Emotional responses to environmental messages: Implications for future environmentally responsible behavioral intentions

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EMOTIONAL RESPONSES TO ENVIRONMENTAL MESSAGES:
IMPLICATIONS FOR FUTURE ENVIRONMENTALLY RESPONSIBLE BEHAVIORAL INTENTIONS

BY

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DISSERTATION

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DEDICATION

This work is dedicated to the memory of my grandfather Mitchell Perrin (1915-2003), who always encouraged me to, “read, read, read.” He passed away during the first week of my time at UNH. His words and unconditional support were, and continue to be, a source of inspiration and motivation.
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EMOTIONAL RESPONSES TO ENVIRONMENTAL MESSAGES:
IMPLICATIONS FOR FUTURE ENVIRONMENTALLY RESPONSIBLE BEHAVIORAL INTENTIONS

Jeffrey L. Perrin
University of New Hampshire, May, 2009

The present study analyzed the role of environmental message characteristics (message modality and message valence) and emotional arousal (positive and negative) in predicting environmentally responsible behavioral intentions. Using an experimental protocol designed to induce emotions in the laboratory, I measured specific emotional responses to gains-framed and losses-framed video and text-only environmental messages, and investigated the relation between intensity of emotional responses to environmental messages and environmentally responsible behavioral intentions. The sample consisted of 161 college students (116 women, 45 men). A hierarchical linear multiple regression was computed to assess the contributions of background variables (environmental knowledge, environmental beliefs, and outdoor recreational behavior), message modality and strength of emotional responses in predicting environmentally responsible behavioral intentions. Findings supported the overall model in explaining variance in environmentally responsible behavioral intentions. Results suggest that background variables, message modality, and negative emotional arousal significantly predicted environmentally responsible behavioral intention. Practical and theoretical implications are discussed.
INTRODUCTION

Environmental degradation is a serious problem. In a 1990 assessment report, the Intergovernmental Panel on Climate Change suggested that increasing atmospheric concentrations of greenhouse gases is at least partly due to human activity. Subsequent reports in 1992 and 1995 provided further evidence that human activity has contributed to warming over the past 50 years (Intergovernmental Panel on Climate Change, 2001). Despite the evidence, a recent American Climate Values Survey reported that, although 73% of survey respondents believe climate change is occurring, only 18% believe climate change is a human-caused and harmful problem (American Climate Values Survey, 2008).

Understanding the causes, effects, and consequences of climate change is complex. Psychologists can directly address the problems of environmental change by focusing on people’s behavior, attitudes, beliefs, and concerns regarding the environment. Psychologists can also assist environmental practitioners that are designing informational messages to educate individuals about pressing environmental concerns. In particular, psychologists can begin to address the role of emotion and emotional responses to news, information, and messages about the environment.

There is a large void in the psychological literature regarding emotional responses to information about the environment. Although previous research has considered the importance of message valence in message design (Davis, 1995; Lord, 1994), the role of emotional arousal has been overlooked. It seems appropriate to begin to explore the influence of emotional arousal of individuals’ behavioral intentions and curiosity.
regarding environmental information. Although addressing the previously researched implications of message valence, the current research extends the literature by addressing issues of message modality and emotional arousal in relation to people’s behavioral intentions.

As psychologists begin to explore humans’ emotional connection to nature, it is important to explore the behavioral implications of this connection as well as the role of emotions in environmental communication. Now, more than ever, non-profit organizations, schools, government agencies, and businesses are attempting to communicate conservation, preservation, and sustainability messages. Individuals’ emotional responses to these messages could have significant behavioral implications. This research fills a void by beginning to explore the relationship between emotional responses to environmental messages and behavioral intentions.

In the first section of this paper, I discuss different types of emotions and methods for measuring emotions. Following a discussion of emotions, I describe the biophilia hypothesis. I identify research that supports the existence of a strong human-nature connection. Clearly, this research does not prove that biophilia exists. Instead, it supports the premise and suggests possible implications of human-nature relationships. Next, I review and critique psychological literature addressing emotional and affective components of the human-nature relationship. I discuss recent scales designed to measure one’s relationship with nature. Then, I review communication methods that may be used by environmental organizations to bring about an emotional response to their messages. In addition, I review research from other fields that focuses on the role of emotional
responses to messages and behavioral implications. Finally, I describe my current research program and discuss my hypotheses.

**Emotions**

Emotions are a core component of the human experience. Human beings have the capacity to feel love, grief, satisfaction, and agitation. Although emotions have the ability to enrich the human experience, they also may cause severe disruptions in judgment (Forgas & Bower, 1987), decision-making (Isen, 1993), memory (Bower, 1981), and behavior (Berkowitz, Jaffee, Jo, & Trocolli, 1999). Emotions consist of cognitive, physiological, and behavioral reactions that influence goals and motives. In fact, it is difficult to conjure up an element of human existence that is impervious to emotional influence. Unfortunately, it is even more difficult to find an agreed upon, inclusive, and comprehensive definition of emotion among the countless divergent interpretations of emotions in the psychology literature.

All emotions consist of feeling states involving positive or negative valence (Fridja, 1988). Feeling states are subjective experiences that can be manifested by bodily sensations and characterized by expressive reactions (e.g., smile), physiological reactions (e.g., production of tears), coping responses (e.g., running from a potential attacker), and cognitions (e.g., thinking one has been wronged by another). The biological, behavioral, and evaluative subject-related component of emotions are reactions often caused by sudden changes in external or mental events (Fridja, 1988). The exact organizational state of emotions is multifaceted and the extent to which one component is considered more important than another depends upon which particular manifestation of emotion (e.g., patterned somatic reactions, action impulses, cognitive appraisals) researchers consider to
be most applicable to their research topic (Cornelius, 1996). Descriptions and classifications of emotions often depend upon the methodological and theoretical partiality of the psychologists working within the domain of psychology (Cornelius, 1996).

Emotions can assist in the way information is received, retained, interpreted, and used (Hochschild, 1998; Milton, 2002). There is a reciprocal relationship between thought and emotion. Knowledge is affected by affect and vise-versa. In other words, there is a relationship between thought and reason that counters the traditional view that emotions hinder rational thought (Barbalet, 1998). The relationship between knowledge and emotions works both ways. In order for learning to take place, emotions are necessary and the knowledge that is acquired through learning generates emotions. According to Milton, "people do indeed come to love, enjoy, or fear things in the process of getting to know them; they also get to know them as a result of loving, enjoying, hating or fearing them" (Milton, 2002, p.66). Accordingly, the intricacy of the relationship makes it difficult to determine how individuals develop particular emotions for specific places, things, or people. The demonstration of particular emotions can only be understood within the complete context of the individual’s experience in specific environments.

Types of emotions

Within the psychological literature, emotions are often classified into two categories: primary emotions (i.e., innate emotions) and secondary emotions (i.e., emotions developed through learning). Although many psychologists have created lists of primary emotions, there is no consensus regarding which emotions should be included on
this list. In a review of literature on primary emotions (also labeled basic or fundamental emotions), Ortony and Turner (1990) found large variation in researchers’ listing of basic emotions. For example, Izard (1971) listed ten basic emotions (anger, contempt, disgust, distress, fear, guilt, interest, joy, shame, and surprise), whereas Weiner and Graham (1984) listed only two basic emotions (happiness and sadness). Perhaps most notable among emotion researchers, William James (1890) identified four fundamental emotions (fear, grief, love, and rage). Notable contemporary emotions researchers Ekman, Friesen, and Ellsworth (1982) identified six primary emotions (anger, disgust, fear, joy, sadness, and surprise), whereas Plutchik (1980) recognized eight basic emotions (acceptance, anger, anticipation, disgust, joy, fear, sadness, and surprise).

Fridja claimed that primary emotions are “identified with action readiness change” (Fridja, 1986, p.72). In other words, specific actions correspond to explicit emotions. The inclination to separate oneself from a harmful event is associated with fear, while the urge to attack corresponds to anger (Fridja, 1986). Fridja’s characterization of basic emotions based upon modes of action readiness is similar to McDougal’s (1926) classification of primary emotions that corresponded to action instigations, or instincts. However, not all theorists’ reasoning for the bases for inclusion is similar. Ekman, Friesen, and Ellsworth (1982) identified basic emotions as the emotions corresponding to universal facial expressions—unambiguous universal facial expressions correspond with specific basic emotions. James’ (1884) listing of basic emotions is based upon bodily involvement. Therefore, the lack of agreement regarding a definitive list of primary emotions is partly attributable to divergent bases for inclusion.
Divergence of classification within the literature may not be as excessive as it seems. Ortony and Turner (1990) postulated that part of the disagreement among researchers results from differences in labeling terms. Ortony and Turner (1990) argued that some researchers, referring to the same concept, use the word rage and others use the word anger. Emotions regarding pleasure may be named joy, happiness, or elation.

Emotional behavior is directly related to the stimulus event. It is not considered to be a random, meaningless, overflow behavior. Emotions are also complex. There is no single form of measurement that conclusively captures an individual’s entire emotional state. For example, observable behavior may be an indistinct manifestation of conflicting impulses. Conversely, verbal reports of feelings may be an incomplete description of emotions, may be dependent upon understanding of language, and are susceptible to attempts at deception (Plutchik, 1989).

Measurement of emotions

Self-report adjective checklists are one of the most commonly used ways to measure emotional states. Questionnaires are subjective reports of emotional behavior focusing on “the manner in which a subject experiences the physiological and expressive changes” of emotions (Wallbott & Scherer, 1989, p.56). Checklists contain a listing of adjectives (e.g., sad, surprised, angry, interested) that a person identifies as a reflection of their feelings. There are many adjective checklists used in emotions research (Plutchik, 1980; Lorr, 1989). Some adjective checklists contain as few as eight adjectives, while others have up to 235 (Plutchik, 1966). Adjective checklists access frequency and/or intensity of emotions (Plutchik, 1989). Other methods of assessing emotions include
psychophysiological changes (heart-rate, skin conductance, or electromyographic activity) and behavioral indices (e.g., facial expressions).

**Biophilia**

The prominent biologist E.O. Wilson addressed the theoretical construction of human beings' connection to nature. In *Biophilia*, Wilson asserted that humans have an "innate tendency to focus on life and lifelike processes" (Wilson, 1984, p.1). Wilson claimed that humans' connection to living organisms is an emotional affiliation. Since *Biophilia*, many psychologists have concentrated on humans' bond with nature. Wilson (1993) claimed that biophilia is innate (an integral part of human nature). He argued that the basis for the biophilia hypothesis is evolutionary logic (Wilson, 1993). During 99% of human history, people have lived among hunter-gatherer groups and have been closely connected to other living organisms. For the duration of this time period, humans depended on a learned knowledge of plants and animals. With the development of culture and language, humans also used living organisms as a crucial source of their learning. According to Wilson, the brain has evolved in "a biocentric world, not a machine-regulated world" (Wilson, 1993, p.32). Because there is no evidence supporting an innate, evolutionary-based notion for humans to concentrate on lifelike processes, Wilson's claims remain speculative and their implications are largely untested.

Human proclivity to maintain a connection to the natural world can be seen throughout history. Villages of the medieval Chinese, homes of ancient Egyptian nobility, and Persian settlements all exhibited widespread and decorative gardens demonstrating the considerable effort people put forth to maintain contact with nature (Ulrich, 1993). Within the last two centuries, the abundance of parks and conservation of nature reserves
have been defended by the viewpoint that contact with nature encourages psychological well-being, mitigates the stress of modern living and furthers physical well-being (Ulrich, 1993). In fact, nature reserves, city parks, national parks, and other natural landscapes are not only provided, they are frequently visited by individuals traveling long distances, hoping to make contact with the natural world. The connection to nature is also manifested through humans’ desire to view and make contact with other species (Gullone, 2000).

Preference for landscapes

There is an abundance of research about humans’ aesthetic preferences for natural landscapes that may provide support for the evolutionary component of the biophilia hypothesis. According to Ulrich (1993), certain natural settings, during the course of our evolutionary history, may have facilitated survival for individuals who acquired positive responses towards these environments.

Balling and Falk (1982) investigated preference for slides of five different natural landscapes: tropical rain forest, temperate deciduous forest, coniferous forest, savanna, and desert. In their first study, subjects judged how much they would like to live in an area similar to the one represented on the slide. In a second study, subjects rated the slides for how much they would like to visit an area similar to the one shown. Based upon rankings on a 6-point scale, subjects showed a significant preference for savanna over all other natural landscapes. Researchers claimed that these findings provide limited support for the hypothesis that humans have a preference for savanna-like settings, potentially attributable to their long evolutionary history on the savannas of East Africa. Savannas provided visual openness (providing protection from possible hidden predators), escape
opportunities and an abundance of animal and plant food (Gullone, 2000; Ulrich, 1993; Kaplan and Kaplan, 1989).

In addition to visual preference for specific types of natural environments (e.g., savannas), research demonstrates that nature scenes are greatly preferred to urban scenes (Kaplan, Kaplan, & Wendt, 1972; Ulrich, 1981). Ulrich (1981) measured effects on alpha brain activity amplitude of viewing three types of slides: nature with water, nature dominated by vegetation, and urban environments without water or vegetation. While viewing slides of vegetation or water, EEG alpha was significantly higher (demonstrating a more relaxed state) than while participants’ viewed urban scenes. Studies from different cultures and countries show similar results for humans’ preference for natural scenes (Ulrich, 1993, for review).

A large segment of the research has involved the presentation of divergent landscape scenes to participants in the form of photographs. Researchers often ask participants to rate photographs on scenic beauty, perceived pleasantness, and preference. Because ratings are obtained for simulations of nature, and not real life exposure, there have been questions concerning the applicability of the results of such studies to the real world. However, researchers have compared real life viewings and simulations, and found strong correlations between the two ratings (Gullone, 2000).

Relation between natural settings and health

There is an abundance of research demonstrating a relation between natural settings and health. Exposure to nature has been shown to be associated with the recovery rate from gall bladder surgery (Ulrich, 1984) and faster and more complete recovery from

In a landmark study demonstrating the restorative and possible preventive influence of the natural world, Kaplan, Kaplan, and Talbot (1988) examined the impact of nearby nature on coping with job stresses. Employees completed surveys on perceptions of job stresses and the significance of restorative factors that may mitigate workday stress. In addition, individuals answered questions regarding overall well being and general health. Researchers found a relation between job stresses and employees’ mental and physical well being. Participants reported nature-related workday involvements to be moderately restorative (as tapped by general dependent measures). Also, individuals who worked outside demonstrated less job stress and greater general well being than individuals who worked indoors. Individuals who indicated they could see outdoors from their desks also reported less job stress than individuals who could not see the outdoors from their desks. In particular, individuals whose outdoor views consisted of built environments (streets, houses, offices) reported higher levels of job stress than those who looked out upon natural environments. Employees who could see some natural elements (grass, flowers, trees) reported higher job satisfaction than those with no outdoor views and those with views of built elements. Finally, employees with nature views and those who worked outside reported less health problems and higher levels of life satisfaction that the rest of the sample.

Nature may also be associated with children’s well being. Wells and Evans (2003) investigated the relation between nearby nature (acting as a buffer), stressful life events, and the general well being of children. They surveyed 337 children in grades three
through five and administered a child behavior questionnaire to their parents. The
behavior questionnaire contained items regarding childhood symptoms of depression,
anxiety, and other childhood indicators that may represent behavioral disorders. Children
were given scales to assess stressful events in their lives. Examples of stressors were
being bullied at school, moving, getting into trouble at school, and being peer pressured.
In addition, children were given a scale to measure their feelings of self-worth. The
researchers completed the naturalness scale of the residential environment. The scale
assessed the amount of nature in the window view, number of live plants indoors, and the
material of the outdoor yard (Wells & Evans, 2003). Results indicated a relationship
between children’s life stress and the presence of nearby nature. Nature moderated the
psychological effects of stress as reported by both children and parents (Wells & Evans,
2003).

