GREEN WITH EMOTION
THE EFFECT OF NEGATIVE EMOTIONAL APPEAL INTENSITY ON COGNITIVE PROCESSING OF ENVIRONMENTAL PSAs

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ABSTRACT

Emotion and cognition are two interrelated concepts in mass media research. This study examines the effect of negative emotional intensity in environmental public service announcements on cognitive processing and behavioral intent. Environmental PSAs with three different levels of negative emotion were used to determine effects on secondary task reaction time (STRT), recognition, and behavioral intent. The data collected showed that recognition performance was highest at the moderate intensity level, and significantly dropped at the low intensity level. STRT results were interesting in that STRT was fastest at the moderate intensity level, and dropped significantly at the high intensity level. Behavioral intent data showed that participants were most likely to support the message sponsor when the message used moderately negative emotion. Future research will shed more light on interpreting STRT as well as the relationship between emotion and cognition.

1

INTRODUCTION

"Where the quality of life goes down for the environment, the quality of life goes down for humans." - George Holland, author

The 21st century has become an era of environmental communication. The growth of environmental marketing and corporate interest in the value of biodiversity has spawned a new source of innovation for environmentally conscious advertisers and products. In the wake of the scientific confirmation of global warming, politicians stand alongside scientists searching for long-term plans to secure the health of our environment. Just as non-profit environmental organizations have done for years, for-profit commercial businesses and brands are now communicating potential solutions to conserve our natural resources and protect Mother Earth.

The popularity of green marketing has grown exponentially from consumer demand for environmentally friendly products and services. According to data collected for the 2007 Green Marketing Conference, there are 63 million green-product consumers in the United States (www.goodandgreen.biz). Many of these consumers are willing to pay up to a 20 percent premium on clean, green products over non-sustainable alternatives. Other markets and industries have recorded this cultural and economic trend. The U.S. Organic Food Industry saw a 284.4 percent jump in consumer sales in the last eight years alone and green building products and services doubled from 2003 to 2005.

Integrated marketing communication agencies have taken notice of this growing trend. Founded in 1993, Green Team USA became the first green integrated communications agency in the United States. This innovative New York agency takes a holistic approach to environmental advertising as seen by their mission statement listed on www.GreenTeamUSA.com:

> "We consider the environment to include every social, natural, and cultural surrounding that impacts the health of our minds, bodies and spirits. So defined, museums and marshlands are equally critical habitats; workplace diversity and World Heritage sites are both in need of preservation and racial discrimination is just as toxic as diesel fumes."

Green Team USA's clientele include Johnson and Johnson, Smithsonian Institute, and Lindblad Expeditions. The agency also leads advertising efforts for well-known nonprofit organizations including Conservation International, World Wildlife Fund, National Geographic Society and Environmental Defense.

. Public relations practitioners have also shifted their perceptions of what shareholders, investors, managers, and consumers value in the business world. They too have bought into the "save the environment" mentality. Authors of *Effective Public Relations, 8th Edition* (Cutlip, Center &Broom, 2004, 222) said, "Public opinion surveys show that damaging the environment is seen as the most serious business crime. Likewise, surveys of leaders in business and government, as well as in public relations, consistently show protection of the environment as their major concern. Concern for protecting the environment also has fueled a green movement even among investors, sometimes previously viewed as interested only in the financial bottom line. They are using their dollars to make the same point an environmental activist made on CBS-TV news: 'Clean up your (environmental) act, not just your image.'"

According to Z+ Partners, a think-tank for strategic, creative and social communication ethical, social and environmental stewardship are major contributors to consumer brand value (www.z+partners.com). This observation suggests the environment plays an increasingly stronger role in every-day consumption decisions. Do people really care more about the environment than they did in the past? If there's a growing demand for environmentally-friendly products, is there also a growing trend of environmental awareness among the general population? The purpose of this research is to analyze environmental communication efforts by today's non-profit environmental organizations, and the effectiveness of specific messages characteristics used by these communicators.

Public Service Announcements (PSAs) are used for cause-related marketing in an attempt to create awareness for healthcare, education, anti-drug efforts and other social sectors. Environmental PSAs seek to heighten awareness for issues such as global warming, illegal wildlife trade, pollution and biodiversity decline. The U.S. Federal Communication Commission historically mandated free airtime for PSAs, however deregulation actions in the 1980s released pressure on stations to air the non-commercial messages (Harris, 2004). With fewer airtime minutes, environmental communicators must find ways to maximize the impact of their PSAs on target audiences. In addition to limited airtime, environmental PSAs also face the challenge of influencing attitude and behavior. While commercial products seek to fulfill an immediate need or want, selling an environmental cause involves changing a person's attitude and behavior. Attitude toward environmental issues is not a personal characteristic that can be easily shifted in the long-term. Some PSAs also ask for short-term calls to action. Environmental PSAs developed by organizations such as the World Wildlife Fund and Greenpeace encourage

audiences to visit their Web sites or make a donation to a conservation fund. While some PSAs may evoke changes in attitude by informing audiences on environmental issues, it is difficult to determine if the persuasive goals of these environmental messages are really being met.

Research in social psychology has attempted to analyze the attitude-behavior relationship through both reasoned and automatic processes. Factors present during attitude formation have been shown to play a strong role in predicting future behavior (Glasman & Albarracin, 2006). One perspective argues that heightened cognitive processing increases availability of attitudes, and thus is more likely to influence future behavior. Cognitive processing is identified as resources allocated to the encoding, storage and retrieval phases of memory. Attitudes that are more easily retrieved from memory are therefore more likely to play a role in future decision-making (Petty, Haugtvedt & Smith, 1995). Another perspective based on constructionist reasoning argues that attitudes become more stable when re-constructed from similar information at a later date, and are therefore more indicative of future behavior, especially if the information remains personally relevant (Erber, Hodges & Wilson, 1995; Wyer & Srull, 1989). These factors play roles in the interaction between attitude toward a message, persuasion, and influences on behavior. Emotion plays a similar role in influencing persuasion and cognitive processing by contributing to attitude formation.

Emotion is often used as a persuasion tactic in environmental messages, and can also influence how messages are cognitively processed. The connection between emotion and cognition is a largely accepted theoretical phenomenon among strategic communication scholars, and the real-time cognitive and emotional processes evoked by

messages lay the foundation for persuasion (Cacioppo, 1999; A. Lang, 2000). Previous research indicates that positive emotional appeal in advertisements has a direct relationship with attitude toward the ad; positive emotion correlated with positive attitude (Murry & Dacin, 1996). Other research has shown messages that use negative emotion require additional cognitive processing because they challenge a person's existing mental state to come up with risk aversion techniques and other coping strategies (Murry & Dacin, 1996). Additional research was needed to determine how negative emotion influences both cognitive processing and behavioral intent. Thus the following research questions were established: How does the negative emotional intensity of an environmental PSA influence cognitive processing of the message? Secondly, how does negative emotional intensity impact behavioral intent to support the environmental cause presented?

The Limited Capacity Model for Motivated Mediated Message Processing (LC4MP) is grounded in models of human attention and memory that have emerged from psychology (Atkinson & Shiffrin, 1968; A. Lang, 2006). The LC4MP proposes that cognitive processing of a media message is driven by activation of the appetitive and aversive motivational systems and that people have limited cognitive resources to be allocated to encoding, storage and retrieval of information contained in the message (A. Lang, 2006). Activatino of the appetitive and aversive motivational systems depends on the intensity of negative or positive information contained in the message (A. Lang, 2006).An increase in negatively valent contents leads to increased activation of the aversive system, and and increase in positively valent content leads to increased activation of the appetitive system.LC4MP also argues that motivational systems are

activated during cognitive processing, depending on the negative or positive valence of a stimuli (A. Lang, 2006). These systems can operate together, separately, or not at all, resulting in four possible activation states (Cacioppo et. al., 1999). The systems are considered to be operating reciprocally when activation in one system increases and activation in the other system decreases. The relationship is considered to be uncoupled when activation in one system occurs while the other system remains the same. Co-activation occurs when both systems are activated in the same direction. Finally, the systems are called inactive if neither positive nor negative valence systems are stimulated. The motivational and personal relevance of a communication message can serve as an indicator for the activation of these systems, and thus impact the cognitive processing of a message. This study was carried out under the assumptions of the LC4MP theoretical framework.

The theoretical implications of this study were to expand communication researchers' understanding of the relationship between emotion and cognition in media. Mass communication research continues to identify relationships between message attributes and how those messages are processed. By testing these relationships through experimental designs, scholars can solidify, revise or expand upon current theories in mass media research. LC4MP identifies distinct patterns in motivation and message processing. This study can provide new evidence to inform this theoretical framework as it applies to environmental PSAs.

The practical importance of examining the role of emotion in cognitive processing is two-fold. The results of media effects studies such as this one can inform strategic communicators which message attributes are most likely to result in better message

encoding, a fundamental stage in memory formation. Secondly, the goal driving this research on environmental PSAs was to understand how to create a more environmentally conscious public. Environmental messages are developed to create awareness for global issues such as climate change, species loss, and pollution, and ultimately, to evoke behavioral changes that make the health of the environment a priority.

2

LITERATURE REVIEW

Environmental Threats

Threats to our environment are a growing and evident reality. In a December 2007 article, the *UK Times* reported a loss of more than 50 percent of the Emperor penguin population due to lost habitat from Antarctica's melting glaciers. The World Wildlife Fund issued a report on December 6, 2007 predicting 60 to 100 percent destruction of the Amazon rainforest due to climate change by 2030. Mountaineers and scientists continue to observe and record melting ice caps on the world's highest mountains. In April 2007, The United Nations warned that if the present rate of global warming continued, drastic flooding could cause a serious threat of disease, water scarcity and starvation across Asia. Environmental organizations face the challenge of effectively communicating these threats and encouraging proactive changes in attitude and behavior in their strategic message campaigns.

In addition to the reality of global warming and its effects, overpopulation, pollution and expanding industrialization is also causing environmental deterioration and loss of biodiversity. According to the U.S. Fish and Wildlife Service, there are more than 1,200 threatened or endangered animal species in the United States alone and hundreds more are candidates for listing. In a 1998 *Washington Post* report, scientists predicted the loss one fifth of all living species within 30 years. Scientists now say that estimate was conservative. Environmental organizations attempt to communicate these threats using

emotional appeals in their message content. The reality of environmental threats illustrates the need for scientific research to understand the role emotion plays in facilitating behavioral change and persuasion. How does the emotional content used in environmental PSAs persuade audiences to help save an endangered species that lives thousands of miles from the message receiver? Strategic communicators are faced with questions like this when developing environmental campaigns, and must be in search of new insights into human cognitive processing to help these campaigns succeed. In order to have the intended persuasive effect, communicators must understand how the level of emotional intensity used in an environmental PSA can influence allocation of cognitive resources, as well as an individual's behavioral intent.

Human influence on the environment is undeniable, from air pollution to habitat destruction to illegal trafficking of animal parts between countries. Environmentalists, theologians, and psychologists alike have discussed the historical relationship between humans and the environment. Philosopher Derek Michaud provided his perception of the human-enviro relationship in his work, *Reflections on Ecology, Theology and Ethics* (2003):

> "Human beings are manipulators and exploiters of the environment by nature … This parasitic relationship to nature is not surprising given the fact that we are animals caught up in the sometimes dirty business of survival, but unlike the beaver that damns a stream, humans are capable of damning every stream on Earth … Beyond our difference from other species in the scope and rate of our impact on the rest of the ecosystem human beings are aware of their actions and can choose to do otherwise."

Environmental organizations attempt to communicate information concerning the above mentioned threats using varying forms and intensity of emotional appeals in their campaign messages. For example, Greenpeace uses light-hearted humor in its campaign

against climate change. In stark contrast, Sanctuary Club depicts images of violence against children and animals to appeal to the audience. The reality of environmental threats and the inclination toward emotional appeals in environmental messages illustrates the need for scientific research to understand the role emotion plays in facilitating behavioral change and persuasion.

How does the variety of emotional content used in environmental PSAs impact the message's ability to persuade audiences to help save an endangered species that lives thousands of miles from the message receiver? Strategic communicators are faced with questions like this when developing environmental campaigns, and need to be in search of new insights into human cognitive processing of media messages to help their campaigns succeed. An understanding of how the level of emotional intensity used in an environmental PSA can influence allocation of cognitive resources, as well as an individual's behavioral intent can help strategic communicators design messages that have the ability to achieve the desired persuasive impact.

By creating an atmosphere of environmental awareness and compassion, strategic communicators can address this relationship and combat the environmental challenges facing not only the United States, but also every country on the globe. This research provided the opportunity to examine how emotion can influence message effectiveness in terms of persuasion and behavioral change. George Holland best explains the practical value of this research by arguing, "Where the quality of life goes down for the environment, the quality of life goes down for humans."

Cognitive Processing

In addition to the practical importance of effective environmental messaging, scholarship on cognitive processing has the ability to expand the theoretical frameworks governing communications research. The Limited Capacity Model for Motivated Media Messages (LC4MP) is one such theoretical framework that guides current research on cognition and emotion (A. Lang, 2000).

LC4MP seeks to explain how human beings, being limited capacity processors, process mediated messages through the encoding, storage and retrieval stages of information processing. The theory allows strategic communicators to determine what message criteria trigger effective message processing through these three stages. This study examined how negative emotional intensity influenced the encoding stage of information processing.

There are two dynamic motivational systems within the LC4MP model that interact to evoke a spectrum of physiologically and psychologically measurable activation responses within the human body. According to the model, the aversive motivational system is activated by an increase in negative stimuli whereas the appetitive motivational system is activated by an increase in positive stimuli. These physiological activations in response to environmental stimuli can have reciprocal, uncoupled, inactive and coactive relationships. In a reciprocal relationship, one system is active while the other is inactive. If the motivational systems are uncoupled, no relationship exists. Neither system is active in an inactive relationship, whereas the systems are said to operate coactively if both are working at the same time.

Two trends in the activation of motivational systems have a strong influence on an individuals' allocation of cognitive resources. *Positivity offset* illustrates the tendency for the appetitive system to have a slightly higher level of activity than the aversive system when exposed to neutral stimuli, or low levels of activation. In contrast, *negativity bias* stipulates that the aversive systems activates more quickly in this neutral environment as a survival response to protect the body from danger. In other words, a slightly negative stimulus will activate the aversive system much quicker than a slightly positive stimulus would active the appetitive system.

LC4MP explains that persuasion and media effects depend upon the cognitive capacity of the message receiver (A. Lang, 2005). This theoretical framework also discusses how the availability and allocation of cognitive resources has dynamic effects on message processing success. *Cognitive overload* is a phenomenon that has been observed and studied in previous cognitive processing research as function of dynamic message characteristics (A. Lang et. al., 2007). Conceptually, cognitive overload suggests that individuals' cognitive capabilities can "overload" because a message may be too arousing, structurally complex or information-dense. Cognitive overload has previously been hypothesized to occur when appetitive (approach) activation slows down and aversive (avoid) activation takes hold in response to a negative stimulus (Figure 1) (A. Lang, 2006).

