A SMOKIN’ GOOD AD: HOW EFFICACY AND EMOTIONAL TONE INTERACT IN ANTI-SMOKING MESSAGES

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A SMOKIN’ GOOD AD: HOW EFFICACY AND EMOTIONAL TONE INTERACT IN ANTI-SMOKING MESSAGES

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A candidate for the degree of Master of Arts,

And hereby certify that, in their opinion, it is worthy of acceptance.

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Professor Paul Bolls

________________________________________
Professor Kevin Wise

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Professor Glenn Leshner

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Professor Steve Hackley
To my mom,
whose encouragement and loving nags got me through grad school

To Levi,
who taught me how strong I really am and that life isn’t easy

For Family & Friends,
I am eternally grateful
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A SMOKIN’ GOOD AD: HOW EFFICACY AND EMOTIONAL TONE INTERACT IN ANTI-SMOKING MESSAGES

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ABSTRACT

This study explores how efficacy-related copy points and emotional tone interact during anti-smoking messages. A psychophysiological experiment was conducted to determine the level of attention, arousal, positive affect, negative affect, and recognition efficacy-related copy and emotional tone elicited from current smokers. These were measured with heart rate, skin conductance response, corrugator and orbicularis oculi activity, and an audio recognition test.

The analysis found that negative messages that contained efficacy-related copy points had increased attention, less arousal, less negative affect and increased recognition than the other types of messages. Efficacy-related copy points were found to dampen negative emotional responding and lessen its intensity.

Anti-smoking PSA creators need to employ efficacy-related copy in their messages to ensure their messages resonate with their target. Efficacy was found to take the bite off of messages, most likely keeping people from responding defensively to the messages.
1. INTRODUCTION

How do efficacy-related copy points interact with perceived emotional tone during anti-smoking message exposure? (See Figure 1). This is an important question to answer in order to help practitioners develop health messages that will have a greater impact on smokers. Efficacy-related copy points have been found to be an important variable in health message acceptance. Further, perceived emotional tone affects a person’s emotional responding. The impact that efficacy-related copy points combined with perceived emotional tone has on a person’s emotional responding needs to be understood so that messages can be designed that resonate with individuals and better capture attention.

![Figure 1](image-url)
In the United States, more than twenty percent of the population smokes cigarettes (Center for Disease Control). In 2004, this segment of the population included around 21 percent of adults and over 22 percent of high school students. More men (23.9%) than women (18.1%) smoke. Further there is a decrease in smoking rates with higher levels of education.

Although smoking is a behavioral choice, it does have consequences on the health of the people smoking and those around them. It is estimated that 438,000 Americans die per year due to smoking or second hand smoke (Center for Disease Control). It is the leading cause of premature death. Further, it is believed that 20 people suffer from a smoking related illness for every one person who dies. Aside from the physical toll this takes on Americans, it also takes an economic toll, exceeding $167 billion yearly between medical expenses and loss of productivity.

Although smoking is easy to take up, people can become addicted within the first few weeks of smoking, some within the first few days, which makes quitting hard (DiFranza et al, 2000). The Center for Disease Control (CDC) found that 70% of American adult smokers want to quit smoking and during 2005, 19.2 million, or 42.5%, of adult smokers had quit for at least one day (CDC). Over half of high school student smokers tried to quit smoking in 2004. Further, 46.5 million adults had successfully quit smoking by 2005. However, only 4.7 percent of smokers quit every year (thetruth.com).

Smoking could be considered a health epidemic due to the problems it’s caused and the actions taken by others to curb it. Florida and California especially focused on running public service announcements with the settlement money from tobacco lawsuits to deter the youth from starting smoking. Florida’s campaign turned out to be successful.
enough to turn into the national campaign that the American Legacy Foundation ran, called the Truth campaign (Johnston, Terry-McElrath, O'Malley, & Wakefield, 2005). This campaign focuses on bashing “Big Tobacco” and stating the statistics on smoking (American Legacy Foundation). It is aimed at teenagers and focuses on messages that don’t pressure people to not smoke but instead only offer the “facts.” This campaign has been found to have increased the decline in smoking rates from 3.2% to 6.8% between 2000 and 2002, mainly effecting middle school students (Farrelly, Davis, Haviland, Messeri, & Healton, 2005).

Smoking has become a public health issue and a legal issue simultaneously. Since smoking is a choice behavior and not an illegal activity (except to minors) it is relatively hard to curb use and influence people to not smoke. The majority of Americans know that smoking is harmful to their health; however, it is unknown how many actually internalize that message.

The goal of this study is to find out how elements in anti-smoking public service announcements (PSAs), specifically efficacy-related copy points, and perceived emotional tone affect responses to the message. In this experiment, two theoretical frameworks are drawn on in order to expand the knowledge about the role of efficacy-related information in health messages. The two theoretical frameworks this study is grounded in are Witte’s (1998) Extended Parallel Processing Model (EPPM) and Lang’s (2006) Limited Capacity Model of Motivated Mediated Message Processing (LC4MP). Connecting these two theories helps inform experiments, such as this current experiment, on how people actually process efficacy-related copy points during exposure to anti-smoking messages. The EPPM model provides a clear conceptualization of efficacy and
its impact in fear appeal messages on outcomes of exposure. The limited capacity model describes how the human mind processes information during exposure to media messages. Combining these two models enables theorizing about how efficacy might influence processing during message exposure. By better understanding how people respond to emotional tone and copy points related to efficacy, campaign producers could produce messages that more effectively persuade viewers of the health risk and how to avoid/overcome it, in this case, how to quit smoking.

Emotional tone and efficacy-related copy points are distinct features within anti-smoking messages that might influence people’s receptibility to a cessation message. For example, many messages rely on negative emotions, i.e. a negative message (smoking will kill you) with depressing music. Others rely on positive emotions, i.e. a positive message (if you quit your lungs will heal) with upbeat music. A handful of anti-smoking messages incorporate efficacy messages. These are either response efficacy (ex. Quitting smoking will improve your health) or self-efficacy (ex. I have the power to quit smoking). According to theories such as the EPPM, efficacy is needed to overcome a threat—a person must feel they are capable to overcome a threat in order to listen and act on a message.

This study seeks to find out how the perceived emotional tone of an anti-smoking message and the presence of efficacy-related copy interact on smokers’ cognitive and emotional processes engaged during message exposure. It is important to look at cognitive and emotional processes that occur during message exposure, as that lays the foundation for any hoped for effects of the message. Attention engaged by a message is important as it determines the likelihood of specific message information getting to
memory. Emotional processes evoked by an advertisement are also critical as they not only influence attention but also help shape resulting attitudes. Ultimately, one needs to know what happens during a message and not just the aftermath to help conclude how a person arrived at their decision and if there are elements that can be changed to help a person arrive at a different decision.

In order to answer the research question, and to expand upon theory, this experiment will have participants (current smokers in their early twenties) watch televised anti-smoking PSAs while connected to sensors that measure heart rate, skin conductance and facial EMG. Some of these PSAs will contain efficacy while others do not, and they will also vary in their emotional tone (positive vs. negative). They will be asked questions following each PSA and their memory will be tested at the end of the study.
2. LITERATURE REVIEW

An effort is made to alert the public or key target markets to different topics of public health. These public health campaigns can be local or national and appear in just about every medium available. One approach that public health campaigns take is to use fear appeal or fear tactics. The logic behind this approach is to scare the target audience into either doing or not doing a particular behavior, depending on what the campaign is focused on.

Fear is defined as “a negatively valenced emotion, accompanied by a high level of arousal” (Witte & Allen, 2000, p. 608). Fear appeals do exactly that: they appeal to a person’s fear and try to arouse their emotions. The thought is that people will act based on their emotion, especially when combined with a string of facts about a topic. Hand in hand with fear is threat, which is the cognitive side of fear.

Over the last 50 years, the effectiveness of fear appeals has been studied (Witte & Allen, 2000). Fear appeal research has centered mostly on pitting high fear messages against low fear messages, doing a manipulation check and assessing which level of fear produces stronger outcomes. Different theories have been proposed about fear appeals and the effect that fear has on people. The latest meta-analysis on fear appeals found that greater attitude, intention and behavior changes are derived from stronger fear appeal messages (Witte & Allen, 2000). Likewise a more persuasive message is one that causes a higher level of fear arousal. Attitudes, intentions, and behaviors are consistently affected by fear appeals. This meta-analysis looked at threat and efficacy as variables
and found that low threat low efficacy messages are less persuasive than any other combination, while high threat high efficacy messages are the most persuasive.

**The beginnings of efficacy**

The beginnings of efficacy as a key factor in behavior change came from Albert Bandura. Bandura looks at efficacy as a process to produce a specific outcome (Bandura, 1977; Bandura, 2004). Bandura discusses efficacy expectations and outcome expectancy. He defines efficacy expectations as the belief that a person can successfully perform a certain behavior that is required to produce a specific outcome. This is comparable to perceived self-efficacy. Outcome expectancy is the belief that a certain behavior will produce a specific outcome. This is comparable to perceived response efficacy.

According to Bandura, efficacy expectations influence whether or not the person will do the particular behavior. A person’s outcome expectancy does not influence their behavior, but instead influences their belief about a certain behavior.

There are four major sources for expectations of personal efficacy: performance accomplishments, vicarious experience, verbal persuasion, and physiological states (Bandura, 1977; Bandura, 2004). Performance accomplishments are the most influential of the four because it’s based on what an individual can and can’t do and their history of successes and failures (Bandura, 1977). Vicarious experiences are when people see others have success and failures with different tasks. Verbal persuasion is when people encourage others or give others suggestions on how to cope with different experiences.
The physiological state of emotional arousal is when a person’s emotions lead them to believe they are competent or not at accomplishing a task.

**Types of Fear Appeal**

Dillard divided the different fear appeal theories into three categories: drive theories, the parallel response model, and the subjective expected utility theories (SEU; Dillard, 1994). The drive theories are based on the notion that a fear appeal produces fear arousal which will motivate actions. In other words fear drives actions. Janis proposed an inverted U shaped curvilinear model of fear (Janis & Feshbach, 1953). A moderate amount of fear arousal would produce the most attitude change, but too much or too little fear would not. There failed to be any research to back up the inverted U shape and the model was dropped (Witte & Allen, 2000).

The parallel response model, proposed by Leventhal, said that fear produced two different processes: danger control processes and fear control processes (Leventhal, 1970). A danger control process is when a person undergoes efforts to control the danger or threat they are facing, whereas a fear control process is when a person undergoes efforts to control their own fear about the danger or threat. The model failed to suggest what prompted a person to enter either process and was considered untestable (Witte & Allen, 2000).

