$ ,  $SD = 0.86$ ). Bivariate correlations between the summed measures and the remaining ad features did not exceed .30.

### *Survey Data*

FAME was a repeated, cross-sectional telephone survey of Florida teens designed to assess the impact of the Florida "truth" campaign (Sly et al., 2001). The sample was drawn from a commercial vendor list that contained information about gender, race/ethnicity, grade in school, and telephone number for approximately 50% of the Florida teen population. A random sample from this respondent pool was drawn and stratified for region, gender, age, and race/ethnicity. The baseline survey was conducted in April 1998 prior to the launch of the Florida "truth" campaign. A total of eight survey waves, each containing approximately 1800 new respondents, were conducted approximately every six months between April 1998 and May 2001.

Each survey asked respondents to indicate whether or not they had seen three to nine specific anti-tobacco ads that had aired in the preceding year. In wave 1 (April 1998) and waves 4 (October 1999) through 8 (May 2001), respondents were also asked a series of follow-up questions about their reactions to each ad. Since two of these questions comprise the main dependent variable for this study, the final analysis sample consisted of 7622 Florida teens aged 12–18 who confirmed awareness of at least one ad inquired about in waves 1, 4, 5, 6, 7, or 8. To confirm awareness, respondents were provided a short description of a specific ad and asked to provide additional details about the ad's content (see Sly et al., 2001, for a detailed description). One ad was randomly selected among respondents who confirmed awareness of multiple ads to ensure that each observation in the final analysis sample was independent. Each respondent was assigned the aforementioned content code values for the specific ad selected.

The average response rates for waves 1–3 were just under 69%<sup>3</sup> (Sly et al., 2001; response rates for subsequent waves were not reported). The final sample was 52.6% male with a mean age of 15.45 ( $SD = 1.65$ ). Over two-thirds of respondents (68.8%) identified themselves as White, with 13.0% African-American, 13.5% Hispanic, and 4.2% "other" (the remaining 0.4% were missing values). Additional details about sampling procedures, their rationale, and questionnaire development are presented elsewhere (Sly et al., 2001).

### *Dependent Variable—Message Processing*

Message processing is typically measured using "thought-listing" measures (Petty & Cacioppo, 1986). These measures require respondents to write down all message-relevant thoughts within a few minutes of exposure to a persuasive communication and rate whether each thought was positive, negative, or neutral. In the context of telephone surveys evaluating an anti-tobacco media campaign, however, thought listing measures are time consuming, place a heavy burden on respondents, and reference messages that were viewed weeks before the interview.

Respondents who confirmed awareness of an ad were asked three questions about their ad responses. Two of these measures, "Did this advertisement make you think about whether or not you should smoke?" and "Did you talk to your friends about

this ad?" reasonably address active engagement with message content following exposure. The first item appears to bear a straightforward relationship to whether or not a respondent generated thoughts about a message, and this measure is moderately correlated with thought-listing measures (Stephenson & Palmgreen, 2001). The second item also addresses the degree to which teens engage with message content following exposure, but likely at a higher level of processing. One must access information about a message from memory *and organize* message-relevant thoughts to talk about an ad; 63.4% of respondents reported thinking about whether or not to smoke after ad exposure, while 25.4% reported talking about the ad.

These considerations suggest these two measures should form a Guttman scale, where the vast majority of respondents who report talking about an ad should also report having thought about it, but not vice versa. Comparisons between the observed response patterns to the ideal response pattern provide additional evidence that the items measure the same underlying construct: 94% of respondents exhibited zero errors (Edwards, 1957), and 77.7% of respondents who reported talking about the ad also thought about it. While the co-efficient of reproducibility ( $CR = .89$ ) fell slightly below McIver and Carmines' (1981) scaling criteria ( $CR > .90$ ), the co-efficient of stability was well above their standard ( $CS = .82$ ; criteria  $CS > .60$ ). Given that the  $CS$  statistic compares  $CR$  to its lowest possible value based on item distributions,  $CS$  appears to provide a more reasonable assessment of fit than  $CR$ . A Guttman-style message processing scale, calculated by summing responses to "think about" and "talk about," represents the study's dependent variable (range 0–2,  $M = 0.88$ ,  $SD = 0.71$ ).