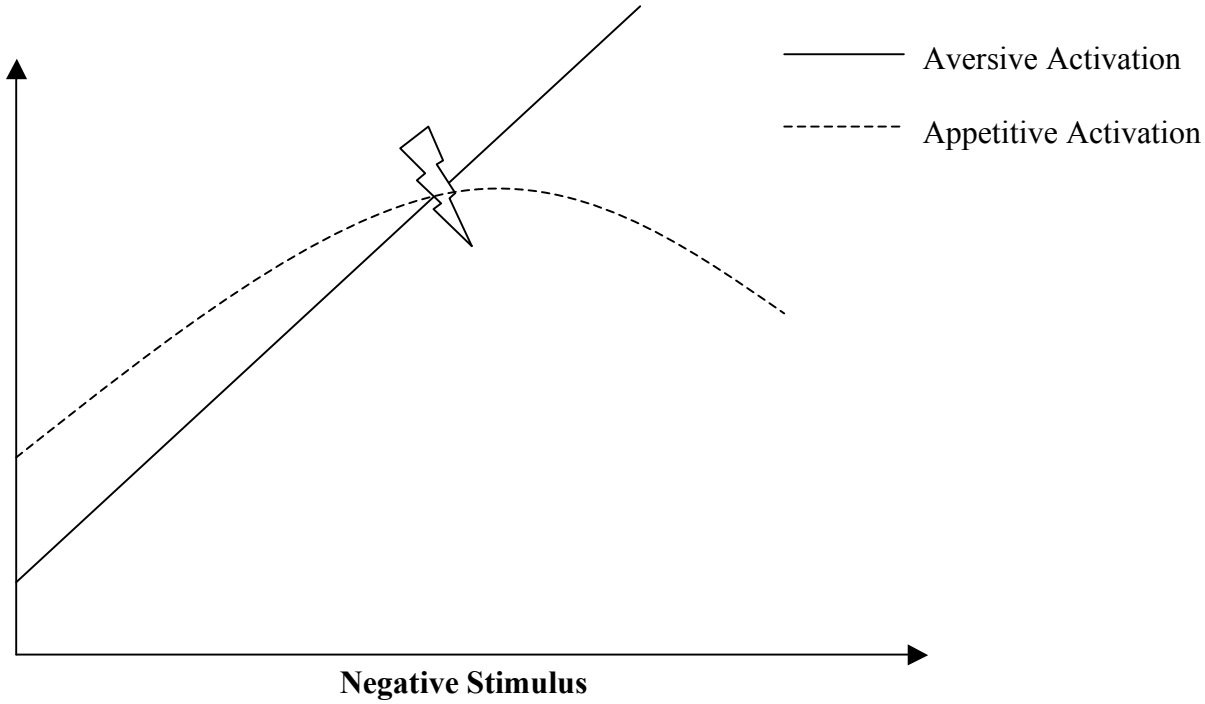

Figure 1. Cognitive overload. Activation of aversive and appetitive motivational systems in response to increasingly negative stimulus.

A. Lang and others (2007) studied those factors thought to induce cognitive overload in TV message processing. The researchers tested the impact of varying levels of valence, arousing content, structural complexity and information density on resources available for cognitive processing. TV messages were categorized using a four-way interaction (calm-positive, calm-negative, arousing-positive, or arousing-negative) with three levels of information intensity (high, medium, low). This study tested cognitive overload as a function of slower secondary task reaction time (STRT) and poorer recognition performance. Message complexity results showed that from medium to high complexity there was a significant drop in audio recognition, indicative of cognitive overload. Messages with a large number of camera changes (a measure of resources allocated) displayed a significant difference between STRT for messages with low,

medium and high resources required. As resources required increased from low to medium and resources allocation was high, STRT slowed down. As resources required increased from medium to high, and resources allocation remained high, STRT significantly sped up. The valence-arousal results showed that messages that were both arousing an negative, and where resources allocated was high, there was a significant drop in recognition when resources required moved from medium to high. Therefore, highly complex, negative, and arousing messages were most likely to have resulted in cognitive overload.

Results also showed that when paired with recognition tests, STRT is an effective and predictable function of resource allocation regardless of emotional content of a message. Additionally, the study showed individuals have fewer available resources when messages are arousing or in other words, emotionally intense. The negativity bias prediction, which states that negative messages are allocated more resources, was supported. These findings suggest that viewers watching highly negative and arousing messages are still allocating a lot of resources to encoding, but there is a point at which resources required becomes too high (due to structural complexity, arousal, and valence), resulting in cognitive overload, as indicated by poor recognition and fast STRT.

Research in the field of television news supports the effectiveness of negative emotional appeal messages (Newhagen et. al., 1992). Negative visual images in news broadcasts have been shown to correlate with increased viewer memory. This study broadens the effect of negative emotion from advertisement messages to news broadcasts. Combining these findings, one could argue that negative appeal messaging plays a constant role in cognitive processing and memory regardless of message credibility. This

provides additional support for research examining the effect of negative appeal in PSAs, since these non-commercial messages most likely lie somewhere between news and advertising on a continuum of message credibility.

The relationship between message content and individual differences has also been shown to play a factor in cognitive processing, specifically the activation of motivational systems. Appetitive activation has been shown to be more likely when the advertised product is considered more risky and when individuals have a highly active appetitive system, or high positivity offset (A. Lang et. al., 2006). In this study, individuals with a more active aversive system had a weaker activation of the aversive system when viewing advertisements for risky products. While viewing ads for risky products, participants had higher levels of arousal and attention, and were more able to remember the ads. This study has been supported by previous research in motivated media message processing and sheds light into a potential relationship between risky products and messages that use negative emotional appeals. Environmental messages, such as those that communicate the effects of illegal wildlife trade, oftentimes use risk as a type of negative emotional appeal in their messages.

Research has shown that levels of encoding, storage and retrieval vary by TV structural pacing, difficulty of the message, and individual audience characteristics. Increasing pacing in TV advertisements has been shown to correlate with an increase in viewer attention and memory, however once the pacing become too fast, the audience experiences cognitive overload and memory suffers (A. Lang, 2006). Production pacing of television messages has also been shown to be an indicator of physiological arousal and information processing. According to one study, although fast pacing and arousing

content increased allocation of resources and memory independently, when combined, the two factors resulted in cognitive overload (A. Lang et. al., 1999). In this study emotional content of the TV message influenced both physiological and self-reported measurements of arousal. This study provides additional support for the LC4MP model and indicates an interaction between message structure and emotional content. Further discussion on emotion as a concept will help identify how differing emotional intensities influence activation of the motivational systems and thus influence cognitive processing.

Emotion Processing

It is necessary to more closely examine the theoretical underpinnings of emotion as an empirical concept. The relationship between cognitive processing and emotion is undeniable. Emotional appeals are not only used in environmental and other cause-related messages but they also help sell commercial products and services. Brands are directly tied to emotion because they are cognitively and emotionally encoded into the brain. As stated by branding specialist Wendy Gordon (2006, 2-10), "There is no such thing as 'rational' vs. 'emotional'- the two are intertwined. Sometimes 'rational' appears to take the high ground, but 'emotional' is the underlying force." Understanding the relationship between cognitive and emotional processing can present insight into developing effective and persuasive messages for environmental organizations.

The ARF's (formerly Advertising Research Foundation) *Journal of Advertising* dedicated its March 2006 issue to the examination of emotion in advertising. The articles sought insight into the myths and truths behind human emotion and how emotion is used in advertising to evoke brand likeability, recognition, recall and message persuasion. Emotion has been designated the gatekeeper to further cognitive processing and behavior

(Poels & DeWitte, 2006). This gatekeeper function assumes that cognition is hardwired via emotions, and that emotions can be the driving force behind how decisions and behaviors are developed. Emotions open the door to conscious thinking, which in turn influences attitude and behavior, fundamental ingredients of the decision-making process and components of cognitive processing.

Scholars in the field of psychology have established multiple combinations of 'basic emotions'. These basic emotions are included based on a range of biological arguments including a tendency to be associated with instinctual and adaptive behaviors, universal facial expressions, and 'hardwired' characteristics (Ortony & Turner, 1990). When combined, these basic characteristics contribute to a wider range of more complex emotions. Plutchik (1980) identifies eight basic emotions in his research: acceptance, anger, anticipation, disgust, joy, fear, sadness and surprise. Ekman, Friesen, and Ellsworth (1982) identify only six: anger, disgust, fear, joy, sadness and surprise. Ekman, Friesen and Ellsworth developed their list of basic emotions by analyzing and interpreting universal facial expression. Plutchik grouped his emotions based on their relationship to adaptive biological processes.

From a neurobiological approach, emotions are responses to the activity of various subcortical systems in the brain. They are produced as responses to chemical and neural automatic processes and serve two biological functions. Emotions are automatic reactions to an immediate situation or stimulus and they serve regulatory roles to maintain the body's homeostasis and prepare the body for future situations. Neuroscientist and behavioral neurologist Antonio Damasio explains the concept of emotion in his book, *The Feeling of What Happens: Body and Emotion in the Making of*

Consciousness (1999, 54): "In either case, and in other situations, the plan is exquisite and the execution is most reliable. In short, or certain classes of clearly dangerous or clearly valuable stimuli in the internal or external environment, evolution has assembled a matching answer in the form of emotion. This is why, in spite of the infinite variations to be found across cultures, among individuals, and over the course of a lifespan, we can predict with some success that certain stimuli will product certain emotions."

Although there is disagreement on a uniform list of basic emotions, researchers agree that the basic emotions lie in the middle of an Emotional Continuum (Poehls & Dewitte, 2006) between low-order and high-order emotions. Cognitive or automatic processing of each emotion depends on its position along this continuum. Emotions are also categorized within three underlying dimensions: 1) arousal, which can be observed on a continuum of calm to excited, 2) dominance, which characterizes an individual's control over his or her emotional responses, and 3) valence, which refers to either an object or emotion's positivity or negativity (Schlosberg, 1954; Cacioppo, 1999). Valence and arousal are the focus of this study and these concepts can be observed through the activation of the appetitive and aversive motivational systems, as defined by the LC4MP framework. A Typology of Emotional Content was developed to outline the dimensions of emotion in relation to the positive or negative valence of a given emotion (Holbrook & O'Shaughnessy, 1984). Figure 2 combines the Emotional Continuum and Typology of Emotional Content into a comprehensive diagram of emotion theory.

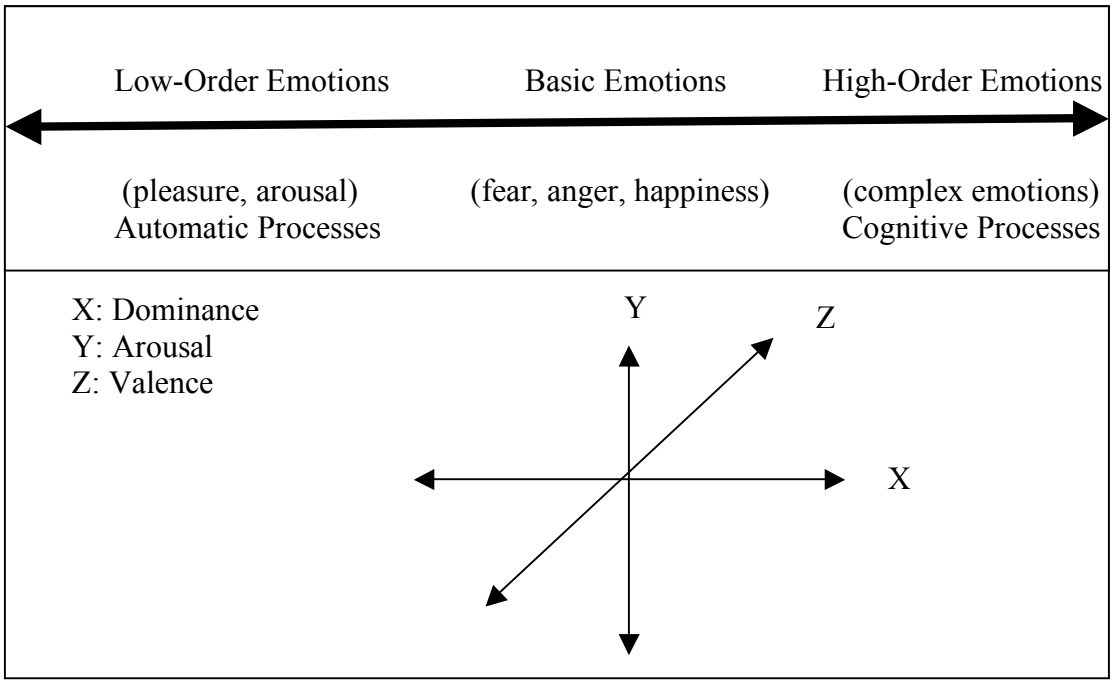

Figure 2. Emotional Continuum and Dimensions of Emotion. Arousal and valence were the primary dimensions of emotion used in this study.

Emotion and feeling are two separate, yet interrelated concepts. However these terms are often mistakenly interchanged in communication literature. Emotions are physiological responses and can therefore be measured using physiological methods. Some researchers suggest that feelings are more subjective interpretations of those emotions, however Damasio argues that in order to experience feelings, neural signals activated by the processing of an emotion are transported within the brain (2000). Damasio's neurobiological perspective of feeling contrasts the definition of feeling as an immeasurable human experience. Damasio explains his view of the relationship between emotion and feeling in *Descartes' Error* (2000, 145):

> "If an emotion is a collection of changes in body state connected to particular mental images that have activated a specific brain system, the essence of feeling an emotion is the experience of such changes in juxtaposition to the mental images that initiated the cycle."

The 1980s were coined the Era of Emotion among scholars because of a strong push for empirical research testing emotion theory. The concept of attention was reintroduced as the dominant component of emotion in advertising, and the differences between motivation, affect and emotion were addressed. Activation became defined as a proactive system based on internal conditions, whereas emotion was defined as a reactive system based on external conditions (Holbrook & O'Shaughnessy, 1984). Additionally, affective systems became categorized based on direction, intensity and duration, whereas emotion was considered more complex and therefore possessed more qualitative characteristics (Zajonc, 1980). According to this definition, emotions are reactionary, short-lived and environment-specific. Although distinctions are made between the three concepts, it is commonly accepted that emotion is a single entity within both motivation and affect.

Since the Era of Emotion, emotion theory has undergone substantial revision, and the concepts surrounding the processing of emotion have been explicated to accommodate new research in the field of communication. For example, strategic communication researchers conceptually defined the notion of engagement, and contrasted it with the concept of attention. While level of attention was defined as an individual's amount of conscious thinking while viewing an advertisement, level of engagement was said to measure subconscious feeling (Heath, 2007). Current research on emotion takes into account both attention and engagement as indicators of emotional processing. Research on subconscious processing has been furthered by other scholars and has led the concept of affectivity to be redefined. According to Cacioppo and Gardner (1999) affectivity can include both conscious and less-than conscious elements

of pleasure and activation. Here, yet another concept, activation, is used to expand the study of emotion. Research suggests not only do emotions lie on a continuum of pleasure-displeasure, but they can also be measured according to an individual's mental activation of a particular emotion.

The complete experience of emotion consists of both cognitive and physiological elements. However, early theories on emotion processing had differing views of the nature of this cognitive-physiological relationship. The James Lange Theory of Emotion argues that physiological changes pre-requisite human emotion (Lang, 1884). Our physical fight or flight reaction to a perceived threat causes our senses to sharpen and our cardio-vascular and respiratory systems to jump into overdrive. The Two-Factor Theory of Emotion was developed as an extension of James Lange's theory, and views physiological arousal as the first step in emotional processing. By placing our physiological arousal into the context of a given situation, we then try to label and attach meaning to our emotion (Schachter, 1962). Conversely, the Cannon-Bard Theory of Emotion argues that our emotions trigger physiological responses. From a neurobiological perspective, we cognitively appraise a situation using our thalamus, which then relays the signal to the amygdala, which is linked to emotion. Our autonomic nervous system then signals for the body to react to our emotional response (Cannon & Bard, 1927).

