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Goal orientation framing and its influence on performance

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THESIS

GOAL ORIENTATION FRAMING AND ITS INFLUENCE ON PERFORMANCE

by

John D. Porter

December 2012

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Motivated by the regulatory focus theory and the Offensive Mindset theory, I researched the influence of framed instructions (offensive, defensive, no messaging) in stressful and stress-free environments. Participants (N = 213) completed one of two tests: a basic math test in a quiet room and a simulated shooting course in a room with the game's volume maximized. Participants were primarily active-duty military, along with civilian staff members, teaching professors and lecturers. Participants rolled dice to randomly select the framing instructions that they would be given. In the basic math test, participants who received framed instructions consistent with their regulatory focus answered more questions correctly than those who received framed instructions that were incompatible. For example, a promotion-focused participant receiving defensive messaging answered fewer questions correctly than one receiving offensive messaging. Under simulated shooting, course game offensive framing showed an increase in both speed and accuracy regardless of regulatory focus. This research represents one of the first tests of regulatory focus and messaging conducted under stress. The results were unexpected and may open new doors in research.

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GOAL ORIENTATION FRAMING AND ITS INFLUENCE ON PERFORMANCE

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Motivated by the regulatory focus theory and the Offensive Mindset theory, I researched the influence of framed instructions (offensive, defensive, no messaging) in stressful and stress-free environments. Participants (N = 213) completed one of two tests: a basic math test in a quiet room and a simulated shooting course in a room with the game's volume maximized. Participants were primarily active-duty military, along with civilian staff members, teaching professors and lecturers. Participants rolled dice to randomly select the framing instructions that they would be given. In the basic math test, participants who received framed instructions consistent with their regulatory focus answered more questions correctly than those who received framed instructions that were incompatible. For example, a promotion-focused participant receiving defensive messaging answered fewer questions correctly than one receiving offensive messaging. Under simulated shooting, course game offensive framing showed an increase in both speed and accuracy regardless of regulatory focus. This research represents one of the first tests of regulatory focus and messaging conducted under stress. The results were unexpected and may open new doors in research.

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LIST OF ACRONYMS AND ABBREVIATIONS

BUD/S	Basic Underwater Demolition / SEAL
CFC	Combat Fighting Course
CQB	Close Quarters Battle
EEG	Electroencephalography
ERP	Event Related Potentials
Hz	Hertz, Oscillations per second
NLP	Neuro Linguistic Programming
NSWC	Naval Special Warfare Center, Coronado, CA
RFQ	Regulatory Focus Questionnaire
SFARTEC	Special Forces Advanced Target and Exploitation Course

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I. INTRODUCTION

Over the past ten years, much research has been done on goal orientation and how individuals perceive a challenge. Some approach a challenge eagerly, seeing the benefits of accomplishing their goal, while others approach a challenge with vigilance, recognizing the costs of not accomplishing their goal and trying to minimize these costs (Higgins, 1997). Some individuals are seen as playing to win while others are seen as playing not to lose. Goal orientation, also called regulatory focus, is how someone perceives a challenge and guides their behavior in accomplishing that goal (Derryberry & Reed 1994; Tykocinski, Higgins, & Chaiken, 1994; Elliot & Sheldon, 1997; Higgins, 1997; Higgins, Cesario, Hagiwara, Spiegal, & Pittman, 2010). During the last ten years the terms aggressive, approach oriented, eager, promote or promotion focused have been used to describe a play to win style, as avoidance, defensive, preventive or prevention focused have been used to describe a play not to lose style (Elliot & Covington, 2001; Freitas & Higgins, 2002, Molden & Higgins, 2008). Regulatory fit suggests that people can best be motivated by reinforcing their goal orientation. An eager offensive person will be motivated by seeing victory while a vigilant prevention focused person will be better motivated by being reminded of the costs of failure, this fits their goal orientation (Roney, Higgins, & Shah, 1995; Higgins, 1997, Rothman, Martino, Bedell, Detweiler, & Salovey 1999).

There is an accepted belief that there is a speed to accuracy trade off, also called the quantity to quality conflict, which theorizes that as speed increases, accuracy decreases in people who are eager, and as speed decreases, accuracy increases in those people who are vigilant (Deary & Graeme, 2001). In a 2003 study, these trends were exacerbated by giving framed instructions in line with participants' goal orientation, resulting in large statistical differences in speed and accuracy aligned with goal orientation (Forster, Higgins, & Bianco, 2003).

In this study, I evaluated the influences of regulatory focus and message framing under stress by asking participants to complete one of two tests. Test One was a basic math test of single digit addition and subtraction problems, participants experienced

minimal to no stress. First, the participants were given a sample of three questions. Then, they were read instructions designed to frame their goal orientation to an offensive aggressive mindset or a defensive vigilant mindset, or were given instructions with no framing to be used as a baseline for the test. Test Two consisted of playing two missions of the first-person shooter computer games *Call of Duty: Modern Warfare 2* and *Call of Duty: Modern Warfare 3.* During the simulation, participants were reminded of weapon safety and time to completion was emphasized in an attempt to cause stress. The first portion of Test Two was to complete a tutorial and then go through a simulated shooting range with both friendly and enemy targets. The portion of the tutorial on the shooting range was timed and scores were recorded for the number of enemy and friendly targets hit. There was no time limit to this mission and no possibility of failure. The second mission presented another shooting range, but also introduced moving targets. This scenario had both friendly and enemy targets as well as the possibility of failing the mission if a participant shot the range safety officer located in the final room.

Test One showed an expected relationship between a participants' regulatory focus and the framed messaging received and an unexpected relationship with age and number of correct answers. Overall, the 104 participants completed 12.93 correct answers in 30 seconds with a standard error of 0.03. On average, the 35 participants who received offensive messaging correctly completed 13.71 questions with a standard error of 0.10. The 36 participants who received defensive messaging completed 12.94 questions with a standard error of 0.09 and the 33 participants who received no messaging correctly completed 12.09 questions with a standard error of 0.10. When participants were divided by goal orientation and framed instructions, promotion-based participants who received offensive instructions performed better than those promotion-based participants receiving defensive instructions, with 13.97 correct responses, standard error of 0.11, those that received defensive instructions correctly answered 13.00 correct responses, standard error 0.12. Participants with a prevention-focus goal orientation who received defensively framed instructions performed better than those who received offensive instructions, 13.00 correct responses, and standard error of 0.37 to 12.20 correct responses standard error of 0.11, respectively.

There was also a relationship with age and number of correctly answered questions. Participants 18 to 24 years of age answered 14.93 questions correctly with a standard error of 0.57. The number of correctly answered questions decreased as age increased with participants over the age of 45 answering only 10.77 answers correctly with a standard error of 1.41.