The subjective utility theories (SEU) include Sutton’s SEU model and Rogers’ protection motivation theory (PMT), as well as a few others (Dillard, 1994). According to the PMT, there were two dimensions of threat, susceptibility and severity, and that
there were two dimensions of efficacy, response efficacy and self-efficacy (Rogers, 1975). The PMT proposed that these four variables interacted amongst themselves. Rogers, however, failed to support this hypothesis, and instead found that attitude, intention and behavior change were instead influenced by an interaction of a threat variable with an efficacy variable (Rogers, 1975; Witte & Allen, 2000). The PMT explains why fear appeals work and when they work; however, they fail to explain when and why they don’t work (Witte & Allen, 2000).

**Extended Parallel Processing Model (EPPM)**

Kim Witte’s Extended Parallel Processing Model (EPPM) looks at fear appeal health communications messages (Witte, 1998; Cho & Witte, 2004; Witte, Girma, & Girgre, 2003; Witte, Berkowitz, Cameron, & McKeon, 1998; Witte & Allen, 2000). The EPPM was built off of the drive theories, the parallel response model, and the SEU theories. This model poses that there are three responses to a fear appeal: people will ignore the message, people will take action and try to control the danger, or people will take action and try to control their fear. A good fear appeal is composed of two main elements. These are threat and efficacy. The threat portion of a message is the sum of two parts: a person’s perceived severity and perceived susceptibility to the threat. Perceived severity is how significant a person believes a threat to be. For example, if a person thinks that cancer is easily treatable, their perceived severity will be low. Perceived susceptibility is how vulnerable a person thinks they are to the threat. A person may not believe they will get cancer because no one else in their family has
contracted it. Their perceived susceptibility will be low. If the threat is perceived to be low, a person will ignore a health message, finding it inapplicable to him/her.

The second part of a fear appeal is efficacy. Efficacy is composed of two main parts: perceived response efficacy and perceived self-efficacy. Perceived response efficacy is how effective a person believes a recommended response is. For example, if a person thinks that condoms successfully protect people from AIDS, that person will have high perceived response efficacy. Perceived self-efficacy is how able a person feels they are to do a recommended response. For example, a person may feel that s/he can use a condom every time s/he has sex. That person will have high perceived self-efficacy.

If a person perceives there to be a threat, they will have one of two reactions: danger control or fear control. When a person has high perceived threat, but low perceived efficacy, a person will have a fear control reaction. This is a self-defense, self-preservation mechanism in which a person undergoes avoidance, denial and/or reactance (issue and message derogation and perceived manipulative intent).

If a person perceives there to be a threat, but has high perceived efficacy, a person will have a danger control reaction. This mechanism motivates a person to avoid a threat through a change in belief, attitude, intention and/or behavior.

Witte’s research has shown that for a danger control reaction, efficacy must be greater than threat, but it is assumed that high threat is necessary. Gore and Bracken (2005) found that only a minimal amount of threat is necessary to cause a danger control reaction. They also found, however, that a message that is high in threat and contains no efficacy pushes a person farther into the fear control response.
Witte, McKeon, Cameron, and Berkowitz (1995) created the Risk Behavior Diagnosis Scale (RBD). This scale was created in order to measure a person’s level of perceived susceptibility, perceived severity, perceived self-efficacy, and perceived response efficacy. The scale consists of twelve items and has been shown to be reliable and valid. The purpose of this scale is to measure each item to show if a person has a higher level of perceived threat or perceived efficacy. Thus it can be found if a person is undergoing danger control or fear control responses.

Messages containing efficacy have been shown to move people who initially held a fear control response closer to/into a danger control response (Witte & Allen, 2000). Messages containing no efficacy but high threat have been shown to move a person initially holding a danger control response toward a fear control response. Further, they’ve shown that a person initially holding a fear control response will be pushed farther into a fear control response. Viewing an efficacy message has not been shown to move a person farther into a danger control response if they initially held a danger control response.

When looking at how perceived efficacy and perceived emotional tone influence emotional responding, it is important to note whether a person’s predisposition toward either fear control or danger control responses predict how a person will respond to a message. For example, if a person takes the RBD scale and scores higher on perceived efficacy than on perceived threat, they are considered to be in a danger control response. Being in a danger control response might influence a person’s perception and response to messages.
Cho & Witte (2004) developed a five step process based on the EPPM on how to use the theory in a practical way. These steps are: 1. examine frequency distributions of each theoretical variable 2. compare the mean score of each theoretical variable to each other 3. create a chart of belief strength 4. determine what influences the theoretical variable 5. create a chart of beliefs to change, introduce and reinforce. These steps help to create messages that will directly reach the intended audience in ways that will be beneficial and increase message acceptance.

Unfortunately, no one has used these five steps to create an anti-smoking message. There have been attempts to use both efficacy and fear together in messages; however, these attempts don’t follow the theoretical approach to make a strong message. The creators of anti-smoking messages appear to take the approach that fear is the best and main way of successfully changing a person’s smoking behavior, as witnessed by the volume of anti-smoking messages using fear appeal. The research on fear appeal effectiveness, however, is mixed. There are many possible confounding variables in anti-smoking messages, including the use of disgusting images, the framing of the message (gain frame versus loss frame), and target (non-smokers—prevention messages, non-smoking venues—petition for clean air, smokers—quitting messages, smoke outside messages).

In order to appropriately look at efficacy in anti-smoking messages, the confounding variables have to be minimized. This means controlling the level of arousal, the valence, and the threat level. It is important to determine if high efficacy anti-smoking messages are “successful”. The EPPM has been tested by looking at how an individual’s perceptions change after exposure to a particular message; however, it is
unknown what happens during message exposure. As previously mentioned, this is important to understand because processing during message exposure is the basis for any hoped for effect of the message.

Gore and Bracken found that high threat and no efficacy pushes a person farther into fear control. Different levels of threat and efficacy during a message have different effects on how a person responds to the message. What happens with varying levels of efficacy during exposure to television PSAs? This study will further the knowledge on how efficacy works in relation to the EPPM during message exposure. In order to understand what happens during message exposure, a leading message processing model will be examined. This model, by A. Lang, is the limited capacity model of motivated mediated message processing (LC4MP).

**Limited Capacity Model of Motivated Mediated Message Processing (LC4MP)**

The LC4MP is a model about how people process media messages. The LC4MP has five major assumptions (Lang, 2006a). First, a person has a limited amount of resources that they can process information with—they are limited capacity information processors (Lang, 2000; Lang, 2006a). Second, they have two motivational systems: the appetitive and aversive systems. Third, media consists of information in different sensory channels and formats. Fourth, behavior occurs and changes over time. Fifth, communication is the interaction of a message and a person’s information processing.

Humans evolved with two different motivational systems to protect them in their environment. Two systems are the appetitive and the aversive system (Lang, 2000; Lang,
Bradley, Sparks & Lee, 2005; Lang, 2006a; Lang, 2006b; Cacioppo & Bernston, 1999; Cacioppo, Gardner & Bernston, 1999). The appetitive system is so named because it is the approach system that helps people to find positive things (food, mates, etc). This system helps people to sustain themselves. The aversive system on the other hand is the fight or flight system. This system helps protect a person from danger. Both systems have different effects on the body physiologically.

In a neutral environment, a person has a higher activation of their appetitive system than their aversive system (Cacioppo & Bernston, 1999; Cacioppo, Gardner & Bernston, 1999). This evolved so that a person would go out and explore the surrounding world. This is referred to as the positivity offset (Lang, 2000; Lang, Bradley, Sparks & Lee, 2005; Lang, 2006a; Lang, 2006b; Cacioppo & Bernston, 1999; Cacioppo, Gardner & Bernston, 1999). The appetitive system has a steady, slow increase in activation in an environment. However, the aversive system once triggered, has a very sharp increase in activation. This is referred to as the negativity bias. This is because a person has to respond to danger or unfriendly stimuli in a quick fashion in order to survive.

Originally, these two systems were thought to respond reciprocally; however, Cacioppo has proposed four different interactions (Cacioppo & Bernston, 1999; Cacioppo, Gardner & Bernston, 1999). The two systems can interact in four ways. They can be reciprocal, where one system increases and the other decreases. They can also be uncoupled, in which there is no relation between the two in how they are activated. They can be coactive, where both increase at the same time. Finally they can be inactive, in which both decrease at the same time.
The aversive and appetitive systems influence a person’s emotional responding. Emotion can be divided into valence (how positive or negative something is) and arousal (the degree of the feeling) (Lang, Bradley, Sparks & Lee, 2005). Negative and positive emotion are considered to be two different systems, much as the appetitive and aversive systems are separate. Negative and positive emotion can interact in the four ways that the appetitive and aversive system interact. The appetitive system tends to evoke more positive valence when it is activated. The aversive system tends to evoke more negative valence when activated.

The way these two systems respond affects how a person processes a message. Anti-smoking messages could be considered threatening to a smoker. This might trigger aversive activation, causing the smoker to disengage from the message as a form of self-preservation. However, the message might also include features that might be attractive to the smoker, increasing appetitive activation. The type and level of activation is important because it determines how a person will respond to a message.

The LC4MP proposes that people have a limited amount of cognitive resources that they divide between three types of information processing: encoding, storage, and retrieval (Lang, 2000; Lang, Bradley, Sparks & Lee, 2005; Lang, 2006a; Lang, 2006b). Encoding is the process in which a person incorporates the information they are exposed to into working memory. This information is obtained through the different senses. There are two types of encoding, automatic selection, in which information relevant to goals and needs are incorporated, as well as a change in the environment, and conscious selection. The more resources that are allocated to encoding, fewer are left for the other two systems. Change in heart rate has been used as a physiological indicator of cognitive
resources allocated to encoding a message (A. Lang, Newhagen & Reeves, 1996). In order to test the performance of encoding a message, video and audio recognition tests are used.

Storage is the process in which information that has been encoded is linked to other information already contained in long-term memory. The LC4MP assumes the associative network structure of memory, in which pieces of information are linked to each other in a web-like fashion. The better linked a piece of information is, the better stored it is considered to be. In order to test how well a message was stored, cued recall tests are used.

Retrieval is the process by which information is pulled from long-term memory and brought to the working memory. Retrieval also helps with storing pieces of information better in memory, as the different information links have to be retrieved for new information to be linked to it. Retrieval is tested by using free recall tests.

To further the knowledge on how people look at a situation and respond, appraisals will be reviewed. The LC4MP explains how the mind processes data and stimuli and how it responds. Appraisals further that by adding in detail on how emotion and cognition work together to respond to a stimulus.

Cognitive-Emotional Processing: Appraisals

Emotional responding embraces several cognitive processing components. If emotional responding didn’t have any cognitive components, a person wouldn’t think about and process what they’re doing or feeling (Power & Dalgleish, 1997). The
cognitive components of emotion are called appraisals. Appraisal theory suggests that a person appraises a situation before responding. A person tries to not only describe emotions, but explain them. Most of these theories begin with a stimulus—something novel in the environment. This either triggers emotional responding or it triggers coping mechanisms, depending on the theory (Power & Dalgleish, 1997; Ellsworth & Scherer, 2003). The idea is that stimuli need to be processed so that the body can respond, both through emotion as feelings and emotion physiologically and behaviorally.

