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THE INFLUENCE OF TRAIT ANXIETY ON INFORMATION PROCESSING: AN
ELABORATION LIKELIHOOD STUDY

by

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A thesis submitted in partial fulfillment of the requirements
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ABSTRACT

This study explored the influence of trait anxiety on information processing in persuasive situations, and investigated cognitive load as a mediator of this relationship. The research presented was based off DeBono and McDermott's (1994) framework for exploring trait anxiety and persuasion. The theoretical lens used to explore information processing, the elaboration likelihood model (Petty & Cacioppo, 1986b) posits that motivation and ability are necessary components to elaborate on a message. However, very little research has addressed ability variables like trait anxiety. I predicted that students high in trait anxiety would be persuaded by the attractiveness of the source (peripherally) whereas students low in trait anxiety would be persuaded by the strength of the arguments presented (centrally).

Undergraduate students were asked to view a picture of a policy presenter and listen to a recording of the student's proposed policy statement. After listening to the recording participants wrote down their thoughts during the presentation and were tested on their ability to recall the arguments presented. They then completed a few scale items assessing their attitudes toward the policy as well as questions to maintain the cover story.

Findings showed no difference in processing between low and high trait anxious individuals. However, there was a significant effect of anxiety on attitudes. Additionally, cognitive load was not found to be a mediator of the relationship between anxiety and attitudes.

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LIST OF ACRONYMS

ELM Elaboration Likelihood Model

CHAPTER ONE: INTRODUCTION

The elaboration likelihood model (ELM; Petty & Cacioppo, 1996) is one of the most influential models of persuasion. As a dual-processing model, it posits that people process persuasive messages through either a central or peripheral route. When a message is processed centrally, the individual engages in issue-relevant thinking and considers the issue carefully. When a message is processed peripherally, the individual makes a decision based on a cue that can be independent of the message, such as attractiveness of the communicator. Whether a message is processed centrally or peripherally is dependent on the individual's motivation and ability. An individual must be motivated and able in order to process a message centrally. If that person is either unmotivated or unable to process the message in some manner, he/she is more likely to be persuaded by peripheral cues.

One such ability factor that has yet to be studied extensively within Petty and Cacioppo's model is anxiety. Anxiety is characterized by feelings of fear, hesitancy, or dread (Endler, Hunt, & Rosenstein, 1962; Freud & Riviere, 1943). Anxiety can be categorized as state anxiety or trait anxiety. While state anxiety focuses on a specific event or situation that induces anxiety, trait anxiety deals with the enduring personality characteristic in which the individual has a propensity to experience anxiety in various contexts. Trait anxiety may play a strong role in the processing of messages as well as persuasion. Although early studies (Janis, 1954; Janis & Feshbach, 1954; Janis, 1955) explored anxiety or anxiousness and susceptibility to persuasion, very little research has been conducted since in exploring trait anxiety and persuasion. ELM

provides a model in which such research can be conducted and the effects of trait anxiety can be explored on a processing level.

Cognitive load, based in limited capacity models, focuses on the mental effort required to achieve a task. In the case of persuasion, cognitive load could be related to processing as well as outcomes. Trait anxious individuals have been shown to have diminished cognitive capacities as well as diminished performance in cognitive-demanding tasks (e.g. Berggren, Koster, and Derakshan, 2012). Applied to a communication context, cognitive load may provide an explanatory mechanism as to *how* ability is diminished by trait anxiety, as posited by the elaboration likelihood model. That is, reduced cognitive capacity may in fact mediate the relationship between trait anxiety and information processing.

Peripheral cues play a vital role in information processing. Attractiveness is one of the most salient peripheral cues (Chaiken, 1979; Mills and Aronson, 1965). Attractive communicators typically elicit more favorable cognitive responses. In persuasion studies, research shows attractiveness operates as a peripheral cue in persuasion. Attractiveness creates a halo effect in which the attractive communicator is seen as more likeable and credible (Horai, Naccari, & Fatoullah, 1974). Attractiveness as a source variable may play multiple roles. In high elaboration conditions such as when individuals have high motivation and high ability for processing a message, it is likely that this source variable acts as a persuasive argument of sorts, enhancing persuasion further. In low elaboration conditions such as low ability, a source variable may provide the simple cue necessary to adopt an attitude. Therefore, individuals scoring high in trait anxiety may have diminished ability and may be directly influenced by the attractiveness of the source as a peripheral cue. In contrast, individuals who score low in trait anxiety should be

able to process normally and elaborate in a normal fashion, focusing primarily on argument strength. The purpose of this study was to investigate the role of anxiety, source attractiveness, and argument strength in a when individuals are highly involved with a persuasion topic.

In summary, outside of early Yale group studies of the 1950's, little research has been done exploring the role of anxiety in persuasion. Furthermore, within research on ELM there is a paucity of research on ability factors or the multiple roles hypothesis with respect to information processing. This study will help fill a gap in the literature concerning ability factors in ELM as well as add to limited research on variables that can play multiple roles in elaboration. Furthermore, an exploration of cognitive load as a mediating variable will help researchers understand the choice to process peripherally in certain contexts. Examining these issues is an important step toward development of a more complete understanding of information processing in persuasion.

CHAPTER TWO: LITERATURE REVIEW

The Elaboration Likelihood Model

The Elaboration Likelihood Model (ELM), proposed by Petty and Cacioppo, provides a model of processing and persuasion. Rooted in social psychology, the model serves to emphasize individual processing strategies when a message is given and attempts to explain the phenomenon of attitude change. Petty and Cacioppo (1979a) found in their early work on persuasion that the key to understanding attitude change lies in the “nature of the cognitive responses elicited” (p. 1923). These responses are linked to two distinct routes to attitude change (Petty, Cacioppo, & Goldman, 1981). The *central* route, as posited by Petty and Cacioppo, involves processing of given information (elaboration), and forming an educated, thought out opinion. Attitude change is viewed as a function of a consideration of issue-relevant messages (Petty, Cacioppo, & Goldman, 1981). In contrast, the *peripheral* route posits that an individual’s change of attitude relies on heuristic or social cues to accept a message, such as the attractiveness of the source. These cues allow an individual to adopt a position without engaging in issue-relevant thinking (Petty, Cacioppo, & Goldman, 1981). It is clear that there is a variance in the cognitive processing that is required on each of these routes. Also, in order for persons to process a message centrally, they must be *motivated* and *able*.

When engaging in the central route, the strength of the persuasive message plays a crucial role. The cogency of the message is the primary factor in determining an attitude change on this route. A proper argument will elicit the favorable cognitive responses necessary, but a weak argument may lead to resistance or even a boomerang effect (Petty & Cacioppo, 1984). Greater

elaboration through the central route produces powerful and enduring results. First, attitudes influenced by issue relevant thinking (central route) more accurately predict behavior than attitudes based on cues. (Petty& Cacioppo, 1986b). Also, attitudes formed or changed by the central route are more resistant to counterarguments. It is clear that in many issue-relevant instances, the central route is preferable in persuasion attempts because of the long-term nature of the effects.

The peripheral processing route is rooted in the use of social cues. This processing route is characterized by a reliance on these cues rather than the presence of effortful message elaboration. Individuals are unlikely and unable to exert “considerable mental effort” in processing all messages. Therefore, individuals rely on cues as mental shortcuts to decision making regarding messages (Shavitt & Brock, 1994). The absence of issue relevant thinking can be an asset to persuaders. Some examples of peripheral cues are source attractiveness, source expertise, or number of arguments (Petty & Cacioppo, 1986a). Using these cues, a persuader is attempting to associate a positive affective state, induced by the cue, to the advocated position (Petty, Heesacker, & Hughes, 1997).

For example, someone wanting to purchase a new car could investigate consumer reviews, read articles on specific car companies, and explore car safety ratings. All of these in-depth investigative processes follow along the central route. Conversely, another person interested in a new car may conclude they have little time to do research and may buy a car based solely on a recommendation. This shortcut process aligns with the peripheral route, relying on cues to make a decision rather than engaging in issue-relevant thinking.

Postulates of ELM

Petty and Cacioppo (1986b) have proposed seven postulates of ELM that explain the dual-processing model in-depth.

Correctness postulate. ELM states that people are motivated to hold correct attitudes. An individual's subjective appraisal determines the correctness of the attitude rather than an objective (logical) appraisal. Issue-relevant processing of a message may confirm an individual's view. Individuals usually are not motivated to be biased, but their goals or motivations may promote bias, such as desiring to be consistent in a viewpoint over time.

Continuum postulate. Petty and Cacioppo make clear that processing exists along a continuum, rather than two distinct endpoints. The continuum exists along endpoints of no thought on issue-relevant messages (peripheral route) and extensive elaboration of information available (central route). Because elaboration is conceived as a continuum, people can engage in elaboration along any point in the continuum, with most cases falling in the middle rather than at extreme end points. Individuals can vary in both quantitative and qualitative dimensions along this continuum. People may engage in a similar qualitative process, such as engaging in issue-relevant thinking, but the "quantitative differences in the amount of thought can lead to differences in the strength of the attitudes formed" (Seiter & Gass, 2004, p. 70). Conversely, people can engage in varying qualitative processes as well. People could be evaluating the messages on different processing routes (ie one is engaged in issue-relevant thinking, the other is not) which utilize different qualitative processes, such as evaluating the strength of the messages (central route) or simply counting the number of arguments presented (peripheral route). With this case, both individuals could be persuaded in distinctly different ways, with one persuaded by

the strong messages received while engaged in issue-relevant thinking, while the other could be persuaded by an abundance of weak arguments, since no extensive thought is occurring.