When stress was induced during Test Two, the relationship between performance and offensive framed instructions strengthened while the relationships between all other recorded variables (regulatory pride, age, gender, height, and military service) showed no statistical significance. On average, participants who received offensive instructions decreased their time to complete the first to the second mission, by more than 9 seconds (11%) regardless of their base goal orientation, and those given defensive instructions had a decrease in their time by roughly 1.2 seconds (1%). Errors recorded, hitting a target with a picture of an unarmed person, showed an inverse of expected results, with promotion-based participants making an average of 0.23 (42%) fewer errors after they received offensively-framed instructions, but and prevention-focused participants made fewer errors after receiving offensively-framed instruction (56% fewer errors) than those prevention-focused who received defensively framed instructions (25% fewer errors.

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II. LITERATURE REVIEW AND BACKGROUND

A. ACHIEVEMENT MOTIVATION

Motivation is defined as an incentive or a drive. Drive should be considered a general state of arousal and incentive should be thought of as a single objective. Both of these definitions are formed from internal desire and learned behavior. If increasing motivation means increasing performance, the benefit of increasing motivation is obvious from a business and its employees to a coach trying to get an athlete to improve their performance. When people speak of motivation, they often reference external sources of motivation such as support groups, peer pressure and motivational speaking. All of these external sources change as an individual interprets them differently. In the 1980s and 1990s, the study of motivation shifted away from external motivators and toward individual achievement goals and goal orientation (Derryberry & Reed, 1994; Elliot & Sheldon, 1997; Higgins, 1997; Tykocinski, Higgins, & Chaiken, 1994). Prior to this time, motivation was thought of as a single thing, the desire to achieve a goal, but then, with more understanding goal achievement was divided to those that approach a challenge and those that avoid a challenge, though both want to achieve their goal (Elliot & Covington, 2001).

B. PROMOTE PLEASURE, PREVENT PAIN: WHAT IS THE GOAL?

Previous research has shown that the attempt to increase the sensation of pleasure and decrease the sensation of pain, whenever possible, is the basic hedonistic psychological foundation of humans and animals (Higgins, 1997). In the mid-twentieth century, tests were conducted on rats to stimulate the pleasure areas of the brain. These rats would continue to push a small bar to the point of starvation and exhaustion to increase or sustain the sensation of pleasure (Olds & Milner, 1954). Animals and people will repeatedly choose pleasure over nutritional or biological needs if given the option; they enjoy the pleasurable sensation (Eisenberger, 1972). People also enjoy the immediate sensation of pleasure, but unlike animals, people also value the anticipation of pleasure or earning and keeping something of value.

Most people value things that are not physical. Many people will apply worth to things that do not give them pleasure. For example people of religion have agreed, even volunteered, to go without pleasure or to receive pain in the hopes of goal attainment, be it removing past transgressions or future salvation. Parents will often go without, to allow their children to go to college in hopes of a better future. At approximately the age of five, most people begin to understand and value things beyond simple pleasure, and by the age of 13 most children have a working understanding of social expectations and norms (Duda & Nicholis, 1992). It is true that obese people, drug addicts and abusive parents exist in society, but these are the extremes, not the norm.

C. GOAL ORIENTATION

Children learn from experience that certain behaviors will bring acceptance or rejection; they learn from achievement and failure. Over time and experience, children begin to orient goals to maximize benefits and minimize the costs. Personalities develop from focusing on goal achievement or prevention (Higgins, 1997, 2000). People's personalities and goal orientations evolve with experiences, (Ebner, Freund, & Baltes, 2006). People who achieve goals quickly tend to develop an eager, promotion-based, offensive goal orientation. People who have had setbacks have learned to be more vigilant, to prevent loss, and be defensive in their goal orientation. This offensive or defensive goal orientation is called regulatory focus (Higgins, 1997). To exemplify regulatory focus, Higgins described two students, both of whom have a desire to get an "A" in his class. The student with the offensive goal orientation will not only look over the assigned study material, but also study additional material from outside the class in order to achieve an "A." A student with a defensive mindset or a vigilant goal orientation will read the assigned study material diligently to achieve his grade. The offensive student looks at the "A" as a goal, and the defensive student looks at the "A" as a duty.

> The benefit of receiving an "A" is also perceived differently, as the achievement of the "A" has a higher regulatory fit for people in a promotion focus (because it maintains the eagerness that sustains their focus) than for people in the prevention focus (because it reduces the vigilance that sustains their focus). (Higgins, 2005, p. 209)

The theory of regulatory fit (Freitas & Higgins, 2002; Higgins, 2005) is that people will respond best to messages or actions that coincide with their base goal orientation. For example, an offensive, eager person may be more suited to a job with the military Special Operations Forces or in aggressive stock trading, whereas a defensive person may perform better in a more conservative career like accounting or health care provider. The job would feel right to the person performing it, that is their choice of jobs fits their goal orientation. This regulatory fit gives value to the performance that is in-step with a person's base orientation (Higgins, 2005).

To put goal orientation and regulatory fit into a more personal perspective, if someone were to break into a house at night and a father and family members are upstairs, the father might ask himself: "Am I willing to die to protect my family?" In the same situation, he might ask himself: "Am I willing to kill to protect my family?" The goals in both cases are the same, to protect his family, but goal orientation is different. A defensive person would think about the costs, the offensive person would think about the need to achieve the goal of protecting the family.

D. SPECIAL COMBAT AGGRESSIVE REACTIONARY SYSTEM (S.C.A.R.S.)

In 1968, Jerry Peterson was drafted by the U.S. Army and assigned to the 173rd Airborne Brigade during two tours of combat in Vietnam. Jerry Peterson is credited with an extraordinary number (50+) of bare-hand kills during his military career. During this time of extreme stress, he developed the "offensive mindset" with no formal psychological education. He developed a first-strike mentality that he brought back and refined over the next 20 years. In 1988, Jerry Peterson proposed his Special Combat Aggressive Reactionary System (SCARS) program to the Naval Special Warfare Center, and for several years, it became the official hand-to-hand combat program taught at Basic Underwater Demolition / SEAL (BUD/S) training as well as advanced training. The Naval Special Warfare Center defines the offensive mindset as follows:

> Offensive Mindset is the ability to maintain a first strike action against an aggressor, even if you move second. The move and think without fear, to be the cause of action and force your opponent to be affected. (Naval Special Warfare Center, 1994, p. 13)

The offensive mindset, developed in 1968, is still taught today in training evolutions and used in actual combat mission tasking. When in training, students are taught to think of offensive and defensive mindsets as vertical and horizontal thinking. Senior Chief Petty Officer (SEAL) Mike Jaco, explained the offensive mindset as such, "Don't think of the what ifs, think of how to get the job done."