One of the leading appraisal theories is by Leventhal and Scherer (Leventhal & Scherer, 1987; Power & Dalgleish, 1997; Ellsworth & Scherer, 2003). They propose that the emotional system consists of three main components that operate in parallel to each other. These are the sensory motor level, the schematic level, and the conceptual level. The first two levels are activated automatically. The sensory level is composed of innate mechanisms, while the schematic level is composed of learned associations. The conceptual level includes memories about emotion, expectations, conscious goals and plans, and self-concept. This level takes the current stimuli and puts it into context.

Leventhal and Scherer also say there are five sequential stages that they call the Stimulus Evaluation Checks (1987). These are novelty, pleasantness, relevance to goals and plans, coping potential, and compatibility with self-concept and social norms. Novelty refers to a stimulus in the environment that catches one’s attention. This is the trigger for the emotional process. Pleasantness refers to whether the stimulus is pleasant, neutral, or unpleasant. The third step deals with an individual’s motivations. The fourth step deals with one’s ability to actually cope with the situation—how many resources one has available and what one’s options are in order to respond to the stimulus. The final
step puts one’s options into a larger context. There has been argument as to whether or not these steps have to occur sequentially (Power & Dalgleish, 1997) and whether all of the steps are always necessary (Ellsworth & Scherer, 2003).

**How does it all relate?**

Since the appraisal of a stimulus affects emotional responding, one can say that the appraisal of the information included in a public service announcement affects emotional responding. Kim Witte postulated in her EPPM that people with high perceived efficacy are motivated to control the danger, where as people with low perceived efficacy are not (Witte & Allen, 2000). When motivated, people actually think about how they can overcome the threat. Further, in the meta-analysis on fear appeal, Witte and Allen found that response efficacy and self-efficacy had stronger effects on perceived outcomes in fear appeal messages than severity and susceptibility, although they were only slightly stronger (Witte & Allen, 2000). Fear appeal messages are negatively toned, which means that since efficacy has stronger effects during fear appeal messages, it has stronger effects during negative messages. This suggests that people appraise efficacy in such a way that it dampens negative emotional responding. In other words, efficacy may take the bite off of a fear appeal due to the way the mind processes it. The other side of this argument is to say that efficacy should enhance positive emotional responding. Thus efficacy should have a stronger effect on negative than positive emotional responding; however, it will have an effect on both.
Since it has thus far been explained what happens cognitively as far as resources and appraisals go, emotion needs to be explained. Emotion is intertwined with cognition. Appraising a situation will trigger emotional responding, through both feelings and through physiological changes.

**Emotion**

According to Davidson, Scherer, and Goldsmith (2003), emotion “refers to a relatively brief episode of coordinated brain, autonomic, and behavioral changes that facilitate a response to an external or internal event of significance for the organism.” There are several theories of emotion. The two that will be looked at in this paper are the dimensional theory of emotion by P.J. Lang and the two factor structure of affect by D. Watson and A. Tellegen.

The dimensional theory of emotion (P.J. Lang, Greenwald, Bradley, & Hamm, 1993) looks at emotion as biologically based. Emotion consists of three dimensions: valence, arousal, and dominance. Valence looks at how positive or negative a message is. Arousal looks at the level of activation, i.e. how strong it is, from exciting to calm. Dominance focuses on whether a person is in control of an emotion or whether the emotion is in control. It is important to note that very few studies have been done on dominance and that it has been found to be a less reliable measure than the other two variables. Further, a two dimensional approach (i.e. valence and arousal) has been found to reliably measure emotion (Bolls, Lang, & Potter, 2001). Thus, dominance is included for theoretical purposes but not for practical purposes.
According to P.J. Lang (1979), there are three different ways to measure emotion. The first is behavioral. This is actually done by watching a person’s facial expression and listening for laughing, crying, etc. The second method is self-report, in which a person gives an account of how an emotion feels. The last measure is physiological, which looks at the body’s response during message exposure. This includes measuring heart rate, skin conductance, and facial EMG.

It is important to point out that there are weaknesses to all three of these (Bolls, Lang, & Potter, 2001). For example, there is often no visual change when an emotion occurs, hindering the behavioral approach. Also, visual cues of an emotion tend to have a delay after the actual emotion is felt. Self-report measures suffer from social response bias and are thought to measure only the extreme points in a message instead of the message as a whole. Physiological measures suffer from the loss of external validity due to the nature of these experiments. A person has sensors placed on them and other conditions within the lab that sets it apart vastly from a person’s real world experiences.

The two factor structure of affect, on the other hand, splits valence into two separate variables (Watson & Tellegen, 1985; Watson, Wiese, Vaidya, & Tellegen, 1999). According to this theory, there are two different variables, positive affect (PA) and negative affect (NA). Positive affect is a scale that runs from high arousing positive to low arousing negative, while negative affect runs from high arousing negative to low arousing positive. Like the dimensional theory of emotion, this theory bases itself around valence and arousal; however, the two factor structure of affect turns the model of the dimensional theory of emotion 45 degrees (Ravaja, Saari, Kallinen, & Laarni, 2006; Watson & Tellegen, 1985; Watson, Wiese, Vaidya, & Tellegen, 1999). The separation of
valence into two different variables follows suit with research into the appetitive and aversive systems. The PA is reflective of the appetitive system, while the NA is reflective of the aversive system.

**Emotional Tone**

Emotional responding occurs in an individual in response to a stimulus. Emotional tone, however, is a message feature. The point of looking at emotional tone in a message is to manipulate emotional responding in the viewer. Emotional tone can be looked at in a variety of ways. Some studies have looked at positive versus negative messages (Bolls, Lang, & Potter, 2001; P.J. Lang & Friestad, 1993; Shapiro & Rieger, 1992), unpleasant versus pleasant (P.J. Lang, Greenwald, Bradley, & Hamm, 1993), and fear versus disgust (Leshner & Bolls, 2005).

The overarching idea behind studying emotional tone in messages is to see how a person emotionally and cognitively responds to it. It is thought that a person’s emotional response to a message influences their perception of the message, as well as the topic it covers and influences later behaviors. Studies have tried to tease apart different emotional features in messages to understand why they produce the results that they do. For example, psychophysiological studies have found that people pay more attention to negative messages (Bolls, Lang, & Potter, 2001) but that positive messages are more memorable. However, Reeves, Newhagen, Mainbach, Basil, & Kurz (1989) found the opposite: negative ads elicit less attention but are remembered better. Lang found higher arousal in viewers watching positive, emotional content, compared to those not watching...
emotional content (Lang, 1990). Further, the arousal is elicited even when the emotional content is either mild or brief.

There are three ways to determine the emotional tone of a message (Bolls, Lang, & Potter, 2001). The first way is to look at whether or not there are actual displays of emotion in the message or if the content is usually considered “emotional.” The next method is to have a variety of people rate the message for items such as valence, arousal, etc either in terms of how the message made them feel or in terms of the content of the message. The final way is to actually manipulate the message, creating two versions of the same message. One of the messages contains more emotional content than the other. This study is going to use the second method, in which the researcher will pick out stimuli that they think will fall into different categories and then have a variety of people rate them for valence and arousal.

This study looks at emotion both as a message feature and as an individual experience because it is important to look at how the features influence individuals. Efficacy is a cognitive process that translates into attitudes, an emotional process. Thus the message feature of emotional tone is in part helping to elicit a cognitive response that will translate into emotional responding. To fully understand how this process happens, one more concept has to be explained: psychophysiology. Psychophysiology explains the link between the mind and the body during cognitive-emotional processing. It helps explain some of the concepts previously mentioned in this section, such as attention and arousal.
Psychophysiology

Psychophysiology is a blend of psychology and physiology, in which the mind is considered to have a physical substrate (Cacioppo, Tassinary, & Berntson, 2000). Psychophysiology aligns different bodily functions with different psychological traits, such as changes in heart rate with variation in attention. It assumes that a psychological input will cause some kind of physiological change. Numerous studies have been conducted to show that different relationships exist. There are five different relationships that are possible between psychological and physiological states (Cacioppo, Tassinary, & Berntson, 2000). These are one-to-one (a psychological state only lines up with one physiological response), one-to-many (a psychological state lines up with many different physiological responses), many-to-one (several psychological states line up to one physiological response), many-to-many (several psychological states line up to several physiological responses), and null (there are no connections between the psychological states and the physiological responses). Assuming that the relationship isn’t null between the psychological and the physiological state, psychophysiology can be used to study the relationships. However, these relationships are rarely one-to-one relationships.

There are three components to an emotion: a subjective experience, an expressive component, and a physiological component (P.J. Lang, 1979). Thus, self-report measures the first component, watching a person measures the second, and psychophysiological methods measure the third component.

Psychophysiology is useful in studying different fields because it allows for understanding of the cognitive and emotional processes that underlie exposure to a
stimulus. This helps explain why some attitude or reaction occurs. For example, the processing of media is useful to study because it allows one to look at what a person does during message exposure. According to Ravaja, there are four goals of media message: to attract attention, to be remembered, to entertain, and to persuade (2004). Thus, research needs to be done in order to figure out what causes all four of these to happen.

Self-report data, while capturing a participant’s thoughts, can be biased towards what the participant thinks the researcher wants. Further, it has been suggested that self-report may only capture reactions to extreme points in a message and miss the overall picture (Bolls, Lang, & Potter, 2001; Ravaja, 2004). Psychophysiological measures, on the other hand, capture points throughout the message. There are other methods, aside from psychophysiology, that allow for participant response during message exposure (CRM for example); however, only psychophysiological measures don’t interfere with message processing (Ravaja, 2004).

Since the actual processing of media affects how the message is perceived, one needs to know how it is processed. Further, a message cannot have an effect unless it is cognitively and emotionally processed. Media researchers use psychophysiology with the goal of figuring out what the cognitive and emotional processes during message exposure are. By knowing how heart rate changes, one knows more about cognitive processing or attention (A. Lang, Newhagen & Reeves, 1996). The more one knows about SCR, the more one knows about the level of arousal evoked by a message (A. Lang et al, 2000). Studies have found that increased attention and increased arousal are correlated with increased recognition and recall.
In terms of mediated messages, it has been shown that people pay more attention to negatively toned messages (A. Lang, 1995; Shoemaker, 1996). Research has shown that there is greater heart rate deceleration during high threat messages (Leshner & Bolls, 2005); however, physiological studies have not looked at whether or not messages with both a threat and an efficacy component will have greater deceleration and thus more attention paid. Thus, the messages should grab their target’s attention to a certain extent. Efficacy should dampen negative emotional responding by making a threat seem less severe or more manageable. Efficacy can be looked at as an empowerment tool that helps individuals to overcome a problem. It should, when coupled with threat, cause an even greater heart rate deceleration and capture more attention due to its importance as a message feature, especially for positive messages, as it should enhance emotional responding. When no efficacy is present, people should disengage from the message, paying less attention. This brings about hypothesis one:

**H1:** There will be an efficacy-related copy points X emotional tone interaction on heart rate such that the difference in cardiac deceleration during exposure to messages with efficacy-related copy compared to those without efficacy-related copy will be greater in negative toned messages compared to positive toned messages.