The Model of the Emotional Process details a more current outline of both cognitive and physiological elements in relation to message processing (Holbrook & O'Shaughnessy, 1984). A message triggers a cognitive appraisal, which is incorporated into personal beliefs and values. This leads to a favorable or unfavorable evaluation of

that message. This process is shown in Figure 3. However, researchers who believe that cognition is not a necessary prerequisite to affective responses have challenged this model. For example, Zajonc claimed that affective responses are immediate reactions to a message, and serve as predecessors to cognitive processing (1980).

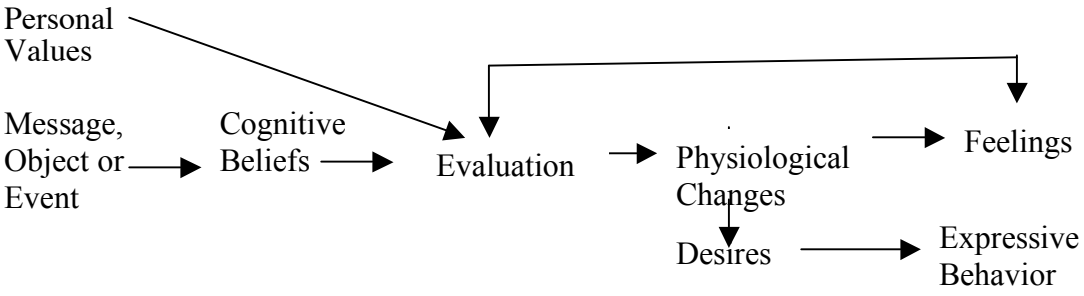

Figure 3. Model of the Emotional Process by Holbrook & O'Shaughnessy.

Many psychological and behavioral studies examine the physiological responses evoked by the emotional processing of fear. By measuring physiological activation as an indicator of emotional processing, researchers have been able to determine the elements of a fear structure by analyzing responses to cognitive representations of a fear stimulus (Foa & Kozak, 1986). Processing of fear stimuli is highly relevant when analyzing effective communication strategies for cause-related products, issues and campaigns. Fear is a common negative appeal emotion in PSAs, especially those involving health and environmental messages.

Further psychological examination of the experience of emotion based in biological naturalism suggests that a mental representation of emotion can be described as, "pleasure or displeasure experienced in conjunction with other mental contents deriving from mental state attributions" (Barrett et. al., 2007). Sensory information is continuously processed by the brain and integrated into pre-existing knowledge, resulting

in an affective state and behavioral disposition. Therefore, emotion forms a multi-dimensional link between cognitive processing and behavior. An individual's affective state can both implicitly and explicitly influence behavior, judgment, and decisions depending on an individual's allocation of attention. The experience of emotion is also conceptualized within social situations.

In 1970, Rachman outlined a working definition of emotional processing based in psychological research and highlighted characteristics that impede and facilitate processing success. Rachman identified state, personality, stimulus and associated activity factors that resulted in difficulty processing. Stimuli that were sudden, intense, dangerous, uncontrollable, unpredictable, or presented in large chunks all resulted in failed emotional processing. These stimuli characteristics should be evaluated when constructing communication messages that use emotion to persuade.

Emotion in Health Messages

Emotional appeals are commonly used in health-related strategic communications campaigns and PSAs. Prior studies on cause–related marketing have focused on the effectiveness of health messages, but little empirical research has been applied to other cause-related issues such as the environment. A longitudinal study on the impact of emotional tone, message, and broadcast parameters revealed insight on the effectiveness of anti-smoking advertisements targeting the youth audience (Biener et. al., 2004). Results from this study showed that youth participants perceived advertisements high in negative emotion, such as those detailing the serious health consequences of smoking, as more effective than advertisements that used other communication strategies, such as humor. Advertisements high in negative emotion were also more likely to be recalled by

the youth participants. However, as the intensity of the negative emotion increased, perceived effectiveness tended to decrease. This observation again brings to light the potential for cognitive overload where fewer resources are allocated to processing the message if it is highly negative. In this case, ads high in negative emotion resulted in better recall (a measure of resources allocated to storage), but weaker perceived effectiveness. This study highlights that the use of negative emotion in cause-related campaigns, such as anti-smoking, is effective, to an extent.

Additionally, social cognitive theorists have outlined five key behavioral stages that influence persuasion by health communication messages; movement from one stage to the next signifies persuasion processing. The stages -- pre-contemplation, contemplation, preparation, action, and maintenance -- are influenced by internal and external social cognitive factors such as self-efficacy, outcome expectations and personal goals (Maibach & Cotton, 1995). These specific cognitive and behavioral considerations are relevant to the processing of health messages; little research has identified such factors when the content of the message shifts to the environment.

Although findings on health-related messaging may be relevant to other anti-drug, anti-smoking, or disease prevention messages, they cannot be generalized to apply to all cause-related media messages, and therefore cannot be applied to environmental PSAs. Health communication messages generally focus on disease prevention and promotion of healthy living, and predominantly use fear/disgust appeals or hard-hitting facts to get the message across. However, internal defense mechanisms within the human body often find ways to block out those storylines, concepts and messages associated with very

intense negative emotion. This presents a challenge for both environmental and health communicators to develop messages that audiences do not automatically shut out.

Kim Witte's (1994) research on fear appeal theorized on a potential boomerang effect, suggesting that negative emotional appeal messages are more effective only up to a certain point. Witte suggests when the level of negative emotional intensity is too high, activation of the appetitive system decreases, as the individual no longer allocates resources to the message, cognitive processing of the message ceases, and the aversive system takes hold. According to Witte, "Defensive motivation is elicited by heightened fear arousal, which occurs when perceived threat is high and perceived efficacy is low, and produces message rejection responses such as defensive avoidance or reactance … Studies have shown that fear appeals with high levels of threat and low levels of efficacy result in message rejection and occasionally in boomerang effects," (1994, 116). These findings suggest a potential threshold point, where the high intensity of negative emotional appeal causes a viewer to reject the message and shut down cognitive processing.

An individual's level of message processing can generally be identified on a peripheral to central continuum. However, there are primary differences in the psychological processes that underlie health and environmental messages. Health communication messages that promote central processing tend to use both content and linguistic cues as forms of persuasion. Strategic health communicators suggest that using novel or unexpected messages and media, instructing audience attention, and using "temporarily immediate speech" in health communication messages all promote audience attention and motivation (Maibach & Parrott, 1995, 20). Cognitive and behavioral

responses to health communication messages show that positive heuristic appeals tend to be highly effective in generating attention, however they elicit minimal processing and only short-term attitude change. Messages that convey emotional benefits tend to evoke deeper processing, heightened recall and attitude change, and increased compliance with the message (Monahan, 1995).

The goals of cause-related PSAs are to increase awareness, reinforce behavior that reduces risks, perpetuate knowledge, persuade, and evoke behavior change. Similarly, the goals of environmental PSAs are to increase awareness about environmental issues of growing concern, reinforce behavior that reduces risks to the environment, perpetuate knowledge, persuade, and encourage people to change how they live their life. The main difference between health and environmental messages is the recipient of these behavior change benefits. Health messages persuade individuals to lead healthy lifestyles so they can live longer. Environmental messages persuade individuals to care about the environment so it can stay greener. Difficulty arises in developing environmental campaigns that communicate a concrete, immediate benefit to the audience.

One may argue for the need to study both negative and positive emotional appeal messages to provide an accurate analysis of emotional intensity's effect on cognitive processing. However, in the case of environmental communication, the message content itself possesses a negative tone. No one ever said, "Good thing this global warming is affecting our planet," or, "Good thing we only have a fraction of the species we used to have!" Environmental issues are negative and controversial in nature. However, there is some literature suggesting the use of positive appeal in health messages is more effective. To understand the results of such studies, one must examine the differences between

environmental and health-related messages. Individual responses to health messages may depend heavily on level of self-efficacy. In adopting healthy behavior, humans are helping their own bodies, and these personal health benefits may be more immediate, tangible, and concrete than the benefits of adopting behavior to help the environment. Anti-drug campaigns tell teens not to do drugs. On the other hand, environmental campaigns ask the audience to take action, whether that be recycling, donating to an endangered species fund, or carpooling to reduce greenhouse emissions. Communication research suggests cognitive and emotional processing of negative fear appeal messages mediates audience involvement and likelihood for behavior change (Roser & Thompson, 1995). Could it be that negative emotion appeal works better than positive emotional appeal when the message encourages a change in behavior and motivates the audience to act?

In addition to the effect of a message's structural components, audience characteristics play a role in the level cognitive processing as well. In a study on cancer messages, sensation-seekers who are more likely to seek out new experiences tend to have higher positivity offset, or a greater level of appetitive activation compared to aversive at low levels of activation (A. Lang, 2006). The same study showed that individuals that tend to be more cautious about new experiences and activities tend to have a lower positivity offset. Additionally, individuals that had a high negativity bias (aversive activation increases at a steeper rate than appetitive) had a stronger negative response to negative cancer messages than those with low negativity bias, which correlated with better message encoding. These results indicate that negative appeal health-related messages may be more effective in persuading audiences that may live a

more cautious lifestyle. This study sought to identify the persuasive effects of varying levels of negative emotion in environmental PSAs by examining resource allocation and behavioral intent.

Manipulations and Measurements

The purpose of this research was to examine the effects of negative emotion on cognitive processing (using STRT and recognition performance) and behavioral intent. The LC4MP framework and previous research in the fields of cognitive processing and emotion informed the research questions and hypotheses of this study.

Negative Emotional Intensity

In message processing, continuous response methods allow the participant to record the degree of arousal and positive and negative emotion felt over time while viewing a message (Biocca, 1994). Cacioppo et. al. (1999) determined three modes of affective processing and activation- reciprocal, uncoupled, and co-activation- that characterize these evaluative responses. A. Lang et. al.'s (2007) study on cognition and emotion in TV message processing used three levels of information intensity. These three levels were manipulated to determine the effects of information density and complexity on available resources in cognitive processing as measured by secondary task reaction time (STRT) and recognition tests. Using three levels of negative emotional intensity (low, moderate, and high) provided enough variation to test the influence of those levels on recognition, STRT, and behavioral intent.

Secondary Task Reaction Time

The scholarly debate over what resources STRT indexes continues. Traditional interpretation led researchers to believe that STRT indicated the amount of resources not being used to perform a primary task, or "remaining resources." Based on this traditional conceptualization, complex and difficult messages, which require more resources to process, would result in slow STRT. Furthermore, simple, easy messages, which require fewer resources to process, would result in fast STRT.

However, mass communication studies have reported counterintuitive STRT findings, where more complex messages actually resulted in faster STRT when compared to less complex messages (Britton & Tesser, 1982). A. Lang and Basil (1998) attempted to explain such findings by suggesting that STRT actually measures "available resources," or resources allocated to the primary task minus the resources required by the task. When more resources are allocated to a task than actually required, a surplus of "available resources" exists. A positive number of available resources would be indexed by fast STRT, zero available resources would be indexed by slow STRT, while a negative number of available resources would indicate cognitive overload (Figure 4). This state of cognitive overload would be accompanied by a significant increase in STRT, as well as a decrease in recognition performance.

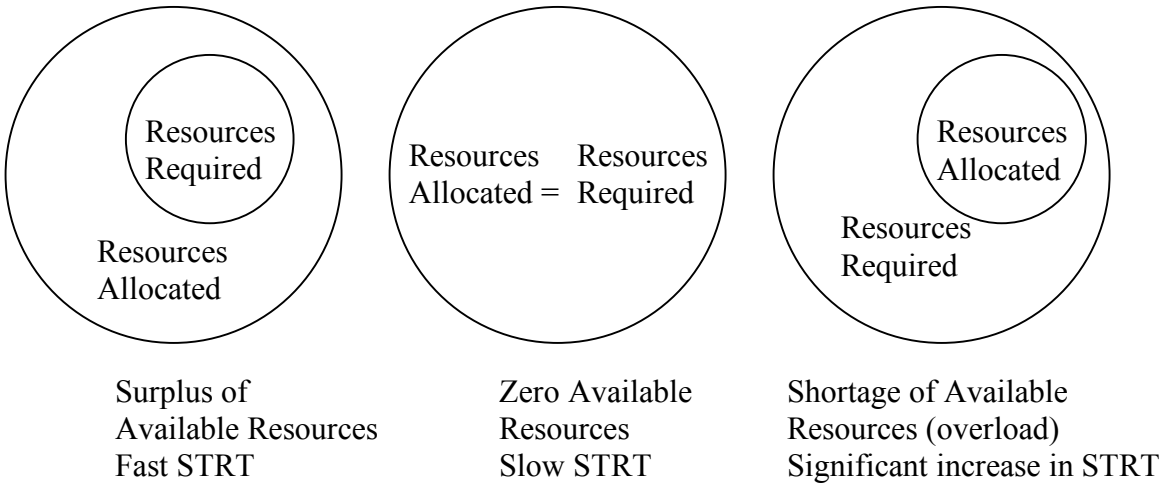

Figure 4. STRT Interpretation (A. Lang & Basil, 1998). Available resources are equaled to resources allocated minus resources required. A surplus of available resources is indexed by fast STRT, zero available resources is indexed by slow STRT, and a shortage of available resources is indexed by a significant increase in STRT.

A. Lang et. al.'s study (2007) testing the use of STRT measures in television viewing showed that STRT indexes available resources rather than resources allocated by the viewer (A. Lang et. al., 2007). According to basic limited capacity theories, higher levels of cognitive processing result in slower STRT. In other words, when viewing messages that are more "information-heavy," viewers tend to respond more slowly to secondary task distracters. However, when information becomes too complex, information overload can occur, causing STRT to speed up. In A. Lang's study, patterns of STRT and recognition remained consistent regardless of a message's emotional appeal; emotion functioned as a constant, increasing both resource allocation and resources required (A. Lang et. al., 2007). This study sought to examine how intensity of emotion affects allocation of resources to encoding, as indexed by STRT.