E. VERTICAL AND HORIZONTAL THINKING

The United States Naval Special Warfare Center, Combat Fighting Course, describes offensive and defensive goal orientation as different ways of thinking, Figure 1. To illustrate the difference between vertical and horizontal thinking; imagine yourself in a fight. How it started is inconsequential. The fight has begun and you are involved. In a cause-and-effect scenario, the initial actions are in the column to the left, the reaction to that is the center column and the outcome is in the column to the right. A defensive thinking person who is trying to minimize failure will attempt to think through all options. Will the opponent punch me with his right or left? Will he kick me? Will he try to tackle or take me down? Then moving to the second column a defensive thinking person would think, if he does throw a right punch, should I parry it to my left, should I step back, should I strike his arm or move forward to grab him? Moving to the final column and the possible outcomes a defensive thinker will note for each reaction, there are multiple outcomes. If I block his arm, I might miss. I might connect on his radial nerve. He might hit me with his other arm or kick me as I am blocking his arm. He might fall from being off balance. All of these thoughts take time, and it is impossible to think your way through even a few strikes in a fight. An offensive fighter will think horizontally, understanding cause and effect, making sure that even if he is acting second to his opponent's actions, he is still the cause. A horizontal thinker should throw out all defensive thoughts, leaving only aggressive movements and thought processing. Thinking of striking, if my opponent does strike first, it does not matter, I do not think of how he will strike, a punch or kick, left or right, I will see body movements, high or low and shoulder movements left or right, I will strike at whatever he throws at me, his leg or arm, and I will continue to strike at his body. His actions are inconsequential to me, only his defeat.

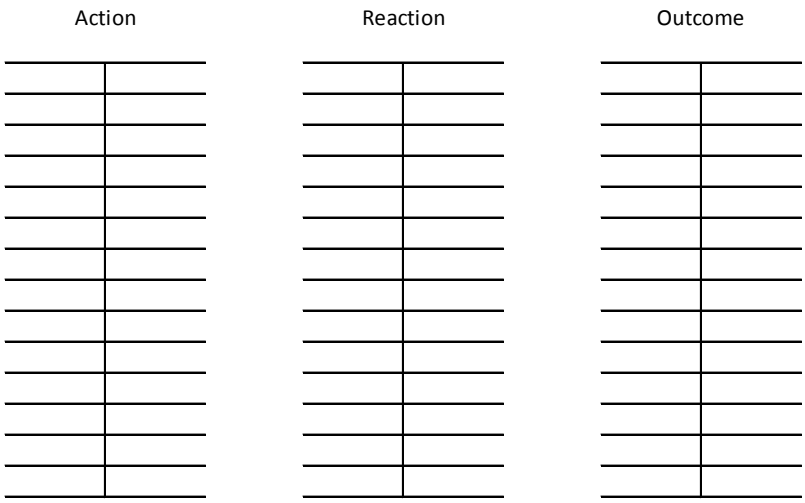

Figure 1. Vertical and Horizontal Thinking

> Human beings are capable of initiating self-movement, which then produces an outward effect (body movement). One can never predict the internal workings of another individual. The only safe action to take, in any aggressive situation, is to be the cause of an effect, not an effect that was caused. Cause the enemy to react to what you do. (Naval Special Warfare Center, 1994, p. 15)

F. FRAMING, MESSAGING

To simulate offensive and defensive mindsets in a more visceral sense, read these two stories and try to visualize yourself and the one being attacked.

> Scenario One: There you are in an isolated location, getting money out of an ATM. A large and very aggressive man starts toward you. There is no doubt he is coming after you, so you get ready to defend yourself. In the dim light, you see what looks like a club in his hand. He swings. You throw your hand up to block! Stop! How does that situation make you feel?

> Scenario Two: There you are in an isolated location getting money out of an ATM. A large and very aggressive man starts toward you. There is no doubt that he is coming after you, so you make the decision to take him out. In the dim light, you see what looks like a club in his hand. He swings. You move into him and strike his arm! Stop! How did that make you feel? Which scenario did you like better?

> The only difference in the two scenarios was a defensive or offensive mindset and the words used to put you there. The physical actions in both scenarios were the same. In scenario one, you were in a defensive mindset. Your goal was to minimize the cost or damage to you; you were getting ready to get hit. In scenario two, you had an offensive mindset; your goal was to take out the attacker. (Naval Special Warfare Center, 1994, p. 13)

In describing these scenarios, specific words were used to frame the situations as offensive or defensive. In scenario one, the words "defend" and "block" were used. In scenario two, the words "take out" and "strike" were used. It is important to show how words can be used to determine how we think and act. The Naval Special Warfare Center called this Neuro Linguistic Programming (NLP). NLP is the way in which words influence our thoughts and actions by programming our mind to think and act in a certain way (Naval Special Warfare Center, 1994).

A much more common term to describe the use of words or phrases to influence people is framing or messaging (Roney et al., 1995; Tykocinski et al., 1994).

Most people will be influenced by framing instructions to offensive or defensive, but some people are extremely one-sided. Their regulatory form (Higgins, 1997; Lamiter et al., 2008) can be very offensive or defensive. Framing that does not match their form or that is regulatory unfit and will have little or no influence on their goal orientation. For example, very vigilant people will maintain a defensive mindset even when given very offensive messaging, like in Scenario Two.

G. MENTAL CHRONOMETRY

Mental chronometry focuses on the use of event-related potentials (ERPs) in the study of human information processing / emphasizes the nature and time-course of the mental events that occur between the presentation of a stimulus and the execution of a response (Rugg & Coles, 1995).

Mental chronometry is the study of how long it takes the brain to recognize and respond to various inputs, ERPs. For each cognitive event (visual recognition or the interpretation of a physical sensation like hot or cold), takes a minimum of 0.2 seconds to occur. For example, if you were asked to press a button when you see a green light, it

should take you .6 to .75 seconds to push the button after you see the green light. The time intervals are broken down as follows. When you see the green light, it is a single ERP that your brain interprets the green light, the second ERP is the decision to press the button, and the third ERP is the nerve impulse to your finger to physically press the button.

This theory was tested repeatedly at the Naval Special Warfare Center, Combat Fighting Course; instructors would have one student hold a cap gun to another student. The unarmed student would strike the arm of the student holding the gun; the student moving first would always move the gun out of harm's way prior to the armed student being able to pull the trigger. Mental chronometry shows us that it takes three times as long to pull the trigger in reaction to movement as it takes for someone to make a single movement.

In combat or other events of extremes, every second counts. In both the scenario of pushing a button when a green light is flashes and pulling a trigger following movement, the decision for what action to take was made prior to the event starting. When decision making is added to reaction times, people can become so overwhelmed that they move from achievement to avoidance. When people begin to think of too many things too quickly, they often do not think things through. As the brain has too many thought per second, brain wave activity increases, but amplitude of brainwaves decrease; it is like skimming through the pages of a magazine but not reading the articles.

H. BRAINWAVE ACTIVITY (NEURAL OSCILLATION)

Brainwave activity changes with a person's moods and activities. There are four basic types of brainwaves ranging from slowest to fastest: Delta, Theta, Alpha, and Beta as shown in Figure 2.