Both positive and negative messages can increase a person’s skin conductance. Message features can influence the arousal level, such as the number of edits (A. Lang et al, 2000). Since efficacy is thought to dampen negative emotional responding, it should
also dampen the intensity of the negative emotional responding. This means that high efficacy negative messages should produce lower levels of arousal than no efficacy negative messages. However, high efficacy positive messages should enhance arousal due to a much greater positive tone, especially when compared to no efficacy positive messages. Thus there should be an interaction between arousal and efficacy. This brings about hypothesis two:

**H2:** There will be an efficacy-related copy points X perceived emotional tone interaction on skin conductance such that efficacy-related copy points decrease skin conductance response evoked by negative messages but increase skin conductance response evoked by positive messages.

The zygomatic muscle, also known as the smile muscle, has been shown to correlate with positive affect, and has been found to be reliable (Bolls, Lang & Potter, 2001). It is located on the cheek, down from the outer corner of the eye and across from the corner of the lip (Hazlett & Hazlett, 1999). Since high efficacy messages “empower” the viewer, so as to speak, high efficacy messages should increase the level of positive affect the viewer has. Since this is being measured by the zygomatic muscle, an increase in positive affect should result in an increase in zygomatic activity. The zygomatic muscle also, however, can have an increase in activation from other emotions, such as a disgusted smirk or an embarrassed smile. This can lead to confusing data.

The orbicularis oculi (OO) is another muscle that is correlated with positive emotion (Ravaja, 2004; Ravaja, Saari, Kallinen, & Laarni, 2006; Witvliet & Vrana,
Located just below the eye socket (Tassinary & Cacioppo, 2000), this muscle is also known as the eye blink muscle. The OO muscle shows a greater increase in activity during positive messages than negative messages (Ravaja, Saari, Kallinen, & Laarni, 2006; Witvliet & Vrana, 1995), although some studies have found that the OO is more reflective of highly emotional content regardless of valence compared to neutral stimuli (Bradley & Lang, 2000). Since efficacy is postulated to potentially make negative messages feel less negative, there might also be an increase in positive emotional responding to the messages. Although negative and positive emotion are postulated to be two different systems, they can respond reciprocally. This brings about hypothesis three:

**H3:** There will be an efficacy-related copy points X emotional tone interaction on orbicularis oculi activity such that the increase in orbicularis oculi activity during exposure to messages with efficacy-related copy compared to those without efficacy-related copy will be greater in negative toned messages compared to positive toned messages.

The corrugator muscle is located right above the eyebrow (Hazlett & Hazlett, 1999). It has been shown to correlate with negative affect (Bolls, Lang & Potter, 2001). Negative affect is being measured in case efficacy does not reflect itself in an increase in positive affect. Since messages can elicit varying amounts of both positive and negative affect, and since the two are separate systems, it is possible that instead of an increase in positive affect, a decrease in negative affect will be witnessed when a participant views a high efficacy message. If efficacy dampens negative emotional responding, there should
be a decrease in negative affect. Negative affect is being measured through the corrugator muscle, and thus a decrease in negative affect will be seen as a decrease in corrugator activity. This brings about hypothesis four:

**H4:** There will be an efficacy-related copy points X emotional tone interaction on corrugator activity such that the decrease in corrugator activity during exposure to messages with efficacy-related copy compared to those without efficacy-related copy will be greater in negative toned messages compared to positive toned messages.

The appetitive system increases resources to encoding and storage, while the aversive system shifts the resources from encoding to retrieval (Lang, 2006a). Further, messages can influence where the resources go. If a person cannot control how fast a message is played, encoding and concurrent retrieval will have the most resources allocated to them, while storage will have fewer. The results of that are a message that was encoded well but poorly stored and thus cannot be retrieved (good recognition, poor recall).

Studies looking at memory have shown mixed results as to whether or not positive or negative messages will increase memory. Most have found that negative messages will be remembered better (A. Lang & Friestad, 1993; Newhagen & Reeves, 1992; Reeves et al, 1989). Several studies have found that positive message will be remembered better (A. Lang, 1995); however, arousal was found to be the main factor in determining memory and not valence. Bolls, Lang, and Potter looked at negative and
positive radio messages and factored the level of arousal in to see if that affected memory (2001). They found that greater memory was elicited by positive messages when the level of arousal was held constant. Otherwise, the messages with the greatest level of arousal were remembered the best, regardless of the level of attention paid.

This brings up the question, how does the interaction of efficacy and emotional tone affect memory? So far this paper has postulated that efficacy will dampen negative emotional responding. It has also suggested that high efficacy positive messages should produce greater levels of arousal. No-efficacy messages, especially negatively toned messages, should cause disengagement from the message and thus lower attention. When all these factors are combined, it follows that high efficacy positive messages should be remembered the best, followed by high efficacy negative messages. No-efficacy positive messages should be remembered better than no-efficacy negative messages due to the idea of disengagement. However, the difference between the two types of negative messages (with and without efficacy) should be greater than the difference between the two types of positive messages (with and without efficacy). This brings about hypothesis five:

**H5.** There will be an efficacy-related copy points X emotional tone interaction on audio recognition such that the increase in audio recognition for messages with efficacy-related copy compared to those without efficacy-related copy will be greater in negative toned messages compared to positive toned messages.
3. METHODOLOGY

Experimental Design

This study employs a 2 (Efficacy Related Copy Points) X 2 (Perceived Emotional Tone) X 4 (Message) X 4 (Order) mixed design. All variables are within subject except for order, which is the only between subject element of this study. Efficacy-related copy points had two levels: present and not present (i.e. high and none). Perceived emotional tone had two levels, positive and negative. There were four messages in each type, making a total of 16 messages. There were four orders in which the messages were shown.

Participants

The participants in this study were 32 college-aged smokers from a Midwestern university. It is recommended that 45 participants are run in a within subject physiological design (Bolls, Lang & Potter, 2001; A. Lang et al, 2000). Further, running 50 or more in order to account for missing data and technical difficulties is even better. Due to recruiting issues, only 32 participants were run. These students were both males and females in their twenties. They consisted only of people who refer to themselves as smokers or social smokers. They were recruited from university classes with the incentive of research credit or extra credit, depending on the class. Some participants participated in the study with no incentive or for gift cards to a local pizzeria. Of the
participants, 78% were female. Although this is not a random sample, it is a within subject design with random assignment to conditions, which will counteract the nonrandom sample. Further, the recognition test is fully randomized through a randomization function in Media Lab. This means that each participant will hear the audio recognition clips in a different order that is randomly generated by the computer program. By randomizing the audio recognition clips, there will not be an overarching order effect, in which participants’ recognition is increased or decreased due to the order of the clips.

**Stimulus**

The stimuli in this experiment were sixteen anti-tobacco public service announcements. These PSAs were pulled from a collection of 400 PSAs. They are from the years of 1996 and 2000. The PSAs were screened by the researcher for efficacy-related copy points and emotional tone. Twenty-six PSAs were pretested for their level of arousal and how pleasant or how unpleasant they were. Of these, sixteen PSAs with similar levels of arousal, but differing on their level of efficacy and perceived emotional tone were selected. This produced four groups of messages: high efficacy/negative, high efficacy/positive, low efficacy/negative, and low efficacy/positive.

In the pretest, 12 current smokers rated the 26 messages. During each message, 6 participants rated the messages using a continuous response measure from very unpleasant to not unpleasant. The other 6 participants rated the messages during exposure using a continuous response measure from very pleasant to not pleasant. All
twelve were instructed to move the bar at the bottom of the screen based on how pleasant (or unpleasant) they found the message to be during the message, from 1 to 9. After each PSA, each participant rated the level of arousal using the SAM-Arousal scale. The pleasantness scores were averaged across participants for each second of the PSA. Once average second by second pleasantness scores were obtained, they were averaged to create one pleasantness score for the PSA. The same procedure was done for unpleasantness scores. The unpleasantness scores were subtracted from 10 so that very unpleasant would correspond numerically to not pleasant. These unpleasantness scores were then subtracted from the pleasantness scores per PSA, so that one difference score was obtained per PSA. If this score was negative it indicated an unpleasant message. If positive, this score indicated a pleasant message. The SAM-Arousal scores were averaged per PSA across participants, creating one score per PSA.

Messages with similar difference scores were chosen to create the four groups of messages. This means that the messages in the “negative-efficacy” group had similar difference scores to one another and to the “negative-no-efficacy” group and that messages in the “positive-efficacy” group had similar difference scores to one another and to the “positive-no-efficacy” group. The positive and negative groups were similar distances from zero. Messages that weren’t as strong emotionally were tossed out. Also, messages that scored really high or low on the SAM-Arousal assessment were thrown out. Thus, the four groups were created as similarly as possible with the given stimuli on both arousal and their positive/negative scores (See Appendix 1 for a list of difference and arousal scores for the messages). An independent t-test could not be run since some of the values were less than one.
**Apparatus**

The equipment used in this study includes a LabLine Coulbourne stack. The experiment was run on Media Lab, using Direct RT to time lock the messages. The signal was collected using 4mm and 8mm AG/AGCL electrodes.

**Procedure**

When the participants arrived in the lab they were greeted and given consent forms to read and sign. Upon verbal explanation of the consent forms, they were seated in a comfortable chair. Sensors were placed on the participant’s face, hand, and arms. The participant was asked to try not to move too much while s/he was connected to the sensors. The participant then viewed sixteen PSAs. Prior to each PSA there was a fifteen-second black screen, during which baseline data for the physiological data were collected. The participant then answered a series of questions about the participant’s level of pleasant/unpleasant ratings and the SAM-Arousal measure. After watching all of the PSAs and answering questions, the sensors were removed and the participant then took an audio recognition test. During this test they were asked to answer ‘yes’ or ‘no’ as to whether or not they had heard the audio clip before. They were verbally debriefed, handed a blank copy of the consent form with contact information on it and a receipt to give their instructor, thanked and then dismissed.
Independent Variables

Efficacy in Messages

There are two areas in which efficacy apply. One is the level of efficacy in messages. This presents itself as messages that have a message of empowerment, “You CAN quit smoking,” or a message about the effects of quitting, “Quitting smoking increases lung capacity 30%,” for example. This type of efficacy, copy points in messages, should trigger people’s perceived efficacy, which is the second kind of efficacy. The main differentiation between the two types is that the first type is a message feature and doesn’t change regardless of who sees the message. The latter is an individual trait, although not a permanent one. This type is influenced by different messages and other aspects within a person’s life. Perceived efficacy is what ultimately leads to the danger control or fear control responses that are postulated by the EPPM.

Like perceived self-efficacy, self-efficacy in messages has to do with the belief that a person has the power to overcome a particular threat. In TV PSAs, these messages can either be an example by someone in a PSA, or a message directly to the audience. This may look like “Overcoming smoking was the hardest thing that I ever did. I had the ability to quit.” It can also look like “I quit, you can too” or “Quitting is hard, but you can do it.”