Long-term persuasion is contingent upon generating *favorable* thoughts about a message rather than negative ones. Responses to a third item, "Did you like this ad?" provide strong evidence that the majority of Florida teens who engaged in message processing generated favorable thoughts about the message: 92.1% of respondents who said an ad made them think about whether or not to smoke indicated that they liked the ad, compared to 75.6% of those who didn't think about it ( $p < .001$ ,  $\chi^2$  test). Similarly, 93.0% of respondents who talked about an ad also liked the ad, compared to 83.6% of those who did not talk about it ( $p < .001$ ,  $\chi^2$  test). The majority of message processing thus occurred among respondents who reported a favorable ad reaction.

#### *Measures—Potential Confounding and Moderating Variables*

##### *Campaign verbal arguments*

Persuasion theory and research suggests that the verbal arguments used in persuasive messages have strong implications for message processing (Chaiken, 1987; Petty & Caccioppo, 1986), highlighting the importance of controlling for these factors. The FAME surveys included ads from the Florida "truth" campaign as well as other, national campaigns that received significant airplay in Florida, including the national "truth" campaign (launched in February 2000), tobacco company Philip Morris' "Think, Don't Smoke" effort (launched in 1999), and public service announcements

(PSAs) that aired prior to the launch of Florida “truth.” Florida and national “truth” campaign messages were quite uniform in their focus on the deceptive practices of the tobacco industry to market a harmful product to teens and their use of non-directive messages that did not instruct teens about whether or not to smoke (Farrelly, Niederdeppe, & Yarsevich, 2003). “Think, Don’t Smoke” and PSA messages, on the other hand, described the social consequences of smoking and portrayed smoking as personal choice, concluding with explicit, directive messages (e.g., “Think, don’t smoke,” and “Tobacco . . . tumor-causing, teeth-staining, smelly, puking habit;” Farrelly et al., 2003). Thus any potentially confounding influence of verbal arguments on message processing should be captured by a single indicator variable distinguishing between the two campaign approaches.

#### *Smoking behavior and social influences*

Issue involvement, defined as “the extent to which the attitudinal issue under consideration is of personal importance” (Petty & Cacioppo, 1979, p. 1915), is linked to higher levels of message processing (Johnson & Eagly, 1989; Petty & Cacioppo, 1990; Stephenson, Benoit, & Tschida, 2001). It is thus important to control for smoking involvement when assessing the impact of PMSV-enhancing features on message processing. Although the FAME surveys did not include direct measures of smoking involvement, the construct is likely in part a function of behavior and social influences (Stephenson & Palmgreen, 2001). All multi-variate models included controls for smoking behavior and smoking among close others. Respondents were categorized into three groups: never smokers, non-current smokers (tried cigarettes but had not smoked in past 30 days), and current smokers (smoked in past 30 days; index  $M=0.52$ ,  $SD=0.70$ ). Social influences were measured with two indicator variables: friend smoking (at least one friend smokes; 34.3% of sample) and household smoking (at least one household member smokes; 35.4% of sample).

#### *Demographics and survey wave*

Analytic models were run separately by age group (12–15 and 16–18). Studies indicate that the Florida “truth” campaign was more successful in reducing smoking behavior among younger teens compared to older youth, suggesting potential differences in message processing (Bauer, Johnson, Hopkins, & Brooks, 2000). In addition, previous studies examined message processing only among teens and young adults (Stephenson, 2002, 2003; Stephenson & Palmgreen, 2001). It is possible that younger teens do not possess the cognitive capacity to process messages in the same way that their older counterparts do. Each of these factors highlights the possibility that specific stylistic features might differentially affect message processing by age. Models also included a linear control variable for specific age within each age group and indicators for gender and race/ethnicity. Finally, indicator variables for each survey wave were included (wave 1 omitted) to account for the potential that Florida teens might process anti-tobacco messages differently over time.

## Results

### *Cumulative Logit Models—Specific PMSV-Enhancing Features*

Cumulative logit models were used to assess the independent impact of each PMSV-enhancing feature (or scaled features) on message processing (Table 2). Standardized co-efficients were calculated by multiplying each log-odds co-efficient by the independent variable's standard deviation and dividing by 1.81 (Allison, 1999). Model fit was assessed with a likelihood ratio chi-square test (testing the global null hypothesis) and generalized *R*-squared.

