PHYSIOLOGICAL EVIDENCE OF CONTENTMENT AS

A WITHDRAWAL-MOTIVATED AFFECT

by

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ABSTRACT

Emotions motivate humans to either approach or avoid stimuli in their environment. While most emotion theorists associate all positive emotions with approach-motivation, there may be some positive emotions associated with withdrawal-motivation. Post-goal states of contentment may prompt an individual to withdraw from the environment to protect and savor goal objects. The current study examined whether post-goal contentment led to withdrawal-motivation using behavioral and psychophysiological measures. Participants wrote an essay evoking contentment, enthusiasm, or neutral affect. Then, participants completed behavioral tasks measuring aspects of withdrawal motivation while EEG and EMG were recorded. Asymmetric frontal activity assessed using electroencephalography (EEG) differed between the contentment and neutral conditions. Specifically, contentment evoked less relative left frontal activation, a neurophysiological marker of approach motivation. Participants in the contentment condition demonstrated less approach motivation than a neutral condition. Participants in the contentment condition demonstrated a trend towards more activity of the zygomaticus major than participants in the neutral condition, suggesting that the content state was experienced as positively valenced. Behavioral measures of risk taking and protective behavior did not reveal differences between conditions. Physiological evidence suggests that contentment is experienced as a positive but possibly withdrawal-motivated state, while behavioral evidence is inconclusive.

LIST OF ABBREVIATIONS AND SYMBOLS

ANOVA	Analysis of Variance
EEG	Electroencephalography
EMG	Electromyography
F	Fisher's *F* ratio: a ratio of two variances
n	Sample size
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
SD	Standard deviation: measure of the variation of a set of data values from its mean
p	Probability associated with the occurrence of obtaining a value equal to or greater than the observed value under conditions of the null hypothesis

ACKNOWLEDGEMENTS

Many thanks to my supervisor and committee chair Dr. Philip Gable for his advice, guidance, and support throughout the course of this project. I would also like to thank my committee members Dr. Alexa Tullett and Dr. Peter Harms for their input and suggestions that helped make this a better project. Additionally, I would like to thank the undergraduate researchers in the SCEN Lab at the University of Alabama for the time and effort put into assisting me with data collection. Lastly, I am especially grateful for my husband's encouragement as I chase my dreams, my parents sacrifices and support that have brought me this far in life, and the endless support of my siblings and family-in-law.

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INTRODUCTION

The study of positive emotion has an extensive past of associating all pleasant states with similar cognitive effects (Frederickson, 2001; Ashby, Isen, & Turken, 1999; Frederickson, 1998). However, more recent work in the area of positive emotions has discovered diverse effects of various positive affects on an array of cognitive processes and behavioral outcomes (Shiota et al., 2014; Shiota, 2014; Gable & Harmon-Jones, 2011; Gable & Harmon-Jones, 2010; Gable & Harmon-Jones, 2008). Yet, despite recognizing positive states as distinct, positive emotion literature for the most part considers all positively valenced states to have a common characteristic: association with approach motivation (Lang, 1995; Watson, 2000; Lang & Bradley, 2013). However, it may be that some positive emotions are associated with the functioning of the withdrawal system.

While early theories confounded approach and avoidance motivation with positive and negative affect, a more recent body of work has shown that this is not always the case. Some negative emotions such as anger are actually associated with approach motivation (Carver & Harmon-Jones, 2009; Carver, 2004; Harmon-Jones, 2003). If negative emotions can be associated with either approach or withdrawal tendencies, then it is possible that positive emotions can also vary in their motivational tendencies. The proposed research investigates a category of motivational affective states largely ignored: positive states that are withdrawal-motivated.

Although this concept has not been studied extensively, some evidence suggests that positive emotions may relate to the withdrawal system. Harlé & Sanfey (2010) demonstrated that evoking serenity led to similar behavioral consequences as negative withdrawal-motivated states in the Ultimatum Game. Carver (2006; 2004) links serenity to the functioning of the behavioral avoidance system. Tullett and colleagues (2015) found evidence for the proneness to nostalgic thinking, considered a positive emotion, to relate to a neurophysiological marker of withdrawal-motivation (greater relative right frontal activity). However, despite some scattered evidence of the existence of these positive-withdrawal states, relatively little research has explicitly examined withdrawal-motivation with positive affect. This proposed research has the purpose of identifying such states.

Contentment as Withdrawal-Motivated

Positive withdrawal emotions may arise in post-goal states where the organism is motivated to protect and savor the goal object. The state of safety and rest following consummatory behavior goes by various names: serenity, relaxation, tranquility, relief, contentment, satiety, or satisfaction (Fredrickson, 1998; Kreibig, 2010; Harlé & Sanfey, 2010). All of these conceptualizations appear to be tapping into a similar affective state, referred to here as contentment.