The amount of nature in the home environment (e.g., household plants, window
views) is also associated with the cognitive functioning and the concentration capacities
of children. Wells’ (2000) study focused on the effects of nearby nature on cognitive
functioning. This study followed longitudinally seventeen children from low-income
families. The first stage occurred while children lived in second-rate apartments
(classified as apartments with limited natural resources). The second stage occurred in the
following year after the families moved to housing with more natural areas. Researchers’
completed the naturalness scale and a scale of cognitive functioning of the children. The
same process was repeated the second year in their new house (Wells, 2000). Wells
(2000) found that the amount of nature in and around this household affected children’s
cognitive functioning: “Children who experienced the most improvement in the natural
elements or restorative characteristics of their home tended to have the greatest ability to direct their attention several months after moving to the new home” (Wells, 2000, p.790).

Research shows that exposure to nature is associated with positive feelings. Sheets and Manzer (1991) investigated the effects of adding vegetation along urban streets. Subjects viewed a drawing of an urban street with or without the presence of vegetation. When viewing tree-lined streets, participants reported feeling friendlier, less sad, and less depressed than when viewing streets without vegetation. Similarly, Kaplan (1985) investigated the relation between residential satisfaction and proximity to nature. Individuals living in multiple family complexes answered questionnaires regarding access to nearby nature, preference for these areas, and satisfaction with their current housing situation. Results indicated that views of nature and perceived adequacy of nearby nature were associated with higher levels of residential satisfaction. Research also has shown that proximity to nature is correlated with feelings of relaxation, enjoyment, a chance to escape worries, a chance to forget tensions, and an opportunity for individuals to think (Talbot & Kaplan, 1984).

Faber Taylor, Kuo, and Sullivan (2001) researched the relation between contact with nature and the attentional function of children with Attention Deficit Disorder (ADD). According to Kaplan (1985), nature is associated with improved attentional functioning in adults with normal attentional capacity. Faber Taylor et al. (2001) examined whether nature is related to attentional functioning improvements with children who have ADD. The researchers were attempting to identify which activities were associated with less severe ADD symptoms and which activities were associated with more severe ADD symptoms. Activities in natural settings were labeled as green by the
researchers. Activities that did not occur in natural settings were labeled not green. Non-green settings were void of any plant or animal life. The second set of questions asked parents to rate the effects of certain after-school activities on their child’s ADD symptoms. According to Faber Taylor et al. (2001), parents nominated activities taking place in green outdoor settings as being associated with less severe symptoms of ADD. On the contrary, parents nominated activities that occur in non-green settings as being associated with more severe ADD symptoms (Faber Taylor et al., 2001). In addition, Faber Taylor et al. (2001) found that parents rated activities conducted in built indoor and outdoor settings as more likely to be related to severe ADD symptoms than activities in green outdoor settings. Children’s play spaces also were related to the severity of ADD symptoms.

Increasing support for the restorative impact of nature has been demonstrated by studies assessing encounters with wilderness settings. Many of these studies evaluate wilderness programs geared towards specific client groups. Although these studies are often criticized for poor research designs and methodology, self-selected subjects with no control groups, and the inability to isolate independent variables, the results consistently support the restorative benefits of nature (Gullone, 2000). Using a between-subjects design, Kaplan (1977) measured emotional and cognitive changes following a two-week program that exposed participants to survival skills in the wilderness. Inclusion of a control group allowed for pre-and post-program comparisons. Wilderness program participants showed increases in confidence and self-sufficiency. Kaplan reassessed these changes five months later and found similar results.
Environmental Identity

Our identity is formed as a result of stable personality attributes and characteristics such as race and gender. Identity is also created by information received through social interactions (Clayton, 2003). Identity is often associated with social relationships, social contexts and social labels. As people move between different groups, they often reconfigure their identity. Our relationships with teammates, co-workers, family members, friends, and authority figures have great influence on who we are or want to become. Depending on the social context, certain components of identity are made salient. For example, an accountant’s identity is more accessible while at work, than at home. When at home the same individual’s identity of father is more easily accessible than when at work. In summary, identity is a relative concept in which one identity must compete with other identities (Linneweber, Hartmuth, & Fritsche, 2003). As a construct, identity is multifaceted, adaptable, and susceptible to many different interpretations (Clayton, 2003).

Myers and Russell (2003) questioned researchers’ decision to restrict the full extension of identity to the human species line. Identity, as a conglomeration of self-concept, personal beliefs, and designation of a person’s concern, is an appropriate concept for comprehending peoples’ relationship with nonhuman nature. Myers and Russell (2003) suggested that the communal (i.e., social) side of identity formation includes our interactions with humans and nonhuman animals. According to Gebhard, Nevers, and Billmann-Mahecha (2003), psychological identity is defined by our experiences with others and ourselves. The importance of interactions with other human beings is vital to our construction and concept of self. To date, interactions with plants,
animals, landscapes, and water have been an inconsequential part of identity theory formation. At the time, Searle’s (1960) work on the role of nonhuman environments in identity formation was an anomaly. Searles suggested the nonhuman environment is one of the essential components of humans’ identity. According to Searles, “there is within the individual a sense, whether at a conscious or unconscious level, of relatedness to his nonhuman environment, that this relatedness is one of the transcendentally important facts of human living” (Searles, 1960, p.5).

However, individuals’ often do not consider their relationship with the natural world as part of their identity. Except for individuals whose occupation includes direct interaction with the natural world (e.g., naturalist, ornithologist, arborist) and individuals whose hobbies include direct interaction with the natural world (e.g., gardener, fisherman, hiker), the human relationship with natural world is often overlooked in consideration of identity (Searles, 1960). According to Clayton (2003), a more inclusive conceptualization of identity would consider how people relate to the natural world, how people classify themselves in the context of nature, and how people characterize their relationships with animate and inanimate aspects of the natural environment.

Thomashow (1995) introduced the term ecological identity to capture “all the different ways people construe themselves in relationship to the earth as manifested in personality, values, actions, and sense of self” (p.3). According to Thomashow (1995) our self-concepts are more than social and cultural interactions. Interpretation of life experiences should include a person’s connection to the earth and direct experiences within our ecosystem (Thomashow, 1995).
Thomashow (1995) recognized the ambiguity of declaring nature as part of our identification. What is nature? Depending upon the individuals and/or the culture, nature may be operationalized in a multitude of ways. Nature may include oceans, stars, galaxies, mammals, insects, plants, and/or trees. Thomashow (1995) claimed an ecological identity is how we extend our self in relation to nature, and that the objects of identification and the level of affiliation must be determined on an individual basis. In short, individual ecological identity reflects individual intuitive, affective and cognitive perceptions of ecological relationships (Thomashow, 1995).

To have an environmental identity means to identify with the natural world. Although it may be strange for some people to express a strong affiliation to the natural world, environmental identity is not limited to a small percentage of the population overly concerned with environmental issues (Kals & Ittner, 2003). According to Clayton (2003), environmental identity is similar to other collective identities (gender and ethnicity) because it offers a sense of connection and belonging to a group. One’s environmental identity has a strong personal and social component, and it exists within all individuals who care about the environment and/or directly interact with the environment (Opotow & Brook, 2003).

Measuring the human-nature relationship

Researchers have begun to quantify the human-nature relationship. A variety of different approaches have attempted to assess the strength of the human-nature connection.
Environmental Identity Scale

To assess the extent to which the natural environment contributes to one’s self-definition, Clayton (2003) developed the Environmental Identity Scale (EID). The scale includes items that tap a collective social identity (e.g., ethnic identity). The scale is intended to recognize identity salience, identification as a group member, and agreement with the environmental ideology associated with an environmental identity and positive emotions associated with the collective identity. Identity salience was operationalized by the importance and amount of individual interaction with the natural world. By determining the contribution of nature to the ecological collective identity with which one identifies self-identification was assessed (e.g., “I think of myself as part of nature, not separate from it”). Environmental ideology was measured by determining the amount of support for sustainable lifestyles and environmental education. Clayton measured positive emotions by asking individuals about their enjoyment in nature through satisfaction and aesthetic appreciation (Clayton, 2003).

Although Clayton claimed to include an emotional component in the scale, some statements in the scale clearly do not represent emotions. Here are the items in the scale that Clayton suggested represent the positive emotions (Clayton, personal contact):

5. *When I am upset or stressed, I can feel better by spending some time in outdoors communing with nature.*

10. *I like to garden.*

16. *I would rather live in a small room or house with a nice view than a bigger room or house with a view of other buildings.*

17. *I really enjoy camping or hiking outdoors.*
21. I have never seen a work of art that is as beautiful as a work of nature, like a sunset or a mountain range.

23. I feel that I receive spiritual sustenance from experience with nature.

Item #5 is the only statement that addresses emotions by considering feelings (See argument below: Connectedness to Nature scale section).

Inclusion of Nature in Self Scale

Inclusion with nature is a multifaceted concept designed to provide a general framework to better understand the human-nature relationship (Schultz, 2002). According to Schultz, inclusion with nature consists of three different components: connectedness, caring, and commitment. Connectedness is a cognitive concept focusing on how much an individual believes nature is a part of his or her cognitive representation of self. The cognitive representations of self can be organized into self-schemas that help organize information and enable individuals to have a better self understanding. In close relationships, cognitive representations of self and others often assimilate (Aron, 1991; Schultz, 2002). According to Schultz, this idea also is applicable to human-nature relationships. Individual who define themselves, as “part of nature will have cognitive representations of self that overlap extensively with their cognitive representations of nature” (Shultz, 2002, p.68). Individuals who do not consider themselves to be part of nature will not have a self-schema that overlaps with nature.

The second component, caring for nature, is the affective part of inclusion in nature. Schultz equates emotions with how much one cares about nature. He proposed feelings of intimacy that occur in a relationship between two individuals can exist in the human-nature relationship. Emotion can be an important component in understanding
environmental behavior and attitudes (Kals, Schumacher, & Montada, 1999). In particular, emotional affinity with nature is correlated with numerous proenvironmental commitments and behavior.

The third dimension, commitment to protect nature, is the behavioral segment of inclusion in nature. This dimension focuses on an individual motivation to act in the best interest of nature. Rarely, is a motivation to act not in accordance with connectedness and caring for nature (Schultz, 2002).

There have been many measurement approaches that consider aspects of inclusion, but none that directly address the idea. There are existing scales for environmental values (Stern, Dietz, & Guagnano, 1995), environmental beliefs (Dunlap, Van Liere, Mertig & Jones, 2000), environmental attitudes (Thompson and Barton, 1994), and environmental motives (Schultz, 2000). In order to assess more directly inclusion with nature, Schultz (2002) modified a scale developed by Aron, Aron and Smollan (1992) to measure the extent to which an individual includes nature within his or her representation of self. The Inclusion of Nature Scale (INS) consists of a series of seven overlapping circles labeled “self” and “nature”, and the item asks respondents to “Please circle the picture below that best describes your relationship with the natural environment. How interconnected are you with nature?” Results from surveys showed a positive correlation with self-reported environmental behavior and with other measures of general environmental attitudes (Schultz, 2002).

Implicit Connection to Nature

According to Oskamp and Schultz (2005), explicit measures of attitudes assume that the attitude exists, it can be retrieved from memory, and that individuals are
forthright in their responses. The methods used by Dunlap, Van Liere, Mertig, and Jones (2000) for measuring beliefs in regard to one’s relationship to nature may not appropriately capture the presence of these beliefs. Schultz (2007) argued that individual belief about one’s relationship to the natural is a “zero-order primitive belief” (p. 6). In other words, we are not aware of our relationship to nature until it is called to our attention. Schultz claimed that although individuals may not be consciously aware of these beliefs, they may influence similar beliefs about the natural world, environmental programs, and environmental concerns. Questioning the validity of measurements based upon explicit beliefs, Schultz, Schriver, Tamanico and Khazian (2004) developed a test based upon social psychological measurement tools (Implicit Association Test) created to measure primitive beliefs (Greenwald, McGhee, & Schwartz, 1998).

The Implicit Association Test (IAT), created by Greenwald et al., (1998), was designed to measure automatic concept-attribute associations. The IAT is considered to be an alternative assessment technique because it does not require conscious awareness of association. Each individual trial asks participants to match two concepts (e.g., cardinal or snake) with the matching two attributes (e.g., bird or reptile) as fast as possible. The two concepts are then joined (bird and good; reptile and bad). Differences in response times to compatible trials (bird and pleasant; reptile and unpleasant) and incompatible trials (bird and unpleasant; reptile and pleasant) determine the strength of association between the two concepts. Expected results would reveal that, in aggregate, bird-pleasant and snake-unpleasant would be stronger associations than bird-unpleasant and snake-pleasant. By using complementary pairs of attributes and concepts, the IAT limits itself to relative, as opposed to absolute, pairs of associations. However, Greenwald and Farnhum
(2000) claimed the IAT can be effectively used because many socially important categories form balancing pairs (e.g., young-old, liberal-conservative, aggressive-peaceful).

The IAT has been used in a variety of social psychological research (Greenwald et al., 2002). Because the IAT is not subject to desirability effects found in self-report measures, it has been particularly valuable in racial prejudice research (Cunningham, Preacher, & Banaji, 2001). In addition to a lack of susceptibility to social desirability effects, it is also very difficult to deliberately falsify a score on the IAT (Greenwald et al., 1998).

A modified version of Greenwald’s Implicit Association Test was created by Schultz et al. (2004) to measure connectedness with nature by analyzing individuals’ associations between themselves and nature by means of a response-time task designed to detect automatic processes. Participants distinguish between words that suggest ‘me’ (I, mine) and ‘not me’ (it, their) using two keys on a computer. Participants also distinguish between ‘nature’ words (mountains, trees) and ‘built’ words (car, table). In total, there are four categories of words used: me, not me, nature and built. One trial consists of a randomly selected word from relevant categories and a set of categories. These two categorization tasks are performed at the same time, once while pairing ‘me’ and ‘nature’ and once while pairing ‘me’ and ‘built’. The degree to which one pairing is quicker indicates a stronger implicit association. In other words, a strong association between self and nature should facilitate the completion of trials with these associations. A person with strong associations between self and built has a more difficult time completing these trials. The test consists of seven blocks of ten separate trials. Participants are instructed to
work as quickly as possible and not to remove their fingers from the keyboard (Schultz, 2004).

When using the IAT as a measure of connection to nature, individuals are more likely to respond quickly when presented with natural stimuli (Schultz et al, 2004). Only 25% of participants responded more quickly to built stimuli (e.g., car). In addition, Schultz et al. (2004) reported a significant positive correlation of connectedness with biospheric environmental concerns and the INS. Although the correlations were small ($r = .20$ and $r = .26$), Schultz noted that previous IAT research has also found correlations to be around .20.

*Connectedness to Nature Scale*

Mayer and Frantz (2004) developed the connectedness to nature scale (CNS) as a measure of individual experiential and affective connection to nature. According to Mayer and Frantz the CNS “follows from Leopold’s contention that people need to feel they are part of the broader natural world if they are to address effectively environmental issues” (Mayer & Frantz, 2004, p.504). The CNS focuses on the extent to which people view themselves as part of the broader natural world, feel a sense of kinship with it, and view their personal welfare as directly associated with the welfare of the natural world.