Hypothesis 1: There will be a main effect of negative emotional intensity on STRT such that:

A) STRT will be significantly slower for moderate intensity compared to low intensity
B) STRT will be significantly faster for high intensity compared to moderate intensity (Figure 5)

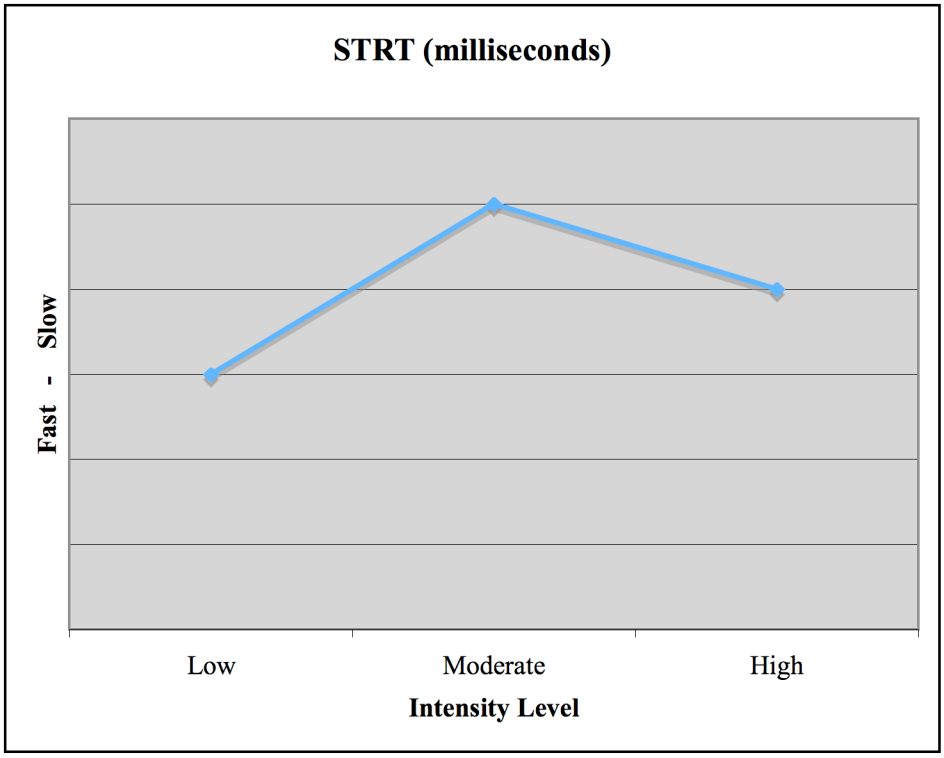

Figure 5. Hypothesis 1. STRT will be slowest for moderate intensity level. STRT will speed up as an indicator of cognitive overload at the high intensity level.

Recognition

Performance on recognition tasks is also used in social science and communication research as an indicator of encoding and memory. It also can be used to better understand and interpret STRT results. In A. Lang et. al.'s (2007) study on cognition and emotion in TV message processing, researchers used a forced-choice audio-recognition test to measure participants encoding of a message. Participants listened to three "real" sentences from each message and three "fake" sentences contrived by the researchers. Researchers found that recognition remains stable

as long as resources are available for encoding, indicating higher cognitive processing, however as complexity in the message increases to the point of overload, recognition drops significantly. STRT increased significantly after the point of overload, indicating that messages with high information density and structural complexity put stress on the cognitive system. When arousal is included in the manipulation of messages, researchers have found that STRT is slower for high-arousal messages, indicating that there are fewer available resources when messages are arousing. The study also supported the negativity bias predication that arousing negative appeal messages are allocated more resources than arousing positive messages.

Hypothesis 2: There will be a main effect of negative emotional intensity on recognition such that:

A) Recognition will be significantly higher for moderate intensity compared to low intensity
B) Recognition will be significantly lower for high intensity compared to moderate intensity (Figure 6)

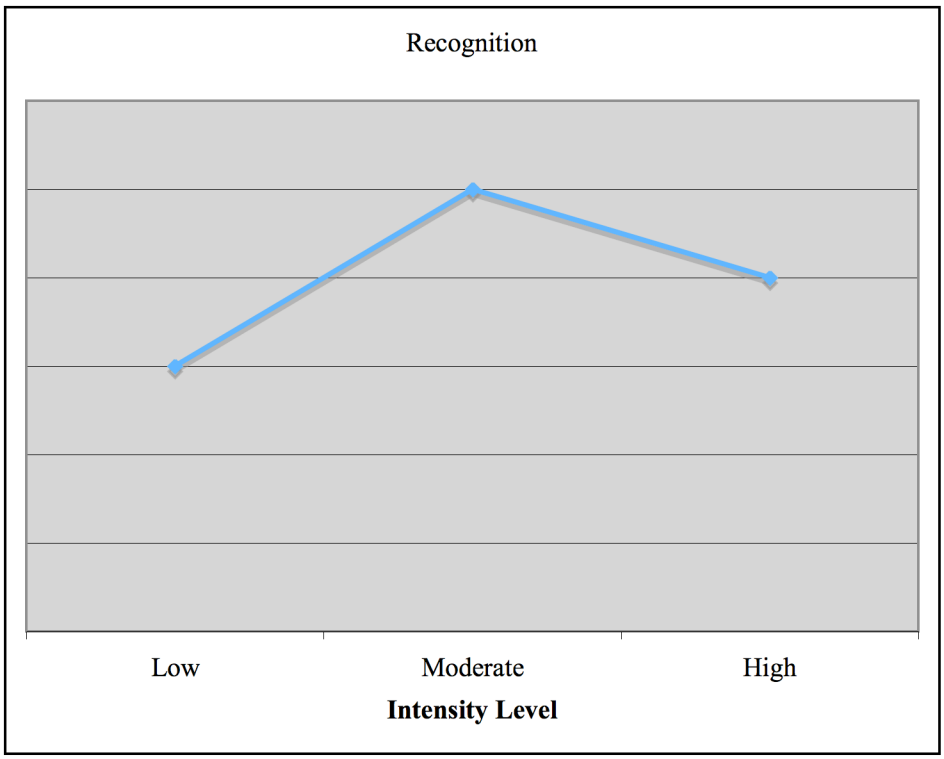

Figure 6. Hypothesis 2**.** Recognition performance will be highest when intensity level is moderate.

Behavioral Intent

Self-reports of intent to take action have been shown to highly correlate with actual behavior (Ajzen & Fishbein, 1980). Research shows that risk perceptions of environmental issues also influence behavior intentions. O'Connor et. al. (2004) examined the relationship between risk perceptions and willingness to address climate change by measuring individual risk perception and knowledge of climate change, and support for voluntary and government actions to address the problem. Findings suggest that risk perceptions, knowledge, and general environmental beliefs are independent predictors of behavior intentions.

Additionally, Baldassare and Katz (1992) found that people who perceive an environmental issue as a personal threat to health and wellbeing are more likely to use

positive environmental practices. The researchers also found that perceived threat of environmental problems was a better predictor of environmental practices than even demographic variables or political affiliations. This research suggests that the perceived severity or susceptibility of an environmental threat to an individual's personal wellbeing may be a stronger indicator of intent to take action than actual concern for the environment. It may be that higher levels of negative emotional appeal increases an individual's intent to take action on the issues presented in the PSA. On the other hand, intent to take action may follow the pattern of A. Lang's theory on cognitive processing overload. If negative emotional intensity is too high, cognitive processing overload could reduce likelihood to take action.

Hypothesis 3: There will be a main effect of negative emotional intensity on behavioral intent such that:

A) Behavioral intent will be significantly higher for moderate intensity compared to low intensity
B) Behavioral intent will be significantly lower for high intensity compared to moderate intensity (Figure 7)

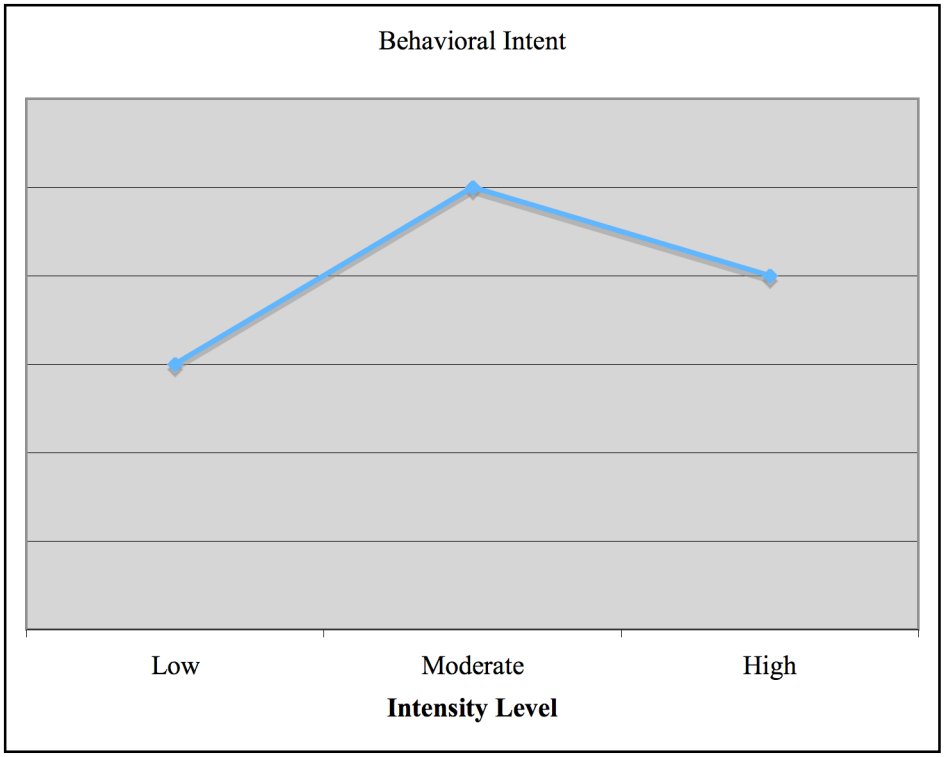

Figure 7. Behavioral intent. Behavioral intent will be strongest at moderate intensity level.

Current research suggests cognitive science and human evolution play a strong role in encouraging environmentally responsible behavior (Kaplan, 2000). Kaplan introduces a Responsible Person Model that suggests an individual's behavior can be a result of multiple motives. Using this model, an environmental campaign utilizing guilt should be replaced by one that offers motivational and problem-solving tactics to encourage pro-environmental behavior. Raymond De Young (2000) expands upon Kaplan's model by suggesting a broader range of motivational factors, including intrinsic satisfaction as a potential motivational strategy. These recommendations for strategic environmental campaigns can either be expanded upon or discredited by studying how individual's cognitively process emotion in environmental advertisements.

3

METHODOLOGY

The purpose of this study was to examine the relationship between intensity of negative emotional appeal in environmental PSAs on cognitive processing and intent to take action. Experiments allow researchers to control for alternative explanations by examining a cause-effect relationship between independent and dependent variables. In a laboratory setting, researchers can manipulate a variable and interpret the influence that variable may have on other variables. In this study, intensity of negative emotional appeal was the manipulated independent variable, and cognitive processing and behavioral intent were dependent variables. A within-subjects experiment will be used so that all experiment participants will be exposed to the same conditions, and therefore each participant will serve as his/her own control.

The predicted relationship between level of negative emotional intensity, STRT/recognition and behavioral intent is reflected in Hypotheses 1, 2 and 3:

> **Hypothesis 1:** There will be a main effect of negative emotional intensity on STRT such that: STRT will be significantly slower for moderate intensity compared to low intensity; and STRT will be significantly faster for high intensity compared to moderate intensity.
>
> **Hypothesis 2:** There will be a main effect of negative emotional intensity on recognition such that: recognition will be significantly higher for moderate intensity compared to low intensity; and recognition will be significantly lower for high intensity compared to moderate intensity.

Hypothesis 3: There will be a main effect of negative emotional intensity on behavioral intent such that: behavioral intent will be significantly higher for moderate intensity compared to low intensity; and behavioral intent will be significantly lower for high intensity compared to moderate intensity.

The design of this experiment was a 3 (Intensity of Negative Appeal) x 3 (Message) x 3 (Order) mixed model repeated measures. The intensity of negative appeal factor had three levels: low, moderate, and high. Participants watched three messages at each level for a total of nine messages. The messages were presented in random order.

Stimulus Materials

Nine 30-second environmental PSAs were selected from a pool of environmental PSAs. All of the PSAs in the pool used negative emotional appeal. Negative emotional appeals were defined as verbal, textual or visual depictions of negative events, locations or animate objects. Negative emotional appeals included negative threats or images related to global warming, pollution, biodiversity loss, poaching, climate change, and other environmental issues. Message content included images of dead animals, violence against humans or animals, extreme environmental devastation, and other negative emotional content. Thirty pre-test participants responded on a seven-point continuous-response measure of unpleasantness. The mean unpleasantness scores were rank-ordered, and a repeated measures ANOVA test was conducted to determine statistical difference between the mean unpleasantness scores of the nine messages with the highest, moderate-level, and lowest unpleasantness ratings

Participants

Fifty undergraduate students enrolled at a Midwest university participated in the experiment for course credit. An alternative assignment was provided to those who did not wish to participate.

Procedure

Participants read and signed an informed consent form. Next, they were seated in front of a laptop. Medialab, the data collection program, presented all instructions and tasks. First, participants watched nine PSAs. During each PSA, participants responded to three randomly placed STRT tones by pressing either shift key on the laptop as quickly as they could. Participants watched one non-stimulus message to practice responding to the STRT tone. The STRT tones were randomly placed in each third of each message, but were not placed in the first five seconds of the messages or the last two seconds of the message. Following each PSA, participants rated the unpleasantness, pleasantness and arousal of the PSA they just viewed on a seven point Likert scale, and responded to 18 questions on a seven-point Likert scale about intent to take action. Following the last PSA, participants watched a three-minute distracter video. Participants then completed the video recognition task. For this task, participants responded to 36 half-second video clips by hitting the left or right shift key as quickly as possible to indicate whether he/she had seen the clip before. Eighteen of the clips were from the stimulus messages and 18 were foils taken from non-stimulus environmental messages. After completing this task, the participants were thanked, provided a receipt of their participation, and dismissed.

Pre-test Results

The mean unpleasantness responses from the continuous response measure results were calculated for each of the pre-test messages. Only environmental PSAs with negative emotional content were included in the pre-test. The three PSAs with the highest mean unpleasantness rating were selected for the high emotional intensity group. The

three PSAs with the lowest mean unpleasantness rating were selected for the low emotional intensity group. The three PSAs with mean unpleasantness ratings in the mid-range were selected for the moderate emotional intensity group (Table 1).

Table 1: Mean Unpleasantness Scores for Negative Environmental PSAs (N=30)

PSA	**Unpleasantness Mean**
1	5.82
2	5.52
3	5.31
4	5.14
5	4.89
6	4.71
7	4.60
8	4.47
9	4.44
10	4.43
11	4.36
12	4.36
13	4.35

Note: Unpleasantness: 1 = not unpleasant; 7 = very unpleasant, N = 30

A 3 (Intensity Level) x 3(Message) repeated measures ANOVA revealed that there was a significant difference between the three groups on ratings of unpleasantness. There was a main effect of intensity level on unpleasantness rating ($F=6.94$; $p=.022$). Pairwise Comparison results showed means for all three levels were significantly different from each other at the .01 level. The three high intensity messages ($M=5.49$) were rated more unpleasant than the three moderate intensity messages ($M=4.73$), and the three moderate intensity messages were rated more unpleasant than the three low intensity messages ($M=4.36$) (Table 2). The effect size was fairly large (.67) indicating these are large effects.