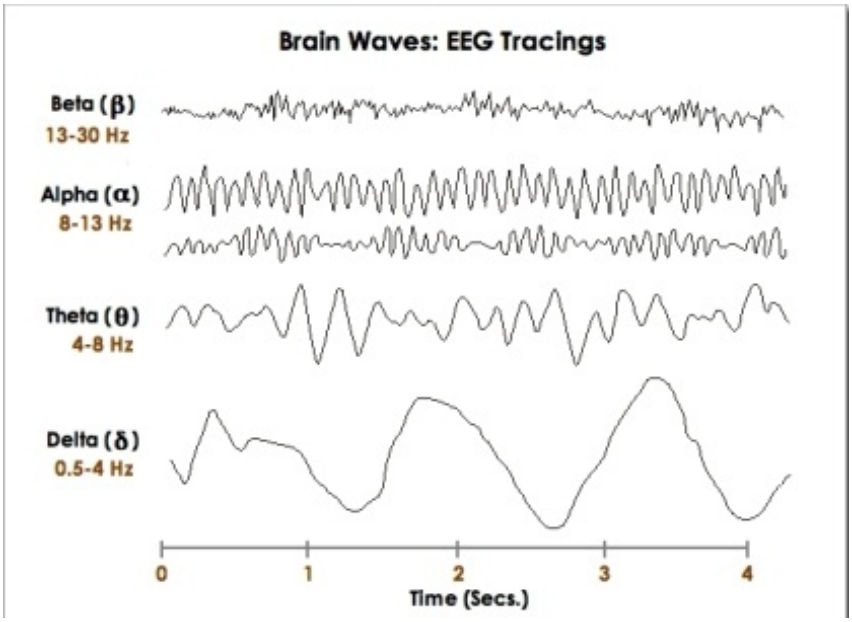

Figure 2. EEG Tracings of Four Main Brainwaves
(From Mueller, 2012)

Delta is the slowest frequency brainwave, but has the highest amplitude. Delta brain waves have a frequency of 0.5 to 3.5 oscillations per second (Hz). Delta brain activity is common for someone in a deep dreamless sleep or a coma. The immune system is at its peak and your body's healing rate is increased during Delta brain activity.

Theta brainwaves have the next fastest frequency of neural oscillation at 3.5 to 7 Hz. Theta brain waves are most often associated with dreaming sleep or deep meditation. Religious monks who have learned to control pain or circulatory function do so when they reach a deep meditative Theta state (Naval Special Warfare Center, 1994).

Alpha brainwaves oscillate at 7 to13 Hz. Alpha is a relaxed wakeful state, referred to by the, Middle East Medical Information Center (2012) as the super learning state. When someone is driving on the highway or watching television, they are most often in an Alpha state. Testing on professional athletes shows football players, swimmers, and boxers usually move from Beta to Alpha brain activity during sporting events, being "in the zone" or "going Alpha" (Naval Special Warfare Center, 1994). Reaction times are increased without awareness, for example when driving a car and the driver sees brake lights in front of him or movement in his peripheral vision, he picks up his right foot,

places it on the brake pedal and applies pressure. He makes these movements with his foot without thought. Athletes react very much the same way often not remembering the details of the fight until seeing a replay. For example the famous second fight between Mohammed Ali and Sonny Liston on May 25, 1965. In the first round Mohammed Ali hit Sonny Liston with a right punch so quickly he did not realize he had thrown the punch and then famously accused Sonny Liston of throwing the fight. Slow motion video showed that not only had Ali hit Liston, but he had actually lifted him off his feet with that "phantom punch":

> The blow that ended the match became known as "the phantom punch," so named because most people at ringside did not see it. Even Ali was unsure as to whether or not the punch connected, as footage from the event shows Ali asking his entourage "Did I hit him?" after the match. Slow motion replays show Ali connecting with a quick, chopping right to Liston's head (known as the "Anchor Punch" according to Ali) as Liston was moving toward him. The blow generated enough power to lift Liston's left foot, upon which most of his weight was placed, off the canvas. (Pecheco, 2003)

Most people spend the majority of their waking hours in Beta where neural oscillation is greater than 13 Hz. In a normal conversation, people are processing about 15–20 bits of information per second, though are only aware of a fraction of those. People with anxiety tend to maintain a high Beta neural oscillation and some research states maintaining a high beta has detrimental effects to the immune system. As oscillation begins to move higher than 20 Hz most people will begin to lose situational awareness; and as oscillation moves above 30 Hz, people will have reduced movements and reactions to external stimulation. People may become "frozen in fear" (Naval Special Warfare Center, 1994).

I. PUTTING IT TOGETHER

People and animals seek pleasure and avoid pain. As children grow to adulthood they learn to take value and apply worth to more than objects but achievements as well. People look at challenges differently. One person tries to maximize benefits, while another to minimize loss, given the same situation. One plays a game to win, another plays not to lose (Higgins, 1997). This offensive or defensive goal orientation is

developed over time, as people learn from previous achievements and losses (Higgins, Friedman, Harlow, Idson, Ayduk, & Taylor, 2001). As they develop their regulatory form, they begin to take actions that are in line with their goal orientation. Regardless of their base goal orientation, framing messages can influence goal orientation temporarily (Spiegal, Grant-Pillow, & Higgins, 2004). In times of extreme stress, offensive goal orientation should minimize decision making time, by minimizing decision options and reducing neural oscillation of the brain, in turn increasing reaction times. It is the hypothesis of this thesis that people receiving offensive framed instruction will perform tasks under stress more quickly and accurately than people receiving defensive or no goal orientation manipulation.

III. METHOD

A. PARTICIPANTS

Two hundred thirteen volunteers from the Naval Postgraduate School and the Presidio of Monterey participated in the study. One hundred ninety-one were students enrolled in graduate level studies or foreign languages and 22 were staff professors and lecturers. Of the 213 volunteers, 29 were female and 184 were male. All participants were over the age of 18. Each participant received a candy bar for participating in the study. Two separate tests were conducted, Test One had 104 participants and Test Two had 109 participants. The results of three participants were not used in calculating results. One participant answered "1" for each math question asked, and the other two participants shot the range safety officer in the final room *Call of Duty: Modern Warfare 3,* Mission *Stay Sharp* multiple times, even thought they were instructed not to at the beginning of each mission. By shooting the range safety officer they forced the mission to restart prior to completion allowing them to run the mission multiple times and become familiar with target locations, which then gave them a distorted performance score.

Recruiting was conducted by online advertising on the Naval Postgraduate School intranet morning student muster page, an e-mail to all Naval Postgraduate School students and fliers posted at Naval Postgraduate School library and Presidio of Monterey Student Activity Center.