Mayer and Frantz (2004) reported that CNS was a statistically significant predictor of ecological behavior. The CNS correlated with ecological behavior and with individual beliefs regarding the natural world (NEP). The INS had a similar pattern of correlation as the CNS to ecological behavior and beliefs (although the correlations are weaker). The IAT did not correlate with ecological behavior, but did correlate with ecological beliefs. Mayer and Frantz (2004) suggested that the CNS supports Leopold’s
claim that connectedness to nature leads to a greater concern for nature. If people feel a strong connection to nature, it would seem reasonable to expect that they will be less inclined to harm it, because harming it would mean they are actually harming themselves. The authors note that the relationship is not causal and there may be a bi-directional relationship between connectedness to nature and ecological behavior, such that, ecological behavior leads to people feeling more connected to nature, and vice versa.

Similar to the positive emotions component of Clayton’s (2003) EID scale, the questions in Mayer and Frantz’s (2004) scale intended to measure emotions appear to mainly assess beliefs. For example “I think of the natural world as a community to which I belong.” Another example, “When I think of my place on Earth, I consider myself to be a top member of hierarchy that exists in nature.” In addition, “My personal welfare is independent of the welfare of the natural world.” These items, taken from Mayer and Frantz’s (2004) connectedness to nature scale, do not appear to accurately measure one’s affective experience with nature. Directions given to participants instruct them to: “Please answer each of these questions in terms of the way you generally feel. There are no right or wrong answers. Using the following scale, in the space provided next to each question simply state as honestly as candidly as you can what you are presently experiencing.”

Although the authors use the word feel in many of their items (e.g., “I feel as though I belong to the Earth as equally as it belongs to me”, “I feel that all inhabitants of the Earth, human and nonhuman, share a common life force” and “I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees”), these items more appropriately tap into the following definition of feel: “to have a general or thorough conviction of: think;
believe, as opposed to the affective component of the word feel which focuses on the emotional definition of *feel* “to be emotionally affected by” (Oxford American Dictionary, 1980). Based upon the definition of feel focusing on cognitions, it is acceptable to use the word in a measurement of beliefs. But Mayer and Frantz claim their scale is affective, which focuses on “arousing emotions, or influenced by and resulting from emotions”, yet their scale is devoid of any emotions. By stating, “CNS measures one’s experiential, emotional connection to nature” the authors claim to measure something they are not measuring (Mayer and Frantz, 2004, p.505).

According to Ortony, Clore, and Foss (1987) “it is apparent that many of the hundreds of words that have been included in studies of affect and emotion do not refer to emotions at all” (Ortony et al., 1987, p. 342). In order to create a structure of lexicon the authors began with a list of 500 words commonly used by psychologists in studies of emotion. Their goal was to create a list of words from the affect literature that specifically deal with emotions. Although the words affect and emotion are used interchangeably within the literature, Ortony et al. (1987) make a clear distinction between the two. According to Ortony et al. (1987) affect is considered to be a broader construct than emotion. The authors state that, “any valenced judgment or condition implicates affect, whereas emotions are more specific” (Ortony et al., 1987, p. 343). For example, preference for one restaurant is considered to be an affective judgment but not an emotional one. According to this classification, all emotional conditions are affective but not all affective conditions are emotional.

Ortony et al. (1987)’s classification is not empirically based. The authors described their work as a “componential analysis” intended to provide a logical taxonomy
or organized account of emotions based upon a “psycholinguistic justification.” The authors clearly distinguish between the two linguistic concepts of being something and feeling something. Being words can be used to describe an emotional state when they are used in the context of feeling. For example, being adventurous is not an emotional state, but feeling adventurous is an emotional state. The context in which feeling words are used can generate an emotional meaning for non-emotional terms, while the context in which for being words cannot. According to Ortony et al., (1987) the inability of researchers to differentiate between the feeling and being contexts has lead to excessive lists of emotion terms. Therefore, a consideration of the kind of condition a word is situated within is an important determinant of Ortony et al.’s taxonomy.

A complete detailed description of Ortony et al. (1987) methods for classification is not necessary within this review. In fact, the pertinent issue of cognitive words being described as affective words is rather elementary. Simply, the taxonomy of Ortony et al. (1987) suggests the best examples of emotion terms are those that are internal, mental conditions, and have an affective focus as opposed to a behavioral or cognitive focus. The following words are an incomplete list of internal affective state emotion terms: aggravated, deflated, embarrassed, guilty, happy, irritated, pained, tense, and uneasy. These words are representative of emotion terms. Although skeptical is an internal state condition, it is focused on cognitive conditions, as opposed to affect. Ortony et al.’s (1987) list of internal mental state conditions with an affective focus includes 136 words. They also include lists of terms classified as: internal conditions with cognitive conditions, internal conditions with cognitive-behavioral conditions, internal conditions
with affective-cognitive conditions, and internal conditions with affective-behavioral conditions.

Mayer and Frantz (2004) use the word *feel* in eight of the fourteen scale items: "I often feel a sense of oneness", "I often feel disconnected", "I often feel a kinship", "I feel as though I do belong", "I often feel part of", "I feel that all inhabitants of the Earth", "I feel embedded within", "I often feel like I am only a small part of" (Mayer and Frantz, 2004, p.513). Although none of the words following *feel* are listed in Ortony, et al. (1987) taxonomy of emotion terms, one could argue (based upon Ortony et al. argument of linguistic context) that the *feeling* context can provide nonemotion words with an emotional importance. For example, a *sense of oneness*, is not an emotion when not put within a *feeling* framework. Ortony et al. (1987) based this reasoning on a distinct rule regarding the phenomenological experience of a situation. The following example refers to the word *abandoned*:

*Thus references to feeling something or other are particularly informative when the situation in question is not itself an emotional state. This is because terms that refer directly to emotions already embody, at least implicitly, some reference to the phenomenological experience, so that the application of the rule is largely redundant. In contrast, when the underlying state is not an emotion, the rule serves to capture the experiential (often emotional) implications of being in that state, implications that the context of feeling helps to make salient.* (Ortony et al., 1987, p.347).

The kinds of emotions one might feel during a *sense of oneness* will probably differ. It is important to consider that the phrases used by Mayer and Frantz are not emotion terms because they are not genuine emotion words which one can report an emotion without a *feeling* context. Whereas an individual can describe an emotion by stating *I am happy*, one can not state *I am a sense of oneness or I am embedded*. These items are not unequivocally considered emotions because they are not internal, mental conditions with...
an affect focus. More importantly, they are state-dependent-like conditions, and not states.

Six items (not using the word feel) on the CNS unequivocally do not measure emotions. Instead they deal directly with cognitions by using the following phrases: “I think”, “I recognize”, “I imagine”, “I have”, “I consider”, and “My personal welfare is” (Mayer and Frantz, 2004, p. 513). Even within the right context, these words clearly refer to thoughts, not emotions.

The first step in scale development is a detailed explanation of the target construct within the proper theoretical context (Clark & Watson, 1995). Mayer and Frantz describe their scale as a measure designed to assess “one’s experiential emotional connection to nature” (Mayer & Frantz, 2004, p.504). A more specific and detailed account of their concept would have made the selection of scale items more appropriate to their construct. What constitutes an emotional connection? Are their cognitive components of an emotional connection? The items in their scale denote a cognitive component to emotional connections (inclusion of words such as think and consider), yet the authors fail to mention the usage of a rational-based model of emotions. In fact, the authors clearly distinguish their scale from others that focus on “rational, cognitive beliefs about humans’ relationship to the environment” (Mayer & Frantz, 2004, p. 505). A detailed theoretical account of emotions would have been helpful in operationalizing their concept.

*Emotional affinity for nature*

Nature-protective behavior has been partially explained by an emotional connection to nature. Recognizing the limitations of a purely rational/cognitive method
for explaining environmentally responsible behavior, Kals, Schumacher, and Montada (1999) created the construct “emotional affinity towards nature.” Previous research by Kals and Montada (1996 as cited by Kals, et al., 1999) assessed the impact of resentment, fear, and guilt on environmentally responsible behavior. An emotional affinity towards nature focuses on positive emotional bonds with nature as a possible mechanism for protecting nature.

Kals et al. (1999) conception of emotional affinity for nature is a composite of “emotional nuances toward nature”: feeling good while in nature, feeling free in nature, feeling safe in nature, and feeling a oneness with nature: “If I spend time in nature today, I feel a deep feeling of love towards nature” is an item included in the “emotional affinity towards nature” construct (Kals et al., 1999, p.188). The authors carefully distinguish emotional affinity from interest in nature. An interest in nature motivates a desire to explain and understand phenomena in the natural world. It is possible to have an interest in nature without an emotional connection. On the contrary, an emotional affinity for nature may be void of a yearning for explanation. An emotional affinity usually results from positive experiences in nature (especially stays in nature), whereas a cognitive-based interest in nature may result from positive or negative experiences.

Emotional affinity towards nature is as powerful a predictor of environmentally responsible behaviors as both indignation about insufficient nature protection by others and general interest in nature (Kals et al., 1999). Combined, the three constructs account for 49% of the variance in environmentally responsible behavior. Although the three variables are intercorrelated, the authors claimed each construct explains different parts of the variance and should all be considered in theoretical models explaining nature-
protection behavior. Addressing their second research question regarding predictors of emotional affinity, the authors found that emotional affinity towards nature was associated with past and present experiences within nature. The authors noted the significance of these findings in regard to educational interventions incorporating direct sensory experience with nature to stimulate interest in nature and emotional affinity towards nature.

The conceptualization of an emotional affinity towards nature is thought provoking and fits appropriately within Wilson’s notion of biophilia. However, Kals et al., (1999) construct does not measure actual emotional responses to nature. In other words, by asking individuals “If I spend time in nature, I feel a deep feeling of love toward nature”, participants are asked to imagine how they feel while in nature. But there are many differing variables to a nature experience. One may feel complete elation gazing upon a picturesque sunset from the beach. On the other hand, the same individual could feel complete fear while being stuck in a thunderstorm while hiking in the mountains.

Kals et al.’s (1999) use of self-report data is conceptually flawed. Self-report emotions research usually falls under one of three categories: induction of emotions (in the field or in the laboratory), observation of responses presumed to evoke emotions (in the field), and the recall of an emotional incident from the past (Wallbott & Scherer, 1989). The methods used by Kals et al., (1999) do not fall into any of these three categories and are not included in most emotion research because emotions are dynamic. They differ depending upon the situation and/or environment.
Communication techniques

The development of the Internet has created new opportunities for environmental organizations to share information, fundraise, and mobilize individuals. Replacing traditional methods of phone calling and direct mail, environmental organizations are now able to spend less money and reach a great number of people (Kutner, 2000). Instantaneous Internet communication enables environmental organizations to encourage people to act on environmental issues by facilitating certain actions (e.g., signing petitions, donating money). In addition, the Internet has greatly increased the availability of information. Using blogs, online videos, social marketing, and viral marketing, organizations are seeking effective ways to have their messages heard. Because online videos can communicate messages in a powerful and immediate manner, and have the ability to stimulate an emotional response, many environmental organizations’ show clips or images on their websites intended to galvanize individuals to take action for their cause.

Message modality

Videos are often an effective means of communication. In the visually oriented culture of the United States, videos effectively attract audience attention using visual variation, visual movement, and scene changes (Steinke, 2001; Singer, 1980). Visual formats, such as television can be more influential in producing attitude change than other mediums (Keating, 1972). In addition, previous research has demonstrated the success of visual messages in changing knowledge and behavior (Steinke, 2001). More specifically, researchers and practitioners have used videos in anti-smoking messages (Sussman, Dent, Burton, Stacy, & Flay, 1995), sexually transmitted disease prevention
(Roye & Hudson, 2003; Rye, 1998), and substance use prevention (Hecht, Marsiglia, Elek, Wagstaff, Kulis, Dustman, & Miller-Day, 2003; Holleran, Reeves, Dustman, & Marsiglia, 2002).

A dual-mode processing in which multimedia presentations add information to the verbal description may lead to an increased understanding of visual messages (Rockwell & Singleton, 2007). In addition, pictures and pictures plus words are more effective than text-only messages in facilitating message recall (Liu & Stout, 1987).

One of the reasons videos are an effective means of communication is because they can effectively communicate affective messages. Since emotions often guide the motivations that direct behavior, emotion eliciting visual messages are more effective in influencing behavior (Izard, 1977).

**Message valence**

Persuasive messages can either frame information by focusing on positive information (i.e., gains-framed) or negative information (i.e., losses-framed) regarding their communication (Nan, 2007). Although some research has found advantages for gains-framed messages (Rothman, Salovey, Antone, Keough, & Martine, 1993), the majority of research has found that negatively framed messages are more effective. For example, Meyerowitz and Chaiken (1987) found that negatively framed messages have a greater impact on judgment than positively framed messages. They concluded that negative messages may be perceived as more important or consequential than positively framed messages.

Previous research has shown that the impact of negative news videos increases arousal (Mundorf, Drew, Zillmann, & Weaver, 1990; Newhagen & Reeves, 1992). In
fact, people experience greater arousal when they are exposed to negative television images compared to when they are exposed to comparable positive images (Reeves, Lang, Thorson, & Rothchild, 1989). According to Mundorf and Zillman (1991) negative video in news stories elicits autonomic arousal. The arousal-eliciting aspect of negative messages often mediates the processing of negative messages (Bradley, 1994; Bradley & Lang, 1991).

Negative video in news stories increases attention (Lang, Newhagen, & Reeves, 1996). Research demonstrates that people pay more attention to negative information than to positive information (Kahneman & Tversky, 1984; Pratto & John, 1991). Paying attention to negative information is often effortless and subconscious (Martin, 2004). According to Pratto and John (1991) there is an evolutionary foundation for the differences in people's responses to negative and positive information. Negative circumstances, possibly leading to danger, are of greater temporal urgency than events that are less pressing and less threatening. The presence of negative affect often leads to urgent action. From an evolutionary perspective, the same psychological mechanism that draws our attention to danger also attracts attention to negative information (Martin, 2004; Newhagen & Reeves, 1992; Reeves, Lang, Thorson, & Rothchild, 1989).

In addition to research on negative video and attention, there has been a plethora of research on the relationship between negative video and viewers' memory for news stories (Furnham & Gunter, 1985; Gunter, Furnham, & Gietson, 1984; Mundorf, Drew, Zillmann, & Weaver, 1990; Newhagen & Reeves, 1992). Lang, Newhagen, & Reeves (1996) have shown that the presence of negative video in news stories increases the amount of capacity required to process the message and increases message retrieval
capabilities. Using negative visual images, Newhagen and Reeves (1992) also found an increased recall memory for visual images when negative video was portrayed.

Martin (2004) found that negative political campaign advertisements actually “stimulate problem awareness, stimulate anxiety about candidates, and make people perceive races as closer” (p. 557). Martin (2008) argued that negative news coverage of politically relevant social issue actually galvanized political participation by affecting citizen awareness of collective problems. Advertisements focusing on negative social information increase the perception of problems and when voters perceive more problems facing the country they are more apt to participate in the political process (Martin, 2000; Martin, 2008). Lau and Pomper (2001) found that campaign negativity usually stimulates voter turnout, except when there are extremely high levels of negativity, which may actually lower turnout. Research on state-level races and a presidential campaign has shown that negative political advertisements increases voter turnout and mobilizes voters (Freedman & Goldstein, 1999; Goldstein & Freedman, 2002). In addition to increased awareness, negative campaigns can create anxiety in the public. Anxiety incites interest in political campaigns (Marcus, Neuman, & MacKuen, 2000), which again may lead to increased political participation (Martin, 2008).