Most theorists associate contentment with the approach system, likely due to the assumed relationship between all positive affects and approach (Lang, 1995; Watson, 2000). Some researchers recognize that contentment does not relate to approach motivation, but associate it with a state of amotivation rather than with withdrawal-motivation (Davidson, 1994; Davidson, 1998; Frijda, 1986; Ellsworth & Smith, 1988; Lazarus, 1991). However, it may be that low levels of withdrawal-motivation are difficult to distinguish from a lack of motivation. Rather than avoidant fleeing, the withdrawal prompted by contentment may manifest itself as a return to a safe and comforting environment following goal attainment.

Contentment arises when an organism experiences a state of satiety of physical and psychological needs (Ellsworth & Smith, 1988; Frederickson, 1998). Much research suggests that contentment serves an important calming physiological function (Ritz, Thöns, Fahrenkrug, & Dahme, 2005; Christie & Friedman, 2004; Palomba, Sarlo, Angrilli, Mini, & Stegagno, 2000). Increased parasympathetic and reduced sympathetic nervous system functioning during states of contentment or satiety aide in digestion and conserving physiological resources (Kreibig, 2010). This decreased vigilance necessitates a safe environment from predators. Following goal attainment, organisms cannot switch into this state of contentment unless a state of safety is first met.

More recent research on the function of contentment suggests that contentment may also serve important psychological functions. Contentment following success causes one to savor and integrate recent experiences into one's self (Csikszentmihalyi, 1991; Frederickson, 1998). This psychological digestion of recent experiences allows one to mentally consolidate and reflect on successful goal attainment experiences. Animal behavior research has determined that following food consumption, animals typically engage in a period of rest (Bradshaw and Cook, 1996; Kushner and Mook, 1984). Recent evidence suggests that this period of rest may facilitate mental digestion, which may be adaptive for encoding successful routes to goal attainment (Foster & Wilson, 2006). In a period of inactivity following successful attainment of food, the pattern of hippocampal cells activated to reach the reward was activated in reverse order (Foster & Wilson, 2006). The researchers suggested this reverse firing of cells may help rats with learning and may be helpful during subsequent goal-finding behavior. This post-goal state of rest may serve a similar function in humans.

Withdrawing from a stimulating environment might be necessary for the organism to engage in mental and physical digestion. A key phase of goal attainment is seeking a safe and familiar place. In order to engage in rest and digestion activities, organisms must withdraw from stimulating aspects of the environment back to a safe and familiar place. Contentment may prompt an organism to withdraw from social environments. Activities associated with contentment are related to basic needs and maintenance of the physical body, but are unrelated to social activities (Berenbaum, 2002). Feelings of contentment arise in situations related to higher levels of certainty and a lack of perceived obstacles (Ellsworth & Smith 1988). Following goal attainment, withdrawing to a safe environment will allow an organism to feel certain about their safety and shield them from potential obstacles. Additionally, evoking feelings of contentment causes greater desire for products associated with home and comfort (Griskevicius, Shiota, & Nowlis, 2010). Following satiety of basic needs, humans should exhibit behavior associated with protection and safety.

Withdrawal to a safe environment necessarily precludes risky behaviors. Post-goal withdrawal involves avoiding predators, while risk taking behavior exposes an organism to dangerous outcomes. Additionally, distance from achieving a goal in pre-goal states increases risk taking behavior in order to close the gap between the organism and the goal object (Mishra & Lalumiere, 2010). In a state of contentment where no goal-activation has occurred, an organism would be unlikely to engage in risky behaviors.

Behavioral Measures of Withdrawal Motivation

The Point Subtraction Aggression Paradigm (PSAP; Golomb et al., 2007) is a computerized task in which participants are given three potential courses of action on each trial: gain a reward for yourself, aggress against an opponent, or protect your own resources from an opponent. These options map onto approach and avoidance behaviors well. Both going after a reward and aggressing against an opponent require activation of the behavioral approach system. In contrast, the defensive response of protection is a withdrawal-oriented behavior.

The Balloon Analogue Risk Task (BART) is a standardized laboratory task designed to assess risk taking behavior (Lejuez et al., 2002). In this task, participants are able to inflate a balloon using a button press. Each pump of the balloon is worth a fixed amount of money, and the participant may choose to cash out the money they have after any number of pumps. The balloon pops on a variable number of pumps on each trial; if the balloon pops no money is earned. Risk taking behavior is quantified by average number of pumps made per balloon, with greater inflation of the balloon demonstrating riskier behavior. Behavioral withdrawal should lead participants to engage in less risk taking behavior.

Hemispheric Lateralization of Motivation

One of the oldest and most consistent measures of approach and withdraw motivation is frontal cortical asymmetry. Early studies on hemispheric processing of emotion found that the left hemisphere is involved with positive affect while the right hemisphere is involved with negative affect (Goldstein, 1939; Gainotti, 1972; Robinson & Price, 1982; for a review see Coan & Allen, 2004). Later research further clarified that frontal asymmetrical processing reflects motivational direction rather than affective valence. Early research confounded valence and motivation by studying only positive affects associated with approach motivation and negative affects associated with withdrawal motivation. However, anger is a negative affect associated with approach motivation, and is accompanied by greater relative left frontal activation (Harmon-Jones & Allen, 1998; Harmon-Jones et al., 2002, 2003; Harmon-Jones, 2004, 2007). Additionally, some studies have associated trait levels of approach motivation to left frontal activity and trait levels of withdrawal orientation to right frontal activity (Sutton & Davidson, 1997). Rather than valence, frontal cortical activity in the left and right hemispheres appears to be associated with approach and withdrawal motivation, respectively.