Response efficacy in messages mimics perceived self-efficacy. It is the message that a certain action will help prevent a threat. In TV PSAs, this appears as messages
saying “After I quit smoking, I had more energy” or messages that say “Quitting smoking will help improve the quality of life.”

For this study efficacy is conceptually defined as information that conveys the benefits of quitting smoking and a personal belief of quitting smoking. This is operationally defined as messages that include copy points that mention having more energy, lung capacity, etc. after quitting smoking or having copy points that mention that the viewer can quit smoking. This definition includes both self-efficacy and response efficacy. This variable is manipulated by using actual PSAs that either contain efficacy or that don’t (a high/low manipulation). These PSAs were created between 1996 and 2000 and have not been edited from their original form to further differentiate the level of efficacy found in the messages (See Appendix 2 for efficacy-related copy points used).

**Emotional Tone in Messages**

Emotional tone is conceptually defined as the valence of the message. Emotional tone is operationally defined as how pleasant and how unpleasant a message was scored as in a pretest. Emotional tone includes positive and negatively toned messages. No PSAs that contain both positive and negative tone were used in this study. Elements of the PSAs that determine emotional tone were the actual visuals used and the audio track, both voices and music. The PSAs used were pretested by 12 individuals using a continuous response measure (CRM) to determine how pleasant and how unpleasant each PSA was. Half of the participants rated PSAs for how unpleasant they were (from very
unpleasant to not unpleasant), while the other half rated PSAs for how pleasant they were (from very pleasant to not pleasant; See Appendix 1).

**Dependent Variable**

**Attention**

Attention in this study was conceptually defined as resources allocated to encoding. Attention was operationalized as heart rate. Heart rate has been shown to correspond with attention (A. Lang, Newhagen & Reeves, 1996), with a deceleration being associated with an increase in allocation of cognitive resources and thus more attention, and an acceleration is associated with a decrease in the allocation of cognitive resources and thus less attention being paid (A. Lang, 1990; A. Lang, 1995). Heart rate is scored as over time, compared to baseline data taken beforehand. In order to make sure the baseline accurately measures resting heart rate, the participant will view 15 seconds of a black TV screen prior to the start of each message. Those 15 seconds will be recorded and scored as the participant’s baseline data. The last five seconds of the baseline were averaged to compute a specific baseline score that each second of data during the message was compared to.

In order to collect the heart rate data, two 8mm, AG/AGCL electrodes were placed on the participant’s forearms. A third 8mm AG/AGCL electrode was placed on the participant’s wrist as a ground reference electrode. Heart rate was collected in
milliseconds between R-spikes and then converted into beats per minute (BPM). A high pass filter of 8 Hz and a low pass filter of 40 Hz were used.

**Arousal**

Arousal was conceptualized as the intensity of emotional responding. Arousal was operationally defined as the self-reported level of how calm/exciting a message was. It was also operationally defined as skin conductance response, a psychophysiological measure. Self-reported arousal was measured using the SAM (Self-Assessment Mannequin) for arousal. The SAM scale has been shown to accurately measure self-reported arousal (Lang, Greenwald, Bradley & Hamm, 1993). Skin conductance response has been used in numerous studies and is correlated with the arousal level (A. Lang et al, 2000). In order to collect skin conductance response, two 8mm, AG/AGCL electrodes were placed on the participant’s palm. Skin conductance response was collected with a sampling rate of 50 (data were collected 50 times per second and averaged to get each second of data).

**Positive Affect**

Positive affect was conceptually defined as the amount of positive emotional response a person has to a message. Positive affect was measured using the psychophysiological measure of the orbicularis oculi muscle. The orbicularis oculi, also known as the eye blink muscle, is located right under the eye above the cheek (Tassinary...
& Cacioppo, 2000). It has been shown to correlate with positive emotion (Ravaja, 2004; Ravaja, Saari, Kallinen, & Laarni, 2006; Witvliet & Vrana, 1995). It is being measured to see if efficacy impacts positive emotion. To collect the orbicularis oculi muscle activity, two 4mm AG/AGCL electrodes were placed over the muscle site just atop of the cheek. A high pass filter of 13 Hz and low pass filter of 1KHz were used to collect data. A sampling rate of 50 times a second was used.

**Negative Affect**

Negative affect was conceptually defined in this study as the amount of negative emotion a person feels toward a message. Negative affect was measured using the physiological measure of the corrugator. This muscle is located right above the eyebrow (Hazlett & Hazlett, 1999). It has been shown to correlate with negative affect (Bolls, Lang & Potter, 2001). Negative affect was being measured in case efficacy did not result in an increase in positive affect. To collect the corrugator muscle activity, two 4mm AG/AGCL electrodes were placed over the muscle site just above the left eyebrow. A high pass filter of 13 Hz was used, as well as an open low pass filter. Data were sampled 50 times a second and averaged for each second.

**Memory**

Memory was conceptually defined as the performance of encoding a message. Memory was tested using an audio recognition test. Audio recognition tests have less of
a ceiling effect than visual recognition tests due to the greater difficulty in remembering audio components than visual components. Further the efficacy element in the PSAs is present in the audio portion of the messages and not in the video portion. Audio messages also reflect on the quality of encoding (A. Lang, Newhagen, & Reeves, 1996).

Three second audio clips were drawn from the PSAs. They were accompanied with a black screen. Participants were asked to choose ‘Yes’ or ‘No’ as to whether they had heard the clip previously, as quickly and accurately as possible. Each PSA had two clips taken from it (one from each half of the announcement). These clips were chosen so that they conveyed a coherent phrase from the message. This was important so that the participant could understand what was being said. There were 32 of these clips, half of the total clips in the audio recognition test. The other half were foils, clips pulled from PSAs that had not been viewed/heard by the participants during this study. Speed and accuracy are both important factors in the analysis of an audio recognition test.

Manipulation Check

Perceived pleasantness and unpleasantness

Perceived pleasantness and unpleasantness was measured following each PSA. The participants were asked how pleasant each message made them feel, as well as how unpleasant. The responses were given on a nine point scale. For pleasantness this scale ranged from very pleasant to not pleasant. For unpleasantness this scale ranged from very unpleasant to not unpleasant.
Data Analysis

The data were analyzed using SPSS. Heart rate data were analyzed by submitting it to a 2 (Efficacy-related Copy Points) X 2 (Perceived Emotional Tone) X 24 (Time) repeated measures ANOVA. Corrugator and orbicularis oculi data was analyzed by submitting it to a 2 (Efficacy-related Copy Points) X 2 (Perceived Emotional Tone) X 25 (Time) repeated measures ANOVA. The last five seconds of the fifteen-second baseline were averaged to create a single baseline point to which all heart rate, corrugator, and orbicularis oculi data was compared. Skin conductance was analyzed both by frequency and amplitude of skin conductance response, submitting each set of data to a 2 (Efficacy-related Copy Points) X 2 (Perceived Emotional Tone) repeated measures ANOVA.

In order to analyze the audio recognition data, two analyses were done: a repeated measures ANOVA of means and a signal detection analysis (Lang et al, 2000). In audio recognition there are two possible answers to whether or not a participant has heard a message (yes/no). Further, there are two types of clips, the target and the foil. The targets are clips that the participant has heard during the course of the experiment. The foils, on the other hand, are clips that the participant has not heard during the experiment. According to signal detection theory, there are four possible answers: a hit (a correct positive), a false alarm (an incorrect positive), a correct rejection, and a miss (an incorrect rejection). Each of these is important and needs to be factored in when analyzing the data. Whether a person gets a hit or a miss is important. Further, the amount of time it
takes them to answer is also important. The less time it takes to select yes or no, the more familiar (or unfamiliar) a person is with the stimulus.
Manipulation Check

The manipulation checks found that the messages conveyed what they were selected to. The negative messages (M=5.031, SD=.182) had significantly more unpleasantness than the positive messages (M=3.051, SD=.216), F(1,31)=61.604, p<.001, $\eta^2=.665$. The positive messages rated higher on pleasantness (M=5.781, SD=.252) than the negative messages (M=3.785, SD=.197), F(1,31)=67.983, p<.001, $\eta^2=.687$. The SAM arousal scale found no significant differences in arousal between positive and negative messages, F(1,31)=2.762, p=.107, $\eta^2=.082$.

Hypothesis 1

Hypothesis 1 predicted that efficacy-related copy would increase attention paid to a message, as measured through heart rate. Further, it predicted that there would be a greater difference in deceleration in heart rate between negative messages than between positive message, showing a greater difference in attention level. This hypothesis was supported.

There was an emotion by efficacy by time interaction, F(23,690)=5.539, p<.001, $\eta^2=.156$ (See Figure 2). The three-way interaction shows that throughout the course of the message, positive messages with efficacy-related copy points had the greatest
deceleration in heart rate; however, negative messages with efficacy-related copy points had the greatest deceleration in the end of the message. Negative messages had a greater difference in deceleration between efficacy and no-efficacy messages than positive messages did (See Figures 3 & 4). The positive messages were significantly different from each other across time, $F(23,690)=3.431, p<.001, \eta^2=.103$. The negative messages were also significantly different from each other across time, $F(23,690)=11.114, p<.001, \eta^2=.172$. Thus, efficacy-related copy points increase the amount of attention people pay to messages, especially increasing the amount paid to negative messages.

There was not an efficacy-related copy points by emotional tone interaction. There was an efficacy by time interaction, $F(23,690)=4.145, p<.001, \eta^2=.121$. This means that the effect of efficacy-related copy on heart rate changed across time. There was also a perceived emotional tone by time interaction on heart rate, $F(23,690)=1.565$, 

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*Figure 2. The three-way interaction on heart rate (emotion by efficacy by time).*
Figures 3 & 4. The three-way interaction on heart rate during positive messages and during negative messages.

p<.05, $\eta^2=.050$. Efficacy-related copy had a significant main effect on heart rate, $F(1,30)=5.373$, p<.05, $\eta^2=.152$. Messages with efficacy-related copy points had greater deceleration ($M=-2.148$, $SD=.343$) than messages that did not have efficacy-related copy points ($M=-1.303$, $SD=.357$).

Hypothesis 2

Hypothesis two predicted that efficacy-related copy in negative messages would decrease their level of arousal, as measured by skin conductance, but increase the level of arousal in positive messages. Hypothesis two was partially supported.

The self-report data for arousal was analyzed both for a manipulation check and for this hypothesis. The interaction between emotion and efficacy for self-reported arousal neared significance, $F(1,31)=3.886$, p=.058, $\eta^2=.111$ (See Figure 5). Negative messages without efficacy-related copy points had the most self-reported arousal ($M=4.195$, $SD=.281$), followed by positive messages without efficacy-related copy points
(M=3.742, SD=.310), then positive messages with efficacy-related copy points
(M=3.344, SD=.282), and negative messages with efficacy-related copy points had the
least self reported arousal (M=3.328, SD=.274). There was a significant main effect for
efficacy, $F(1,31)=35.025$, $p< .001$, $\eta^2=.530$. Messages without efficacy-related copy
points had significantly more self-reported arousal (M=3.969, SD=.280) than messages
with efficacy-related copy points (M=3.336, SD=.266).