Table 2: Unpleasantness Means by Intensity Level (Pre-test)

Intensity Level	**Unpleasantness Mean (SE)**
Low	4.36* (.216)
Moderate	4.73* (.192)
High	5.49* (.087)

Note: Unpleasantness: 1 = not unpleasant; 7 = very unpleasant, N = 30, *p<.01

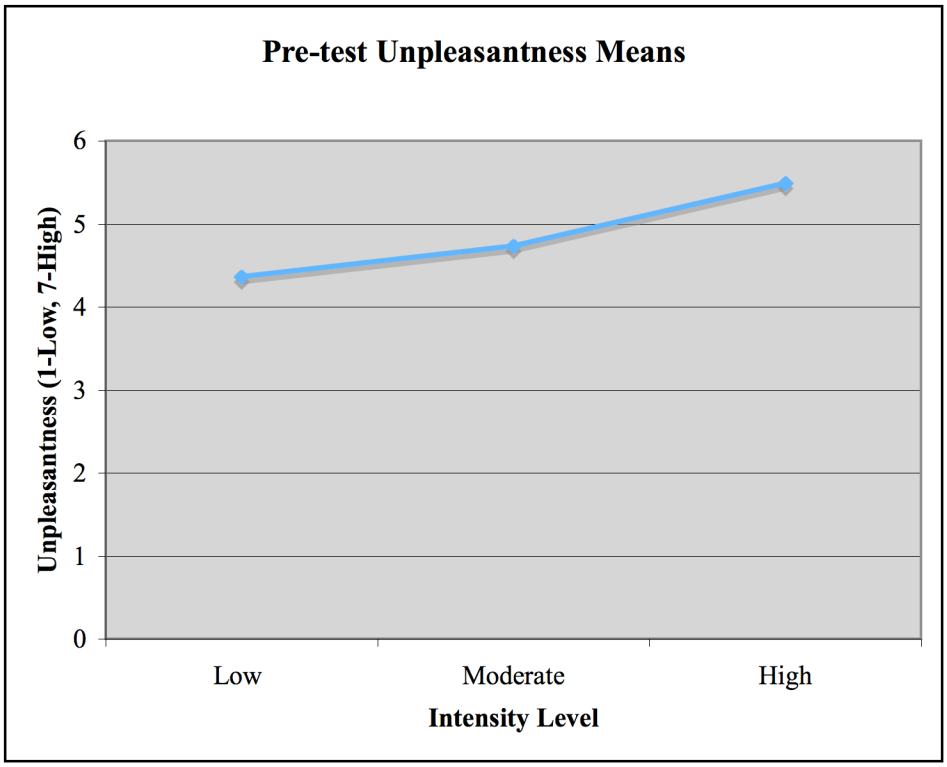

Figure 8. Mean continuous response ratings for unpleasantness for pre-test.

Video I-squared

The nine stimulus PSAs were coded for visual information introduced using calculations for I^2. A. Lang and colleagues introduced this measure to identify information introduced by a structural feature of a visual message (A. Lang, Bradley, Park, Shin & Chung, 2004). This measure identified the number of cuts and camera changes, accounting for pacing and structure of the messages. Chi-square, a nonparametric statistic, was calculated to determine statistical significance between the I^2

values for each of the three intensity levels (Chi-square = 57.3, df = 4, p<.001). The moderately negative messages were significantly less visually complex compared to messages with low negative intensity. The highly negative messages were significantly less visually complex compared to messages with moderate negative intensity.

Table 3: I-squared values for nine stimulus messages

	Low I^2	Mod I^2	High I^2
Message 1	62	55	51
Message 2	63	18	52
Message 3	39	59	8
Mean	54.6	44	37

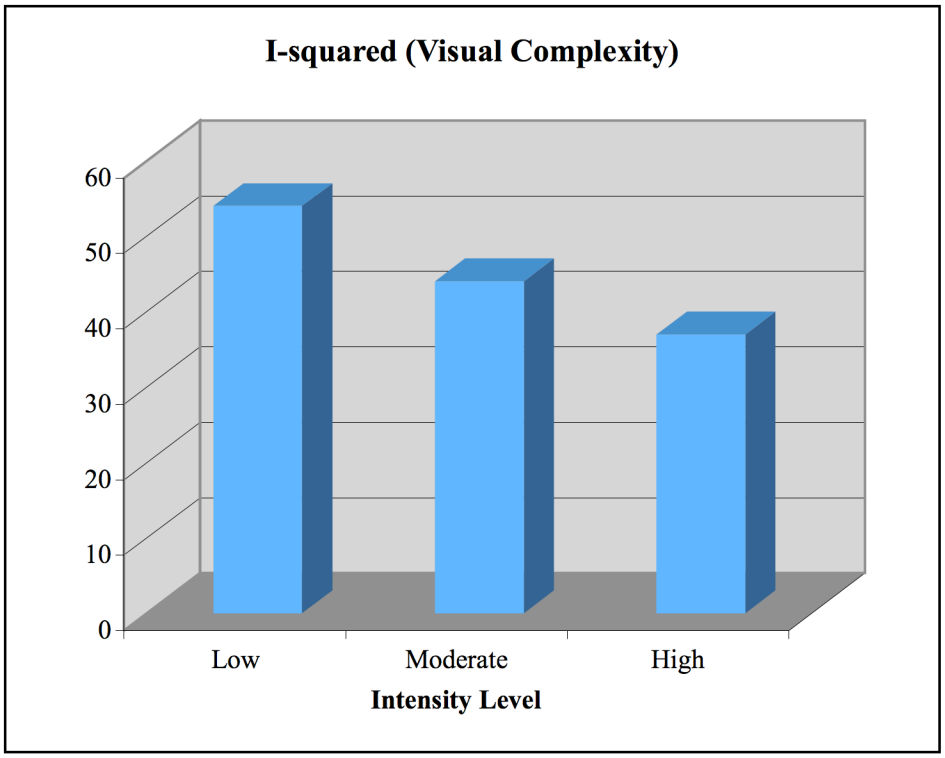

Figure 9. Mean i-squared (visual complexity) values across three conditions.

Dependent Variables

Arousal and Valence

After watching each stimulus message, participants gave self-report ratings of arousal on a seven-point Likert scale. Participants also rated the unpleasantness and pleasantness on a seven-point Likert-scale as a measure of valence intensity.

STRT

Cognitive resources available for message encoding was measured using secondary task reaction time and resources allocated to encoding was measured using the video recognition task. STRT is theorized to directly index cognitive resources available for the encoding stage of cognitive processing (A. Lang et. al, 2006). A STRT tone was randomly placed in each third of each stimulus message and participants were instructed to press either shift key on a laptop as quickly as they could after hearing the tone. The first STRT tone was placed at least five seconds after the onset of the PSA and the last tone was placed no more than two seconds before the end of the PSA. The STRT data was averaged across each of the three conditions and analyzed using a 3 (Intensity of Negative Appeal) x 3 (Message) x 3 (Order) repeated measures ANOVA.

Recognition

Performance on video recognition tasks is also theorized to index resources allocated to encoding information that has been presented. Two half-second clips were randomly selected from the first 15 seconds and last 15 seconds of each stimulus message, to make a total of 18 target clips. Eighteen half-second clips were taken from other non-stimulus environmental messages and used as foils. The 36 clips were

presented in random order, and participants were asked to hit the left or right shift key as quickly as possible to indicate whether he/she had seen the clip before.

There were four possible outcomes for the video recognition task: hits, misses, correct rejections and false alarms. Hits and correct rejections are accurate responses that correctly identify whether the video clip had been previously viewed. Misses and false alarms are inaccurate response that incorrectly identify whether the video clip had been previously viewed. Accuracy proportions were calculated for hits and correct rejections by calculating the ratio of accurate response to the total number of video clips.

To further analyze the video recognition data, a signal detection theory analysis was conducted using non-parametric statistical formulas (MacMillan & Creelman, 1991). Sensitivity (A'), or the ability to discriminate between old and new information, was calculated. The larger the value of A', the more sensitive the participant, which means he/she was more likely to discriminate between old and new information.

Criterion bias (B''), the judgment shift associated with making a correct or incorrect response, was also calculated. As B'' approaches 1, the more the participant is said to have conservatively shifted his/her criterion to reduce false alarms. As B'' approaches -1, the more the subject is said to have liberally shifted his/her responses to maximize hits.

Finally, response times were recorded to measure how long it took for the participant to respond after viewing the video clip. Response times were measured in milliseconds from the beginning of the video clip to the moment the participant responded.

Behavioral Intent

Behavioral intent was measured using a three-item semantic differential scale adapted from Juster's purchase intent scale (1964). Participants rated the likelihood, probability and possibility of performing a specific behavior related to the environmental issue presented in the PSA (Appendix). These issues included killing of endangered species, illegal wildlife trade, climate change, deforestation, and global warming. Each statement was a reflection of a different level of behavior. Reliability for the multiple-item scale was calculated with Cronbach's alpha for each of six statements across all three conditions. All 18 alphas were above .90, indicating reliability for this multiple-item measure was strong.

To analyze the behavioral intent data, 3 (Intensity of Negative Appeal) x 3 (Message) repeated measures ANOVAs were executed for each of the six behavioral intent items.

Participants

Fifty undergraduate students enrolled at a Midwest university participated in the experiment for course credit. An alternative assignment was provided to those who did not wish to participate.

Procedure

Participants read and signed an informed consent form. Next, they were seated in front of a laptop. Medialab, the data collection program, presented all instructions and tasks. First, participants watched nine PSAs. During each PSA, participants responded to three randomly placed STRT tones by pressing either shift key on the laptop as quickly as they could. Participants watched one non-stimulus message to practice responding to the

STRT tone. The STRT tones were randomly placed in each third of each message, but were not placed in the first five seconds of the messages or the last two seconds of the message. Following each PSA, participants rated the unpleasantness, pleasantness and arousal of the PSA they just viewed on a seven point Likert scale, and responded to 18 questions on a seven-point Likert scale about intent to take action. Following the last PSA, participants watched a three-minute distracter video. Participants then completed the video recognition task. For this task, participants responded to 36 half-second video clips by hitting the left or right shift key as quickly as possible to indicate whether he/she had seen the clip before. Eighteen of the clips were from the stimulus messages and 18 were foils taken from non-stimulus environmental messages. After completing this task, the participants were thanked, provided a receipt of their participation, and dismissed.

4

RESULTS

Data Cleaning

Prior to analysis, all of the dependent variable data was examined for missing data and outliers. The STRT data had five instances of missing data. All missing data was replaced with the series mean. One subject's data was thrown out because STRT data for an entire message was missing.

The researcher considered STRTs of more than 1000 milliseconds to be outliers. These times were replaced with the next highest STRT in the series. Overall, less than 1 percent of the STRT data was replaced.

Data from one recognition variable within the low intensity level was inaccurately recorded for all participants. This data was not used, and analysis was conducted using only accurately recorded recognition data for the low intensity message. There were no missing data for any of the other measures.

Introduction to Results

In order to more completely understand the effect of negative emotional appeal intensity on resource allocation, recognition, and behavior intent, it was also necessary to test the impact of varying negative intensities on self-reported arousal and valence. Arousal has been shown to significantly impact allocation of resources to encoding and

influence activation of the appetitive and aversive motivational systems. Therefore, results will first be presented from self-reported measures of arousal, pleasantness and unpleasantness.

Arousal Results

Fifty participants participated in the experiment. The data collected reflected a self-reported arousal on a seven-point scale after the participant watched each message. A 3 (Intensity Level) x 3 (Message) repeated measures ANOVA was used to analyze emotional intensity's affect on arousal. The analysis showed there was a significant main effect of intensity level on self-reported arousal ($F=8.174$; $P < .001$). Mean self-reported arousal for high intensity ($M=5.007$) was greater than for moderate intensity (4.467), and the difference was significant ($P<.001$, $SE=.129$). Mean self reported arousal for moderate intensity ($M=4.467$) was greater than for low intensity ($M=420$), but the difference was not significant. Mean self-reported arousal for high intensity was greater than for low intensity, and the difference was significant (Table 4).

Table 4: Mean Self-Reported Arousal (SE)

Intensity Level	**Arousal (SE)**	**Pairwise Comparison**	**Significance**
Low	4.420 (.167)	Low-Moderate	Not significant
Moderate	4.467 (.178)	Moderate-High	p<.001
High	5.007 (.175)	Low-High	p<.001

Note: Arousal 1 = Not at all; 7 = A lot, N = 50,

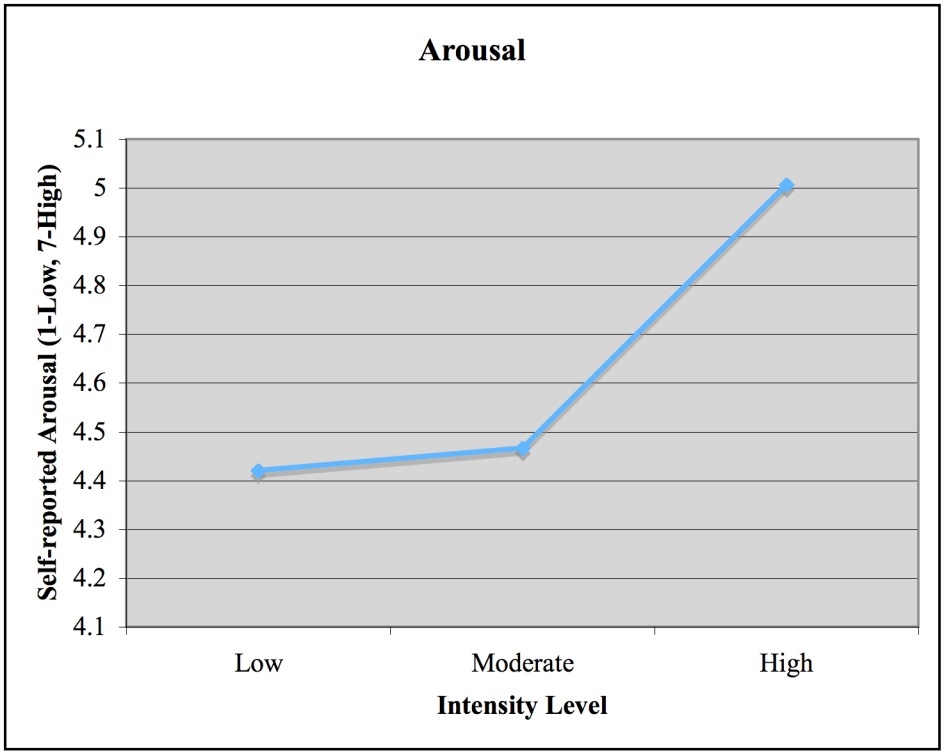

Figure 10. Self-reported mean arousal scores for low, moderate and high intensity.

Pleasantness and Unpleasantness Results

Self-reported measures of pleasantness and unpleasantness were analyzed using a 3 (Intensity Level) x 3 (Message) repeated measures ANOVA. Participants reported the level of unpleasantness and pleasantness of each message on seven-point scales. There was a significant main effect for level of intensity on self reported pleasantness ($p<.001$, $F=46.542$) and unpleasantness ($p<.001$, $F=34.550$).

Pleasantness

Mean self-reported ratings of pleasantness were higher for low intensity ($M=3.567$) compared to moderate intensity ($M=3.400$), but the difference was not significant. Mean ratings of pleasantness were higher for moderate intensity compared to high intensity ($M=2.247$), and the difference was significant ($p<.001$, $SE= .147$). Mean

ratings of pleasantness were higher for low intensity compared to high intensity, and the difference was also significant (p<.001, SE= .161).

Unpleasantness

Mean self-reported ratings of unpleasantness were lower for low intensity (M=4.153) compared to moderate intensity (M=4.407), and the difference was approaching significance (p=.051). Mean ratings of unpleasantness were lower for moderate intensity compared to high intensity (M=5.567), and the difference was significant (p<.001, SE= .157). Mean ratings of unpleasantness were lower for low intensity compared to high intensity, and the difference was also significant (p<.001, SE= .175).