Davidson (1994; 1998) asserted that positive affects high in levels of approach motivation, such as pre-goal states of desire, are related to left frontal activation. However, his theory suggests that post-goal forms of positive affect (contentment) would not be related to greater left frontal activity because it is unrelated to approach-motivation. Consistent with this theory, children experiencing a state of contentment in response to playing a game experience a shift in EEG patterns to relative right frontal activity (Light, Coan, Frye, Goldsmith, & Davidson, 2009). Additionally, mothers demonstrated greater relative right frontal activity the more they perceived contentment in their own infants (Killeen & Teti, 2012). Withdrawal-motivation may be responsible for the relationship between contentment and right frontal activity.

According to the traditional conception of contentment as a positive (and therefore approach-related) affect, contentment would relate to greater left frontal activation. However, if post-goal states of contentment are actually states of positive withdrawal, contentment should not evoke left frontal activation, and should instead be associated with reduced relative left frontal activation compared to a neutral state.

Valence-Specific Facial Muscle Activity

Contentment is subjectively felt as a pleasant affective state. Psychophysiological research has determined that pleasant stimuli elicit greater activity over the zygomaticus major and decreased activity over the corrugator supercilii (Brown & Schwartz, 1980; Bradley, 2000; Larsen, Norris, & Cacioppo, 2003). The zygomaticus major muscle is used to pull the cheeks upward during smiling, and is more sensitive to identifying positive rather than negative states. The corrugator supercilii muscle is responsible for drawing the brow down and together during frowning. The corrugator supercilii is less susceptible to voluntary control and may be more sensitive to implicit subjective feelings. Although both muscles have been used as measures of emotional reactivity, most evidence points to the superiority of the corrugator supercilii in assessing valence (Larsen, Norris, & Cacioppo, 2003; Lang, Greenwald, Bradley, & Hamm, 1993). Facial EMG will be assessed in order to ensure that participants are feeling positive in content states.

The Current Study

The current study aimed to study the motivation and valence of a state of contentment through psychophysiological measures. Contentment was manipulated through an essay prompt used in previous research (Griskevivius, Shiota, & Neufield, 2010). As comparison conditions, a neutral control and positive approach-motivated state (anticipatory enthusiasm) were used. Following the emotion induction, participants completed two laboratory tasks in counterbalanced order to assess propensity to withdraw. They completed the Point Subtraction Aggression Paradigm (PSAP), in which participants compete with a fictitious other participant in order to gain the most points. This task provided options to attempt to obtain rewards (gain points), aggress towards an opponent (opponent loses points), or protect one's own resources (prevent losing points). Additionally, participants completed the Balloon Analogue Risk Task (BART) as a measure of risk taking behavior.

Participants who felt contentment were hypothesized to exhibit more instances of protecting one's own resources from the predator (other participant), and to exhibit less approach behaviors of either gaining points or aggressing towards the opponent. Participants in the contentment condition were hypothesized to demonstrate less risk taking behavior than those in the neutral or approach-motivated conditions. The contentment condition was expected to exhibit greater relative right frontal activity than a neutral state. Additionally, participants in the contentment condition should show more smiling than a neutral condition, evidenced by greater activity of the zygomaticus muscle and less activity of the corrugator muscle.

METHODOLOGY

Participants

Participants were recruited using the online PY101 subject pool at the University of Alabama. Participants took part in one of two laboratory studies: behavioral or physiological. Participants in the behavioral only study completed all individual difference measures and behavioral tasks in one of three conditions: contentment, anticipatory enthusiasm, and contentment. The behavioral study included 183 (133 female) participants with an average age of 19.2 (SD = 2.43).

Participants in the physiological study completed the same measures and tasks as the behavioral participants, but with EEG and EMG sensors applied. The physiological study utilized only the contentment and neutral conditions, because differences in EEG and EMG between these two conditions would provide the strongest evidence for contentment as a withdrawal-motivated affect. The physiological study included 62 (39 female) participants with an average age of 19.2 (SD = 1.16).

From the behavioral study, six participants were excluded due to one of the following: not completing the tasks within the allotted time (4), not understanding instructions and completing tasks incorrectly (1), or guessing the purpose of the experiment during debriefing (1). From the physiological study, three participants were excluded from all analyses due to equipment issues (2) or changes to the procedure (1). Additionally, EEG data from five participants was excluded from analyses due to excessive artifacts. EMG data from six participants was excluded due to recording issue. For these participants, data was included in analyses of the behavioral tasks. The final sample included 236 participants (177 in the behavioral study and 59 in the physiological study).