![Self-Reported Arousal Emotion X Efficacy](image)

*Figure 5. The interaction between emotion and efficacy for self reported arousal.*

Skin conductance was analyzed using the greatest amplitude of skin conductance
per message, the frequency of the skin conductance responses per message, and the skin
conductance level across the message. The interaction between emotional tone and
efficacy-related copy neared significance in amplitudes of skin conductance responses,
such that $F(1,27)=3.369$, $p=.077$, $\eta^2=.111$. Positive messages with efficacy-related copy
points had the highest amplitudes (M=1.210, SD=.186), followed by positive messages
without efficacy-related copy points (M=1.010, SD=.165). The negative messages had lower amplitudes in their skin conductance responses, although negative messages without efficacy-related copy points had higher amplitudes (M=.670, SD=.107) than negative messages with efficacy-related copy points (M=.651, SD=.091). There was a significant main effect for emotion in skin conductance amplitudes, F(1,27)=18.327, p<.001, η²=.404 (See Figure 6). Positive messages had higher amplitudes (M=1.110, SD=.169) than negative messages (M=.660, SD=.091).

![SCR Amplitudes Emotion X Efficacy](image)

*Figure 6.* Emotion by efficacy interaction on skin conductance amplitudes.

There was a significant main effect for emotion in skin conductance frequencies, F(1,27)=14.469, p=.001, η²=.349. Positive messages had higher frequencies of skin conductance responses (M=1.920, SD=.308) than negative messages (M=1.420, SD=.224). Efficacy was almost significant in skin conductance frequencies, such that F(1,27)=4.110, p=.053, η²=.132. Messages containing efficacy-related copy points had
higher frequencies of skin conductance responses (M=1.772, SD=.275) than messages that did not contain efficacy-related copy points (M=1.567, SD=.256).

A significant three-way interaction was found on skin conductance level on emotion by efficacy by time, F(24,648)=4.040, p<.001, η²=.130. (See Figure 7). This interaction found that positive messages had an increase in skin conductance activity, with positive messages containing efficacy-related copy having the greatest increase, while negative messages had a decrease in skin conductance activity (See Figures 8 & 9 for a breakdown of positive versus negative). Also, the interaction on skin conductance level between emotion and efficacy neared significance, F(1,27)=3.871, p=.059, η²=.125. This interaction found that positive messages with efficacy-related copy had the most

![Figure 7. The three-way interaction on skin conductance level](image)

This interaction found that positive messages had an increase in skin conductance activity, with positive messages containing efficacy-related copy having the greatest increase, while negative messages had a decrease in skin conductance activity (See Figures 8 & 9 for a breakdown of positive versus negative). Also, the interaction on skin conductance level between emotion and efficacy neared significance, F(1,27)=3.871, p=.059, η²=.125. This interaction found that positive messages with efficacy-related copy had the most
Figures 8 & 9. The three-way interaction on skin conductance level during positive messages and during negative messages.

Skin conductance activity throughout the message (M=.230, SD=.072), followed by positive messages without efficacy-related copy (M=.070, SD=.049). Negative messages without efficacy-related copy had the third greatest skin conductance activity (M=-.123, SD=.076) and negative messages with efficacy-related copy had the least skin conductance activity (M=-.140, SD=.048). A significant interaction was found on skin conductance level between emotion and time, $F(24,648)=6.243$, $p<.001$, $\eta^2=.188$. A main effect for emotion was also found for skin conductance level, $F(1,27)=13.154$, $p=.001$, $\eta^2=.328$. This main effect found that negative messages had significantly less skin conductance activity (M=-.032, SD=.044) than positive messages (M=.150, SD=.052).

These results support the idea that efficacy-related copy points strengthen arousal in positive messages, although only slightly, while efficacy-related copy points dampen arousal in negative messages. The skin conductance amplitude and skin conductance level analyses had essentially identical results. The results of skin conductance
frequencies and amplitudes might have had stronger statistical significance had more participants been run.

**Hypothesis 3**

Hypothesis 3 predicted that efficacy would increase positive affect, as measured through the orbicularis oculi. Further, it predicted that efficacy would have a greater increase in negative messages than positive messages. This hypothesis was partially supported.

There were no significant findings for the orbicularis oculi on emotion or efficacy; however, the main effect for the efficacy in the orbicularis oculi neared significance, \( F(1,29)=3.889, \ p=.058, \eta^2=.118 \). Messages with efficacy-related copy points had more orbicularis oculi movement (\( M=.813, \ SD=.369 \)) than messages without efficacy-related copy points (\( M=-.662, \ SD=.613 \)). Although this finding was not quite significant, it would have been if more subjects had been run. It means that messages that contained efficacy-related copy points, whether positive or negative, elicited more positive affect than messages that did not contain efficacy. This partially supports the hypothesis that efficacy would increase positive affect.
Hypothesis 4

Hypothesis 4 predicted that efficacy would decrease negative affect, as measured through the corrugator muscle. It predicted that efficacy would have a greater decrease in negative messages than positive messages. This hypothesis was partially supported.

The emotion by efficacy by time interaction on corrugator activity was significant, \( F(24,720) = 2.010, p < .01, \eta^2 = .063 \) (See Figure 10). There was also a significant interaction between emotion and efficacy on corrugator activity, \( F(1,30) = 4.963, p < .05, \eta^2 = .142 \). Negative messages without efficacy-related copy points had the most corrugator activity (\( M = 4.585, SD = .959 \)), followed by positive messages with efficacy-related copy points (\( M = 3.234, SD = .784 \)), then positive messages without efficacy-related copy points (\( M = 2.164, SD = 1.273 \)), and negative messages with efficacy-related copy points (\( M = 2.164, SD = 1.273 \)).
related copy points had the least (M=1.336, SD=1.334). There was also a significant
efficacy by time interaction on corrugator activity, F(24,720)=1.849, p<.01, \( \eta^2 = .058 \).
This means that efficacy’s effect on corrugator changed across the message.

The three-way interaction on corrugator activity shows that activity during
negative messages that contain efficacy-related copy points is the lowest (See Figure 11).
Not surprisingly, negative messages that do not contain efficacy-related copy points had
the highest corrugator activity. During positive messages, efficacy-related copy points
appeared to have the opposite effect, as positive messages with efficacy-related copy
points having more corrugator activity than positive messages without efficacy-related
copy points (See Figure 12). The positive messages almost significantly differed from
each other across time, F(24,720)=1.452, p=.075, \( \eta^2 = .046 \). The negative messages were
significantly different from each other across time, F(24,720)=2.355, p<.001, \( \eta^2 = .073 \).
This supports part of the hypothesis, that efficacy-related copy points would decrease
negative affect in negative messages; however, it fails to support the idea that efficacy-
related copy points would decrease negative affect during positive messages.

Figures 11 & 12. The three-way interaction on corrugator activity during negative and positive messages.
Hypothesis 5

Hypothesis 5 predicted that efficacy would increase the memorability of messages, such that negative messages would have a greater increase in audio recognition with efficacy than the increase in positive messages. This hypothesis was partially supported.

When a repeated measures ANOVA was run on the accuracy of targets in audio recognition data from the messages, there was a significant interaction between emotional tone and efficacy-related copy on audio recognition, $F(1,31)=9.681$, $p<.01$, $\eta^2=.238$ (See Figure 13). Negative messages with efficacy-related copy points were significantly better remembered ($M=.953$, $SD=.012$; $p<.001$) than any of the other three message types (positive efficacy ($M=.852$, $SD=.025$), positive no-efficacy ($M=.859$, $SD=.018$), negative no-efficacy ($M=.832$, $SD=.024$)). There was a significant main effect for efficacy in audio recognition, $F(1,31)=7.494$, $p=.01$, $\eta^2=.195$. Messages that contained efficacy-related copy had greater accuracy ($M=.902$, $SD=.015$) than messages that did not contain efficacy-related copy ($M=.846$, $SD=.014$). Emotional tone neared a significant main effect, $F(1,31)=3.507$, $p=.071$, $\eta^2=.102$. Negatively toned messages had greater accuracy ($M=.893$, $SD=.014$) than positively toned messages ($M=.855$, $SD=.014$).
A signal detection analysis was run on the audio recognition data. There was a significant interaction on emotion and efficacy for sensitivity (F(1,30) = 5.832, p < .05, $\eta^2 = .163$) and for criterion bias (F(1,30) = 6.246, p < .05, $\eta^2 = .172$) (See Figures 14 & 15). This means that participants were more sensitive to negative messages that contained efficacy-related copy points (M = .935, SD = .008) and more willing to guess on negative messages that contained efficacy-related copy points (M = -.721, SD = .077), as compared to positive messages that contained efficacy-related copy points (M = .898, SD = .012; M = -.286, SD = .104), positive messages that did not contain efficacy-related copy points (M = .897, SD = .011; M = -.183, SD = .083), and negative messages that did not contain efficacy-related copy points (M = .893, SD = .010; M = -.187, SD = .097). A significant main effect was found on efficacy-related copy for both sensitivity (F(1,30) = 6.226, p < .05, $\eta^2 = .172$) and for criterion bias (F(1,30) = 10.569, p < .01, $\eta^2 = .261$). Messages that contained efficacy-related copy had more sensitivity (M = .916, SD = .009) and more liberal
criterion bias (M=-.503, SD=.066) than messages that did not contain efficacy-related copy (M=.895, SD=.008; M=-.185, SD=.072). A significant main effect was also found on emotional tone for sensitivity (A prime) (F(1,30)=4.537, p<.05, η²=.131) and for criterion bias (B double prime) (F(1,30)=7.419, p<.05, η²=.198). Negatively toned messages had greater sensitivity (M=.914, SD=.008) and more liberal criterion bias (M=-.454, SD=.058) than positively toned messages (M=.897, SD=.009; M=-.234, SD=.068)).

![Figures 14 & 15. The interaction on sensitivity (A’) and criterion bias (B”).](image)

A repeated measures ANOVA was run on the latency of audio recognition data (i.e. how long it took participants to respond to the audio recognition test) and found a significant main effect for efficacy (F(1,31)=5.185, p<.05, η²=.143). This means that participants were faster in responding to messages that contained efficacy-related copy points (M=861.500, SD=32.911), regardless of their emotional content, compared to messages that did not contain efficacy-related copy points (M=906.893, SD=31.815). There were no other significant findings for latency.
This hypothesis was partially supported due to the fact that participants had better audio recognition for negative messages that contained efficacy-related copy points. It is only partially supported because positive messages that contained efficacy-related copy points did not significantly differ from the messages that did not contain efficacy-related copy points.
5. DISCUSSION

Overview

The purpose of this study was to see how efficacy-related copy points and emotional tone interact during anti-smoking PSAs. The general hypothesis for this study was that efficacy-related copy points should dampen negative emotional responding, and in some cases strengthen positive emotional responding. Further efficacy-related copy points should influence the level of attention paid to the message as well as recognition of audio copy in the message. Results of this experiment uncovered significant effects of efficacy-related copy points on negative emotional response, arousal, cognitive resources allocated to encoding and message recognition (See Figure 13). In general, it appears that efficacy-related copy dampens the intensity of negative emotional responding, increases cognitive resources allocated to encoding the message, and improves message recognition. These results offer support for the idea that the inclusion of efficacy-related copy points help increase the “effectiveness” of anti-smoking advertisements.