Multiple roles postulate. In ELM, variables can play multiple roles across various persuasion contexts. Depending on the likelihood of elaboration in the given context, variables can have varying effects on persuasion. The qualitative differences mentioned earlier can create a situation in which the cues in one context where an individual is on the peripheral route can be used as arguments in a different context where an individual is on the central route. For example, Petty, Schumann, Richman, and Strathman (1993) found that mood played multiple roles in high- and low-thought conditions. They showed that mood had a direct effect on attitudes in a low-elaboration context, whereas in a high-elaboration context, the effect of mood on attitude was mediated by the valence of thoughts generated.

Objective-processing postulate. There are situations in which individuals seek the “truth” in a message rather than attaining a specific attitude. In these situations, changes in an individual’s motivation or ability directly influence the scrutiny of a message’s arguments. For example, distraction could lead to disruptive thoughts (Petty, Wells, & Brock, 1976), thus decreasing persuasion in a normally high elaboration likelihood context. Conversely, distraction could aid in persuasion when unfavorable thoughts have been elicited.

Biased-processing postulate. When an individual is motivated to maintain an attitude (such as the attitude towards a product recently purchased), that individual will be motivated to process messages in a way that is favorable to maintaining that attitude. Biased processing can also occur when variables such as a forewarning of persuasive intent can induce counterarguing and

resistance to persuasion (Petty & Cacioppo, 1979b). Depending on the valence of the thoughts generated based on the bias, a strong message can be enhanced due to bias or a weak message's lack of strength can be more readily apparent, increasing counterarguing.

Trade-off postulate. Petty and Cacioppo predict a trade-off between the impact of message elaboration and peripheral route processes on attitudes. As the likelihood of issue-relevant thinking increases, the impact of central route practices (e.g. evaluating the cogency of the argument) increases and the impact of peripheral route processes (e.g. source attractiveness) decreases. The opposite holds true as well. As the likelihood of elaboration decreases, the impact of peripheral cues on attitudes increases while the impact of central processes on attitudes decreases.

Attitude strength postulate. In regards to the results of message processing, attitudes formulated or modified through the central route are more persistent over time, are more resistant to persuasion, and have a greater impact on cognition and behavior than attitudes formulated or modified through the peripheral route. This notion has been confirmed by several studies over time exploring persuasion by different cues (Chaiken, 1980) as well as individual differences/personality's effects on persuasion (Cacioppo, Petty, Kao, & Rodriguez, 1986; Haugtvedt & Petty, 1992).

Motivation

Persuasion is dependent on *elaboration* – “the extent to which people think about issue-relevant arguments contained in persuasive messages” (Eagly & Chaiken, 1993, p. 306). Petty, Cacioppo, and Goldman (1981) stated that individuals elaborate on messages when they are

motivated to do so. It was clear from their earlier studies (Petty & Cacioppo, 1979a) that people were more motivated to process a message when it had a high personal relevance. They concluded that central route processing only takes place when a person is motivated to process the communication and has the ability to do so. Also, the message must be compelling in order to elicit favorable cognitive responses (Petty, Cacioppo, & Goldman, 1981). When this occurs, an individual engages in attentive thought to the issue, and based on the assumption he/she is motivated and able, will engage in issue-relevant thinking and will change an attitude based on the merits of the message. Linking back to the underlying decision making process of motivation and ability, Petty and Cacioppo (1986a) stated “as motivation and/or ability to process arguments is decreased, peripheral cues become relatively more important determinants of persuasion” (p. 20).

Individuals vary in the dimensions central to their attitudes and beliefs. Theoretically, in order to elicit elaboration, the message must be relevant to the individual. Motivation has often been operationalized as issue involvement in ELM studies. Issue involvement is manipulated to identify the inherent drive to engage in issue-relevant thinking. Petty and Cacioppo were not the first to point out the relevance of issue involvement to the persuasion process. Sherif, Kelly, Rodgers Jr., Sarup, & Tittler (1973) initially found that different levels of involvement are associated with differences in social judgment, even among individuals with the same attitudinal position. They also found a positive relationship between issue involvement and future behavior engagement post-message. Petty, Cacioppo, and Goldman (1981) acknowledged that aligning with social judgment theory, the greater the personal involvement with an issue, the more difficult it is to change those attitudes. Providing a framework for elaboration, Petty and

Cacioppo (1979a) identified that increasing a person's involvement with an issue also increases a person's motivation to think about information presented in the persuasive message.

Ability

Ability, the other situational factor that influences whether a person processes a message centrally, has been operationalized in various ways in ELM studies. Ability can be influenced by both situational variables and personal variables. For example, the ability to think about a message (and thus engage in the central route) can be reduced by time – a situational variable, or lack of knowledge – a personal variable (Petty, Heesacker, & Hughes, 1997). A common manipulation of ability is distraction. In most situations, attention and involvement correlate highly, and attention has even been deemed a necessary component of persuasion (Ray & Batra, 1983). From an ELM perspective, distractions can interfere with a subject's ability to generate supportive arguments or counterarguments (Petty, Wells, & Brock, 1976). Specifically, distraction will result in “enhanced persuasion when a message presents poor arguments...and reduced persuasion when a message presents very good arguments” (p. 883). Distraction creates a modulating effect on persuasion in which distraction constrains the primary cognitive response of a persuasive attempt. If the primary response is counterarguing, distraction will inhibit this response and thus increase persuasion. If the primary response is favorable thoughts and responses, distraction will inhibit this function and decrease persuasion.

Additional factors affecting ability to elaborate have been studied. Heart rate can have an effect on ability to elaborate. Cacioppo (1979) found that subjects generated more counterarguments when a message was read when a recipient had an accelerated heart rate by

manipulating a pacemakers' beats per minute to be higher than a normal setting. One final ability factor is intelligence. Rooted in ELM, it is tempting to suppose that the greater a recipient's intelligence, the greater ability to elaborate. However, the role of intelligence in elaboration appears to be quite complex. Petty and Cacioppo (1986a) noted that argument strength is quite subjective and an argument's strength depends on the prior store of information in memory. The effect of intelligence can be confounding based on this notion. An interesting note to the complexity of intelligence's effect on persuasion is that an intelligent individual may be more susceptible to specific peripheral cues. For example, a participant of high intelligence may perceive that a source that acknowledges both sides of an argument is more credible when compared to a source that acknowledges only one side (Petty & Cacioppo, 1986a).

Anxiety

Although it has rarely been assessed with relationship to ELM, anxiety may also be a factor related to ability to engage in central route processing. Anxiety can be characterized by feelings of hesitation, withdrawal, fear, trembling, and even immobilization (Endler, Hunt, & Rosenstein, 1962). Freud (1943) also noted that anxiety is a character trait comprised of "expectant dread" or "anxious expectation". Lader (1975) posited that there is difficulty in defining anxiety because it is "an amalgam of overt behavioural characteristics that can be studied scientifically, and introspective feelings that are epistemologically inaccessible" (p. 6). It is clear that there is a variation in defining anxiety among scholars, but it is apparent that as an affective state it is characterized as a drive of sorts, with nervousness and possible fear. As a character-trait, anxiety is conceived as an ever-present factor in one's personality – it is a stable condition of higher alertness, sense of danger, and nervousness. The differentiation between

these two states led to the trait-state models of anxiety, distinguishing between an affective state (state anxiety) and a character trait of anxiety (trait anxiety).

Spielberger (1985) distinguished that anxiety can be conceived as either reactions/responses or as a personality trait. Referring to an individual as “anxious” can intimate that the individual is anxious at the moment, or that the individual is an anxious person. A trait anxious person has the general tendency to respond to situations anxiously and a propensity to respond to stress and threat anxiously (Reiss, 1997). In contrast, state anxiety is conceived as a reaction of sorts. State anxiety is triggered by a cognitive appraisal of external variables as threatening, inducing a fear or danger control reaction. Rather than a propensity to respond to situations anxiously, it is the situation itself that induces anxiety.

Anxiety and Persuasion

Early persuasion studies explored the effects of persuasive communication on anxious and non-anxious individuals. Janis and Feshbach (1954) investigated the effectiveness of fear arousing communication on anxious individuals and found that highly anxious individuals were less influenced by fear-arousing communication. In a similar study, Janis (1955) hypothesized that highly anxious individuals’ predisposition to being persuaded depends on the anxious reaction induced. That is, persons with a high degree of “neurotic anxiety” (i.e. phobias or anxiety attacks) would be less persuadable, whereas persons with high “socially oriented anxiety” (i.e. shyness or fear of criticism) would be more persuadable (p. 663). Few differences were found between groups, although socially oriented anxiety was significantly more predictive of attitude change over time.

Anxiety inducing messages, or fear appeals, can also increase persuasion. Instead of utilizing physical consequences, the traditional focus of anxiety arousing communication, Powell and Miller (1967) provided a focus on social consequences. They hypothesized that the pressure to conform to societal norms and preferences or the risk of disapproval from deviating from these norms could be a key motivator in persuasive attempts. Regardless of the level of source credibility, they found that social-disapproval messages induced greater anxiety than social-approval messages. Furthermore, the social-disapproval message only produced greater attitude change with a highly credible source. This suggests anxious individuals may process messages differently based on the presence of peripheral cues. While various messages may induce similar levels of anxiety, the use of a peripheral cue such as credibility or attractiveness may be the necessary component to achieve attitude change in anxious individuals.