Measures

Demographics

Participants reported basic demographic information including: sex, age, and ethnicity.

Handedness

Handedness was assessed among physiological participants using a 13-item checklist asking participants which hand they use to perform various tasks. Right handedness was defined as performing no more than one task with their left hand. All participants were right-handed.

BIS/BAS

Participants completed the 20-item BIS/BAS Scale (Carver & White, 1994) assessing behavioral approach and inhibition sensitivity. BAS consists of three subscales: Reward Responsiveness, Drive, and Fun Seeking. Reward Responsiveness refers to positive responses to the occurrence and anticipation of a reward. Drive assesses the persistent pursuit of goals. Fun Seeking measures propensity to approach new and exciting rewards. BIS comprises sensitivity to punishment.

State Emotions

Participants reported how much they felt a variety of emotions on a nine-point scale to assess state emotions prior to manipulations. Specifically, participants were asked about feelings of contentment, serenity, tranquility, excitement, and enthusiasm. Additionally, participants reported a variety of other positive and negative emotions as filler variables.

Social Interaction Anxiety Scale (SIAS)

Participants completed the 19-item SIAS (Mattick & Clarke, 1998). This scale assesses general tendencies to be fearful of social situations and avoid them.

Point Subtraction Aggression Paradigm

The Point Subtraction Aggression Paradigm (PSAP; Golomb et al., 2007) is a standardized laboratory task that measures aggressive tendencies. In this task, participants were told that they are playing a computer game with an opponent where the goal is to earn as many points as possible. The participants were given three options to earn more points, protect their points from the opponent, or lower their opponents points. First, participants could press button 'A' 100 times in order to add a point to their total. They could also press button 'B' 10 times in order to subtract a point from their opponents' total, but not add to their own total. Lastly, they could press button 'C' 10 times, which was a protective option that prevented points from being stolen from the participant for a period of time. From time to time the game automatically subtracted points from the participant's total to simulate their opponent stealing their points. The variables of interest on this task included the number of times each participant selects each of the three options on the task. The number of times the participant selected option "A" was indicative of reward seeking behavior. The number of times the participant selected option "B" was indicative of aggressive behavior. The number of times the participant selected option "C" was indicative of defensive withdrawal behavior.

Balloon Analogue Risk Task (BART)

In the BART task, participants were given the task of winning money by inflating an animated balloon. Each pump of the balloon added money to the total, but popping the balloon resulted in a loss of all money on that trial. Each pump of the balloon was increasingly riskier as the balloon may pop at any point. The participant could “cash out” prior to the balloon exploding at any point by clicking a button. The variables of interest for the BART captured risk-taking behavior. The proportion of balloon explosions was calculated by dividing the number of balloons pumped to the point of explosion by the total number of balloons. The average adjusted pump count was the average number of pumps on each unexploded balloon, and indicated greater risk-taking propensity.

Manipulation Checks

At the end of the experiment, participants were asked to report their emotions on a scale of 1-9 for a variety of positive and negative emotion words, including the targeted emotion of contentment. This was done to ensure that participants in the positive affective conditions were feeling more positive than the neutral condition. Additionally, it was meant to ensure that no condition was experiencing negative affect. Emotion words included were content, tranquil, serene, enthusiastic, excited, afraid, distressed, angry, eager, and angry. This manipulation check was added to the protocol after data collection began. Manipulation check data was collected for 54 participants in the behavioral study and 41 participants in the physiological study.

Electroencephalography (EEG) Assessment

For those in the physiological study, EEG activity was recorded using 64 tin electrodes in a stretch-lycra cap (Electro-Caps, Eaton, OH). A ground electrode was placed midway between FZ and FPZ. Data was referenced to the left earlobe. All electrode impedances were kept under 5 kΩ and homologous sites were within 1 kΩ of one another. Data was amplified with NeuroScan SynAmps RT amplifier units (El Paso, TX). Data were low pass filtered at 100 Hz, high-pass filtered at 0.05 Hz, notch filtered at 60 Hz, and digitized at 500 Hz. Data were hand-inspected for artifacts, then transformed with a regression-based eye blink correction. Then, data were visually inspected a second time to ensure proper correction.

The time period analyzed for the current study was a resting recording that occurred directly following the essay manipulation. All epochs 1.024s in duration were extracted through a Hamming window, with consecutive epochs overlapping by 50%. An average ears reference was derived. Power spectra were calculated using a fast Fourier transformation; power values from the traditional alpha band (8-13 Hz) were averaged across all epochs (Coan & Allen, 2004; Harmon-Jones & Allen, 1997). A difference score was created by subtracting log left from log right for homologous sites. An asymmetry index was created by averaging the asymmetry scores from homologous pairs F4/F3, F2/F1, and FC4/FC3. Because alpha activity is inversely related to cortical activation (Laufs et al., 2003), lower scores reflect greater relative right frontal activity.