Table 5: Mean Scores for Pleasantness and Unpleasantness (SE)

Intensity Level	**Unpleasant (SE)**	**Pleasant (SE)**	**Pairwise Comparison**	**Significance**
Low	4.153 (.148)	3.567 (.150)	Low-Moderate	Not significant
Moderate	4.407* (.121)	3.4 (.143)	Moderate-High	p<.001
High	5.567* (.172)	2.247 (.138)	Low-High	p<.001

Note: Unpleasantness 1- Not at all, 7- A lot
Pleasantness: 1- Not at all 7- A lot, N=50

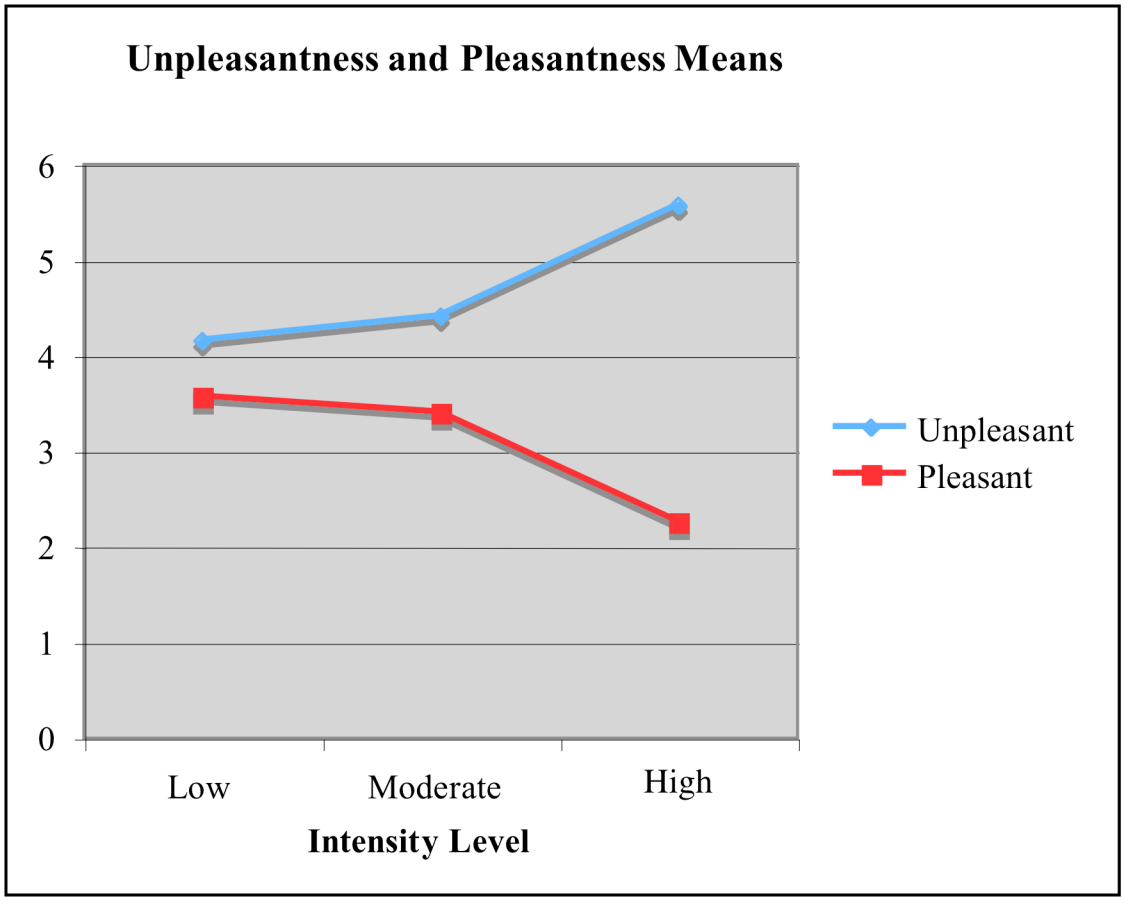

Figure 11**.** Self reported means scores for unpleasantness and pleasantness across three conditions.

STRT Results

Hypothesis 1 predicted a main effect of negative emotional intensity on STRT such that: STRT will be significantly slower for moderate intensity compared to low intensity; STRT will be significantly faster for high intensity compared to moderate intensity, indicative of cognitive overload.

The STRT data was averaged across each of the three conditions and analyzed using a 3 (Intensity of Negative Appeal) x 3 (Message) repeated measures ANOVA. Results from the STRT data analysis showed a significant main effect for negative emotional appeal intensity ($p<.001$, $F=22.409$). However, results did not reveal the

predicted direction of the relationship. STRT was significantly slower for high negative intensity (M=485.784, SE=12.597) compared to moderate negative intensity [(M=430.825, SE=11.946) (p<.001, SE=8.424)]. STRT was significantly faster for moderate negative intensity compared to low negative intensity (M=464.497, SE=11.353) (p<.001, SE=8.482). STRT was also significantly slower for high negative intensity compared to low negative intensity (p<.01, SE=7.918). Overall, STRT was fastest for moderate negative intensity messages, and slowest for high negative intensity messages.

Table 6: Mean STRT Scores and Pairwise Comparison

Intensity Level	**STRT in milliseconds (SE)**	**Pairwise Comparison**	**Significance**
Low	464.497 (11.353)	Low – Moderate	p<.001
Moderate	430.825 (11.946)	Moderate – High	p<.001
High	485.784 (12.597)	Low – High	p<.01

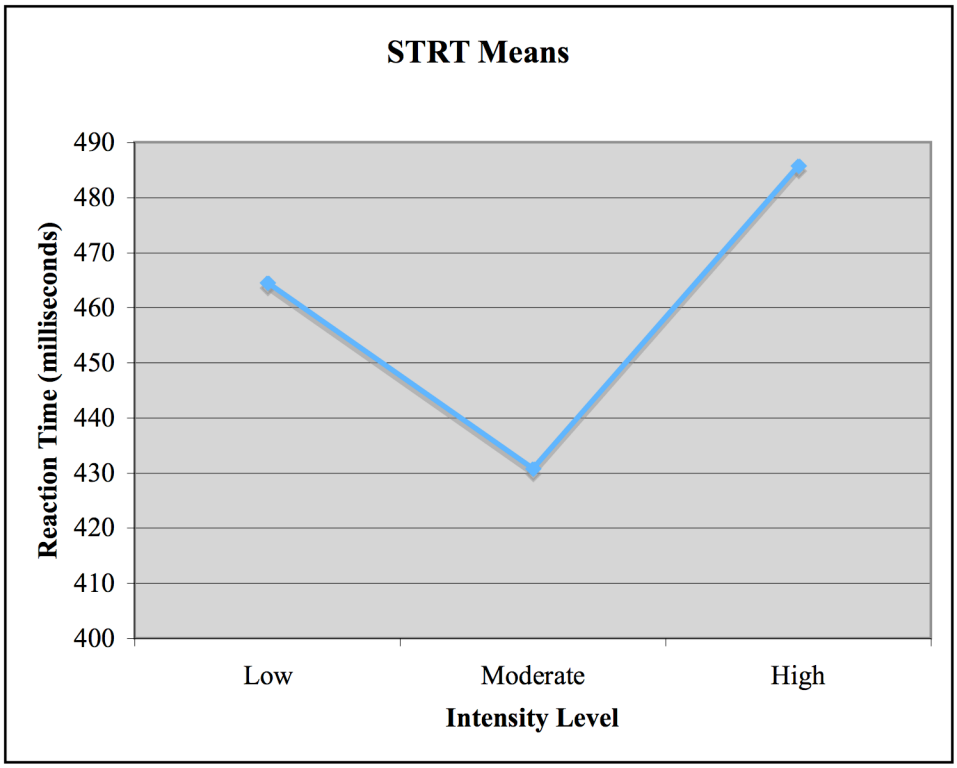

Figure 12. Mean STRT in milliseconds for low, moderate and high intensities.

Recognition Results

Hypothesis 2 predicted a main effect of negative emotional intensity on recognition such that: recognition will be significantly higher for moderate intensity compared to low intensity; recognition will be significantly lower for high intensity compared to moderate intensity, indicative of cognitive overload.

Accuracy

Accuracy proportions were calculated for hits and correct rejections by calculating the ratio of accurate response to the total number of video clips. This data was analyzed using a 3 (Intensity Level) x 3 (Message) repeated measures ANOVA. The results showed that there was a significant main effect for intensity of negative emotional appeal on recognition accuracy ($p<.001$, $F=15.041$). Participants were more accurate when responding to the moderate-intensity messages ($M=.75$, $SE=.020$) than when responding to the low intensity messages ($M=.60$, $SE=.030$), and the difference was significant ($p<.001$,$SE=.037$). Participants were less accurate when responding to the high-intensity messages ($M=.54$, $SE=.034$) than when responding to the moderate-intensity messages, and the difference was significant ($p<.001$, $SE=.040$). Participants were more accurate when responding to low intensity messages when compared to high intensity messages, but the difference was not significant. Overall, participants responded most accurately to moderate intensity messages.

Table 7: Mean Accuracy Rates for Recognition

Intensity Level	Recognition Accuracy (SE)	Pairwise Comparison	Significance
Low	0.6 (.030)	Low - Moderate	p<.001
Moderate	0.75 (.020)	Moderate - High	p<.001
High	0.54 (.034)	Low - High	Not significant

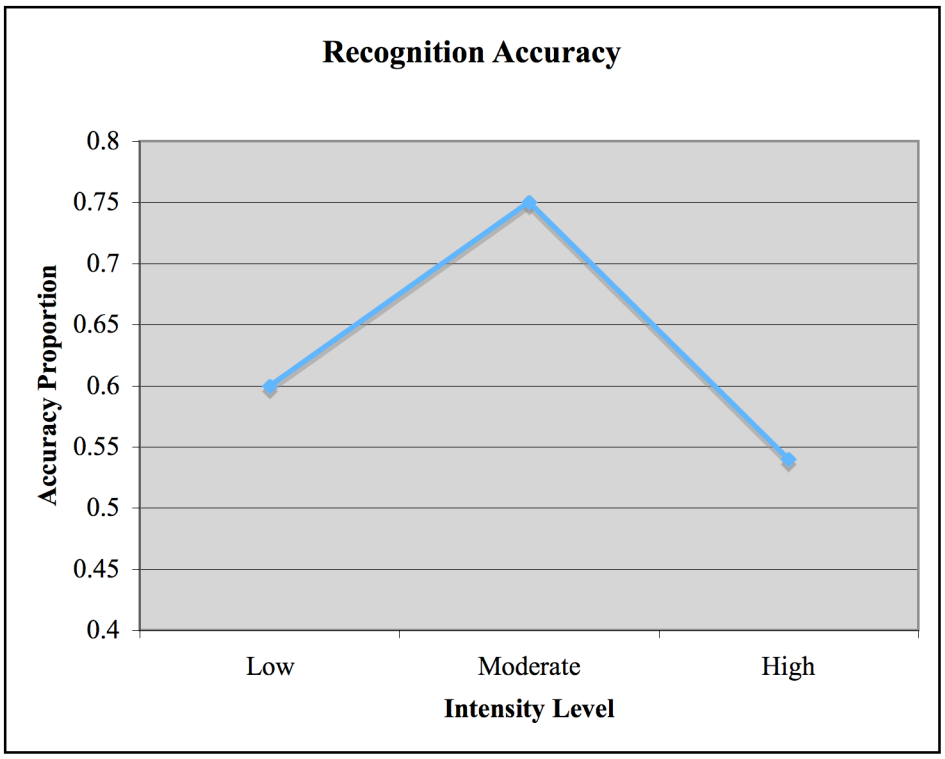

Figure 13. Mean recognition accuracy rates for three conditions.

Sensitivity

False alarm rates and hit rates were calculated for each intensity level. Sensitivity was calculated using A'. Higher scores were indicative of greater sensitivity. Calculating A' prime assumes that the hit rate is greater than the false alarm rate in all cases. In this study, that assumption held true. The results showed there was a significant main effect of intensity on sensitivity ($p<.001$). Participants were significantly more sensitive during the recognition task for messages with moderate negative intensity compared to low negative intensity. Participants were significantly less sensitive during the recognition task for messages with high negative intensity compared to moderate negative intensity.

Table 8. Mean Sensitivity (A') and Significance Values

Intensity Level	**Sensitivity (SD)**	**Pairwise Comparison**	**Significance**
Low	.8459 (.08)	Low - Moderate	p<.001
Moderate	.8987 (.05)	Moderate - High	p<.001
High	.8264 (.09)	Low - High	Not significant

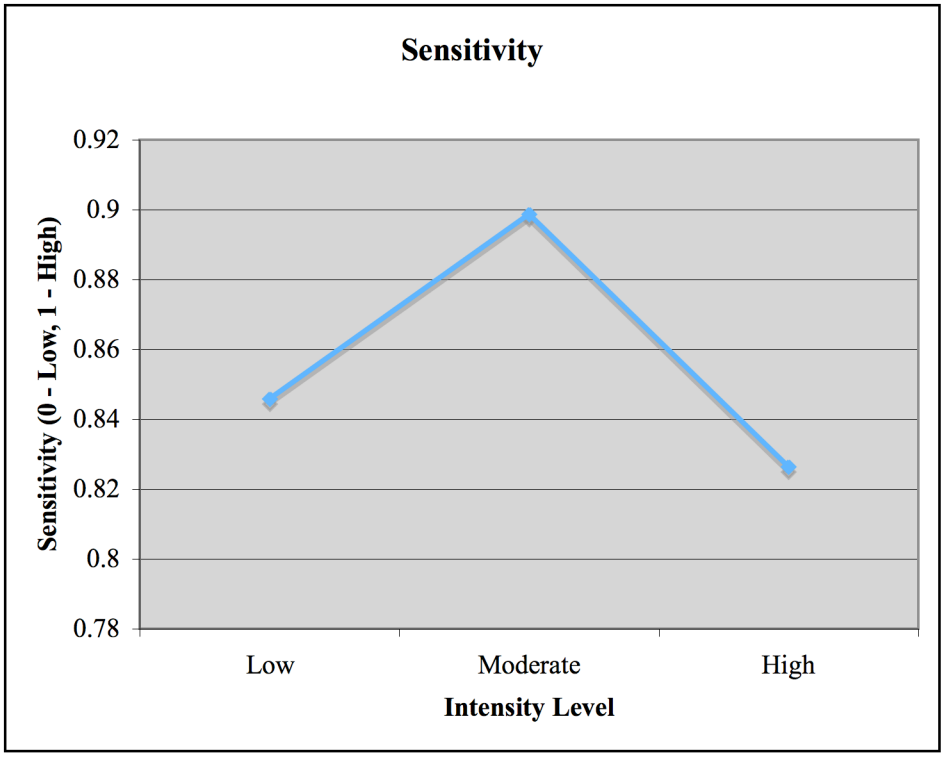

Figure 14. Mean sensitivity rates for three conditions.

Criterion Bias

Criterion bias was calculated using B". Higher scores indicated participants became more conservative in their judgment by being more likely to respond "no" when asked if they had seen the foil or target in the experiment. According to the criterion bias analysis, there was a significant main effect for negative emotional appeal intensity ($F=18.287$, $p<.001$). Participants were most conservative when responding to the low negative intensity messages ($M=.742$, $SE=.070$)) and most liberal when responding to moderate intensity messages ($M=.200$, $SE=.088$). Pairwise comparison showed that the difference in criterion bias was significant when comparing low to moderate intensity ($p<.001$) and moderate to high intensity ($p<.001$), but the difference between low and high intensity was not significant. Participants were slightly less conservative when

responding to high negative intensity messages (M=.715, SE=.073) compared to low negative intensity messages. This data indicates that participants had the smallest shift in judgment when making judgments calls on video clips from moderate intensity messages.