Contrary to hypotheses 1–5, there were no significant associations between message features and message processing among younger teens. Among older teens, the number of unrelated cuts (standardized co-efficient = .09, *OR* = 1.03, *p* < .001) and the use of suspenseful features (standardized co-efficient = .10, *OR* = 1.21, *p* < .001) increased the odds of message processing, findings consistent with hypotheses 1 and 4. However, the remaining three hypotheses (2, 3, and 5) found no support among this age group.

Subsequent analyses explored whether the inclusion of a quadratic term for unrelated cuts produced significantly better model fit by taking the difference in  $-2 \log$  likelihoods and calculating the significance of a chi-square test with two degrees of freedom (the difference in the number of parameters between models). These analyses provided no evidence that the inclusion of a quadratic term improved model fit among either age group.

**Table 2** Relationship between PMSV-Enhancing Components and Message Processing

	12–15 ( <i>n</i> = 3409)		16–18 ( <i>n</i> = 4171)	
	Standardized co-efficient	Odds ratio	Standardized co-efficient	Odds ratio
Number of unrelated cuts	0.04	1.01	0.09***	1.03***
Visual (edits + acted out)	−0.02	0.96	0.03	1.07
Suspenseful (intense images + second-half punch)	0.04	1.09	0.10***	1.21***
Loud/fast music	0.01	1.06	0.04	1.27
Sound saturation	0.02	1.08	−0.04	0.85
Campaign (TDS/PSA vs. truth)	0.03	1.12	−0.01	0.96
Age	−0.12***	0.82***	0.04*	0.91*
Male	0.01	1.05	0.04*	1.15*
Black	0.05*	1.33*	0.07***	1.42***
Hispanic	0.06***	1.45***	0.04*	1.23*
Other	0.03	1.29	−0.03	0.077
Smoking behavior	0.03	1.10	0.01	1.02
Friend smokes	−0.03	0.87	0.01	1.05
Household smokes	−0.01	0.95	0.01	1.05
Generalized <i>R</i> -squared		.025		.034

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001. Models also included indicator variables for each survey wave (wave 1 omitted as the comparison group) to account for possible differences in message processing over time.

### Cumulative Logit Models—Three-Item Additive Index

Next, a three-item index was created by adding unrelated cuts (dichotomized by a median split), intense images, and second-half punch (index range 0–3,  $M = 1.35$ ,  $SD = 1.28$ ). This measure was developed to provide an estimate of the overall effect of PMSV-enhancing features on message processing. Model results are presented in Table 3. Among younger teens, the three-item index was significantly associated with increased message processing (standardized co-efficient = .08,  $OR = 1.11$ ,  $p < .01$ ). The effect was considerably larger among older teens (standardized co-efficient = .17,  $OR = 1.25$ ,  $p < .001$ ).

The analysis explored research question 1 by including a quadratic term for the additive, three-item index. This specification provided a direct test of whether the combined use of five or more unrelated cuts, intense imagery, and a second-half punch overloaded the cognitive system and reduced message processing. The inclusion of a quadratic term did not improve model fit among younger teens, but slightly improved model fit among older teens ( $p < .05$ ). Figure 1 plots model predicted values for message processing by the additive index to gain a clear understanding of the relationship between these variables. The figure shows that younger teens were more likely to report engaging in both types of message processing than older teens. Among older teens, higher levels of message processing were associated with increases in the additive index, but the rate of increase was smaller at the highest index values. Nevertheless, inconsistent with expectations derived from the Limited Capacity Model, the model did not predict lower levels of processing when all three message features used in the same ad.