*Emotional appeals and behavior*

As opposed to rational appeals, based on statistics and logical arguments, emotional appeals are intended to elicit specific feelings, such as fear or elation (Kaid & Johnston, 2006). Emotional appeals are often associated with behavioral change and intentions. A number of advertising studies found emotions to be associated with aspects of the behavioral decision making process (Aaker, Stayman, & Hagerty, 1986; Darley &
Lim, 1992; Gardner, 1985; Holbrook & O'Shaughnessy, 1984; Ray & Batra, 1983). For example, Edell and Burke (1987) found that both positive and negative feelings are important predictors of an advertisement's effectiveness and both uniquely contribute to participants' attitudes toward the ad and the brand.

In addition to advertising campaigns, emotional appeals are often used in public health promotions. Hafstad, Stray-Pederson, and Moore (1997) assessed the role of emotional appeals in mass media campaigns devised to prevent smoking. Results showed that the campaigns created positive and negative affective responses. In particular, girl smokers had a strong negative affective reaction to the campaign. The negative affective reactions were associated with positive behavioral change (i.e., decided to stop smoking). They concluded that a communication strategy based upon provocative negative messages should be considered in efforts to encourage positive behavioral reactions.

In a study investigating viewers' responses to televised fund raising drives by a public television station, Fisher, Vandenbosch, and Antia (2008) found that the most effective fund raising appeals induce negative emotions. When testing combinations of appeal beneficiary (self versus other) and emotional valence (negative versus positive) only the other-benefit and negative emotion interaction term positively affected the number of calls to the television station. The self-benefit and positive emotion interaction term did not positively affect the number of calls to the television station.

Bagozzi and Moore (1994) found that public service advertisements designed to induce negative emotion lead to empathic reactions and a decision to help (Bagozzi & Moore, 1994). Specifically, Bagozzi and Moore (1994) identified anger, sadness, fear, and tension as four emotions that affected empathy and a decision to help. The
researchers found that the more emotionally intense ads in their study created the strongest desire to contribute to the organization. These findings contribute to previous research demonstrating that sadness leads to positive attitudes towards helping and potential intentions to help (Cialdini & Kenrick, 1976).

Baumgartner, Sujan, and Padgett (1997) found that overall ad judgments are dominated by peak emotional experiences while viewing advertisements. In other words, emotional arousal, or strength of immediate affective reactions, was associated with overall evaluations. In a recent recruitment web-based computer research study, Reeves, Highhouse, and Brooks (2006) found that overall evaluations of organizations are influenced more by the intensity of affective reactions to the messages than the content valence (positive information or negative information) of the message. The authors suggest practitioners should pay more attention to the average affective reactions to messages than the valence of the information that is presented. However, it is important to note that message valence can influence arousal. According to Lang, Dhillon, and Dong (1995), media messages with a negative emotional tone tend to be more arousing than positive ones. In addition their research suggests negative messages are remembered better than positive ones, Lang, Dhillon, and Dong (1995) found that when valence is controlled for, arousing television messages are remembered better than calmer messages.

Environmentally Responsible Behavior

Environmentally responsible behavior occurs when the actions of an individual or group of individuals encourages the sustainable use of natural resources (Sivek & Hungerford, 1989). Environmentally responsible behavior has been well researched in the
discipline of psychology. Previous research has demonstrated a relationship between environmental beliefs and behavior (Corral-Verdugo, Bechtel, & Fraijo-Sing, 2003; Stern, 1994), outdoor recreational behavior and pro-environmental behavior (Teisl & O’Brien, 2003; Dunlap & Hefferman, 1975; Tarrant & Green, 1999), environmental knowledge and recycling behavior (Arbuthnut, 1977), and environmental knowledge and responsible environmental behavior (Sia, Hungerford, & Tomera, 1986).

Message valence and environmentally responsible behavior

The findings regarding message framing and environmentally responsible behavior is limited, and not clear. Lord (1994) found that positive appeals resulted in more favorable beliefs and attitudes about recycling. However, a greater increase in actual recycling behavior was the result of a negatively framed message communicated by a personal acquaintance. In a study exploring how environmental message framing influences attitudes and recycling behavior, Davis (1995) found that messages focusing on losses to the current generation lead to the highest level of intention to participate in environmentally responsible behavior.

Emotional appeals and environmentally responsible behavior

Emotionally based appeals are prevalent in the environmental movement. Many environmental organizations’ websites contain images and/or videos of animals that are victims of destructive human behavior. Emotionally based campaigns benefit from individuals’ learned emotional reactions to animals (Schenk, Templer, Peters, & Schmidt, 1994). Appeals for increasing awareness of considerable environmental issues (e.g., climate change) may be more effective when symbolized by an emotionally provocative image. However, the relationship between the strength of an emotional response to an
environmental message and behavioral intentions is unknown. Other research has focused on the relationship between anticipated emotions and pro-environmental behavioral intention (Carrus, Passafaro, & Bonnes, 2008); emotional responses to hypothetical forest management issues (Vining, 1992); affect and expected affect regarding recycling (Smith, Haugtvedt, & Petty, 1994) and emotional concern for the environment (Grob, 1995). However, previous research has not investigated the relationship between inducing emotional responses in the laboratory (i.e., simulating online social marketing techniques) and environmentally responsible behavioral intentions.

**Current research**

The goal of this research is to investigate the role message modality, message valence, and intensity of emotional response to environmental messages, in predicting environmentally responsible behavioral intentions and a willingness to receive more information about environmental issues. Using an experimental protocol designed to induce emotions in the laboratory, I measured specific emotional responses to gains-framed and losses-framed environmental video messages and text-only messages, and investigated the relationship between intensity of emotional responses (arousal) to environmental messages and environmentally responsible behavioral intentions. Environmental beliefs, outdoor recreational behavior, and environmental knowledge were included as control variables on the basis of their relevance in the environmentally responsible behavior literature as well their potential influence on environmentally responsible behavior.
Hypothesis #1: Background variables

Based upon previous research on environmentally responsible behavior (Corral-Verdugo, Bechtel & Fraijo-Sing, 2003; Stern, 1994; Teisl & O’Brien, 2003; Dunlap & Hefferman, 1975; Tarrant & Green, 1999; Arbuthnut, 1977; Sia, Hungerford, & Tomera, 1986) environmental beliefs, outdoor recreational activity, and environmental knowledge will be significant predictors of environmentally responsible behavioral intentions and a willingness to receive more information about environmental issues.

Hypothesis #2: Message modality

Based upon research on the efficacy of video (Steinke, 2001; Singer, 1980; Hecht et al., 2003; Holleran et al., 2002; Keating, 1972), message modality will be a significant predictor of environmentally responsible behavioral intentions and a willingness to receive more information about environmental issues. In particular, individuals primed with messages accompanied by a video clip (both losses-framed and gains-framed) will have higher environmentally responsible behavioral intentions and a higher willingness to receive more information about environmental issues than individuals primed with text-only (both losses-framed and gains-framed) messages of environmental issues.

Hypothesis #3: Message valence

Consistent with research on losses-framed messages (Davis, 1995; Lau & Pomper, 2001; Lord, 1995; Martin, 2000; Martin, 2004; Martin, 2008; Meyerowitz & Chaiken, 1987), message valence will be a significant predictor of environmentally responsible behavioral intentions and a willingness to receive more information about environmental issues. In particular, individuals primed with losses-framed environmental messages accompanied by video clips will have higher environmentally responsible
behavioral intentions than individuals primed with gains-framed environmental messages accompanied by videos clips. Also, individuals primed with losses-framed text-only messages will have higher environmentally responsible behavioral intent than individuals primed with gains-framed text-only messages.

Hypothesis #4: Emotional arousal

Based on emotional arousal research (Lang, Dhillon, & Dong, 1995; Highhouse & Brooks, 2006; Baumgartner, Sujan, & Padgett, 1997), the intensity of positive and negative emotional response to messages about environmental issues will positively predict individuals' intention to act environmentally responsibly.

How is this research different from previous research?

Previous research has addressed the role of emotions in ecological behavior and environmental decision-making (Mayer & Frantz, 2004; Clayton, 2003; Kals, Schumacher & Montada, 2003). However, the literature focusing on emotional components of human connectedness to nature is fraught with conceptual ambiguity. As a result, many methods of measurement (i.e., scale construction) within the literature fail to measure appropriately the targeted construct (e.g., Mayer & Frantz, 2004). In addition, previous research has addressed the role of emotional responses to advertisements in political campaigns (e.g., Martin, 2000; Martin, 2004; Martin, 2008), public service advertisements (Bagozzi & Moore, 1994), fund raising (Fisher, Vandenbosch, & Anita (2008), and overall organization evaluation (Highhouse & Brooks, 2006) but has not assessed specific emotional responses to environmental messages. My research is different from previous research for the following reasons:
1. I am examining the relation between message modality (video and text or text-only) and environmentally responsible behavioral intentions.

2. I am the relation between message valence (gains-framed and losses-framed) and environmentally responsible behavioral intentions.

3. I am measuring actual emotional responses to environmental messages using a standard measure of emotional response.

4. I am examining the relation between emotional arousal and behavioral intent.
CHAPTER I

METHODS

Participants

The participants ($N=231; 162$ women, $69$ men) were recruited from undergraduate psychology classes at a moderate sized public university in the eastern United States. Fifty percent of the students were freshmen, $32\%$ were sophomores, $15\%$ were juniors, and $3\%$ were seniors. Over $90\%$ of undergraduate students at the university are between the ages of $18$ and $23$. The students received course credit for their participation.

Preliminary investigations compared the effect of reporting emotional responses and not reporting emotional responses on environmentally responsible behavioral intentions. After a preliminary data analysis this component of the research was not pursued. Therefore, seventy of the participants (who did not report emotional responses) were dropped from further analyses. In the final sample ($N=161; 116$ women, $45$ men), $44\%$ of the students were freshmen, $37\%$ were sophomores, $17\%$ were juniors, and $2\%$ were seniors.

Procedure

After reporting to the lab, small groups of five or fewer students individually completed an informed consent form and a questionnaire consisting of demographic information and the background measures (environmental beliefs, outdoor recreational activity, environmental knowledge). Upon completion of the questionnaire, participants were reminded to return two days later and then dismissed.
In part two of the experiment, participants returned to the lab and were randomly assigned to one of four experimental groups: losses-framed messages video group, gains-framed messages video group, losses-framed messages text-only group, and gains-framed messages text-only group.

**Losses-framed messages video group**

This group read four losses-framed messages accompanied by video clips focusing on the current and potential future problems regarding each environmental issue (e.g., status of red-breasted geese, South American rainforests, status of Polar Bears, and pesticide farming).

**Gains-framed messages video group**

This group watched four gains-framed video clips accompanied by text focusing on the current positive aspects of conservation initiatives and potential advantages regarding future pro-environmental actions (e.g., status of red-breasted geese, South American rainforests, status of Polar Bears, and organic farming).

The instructions for both (gains-framed and losses-framed) video groups were the same. Videos clips were projected onto a screen with an LCD projector. After each video clip, the researcher paused to allow participants to read the paragraph accompanying each video.

**Losses-framed messages text-only group**

This group read four passages focusing on the current and potential future problems regarding the four different environmental issues. These issues were the same as those in the gains-framed message video group.
Gains-framed messages text-only Group

This group read four passages focusing on the current positive aspects of conservation initiatives and potential advantages regarding future pro-environmental actions. These issues were the same as those in the losses-framed message video group.

The instructions were the same for both (gains-framed and losses-framed) text-only groups. Participants in the text-only groups were instructed to read descriptions of four nature-based scenarios. Upon completion of the fourth passage, participants were instructed to stop and wait for further instructions.

Next, participants in all groups filled out the second questionnaire consisting of the primary measures (emotion adjective checklist, environmentally responsible behavioral intentions inventory, and a one-item measure about willingness to receive more information). Before departure from the lab, participants were debriefed on the focus, goals, and hypotheses of the study.

Stimulus material

I selected four categories of films clips from the National Geographic Digital Motion Film archive. Each category consisted of a gains-framed and losses-framed video related to an environmental issue. The category pairings were: gains-framed information regarding population status of red-breasted geese; losses-framed information regarding population status of red-breasted geese; gains-framed information regarding preservation status of South American rainforests; losses-framed information regarding preservation status of South American rainforests; gains-framed information regarding the environmental benefits of organic farming; losses-framed information regarding the environmental detriments of pesticide farming; and gains-framed information regarding
population status of polar bears; losses-framed information regarding population status of polar bears. Film clips were equivalent in camera speed, audio content, and length (see Appendix A for video descriptions, see Appendix B for accompanying text).

The four sets of environmentally themed messages (video clip and accompanying text) were pretested by a sample of 66 students in undergraduate psychology classes at a moderate sized public university in the eastern United States. The participants were asked to rate each message on a negative/positive scale of environmental wellbeing. The directions read as follows:

*Imagine you are attending a senate hearing on the current state of the planet’s natural resources. A senator is using video clips and accompanying text to demonstrate positive examples of human efforts towards preservation, conservation, and sustainability. The senator is also using video clips and accompanying text to demonstrate negative examples of humans’ destruction, expenditure, and non-sustainable usage of natural resources. Before presenting to the United Nations Environment Program (UNEP) the senator is soliciting your advice on the effectiveness of each message.*

*While considering issues such as pollution, pesticides, climate change, species loss and deforestation, please rate each message indicating the positive (+10) or negative (-10) theme of the message. Please clearly circle your response to the message on the scales provided. If a message does a good job of presenting a scene that shows a losses-framed environmental scene, you should circle a negative number of the scale. The more losses-framed the environmental scenario, the higher the negative number should be. On the other hand, if a message does a good job of presenting a scene that shows a gains-framed environmental scene you should circle a positive number of the scale. The more gains-framed the environmental scenario, the higher the positive number should be. Finally, if you think the message depicts a neutral scene, you should circle the “0” on the scale.*

Each pair of messages showed significant differences between negative/positive ratings of the message. The overall mean value of negative/positive theme for the gains-framed population status red-breasted geese message ($M = 6.50, SD = 2.30$) was higher than the overall mean value of negative/positive theme for the losses-framed population statues of red-breasted geese message ($M = -6.59, SD = 2.75$), $t(65) = -27.79, p < .001, r$
The overall mean value of negative/positive theme for the gains-framed preservation status of South American rainforests message \((M = 4.16, SD = 3.90)\) was higher than the overall mean value of negative/positive theme for the losses-framed status of South American rainforests message \((M = -6.56, SD = 2.64)\), \(t(65) = -17.88, p < .001, r = -.07\). The overall mean value of negative/positive theme for the environmental benefits of organic farming message \((M = 6.24, SD = 2.71)\) was higher than the overall mean value of negative/positive theme for the environmental detriments of pesticide farming message \((M = -5.16; SD = 2.48)\), \(t(65) = -22.03, p < .001, r = -.30\). The overall mean value of negativity for gains-framed population status of polar bears message \((M = 5.36, SD = 3.30)\) was higher than the overall mean value of negative/positive theme for the losses-framed population status of polar bears message \((M = -7.13; SD = 3.02)\), \(t (65) = -20.92, p < .001, r = -.17\).

**Measures**

**Emotional Response**

Watson and Clark’s (1994) Positive and Negative Affect Scale (PANAS-X) measured specific positive and negative emotional responses to the video clips. The scale consists of a number of words and phrases that describe feelings and emotions. Participants were instructed to read each item and mark the appropriate answer (1-very slightly or not at all; 2-a little; 3-moderately; 4- quite a bit; 5- extremely) in the space provided. Participants were instructed to indicate to what extent they currently feel each feeling or emotion (see Appendix C for full scale).

Two composite dimension scores were computed for each participant. Negative affect (NEG) was computed by adding scores on ten negative emotion items: afraid,
scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, and distressed. Internal consistency was strong for the negative emotion items (Cronbach’s alpha = .90). Sample scores ranged from 10 to 39 ($M = 19.01; SD = 7.65$). Positive affect (POS) was computed by adding scores on ten positive emotion items: active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud and strong (see Watson & Clark, 1994, for explanation of general dimensions). Internal consistency was also strong for positive emotion items (Cronbach’s alpha = .84). Scores ranged from 10 to 47 ($M = 23.01; SD = 6.83$).