From an ELM perspective, anxiety affects one's ability to elaborate on a persuasive message. Anxiety can interfere with the processing of messages and lead to a peripheral route of persuasion. DeBono and McDermott (1994) sought to explore differences in persuasability between high and low trait anxiety groups. Participants initially were separated into high and low trait anxiety groups based on a median split of their scores on the Trait Anxiety Scale. Using a perfume magazine advertisement as the persuasive communication, a 2 (trait anxiety) x 2 (source attractiveness) x 2 (argument strength) factorial design was used. As expected, low trait anxiety individuals were more persuaded by the cogency of the message rather than the attractiveness of the source. In contrast, high trait anxiety individuals were influenced by the attractiveness of the source rather than the strength of the argument. These results suggest that people high and low in trait anxiety may utilize different information in attitude formation. In terms of ELM, those high

in trait anxiety relied on a peripheral cue, source attractiveness, to form an attitude toward the perfume. Higher attractiveness of the source was associated with more positive attitude towards the product. Conversely, those low in trait anxiety were more influenced by the cogency of the argument to form an attitude towards the perfume. Stronger arguments were associated with more favorable attitudes toward the product. In the low trait anxiety group, no main effect for spokesperson attractiveness occurred.

Anxiety's effect on persuasion is similar to other drive models, such as the Extended Parallel Process Model (Witte, 1992). The appraisal of a threat induced by a fear appeal triggers a variety of cognitive responses. The perceived threat directly influences a person's motivation to process a message and in turn behavior, whether it is to mitigate the danger itself or the feeling of fear. Fear or perceived threat creates a drive to behave in such a way that alleviates the negative state that arises. Similarly dealing with perceived threat or danger, when anxiety is high, a drive is created to relieve that anxiety. This drive influences message processing and in the case of persuasive attempts, attitudes and behavior will align in such a manner as to relieve the anxiety. Therefore, anxiety should increase a person's motivation to process as well.

One factor that ELM research does not address sufficiently is individual differences in ability. Though from a state anxiety context, Sarason (1984) found that those prone to test anxiety performed noticeably different when an evaluative component was introduced to a testing situation. It was clear that a stronger anxious reaction was induced upon the introduction of an evaluative component. There has been considerable support for the idea that cognitive performance in highly anxious individuals diminishes greatly in task performances that demand cognitive resources (Deffenbacher, 1978; Gross & Mastenbrook, 1980; Sengupta & Johar, 2001).

Anxiety significantly modulates the effectiveness of attentional networks, such as alertness and orientation (Pacheco-Unguetti, Acosta, Callejas, & Lupianez, 2010), which can affect a variety of outcomes in communication. The mechanism behind this association may be distractibility. Anxiety can impair processing efficiency as well as inhibition functions, leading to an increase in distractibility (Eysenck, Derakshan, Santos, & Calvo, 2007).

Eysenck, Derakshan, Santos, and Calvo (2007) proposed that anxiety impacts cognitive performance through attentional control. Aligning with trait anxiety, they noted that “anxious individuals preferentially allocate attentional resources to threat-related stimuli whether internal...or external” (p. 338). Expanding further, anxiety creates an imbalance among the two attentional systems. The stimulus-driven attentional system (ie threat response) has an augmented role in anxious individuals while the goal-directed attentional system has a diminished role in processing and behavior (Corbetta & Shulman, 2002). Although framed in terms of task performance, Eysenck et al. (2007) make clear through attention control theory that anxiety impairs processing efficiency.

Attractiveness

In the context of the Elaboration Likelihood Model, communicator attractiveness is a strong peripheral cue in a low elaboration context. It is assumed that an attractive communicator (versus a less attractive/unattractive communicator) will elicit more favorable cognitive responses. Dion, Berscheid, and Walster (1972) identified the natural stereotype that “what is beautiful is good” (p. 285). It was found that attractive individuals were more socially desirable and were perceived to enjoy better occupational and social lives. Patzer (1985) noted that the strength of

attractiveness may lie in the construct itself, as “no other personal characteristic is so readily observable” (p. 9) other than race or sex. The immediate availability of this cue in interaction makes it so strong. Decisions are made instantaneously based on previous perceptions and schemata as to whether an individual is both likeable and trustworthy. Based solely on the attractiveness of the individual, participants received the impression that the individual was happy, active, and amiable. This interpersonal “reality” of attractiveness equates to positive attributions and plays a vital role in persuasive communication.

There have been multiple theories throughout history as to what makes an individual attractive. The ancient Greeks argued for the mathematical concept of the “Golden Proportion”, a 1:1.6 ratio that describes an ideal ratio for physical structures in nature. Examples of natural objects that exemplify this ratio are flowers or the spiral in a seashell (Rubenstein, Langlois, & Roggman, 2002). Langlois and Roggman (1990) examined whether mathematical averageness is linked to facial attractiveness. They found that the more face composites averaged (i.e. 16 or 32 faces versus 2) the greater judges rated attractiveness. These tendencies carried across various cultures when rating culturally similar faces as well as culturally different faces. Overall there was cross-cultural agreement on attractiveness based on averages. Also, facial symmetry is a factor in facial attractiveness. An asymmetrical face can hint at developmental issues that arise based in genetic fitness, so symmetry may be a vital clue of an individual’s genetic quality and thus crucial in mate selection (Thornhill & Gangestad, 1993)

Attractiveness and Persuasion

Attractiveness can have a strong impact on attitudes and persuasive communication. Providing some of the earliest support for the effects of attractiveness, Mills and Aronson (1965) found strong support of greater persuasion with attractive sources than unattractive sources. Chaiken (1979) also found that physical attractiveness significantly enhanced persuader effectiveness, even across sexes. Attractive communicators also are often perceived as more credible of a source than unattractive communicators, whether as a live facilitator or simply a pictured individual (Snyder & Rothbart, 1971). Attractiveness is a strong enhancer of persuasion due to this multi-level cue – beyond the surface it also enhances other peripheral cues like credibility or likeability. Attractive persuaders could be more persuasive not only due to attractiveness but also because they are more effective communicators due to a heavier exposure to social settings that enabled them to hone their communication skills (Goldman & Lewis, 1977). Similarly, Horai, Naccari, and Fatoullah (1974) found support for a relationship between high attractiveness and high perceived expertise. Also, unattractive sources were liked less than attractive individuals as well as unpictured persuaders. From a marketing context, a communicator of higher physical attractiveness enhances receiver attitude and evaluation of a product (Baker & Churchill, 1977). Patzer (1985) found that aside from interaction effects, communicator physical attractiveness's effect on cognitive and affective attitudinal components is positive. Patzer also stated that “as the communicator physical attractiveness increases, the receiver's beliefs increase in agreement with the persuasive communication” (p. 212).

In a more recent study of attractiveness, Olivola and Todorov (2010) found that there is strong evidence to suggest that voting, in part, is rooted in the attractiveness of the candidate as

well as appraisals made based on the candidate's attractiveness. Specifically, higher ratings of attractiveness were associated with higher ratings of perceived competence – a major factor in candidate selection and voting. Additionally, Praxmarer (2011) found that attractive presenters in advertisements for attractiveness-unrelated products were more persuasive than unattractive presenters. Those presenters were also rated as more competent and trustworthy in both same-sex and opposite-sex conditions. There were also increased levels of liking of the advertisement for the attractive presenter advertisement in comparison to the unattractive presenter advertisement.

Results of studies regarding attractiveness and expertise have been inconsistent (Horai et al., 1974; Mills & Harvey, 1972; Snyder & Rothbart, 1971). Maddux and Rogers (1980) ran similar studies and found no effect of attractiveness on perceived expertise. They proposed that under certain conditions, attractive sources may lack the influential power based solely on attractiveness. Similarly, Eagly, Ashmore, Makhijani, and Longo (1991) conducted a meta-analysis on studies regarding the physical attractiveness stereotype. The analysis revealed that the effects of attractiveness on perceivers' inferences were highly varied and the effect of such a variable depended heavily on the type of inference the receiver was asked to make. As one explanation of the variation in effects of attractiveness on persuasion, Petty, Cacioppo, and Schumann (1983) posited low involvement situations promote the use of peripheral cues. High involvement conditions promote elaboration and issue-relevant thinking and thus nullify or diminish the attractiveness effect. Conversely, low-involvement issues may discourage elaboration and issue-relevant thinking and may make attractiveness a relevant cue or enhance the effect of the cue.

Petty and Cacioppo (1986a) noted that certain variables can serve multiple roles in persuasion. Some variables that can have this effect include source variables, mood, and rhetorical questions. Source variables affect persuasion differently as the elaboration likelihood changes (Eagly & Chaiken, 1993). When motivation and/or ability for processing are low, “positive sources appear to be effective as simple cues” (Petty & Cacioppo, 1984, p. 669). For example, Kiesler and Mathog (1968) found that when manipulating distraction (an ability variable) and source credibility (a source variable), source credibility’s effect was significant only in the high distraction group. It is reasonable to infer that source attractiveness, another source variable, could also play multiple roles – it could serve as a peripheral cue when elaboration likelihood is low but play no vital role in a high elaboration condition.