B. MEASURES

Performance was assessed in two tests, a math test and a first-person shooter game. It was the intent of this study to evaluate the influence of messaging on performance under stress, but due to potential triggers of post-traumatic stress in the military volunteer pool, time and sound were the only acceptable stressor used. Previous performance testing in a stress-free environment has shown that offensive people tend to be faster but with reduced accuracy, and defensive focused people tend to perform slower but with increased accuracy (Forster et al., 2003).

During Test One; participants were given 30 seconds to answer as many math problems as possible. During test two, participants conducted a tutorial that taught game movement and controls. The tutorial finished in a timed evolution on a simulated shooting range (*Call of Duty: Modern Warfare 2*, Mission *S.S.D.D.*). Then, they were asked to go through a different shooting range (*Call of Duty: Modern Warfare 3*, Mission *Stay Sharp*). The differences in time to completion, along with enemy and friendly targets hit, were recorded to evaluate speed and accuracy.

Following testing, a participant completed a demographic questionnaire about gender, age, height, and military service, and their base goal orientation was assessed using a regulatory focus questionnaire. The Event Reaction Questionnaire (Higgins et al., 2001), more commonly referred to as the Regulatory Focus Questionnaire (RFQ) is designed to assess a participants' history of successes or failures and how those influence present offensive or defensive goal orientation. Latimer et al. (2008) showed that the results of the RFQ stay constant over time regardless of messaging influence, suggesting that framed instructions that are not aligned to an individual's goal orientation or regulatory fit will not have a positive influence on performance.

No personally identifiable information was collected from the follow-up questionnaire. The date and time were written by the research assistant at the top of each questionnaire following testing and were used to identify participants' performance and match performance scores to demographic and RFQ answers.

C. REGULATORY FOCUS

The RFQ was used to evaluate a participant's goal orientation (Higgins et al., 2001). The RFQ consists of 11 questions, meant to ascertain a participant's history of accomplishments or failures due to eager or vigilant goal orientation (Higgins, 1997). Figure 3 shows the 11 RFQ questions in order; each question is answered with a one through five with five being very often and one being not at all. Questions 1, 3, 7, 9, 10, and 11 are to determine participants' promote score whereas questions 2, 4, 5, 6 and are associated with prevent scores. The RFQ total score is calculated as follows:

Promote: (6 - response #1) + response #3 + response #7 + (6 – response #9) + response 10 + (6 – response #11). The sum of this equation is divided by 6 (total number of questions) giving a promote score of 1–5.

Prevent: (6 – response #2) + (6 – response #4) + response #5 + (6 – response #6) + (6 – response #8). The sum of this equation is divided by 5 (total number of questions) giving a prevent score of 1–5.

Questions 1, 2, 4, 6, 8, 9, and 11 are reverse correlated, meaning if a participant answered a 5, their score is actually a 1.

The higher of the two scores determines a participant's regulatory focus or goal orientation (Higgins, 1997). For example, if a person scores a promote score of 3 and a prevent score of 5, that person is determined to have a prevent or vigilant goal orientation.

Event Reaction Questionnaire
This set of questions asks you HOW FREQUENTLY specific events actually occur or have occurred in your life. Please indicate your answer to each question by circling the appropriate number below it.
1. Compared to most people, are you typically unable to get what you want out of life?
2. Growing up, would you ever "cross the line" by doing things that your parents would not tolerate?
3. How often have you accomplished things that got you "psyched" to work even harder?
4. Did you get on your parents' nerves often when you were growing up?
5. How often did you obey rules and regulations that were established by your parents?
6. Growing up, did you ever act in ways that your parents thought were objectionable?
7. Do you often do well at different things that you try?
8. Not being careful enough has gotten me into trouble at times.
9. When it comes to achieving things that are important to me, I find that I don't perform as well as I ideally would like to do.
10. I feel like I have made progress toward being successful in my life.
11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them.

Figure 3. Regulatory Focus Questionnaire (From Higgins et al., 2001)

Of the 211 participants, 164 scored higher on promote questions, 45 scored higher on prevent questions, and two showed no preference.

D. MATERIALS

All testing was conducted on Apple Macintosh notebook computers with 13.3-inch screens and an external mouse. These computers utilized Windows 7 operating system. A separate computer was used for each phase of testing. One computer was dedicated to math testing, a second computer was dedicated to *Call of Duty: Modern Warfare 2*, and a third computer was dedicated to *Call of Duty: Modern Warfare 3* to

ensure as little variability in testing as possible. All participants who took the math test used the same computer and the same mouse. Test Two was also conducted using the single computer and mouse per mission.

The mouse and keyboard game interface were chosen over traditional game controls to level the playing field. Many of the younger participants were familiar with the game but were uncomfortable using a mouse and keyboard (as noted in the comments section of the follow-up questionnaire), and many older participants felt familiar with a mouse and keyboard but had never played the games before.

The math test was created at the Naval Postgraduate School using zTree software. The software guided participants through three practice problems followed by a timed 30-second session of basic math problems. There were 76 possible questions; the highest number of correctly answered questions was 21. The average time to complete the practice math problems, the test and the follow on questions was less than five minutes.

The *Call of Duty* series of games offers missions that record time to completion, accuracy, and number of enemy and friendly targets hit. Additionally, they offered simulated shooting range missions since this study had to avoid missions that would simulate the stresses of actual combat. The time to complete both missions and the follow-up questions was less than 15 minutes.

E. MESSAGING DEVELOPMENT

During this research, three types of message instruction framing used. These were offensive, defensive and no messaging. Spiegal, Grant-Pillow, & Higgins (2004) showed that framing instructions encourages behavior change in goal orientation, but Higgins (2000) showed that only message framing that coincides with a person's goal orientation will have positive results, increasing the positive feeling of their organic motivation. For example, if a participant receives messaging that opposes their goal orientation they may see no value in the task and become disinterested (Cesario et al., 2004; Freitas et al., 2002; Higgins 2005; Higgins et al 2010). Offensive instruction framing was developed to emphasize the benefit of goal accomplishment while ignoring possible costs (Elliot & Sheldon, 1997). Defensive framing was developed to emphasize the costs of failure to

perform and the penalties for mistakes (Elliott & McGregor, 2001). No messaging instructions were developed as the minimum information needed to complete the evolution with an attempt not to influence the participant's goal orientation.

The actual framed instruction that was given to participants was as follows:

Test One

Offensive:

"You are about to take a basic math test, once you are ready to start you will be given 30 seconds to complete as many questions as possible. You will receive points for each question you correctly answer. These are basic addition and subtraction problems you will have no problem completing them correctly."

Defensive:

"You are about to take a basic math test, will be given 30 seconds to complete as many questions as possible. Only the questions you answer correctly will be scored. Incorrect answer will not be scored and work against you on your overall time."

No Messaging:

"You are about to take a basic math test, you will have 30 seconds to answer the questions."

Test Two

Offensive:

"There are both friendly and enemy targets. Hit all enemy targets and complete the range as quickly as possible. Your score will be your speed to hit all targets and exit the shooting range."