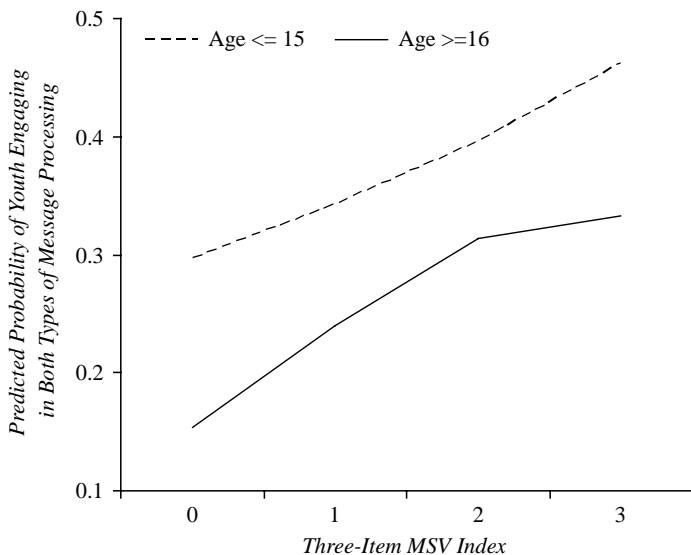
### Discussion

This study provides evidence that the use of specific PMSV-enhancing video and format features are associated with increased message processing of anti-tobacco ads, particularly among older teens (16–18). Consistent with study hypotheses, more frequent unrelated cuts (hypothesis 1) and the use of suspenseful features (hypothesis 4) increased the odds that older teens engaged in message processing. Suspenseful imagery (intense images) and formats (a second-half punch) are likely to promote emotional

**Table 3** Relationship between a Three-Item Additive MSV Index and Message Processing

	12–15 ( $n = 3409$ )		16–18 ( $n = 4171$ )	
	Standardized co-efficient	Odds ratio	Standardized co-efficient	Odds ratio
Three-Item MSV Index	0.08**	1.11**	0.17***	1.25**
Generalized $R^2$		.025		.030

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ . Models included controls for campaign, age, gender, race/ethnicity, smoking behavior, friend smoking, household smoking, and a series of indicator variables for each survey wave (wave 1 omitted as the comparison group) to account for possible differences in message processing over time.



**Figure 1** Relationship between MSV index and message processing by age.

responses; as a result, the association between these features and processing are potentially explained by the fact that emotional responses promote additional message scrutiny and processing (Stephenson, 2002, 2003). Unrelated cuts, however, likely have little bearing on emotional responses to an ad, suggesting that an alternate theoretical mechanism explains the relationship between this feature and message processing. SI provides such an explanation, suggesting that interpretation of unrelated images juxtaposed through editing increases the amount of cognitive resources devoted to processing a message, which in turn promotes message processing (Messaris, 1997). While the effect sizes for both of these features are relatively small in absolute terms (.09 for unrelated cuts, .10 for suspenseful features among older teens), they were greater in magnitude than any demographic characteristic included in the older teen models. The fact that similar effect sizes were observed for unrelated cuts and suspenseful features suggests that SI and suspense-inducing features play comparable, complementary roles in promoting message processing.

The relationship between PMSV-enhancing features and message processing among younger teens (12–15) was less clear. When considered independently, none of the message features tested in this study were associated with increased message processing, although four of five were in the hypothesized direction. An additive index comprised of unrelated cuts and suspenseful features, however, was associated with increased processing among this age group. The magnitude of this association was considerably smaller (effect size = .08) compared to that observed among older teens (effect size = .17), suggesting that these features had weaker implications for processing teens aged 15 and younger.

Younger teens were considerably more likely than their older counterparts to engage in message processing after seeing an anti-tobacco ad. This suggests that the stylistic

presentation of anti-tobacco ads may simply matter less for message processing and subsequent persuasion among younger teens than older teens. Skepticism toward advertising increases steadily throughout the teenage years (Boush, Friestad, & Rose, 1994). Therefore, it is possible that older teens are more resistant to persuasion and thus are more difficult audience to engage in active, favorable message processing. If this is indeed the case, increasing the number of PMSV-enhancing features in messages targeting this group appears to be one promising strategy to facilitate message processing and subsequent persuasion. Future studies should assess differences in message processing by age to confirm this speculative explanation.

This study provided no evidence that the limited cognitive capacity of younger viewers explains differences in PMSV-enhancing feature effects by age. Among younger teens, the combined use of frequent unrelated cuts, intense images, and a second-half punch produced higher levels of processing compared to the use of zero, one, or two of these features. Similarly, the use of all three of these features increased message processing among older teens when compared to the use of fewer features (although the marginal increase in message processing between two and three PMSV-enhancing features was limited). These results suggest that the combination of unrelated cuts, intense imagery, and a second-half punch are insufficient to produce cognitive overload and undermine message processing. Nevertheless, this study does not argue that the Limited Capacity Model is mistaken or inapplicable to anti-tobacco ads. As noted previously, only three of the ads used in the study contained enough unrelated cuts to exceed Lang et al.'s (1993) proposed threshold (ten or more unrelated cuts) for overload. This finding suggests that many anti-tobacco advertisements are unlikely to exceed unrelated cut thresholds for reduced message processing and provides evidence that the relatively frequent use of this feature might have favorable consequences for ad effectiveness.