Table 9: Mean Criterion Bias (B") and Significance Values

Intensity Level	Criterion Bias (SE)	Pairwise Comparison	Significance
Low	.742 (.070)	Low - Moderate	p<.001
Moderate	.200 (.088)	Moderate - High	p<.001
High	.715 (.073)	Low - High	Not significant

Note: Scores closer to +1 indicate a more conservative shift in judgment.

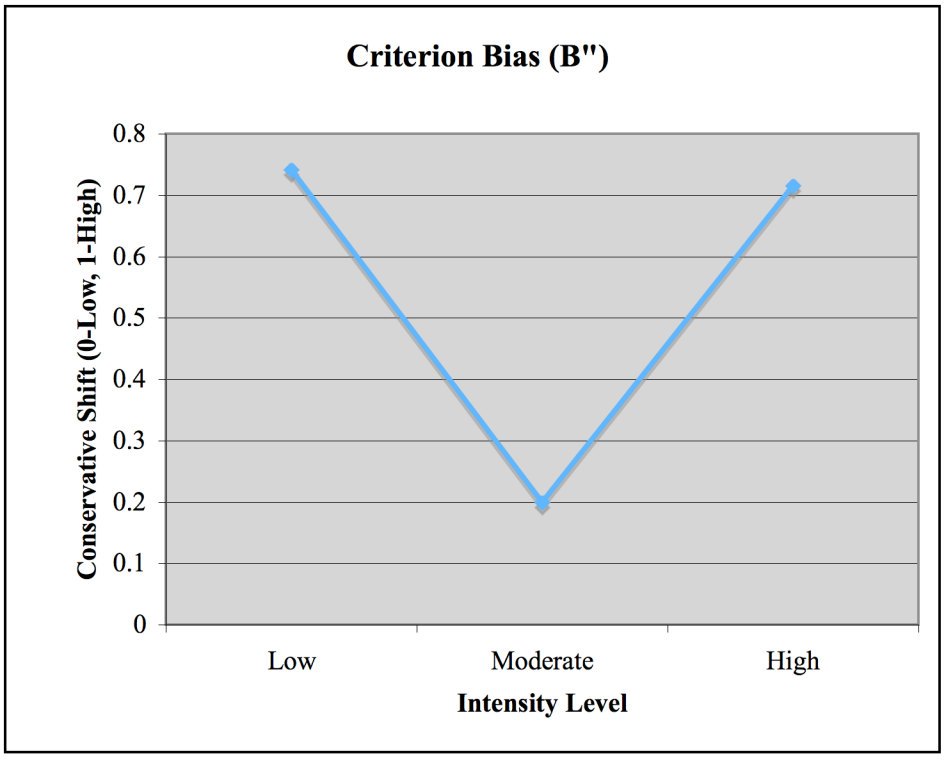

Figure 15. Criterion bias (B") calculated for each intensity level.

Response Times

Response times were measured in milliseconds from the beginning of the video clip to the moment the participant responded. The average recognition response times were calculated across conditions and analyzed using a 3 (Intensity Level) x 3 (Message) repeated measures ANOVA. The results showed that there was no significant main effect

for negative emotional intensity on response times for the recognition task (P=.246). However, mean response times were slowest for moderate intensity messages (M=1086.11), and fastest for high intensity messages (M=1022.443).

Table 10. Mean Response Times to Video Recognition Task (Not significant)

Intensity Level	**Response Time (SE)**
Low	1069.857 (39.886)
Moderate	1086.11 (35.299)
High	1022.443 (36.089)

Behavioral Intent Results

Reliability Analysis

To analyze behavioral intent results, the researcher first conducted a reliability analysis for six items across all three intensity levels. Alphas in all 18 calculations were above .90, so reliability for the multiple-item index was consistent.

Table 11. Reliability Analysis (Cronbach's alpha)

Intensity Level	**Support Sponsor**	**Seek Information**	**Visit Web site**	**Donate Money**	**Volunteer**	**Change Personal Behavior**
High	.916	.929	.930	.956	.957	.929
Moderate	.903	.921	.939	.953	.950	.902
Low	.911	.946	.942	.942	.939	.930

To analyze results of the self-report behavioral intent data, a 3 (Intensity Level) x 3 (Message) repeated measures ANOVA was executed for each level of behavioral intention. There was a significant main effect for level of intensity on one out of six behavioral intention items. The item was intention to "support the sponsor" of the message. This was considered to be the lowest level of behavioral intent. Mean scores for

intent to support the message sponsor were higher for moderate intensity level (M=4.922) compared to both low (M=4.66) and high intensity levels (M=4.507).

Table 12: Behavioral Intent Means (By Intensity Level and Behavioral Intent Item)

Intensity Level	Support Sponsor	Seek Information	Visit Website	Donate Money	Volunteer	Change Personal Behavior
Low	4.66	4.327	4.011	3.202	3.702	4.473
Moderate	4.922	4.233	4.076	3.28	3.742	4.404
High	4.507	4.046	3.816	3.193	3.613	4.238
Sig. (p)	.007	0.253	0.252	0.612	0.474	0.234
Mean	4.696	4.202	3.968	3.225	3.686	4.372

Note: 1- Not likely/probable/possible, 7- Very likely/probable/possible

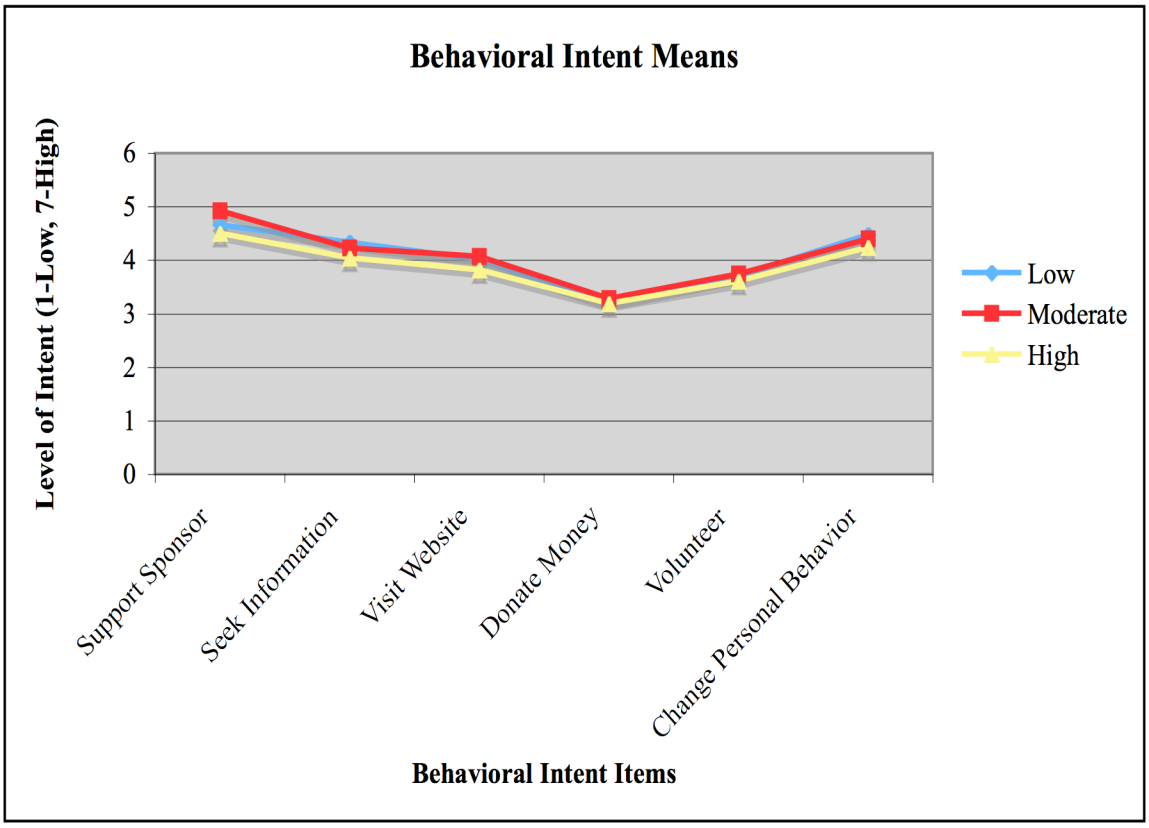

Figure 16. Mean Behavioral Intent Scores (Low Intent - 1, High Intent - 7)

There was a significant main effect of intensity of intent to support sponsor. All other mean differences were not significant. Regardless of intensity level, participants

were least likely to donate money or volunteer to the cause presented in the environmental PSAs. Participants were most likely to support the sponsor and seek more information about the environmental issue.

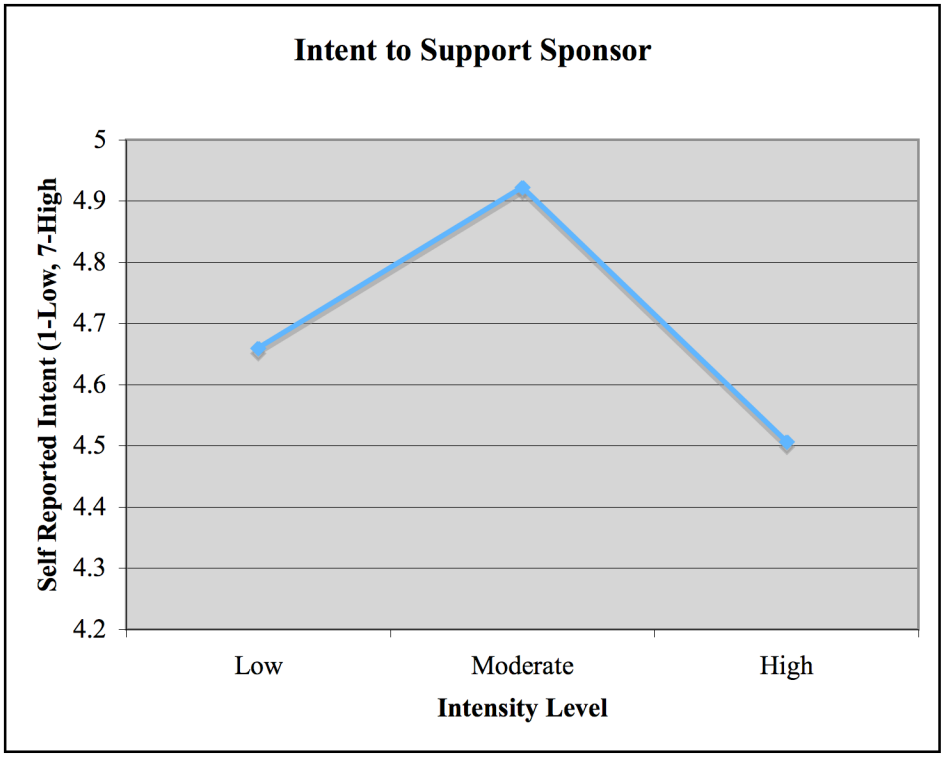

Figure 17. Mean scores for self-reported intent to support sponsor on seven-point scale across all three conditions

5

DISCUSSION

This study sought insight into the influence of negative emotional intensity on cognitive processing and behavioral intent. Encoding is a necessary pre-requisite to the storage and retrieval phases of cognitive processing. STRT and recognition were variables used to measure resources available for and allocated to encoding. Behavioral intent was measured to examine the effects of negative emotional intensity on intent to take action. This study also sought to examine the relationship between valence and arousal, two key dimensions of emotion theory. The Limited Capacity Model for Motivated Mediated Messaging helped guide the research hypotheses.

Results from the arousal measurement indicate that as negative emotional intensity increases, self-reported arousal increases as well. There was a main effect of intensity on arousal, such that high intensity resulted in the highest self-reported arousal. These results support previous research that suggests emotional content is more arousing than non-emotional content in messages.

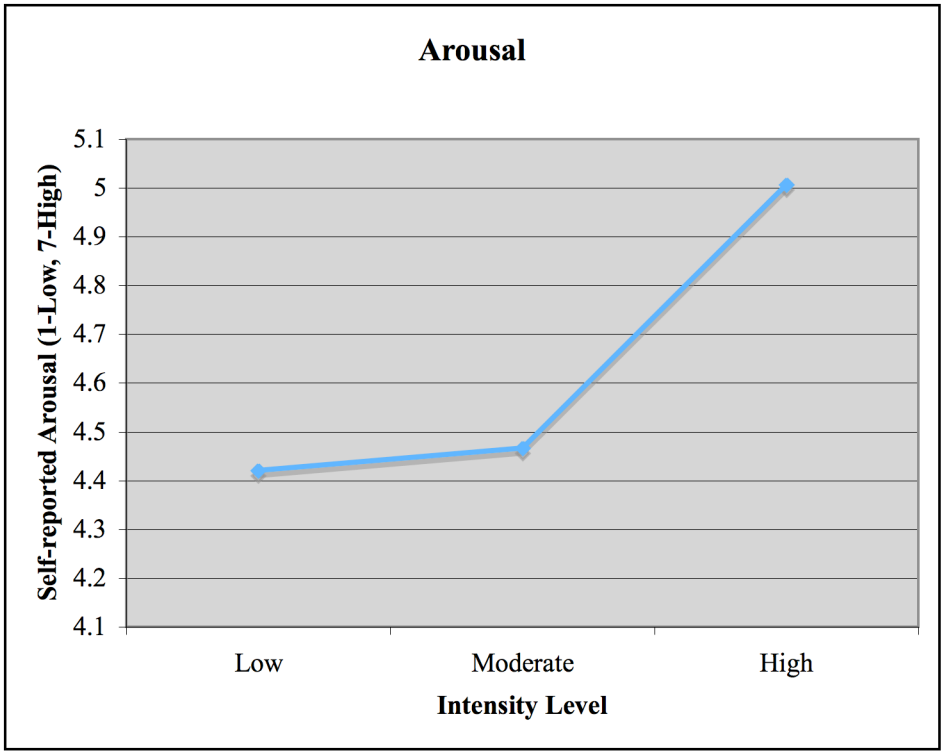

Figure 18. Arousal

Results from the unpleasantness and pleasantness self-report measurements provided confirmation that the stimulus messages used varying intensities of negative emotion to appeal to the audience. Main effects of intensity were found for both measures. As the level of emotional intensity heightened, self-reported ratings of unpleasantness increased and self-reported ratings of pleasantness decreased. The continuous response ratings of valence from the pre-test showed a significant difference between all three levels, whereas the self-report ratings retrieved from the main study illustrated no significant difference in unpleasantness between low and moderate intensity messages. The pre-test results may be a more accurate measure of message valence because it recorded moment-by-moment unpleasantness ratings. In contrast, the self-report measure produced a global, overall rating for each message. There was no significant difference between low and moderate intensity when analyzing pleasantness,

unpleasantness, and arousal self-report data, whereas, the effect of all other levels on these variables was significant. This provides support for positivity offset under the LC4MP framework. The lower levels of negative emotional intensity are not as arousing, and the arousal level does not increase significantly until emotional intensity is very high.