Environmentally Responsible Behavioral Intention (ERBI)

A modified version of Smith-Sebasto’s (1992) Environmentally Responsible Behavior Inventory (ERBI) measured environmentally responsible behavioral intentions. Since the scale was originally a self-report scale of actual behaviors, items were modified to focus on intent. In addition, a few items from the scale were omitted and replaced with items more applicable to college students. Participants answered 23 questions (see Appendix D for full scale) An example item is “What is the likelihood that you will join an environmental organization on campus”? Participants responded using a 5-point Likert-scale as follows: (1) very improbable, in less than 10% of the chances I will have, (2) fairly improbable, in less than 30% of the chances I will have, (3) probable, in about 50% of the chances I will have, (4) fairly probable, in about 70% of the chances I will have, (5) very probable, in about 100% of the chances I will have. Individuals in the sample had scores ranging from 46 to 108 ($M = 76.54; SD = 14.57$). Internal consistency was strong (Cronbach’s alpha = .93)
Willingness to receive more information about environmental issues

A one item-measure asked participants whether or not they would be willing to receive more information about environmental issues in this experiment (MOREINFO). Scores ranged from 0 to 1 ($M = .17; SD = .38$). Because this was a one-item measure internal consistency was not assessed.

Environmental Beliefs

The new environmental paradigm (NEP) scale measured individuals’ beliefs having to do with the natural world (Dunlap et al., 2000). Participants answered 15 items (See Appendix E for full scale) about the relationship between humans and the environment. An example item is “Humans are severely abusing the environment”. Participants responded using a 5-point Likert-scale as follows: (1) strongly agree, (2) mildly agree, (3) neutral, (4) mildly disagree, (5) strongly disagree. Individuals in the sample had scores ranging from 23 to 73 ($M = 53.05; SD = 8.23$). Internal consistency was strong (Cronbach’s alpha = .81)

Outdoor Recreational Activity

Perrin’s (2004) Outdoor Recreational Behavior Inventory (REC) assessed participants’ outdoor recreational activity. Participants answered 13 questions about outdoor recreational behavior (see Appendix F for full scale). An example item is “How often you participate in the following activity: hiking?” Participants responded using a 5-point Likert-scale as follows: (1) never, 0 times per year, (2) occasionally, 1-3 times per year (3) sometimes, 4-6 times per year (4) frequently, 7-9 times per year, (5) usually, 10
or more times per year. Individuals in the sample had scores ranging from 16 to 55 \( (M = 29.10; SD = 8.05) \). Internal consistency was strong (Cronbach’s alpha = .80).

**Environmental Knowledge**

The 2002 National Environmental Education Training Foundation/Roper Survey environmental knowledge quiz assessed participants’ environmental knowledge (National Environmental Education Training Foundation, 2002) (KNOW). Participants answered 12 questions (See Appendix G for full quiz). An example item is “Which of the following is a renewable resource?”). Scores on the quiz ranged from 3 to 11 \( (M = 7.50; SD = 2.10) \).

**Brief Mood Introspection Survey**

The brief mood introspection survey (BMIS) (Mayer & Gaschke, 1988) is a 16 adjective measure of current mood. The measure includes 8 positive adjectives (e.g., happy, lively) and 8 negative adjectives (e.g., sad, tired) (See Appendix H for full scale). Participants responded using a 4-point Likert-scale as follows: (1) definitely do not feel, (2) do not feel, (3) slightly feel, (4) definitely feel. Pleasant mood (PLEASANT) was computed by adding scores on eight positive adjectives: lively, happy, caring, content, peppy, calm, loving, and active. Internal consistency was strong for positive mood items (Cronbach’s alpha = .82). Scores ranged from 11 to 31 \( (M = 22.90; SD = 4.01) \).

Unpleasant mood (UNPLEASANT) was computed by adding scores on eight negative adjectives: sad, tired, gloomy, jittery, drowsy, grouchy, nervous, and fed up. Internal consistency was also strong for negative mood items (Cronbach’s alpha = .77). Scores ranged from 8 to 31 \( (M = 15.92; SD = 4.20) \).
CHAPTER II

RESULTS

Preliminary data screening included a univariate outlier analysis to detect any participants' scores with an unusual value for any of the variables. First, all scores were converted to a z-scores. Participants with a value for the dependent variable that was outside of two standard deviations were eliminated from the following analyses. As a result, eight participants were dropped from all subsequent analyses. Four other cases were dropped for missing data on at least one of the variables. For this analysis the total $N$ was 149.

Preliminary data screening also included descriptive statistics, frequency distribution tables to search for ceiling and floor effects, histograms for all quantitative variables to assess the shape of the distribution of scores, and scatter plots for all pairs of variables. Frequency distribution tables revealed a slight floor effect for negative emotion (NEG). All univariate distributions were fairly normal, except for negative emotion (NEG) that was positively skewed.

Table 1
Descriptive statistics for continuous dependent and independent variables ($N = 149$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERBI</td>
<td>76.93</td>
<td>14.48</td>
</tr>
<tr>
<td>NEP</td>
<td>53.19</td>
<td>8.20</td>
</tr>
<tr>
<td>REC</td>
<td>29.15</td>
<td>8.12</td>
</tr>
<tr>
<td>KNOW</td>
<td>7.53</td>
<td>2.11</td>
</tr>
<tr>
<td>POS</td>
<td>23.11</td>
<td>6.90</td>
</tr>
<tr>
<td>NEG</td>
<td>19.20</td>
<td>7.70</td>
</tr>
<tr>
<td>PLEASANT</td>
<td>22.90</td>
<td>4.01</td>
</tr>
<tr>
<td>UNPLEASANT</td>
<td>15.93</td>
<td>4.20</td>
</tr>
</tbody>
</table>
Willingness to receive more information (MOREINFO)

Descriptive statistics revealed an extremely low mean ($M = .17$, $SD = .38$) for the dichotomous outcome variable - willingness to receive more information about environmental issues (MOREINFO). I reported a chi square contingency table for the number of participants willing to receive more information about environmental issues in each group.

Brief mood introspection survey (BMIS)

In order to ensure that random assignment created equivalent groups I conducted a 2 x 2 multivariate analysis of variance (ANOVA) to assess differences in pleasant mood (BMIS-PLEASANT) and unpleasant mood (BMIS-UNPLEASANT) between groups. I did not expect to find any mean differences between the groups since BMIS was measured before the experimental manipulation. The between subjects factors were message modality (MODALITY) and message valence (VALENCE). No main effects were found for message modality, $F(3, 146) = .36$, $p = .55$. No main effects were found for message valence, $F(3, 146) = 1.38$, $p = .24$. There was no interaction between the factors, $F(1, 147) = .13$, $p = .72$. The BMIS was not included in any further analyses.

Message valence and message modality

I conducted a 2 x 2 ANOVA to assess differences in environmentally responsible behavioral intentions across VALENCE and MODALITY (see Table 2). There was a significant difference in environmentally responsible behavioral intentions in the MODALITY groups, $F(1, 148) = 8.28$, $p < .01$. There were no significant differences in the VALENCE groups, $F(1, 148) = .00$, $p = .94$. There was also no significant
interaction between VALENCE and MODALITY, $F(1, 148) = .03, p = .86$. Since there were no main effects for VALENCE and no interaction effects with VALENCE and MODALITY the subsequent regression analyses were collapsed across VALENCE.

Table 2

*Means and Standard Deviations of environmentally responsible behavioral intentions for the four experimental groups:*

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Losses-framed video group</td>
<td>40</td>
<td>80.10</td>
<td>12.98</td>
</tr>
<tr>
<td>Gains-framed video group</td>
<td>36</td>
<td>80.30</td>
<td>14.66</td>
</tr>
<tr>
<td>Losses-framed text-only group</td>
<td>37</td>
<td>73.81</td>
<td>15.13</td>
</tr>
<tr>
<td>Gains-framed text-only group</td>
<td>36</td>
<td>73.19</td>
<td>14.16</td>
</tr>
</tbody>
</table>

_Hypotheses testing: Bivariate correlations_

Pearson correlations were run to evaluate the bivariate relations between environmentally responsible behavioral intentions (ERBI), environmental beliefs (NEP), outdoor recreational behavior (REC), environmental knowledge (KNOW), message valence (VALENCE), message modality (MODALITY), positive emotional response (POS), and negative emotional response (NEG) (see Table 3).

Table 3

*Correlations of ERBI, NEP, REC, KNOW, VALENCE, MODALITY, POS, and NEG*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ERBI</th>
<th>NEP</th>
<th>REC</th>
<th>KNOW</th>
<th>VALENCE</th>
<th>MODALITY</th>
<th>POS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEP</td>
<td>.22**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REC</td>
<td>.24**</td>
<td>-.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KNOW</td>
<td>.13</td>
<td>.17*</td>
<td>.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VALENCE</td>
<td>.01</td>
<td>.00</td>
<td>.10</td>
<td>-.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODALITY</td>
<td>.23**</td>
<td>.08</td>
<td>.11</td>
<td>-.03</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POS</td>
<td>.16*</td>
<td>-.11</td>
<td>.29**</td>
<td>-.05</td>
<td>.02</td>
<td>-.11</td>
<td></td>
</tr>
<tr>
<td>NEG</td>
<td>.25**</td>
<td>.08</td>
<td>.01</td>
<td>-.08</td>
<td>.61**</td>
<td>-.05</td>
<td>.27**</td>
</tr>
</tbody>
</table>

** $p < .01$

_Hypothesis 1: Bivariate correlations of background variables and ERBI_

Environmental beliefs (NEP) were positively related to environmentally responsible behavioral intentions ($r = .22, p < .01$). Outdoor recreational activity (REC)
was also positively related to environmentally responsible behavioral intentions ($r = .24, p < .01$).

**Hypothesis 2: Bivariate correlations of MODALITY and ERBI**

Message modality (MODALITY) was positively related to environmentally responsible behavioral intentions ($r = .23, p < .01$).

**Hypothesis 3: Bivariate correlations of VALENCE and ERBI**

There was no significant correlation between VALENCE and ERBI.

**Hypothesis 4: Bivariate correlation of POS and ERBI; NEG and ERBI**

Positive emotional response (POS) was positively related to environmentally responsible behavioral intentions ($r = .16, p < .05$). Negative emotional response (NEG) was also positively related to environmentally responsible behavioral intentions ($r = .25, p < .01$).

**Bivariate correlations for specific adjectives.** I computed correlations for each of the ten PANAS-X adjectives that make up negative emotional response and ERBI for each of the two losses-framed experimental groups and a losses-framed collapsed group (see Table 4). I also computed correlations for each of the ten PANAS-X adjectives that make up positive emotional response and ERBI for each of the two gains-framed experimental groups and a gains-framed collapsed group (see Table 5). *Upset, distressed,* and *nervous* were significant predictors in all three losses-framed conditions. *Inspired* and *strong* were significant predictors in two of the three gains-framed conditions.
Table 4
*Correlations by losses-framed video group (n = 42), losses-framed text-only (n = 37) and losses-framed collapsed group (n = 79) of ERBI and ten individual adjectives that comprise of negative affect- afraid (AF), guilty (GT), ashamed (AS), scared (SC), jittery (JI), irritable (IR), upset (UP), distressed (DI), hostile (HS), and nervous (NR).*

<table>
<thead>
<tr>
<th>Losses-Framed</th>
<th>AF</th>
<th>GT</th>
<th>AS</th>
<th>SC</th>
<th>JI</th>
<th>IR</th>
<th>UP</th>
<th>DI</th>
<th>HS</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video ERBI</td>
<td>.37*</td>
<td>.27</td>
<td>.23</td>
<td>.25</td>
<td>.19</td>
<td>.09</td>
<td>.45**</td>
<td>.45**</td>
<td>.16</td>
<td>.34*</td>
</tr>
<tr>
<td>Text ERBI</td>
<td>.29</td>
<td>.39*</td>
<td>.20</td>
<td>.27</td>
<td>-.05</td>
<td>.20</td>
<td>.50**</td>
<td>.37*</td>
<td>.09</td>
<td>.43**</td>
</tr>
<tr>
<td>Collapsed ERBI</td>
<td>.27*</td>
<td>.30**</td>
<td>.23*</td>
<td>.21</td>
<td>.07</td>
<td>.14</td>
<td>.48**</td>
<td>.40**</td>
<td>.11</td>
<td>.33**</td>
</tr>
</tbody>
</table>

**p < .01  
*p < .05

Table 5
*Correlations by gains-framed video (n=38) group, gains-framed text-only (n=37), and gains-framed collapsed group (n= 75) of ERBI and ten individual adjectives that comprise of positive affect- proud (PR), alert (AL), active (AC), attentive (AT), determined (DT), enthusiastic (EN), excited (EX), inspired (IS), interested (IT), and strong (ST).*

<table>
<thead>
<tr>
<th>Gains-Framed</th>
<th>PR</th>
<th>AL</th>
<th>AC</th>
<th>AT</th>
<th>DT</th>
<th>EN</th>
<th>EX</th>
<th>IS</th>
<th>IT</th>
<th>ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video ERBI</td>
<td>.31*</td>
<td>.31*</td>
<td>.54**</td>
<td>.49</td>
<td>.38*</td>
<td>.35*</td>
<td>.26</td>
<td>.51**</td>
<td>.29</td>
<td>.40*</td>
</tr>
<tr>
<td>Text ERBI</td>
<td>.06</td>
<td>-.06</td>
<td>-.12</td>
<td>-.14</td>
<td>.00</td>
<td>-.17</td>
<td>-.04</td>
<td>-.13</td>
<td>.11</td>
<td>.15</td>
</tr>
<tr>
<td>Collapsed ERBI</td>
<td>.16</td>
<td>.12</td>
<td>.19</td>
<td>.19</td>
<td>.21</td>
<td>.09</td>
<td>.09</td>
<td>.35**</td>
<td>.24*</td>
<td>.24*</td>
</tr>
</tbody>
</table>

**p < .01  
*p < .05

Hypotheses testing: Hierarchical multiple regression

Hierarchical multiple regression models were developed to examine the independent contributions of the experimental manipulation (MODALITY) and emotional response (POS and NEG) while controlling for background variables environmental beliefs (NEP), outdoor recreational behavior (REC), and environmental knowledge (KNOW). Scatter plots revealed no multivariate outliers, linear relationships between variables, and a homoscedacity of variance. The criterion variable was
environmentally responsible behavioral intention. Three sets of predictor variables were entered into the regression.

The first model included the three continuous background variables: NEP, REC, KNOW. The second model included the background variables and the experimental manipulation environmental message variable: MODALITY (video and text-only). The third model included the background variables, the experimental manipulation environmental message variable and the two continuous emotional response variables: POS and NEG. Results of the hierarchical regression are reported in Table 6 and Table 7.