Defensive:

"There are both friendly and enemy targets. Points will be deducted for hitting friendly targets. You will fail the shooting range mission if you shoot the course instructor in the final room. You must hit all enemy targets to complete the mission. Your final score will be a combination of time to completion and accuracy."

No Messaging:

> "There are both friendly and enemy targets. Hit all the enemy targets and avoid hitting the friendly targets to complete the course."

F. PROCEDURE

Volunteers were asked to participate in one of two tests, a math test or a first-person shooter game. After reading and signing a consent form, participants were asked to roll a six sided die. A roll of one or two would give them instructions "A" (offensive), a roll of three or four would give them instructions "B" (defensive) and a roll of a five or six would give them instructions "C" (No message farming).

All Test One (math) participants were given the following instructions prior to doing three practice problems:

> "You are about to take a basic math test, you will first be given a sample test of three (3) questions. This sample is not timed. You will have to click the box, then enter your answer, then click OK to move to the next question."

They were then given the following sample questions:

1) 2+2=

2) 3–1=

3) 4+2=

The test consisted only of single digit addition and subtraction problems. The goal of this research study was not to evaluate mathematic skills but rather, to assess performance, that is, the ability of participants to quickly and correctly react to a problem. The following 38 questions were asked twice in a random order:

1) 9+1=

2) 9–3=

3) 8–7=

4) 8–6=

5) 8–5=

6) 8–4=

7) 8–1=

8) 7–1=

9) 7–2=

10) 7–4=

11) 7–6=

12) 7+1=

13) 7+2=

14) 6–5=

15) 6–3=

16) 6–1=

17) 6+1=

18) 5–4=

19) 5–2=

20) 5–1=

21) 5+1=

22) 5+4=

23) 4–3=

24) 4+1=

25) 4+4=

26) 4+5=

27) 3–2=

28) 3–1=

29) 3+1=

30) 3+4=

31) 3+5=

32) 2–1=

33) 2+3=

34) 2+6=

35) 1+2=

36) 1+4=

37) 1+6=

38) 10–3=

The zTree software recorded correct and incorrect answers with a time stamp. Following testing, participants were asked to fill out a hard copy questionnaire. Each participant's questionnaire responses were later combined with their performance scores, using date and time. Participants were given a candy bar following the completion of the questionnaire.

During Test Two (first-person shooter), all participants were given the following instructions prior to starting the tutorial:

> The following is a practice round to get you familiar with the controls you will be using, there is no time limit to practice. The movement controls are W & S (forward and back), A & D keys (side to side). Use the "shift" key to sprint. The right mouse button will have you look through your sights; the left mouse button will fire. You can move and fire or look through your sights at the same time.
>
> In the tutorial you will have as much time as you like to become familiar with weapons use, reloading and movement controls.
>
> Following a basic familiarization you will be asked to move to a shooting course that will have moving targets, move to the white dot with a range maker on your screen.

> Once you are given instructions prior to entering the shooting course you will look to your left at a closed gate. Once that gate opens, move through it and then to your right to face the shooting course. Targets will pop up as you move forward through the shooting course.
>
> Time will start as soon as the gate opens, you will have two minutes to complete the course. Move your way through the shooting course hitting all enemy targets and into the building at the far end of the field, avoid shooting civilians as you move through the building and to the roof, then jump down from the roof back onto the shooting course and shoot targets as you exit the field to complete the tutorial and stop time, time will stop once you exit the course. At the end you will have to sprint (shift key) through an alley. At some point a target will pop directly in front of you, you must use your knife "E" to hit this target.
>
> Note: a small number of people will feel motion sickness type symptoms while playing video games, this is referred to as simulator sickness. It is extremely unlikely to occur with less than 30 minutes of game play: however if you feel any motion sickness type symptoms (nausea, headache, dry mouth), immediately stop playing and notify the research assistant.

After the tutorial, participants changed to a different computer to complete the *Stay Sharp* mission. They were read a reminder set of instructions as well as the framed instructions, and then completed the *Stay Sharp* mission. Upon completion of the two missions, participants were given the hard copy questionnaire and finally their candy bar.

IV. RESULTS

A. PARTICIPANT CHARACTERISTICS

Of the 211 research participants, 182 were male, 29 were female. The majority of participants were age 18 to 45 years of age with 31.1% being 18–24, 37.4% being 25–34, 25.6% being 35–45 and 5.7% being more than 45 years old. Participants' height was also measured as a possible influence of eager or vigilant goal orientation. Only 0.9% of participants were less than 5 feet in height, 16.6% were between 5 feet and 5 feet 6 inches, 58.8% were between 5 foot 6 inches and 6 feet, with 23.7% being greater than 6 feet tall. Military service was also recorded; 10.4% of participants were civilians, while all others were active duty military with 34.6% Army, 29.9% Navy, 18% Air Force and 7.1% Marine Corps.

B. RFQ SCORES OF PARTICIPANTS

The participants of this study were dominantly promotion goal oriented based on RFQ scores, which was unanticipated Figure 4. A more even distribution of goal orientation or a preponderance of prevention-focused participants seemed more likely; as people are generally risk-averse (Scholer et al., 2010). It is possible that active-duty military members, in this all-volunteer force, during a time of war, tend to be promotion goal oriented, or it is possible that this is an anomaly. More research needs to be conducted in this area of interest.

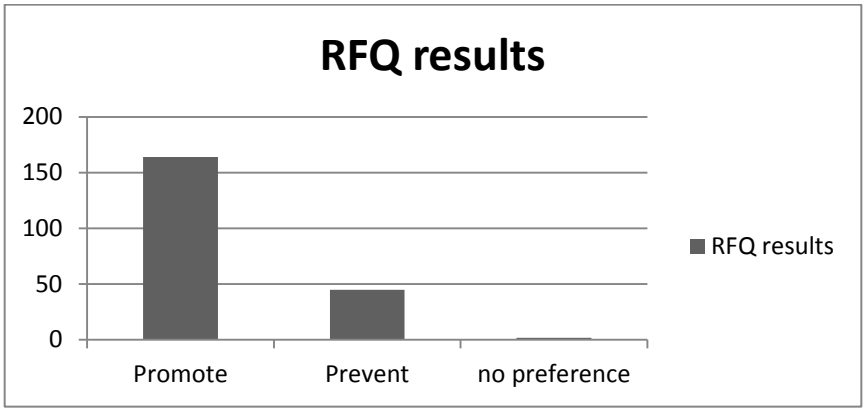

Figure 4. RFQ results

C. TEST ONE

Test One had 104 participants answering an average of 12.93 math problems correctly in 30 seconds, with a standard error of 0.03. Participants on average answered 0.19 answers incorrectly with a standard error of .01. When broken down by the framed instructions given to participants, Figure 5, those receiving offensive framing answered 13.97 math problems correctly with a standard error of 0.04 and incorrectly answered 0.10 questions with a standard error of 0.01. While those who received defensively framed instructions answered an average of 13.00 correctly with a standard error of 0.16 and answered an average of 0.11 incorrect answers with a standard error of 0.02. Those that did not receive framed instructions answered an average of 12.00 correctly with a standard error of 0.71 and 0.21 incorrectly with a standard error of 0.03.