Contrary to study hypotheses, the use of frequent edits, an "acted out" format, loud/fast music, and sound saturation did not increase message processing among younger or older teens. These hypotheses were derived by extending concepts of SI to other visual and non-verbal audio characteristics. However, SI was originally proposed as an explanation for the persuasive effects of juxtaposed images (those captured by unrelated cuts). Thus, failure to support the extension of this logic to other message features should not be used to discredit the utility of SI as an explanation for the effects of unrelated cuts on message processing. Study hypotheses based on SI did predict that the effects of unrelated cuts on message processing would be stronger than edits, a finding that found support among older teens. It is also possible that the study lacked statistical power to detect effects for these characteristics. Nevertheless, given the study's large sample size, failure to detect effects of such magnitude are probably of little practical relevance.

### *Limitations*

While consistent with the theoretical argument outlined in the introduction, survey data are not equipped to provide definitive support for SI as the explanatory

mechanism for the relationship between unrelated cuts and message processing. It is still possible that alternate mechanisms (e.g., increased attention alone, emotional arousal) could account for the observed relationship between these variables. Future studies might assess reflexive and physiological responses to unrelated cuts to explore these alternate explanations in a laboratory setting. For example, the time it takes for an individual to respond to a secondary task (e.g., hitting a button every time a flashing light appears) while processing a message provides an indirect measure of cognitive resources devoted to message encoding; slower reaction time signals increased cognitive resources devoted to encoding (Lang, 2000). SI argues that processing juxtaposed images requires individuals to retrieve relevant information from memory to encode and interpret the images' meaning. Thus memory retrieval prompted by SI should increase resources allocated to message encoding and consequently reduce secondary task reaction times. Indeed, the available evidence shows that unrelated cuts do reduce reaction times associated with secondary tasks, suggesting that attention alone does not account for processing associated with unrelated cuts (Geiger & Reeves, 1993; Lang et al., 1993). However, processing emotionally evocative messages also reduces reaction times (Lang et al., 1999), highlighting the need to assess whether unrelated cuts also produce an emotional response.

Several strategies have been used to measure emotional response to visual stimuli, including (1) detailed observation and coding of facial expressions (Ekman & Friesen, 1978), (2) electrode measurement of electromyographic (EMG) activity in facial muscles (Cacioppo & Petty, 1989), and (3) self-report of emotional reactions (Palmgreen et al., 2002). While none of these approaches represents a "gold standard" of emotion measurement, researchers might expose respondents to a set of unrelated cuts used in anti-tobacco ads and use a combination of these strategies to assess emotional responses. SI in and of itself should not evoke emotional reactions. As a result, research documenting slowed secondary task reaction times and minimal emotional response to unrelated cuts would provide stronger support for SI as the explanatory mechanism.

Although each model included an extensive list of control variables, data on the relative reach and frequency of each ad in the study was not available. It is likely that some ads aired more frequently and for longer periods of time and thus could have affected the level of message processing. However, differences in relative "dose" would only confound the impact of PMSV-enhancing features if the heavy rotation ads were more likely to contain these features. This hypothesis was tested among a subset of ads from the Florida "truth" campaign using data about the relative reach and frequency of each ad's airplay (parallel data was unavailable for the other campaigns). Reach and frequency did not reduce the impact of PMSV-enhancing features on either message processing outcome. These findings provide assurance that, at least for the Florida "truth" campaign, the impact of PMSV-enhancing features on message processing cannot be explained by the frequency or duration of individual ads.

Another study limitation is the fact that sensation-seeking measures were not available in the FAME surveys. The Activation Model proposes that exposure is a

function of the interaction between an individual's level of sensation seeking and PMSV-enhancing attributes of the message itself (Donohew et al., 1998). Nevertheless, several studies have found little evidence for differential effects of PMSV between low and high sensation seekers (e.g., Harrington et al., 2003; Lorch et al., 1994; Palmgreen et al., 2002; Stephenson & Palmgreen, 2001). These results suggest that differences between HSS and LSS may not be as pronounced as the Activation Model (Donohew et al., 1998) predicts. Indeed, this study provided evidence that specific PMSV-enhancing features were associated with increased message processing among all older teens (16–18). Nevertheless, future studies should investigate whether specific PMSV-enhancing features exhibit different relationships with message processing by sensation seeking.