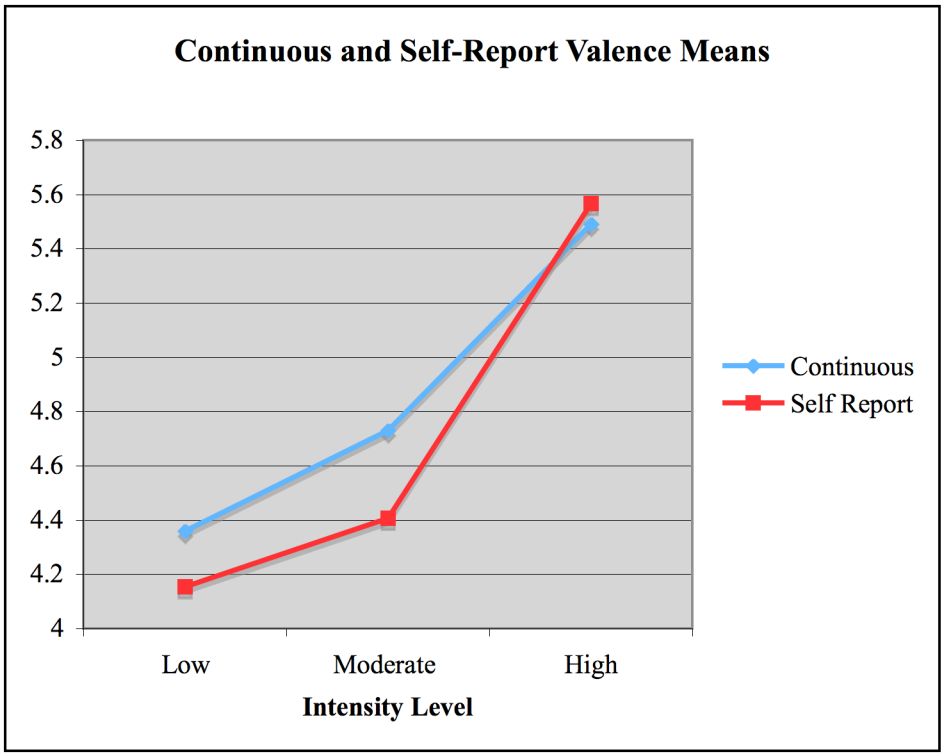

Figure 19. Pre-test unpleasantness means (continuous response measure) plotted with self-report unpleasantness means.

The STRT results showed that there was a main effect of intensity level on secondary task reaction time, however the predicted dynamic of that relationship –that STRT would significantly increase for the high intensity level due to cognitive overload – was not supported. Therefore Hypothesis 1 was partially supported. The results indicated that STRT was fastest for moderate intensity levels, and slowest for high intensity levels. At first glance, these results were baffling. They seemed to contradict the cognitive overload phenomena illustrated by A. Lang as a component of her LC4MP prediction.

However, upon further analysis, the researcher developed potential explanations for these results.

Slow STRT for high intensity levels indicates that participants were still allocating a high degree of cognitive resources to encoding. This could lead us to believe that cognitive overload was not reached. A possible explanation for this could be that the stimuli presented in these messages may not have been emotionally intense enough to evoke mental overload.

A second potential explanation reaches back to the traditional interpretation of the resources STRT measures. Traditional interpretation led researchers to believe that STRT indicated the amount of resources not being used to perform a primary task, or "remaining resources." Based on this traditional conceptualization, complex and difficult messages, which require more resources to process, would result in slow STRT. Furthermore, simple, easy messages, which require fewer resources to process, would result in fast STRT. The data from this study appear to support this traditional interpretation, where higher emotional complexity in messages results in slower STRT. Since moderate negative emotional intensity resulted in the fastest STRT, according to this traditional interpretation, these messages were the easiest to process. However, the the arousal measurement does not support this traditional STRT interpretation. Arousal was highest at the high intensity level. Research has shown individuals allocate more resources to processing messages that are arousing. If more resources were allocated to the high intensity message, one would assume recognition for this measure would be high. Recognition results show us that in fact recognition was poorest for the highly negative messages.

The third explanation for the STRT results relies on further analysis of the recognition results in relation to possible confounding characteristics of the messages. Hypothesis 2 predicted that there would be a main effect of intensity level on recognition such that recognition would be significantly higher for moderate intensity compared to low intensity, and significantly lower for high intensity compared to moderate intensity, indicative of cognitive overload. These results indicate Hypothesis 2 was supported and suggest that cognitive overload was reached at the highest intensity of negative emotional appeal. Recognition accuracy was lowest for the high intensity messages and highest for the moderate intensity messages. The combined STRT and recognition results indicate that while participants were still allocating a high degree of cognitive resources to encoding highly negative messages, those resources were not enough to prevent significantly lower levels of recognition.

A study on negative tone in radio messages by Bolls, A. Lang, and Potter (2001) revealed similar results where allocation of resources and recognition performance did not follow the predicted pattern. In this study, resource allocation was measured using heart rate; slower heart rate indicates more resources allocated. Results revealed that highly arousing messages resulted in poor recognition performance, an indicator of cognitive overload, and slower heart rate. Although radio listeners were attending to the message, that attention did not lead to better recognition. These studies build support for the argument that attention does not equal memory.

The signal detection analysis provided additional room for interpretation of the recognition performance results. There was a strong significant main effect of intensity on both sensitivity and criterion bias. Participants were most sensitive when presented

with environmental PSAs that used moderate negative intensity compared to both low and high negative intensity PSAs. There was a significant drop in sensitivity when negative intensity was at the highest level. These results indicate participants were most able to distinguish between old and new information at the moderate intensity level, and had a more difficult time distinguishing between old and new information when presented with highly negative messages.

The criterion bias analysis showed participants responded least conservatively to messages with moderate negative emotional intensity, and most conservatively to messages with high and low negative emotional intensities. These results support the notion that moderate messages were encoded most successfully. The low B'' values for moderate messages indicates that participants were most confident in their judgment when they saw video clips from these messages. Furthermore, the very conservative B" value for high intensity messages leads us to believe that although participants were still allocating resources to these messages, this allocation did not translate to a willingness to say "yes" at lower levels of familiarity. These results support a recent study by Fox et. al. (in press) that used signal detection theory to analyze cognitive processing. In their study, criterion bias became significantly more liberal when resources were available preceding a significant drop in recognition sensitivity. In the case of the high intensity messages, available resources became scarce, but not negative, and information continued to be encoded, but not as accurately. Therefore, participants were not as willing to say "yes" to lower levels of familiarity for high intensity messages as they were for those that were moderate intensity.

The results of these measures can also be analyzed in terms of a phenomena

identified by A. Lang, Bradley, Cuthbert (1997) as the *defense cascade model*. The model identifies physiological reactions that occur as a result of increasing arousal before and after the stimuli is encountered. This model suggests that as the difference between the appetitive and aversive system increases, so does the withdrawal response. Looking at this study's results we can see that as the arousal level increased to the highest level with the high negative intensity message, the difference between the aversive and appetitive systems was large, leading to a stronger withdrawal response as indicated by the poor recognition performance. On the other hand, the difference between the aversive and appetitive systems was not as large during the moderate intensity messages, as indicated by the lower arousal level. Therefore, the withdrawal response was not strong. Resources allocated to the highly negative messages may have been directed towards a withdrawal tactic. In the laboratory setting, participants are forced to watch the messages presented. In real life situations, a person can simply change the channel if the stimulus presented is highly negative. The participant may have been allocating resources to the withdrawal response in the laboratory setting, which could account for the slower STRTs. In real life, STRT may in fact speed up because it takes little effort to flip the switch on a remote.

The behavioral intention results showed a main effect for negative emotional intensity on intent to support the sponsor of the message. Conceptually, this variable was considered to be the lowest level of behavioral intention. The results indicated that participants were most likely to support the message sponsor if the message used a moderate level of negative emotion. Additionally, participants were least likely to support the message sponsor if the message used a high level of negative emotion. These results

expand upon the cognitive overload phenomena supported by the recognition data. Where recognition performance drops as emotional intensity increases to the highest level, intent to take action also decreases. Where recognition performance is highest, at the moderate level of negative emotion, intent to take action is also high. These results illustrate a link between encoding and behavior. Where encoding of a message is successful, as seen in the moderate intensity level, the participant is more likely to support the message. These behavior intention results could also be an indicator of attitude. Here, one can draw a link between recognition as a measure of encoding, and self-reported intention to take action as a measure of attitude toward the message. These measures are all indicators of persuasion, thus bringing to light the relationship between emotion, memory, attitude and behavior.

Combining the results for all dependent measures, it appears that messages that were high in both arousal and negative emotional intensity led to lower recognition performance, and thus less successful encoding of the message. These high arousal – high negative intensity messages also were least likely to influence behavioral intent. The participants were likely devoting much of their attention to the high intensity messages, as evidenced by the slow STRT results, however that attention did not translate to better recognition. In comparison, messages that used moderate levels of negative emotion and were moderately arousing actually led to the highest levels of recognition, and thus the most successful encoding. These moderate messages also were most likely to increase behavioral intent. Although the STRT data do not appear to support the dynamic relationship predicted in Hypothesis 1 and presented by the LC4MP framework, the recognition data fully supports the cognitive overload prediction suggested in Hypothesis

2.

These results indicate that increasing negative emotional intensity to the highest level does not lead to better encoding or more behavioral intent. As suggested by the recognition results, messages with high negative emotional intensity were less likely to be encoded successfully when compared to those that used moderate negative appeals. Overall, the study suggests that messages that use extreme emotional content are less likely to persuade audiences. These results indicate that environmental communicators should not develop messages with extremely negative emotional content if they want their messages to be remembered and to lead to behavior change. It appears that when negative emotional intensity becomes too high, the aversive motivation system takes hold as a defense mechanism. At the point of cognitive overload, the steep increase in aversive activation is accompanied by a sharp decrease in the appetitive motivational system. Therefore, rather than approaching the information presented, it is guarded against, and not encoded into memory. However, the results do indicate that environmental communicators should continue to use moderate levels of negative emotion in their messages. Moderate levels lead to the best encoding and highest likelihood to persuade audiences.

This study can be generalized only to the sample used. These results cannot be generalized to a larger population. However despite the lack of external generalizability, this study can suggest a generalization about a relationship between the concepts of emotion, cognition and behavior in environmental PSAs.

The sample of undergraduate students used in this study limits generalizability to larger populations. The lack of significant effects for five out of the six behavioral intent

variables could be a reflection of the demographic of the sample.

Further research should be conducted on how the type of negative appeal used, such as fear, grief, sadness, or anxiety, influences memory, behavior and persuasion. The type of negative emotion used could play a more defining role in how these messages are processed, and which messages are most effective. Additional research could also should how negative emotion in environmental PSA influences other cognitive processing stages including storage and retrieval.

Other variables could impact the relationship between the emotional intensity and cognition. For example, familiarity toward the message may have influenced allocation of resources in processing the messages. Messages that were more familiar to the viewer, because they are more commonly broadcast on national television, may have required fewer resources to process. Environmental PSAs that used moderately negative appeals may have been more familiar to the audience and required fewer resources to process. This would have left more resources available to perform the secondary task, speeding up STRT. Familiarity should be explored as a potential confounding variable that could account for the interesting STRT findings of this study. Other confounding variables may exist that influenced these results or could inform future research. Orientation toward the environment could maximize or minimize the relationship between negative intensity, cognitive processing and behavioral intent. Message effectives could also depend on individual differences based on attitudes toward the environment. Environmental communicators seek to raise awareness for environmental issues from global warming to water resources. Encouraging positive action towards improving our environment among indifferent audiences is difficult. Further research in the fields of

mass media and strategic communications can assist these organizations in their quest to save the environment.

APPENDIX 1

Recruitment Script

Hi, my name is _____ and I'm a graduate student here in the Journalism School. I'm looking for people to participate in a research experiment. This experiment looks at different environmental public service announcements and how they affect cognitive and emotional responses. The study takes approximately 30-45 minutes. It takes place in the PRIME Lab, 176 Gannett. You'll receive one credit for research participation by taking part in this study. Thanks.

APPENDIX 2

Experimental Consent Form

You are invited to participate in a research study in which you will view environmental public service announcements (PSAs). You will respond to a short questionnaire after watching each PSAs. After the last PSA you will be given a task. You participation in this study will take between 45 minutes to 1 hour to complete.

If you have any questions regarding this study, please contact Assistant Professor Paul Bolls, Missouri School of Journalism, 176A Gannett Hall, Columbia, MO 65211; tel. (573) 884-0170.

If you have read this form and decide to participate in this project, please understand your participation is voluntary, and you have the right to withdraw your consent or discontinue participation at any time without penalty. You have the right to refuse to answer any question. In addition, your individual privacy will be maintained in all published and written work resulting from this study. All research materials must be kept for a period of 3 years following the completion of the project. For participating in this experiment, you will receive one credit towards the required the research participation component of J4952. If you choose to drop out of this study, you may earn the equivalent course credit by writing a short paper on the role of research in advertising. Your participation will help researchers learn more about how people process information from online news. There are no other benefits.

If you have questions about your right as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact, anonymously if you wish, the Campus Institutional Review Board, 483 McReynolds, University of Missouri, Columbia, MO 65211 or by phone at (573) 882-9585.

Signature:_____ Date:_____

APPENDIX 3

Self Report Scales for Arousal, Unpleasantness and Pleasantness

1. This video was pleasant.
   1…2…3…4…5…6…7…8…9
   Not at all A lot

2. This video was unpleasant.

   1…2…3…4…5…6…7…8…9
   Not at all A lot

3. This video was arousing.

   1…2…3…4…5…6…7…8…9
   Not at all A lot

APPENDIX 4

Behavioral Intent Scale

Behavioral intent was measured using a seven point semantic differential scale adapted from Juster's purchase intent scale (1964). Participants responded to questions related to behavioral intent for environmental issues presented in each PSA. Participants rated the likelihood, probability, and possibility of behavioral intent for each statement on a one to seven semantic differential scale. Participants will respond to six standardized questions after each PSA, however the topic of each question will reflect the environmental issue presented in each PSA.

1. After viewing this public service announcement, how likely are you to support the sponsor of this message?

Unlikely	1	2	3	4	5	6	7	Likely
Improbable	1	2	3	4	5	6	7	Probable
Impossible	1	2	3	4	5	6	7	Possible

2. After viewing this public service announcement, how likely are you to seek more information about illegal wildlife trade?

Unlikely	1	2	3	4	5	6	7	Likely
Improbable	1	2	3	4	5	6	7	Probable
Impossible	1	2	3	4	5	6	7	Possible

3. After viewing this public service announcement, how likely are you to visit the sponsoring organization's Web site?

Unlikely	1	2	3	4	5	6	7	Likely
Improbable	1	2	3	4	5	6	7	Probable
Impossible	1	2	3	4	5	6	7	Possible

4. After viewing this public service announcement, how likely are you to donate money to help ACAP end the illegal wildlife trade?

Unlikely	1	2	3	4	5	6	7	Likely
Improbable	1	2	3	4	5	6	7	Probable
Impossible	1	2	3	4	5	6	7	Possible

5. After viewing this public service announcement, how likely are you to volunteer to help ACAP end the illegal wildlife trade?

Unlikely	1	2	3	4	5	6	7	Likely
Improbable	1	2	3	4	5	6	7	Probable
Impossible	1	2	3	4	5	6	7	Possible

6. After viewing this public service announcement, how likely are you to change your personal behavior to play a stronger role in ending the illegal wildlife trade?

Unlikely	1	2	3	4	5	6	7	Likely
Improbable	1	2	3	4	5	6	7	Probable
Impossible	1	2	3	4	5	6	7	Possible

APPENDIX 5

Debriefing Script

Thank you for participating in this research. We were interested in seeing how different levels of negative emotion in environmental public service announcements would affect how you cognitively processed the message and how likely you would alter your behavior to support the environmental issue presented in the message. This data is not attached to your identity and will only be analyzed in aggregate form. Do you have any questions about the experiment?

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