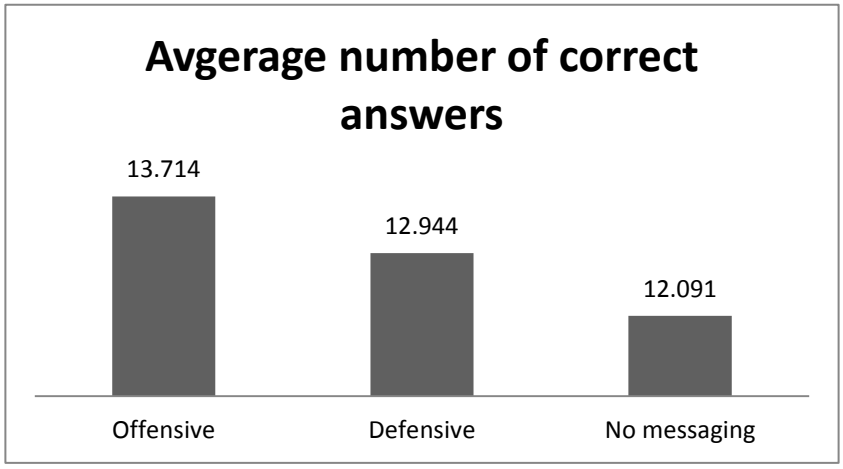

Figure 5. Average Number of Correct Answers by Framed Instructions

The results were then examined using a linear regression analysis to determine if there were any relationships of statistical significance. Participants who received offensive messaging had a coefficient of answering 1.43 more answers correctly than a participant with no messaging, with a P-value of 0.0376 and an R-square value of 0.0632, showing statistical significance only in offensive messaging. Those who received defensively framed instructions had a coefficient of 0.634 with a P-value of 0.7766,

showing no statistical significance. The greatest relationship was discovered when a regression analysis was done with participants' age, showing a steady decrease in performance as age increases, Figure 6.

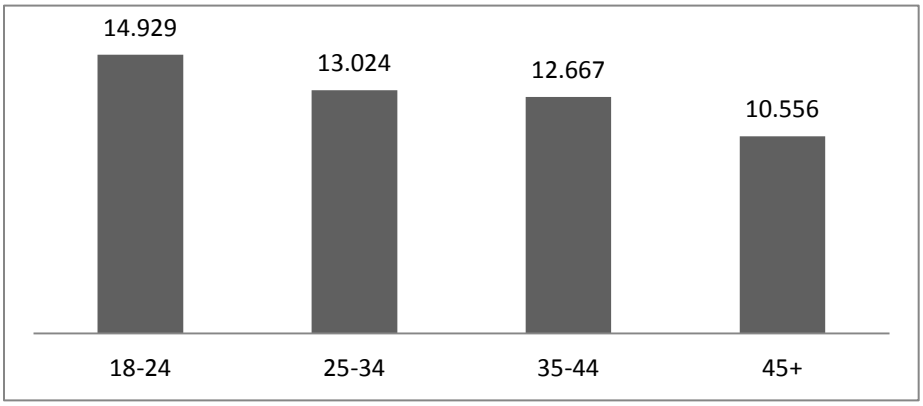

Figure 6. Test One, Correct Answers by Age

Participants aged 18 to 24 years old performed significantly better than other age groups with an average score of 14.93 correct answers. A linear regression analysis across all ages, using 45 and older as base, gave 18 to 24 year olds an intercept of 4.151 with a P-value of 0.003 and an R-square value of 0.091. 25 to 34 year olds averaged 13.26 correct with a P-value of 0.035. Participants aged 35 to 45 averaged 12.80 correct answers, while participants who were 45 and older averaged 10.78 correct answers.

Participants who had a base goal orientation of promote or eager tended to perform better than those with a prevent goal orientation Tables 1 and 2. As expected from previous research studies, participants with RFQ scores high in promote, performed best when given offensive framed instructions and those who had RFQ scores suggesting strong prevent or vigilant goal orientations performed best when given defensive framed instructions (Elliot & Sheldon, 1997; Forster et al., 2003; Higgins 1997; Higgins et al., 2001; Latimer et al., 2008; Mann, Sherman & Updegraff, 2004; Scholer, Fujita, Higgins, Stroessner, & Zou, 2010; Shan, Friedman, & Higgins,1998).

Table 1. Test One, Number of Correct Answers by RFQ and Framed Messaging

Number of correct answers			
Messaging received	Regulatory focus		
	Promote	Prevent	No preference
Average	13.07	12.42	12
Offensive	13.97	12.2	N/A
Defensive	13	13	11
No messaging	12.04	12.13	13

Table 2. Test One, Number of Incorrect Answers by RFQ and Framed Messaging

The higher the number the more questions answered incorrectly on average

Number of incorrect answers			
Messaging received	Regulatory focus		
	Promote	Prevent	No preference
Average	0.22	0.11	0
Offensive	0.1	0	N/A
Defensive	0.31	0.17	0
No messaging	0.25	0.13	0

Though both framing and age showed an influence in performance, the results of Test One are considered inconclusive.

D. TEST TWO

Test Two had 107 participants complete both missions, *Call of Duty: Modern Warfare 2 – S.S.D.D. and Call of Duty: Modern Warfare 3 – Stay Sharp*. The average time to complete the first mission was 73. 02 seconds hitting an average of 1.11 friendly targets. The average time to complete the second mission was 70.76 seconds, hitting an average of .29 friendly targets. The hitting of friendly targets was a base of evaluating accuracy during this test, if a friendly target was hit that was recorded as an error. Since no participant had played this video game using the mouse and keyboard as game interface, it was determined to be the more unbiased control interface. To evaluate the influence of framed instructions each individual participant's time to complete the second mission was recorded and then subtracted that from time to complete their first mission.

This was done so a new player would not be compared to an experienced player. Using this analysis, the average time change between missions was -4.29 seconds (-4.82%) with a reduction in friendly targets hit by -0.55 (-42%).

When participants were separated by what set of framed instructions they received, the influence of messaging became clear, Figure 7. Separate linear regression analyses were conducted to test the effects framed instructions had on performance. For those participants who received offensive framed instructions, their time to complete the second mission decreased by 9.01 seconds (11.13%). Analysis showed a P-value of 0.038 and an R-square of 0.063. Those who received defensive framed instructions decreased their time to complete the second mission by 1.219 (0.14%) seconds and those who received no messaging decreased their time by 2.163 seconds (2.59%).