Electromyography (EMG) Assessment

EMG was recorded using bi-polar tin electrodes placed along the zygomaticus major muscle and the corrugator supercilii muscle. Electrode impedances were kept under 10 kΩ. Data were amplified and filtered online using a bandpass filter of 0.05-1000Hz. Data were hand artifact rejected. Mean amplitude during the resting recording following the essay writing portion of the experiment was calculated to assess emotional valence.

Procedure

Participants were brought into the lab and informed consent was given. Participants completed measures of demographics, handedness (for physiological study), BIS/BAS, SIAS, and state emotions. For the physiological study, EEG electrodes in a stretch lycra cap were then applied to the scalp and EMG electrodes were applied to the zygomaticus major muscle and the corrugator supercilii muscle.

Next, affective state was manipulated using an essay prompt designed to have participants visualize a past emotional experience. Based on Griskevivius, Shiota, and Neufield (2010), participants were asked to visualize and write about an experience evoking contentment, anticipatory enthusiasm, or neutral affect. Specifically, participants received one of the following instructions:

> Contentment. Please try to recall an event in your life when you had just eaten a delicious meal and your body felt full and comfortable. Please recall a specific event in which you felt full and comfortable after a delicious meal, rather than a general period of time.
>
> Anticipatory Enthusiasm. Please try to recall a specific time in your life when you knew something good was going to happen to you soon, and you were looking forward to that event. The event can be anything that you were looking forward to, but focus on the feeling you had leading up to that event, rather than the event itself. Please recall a specific time when you had the feeling of anticipating a positive event, not a general period of time.
>
> Neutral. Please try to recall the last time you did the laundry. Focus on the feeling you had during this event. Please recall a specific event, not a general period of time.

All participants then received identical instructions asking them to remember the event as vividly as they could, and write about the event and their feelings during it.

Following the essay prompt, participants completed the PSAP and the BART, in counterbalanced order across participants. These tasks were completed on a monitor using Inquisit Lab stimulus presentation software. Responses were given using a keyboard. After completing both tasks, participants completed a manipulation check where they reported their emotions. Then, they were debriefed.

RESULTS

Physiological Analyses

Following the essay manipulation, participants in the contentment group exhibited less relative left frontal activation (greater relative right frontal activation) compared to participants in the neutral condition, $F(1, 53) = 4.13$, $p = .04$ (see Figure 3.1). Facial EMG of the zygomaticus major and corrugator supercilii were compared between conditions. Participants in the contentment condition exhibited a trend towards greater zygomaticus major activity than participants in the neutral condition, $F(1, 52) = 1.53$, $p = .22$ (see Figure 3.2). Corrugator supercilii activity did not differ between conditions, $F(1, 52) = .02$, $p = .88$ (see Figure 3.3).