The list of PMSV-enhancing features coded for and tested in this study is likely incomplete. The basis for the selection of these particular features was the result of one study (Morgan et al., 2003), which made no claims to have identified an exhaustive list of PMSV-enhancing features. Research suggests that other characteristics, such as the extensive use of extreme close-ups (Reeves et al., 1999), frequent onscreen movement (Schmitt, Anderson, & Collins, 1999), or more subjective ad qualities such as the quality of acting or script (Morgan et al., 2003), may also exert influence on PMSV and message processing.

The use of an additive index to gauge the overall effect size of PMSV-enhancing features lacks strong theoretical justification. It is likely that certain PMSV-enhancing features are more strongly related to a message's sensory, affective, and arousal responses, but assigning each a value of "1" or "0" may obscure the unique and differential contributions of each feature. Nevertheless, this study's findings suggest the effects of unrelated cuts (standardized co-efficient = .09) and suspenseful features (standardized co-efficient = .10) were roughly equal in magnitude. In the absence of stronger theory or empirical support, an additive index appears to be an appropriate starting point for assessing the cumulative impact of audio, visual, and format features on message processing. As study findings that isolate the independent contributions of various stylistic features continue to accumulate, future studies might develop more refined measures of PMSV-enhancing features. Clearly more research is needed to specify the optimal mix of audio, video, and format features that maximize the likelihood of persuasion and subsequent behavior change. In addition, future studies should continue to explore alternate features that might enhance attention and message processing and continue to explore whether the features examined here increase these outcomes in a variety of message contexts.

Finally, this study explored the relationship between PMSV-enhancing features and message processing, which other studies have in turn linked to enhanced long-term persuasion (e.g., Petty & Cacioppo, 1986). However, this study provides no direct evidence that these features increase the likelihood that anti-tobacco ads will affect tobacco-related beliefs, attitudes, intentions, and behavior. Nevertheless, other studies provide strong evidence that the Florida and national "truth" campaigns have been successful in changing tobacco-industry related attitudes and behavior (Farrelly, Davis, Haviland, Messeri, & Healton, 2005; Sly, Trapido, & Ray, 2002), suggesting that

message processing translated into subsequent attitude and behavior change. The fact that the Florida and national “truth” campaigns have used messages that feature PMSV-enhancing features might explain, in part, why these campaigns have been met with success.

Nevertheless, the use of a survey methodology requires respondents to rely on their own subjective recall of their exposure and reaction to specific ads. Controlled laboratory experiments, on the other hand, can ensure equivalent message exposure among groups and thus permit causal attribution for subsequent changes in beliefs, attitudes, intentions and behavior to specific message characteristics. Lang and colleagues, among others, have explored a variety of PMSV-enhancing features using experimental methodologies, but many of these studies have employed physiological measures (e.g., heart-rate deceleration, galvanic skin response) rather than measures of message processing and persuasion (e.g., Geiger & Reeves, 1993; Lang, 2000; Lang et al., 1999). Future experiments might incorporate these measures to provide a broader understanding of the relationship between stylistic elements and outcomes.

Methodological limitations notwithstanding, this study provides evidence that specific PMSV-enhancing features (the use of unrelated cuts, intense imagery, and a second-half punch) enhance the likelihood that teens actively process anti-tobacco ads. This study extends theories of attention (Activation Model of Information Exposure) and processing (Limited Capacity Model) into the context of anti-tobacco media campaign design and moves us closer to a broader understanding of the relationship between stylistic features, message processing, and persuasion.

## Notes

- [1] Each ad in this study’s sample coded as “acted out” also conveyed the ad’s central meaning verbally or with text.
- [2] Morgan et al.’s (2003) “unexpected format” definition read as follows: “If the images and the message could be interchangeable with a number of other antidrug PSAs, it is ‘expected,’” (p. 519).
- [3] Response rate calculations account for parent refusals, child refusals, and failure to contact after five call-backs.