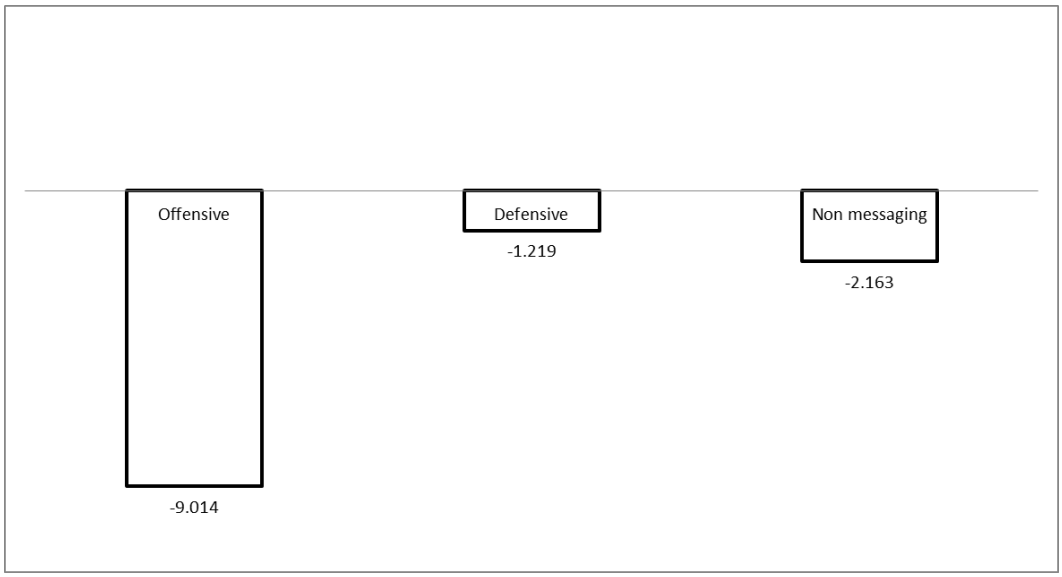

Figure 7. Test Two, Change in Seconds After Messaging.

The change in the number of friendly targets hits was minimal compared among the three groups; those who received offensive messaging had an average decrease of 0.263 (33%) friendly targets hit, as those who received defensive and no messaging had a decrease in friendly targets hit of 0.743 (45%) and 0.676 (49%), respectively.

When participants were further separated by their regulatory focus scores and the type of framed instruction that they received, those who received offensive instructions performed much faster than those who received defensive instructions or no messaging. Table 3

Table 3. Test Two, Difference in Time to Completion First and Second Mission

Difference first and second mission	Promote		Prevent	
	Time (Sec)	%	Time (Sec)	%
Average	-5.072	-5.59%	-1.844	-2.44%
Offensive	-9.39	-11.16%	-7.806	-11.01%
Defensive	-1.502	-0.35%	0.975	1.48%
No Messaging	-4.378	-5.62%	1.415	2.29%

When evaluating errors, that is, the number of friendly targets hit, the results were contradictory to what was expected. Previous studies (Forester et al., 2003), have suggested that promotion focused participants respond best to offensive instructions and vigilant focused participants would respond best to defensive instructions. However, the exact opposite occurred. When promote focused participants received defensive instructions, they made roughly 20% fewer errors. When vigilant focused participants received offensive instructions, they made roughly 30% fewer errors, contradicting regulatory fit research (Shah, Friedman, & Higgins, 1998). During Test Two, participants hit more than 5,000 enemy targets and fewer than 200 unarmed targets. The larger percentages of change in Table 4 are related to the low number of errors, whereas a single hit of a friendly target would have a larger percentage change.

Table 4. Test Two, Change in Number of Friendly Targets Hit After Messaging

Friendly targets hit		
Difference first and second mission	Promote	Prevent
Average	-42%	-42%
Offensive	-26%	-56%
Defensive	-47%	-25%
No Messaging	-56%	-38%

Table 4 shows the percentage of change in friendly targets hit. As there was a decrease in all areas, the higher the decrease the fewer targets were hit. For example -56% hit fewer targets after messaging and -25% had the smallest change in targets hit after messaging.

Regression analysis of age, gender and military service showed no statistically significant relationship with speed or accuracy.

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V. DISCUSSION

A. INFLUENCE OF FRAMED INSTRUCTIONS ON PERFORMANCE

In this study, I showed the influence of message framing on performance, conditional on environmental stressors. Without stress, messaging influenced performance as expected in Test One. For example, giving framed instruction consistent with participants' regulatory form increased performance (Cesario, Grant, & Higgins, 2004; Higgins, 2005; Shah et al., 1998). Although offensive framing had a stronger influence in promotion focused participants than did defensive framing with prevention focused participants, this is similar to the results of Latimer et al. (2008).

When stress was introduced in Test Two, offensively framed instructions increased performance of participants regardless of their goal orientation as scored by the RFQ. It was my attempt in developing instructional messaging under times of stress to emphasize the completion of the mission, while ignoring the possibility of error or failure and by doing so preventing the thought of possible losses and force all participants into an eager goal orientation. It is possible that while under the influence of this type of extreme offensive messaging all or most participants, even those with a base prevent or vigilant goal orientation, became eager in their goal orientation.

B. LIMITATIONS OF THIS STUDY

Test One was developed using the zTree software with a mouse and keyboard interface. As such, hand-to-eye coordination could have influenced the test results. I believe more accurate results would be found if the test could be repeated with a number-pad interface only.

This study was very limited as the majority of participants were active-duty military and the amount of stress authorized by the Naval Postgraduate School; Institutional Review Board, during testing was minimal. Though the participant pool would be less diverse, a more accurate study of instructional framing under stress would occur by testing framed instructions during the Special Forces Advanced Reconnaissance, Target Analysis and Exploitation Course (SFARTEC). This is an

advanced close quarters battle (CQB) course, where operators could be given framed instructions prior to entering the CQB course and then given different instruction while running the same CQB course a few days later.

C. CONCLUSION

The results of this study confirm the importance of regulatory focus and framed messaging. In both Tests One and Two, participants with high promote scores from the regulatory focus questionnaire performed faster and with fewer mistakes. Scores from Test One were expected. When scores for speed and errors were computed for Test Two, the outcome was less expected. The change in the number of errors that a participant made while under stress was reversed from what I expected as those who performed faster made fewer errors and those who performed slower made more errors.

It is challenging to generalize the results of this research and come to a conclusion as the participant pool was predominantly military with an uncharacteristically high number of promote goal oriented persons. The unique participant pool used in this study opens many doors in research and has many military implications. The demographics of this study show an unprecedented preponderance of promote goal oriented people serving in the active-duty military. Understanding goal orientation may help with future recruiting. The knowledge that active duty service members are dominantly promote goal oriented and the performance enhancers of aggressively framed instructions during stressful evolutions, when refined this research could be a large combat multiplier on the battle field.

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