In the case of high trait anxiety (low ability), participants will likely treat attractiveness as a simple cue that directly influences their attitude. Research (Chaiken, 1980; Petty et al., 1981) has shown that a lack of ability in some manner influences people to rely on a peripheral cue to process a message. As ability decreases or becomes absent, the cogency of the argument becomes less important as a determinant of the persuasiveness of the arguments. High trait anxiety, a lacking of ability, should promote the processing of peripheral cues, especially in the case of a highly attractive source. Due to a lack of ability, as identified by Petty and Cacioppo (1984), trait anxious individuals will rely on the saliency of a peripheral cue. In the case of this study, having a highly attractive source in a low ability condition should encourage individuals to process peripherally.

Based on this literature the following hypotheses were advanced:

H1: In a high involvement situation, individuals low in trait anxiety will be persuaded more by the cogency of the argument than the attractiveness of the source.

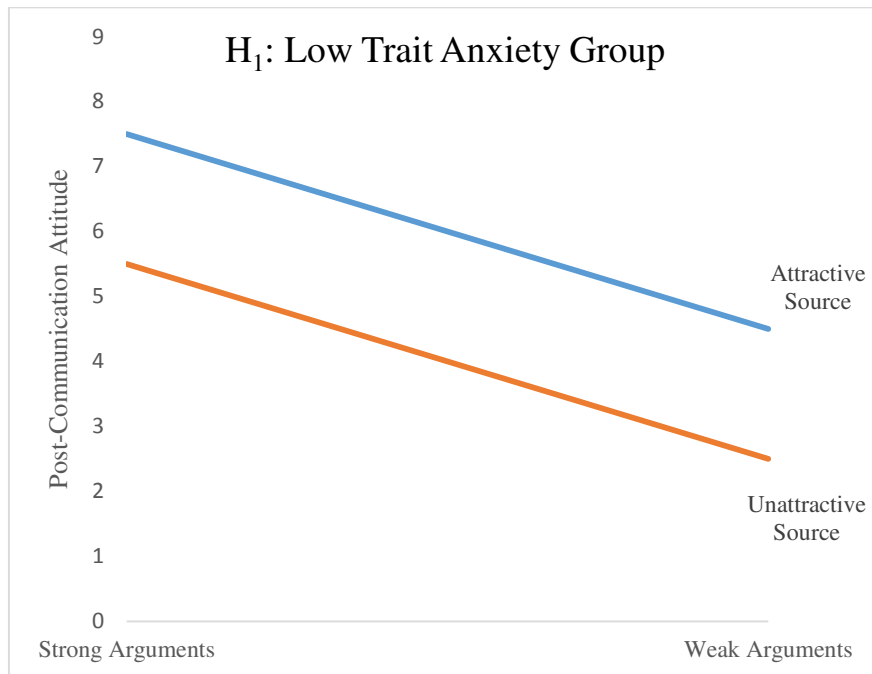


Figure 1. Graphical representation of H₁

H2: In a high involvement situation, individuals high in trait anxiety will not be persuaded by argument strength in the high attractiveness condition, but will be persuaded by argument strength in the low attractiveness condition.

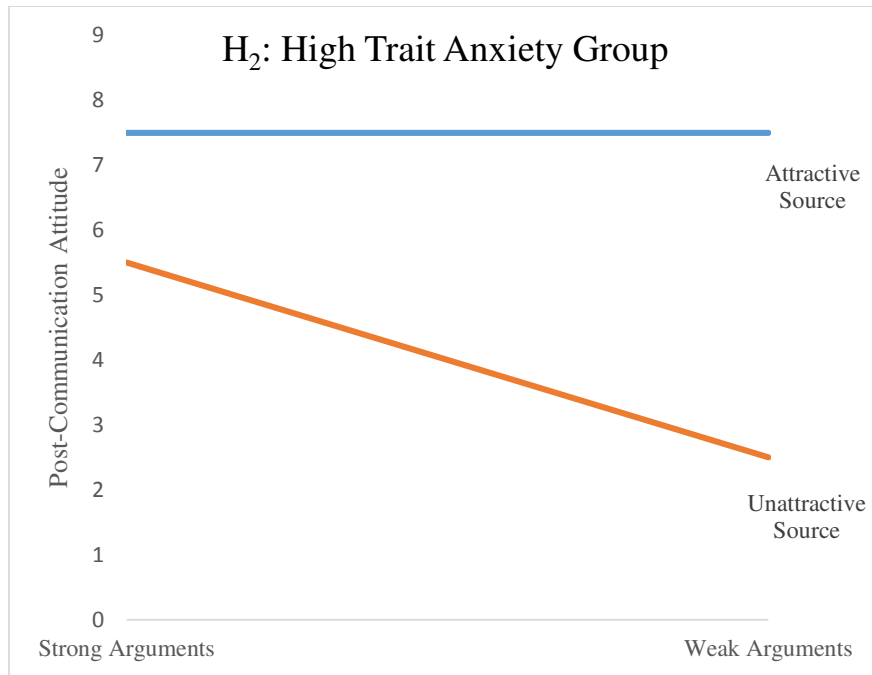


Figure 2. Graphical representation of H₂

Cognitive Load Theory

Sengupta & Johar (2001) indicated that from an ELM perspective, in high anxiety conditions, a lowered cognitive capacity can impede message elaboration, reducing issue-relevant thinking and message recall. One explanation for this could lie in the construct of cognitive load, a mediator variable that has not previously been proposed in an ELM context. Cognitive load is the mental workload necessary for learning (Moreno & Park, 2010). Paas, Renkl, and Sweller (2004), have proposed that cognitive load has three sources: intrinsic (number of elements to be processed simultaneously and prior knowledge), extraneous (other mental activities), and germane (schema acquisition and automation) load. Additionally, the crucial aspect of this theory with respect to this study is the notion of the “additivity hypothesis,” which posits that when people are faced with new material, additional cognitive load is placed on

the individual to process this new material. In the case of processing messages, if the cognitive load induced by persuasive communication is excessive, issue-relevant thinking and elaboration may be inhibited.

Working memory is the primary structure associated with processing information. In order to understand cognitive load, it is vital to understand working memory and its place in cognitive processes. There are multiple models of working memory and how the various components work together. One useful model in the case of cognitive load is working memory as a workspace. Within this workspace, the central executive controls the flow of information and balances attentional resources (Kellogg, 2007). The components of working memory work simultaneously to process or recall information. Cognitive load deals with how much information our minds (working memories) can hold. When dealing with novel information working memory is limited in capacity and duration (Sweller, Ayres, & Kalyuga, 2011). That is, individuals exposed to messages can create a significant load, especially when the effects of anxiety are present. Anxiety can affect working memory performance by requiring more effort to process information, which in turn reduces processing and storage capabilities of memory (Owens, Stevenson, Norgate, & Hadwin, 2008). Therefore, according to ELM, anxiety can diminish ability to store information, quite possibly leading to a peripheral route to persuasion.

Support for cognitive load as a mediating process in persuasion can be found in cognitive psychology. Kahneman's (1973) capacity theory proposed that attention is limited based on an overall cognitive capacity. An individual's ability to carry out tasks as well as the ability to assign cognitive resources is fixed. An activity can fail simply because of a lack of cognitive capacity or because other activities are drawing resources away from the primary task. Applying

the concept of capacity theory to the communication field, Lang's (2000) Limited Capacity Model of Motivated Mediated Message Processing (LC4MP) posits that due to a fixed capacity of cognitive resources, individuals process mediated messages (such as television viewing) differently and utilize different amounts of cognitive effort in encoding, storage, and retrieval. As CLT and capacity theory would posit in a communication context, Lang identified that the major factor in processing of messages is if the message receiver has enough cognitive resources available to adequately process the message.

If fewer cognitive resources are allocated to the processing of the message than required, the message will not be processed thoroughly. Therefore, message receivers must have the cognitive capacity to first process a message and then engage in issue-relevant thinking. Given this, we might expect that when trait anxious individuals are exposed to a message, this will increase their cognitive load as an extraneous variable, and lower their ability to perform the task, in this case engage in issue-relevant thinking about a particular piece of persuasion. That is:

H3: Cognitive load will mediate the relationship between trait anxiety and cognitive processing.

Conclusion

ELM is useful for studying persuasive communication from a processing perspective. Within this processing model, a variety of factors can affect ability. The personal ability variable of anxiety has not been explored sufficiently. Petty and Cacioppo's studies on need for cognition are the only such studies of a personality variable that depends on individual differences. Also, there is a strong need for additional research on ability factors influencing processing and persuasion. Although Janis's preliminary work in anxiety and message processing ushered in the

creation of a processing model, little research has been done since that era to explore anxiety's effect on processing and persuasion. A study on the link between these areas would address this gap in the literature.

Research on persuasive communication and trait anxiety is quite limited since Janis's early work. DeBono and McDermott (1994) provide a suitable model for exploring trait anxiety's effect on elaboration, but lacked any sort of answer as to why there was a difference between high and low trait anxiety groups. A possible mediating variable is cognitive load. Research has shown a difference in cognitive processing and ability in trait anxious groups (Deffenbacher, 1978; Gross & Mastenbrook, 1980; Sengupta & Johar, 2001). Assessing levels of cognitive load should show significant differences between groups and may explain differences in persuasion across groups.