Figure 3.1.
Greater Left Frontal Asymmetry Scores by Condition

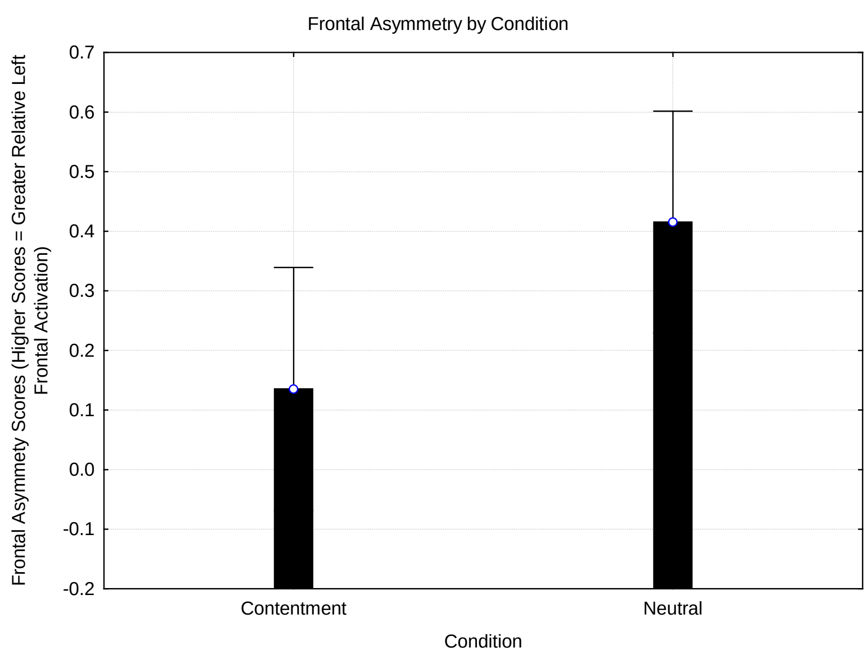


Figure 3.2
Zygomaticus Major Activity by Condition

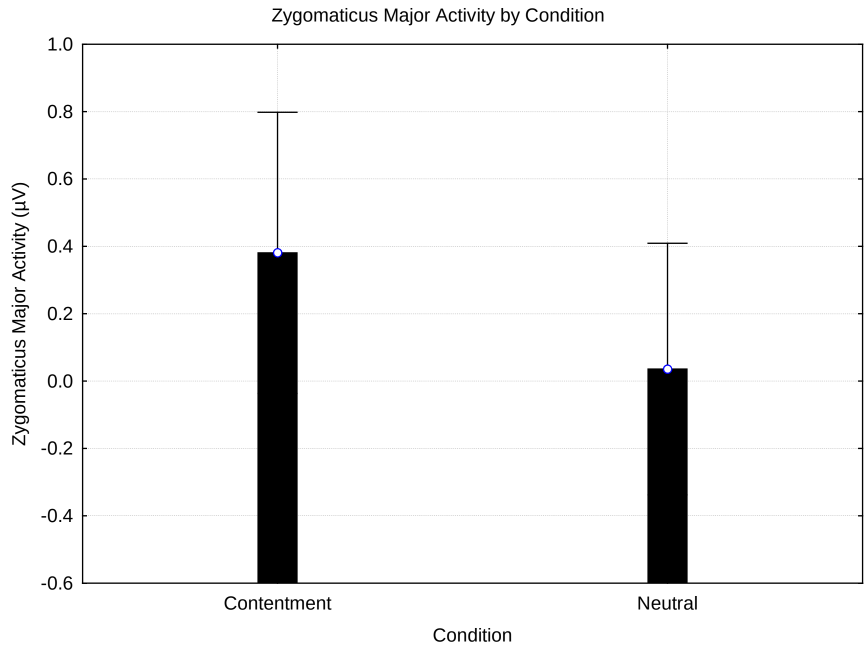
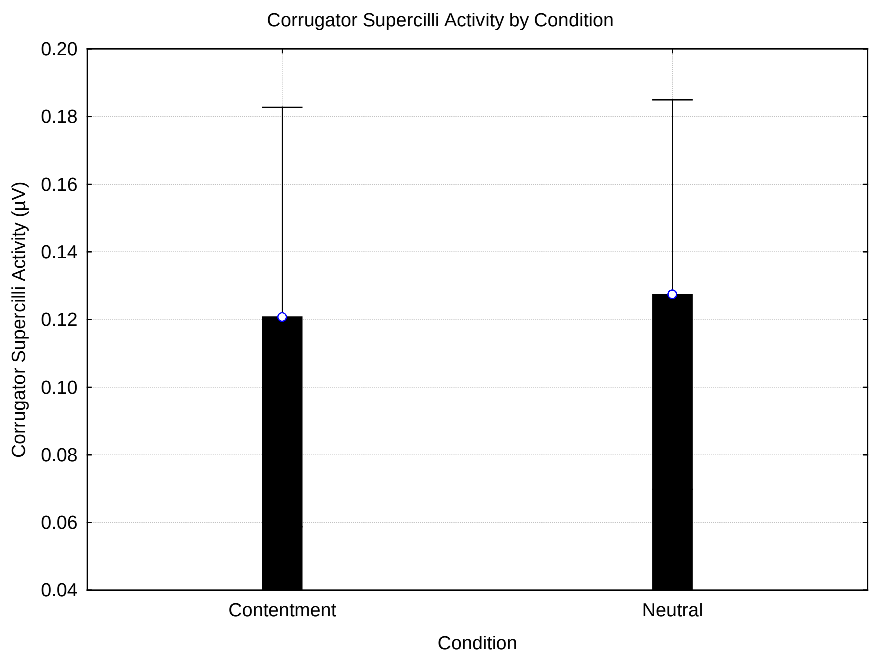


Figure 3.3
Corrugator Supercilii Activity by Condition



Behavioral Tasks

Analyses were conducted with participants from both the behavioral and the physiological studies in separate and combined samples. Results are reported for the combined sample for the BART and PSAP tasks, but the results did not differ when examining each sample separately.

Each behavioral task variable from the BART and PSAP tasks was subjected to a one-way ANOVA with condition as the between subjects factor. The adjusted average pump count in the BART task did not differ between conditions, $F(2, 234) = 1.64$, $p = .20$ (see Figure 3.4). The proportion of exploded balloons also did not differ between affective conditions, $F(2, 234) = .89$, $p = .41$ (see Figure 3.5). Reward seeking behavior in the PSAP did not differ between affective conditions, $F(2, 235) = 1.87$, $p = .16$ (see Figure 3.6). There was no significant effect of condition on aggression in the PSAP, $F(2, 235) = .61$, $p = .54$ (see Figure 3.7). Protective behavior in the PSAP did not differ by condition, $F(2, 235) = 1.15$, $p = .32$ (see Figure 3.8).