## References

- Allison, P. (1999). *Logistic regression using the SAS system: Theory and application*. Cary, NC: SAS Institute.
- Bauer, U. E., Johnson, T. M., Hopkins, R. S., & Brooks, R. G. (2000). Changes in youth cigarette use and intentions following implementation of a tobacco control program: Findings from the Florida youth tobacco survey, 1998–2000. *Journal of the American Medical Association*, 284, 723–728.
- Boush, D. M., Friestad, M., & Rose, G. M. (1994). Adolescent skepticism toward TV advertising and knowledge or advertiser tactics. *Journal of Consumer Research*, 21, 165–175.
- Cacioppo, J. T., & Petty, R. E. (1989). The elaboration likelihood model: The role of affect and affect-laden information processing in persuasion. In P. Cafferata, & A. M. Taybou (Eds.),

- Cognitive and affective responses to advertising* (pp. 69–90). Lexington, MA: D.C. Heath & Co.
- Chaiken, S. (1987). The heuristic model of persuasion. In M. P. Zanna, J. M. Olson, & C. P. Herman (Eds.), *Social influence: The Ontario symposium* (Vol. 5, pp. 3–30). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Donohew, L., Lorch, E. P., & Palmgreen, P. (1998). Applications of a theoretic model of information exposure to health interventions. *Human Communication Research*, 24, 454–468.
- Edwards, A. (1957). *Techniques of attitude scale construction*. Englewood Cliffs, NJ: Prentice Hall.
- Ekman, P., & Friesen, W. V. (1978). *Facial action coding system: A technique for the measurement of facial movement*. Palo Alto, CA: Consulting Psychologists Press.
- Everett, M. W., & Palmgreen, P. (1995). Influences of sensation seeking, message sensation value, and program context on effectiveness of anti-cocaine public service announcements. *Health Communication*, 7, 225–248.
- Farrelly, M. C., Davis, K. C., Haviland, M. L., Messeri, P., & Healton, C. G. (2005). Evidence of a dose-response relationship between “truth” antismoking ads and youth smoking prevalence. *American Journal of Public Health*, 95, 425–431.
- Farrelly, M. C., Niederdeppe, J., & Yarchoan, J. (2003). Youth tobacco prevention mass media campaigns: Past, present and future. *Tobacco Control*, 12(Suppl. 1), i35–i47.
- Geiger, S., & Reeves, B. (1993). The effects of scene changes and semantic relatedness on attention to television. *Communication Research*, 20, 155–175.
- Harrington, N. G., Lane, D. R., Donohew, L., Zimmerman, R. S., Norling, G. R., An, J.-H., et al. (2003). Persuasive strategies for effective anti-drug messages. *Communication Monographs*, 70, 16–30.
- Hornik, R. C. (2002). *Public health communication: Evidence for behavior change*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion: Psychological studies of opinion change*. New Haven, CT: Yale University Press.
- Johnson, B. T., & Eagly, A. H. (1989). Effects of involvement on persuasion: A meta-analysis. *Psychological Bulletin*, 106, 290–314.
- Lang, A. (2000). The limited capacity model of mediated message processing. *Journal of Communication*, 50, 46–70.
- Lang, A., Bolls, P., Potter, R. F., & Kawahara, K. (1999). The effects of production pacing and arousing content on the information processing of television messages. *Journal of Broadcasting and Electronic Media*, 43, 451–475.
- Lang, A., Geiger, S., Strickwerda, M., & Summer, J. (1993). The effects of related and unrelated cuts on viewers’ memory for television: A limited capacity theory of television viewing. *Communication Research*, 20, 4–29.
- Lang, A., Zhou, S., Schwartz, N., Bolls, P. D., & Potter, R. F. (2000). The effects of edits on arousal, attention, and memory for television messages: When an edit is an edit can an edit be too much? *Journal of Broadcasting and Electronic Media*, 44, 94–109.
- Lorch, E. P., Palmgreen, P., Donohew, L., Helm, D., Baer, S. A., & Dsilva, M. U. (1994). Program context, sensation seeking, and attention to televised anti-drug public service announcements. *Human Communication Research*, 20, 390–412.
- McGuire, W. J. (2001). Input and output variables currently promising for constructing persuasive communications. In R. E. Rice, & C. K. Atkin (Eds.), *Public communication campaigns* (3rd ed., pp. 22–48). Thousand Oaks, CA: Sage.
- McIver, J. P., & Carmines, E. G. (1981). *Unidimensional scaling*. Beverly Hills, CA: Sage.
- Messaris, P. (1997). *Visual persuasion: The role of images in advertising*. Thousand Oaks, CA: Sage.
- Morgan, S. E., Palmgreen, P., Stephenson, M. T., Hoyle, R. H., & Lorch, E. P. (2003). Associations between message features and subjective evaluations of the sensation value of antidrug public service announcements. *Journal of Communication*, 53, 512–526.