CHAPTER THREE: METHODS

Study Design and Participants

This study employed a 2 (trait anxiety: high, low) x 2 (attractiveness: high, low) x 2 (argument quality: strong, weak) factorial design. A convenience sample of 561 university undergraduates was drawn from large undergraduate communication courses at the University of Central Florida. Participants who did not complete the survey in its entirety were removed from the study. This policy resulted in a removal of 19 cases, leaving a total of 542 participants. Of the sample, 40.2% were male and 59.8% were female. The race breakdown of participants was 2 (0.4%) American Indian or Alaska Native, 22 (4.1%) Asian/Pacific Islander, 62 (11.4%) Black or African American, 380 (70.1%) White, 75 (13.8%) Other, and 1 (0.2%) Unknown. The majority of participants (93.9%) were 18-24 years old.

Participants were recruited directly from large undergraduate courses in the College of Sciences. Most participants were offered class credit for completion of the experiment, with alternative credit assignments available for those under 18 years of age or who chose not to participate in the study. Permission for the study was obtained from the UCF Institutional Review Board (IRB).

Procedure

Students were notified of the study by their instructors. The announcement stated that an interpersonal communication graduate student is performing an experiment to complete his degree. It explained that the purpose of the study is to measure student responses to proposed university policies.

Upon arrival to the survey webpage, students were informed that the University of Central Florida was currently undergoing an academic reevaluation and that administration (including the president of the university) was seeking recommendations about policy changes to be instituted. The subjects were told that each policy statement had been recorded for presentation to the university administration. The participants were also told that the communication department was cooperating with university administration in having the taped statements rated for quality assurance. Participants were randomly assigned to one of the following conditions: a strong message and an attractive source, a weak message and an attractive source, a strong message and an unattractive source, or a weak message and an unattractive source. After receiving instructions and completing the anxiety measure, participants viewed a picture and heard a recording. All of the recordings were made by the same speaker and advocated that seniors should be required to take comprehensive examinations in their major area as a prerequisite to graduation. After listening to the appropriate message, students completed a dependent variable questionnaire, were debriefed, thanked, and dismissed.

Independent Variables

Trait Anxiety

Participants preliminarily completed the trait portion of the State-Trait Anxiety Inventory (STAI Form Y) and subsequently were classified in high and low groups based on the top and bottom 30% of scores (Debono & McDermott, 1994; Janis, 1955; Sengupta & Johar, 2001).

Attractiveness

Accompanying the recording was a picture of an individual, indicated as the author of the policy statement. The individual pictured for both the attractive and unattractive conditions remained the same. In the unattractive condition, the attractive individual's photo was manipulated using Adobe Photoshop to reduce attractiveness (ie less face symmetry, noticeable blemishes, etc.), thus reducing variables accrued with using different individuals. Three photos were pretested to ensure a significant difference in attractiveness ratings using a separate panel of students that were not participating in the study. The individual that had the greatest mean difference in attractiveness ratings between the attractive and unattractive photographs was chosen as the stimuli for the survey.

Argument Quality

Even though all subjects heard a message advocating the institution of senior comprehensive exams, the arguments that were used in support of the message conclusion were varied. As a rule of the thumb, Petty and Cacioppo (1986a) argued that strong messages should elicit predominantly favorable thoughts (ie 65% favorable, 35% unfavorable) when participants are instructed to think about them, but weak messages should elicit predominantly unfavorable thoughts (ie 65% unfavorable, 35% favorable) when participants are instructed to think about them. In order to align with this rule of thumb, all arguments were pretested to assure a significant difference between strong and weak arguments. In short, strong arguments provided persuasive evidence (statistics, data, etc.) in support of the exam. For example, the comprehensive exam will allow students' to place a greater emphasis on material the student feels is most relevant. Weak arguments, on the other hand, relied primarily on weak evidence

such as quotations, personal opinions, and examples to support their opinion. For example, a friend of the speaker recently took a senior comprehensive exam and now has a prestigious academic position. The messages were equivalent in length and were also pretested to assure no differences in the difficulty to understand the messages or that the messages were hard to follow. These messages were pretested by a separate panel of students to ensure significant differences between strong and weak messages.

Cognitive Load

Cognitive load was assessed using a simple recognition test. Subjects heard samples taken from the original policy statements they heard. After each audio file the participant was asked to indicate whether he or she heard the statement during the experiment. Half of the sound files presented were from the content presented during the experiment, and the other half were not; they were foils. Foils were chosen from the same policy statements, but were changed slightly in order to change the meaning of the phrase or statement. If a participant indicated that he or she had heard a statement that they actually did, that was considered a hit. If a participant indicated that he or she heard a statement that was not previously heard, that was considered a false alarm. Hit rates were calculated for each of the recall questions and summed to create an overall recognition score.

Dependent Variables

Attitude Toward the Policy

Two measures of attitude were included. The first asked participants to rate the concept “Comprehensive Exams” on four 9-point semantic differential scales (*good/bad*, *beneficial/harmful*, *foolish/wise*, and *unfavorable/favorable*). Next, on an 11-point scale anchored by 1- “*do not agree at all*,” and 11- “*agree completely*,” participants rated the extent to which they agree with the proposal requiring seniors to take a comprehensive exam before graduating. The participants’ responses were converted to standard scores and averaged for an index of attitudes toward comprehensive exams. Participants then responded to a number of additional items designed to maintain the cover story, such as ratings of the speaker voice quality, delivery, enthusiasm, etc.

Thought Listing

Similar to Petty et al. (1981), participants listed the thoughts they had while listening to the tape. Five boxes in the online survey were provided to write down those thoughts. After completing this initial step, participants then rated their ideas as either favorable, unfavorable, or neutral. No independent judges were used to score subjects’ thoughts listed, since previous research indicates judges’ ratings correlate highly (Petty & Cacioppo, 1979; e.g. Petty & Cacioppo, 1984; Petty, Wells, & Brock, 1976).

CHAPTER FOUR: RESULTS

Preliminary Analyses

Manipulation Checks

An independent samples t-test ($t(540) = 15.45, p < .001$) revealed a significant difference in attractiveness ratings on a ten point scale across conditions such that those in the attractive condition rated their student policy presenter as more attractive ($M = 6.41, SD = 2.268$) than those in the unattractive condition ($M = 3.58, SD = 1.993$). Additionally, an independent samples t-test ($t(540) = 11.81, p < .001$) revealed a significant difference in ratings of the quality of arguments presented on an eleven point scale across conditions such that those in the strong argument condition rated the arguments heard as stronger ($M = 7.65, SD = 2.232$) than those in the weak argument condition ($M = 5.07, SD = 2.818$). The thought listing items were also checked to ensure a successful manipulation of argument strength. Petty and Cacioppo suggested that strong arguments should elicit 65% favorable thoughts and weak arguments should elicit 65% unfavorable thoughts. The manipulations proved to be close to these requirements: those in the strong argument condition listed 60.9% favorable thoughts and those in the weak argument condition listed 62.3% unfavorable thoughts.

Trait anxiety scores ranged from 21 to 68, compared to the minimum of 20 and the maximum of 80 on the scale ($M = 40.59, SD = 9.52$). For the purposes of hypothesis testing, STAI scores were converted to a nominal variable with the lower 30% of scores (161 participants) in the low anxiety group and the upper 30% of scores (173 participants) in the high anxiety group. Those in the low group had scores ranging from 21 to 34 and those in the high

group had scores ranging from 46 to 68. A one sample t-test ($t(333) = 37.18, p < .001$) confirmed significant differences between the low anxiety and high anxiety groups.

Reliability

The reliability for scales were as follows: the 20 item trait measure of the STAI scale was highly reliable ($\alpha = .90$) as was the 5 item composite attitude measure ($\alpha = .92$). The recall exercise also yielded a reliable, normal distribution of scores, with a mean of .72 (72% correct) and standard deviation of .18.

Hypothesis Testing

H₁ and H₂ predicted an interaction effect of trait anxiety, argument strength, and attractiveness of the source on attitudes such that those low in trait anxiety would be persuaded by the strength of the argument, whereas those high in trait anxiety would be persuaded by the attractiveness of the source. To test these hypotheses, a three-way analysis of variance (ANOVA) was ran. Results are presented in Table 1. The analysis revealed that neither H₁ nor H₂ was supported. As expected, argument strength had a significant positive relationship with attitudes toward the proposed policy. Additionally, post hoc analysis did reveal a main effect of anxiety on attitude ($F(2) = 3.25, p = .039, \eta^2 = .012$) such that participants low in trait anxiety rated the comprehensive exams more favorably ($M = .11, SD = .94$) than those high in trait anxiety ($M = -0.13, SD = .85$) on the standardized index of attitude.

Table 1.
 Test of relationship of trait anxiety, argument strength, and attractiveness of source on attitude

| Source | <i>df</i> | <i>F</i> | <i>P</i> | η^2 |
|--|-----------|----------|----------|----------|
| Anxiety | 2 | 3.253 | .039 | .012 |
| Argument Strength | 1 | 116.576 | .000 | .180 |
| Attractiveness | 1 | .739 | .390 | .001 |
| Anxiety x Argument strength | 2 | 1.279 | .279 | .005 |
| Anxiety x attractiveness | 2 | .266 | .767 | .001 |
| Argument strength x attractiveness | 1 | 2.764 | .097 | .005 |
| Anxiety x argument strength x attractiveness | 2 | .370 | .691 | .001 |

H₃ stated that cognitive load would mediate the relationship between anxiety and attitude. In order for mediation to be established, certain criteria must be met. First, there must be a relationship between the causal variable (anxiety) and the dependent variable (attitude). This criteria was met. However, when recall score, the measure of cognitive load, was added to the model in Table 1, there was no significant relationship between it and attitudes ($p = .928$; see Table 2). Therefore, the criteria for mediation were not met and H₃ was not supported.