<table>
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Figure 16
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<tr>
<td>2</td>
<td>Arousal</td>
<td>SAM-A</td>
<td>Messages with efficacy-related copy points had less self-reported arousal.</td>
<td>Partially</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SCR</td>
<td>Positive messages with efficacy-related copy had higher SCR than positive messages without efficacy-related copy. Negative messages with efficacy-related copy did not significantly differ in SCR from negative messages without efficacy-related copy.</td>
<td>Partially</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SCL</td>
<td>Positive messages with efficacy-related copy had higher SCL than positive messages without efficacy-related copy. Negative messages with efficacy-related copy had slightly lower SCL than negative messages without efficacy-related copy through most of the message.</td>
<td>Partially</td>
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<td>3</td>
<td>Pos. Affect</td>
<td>OO</td>
<td>Messages with efficacy-related copy points had more OO activity.</td>
<td>Partially</td>
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<td>4</td>
<td>Neg. Affect</td>
<td>Corr</td>
<td>Negative messages with efficacy-related copy had the least corrugator activity. Positive messages with efficacy-related copy had more corrugator activity than positive messages without efficacy-related copy. There was a greater difference in corrugator activity in negative messages.</td>
<td>Partially</td>
</tr>
<tr>
<td>5</td>
<td>Memory</td>
<td>Audio Rec</td>
<td>Negative messages with efficacy-related copy had greater audio recognition than any other message type.</td>
<td>Partially</td>
</tr>
</tbody>
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Figure 16.

**Attention**

In this study heart rate was used as a measure for attention, more specifically, resources allocated to encoding. The effect for heart rate strongly supported the hypothesis. The results showed that messages that contained efficacy-related copy points had greater cardiac deceleration than those that did not. There was a large difference in
cardiac deceleration between negative messages that contained efficacy-related copy points and negative messages that did not contain efficacy-related copy points. These results suggest that attention is not only affected by efficacy-related copy points, but is increased by the presence of these copy points. This pattern of results supports the idea that efficacy-related copy may decrease severity of a threat, so instead of withdrawing from a message people pay more attention to it. However, attention is not enough to fully support this idea. Perceived severity of a threat was not measured making this only a possible explanation. There are other possibilities why an increase of attention occurred.

Analysis of the heart rate data also showed that positive messages with efficacy-related copy points had the greatest cardiac deceleration throughout the entire messages, unlike negative messages with efficacy-related copy points that had great cardiac deceleration during the last part of the messages. With television messages, capturing attention is a key factor to a successful message. If an agency doesn’t have a message that people pay attention to, their entire message is lost. Is it better to have a message with better attention throughout the message or with tremendously more attention paid only during the end of the message? Attention, as mentioned earlier, is conceptualized as the amount of resources used to encode information. So, although increased attention is considered a good thing for television messages, it really depends on the performance of the encoding more than just the resources allocated to encoding an ad in working memory. The performance of encoding was tested by the audio recognition test. To put it bluntly, attention does not translate into memory.
Arousal

Self-report data, as well as skin conductance response, were used to measure arousal in this study. The results for self-reported arousal showed that participants found messages that contained efficacy-related copy points less arousing than those that did not. The results for skin conductance responses found that messages containing efficacy-related copy points had differing results, dependent on their emotional tone. Thus positive messages containing efficacy-related copy points had higher skin conductance response amplitudes than positive messages that didn’t contain efficacy-related copy points. Negative messages containing efficacy-related copy points had lower skin conductance response amplitudes than negative messages that didn’t contain efficacy-related copy points. These results neared significance but did not meet the p-value cut off of .05.

The skin conductance response and skin conductance level results partially support the hypothesis. It was predicted that efficacy-related copy points would dampen the intensity of negative emotional responding, which would be seen in terms of arousal as a decrease in skin conductance responses during negative messages. It was also postulated that efficacy-related copy points would enhance positive emotional responding, which would be seen in terms of arousal as an increase in skin conductance responses during positive messages. The reason that skin conductance response and level do not fully support the hypothesis is because the results of negative messages with efficacy-related copy do not differ significantly in SCR or a large amount in SCL from the results of negative messages without efficacy-related copy.
Self-report data and physiological data differ on their findings, with self-report finding more arousal in messages without efficacy, while in physiological data positive messages elicited more arousal. This difference could be due to several different reasons. The physiological responses could have been due to desensitization to negative material, especially that of anti-smoking. In the US, anti-smoking messages have been aired for years and so a smoker might be ‘immune’ so as to speak to these messages, which are usually negative. Further, the self-report data might have had messages with efficacy-related copy rated lower in arousal because they felt more in control. Unlike messages that don’t have efficacy-related copy, the ones that do offer ways of maintaining control of what happens to a person. These messages present ways a smoker can quit smoking and overcome the obstacles, unlike the messages that do not contain these copy points. Also, social response bias may be an issue, where the participants were answering with what they thought the researcher was looking for, or what they thought would make themselves look better. Whatever the reason for the difference between self-report and physiological findings, the interesting thing is that negative messages with efficacy-related copy points have the least arousal in all of the measures. This partially supports the idea that efficacy dampens negative emotional responding.

**Positive Affect**

The orbicularis oculi findings neared significance for the impact of efficacy; however, there was not an efficacy-related copy points by emotional tone interaction. This means that positive messages didn’t enhance the level of positive affect participant’s
felt, nor did negative messages have significantly less positive affect. However, because
the analysis neared significance, it possibly means that messages that contained efficacy-
related copy points could elicit more orbicularis oculi response than those that did not
contain efficacy-related copy points. This is an interesting point due to the mixed
findings on the orbicularis oculi as seen in the literature review. The orbicularis oculi has
been found in some studies to measure highly emotional content, instead of merely
positive affect (Bradley & Lang, 2000). Thus efficacy did have an impact on positive
affect; however, emotion did not.

It is plausible that although the messages were rated positive and negative in self-
report, that they weren’t positive or positive enough to elicit increased orbicularis oculi
activity and thus more positive affect. The stimuli were anti-smoking messages that were
being shown to smokers. Thus, although half were positive, they still are messages that
are directed against the participants’ behavior. It is also important to note that this paper
is based on the idea that positive and negative systems are separate. Thus it is plausible
that the messages didn’t affect the orbicularis oculi (positive affect) where as they
affected the corrugator muscle (negative affect).

Negative Affect

The corrugator findings suggest that negative and positive messages that contain
efficacy-related copy points have opposite effects. It suggests that negative messages
with efficacy-related copy points have a decrease in negative affect, while positive
messages with efficacy-related copy points have an increase in negative affect. The
decrease in negative affect during the negative messages suggests that efficacy-related copy points do indeed dampen negative emotional responding. The increase in negative affect for positive messages containing efficacy-related copy points could be explained by several things. For example, positive messages that do not contain efficacy related copy points have messages along the lines of “I don’t smoke, my friends don’t smoke.” Positive messages that do contain efficacy-related copy points, conversely, mention things such as “lung capacity increases 30 percent within three months of quitting smoking” and the ideas that people “feel better” when they quit smoking and that quitting takes practice. These messages could increase negative affect by possibly causing people to think of their own lives and smoking behaviors. This could be due to cognitive dissonance between what people know to be true in their life (smoking is a part of their life and they enjoy it) and what the message implies (if you smoke, you don’t feel as good and it’s hard to quit smoking). Further by mentioning the positives of quitting smoking, smokers could be prompted to think about the negative consequences of their smoking behavior.

When all of the messages were reviewed, it was found that negative messages that contained efficacy-related copy points didn’t have as much of a strong emotional pull or serious points of dialogue (except for one of the four messages) until the end of the message, around where the corrugator activity starts to increase for this type of message. This means that the copy points weren’t as relevant or as meaningful. Positive messages with efficacy-related copy points, however, seem to have dialogue points and pictures that have emotional pulls and serious dialogue points throughout the messages. The message design might be the cause of the difference between positive and negative
messages; however, even when the negative messages with efficacy-related copy points had the most corrugator activity, they still had less activity than two of the message types (positive messages without efficacy-related copy points had less activity for a several second span). Thus, even taking into account the difference in message design, negative messages that contain efficacy-related copy points create less negative affect than other message types.

**Memory**

The findings for audio recognition showed that negative messages that contained efficacy-related copy points were significantly better remembered than all of the other message types. The question is why specifically were negative messages with efficacy-related copy points better remembered, while there was no difference between any of the other three groups. Positive messages were not remembered better than negative messages (or vice versa). Nor were messages that contained efficacy-related copy points better remembered than those without. Instead it was specifically one group.

The negative messages with efficacy-related copy tended to have no background music or sound effects, unlike the other three conditions. Positive messages without efficacy-related copy points had one recognition clip out of the eight that was entirely music, as that was all in that section of the message. While the presence of background music could have made the audio clips harder to identify, it could have also made them more distinct. Due to the diversity in the clips, it is doubted that the presence of music
during the clips hindered recognition. Thus, it can be presumed that there was something about the negative messages that contained efficacy-related copy points.

Summary

Participants paid more attention to the messages that contained efficacy-related copy points than messages that didn’t. However, as this shows, attention does not necessarily translate into memory, although it can (as seen by negative messages that contained efficacy-related copy points). If efficacy-related copy dampens negative emotional responding, it also enhances reception of the message. This does not mean that people will accept and follow the messages (i.e. quit smoking). Instead it means people will pay more attention, react less negatively to the messages, and remember them better.

The overarching findings of this experiment are that efficacy-related copy points in messages do in fact dampen negative emotional responding in negative messages. Negative messages containing efficacy-related copy points elicit more attention, less arousal, less negative affect, and increase recognition. This paper highlights the need for the inclusion of efficacy in anti-smoking messages no matter the emotional tone of the messages. It also shows the need for efficacy-related copy in negative messages, as the differences between negative messages without efficacy-related copy points and negative messages with efficacy-related copy points are huge.

This study also branches the idea that efficacy can be used in all kinds of health communications, including choice behaviors. Most studies dealing with efficacy (at least using the EPPM as a basis) look at diseases and behaviors that can be done to prevent or
diagnose them. Smoking, instead, is a complete choice behavior. In relation to the EPPM, there isn’t something to modify behavior (example condoms to prevent HIV/AIDS) or to prevent something (example get a vaccine or get screened for a disease). Instead, the only real solution is to stop the behavior (quit smoking). Also, smoking doesn’t have one consequence, it has many and not everyone who smokes suffers the consequences at a major level. This affects the severity and susceptibility parts of the EPPM. If the EPPM can be branched out to smoking it can be branched out to other areas of health communication. It also shows the strong effect efficacy can have.