- Nabi, R. L. (1999). A cognitive-functional model for the effects of discrete negative emotions on information processing, attitude change and recall. *Communication Theory*, 9, 292–320.
- Nabi, R. (2000). *Antidrug PSA codebook*. Unpublished manuscript, University of Arizona, Tucson.
- O'Keefe, D. J. (2003). Message properties, mediating states, and manipulation checks: Claims, evidence, and data analysis in experimental persuasive message effects research. *Communication Theory*, 13, 251–274.
- Palmgreen, P., Donohew, L., Lorch, E. P., Hoyle, R. H., & Stephenson, M. T. (2001). Television campaigns and adolescent marijuana use: Tests of sensation seeking targeting. *American Journal of Public Health*, 91, 292–296.
- Palmgreen, P., Stephenson, M. T., Everett, M. W., Baseheart, J. R., & Francies, R. (2002). Perceived message sensation value (PMSV) and the dimensions and validation of a PMSV scale. *Health Communication*, 14, 403–428.
- Petty, R. E., & Cacioppo, J. T. (1979). Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology*, 37, 1915–1926.
- Petty, R. E., & Cacioppo, J. T. (1986). *Attitudes and persuasion: Central and peripheral routes to attitude change*. New York: Springer-Verlag.
- Petty, R. E., & Cacioppo, J. T. (1990). Involvement and persuasion: Tradition versus integration. *Psychological Bulletin*, 107, 367–374.
- Reeves, B., Lang, A., Kim, E. Y., & Tatar, D. (1999). The effects of screen size and message content on attention and arousal. *Media Psychology*, 1, 49–67.
- Reeves, B., Thorson, E., Rothschild, M., McDonald, D., Hirsch, J., & Goldstein, R. (1985). Attention to television: Intra stimulus effects of movement and scene changes on alpha variation over time. *International Journal of Neuroscience*, 25, 241–255.
- Salomon, G. (1981). *Interaction of media, cognition, and learning*. San Francisco: Jossey-Bass.
- Schmitt, K. L., Anderson, D. R., & Collins, P. A. (1999). Form and content: Looking at visual features of television. *Developmental Psychology*, 35, 1156–1167.
- Sly, D. F., Heald, G. R., & Ray, S. (2001). The Florida "truth" anti-tobacco media evaluation: Design, first year results, and implications for planning future state media evaluations. *Tobacco Control*, 10, 9–15.
- Sly, D. F., Trapido, E., & Ray, S. (2002). Evidence of the dose effects of an antitobacco counteradvertising campaign. *Preventive Medicine*, 35, 511–518.
- Southwell, B. G. (2005). Between messages and people: A multilevel model of memory for television content. *Communication Research*, 32, 112–140.
- Stephenson, M. T. (2002). Sensation seeking as a moderator of the processing of anti-heroin public service announcements. *Communication Studies*, 53, 358–380.
- Stephenson, M. T. (2003). Examining adolescents' responses to antimarijuana PSAs. *Human Communication Research*, 29, 343–369.
- Stephenson, M. T., Benoit, W. L., & Tschida, D. A. (2001). Testing the mediating role of cognitive responses in the elaboration likelihood model. *Communication Studies*, 52, 324–337.
- Stephenson, M. T., & Palmgreen, P. (2001). Sensation seeking, perceived message sensation value, personal involvement, and processing of anti-marijuana PSAs. *Communication Monographs*, 68, 49–71.
- Stephenson, M. T., Palmgreen, P., Hoyle, R. H., Donohew, L., Lorch, E. P., & Colon, S. E. (1999). Short-term effects of an anti-marijuana media campaign targeting high sensation seeking adolescents. *Journal of Applied Communication Research*, 27, 175–195.
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, 59, 329–349.
- Zuckerman, M. (1990). The psychophysiology of sensation seeking. *Journal of Personality*, 58, 314–345.

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