Table 2.
Test of mediation

| Source | <i>df</i> | <i>F</i> | <i>p</i> | η^2 |
|---|-----------|----------|----------|----------|
| Recall Score | 1 | .008 | .928 | .000 |
| Anxiety Factor | 2 | 3.230 | .040 | .012 |
| Argument Strength | 1 | 110.791 | .000 | .173 |
| Attractiveness | 1 | .745 | .388 | .001 |
| Anxiety x Argument strength | 2 | 1.263 | .284 | .005 |
| Anxiety x attractiveness | 2 | .265 | .767 | .001 |
| Argument strength x attractiveness | 1 | 2.687 | .102 | .005 |
| Anxiety x argument strength x attractiveness | 2 | .373 | .689 | .001 |

CHAPTER FIVE: DISCUSSION

DeBono and McDermott's study (1994) on trait anxiety and persuasion, along with the theoretical framework of ELM, provided the theoretical lens necessary to pursue this study. This study attempted to provide insight into trait anxiety's effect on message processing. Little research has focused on the effect of ability on persuasion and message processing. Although none of my hypotheses were supported, I believe this study can be used as a foundation for future studies that explore message processing and individual differences. It was clear that there were no significant differences between the low trait anxiety condition and the high trait anxiety condition. This is a peculiar result, especially with the multitude of studies that have indicated differences in cognitive performance among these groups (Deffenbacher, 1978; Gross & Mastenbrook, 1980; Sengupta & Johar, 2001). However, there was a significant effect of anxiety on attitude, laying the foundation for a variable to mediate or moderate this relationship.

It is important to note that the effects I was trying to harness can be difficult to elicit. Although the attractiveness manipulations were significantly different the manipulations may not raise anxiety sufficiently in order to capture the effect I hypothesized. Additionally, trait anxiety, as the bedrock of this study, must be activated in some sort of capacity. Although there were significant differences across the low and high anxiety groups, there was no interaction effect. While the picture and recording in an online survey was an attempt to simulate an interpersonal context, it may be necessary to have a physically interpersonal environment with real people to create a true feeling of anxiety. It is also clear that the main effect of anxiety on attitude had some influence on attitudes. This comes as no surprise, since the conceptual definition of trait

anxiety is in fact simply a propensity to be anxious. When a message high in motivation is used, a daunting final exam that predicts if a student will graduate, of course those high in anxiety will have less favorable attitude towards the policy than those low in anxiety.

One final variable that proved to be difficult was cognitive load. Although from a theoretical perspective cognitive load could be a suitable mediating variable, it was complicated to assess. There are a variety of measures to assess this load (Brunken, Plass, & Leutner, 2003) but currently no measure exists to capture how much work a participant's brain is going through at any given time. The recall test, adapted from Lang, Kurita, Gao, and Rubenking's (2013) forced choice visual recognition test, may have simply been an indicator of how much a participant listened or even how good the arguments used were rather than a true indication of cognitive load. With that said, the effect of anxiety on attitudes is the first step to finding a mediating or moderating variable.

Limitations

This study had several limitations. First, an online survey, while greatly expediting the research process, may not have captured the necessary effects that an in-person survey may have. Petty and Cacioppo's original work was with text-based messages and all participants completed the survey simultaneously. In this study, participants could have taken the survey together or informed others about the survey prior to taking it.

Also, a convenience sample of undergraduate students was used. The student sample used in this study was overwhelmingly white and female, limiting the generalizability of the results. Additionally, the person pictured who was the "presenter of the policy" was a male. While the

majority of participants were women, participants not attracted to men may not have experienced an increase in anxiety from the attractive presenter. Thus, the effect of attractiveness as a peripheral cue may not have been salient enough to interact with trait anxiety. Although the goal of an attractive condition is to have the policy presenter be deemed attractive, an unrealistically attractive source may limit attractiveness ratings. However, increasing the variability in attractiveness using an extremely attractive presenter might have enhanced the effect of attractiveness on anxiety and attitudes.

Future Research

Although hypotheses in this study were unsupported, I believe a path has been paved for future research in this area. As stated in the literature review, impaired ability and the presence of a salient peripheral cue should lead to a directly peripheral route of processing. Further investigation is needed into the saliency of peripheral cues for trait anxious individuals. It is possible that only a face-to-face interaction with an attractive versus unattractive individual may elicit enough anxiety to affect message processing. Therefore, it would be worthwhile to replicate this experiment with state anxiety and provide various in-person contexts that arouse anxiety, such as in a healthcare provider's office. The anxiety-inducing environment may hinder processing of messages and limit the success of healthcare provider's recommendations or even the patient-provider relationship. The processing of health messages, then, might hinge upon the barrier of anxiety in what would usually be conceived as an extremely anxiety-inducing environment.

Additionally, emergent technologies provide opportunities for replication in new contexts. Creating immersive environments such as simulations may lead to a more salient persuasive setting, possibly increasing motivation and attentional processes. Presence of others may also play a role in the processing of messages. Replicating the study in an immersive environment or face to face setting with fellow participants may appeal to elements of social approval and may create additional anxiety that affects message processing.

Every attempt was made to follow previous research – through Petty and Cacioppo’s original arguments script as well as the thought listing technique. I believe for there to be future research in this area strides must be made to explore how to capture these effects best with new communication technologies, like computer mediated communication. Once that has been explored then various persuasive contexts can be researched, such as health campaigns and messages. Message processing is absolutely crucial to understanding the effectiveness of persuasion. It is more than simply assessing attitude and behavior change – it is about understanding the process that leads those changes. This study was a first step towards investigating this issue and understanding the effect of ability on information processing.

APPENDIX A: ARGUMENTS

Strong Arguments Script

Hello there. My name is Ryan Johnson and I'm here today because the administration at the University of Central Florida called for proposals for new policies to be implemented here at the university. I propose that seniors should be required to take comprehensive exams in order to graduate. I'd like to show you why this would be a great step forward for our university and help us all be even better students and better people while we're here.

There is plenty of evidence to support the implementation of this policy. The National Scholarship Achievement Board recently revealed the results of a five-year study conducted on the effectiveness of comprehensive exams at Duke University. The results of the study showed that since the comprehensive exam has been introduced at Duke, the grade point average of undergraduates has increased by 31%. At comparable schools without the exams, grades increased by only 8% over the same period. The prospect of a comprehensive exam clearly seems to be effective in challenging students to work harder and faculty to teach more effectively. It is likely that the benefits observed at Duke University could also be observed at other universities that adopt the exam policy.

It is also clear that comprehensive exams can affect our futures. Graduate schools and law and medical schools are beginning to show clear and significant preferences for students who received their undergraduate degrees from institutions with comprehensive exams. As the Dean of the Harvard Business School said: "Although Harvard has not and will not discriminate on the basis of race or sex, we do show a strong preference for applicants who have demonstrated their expertise in an area of study by passing a comprehensive exam at the undergraduate level." Admissions officers of law, medical, and graduate schools have also

endorsed the comprehensive exam policy and indicated that students at schools without the exams would be at a significant disadvantage in the very near future. Thus, the institution of comprehensive exams will be an aid to those who seek admission to graduate and professional schools after graduation.

The improvements comprehensive exams could bring to our university go beyond the students as well. An interesting and important feature of the comprehensive exam requirement is that it has led to a significant improvement in the quality of undergraduate teaching in the schools where it has been tried. Data from the Educational Testing Service confirm that teachers and courses at the schools with comprehensive exams were rated more positively by students after the exams than before. The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching because departments look bad when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

One other great benefit that I know you students will like is that other universities that have implemented this policy have typically eliminated regular final examinations for seniors. This elimination of final exams in all courses for seniors allows them to better integrate and think about the material in their major area just prior to graduation rather than “wasting” a lot of time cramming to pass tests in courses in which they are really not interested. Students presently have to take too many courses in subjects that are irrelevant to their career plans. The comprehensive exam places somewhat greater emphasis on the students major and allows greater concentration on the material that the student feels is most relevant.

One final bit of support for this policy can be seen in what most students are here for: a high paying job. Data from the University of Virginia, where comprehensive exams were recently instituted, indicate that the average starting salary of graduates increased over \$4000 over the two-year period in which the exams were begun. At comparable universities without comprehensive exams, salaries increased only \$850 over the same period. As Saul Siegel, a vice-president of IBM put it in Business Week recently, "We are much quicker to offer the large salaries and executive positions to these kids because by passing their area exam, they have proven to us that they have expertise in their area rather than being people who may or may not be dependable and reliable." Another benefit is that universities with the exams attract larger and more well-known corporations to campus to recruit students for their open positions. The end result is that students at schools with comprehensive exams have a 55% greater chance of landing a good job than students at schools without the exams.

Weak Arguments Script

Hello there. My name is Ryan Johnson and I'm here today because the administration at the University of Central Florida called for proposals for new policies to be implemented here at the university. I propose that seniors should be required to take comprehensive exams in order to graduate. I'd like to show you why this would be a great step forward for our university and help us all be even better students and better people while we're here.

There is plenty of evidence to support the implementation of this policy. The National Scholarship Achievement Board recently revealed the results of a study they conducted on the effectiveness of comprehensive exams at Duke University. One major finding was that student anxiety had increased by 31 %. At comparable schools without the exam, anxiety increased by only 8%. The Board reasoned that anxiety over the exams, or fear of failure, would motivate students to study more in their courses while they were taking them. It is likely that this increase in anxiety observed at Duke University would also be observed and be of benefit at other universities that adopt the exam policy.