This study has several implications for the EPPM. It shows that the EPPM can be studied in other means than just self-report. This study tested various elements of the EPPM during message exposure. This helps overcome some of the weaknesses of self-report, such as response bias or answering based on the most memorable element of a message. It also suggests that in a threatening topic (anti-smoking messages would be threatening to smokers) efficacy helps lessen a person’s defensive responding to a threat. This lessening of defensive responding could facilitate a change from fear control to danger control. Although this study did not measure a person’s change to the RBD scale around a message, the changes in emotional responding during a message support the idea that negative messages that contain efficacy-related copy points are more manageable than those that don’t contain efficacy-related copy points. In other words, it would point the participant toward a danger control reaction, as the dampening of negative emotional responding would mean that there was greater efficacy than threat.

This study further supports the LC4MP. It shows that attention does not necessarily translate to increased recognition of materials, which goes back to the idea
that people have a limited amount of resources to allocate and the allocation of resources
to encode does not necessarily mean that the message was well encoded. Further, it
suggests that the processing of certain messages (ex. Efficacy) can dampen negative
emotional responding, which shows the most clearly in the corrugator data. This study
supports the LC4MP.

At the beginning of this paper, it was mentioned that this study sought to overlap
the EPPM and the LC4MP. The LC4MP deals with how the mind processes information,
while the EPPM deals with how people react to efficacy and threat messages. This study
shows that the two theories can work together and be overlaid. This study shows that
efficacy does have an impact on emotional responding, as measured through
physiological changes, instead of just self reported data.

As there are limited resources with which a person encodes, stores, and retrieves a
message, there are message features that enhance these processes. This paper suggests
that efficacy, by dampening negative emotional responding, helps enhance these three
processes during negative messages.

**Industry Implications**

This study means big things for advertising agencies and other agencies creating
anti-smoking messages. Whether positive or negative, agencies need to create television
messages that contain efficacy-related copy points. Although this study did not
distinguish between response efficacy and self-efficacy, it is important for the industry to
pick one or both types of efficacy to incorporate into their message. It is imperative to
use efficacy-related copy points in negatively toned messages. Further, negative messages that contain efficacy-related copy points would be the best approach they could use. The main point that members in the industry creating messages need to understand is that messages that are negative without any form of efficacy in them may be more likely to be processed defensively, which could decrease effectiveness of the message. Very few of the anti-smoking PSAs employ efficacy-related copy in them. Further, many of the messages created are negative. Although recently the Truth Campaign makes up most of the anti-smoking messages (with their bash on big tobacco), there should probably be messages geared at current smokers as well.

It would be interesting to look at advertisements that sell products to aid in the cessation of smoking. This form of product advertising seems more likely to employ efficacy as a means to push their product. They tend to focus on response efficacy, stating the benefits obtained by quitting smoking. Further they mention success stories of people who have high self-efficacy because they were able to quit smoking after all else had failed and either directly state or imply that the viewer can do it as well. The creators of public service announcements should imitate these product advertisements in the use of efficacy and amend their strategy and message testing so that their messages connect with the viewers. This study shows that on some level efficacy-related copy points help draw the viewer in, as seen by the increase in attention and the increase in memory (for negative messages).
Limitations

This study had several limitations. First, the messages were not created for this experiment so there are other variables within the messages aside from the specific ones being studied. This limitation was offset by the use of four messages per condition in hopes that the consistent variables (efficacy-related copy points/emotional tone) would be the ones affecting the outcome.

Only 32 participants were used, and several had one section of physiological data thrown out due to issues with collection of the data (sensors coming lose or picking up noise). Thus some of the findings neared significance instead of meeting the strict p-value cut off of .05 that was used for this study. Using only smokers made recruiting harder, as not all smokers admit to being smokers (thus social smokers were used as well). Further, this was an unfunded study, making the recruitment of participants even harder. This study, however, provides good pilot data into the field of emotional responding during efficacious messages. In this study, 78% of the participants were females. For 18-24 year olds who have attended college that smoke (age range used in this study was 18-29), only about 43% are females (CDC). Thus the study does not capture the true break down of smokers; however, since it was a within-subjects design measuring physiological responses, this should not affect the results.

It is also important to note that some of these findings are not directly applicable to the real world. This study took place in a lab meaning that it suffers a loss of external validity. This means that the findings aren’t generalizeable. For example, in a real world environment, a person has choices of what they want to watch. They have a remote so
that they can change the channel whenever they please. Thus simply paying more attention to a message in a lab setting does not mean that at home the person would pay attention to—or even see—the message. People also can multi-task while watching television, which would decrease the available resources to encode information.

Future Research

This study opens up a floodgate of further studies that can be run. More research should be conducted on efficacy’s impact on people’s emotional responding. Research should explore other variables and use different message designs containing efficacy-related copy points to see if message designs can enhance efficacy’s impact on emotional responding. Further, research on people who want to quit versus those who are content in smoking should be conducted to see if efficacy-related copy points have the same effect on both or if one group responds to the messages differently. It would be interesting to see if participants actually do accept the messages. To do this a survey on attitudinal and behavioral changes would need to be assessed; however, a TV message on quitting smoking is unlikely to actually translate into people quitting. It could, however, help foster an attitude more open to the idea of quitting.

Different age groups should be studied to see if efficacy-related copy points reach older versus younger people better (or vice versa). It should also be studied as to whether or not efficacy-related copy points in messages cause similar physiological responses in participants on different health messages (ex. Cancer messages, HIV/AIDS messages, diabetes).
It would also be interesting to measure startle responses during messages containing efficacy and those that do not and see what the differences are. Startle response is used to measure the level of aversive activation. Startle response is measured using the orbicularis oculi; however, the data is analyzed differently for startle response than for positive affect. Blasts of white noise are embedded into the messages. A person’s “startle” to these messages is measured. The bigger the startle response, the more aversive activation. It would be interesting to expand on the research in this area.

A secondary task reaction time (STRT) study should also be run on anti-smoking messages that contain efficacy-related copy. STRT studies offer another way to measure resources allocated to encoding. Although this was measured in the current study using heart rate, STRT would offer another measurement and allow for a form of repetition of results.

The TV advertisements selling products to help with cessation of smoking would be interesting to study in relation to those that push for the cessation of smoking without products. At least some of the product advertisements use efficacy, adding another dimension to how to study the use of efficacy. This makes sense because the marketers want people to believe that they need the product and that the product really does work. It would be interesting to see if these product advertisements do in fact use efficacy or a greater level of efficacy and what effect that has on emotional responding.
Conclusion

This study has paved the way for an abundance of future research. It has opened up exploration into a new area of research. Hopefully the effects of efficacy-related copy in anti-smoking message will be further studied so that more effective, persuasive messages can be created. The purpose of this study was to explore the relationship between efficacy-related copy and emotional tone. Since a relationship was in fact found to exist, the ramification is that more research needs to be pursued to find all the ins and outs of this relationship.
APPENDIX 1
Pretest Difference and Arousal Scores

Positive Efficacy 1
Difference Score: 2.184167
SAM-Arousal Score: 3.833333

Positive Efficacy 2
Difference Score: 1.790215
SAM-Arousal Score: 4.166667

Positive Efficacy 3
Difference Score: 0.601076
SAM-Arousal Score: 4.083333

Positive Efficacy 4
Difference Score: 0.204355
SAM-Arousal Score: 3.833333

Not used:

Positive Efficacy 5
Difference Score: 2.29129
SAM-Arousal Score: 2

Positive Efficacy 6
Difference Score: 2.520016
SAM-Arousal Score: 2.916667

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Positive No-Efficacy 1
Difference Score: 1.968441
SAM-Arousal Score: 3.916667

Positive No-Efficacy 2
Difference Score: 0.91871
SAM-Arousal Score: 4.833333

Positive No-Efficacy 3
Difference Score: 0.427604
SAM-Arousal Score: 5.75

Positive No-Efficacy 4
Difference Score: 1.77489
SAM-Arousal Score: 4.25

Not used:

Positive No-Efficacy 5
Difference Score: -1.21959
SAM-Arousal Score: 5.666667

Positive No-Efficacy 6
Difference Score: -0.77887
SAM-Arousal Score: 4.333333

_negative_efficacy_1
Difference Score: -1.39016
SAM-Arousal Score: 4.083333

Negative Efficacy 2
Difference Score: -0.74387
SAM-Arousal Score: 4.666667

Negative Efficacy 3
Difference Score: -0.45108
SAM-Arousal Score: 4.833333

Negative Efficacy 4
Difference Score: -0.00229
SAM-Arousal Score: 2.75

Not used:

Negative Efficacy 5
Difference Score: 0.508871
SAM-Arousal Score: 4.75

Negative Efficacy 6
Difference Score: 0.268315
SAM-Arousal Score: 4.25

Negative Efficacy 7
Difference Score: -1.5855
SAM-Arousal Score: 4.416667
Negative No-Efficacy 1
Difference Score: -2.38022
SAM-Arousal Score: 4.25

Negative No-Efficacy 2
Difference Score: -1.60016
SAM-Arousal Score: 4.75

Negative No-Efficacy 3
Difference Score: -2.24058
SAM-Arousal Score: 5.25

Negative No-Efficacy 4
Difference Score: -2.08271
SAM-Arousal Score: 5

Not used:

Negative No-Efficacy 5
Difference Score: -2.49958
SAM-Arousal Score: 6

Negative No-Efficacy 6
Difference Score: -2.51178
SAM-Arousal Score: 7.5

Negative No-Efficacy 7
Difference Score: -0.62899
SAM-Arousal Score: 5.833333
APPENDIX 2

Efficacy-related copy in messages

Positive messages with efficacy-related copy:
1. “…she’s already feeling better, has more stamina, more energy, and her lungs are stronger than ever before…”
2. (we can help) “…just three months after stopping smoking lung function increases up to 30%…”
3. “…takes time, practice and patience, call for help”
4. “…quitting takes practice… call us…we’ll teach you how to quit slow, for good”
   “I can do that” “I know you can”

Negative messages with efficacy-related copy:
1. “This is it, my last smoke… feels different… I can do this”
2. “…We told her smoking stinks up her hair, she said she could fix it. Same with her breath and clothes. Smoking makes her teeth and nails yellow, she said she could fix it…cigarette smoke gets into your skin and causes permanent wrinkles…she quit…it was cool”
3. “…I keep smoking. So what if my breath stinks, the breath mint people gotta make a living. So what if everything tastes like chicken, I like chicken. So what if the sex is only so-so….<dialing sound>”
4. “…I quit smoking. I went cold turkey, well, me and Bigfoot…. Quitting is easier with a friend”
REFERENCES


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