Table 6
Results of hierarchical multiple regression to predict environmentally responsible behavioral intention (ERBI) from NEP, REC, KNOW, MODALITY, POS, and NEG.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\hat{\beta}$</th>
<th>$t$</th>
<th>$sr^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP</td>
<td>.38</td>
<td>.14</td>
<td>.22</td>
<td>2.71**</td>
<td>.04</td>
</tr>
<tr>
<td>REC</td>
<td>.42</td>
<td>.14</td>
<td>.24</td>
<td>3.02**</td>
<td>.05</td>
</tr>
<tr>
<td>KNOW</td>
<td>.51</td>
<td>.55</td>
<td>.08</td>
<td>.94</td>
<td>.01</td>
</tr>
<tr>
<td><strong>MODEL 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP</td>
<td>.35</td>
<td>.14</td>
<td>.20</td>
<td>2.52**</td>
<td>.04</td>
</tr>
<tr>
<td>REC</td>
<td>.38</td>
<td>.14</td>
<td>.22</td>
<td>2.77**</td>
<td>.04</td>
</tr>
<tr>
<td>KNOW</td>
<td>.58</td>
<td>.54</td>
<td>.09</td>
<td>1.08</td>
<td>.01</td>
</tr>
<tr>
<td>MODALITY</td>
<td>5.64</td>
<td>2.24</td>
<td>.20</td>
<td>2.52*</td>
<td>.04</td>
</tr>
<tr>
<td><strong>MODEL 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP</td>
<td>.32</td>
<td>.14</td>
<td>.18</td>
<td>2.39*</td>
<td>.03</td>
</tr>
<tr>
<td>REC</td>
<td>.32</td>
<td>.14</td>
<td>.18</td>
<td>2.27*</td>
<td>.03</td>
</tr>
<tr>
<td>KNOW</td>
<td>.77</td>
<td>.52</td>
<td>.11</td>
<td>1.47</td>
<td>.01</td>
</tr>
<tr>
<td>MODALITY</td>
<td>6.42</td>
<td>2.19</td>
<td>.22</td>
<td>2.93**</td>
<td>.05</td>
</tr>
<tr>
<td>POS</td>
<td>.20</td>
<td>.17</td>
<td>.10</td>
<td>1.18</td>
<td>.01</td>
</tr>
<tr>
<td>NEG</td>
<td>.42</td>
<td>.15</td>
<td>.22</td>
<td>2.87**</td>
<td>.04</td>
</tr>
</tbody>
</table>

**$p < .01$**

* $p < .05$
Hypothesis 1: Hierarchical multiple regression: Background variables (Model 1)

The combined set of background variables accounted for a significant amount of
the variance in environmentally responsible behavioral intentions, adjusted, $R^2 = .11$,
$F(3,145) = 6.13, p < .01$ (see Table 7).

Hypothesis 2: Hierarchical multiple regression: Message Modality (Model 2)

The change in explained variance associated with MODALITY to the model was
significant, $R^2 \Delta = .04, F(4,144) = 6.32, p < .01$ (see Table 7). Hypothesis 3 was not tested
in this model.

Hypothesis 4: Hierarchical multiple regression: Emotional response (Model 3)

The change in explained variance associated with POS and NEG to the model was
significant, $R^2 \Delta = .07, F(6,142) = 6.23, p < .01$ (see Table 7).

Overall Regression Model- Individual Predictors

The overall regression including all six variables was statistically significant, $R = .47, R^2 = .22$, adjusted $R^2 = .19, F(7, 148) = 6.62, p < .01$. Environmentally responsible
behavioral intentions could be predicted from the seven variables. The regression model
accounted for 22% of the variance in behavioral intention scores.

Table 7
Summary of $R^2$ values and $R^2$ changes at each step in the hierarchical regression

<table>
<thead>
<tr>
<th>Predictors Included</th>
<th>$R^2$ for model</th>
<th>$F$ for model</th>
<th>$R^2$ change</th>
<th>$F$ for $R^2$ change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NEP, REC, KNOW</td>
<td>.113</td>
<td>$F(3,145) = 6.13^{**}$</td>
<td>.113</td>
<td>$F(3,145) = 6.13^{**}$</td>
</tr>
<tr>
<td>2. MODALITY</td>
<td>.150</td>
<td>$F(4,144) = 6.35^{**}$</td>
<td>.037</td>
<td>$F(4,144) = 6.32^{*}$</td>
</tr>
<tr>
<td>3. POS, NEG</td>
<td>.218</td>
<td>$F(6,142) = 6.62^{**}$</td>
<td>.069</td>
<td>$F(6,142) = 6.23^{**}$</td>
</tr>
</tbody>
</table>

**$p < .01$
* $p < .05$
Contingency table: MOREINFO

As previously mentioned the MOREINFO variable was not included in the standard statistical analyses. However, a chi-square contingency table was created to examine the number of individuals willing to receive more information about environmental issues in the four different groups (see Table 8). Results suggest a similar pattern of results to the regression model: more individuals in the video group were willing to receive more information about environmental issues.

Table 8
Contingency table for number of individuals willing to receive more information about environmental issues (percentages)

<table>
<thead>
<tr>
<th></th>
<th>Video</th>
<th>Text-only</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Losses-framed</td>
<td>11 (28%)</td>
<td>6 (16%)</td>
<td>17 (36%)</td>
</tr>
<tr>
<td>Gains-framed</td>
<td>6 (17%)</td>
<td>2 (5%)</td>
<td>8 (11%)</td>
</tr>
<tr>
<td>Total</td>
<td>17 (37%)</td>
<td>8 (11%)</td>
<td>25 (17%)</td>
</tr>
</tbody>
</table>
CHAPTER III

DISCUSSION

Results suggest that background variables, message modality, and emotional response were all significant predictors of environmentally responsible behavioral intentions.

Hypothesis 1: Background variables

Background variables were included as control variables on the basis of their relevance in the environmentally responsible behavior literature. Specifically, environmental beliefs and outdoor recreational knowledge were significantly correlated with environmentally responsible behavioral intentions. There was no significant correlation between environmental knowledge and environmentally responsible behavioral intentions.

Environmental beliefs

Environmental beliefs were associated with environmentally responsible behavioral intentions. These findings are consistent with research demonstrating a relationship between environmental beliefs and behavior (Corral-Verdugo, Bechtel, & Fraijo-Sing, 2003; Stern, 1994). This result is not surprising. A pro-environmental belief system (high scores on the NEP) may be associated with using less, simpler living, and giving up certain comforts for the sake of a general societal goal (Schultz & Zelezny, 2003).

I suspect that the relation between pro-environmental beliefs and environmentally responsible behavior could be even stronger with a different measure of environmental
beliefs. Although the NEP (Dunlap et al., 2000) is the most widely used measure of environmental beliefs in the psychology literature it does have a negativity bias in the scale items. The NEP was designed to measure endorsement of an ecological worldview using a set of 15 items tapping beliefs about humanity’s relationship with nature (Dunlap et al., 2000). Questions address issues such as ecological limits, balance of nature, and human domination. In a recent comparison of the Connectedness to Nature Scale (CNS) (Mayer & Frantz, 2004) and the NEP Scale (Dunlap, et al., 2000), Perrin and Benassi (in press) found that the NEP scale is more negative in tone than the CNS. Many of the items in the NEP scale focus on the negative impacts of humans on nature. For example, the item, ‘If things continue on their present course, we will soon experience a major ecological catastrophe’ taps an overtly pessimistic worldview of our current situation. This item ignores any current positive conservation or preservation initiatives that exist (for complete list of NEP items see Appendix E). Therefore, those that score high on the NEP may have a pro-environmental belief that may also be related to a pessimistic view of the current and future environmental situation.

What happens when one who has a pessimistic view about human impact on the natural world is confronted with positive information, or gains-framed messages, regarding conservation and preservation of natural resource? What are the behavioral implications of the presentation of contradicting information? Schultz and Zelezny (2003) suggest that practitioners reframe environmental messages to be harmonious with American values. This idea could extend to the topic of environmental beliefs. It may be most effective to create environmental messages that are congruent with individual belief systems. Losses-framed messages may possibly be more congruent with overtly
pessimistic environmental beliefs. Congruency between environmental beliefs and message valence may be a more effective method for encouraging responsible environmental behavior. This area should be addressed in future research that utilizes a more neutral measure of environmental beliefs.

Outdoor recreational behavior

Outdoor recreational behavior was associated with environmentally responsible behavioral intentions. Previous research has found that outdoor recreational activities can have a positive significant association with environmental behavior and environmental concern (Teisl & O’Brien, 2003; Dunlap & Hefferman, 1975; Tarrant & Green, 1999). Specifically, Tarrant and Green (1999) suggested that recreational activities provide a direct experience with the natural environment that is more important in generating responsible environmental behaviors than non-direct, passive experiences. Indirect experiences may increase environmental understanding and awareness, but direct involvement is more likely to influence behavior.

Results from this study support the notion that participating in various types of outdoor recreational activities impacts environmental behavior and concern. In particular, the present results support Teisl and O’Brien’s (2003) findings that appreciative recreational activities are consistently correlated with higher levels of environmental behavior and concern. Teisl and O’Brien (2003) investigated the association between forest-based recreational activities and four measures of environmental behavior and concern: support of environmental groups, level of interest in forest management, opinions on what percentage of U.S. forests are managed in eco-friendly manner, and the likelihood of purchasing an environmentally certified and labeled wood product. Teisl
and O'Brien's results supported an earlier hypothesis by Dunlap and Hefferman (1975) that outdoor recreation participation can have a significant positive association with level of environmental behavior and concern. More specifically, Teisl and O'Brien found participation in several forest-based activities to have significantly different effects than no participation.

The current findings are consistent with Tarrant and Green's (1999) hypothesis that direct nature experience is a better predictor of environmentally responsible behavior than non-direct, passive experiences. Tarrant and Green (1999) investigated "the influence of outdoor recreation participation on the predictive validity of environmental attitudes" (p. 18). Their study addressed how outdoor recreation may influence environmental attitudes and behaviors and examined the effect of outdoor recreation participation on environmental attitude-behavior consistency. According to Tarrant and Green, attitudes about the environment do not typically correspond with their environmental behaviors. The researchers found involvement with appreciative recreation activities to act as a mediator in the attitude-behavior relationship therefore improving prediction of responsible environmental behaviors from environmental attitudes. Tarrant and Green suggested that recreational activities provide a direct experience with the natural environment that is more important in generating responsible environmental behaviors than non-direct, passive experiences. Tarrant and Green suggested that indirect experiences may increase environmental understanding and awareness, but direct involvement is more likely to influence behavior. According to the authors, direct experience make proenvironmental attitudes more accessible and as a result make attitudes better predictors of behavior.
Environmental knowledge

The current experiment did not find a significant relationship between environmental knowledge and environmentally responsible behavioral intentions. These results are inconsistent with previous research findings that associate environmental knowledge with behavioral commitment and behavior (Arbuthnut, 1977; Sia, Hungerford, & Tomera, 1985; Kaiser & Fuhrer, 2003). The lack of consistency with other environmental knowledge research may be due to differences in types of environmental knowledge (e.g., procedural or theoretical), a variety of mediational influences on the relationship between knowledge and behavior, and the consideration of situational constraints on the relationship (Kaiser & Fuhrer, 2003).

Overall, the lack of consistency with regarding environmental knowledge and environmentally responsible behavioral intentions are partly due to the extremely complex nature of environmentally responsible behavior. According to Stern (2000), "environmentally significant behavior is dauntingly complex, both in its variety and in the causal influences on it" (p. 421). Although some of the factors related to environmental behavior may be general, there are many factors that may be behavior-specific (e.g., recycling). Since different variables may be associated with unique factors, it may be useful to consider each behavior separately (Stern, 2000). As previously mentioned, it is useful to combine specific behaviors due to limited resources of practitioners attempting to inspire a multitude of behaviors with one message. A thorough investigation of specific environmentally responsible behaviors is outside of the scope of
this research. However, contradictory findings may be due to differences in the scope of operationalized dependent variables (e.g., specific, general).

**Hypothesis 2: Message Modality**

Results of this experiment demonstrate an impact of message modality (video and text-only) on environmentally responsible behavioral intentions. Previous research has successfully used videos in anti-smoking messages (Sussman, Dent, Burton, Stacy, & Flay, 1995), sexually transmitted disease prevention (Royer & Hudson, 2003; Rye, 1998), and substance use prevention (Hecht et al., 2003; Holleran et al., 2002). The present effort contributes to the field of message modality by extending the research to include environmental messages.

Previous research has shown that videos increase attention (Singer, 1980; Reeves, Thorson, Rothschild, & McDonald, 1983). Although attention was not the focus of this research, it is possible that an increase in attention due to visual images may have impacted behavioral intentions. Attention to a message influences the degree to which it is integrated into a mental representation and processed (Rothman & Salovey, 1997; Petty & Cacioppo, 1986). It is possible that an increased attention to video group messages allowed participants the opportunity to process the message by paying attention to specific details of the message.

There are other possible explanations for the relation between videos and environmentally responsible behavioral intentions. Videos have the ability to capture the beauty of the natural world or the destruction of the natural world more effectively than text-only messages. A more visual representation of the natural world may make it easier
for individuals' to understand the implications of destructive environmental practices, therefore leading to more responsible behavioral intentions.

Further research is needed in the area of message modality in environmental messages. The current research provides a solid foundation for understanding the relation between message modality and behavioral intentions. Future research should focus on the possible mediating role of attention and message comprehension in the relation between message modality and environmentally responsible behavioral intention.

Hypothesis 3: Message Valence

There was no significant impact of message valence (losses-framed or gains-framed) on environmentally responsible behavioral intentions. The original hypothesis that individuals in the losses-framed message groups will have a higher environmentally responsible behavioral intention and a greater willingness to receive more information about environmental issues was primarily grounded in research in several areas—negative political campaigns; the relationship between negative information and attention; and the relationship between negative information and memory. The hypothesis was also grounded in previous research findings that negatively-framed messages, or messages focused on losses, lead to greater environmentally responsible behavioral intentions and actual behavior (Davis, 1995; Lord, 1994).

The fact that these findings are not consistent with previous research on message valence and environmental communication may not be surprising. In other fields, the findings on the persuasive effect of gain-versus losses-framed messages have been inconsistent. Some studies in health prevention research have found that loss framed messages are more persuasive (Meyerowitz & Chaiken, 1997), whereas other studies
have shown gains-framed messages to be more persuasive (Rothman, Salovey, Antone, Keough, & Martin, 1993). In a meta-analysis review based upon 42 effect sizes, O'Keefe and Jensen (2008) found that gains-framed appeals are more engaging than losses-framed appeals. Message engagement was based upon a number of different factors such as number of message-related thoughts, memory for the message, knowledge improvement following the message, etc.

Besides the overall inconsistency of findings regarding message valence, there are other possible reasons that my results are not consistent with previous research on environmental messages (Lord, 1994; Davis, 1995). One factor related to issue involvement. Issue involvement can be associated with the persuasiveness of a message appeal (Johnson & Eagly, 1989, 1990). Maheswaran and Meyers-Levy (1990) proposed that issue involvement predicted whether there is an advantage for losses-framed messages or gains-framed messages. Nan (2007) found that the persuasiveness of gain versus losses-framed messages is dependent upon the audience’s issue involvement. Gains-framed messages were more advantageous in a low-involvement condition and losses-framed messages were more advantageous in a high-involvement condition. These results are consistent with research findings on the relation between greater issue involvement and the effectiveness of safe-sex public service announcements (Perse, Nathanson, & McLeod, 1996).

The current research did not consider the role of issue involvement. Perhaps if there was a low issue involvement and high issue involvement group the results would have differed so that losses-framed messages would have been more advantageous in a high involvement condition and gains-framed messages would have been more
advantageous in a low-involvement condition.

Another possible reason for the inconsistency of message valence research findings is personal relevance. Personal relevance stresses how the target will be personally, negatively or positively, affected. According to Davis (1995), problem valence typically occurs in contexts in which the receiver of the message communication is also the individual at risk. In most of these situations, a negativity bias occurs and individuals will be more persuaded by messages emphasizing how they will be negatively affected by consequences of inaction as opposed to how they will be positively affected by consequences of action. Individuals are most likely to change their behavior if they are identified as the audience that will be affected from their action or inaction (Vaughan & Seifert, 1992). Short-term valence can make the relevance of the message more immediate. Davis (1995) compared framed communication in terms of the impact of current generations and future generations. Recall that losses-framed messages were only persuasive when the current generation was the target of the message (Davis, 1995). According to Davis (1995), “individuals in this study population were most favorable toward (and most influenced by) a communication which emphasized the negative consequences of their own inaction on themselves and their own generation” (p. 295).