Implementing these exams is also the fair thing to do. Graduate students have always had to take a comprehensive exam in their major area before receiving their degrees, and it is only fair that undergraduates should have to take them also. As the Dean of the Harvard Business School said "If a comprehensive exam is considered necessary to demonstrate competence for a masters or doctoral degree, by what logic is it excluded as a requirement for the bachelor's degree? What administrators don't realize is that this is discrimination just like discrimination against Blacks or Jews. There would be a lot of trouble if universities required only Whites to take comprehensive exams but not Blacks. Yet universities all over the country are getting away

with the same thing by requiring graduate students but not undergraduates to take the exams." Thus, the institution of comprehensive exams could be as useful for undergraduates as they have been for graduate students.

These exams also provide a great opportunity. One feature of the comprehensive exam requirement that students at the schools where it has been tried seem to like is that passing the exams provides a very difficult challenge. For example, many students want jobs in business when they graduate and the corporate world is very tough. Yet, most students' lives are filled with few challenges whatsoever. Everything has been provided for them since the day they were born. It's not that students are not grateful, but knowing that they had to pass a difficult exam before they graduated would prepare them for the hard and cold realities of life. Students would be nervous about passing the exam and fear that if they did not pass and graduate, four years of time would be wasted. However, that is what life is all about – taking risks and overcoming them. Having to pass a comprehensive exam is a challenge most students would welcome.

These exams can also save in costs. Faculty members at universities with the comprehensive exams who were interviewed by researchers from the Carnegie Commission on Higher Education revealed that they liked the exams because it reduced the number of tests they felt they had to give in their classes knowing that students would still face one ultimate test of their knowledge in the comprehensive exam. A study at Notre Dame showed that this reduction in regular course tests saved enough paper to cover the cost of painting two classrooms.

Finally, the exams seem quite popular already. Data from the University of Virginia show that some students favor the senior comprehensive exam policy. For example, one faculty member asked his son to survey his fellow students at the school since it recently instituted the

exams. Over 55% of his son's friends agreed that in principle, the exams would be beneficial. Of course, they didn't all agree but the fact that most did proves that undergraduates want the exams. As Saul Siegel, a student whose father is a vice-president of IBM wrote in the school newspaper: "The history of the exams can be traced to the ancient Greeks. If comprehensive exams were to be instituted, we could feel pleasure at following traditions begun by Plato and Aristotle. Even if there were no other benefits of the exams, it would be worth it just to follow tradition."

APPENDIX B: PHOTOGRAPHS

Attractive Photo



Unattractive Photo



APPENDIX C: IRB APPROVAL LETTER



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Michael S. Appelbaum**

Date: **November 24, 2014**

Dear Researcher:

On 11/24/2014, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review: Exempt Determination
Project Title: The influence of trait anxiety on information processing: An elaboration likelihood study
Investigator: Michael S. Appelbaum
IRB Number: SBE-14-10778
Funding Agency:
Grant Title:
Research ID: N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the [Investigator Manual](#).

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

IRB Coordinator

APPENDIX D: RECALL STATEMENTS

Strong Arguments Recall Statements

Targets

1. The results of the study showed that since the comprehensive exam has been introduced at Duke, the grade point average of undergraduates has increased by 31%.
2. Thus, the institution of comprehensive exams will be an aid to those who seek admission to graduate and professional schools after graduation.
3. An interesting and important feature of the comprehensive exam requirement is that it has led to a significant improvement in the quality of undergraduate teaching in the schools where it has been tried.
4. At the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.
5. The end result is that students at schools with comprehensive exams have a 55% greater chance of landing a good job than students at schools without the exams.

Foils

1. A drawback is that regular final examinations were still instituted for seniors
2. Students presently have to take only courses relevant to their career plans
3. Harvard has little interest in students who passed comprehensive exams as undergraduates
4. A study from the University of Virginia stated that the average health insurance benefit of graduates increased once the exams begun
5. The comprehensive exam challenges students to listen more

Weak Arguments Recall Statements

Targets

1. Fear of failure would motivate students to study more in their courses while they were taking them
2. Making graduate students but not undergraduate students take comprehensive exams is discrimination.
3. Having to pass a comprehensive exam is a challenge most students would welcome.
4. A study at Notre Dame showed that this reduction in regular course tests saved enough paper to cover the cost of painting two classrooms.
5. Over 55% of his son's friends agreed that in principle, the exams would be beneficial.

Foils

1. One major finding from a Duke University study was that student misconduct increased by 31%
2. Graduate students have always had to take an admissions test before receiving their degrees
3. That is what life is all about - taking tests and passing them
4. Even if there were no other benefits of the exams, it would be worth it just to follow the law
5. Faculty members like the exams because it reduced the amount of grading they had to do.

APPENDIX E: SURVEY

EXPLANATION OF RESEARCH

Principal Investigator: Michael Appelbaum

You are being invited to take part in a research study. Whether you take part is up to you. Instructors may offer class credit for participating in this survey. If you do not wish to participate or are unable to, an alternate assignment of comparable time and effort will be provided.

The goal of the current study is to determine if students differing in personality variables process messages differently.

If you agree to participate, you will be provided with an online survey that will ask you to listen to an audio recording followed by answering a series of questions about what you heard.

All of this information will be kept confidential and private. The survey should take no longer than 20 minutes to complete.

You must be 18 years of age or older to take part in this research study.

You must be able to hear sound through the device used to complete the survey.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints please contact Michael Appelbaum, michael.appelbaum@knights.ucf.edu;

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

- I agree to participate
- I do not agree to participate

First, please answer a few demographic questions

I identify my gender as...

- Male
- Female

I identify my race as...

- American Indian or Alaska Native
- Asian/Pacific Islander
- Black or African American
- White
- Other
- Unknown

How old are you?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

In this questionnaire you will be asked to give your opinion about a change of policy regarding examinations at UCF. You will first hear a message about the policy, Then you will answer questions about the presentation, the quality of recording, and the policy itself.

In order to factor in students' individual levels of test anxiety, which could influence their attitudes toward the message, before listening to the message you will be asked to fill out a brief anxiety scale.

A number of statements which people have used to describe themselves are given below. Read each statement and then fill in the appropriate number next to the statement that indicates how you **generally** feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

| | Almost Never 1 | Sometimes 2 | Often 3 | Almost always 4 |
|---|---------------------------------|------------------------------|--------------------------|----------------------------------|
| I feel pleasant | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel nervous and restless | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel satisfied with myself | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I wish I could be as happy as others seem to be | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel like a failure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel rested | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I am "calm, cool, and collected" | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel that difficulties are piling up so that I cannot overcome them | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I worry too much over something that doesn't really matter | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I am happy | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I have disturbing thoughts | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I lack self-confidence | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel secure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I make decisions easily | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel inadequate | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I am content | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Some unimportant thought runs through my mind and bothers me | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I take disappointments so keenly that I can't put them out of my head | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I am a steady person | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I get in a state of tension or turmoil as I think over my recent concerns and interests | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The administration at the University of Central Florida has put out a call for new policy proposals to be implemented at the university. Ryan is a student at UCF that would like to propose a new exam policy. His audio recording will be presented to the administration at the university. It is important to assess how much students support his arguments as well as the quality of the recording.

A picture of Ryan is displayed on the following page along with his audio recording.

Please listen to the entire recording before proceeding to the follow-up questions.

Please make sure you have your volume enabled on your device before clicking play



UCFCommResearcher
W Recording

SOUNDCLOUD



[Cookie policy](#)

Once the recording is over, you'll see a continue icon below. Please press it to continue

List five thoughts that occurred to you as you were listening to the speaker's proposal. Your thoughts may have been about the author, or about the proposal, or neither. Just try to remember the thoughts that crossed your mind while you were listening to the material.

Thought 1

Thought 2

Thought 3

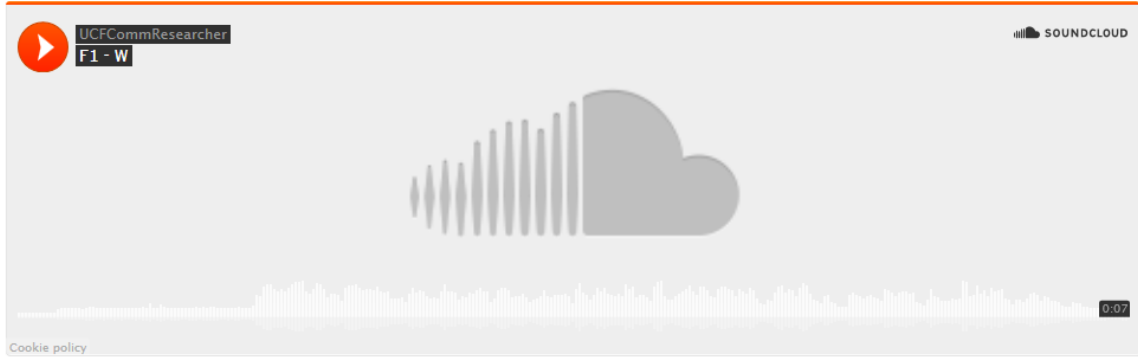
Thought 4

Thought 5

Now that you have written down the thoughts you recall, please select a + (plus sign) next to a thought that you believe is positive or in favor of the advocated position, a - (minus sign) next to a thought that you believe is negative or opposed the advocated position, or a **0** (zero) next to a thought you believe is neutral or irrelevant.

| | + | - | 0 |
|-----------|-----------------------|-----------------------|-----------------------|
| Thought 1 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Thought 2 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Thought 3 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Thought 4 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Thought 5 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Now you're going to hear several sentences that you either heard or did not hear in the previous recording. Click play to start each recording. We'd like you to indicate whether you heard that EXACT phrase as quickly as you can.



UCFCCommResearcher
F1 - W

SOUNDCLOUD

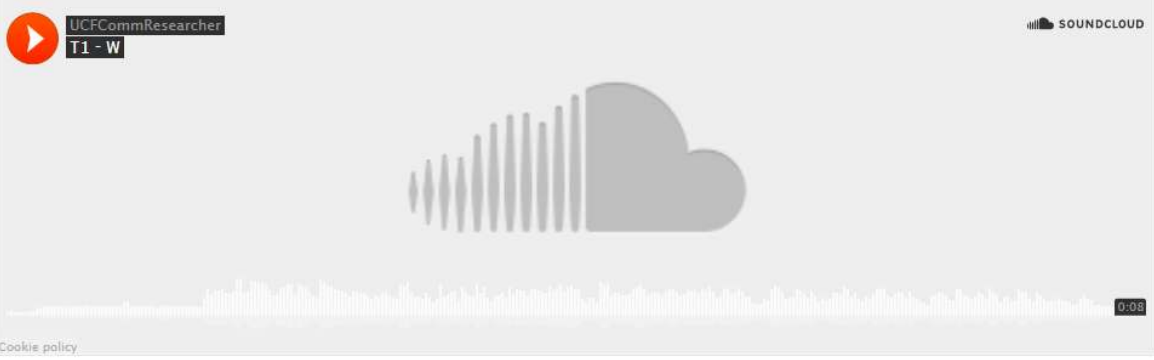
0:07

Cookie policy

Did you hear that statement earlier?

Yes I heard that

No I didn't hear that



UCFCCommResearcher
T1 - W

SOUNDCLOUD

0:08

Cookie policy

Did you hear that statement earlier?

Yes I heard that

No I didn't hear that

UCFCommResearcher
T2 - W

SOUNDCLOUD

Cookie policy

Did you hear that statement earlier?

Yes I heard that

No I didn't hear that

UCFCommResearcher
F2 - W

SOUNDCLOUD

Cookie policy

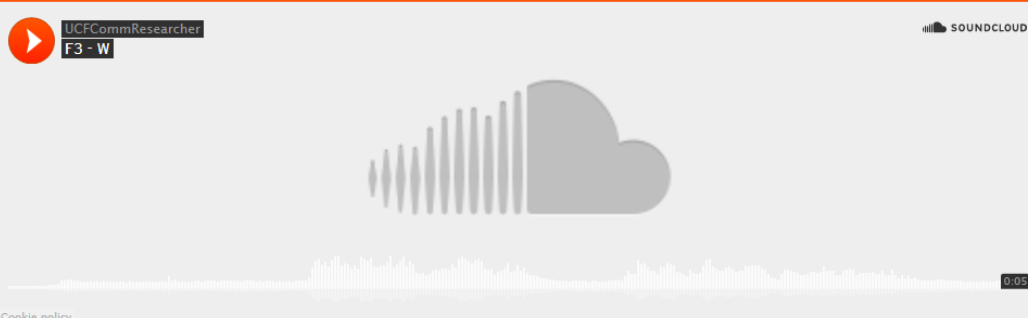
Did you hear that statement earlier?

Yes I heard that

No I didn't hear that

UCFCommResearcher
F3 - W

SOUNDCLOUD



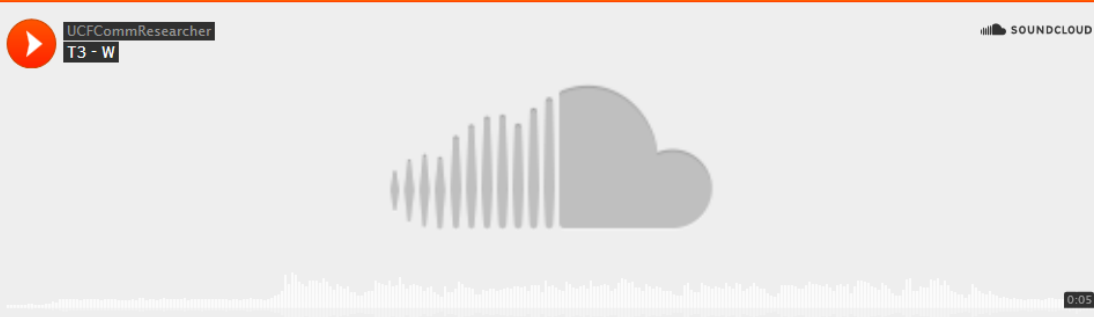
Cookie policy

Did you hear that statement earlier?

- Yes I heard that
- No I didn't hear that

UCFCommResearcher
T3 - W

SOUNDCLOUD



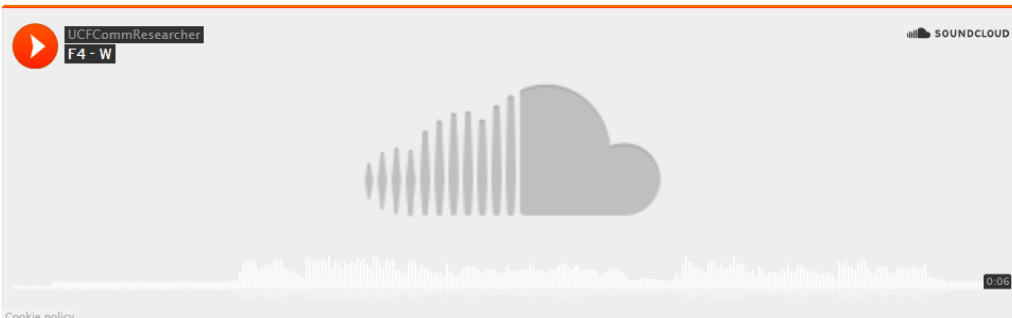
Cookie policy

Did you hear that statement earlier?

- Yes I heard that
- No I didn't hear that

UCFCommResearcher
F4 - W

SOUNDCLOUD



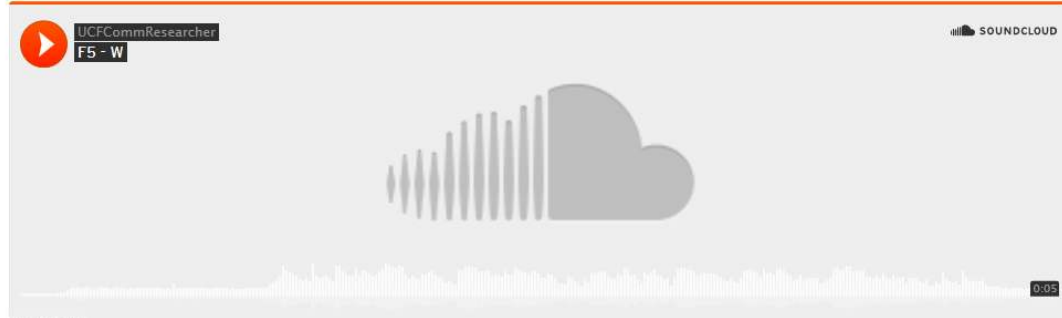
Cookie policy

Did you hear that statement earlier?

- Yes I heard that
- No I didn't hear that

UCFCommResearcher
F5 - W

SOUNDCLOUD



Cookie policy

Did you hear that statement earlier?

- Yes I heard that
- No I didn't hear that

UCFCommResearcher
T4 - W

SOUNDCLOUD

Cookie policy

Did you hear that statement earlier?

Yes I heard that

No I didn't hear that

UCFCommResearcher
T5 - W

SOUNDCLOUD

Cookie policy

Did you hear that statement earlier?

Yes I heard that

No I didn't hear that

The following items ask your opinion about the comprehensive exam policy advocated by the student speaker

Please rate the concept "Comprehensive Exams"

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
|-------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------|
| Good | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Bad |
| Beneficial | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Harmful |
| Foolish | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Wise |
| Unfavorable | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Favorable |

How much do you agree with the proposal requiring seniors to take a comprehensive exam before graduating?

| | Do not agree at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Agree Completely |
|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Comprehensive exams | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Finally, please indicate your thoughts about the quality of this presentation itself

On a scale from 1 to 10, with 1 being the least attractive and 10 being the most attractive, how attractive was the person in the photograph?

| | Least Attractive | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Most Attractive |
|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Attractiveness | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

How would you rate the quality of the arguments used by the speaker to support the position advocated?

| | Not Very Good Arguments | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Very Good Arguments |
|--------------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Quality of the Arguments | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please evaluate the following aspects of the audio recording of the policy proposal

| | Very Bad | | | | | | | | | Very Good 10 |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Voice Quality | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Clarity of the Recording | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Recording Volume | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Thank you for completing this survey. If you completed this survey for class credit, please provide the following information as it is displayed below or you will not receive credit:

Last Name, First Name

Example: Doe, John

Please provide the following information as it is displayed below or you will not receive credit:

Instructor, Class

Example: Dr. Michael Smith, ENG 3007

We thank you for your time spent taking this survey.
Your response has been recorded.

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