In the current research, the targets of the messages were not necessarily the individuals that would be directly or noticeably affected by their action or inaction. For instance, the message regarding South American rainforests addressed the losses of rainforest devastation and the gains of rainforest preservation. A change in behavioral intentions regarding the issue could have resulted in further education about this issue, activism regarding this issue, or refusal to buy products that are not rainforest-certified.
(e.g., Rainforest Alliance certification). Although the indirect effects of this behavior may affect the target of the message (e.g., feeling good about oneself), the greater impact will be on the status of the rainforest. Because the message content was focused on the gains and losses associated with the rainforest and not the target of the message (the individual), message-valence effects were potentially mitigated.

Finally, the findings of this research may not be consistent with previous message valence research due to the lack of direct connection between the message content and the criterion variable—environmentally responsible behavioral intentions. Although Davis (1995) did not find an effect of activity framing (e.g., participate in community clean ups if community clean ups are the focus of the message), research in the field of community-based marketing suggests otherwise. According to McKenzie-Mohr (1999), “when crafting your message you will want to ensure that the actions that you advocate are clearly articulated” (p. 93). Furthermore, messages are most effective when they describe proactive behavior in a clear and straightforward manner.

In the current research, the connection between the message and the intentional behavior was not always clear and direct. In fact, the messages were not designed to directly persuade individuals to act in a particular manner. Rather, messages were informative and created to prime individuals to have an emotional response to the messages. In some instances, the connection between the message content and the environmentally responsible behavioral intentions was simple and clear. For example the gains-framed message about organic farms read as follows:

There are an increasing amount of organic farms in the United States. Organic crops are grown without the use of conventional pesticides, artificial fertilizers, human waste, or sewage sludge, and are processed without ionizing radiation or food additives. Organic farms do not release
synthetic pesticides into the environment, some of which have the potential to harm local wildlife. When calculated either per unit or per unit of yield, organic farms use less energy and produce less waste. Organic food sales have grown 20% over the last few years.

The environmentally responsible behavioral intention directly related to this message is the following: buy locally grown organic fruits and vegetables. However, there are other intentional behavior items that are not as directly related to the message. For example, the item, read labels on products to see if their contents were environmentally safe could be associated with this message. There are now agencies that certify products and foods as organic (e.g., Rainforest Alliance). However, the relationship between the two is not clear and straightforward. Individuals may not recognize the link between a consumer decision to buy organic and the reduction of synthetic pesticides that may harm animals and wildlife.

The bulk of message valence research has concentrated on attempts to encourage the performance of a single action (e.g., recycle, apply sunscreen, use condoms). However, practitioners in environmental and other fields are often trying to motivate people to perform a series of responses. Most behavior advocated by experts in the fields of health and sustainability requires a set of sustained actions (Rothman, Bartels, Wlaschin, & Salovey, 2006). Furthermore, the budgets of many non-profit organizations are limited and often public service campaigns are designed to address a series of actions. Although a response to a single appeal may help in developing a set of testable behavioral predictions, message-valence research should also consider the relation between prompts and a series of responses. The current research did not find a message valence effect for a series of behavior. However, the non-conclusive findings raise questions about message valence for an audience that may not have issue involvement,
for issues that may not be personally relevant, and for sets of behavior that may not be directly related to message appeals.

Environmentally responsible behavior is multifaceted. Although message valence was not found to have an influence on behavioral intentions, this result could have been affected by issue involvement, personal relevance, and message-behavior connection. In addition, other potential barriers to act could be the inconvenience (e.g., taking recycling to the recycling center), safety (e.g., taking mass transit at night), and cost (e.g., buying organic products) (McKenzie-Mohr, 1999).

Hypothesis 4: Emotional Arousal

My results suggest that there are reliable relations between intensity of negative emotional responses to environmental messages and environmentally responsible behavioral intentions. However, there was not a reliable relation between positive emotional response to environmental messages and environmentally responsible behavioral intentions.

Negative emotions and behavioral implications

These results also partially support research demonstrating that the most effective fundraising appeals induce negative emotions (Fisher, Vandenbosch, & Anita, 2008), that public service ads that induce negative emotions lead to empathic responses resulting in a decision to help (Bagozzi & Moore, 1994), and that negative emotions, such as fear (Sheldon & Rogers, 1976) and sadness (Cialdini & Kendrick, 1976), may prompt potential decisions to help. My work extends previous research by assessing the relationship between emotional responses and behavioral intentions with regard to environmental messages.
Emotional arousal and behavioral implications

Past research has found relationships between emotional arousal and desire to contribute to an organization (Bagozzi & Moore, 1994), emotional arousal and overall ad judgments while viewing advertisements (Baumgartner, Sujan, & Padgett, 1997), and intensity of affective reactions to messages and overall evaluations of organizations (Reeves, Highhouse, & Brooks, 2006). Reeves, Highhouse, and Brooks (2006) suggested that overall evaluations are more influenced by emotional intensity than content valence. In other words, it is not whether a message is positive or negative, but rather the intensity of individual’s response to the message that determines the effectiveness of the message.

My results add to previous findings in other fields (e.g., advertising, recruitment) by demonstrating a relation between emotional responses to environmental messages and behavioral intentions. Although the previously mentioned barriers to environmentally responsible behavior complicate the relationship between intentions and behavior, this research is unique within the field of environmentally responsible behavior by identifying the relationship between emotional arousal and behavioral intentions.

Limited capacity model of media processing

Research of emotion in health messages has also shown that appeals high in negative emotion are more effective at inducing behavioral change. However, research has shown that as emotional intensity increases, the effectiveness of the message at creating behavioral change actually decreases (Biener, Ji, Gilpin, Albers, 2004). Lang (2000) developed the limited capacity model of media processing (LC3MP). A core element of the LC3MP is that individuals have a limited capacity of cognitive resources to process incoming information. Messaging comprehension suffers when all cognitive
resources are spent. In particular, the receiver of the message must select which information to encode and store (Lang, Schwartz, Lee, & Angelini, 2007).

Cognitive load refers to the cost the viewer pays to process a message (Lang, Chung, Lee, Schwartz, & Shin, 2005). In other words, there are detrimental effects when cognitive resources are maxed out during message comprehension. For example, when message content is complex there is an increase in attention to the message and a decrease in memory of the message (Lang, Bolls, Potter, & Kawahara, 1999). When the overall message capacity load imposed by the message is less the viewer’s mental capacity, there are additional mental resources available that lead to an increase in memory (Lang et al., 2005). Cognitive overload occurs if the message content exceeds the cognitive capacity of the viewer.

Emotionally rich content increases the allocation of cognitive resources assigned to a message (Lang et al., 2005). Specifically, emotional arousal in viewers results in an automatic allocation of resources to the encoding and storage components of memory. The effects of cognitive overload are important to consider. My results suggest that arousal is associated with environmentally responsible behavioral intent. Although the roles of memory and message comprehension were not investigated in this study they are important variables to consider in future research. Does memory message comprehension mediate the relationship between arousal and behavioral intentions? If so, it would be prudent for practitioners to consider the arousal levels of their message. If they are too arousing, creating cognitive overload, less resources may be available for message comprehension. An inability to comprehend message information will mitigate behavioral change efforts.
Limitations and Future Possibilities

A limitation of the current study is that it only describes a sample of psychology students at a moderate sized public university in the eastern United States. The sample is not representative of the general population and cannot be generalized to populations that are not represented by the sample.

Another limitation is the lack of consistency between video clips. Although video clips were controlled for temporal and contextual aspects, there were still differences other than content type between losses-framed and gains-framed video clips (e.g. camera angle, color). It is possible that individuals were responding to these differences in the videos as opposed to the intended content differences in the environmental messages.

A third limitation is the criterion variable. Although the ability to predict behavior from intentions is relatively strong (Ajzen & Fishbein, 1973), attitudes about the behavior, subjective norms, perceived behavioral control, and behavioral normative control can all influence the relationship between intention and behavior (Ajzen & Fishbein, 1980). In addition, research demonstrates that the process of surveying individuals actually changes their intentions and behavior (Feldman & Lynch, 1988; Morwitz, Johnson, & Schmittlein, 1993). Simply asking people about their future environmentally responsible behavioral intentions could change their future intentions.

As previously mentioned, environmentally responsible behavior is a complex phenomenon. Predicting behavior from intention may be more difficult with a set of responses that have so many barriers. According to Stern (2000), environmental behavioral intent is only one factor affecting behavior and perhaps not the most important one. Many responses are constrained by external barriers, such as income and local
infrastructure. Also, some responses that are beneficial to the environment are not a result of pro-environmental intentions. For example, turning down a thermostat may be driven by nonenvironmental concerns, such as saving money (De Young, 2000). The specific behavior (e.g., signing a petition, recycling, buying environmental friendly products), the social context (e.g., curbside recycling programs, price of oil, availability of bike paths), and the actor (e.g., availability of time to act, income, race) all affect the relationship between behavioral circumstances and actual behavior (Stern, 2000).

**Future research**

I found a statistically significant relation between emotional intensity and behavioral intention. However, no significant correlations were found between the background measures (environmental beliefs, knowledge, outdoor recreational behavior) and intensity of negative emotional response. If emotional intensity is associated with behavioral intention, it will be important to investigate individual differences in emotional responses to environmental messages. Possibly, emotional appeals are best directed toward a specific group of people (e.g., low issue involvement) and cognitive appeals are best directed toward another group of people (e.g., high issue involvement). Personal relevance of messages is a consistent influence on message processing (Schneider & Laurion, 1993). Emotional appeals may also be influenced by personality (e.g., fit to persuade personality), issue relevance, and attitudes about environmental issues. Although this issue has been well researched in the field of political campaigns (Brader, 2006), it has not been thoroughly explored in environmental social marketing campaigns.
In the current experiment, differences between video messages (losses-framed and gains-framed) and text-only messages (losses-framed and gains-framed) were examined. However, differences in video-only messages were not investigated. Although, video messages are usually accompanied by written text or audio, it would be interesting to investigate the emotional impact of a strictly visual emotional appeal. Do visual images need to be accompanied by a message?

There are other means of measuring emotions that are less subjective than self-report data and do not rely on individual assessments of emotional experiences. Future research using different methods of measuring emotions may further elucidate the relation between emotional responses and behavioral intent. Tracking psychophysiological changes is one example of a method for measuring emotions. Physiological reactions are a result of activity in the autonomic nervous system. These changes are associated with emotions. Changes are manifested through variation in skin responses, brain waves, heart responses, and blood pressure—all of which can be measured with research instruments. Another method for measuring emotions is facial expression instruments. Emotions are associated with patterns of expression (Ekman, 1993).

**Conclusion and Implications**

The present set of findings has implications for practitioners using media-based approaches to convey environmental messages. Videos are an effective means of encouraging environmentally responsible behavioral intentions. This is good news for environmental practitioners for several reasons. First, creating on-line videos is relatively inexpensive as compared to mailing brochures, newsletters, or other direct-mail
techniques. Second, videos have the ability to reach a wider range of people. Besides an increase in the number of people using the Internet, social networking sites are becoming more popular. Environmental video messages can be posted on sites like YouTube and Facebook where they can reach a wide range of people. Also there is an increase in hand-held gadgets that have the capability to show online videos. Third, it is possible to adjust video group-based messages by adjusting content, motion, color, and sound to increase emotional arousal. Modern communication and media technology are increasing opportunities to personalize media presentations (Riecken, 2000). The form of a media presentation can be adjusted to meet different moods that can result in enhanced pleasure, arousal, and involvement (Ravaja, Saari, Kallinen, & Laarni, 2006). In other words, presentations can be adjusted to fit mood and other individual characteristics that may influence behavioral intentions to messages. With further research on the predictors of emotional arousal to environmental messages, technology will be able to strengthen and personalize messages to be even better at eliciting behavioral change.

Another important implication of the current research is the significance of negative emotional arousal in predicting behavioral intention. Practitioners should consider a few important conditions before creating their environmental messages. First, negative emotional arousal is predictive of behavioral intentions, but extreme fear-inducing messages may be less effective. The cognitive overload theory suggests that message comprehension may be compromised by the allocation of resources spent on highly arousing messages. Second, emotional appeals inducing negative emotions should consider their desirable behavioral outcomes when developing their message appeal. Results from this study suggest an association between a more general listing of
responsible behaviors. Environmental organizations focusing on one specific behavior (e.g., encouraging people to commute to work via bicycle) should consider the narrow focus of their desired outcome.

Further research will seek to clarify the mediating factors between arousal and behavioral intention. Moser (2007) argued that, “neglecting the emotional reception of climate-related news makes communication and outreach efforts more likely to fail” (p. 65). Practitioners should not focus solely on message valence or modality when designing environmental messages but also consider the intensity of recipients’ emotional reactions to their messages.
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APPENDICES
APPENDIX A
Environmental messages (descriptions of videos)

1). Losses-framed environmental message about the population status of red-breasted geese
This video clip shows red-breasted geese flying in a heavy polluted industrial area. Behind the geese are multiple smoke stacks emitting dark black pollutants into the air.

2). Gains-framed environmental message about the population status of red-breasted geese
This video clip shows red-breasted geese flying over an undisturbed lake. Behind the geese is dense green forest. There are no visible signs of pollutants.

3). Losses-framed environmental message about the preservation status of South American rainforests
This video clip shows a South American rainforest tree being cut down by a tractor. The surrounding area has already been clear-cut.

4). Gains-framed environmental message about the preservation status of South American rainforests
This video clip pans over a pristine South American protected rainforest. There are no signs of any human impact in this video.

5). Losses-framed environmental message about the environmental detriments of pesticide farming
This video clip shows a tractor spraying a farm with pesticides. The clip highlights the overwhelming size of the farm and large amount of pesticides used to maintain the land.

6). Gains-framed environmental message about the environmental benefits of organic farming
This clip shows an organic United States farm. The farm is relatively small in size and the video clip shows no indication of pesticides.

7). Losses-framed environmental message about the population status of polar bears
This video clip shows a polar bear swimming in the Arctic Ocean. This video clip highlights the lack of sea ice in the immediate area of the polar bear.

8). Gains-framed environmental message about the population status of polar bears
This video clip shows a polar bear walking on a large sheet of ice. The bear is surrounded by very large ice caps.
APPENDIX B
Environmental Messages (Text-version)

1). Losses-framed environmental message about the population status of red-breasted geese
Flocks of red-breasted geese often fly through heavily polluted industrial areas during their migration. The spectacular, efficient respiratory system of the red-breasted goose requires pure air flowing through the lungs, air sacs and sinuses. Unfortunately, nature didn't provide a filter designed to cope with all the modern air pollution. To contaminate this system with smoke, dust, and volatile chemicals leads to many health problems including death. There has been a strong decline in numbers of red-breasted geese in the last decade. The worsening outlook for the species has caused the species to be uplisted from a species of Least Concern to Endangered status in 2007.

2). Gains-framed environmental message about the population status of red-breasted geese
There are many protected areas where red-breasted geese can be seen flying over an undisturbed lake. Red-breasted geese need large areas to roost, breed, and feed. The efficient respiratory system of the red-breasted goose requires pure air flowing through the lungs, air sacs, and sinuses. The recent identification and protection of these sites is very important to the population status of this species. There is a great potential for an increase in red-breasted geese as more breeding areas become protected areas.

3). Losses-framed environmental message about the preservation status of South American rainforests
International timber companies are frequently destroying South American rain forests. The worldwide demand for timber, paper and cattle puts an obvious strain on the rainforest which houses thousands of species that don't exist anywhere else in the world. In addition, the amount of CO2 consumed by the plants within the rainforest is so great that we would be looking at significant global warming should the rainforests not be there anymore. We would also be looking at massive drops in our oxygen percentages in the atmosphere because of the amount emitted by all of the lush forest.

4). Gains-framed environmental message about the preservation status of South American rainforests
Due to conservation efforts there is still a large amount of pristine rainforest in South America. Rainforests are important because they house thousands of species that don’t exist anywhere else in the world. Currently, the amount of protected rainforest area is increasing. These protected areas are under community surveillance. In addition, there has been a steady increase in established programs that promote sustainable use of rainforests. These efforts could have a significant impact on checking global climate change.
5). Losses-framed environmental message about the environmental detriments of pesticide farming
Farmers are frequently spraying pesticides on United States mid-western farms. Agricultural pesticides are deliberately manufactured as poisons, to destroy agricultural pests. These chemicals may have adverse effects on the environment. Pesticide residues may enter streams through run-off and pose dangers to fish, birds, wild animals and plants in the aquatic habitat. In addition, persistent pesticides may move through the food chain and eventually be ingested by and adversely affect birds, wild animals and domestic livestock.

6). Gains-framed environmental message about the environmental benefits of organic farming
There are an increasing amount of organic farms in the United States. Organic crops are grown without the use of conventional pesticides, artificial fertilizers, human waste, or sewage sludge, and are processed without ionizing radiation or food additives. Organic farms do not release synthetic pesticides into the environment, some of which have the potential to harm local wildlife. When calculated either per unit or per unit of yield, organic farms use less energy and produce less waste. Organic food sales have grown 20% over the last few years.

7). Losses-framed environmental message about the population status of polar bears
Due to rapid Arctic thawing and a lack of sea ice, documented by new reports from scientists and arctic natives, polar bears are being forced to swim long distances. The reduction of the permanent Arctic sea ice by 14 percent since the 1970s is causing not only feeding and breeding difficulties, but also drownings and apparent cannibalism among bears. Recent declines in polar bear numbers can be linked to the retreat of sea ice and its formation later in the year. Ice is also breaking up earlier in the year, forcing bears ashore before they have time to build up sufficient fat stores, or forcing them to swim long distances, which may exhaust them, leading to drowning. The results of these effects of global warming have been thinner, stressed bears, decreased reproduction, and lower juvenile survival rates.

8). Gains-framed environmental message about the population status of polar bears
The polar bear, native to the arctic, is the world’s largest carnivore. Polar bears rely on sea ice to hunt live seals and walrus calves in the winter and the spring. In other words, sea ice is essential to the very survival of the species. In order to protect polar bears the Marine Mammal Protection Act and International Agreement on the Conservation of Polar Bear Acts were both signed in the 1970s by the United States. In a further effort to protect polar bears, the World Conservation Union listed them as a vulnerable species in 2006. The Polar Bear is currently being considered for the United States Endangered Species List. Private environmental groups continue to work to preserve the polar bear’s natural habitat.
Appendix C
Positive and Negative Affect Schedule (PANAS-X)
Watson and Clark (1994)

For the next set of questions please use the following scale. For each item, write the number that corresponds to the extent that you currently feel that emotion.

<table>
<thead>
<tr>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = very slightly or not at all</td>
</tr>
<tr>
<td>2 = a little</td>
</tr>
<tr>
<td>3 = moderately</td>
</tr>
<tr>
<td>4 = quite a bit</td>
</tr>
<tr>
<td>5 = extremely</td>
</tr>
</tbody>
</table>

1. ____ afraid         31. ____ irritable
2. ____ scornful       32. ____ scared
3. ____ disgusted      33. ____ alert
4. ____ loathing       34. ____ jittery
5. ____ guilty         35. ____ calm
6. ____ ashamed,       36. ____ concentrating
7. ____ blameworthy    37. ____ determined
8. ____ angry at self  38. ____ astonished
9. ____ disgusted with self
10. ____ dissatisfied with self
11. ____ sad
12. ____ blue
13. ____ downhearted
14. ____ alone
15. ____ lonely
16. ____ happy
17. ____ joyful
18. ____ delighted
19. ____ cheerful
20. ____ excited
21. ____ enthusiastic
22. ____ lively
23. ____ energetic
24. ____ proud
25. ____ strong
26. ____ confident
27. ____ bold
28. ____ daring
29. ____ fearless
30. ____ sleepy
31. ____ irritable
32. ____ scared
33. ____ alert
34. ____ jittery
35. ____ calm
36. ____ concentrating
37. ____ determined
38. ____ astonished
39. ____ upset
40. ____ distressed
41. ____ active
42. ____ hostile
43. ____ attentive
44. ____ bashful
45. ____ sluggish
46. ____ tired
47. ____ timid
48. ____ inspired
49. ____ interested
50. ____ relaxed
51. ____ sheepish
52. ____ fear
53. ____ surprised
54. ____ amazed
55. ____ frightened
56. ____ nervous
57. ____ shy
58. ____ shaky
59. ____ angry
60. ____ at ease
APPENDIX D
Modified version of Environmentally Responsible Behavioral Inventory (ERBI)
Smith-Sebasto (1992)

For the next set of questions please use the following scale. Circle the appropriate number for each item.

<table>
<thead>
<tr>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Very Improbable, in less than 10% of the chances I will have.</td>
</tr>
<tr>
<td>2 = Fairly improbable, in about 30% of the chances I will have.</td>
</tr>
<tr>
<td>3 = Probable, in about 50% of the chances I will have.</td>
</tr>
<tr>
<td>4 = Fairly probable, in about 70% of the chances I will have.</td>
</tr>
<tr>
<td>5 = Very probable, in about 90% of the chances I will have.</td>
</tr>
</tbody>
</table>

In the future, how probable is that you will:

1. Stop buying from a company that showed disregard for the environment.
   
   1 2 3 4 5

2. Switch to one brand or another due to concern for the environment.
   
   1 2 3 4 5

3. Investigate the President of the United States' policy on the environment.
   
   1 2 3 4 5

4. Write your elected officials expressing your opinions on environmental issues.
   
   1 2 3 4 5

5. Try to learn what you can about recycling, conserving energy, and alternative forms of energy.
   
   1 2 3 4 5

6. Join in community cleanup efforts.
   
   1 2 3 4 5

7. Enroll in a course for the sole purpose of learning more about environmental issues.
   
   1 2 3 4 5

8. Read publications that focus on environmental issues (such as pollution, conservation, global warming, etc.).
   
   1 2 3 4 5

9. Recycle glass bottles or jars or aluminum cans.
   
   1 2 3 4 5

10. Recycle old newspapers.
    
    1 2 3 4 5

11. Sort your trash to separate non-recyclable from recyclable material.
    
    1 2 3 4 5

12. Buy products made from recycled material.
    
    1 2 3 4 5
13. Cut down on the use of your car by using public transportation.

14. Use biodegradable, no phosphate soaps, or detergents.

15. Read labels on products to see if their contents were environmentally safe.

16. Watch TV programs about environmental issues (such as pollution, conservation, global warming, etc.).

17. Try to convince others to be environmentally responsible (recycle, buy eco-friendly products, reduce energy usage).

18. Conserve water by turning off the water while brushing your teeth.

19. Turn off lights, TV, or computer when not in use.

20. Pick up litter on campus.


22. Attend lectures, discussions, or seminars about environmental issues.

23. Join an environmental organization on campus.
APPENDIX E
New Environmental Paradigm (NEP)
Dunlap, Van Liere, Mertig, and Jones (2000)

Scale
1 = Strongly agree
2 = Mildly agree
3 = Neutral
4 = Mildly disagree
5 = Strongly disagree

1. We are approaching the limit of the number of people the earth can support.
2 = Strongly agree
2. Humans have the right to modify the natural environment to suit their needs.
   1 2 3 4 5
3. When humans interfere with nature, it often produces disastrous consequences.
   1 2 3 4 5
4. Human ingenuity will insure that we do NOT make the earth unlivable,
   1 2 3 4 5
5. Humans are severely abusing the environment.
   1 2 3 4 5
6. The earth has plenty of natural resources if we just learn how to develop them.
   1 2 3 4 5
7. Plants and animals have as much right as humans to exist.
   1 2 3 4 5
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.
   1 2 3 4 5
9. Despite our special abilities, humans are still subject to the laws of nature.
   1 2 3 4 5
10. The so-called “ecological crisis” facing mankind has been greatly exaggerated.
    1 2 3 4 5
11. The earth is like a spaceship with very limited room and resources.
    1 2 3 4 5
12. Humans were meant to rule over the rest of nature.
    1 2 3 4 5
13. The balance of nature is very delicate and easily upset.
    1 2 3 4 5
14. Humans will eventually learn enough about how nature works to be able to control it.
    1 2 3 4 5
15. If things continue on their present course, we will soon experience a major ecological catastrophe.
    1 2 3 4 5
For the next set of questions please use the following scale. Circle the appropriate number for each item.

<table>
<thead>
<tr>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Never (0 times per year)</td>
</tr>
<tr>
<td>2 = Occasionally (1-3 times per year)</td>
</tr>
<tr>
<td>3 = Sometimes (4-6 times per year)</td>
</tr>
<tr>
<td>4 = Frequently (7-9 times per year)</td>
</tr>
<tr>
<td>5 = Usually (10 or more times per year)</td>
</tr>
</tbody>
</table>

Currently, how often do you participate in the following activities?

1. Hiking/Nature Walking
   1 2 3 4 5
2. Bicycling
   1 2 3 4 5
3. Nature photography
   1 2 3 4 5
4. Bird watching
   1 2 3 4 5
5. Cross-country skiing/Snowshoeing
   1 2 3 4 5
6. Downhill skiing/Snowboarding
   1 2 3 4 5
7. Kayaking/Canoeing
   1 2 3 4 5
8. Hunting
   1 2 3 4 5
9. Surfing
   1 2 3 4 5
10. Fishing
    1 2 3 4 5
11. Rock climbing
    1 2 3 4 5
12. Swimming
    1 2 3 4 5
13. Gardening
    1 2 3 4 5
APPENDIX G
Environmental Knowledge Quiz (KNOW)
National Environmental Education Training Foundation (2002)

The following questions are a test of your knowledge about certain topics related to the environment. For each question, please circle what you believe is the correct answer.

1. There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? Is it...
   a. Multiplicity
   b. Biodiversity
   c. Socio-economics
   d. Evolution
   e. Don’t know

2. Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? Is it...
   a. Factories and businesses
   b. People breathing
   c. Motor vehicles
   d. Trees
   e. Don’t know

3. How is most of the electricity in the U.S. generated? Is it...
   a. By burning oil, coal, and wood
   b. With nuclear power
   c. Through solar energy
   d. At hydroelectric power plants
   e. Don’t know

4. What is the most common cause of pollution of streams, rivers, and oceans? Is it...
   a. Dumping of garbage by cities
   b. Surface water running off yards, city streets, paved lots, and farm fields
   c. Trash washed into the ocean from beaches
   d. Waste dumped by factories
   e. Don’t know

5. Which of the following is a renewable resource? Is it...
   a. Oil
   b. Iron ore
   c. Trees
   d. Coal
   e. Don’t know
6. Ozone forms a protective layer in the earth’s upper atmosphere. What does ozone protect us from? Is it …
   a. Acid rain
   b. Global warming
   c. Sudden changes in temperature
   d. Harmful, cancer-causing sunlight
   e. Don’t know

7. Where does most of the garbage in the U.S. end up? Is it in…
   a. Oceans
   b. Incinerators
   c. Recycling centers
   d. Landfills
   e. Don’t know

8. What is the name of the primary federal agency that works to protect the environment? Is it the…
   a. Environmental Protection Agency (the EPA)
   b. Department of Health, Environment, and Safety (the DHES)
   c. National Environmental Agency (the NEA)
   d. Federal Pollution Control Agency (the FPCA)
   e. Don’t know

9. Which of the following household wastes is considered hazardous waste? Is it…
   a. Plastic packaging
   b. Glass
   c. Batteries
   d. Spoiled food
   e. Don’t know

10. What is the most common reason that an animal species becomes extinct? Is it because…
    a. Pesticides are killing them
   b. Their habitats are being destroyed by humans
   c. There is too much hunting
   d. There are climate changes that affect them
   e. Don’t know

11. Scientists have not determined the best solution for disposing of nuclear waste. In the U.S., what do we do with it now? Do we…
    a. Use it as nuclear fuel
   b. Sell it to other countries
   c. Dump it in landfills
   d. Store and monitor the waste
   e. Don’t know
12. What is the primary benefit of wetlands? Do they…
a. Promote flooding
b. Help clean the water before it enters lakes, streams, rivers, or oceans
c. Help keep the number of undesirable plants and animals low
d. Provide good sites for landfills
e. Don’t know
APPENDIX H  
Brief Mood Introspection Survey (BMIS)  
Mayer and Gaschke (1988)

For the next set of questions please use the following scale. Circle the response below that indicates how well each adjective describes your present mood.

<table>
<thead>
<tr>
<th>Adjective</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lively</td>
<td>2</td>
</tr>
<tr>
<td>2. Happy</td>
<td>3</td>
</tr>
<tr>
<td>3. Sad</td>
<td>4</td>
</tr>
<tr>
<td>4. Tired</td>
<td>1</td>
</tr>
<tr>
<td>5. Caring</td>
<td>2</td>
</tr>
<tr>
<td>6. Content</td>
<td>3</td>
</tr>
<tr>
<td>7. Gloomy</td>
<td>4</td>
</tr>
<tr>
<td>8. Jittery</td>
<td>1</td>
</tr>
<tr>
<td>9. Drowsy</td>
<td>2</td>
</tr>
<tr>
<td>10. Grouchy</td>
<td>3</td>
</tr>
<tr>
<td>11. Peppy</td>
<td>4</td>
</tr>
<tr>
<td>12. Nervous</td>
<td>1</td>
</tr>
<tr>
<td>13. Calm</td>
<td>2</td>
</tr>
<tr>
<td>14. Loving</td>
<td>3</td>
</tr>
<tr>
<td>15. Fed Up</td>
<td>4</td>
</tr>
</tbody>
</table>

1 = definitely do not feel  
2 = do not feel  
3 = slightly feel  
4 = definitely feel
<table>
<thead>
<tr>
<th>16. Active</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
May 4, 2009

Jeffrey Perrin
Psychology, Conant Hall
Durham, NH 03824

**Study:** Emotional Responses to Nature Stimuli

**Approval Date:** 09/27/2007

The Psychology Departmental Review Committee, a subcommittee of the Institutional Review Board (IRB) for the Protection of Human Subjects in Research, reviewed and approved the protocol for your study as Exempt as described in Federal Regulations 45 CFR 46, Subsection 101 (b).

Approval is granted to conduct the project as described in your protocol. Changes in your protocol must be submitted to this committee for review and approval prior to their implementation.

The protection of human subjects in your study is an ongoing process for which you hold primary responsibility. In receiving approval for your protocol, you agree to conduct the project in accordance with the ethical principles and guidelines for the protection of human subjects in research, as described in the Belmont Report. The full text of the Belmont Report is available on the Office of Sponsored Research (OSR) webpage at http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.htm or by request from the OSR.

There is no obligation for you to provide a report to this committee upon project completion unless you experience any unusual or unanticipated results with regard to the participation of human subjects. Please report such events to this office promptly as they occur.

If you have questions or concerns about your project or this approval, please feel free to contact a member of the Psychology Departmental Review Committee.

For the IRB,

[Signature]

Julie F. Simpson
Manager

**cc:** File