Figure 3.4
Adjusted Average Pump Count by Condition

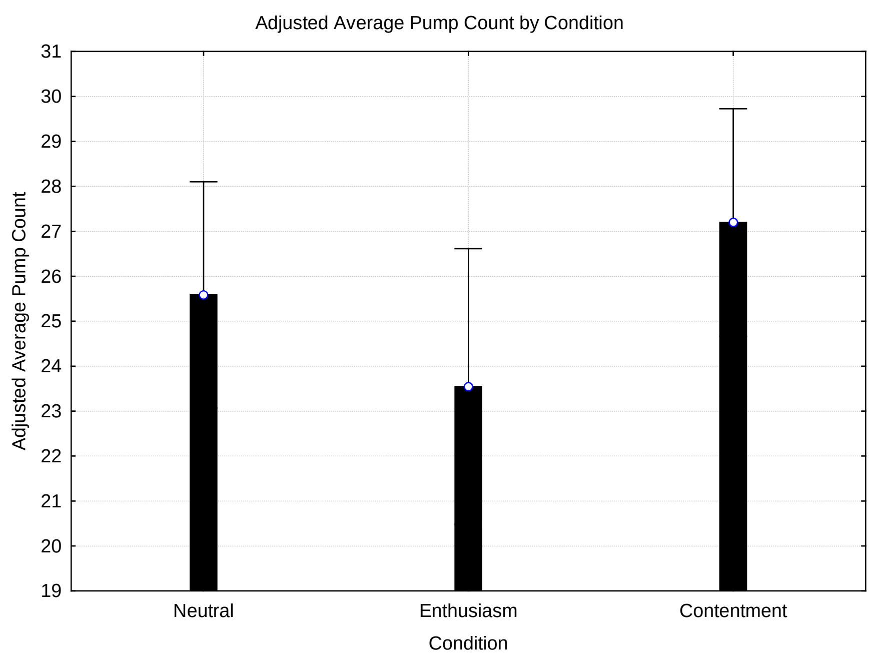


Figure 3.5

Proportion Exploded Balloons by Condition

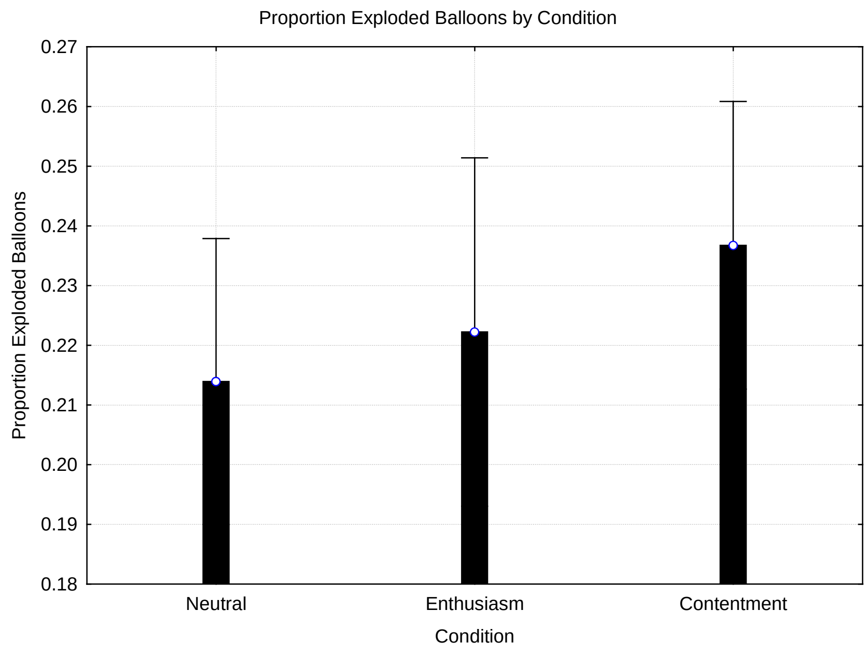


Figure 3.6

Reward Seeking Behavior in PSAP by Condition

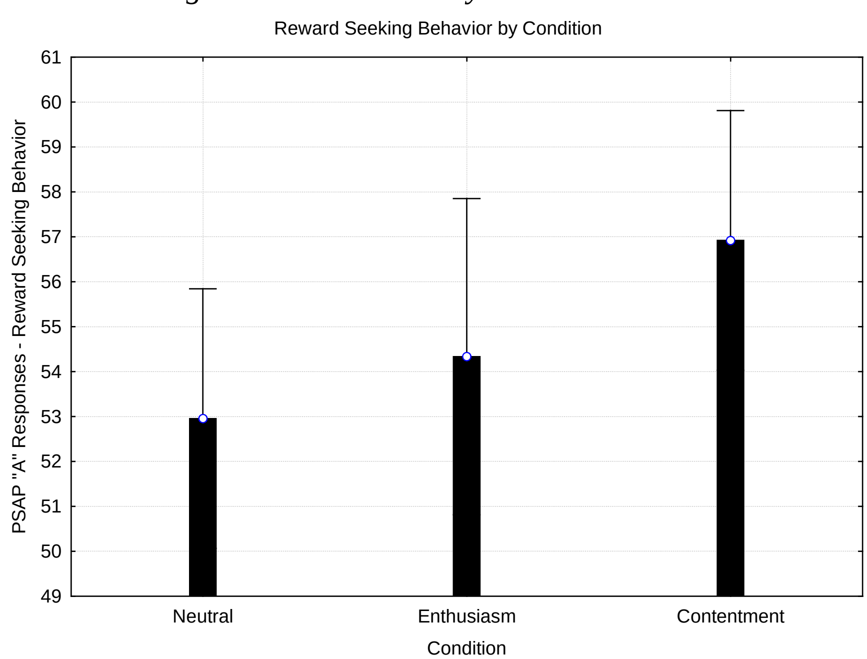


Figure 3.7
Aggressive Behavior in PSAP by Condition

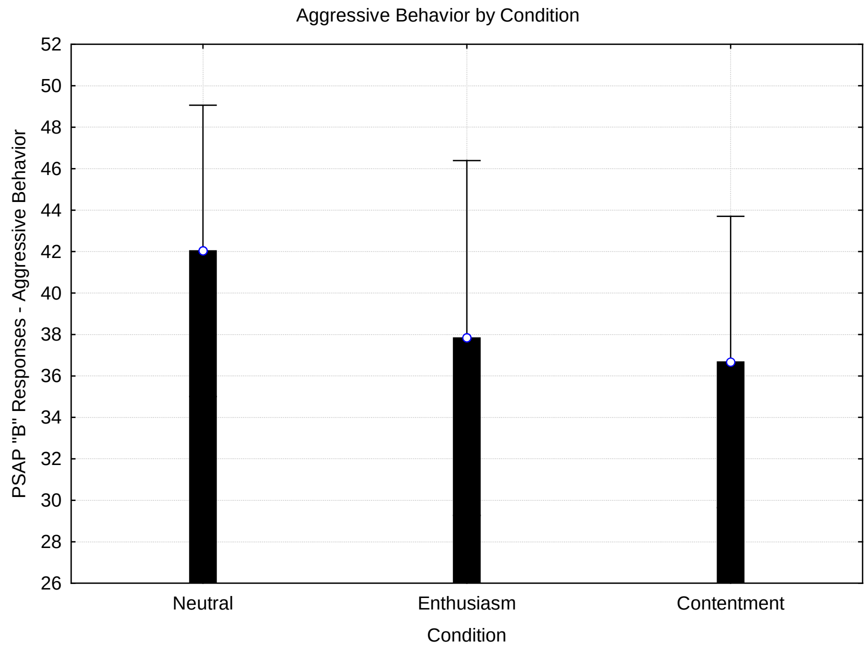
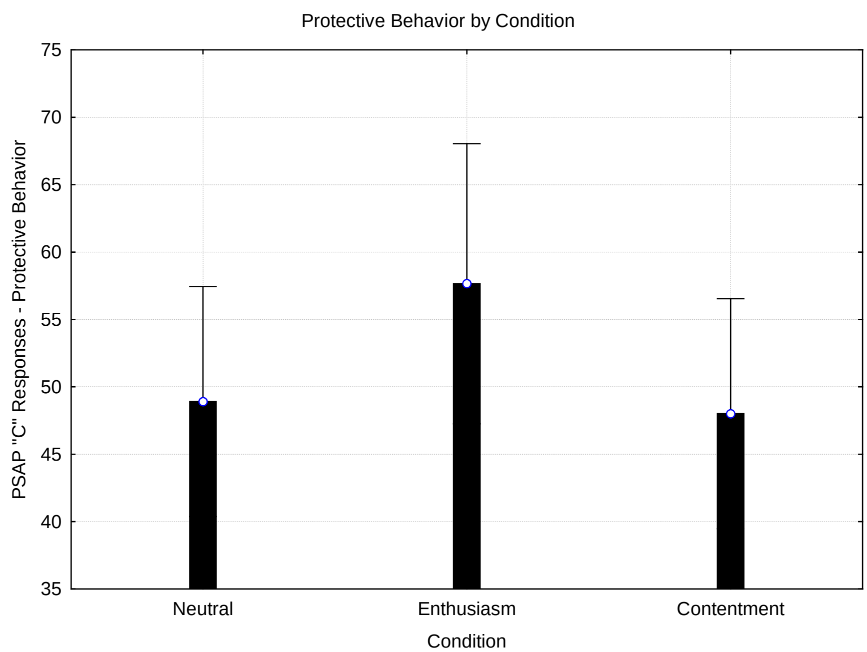


Figure 3.8
Protective Behavior in PSAP by Condition



Manipulation Checks

In the behavioral study, participants did not report differing levels of contentment based on condition, $F(2, 52) = 1.87$, $p = .16$ (see Figure 3.9). Additionally, in the physiological study, participants in the contentment and neutral conditions did not report different levels of contentment, $F(1, 40) = 1.91$, $p = .17$ (see Figure 3.10).

Figure 3.9

Reports of Contentment in the Behavioral Study

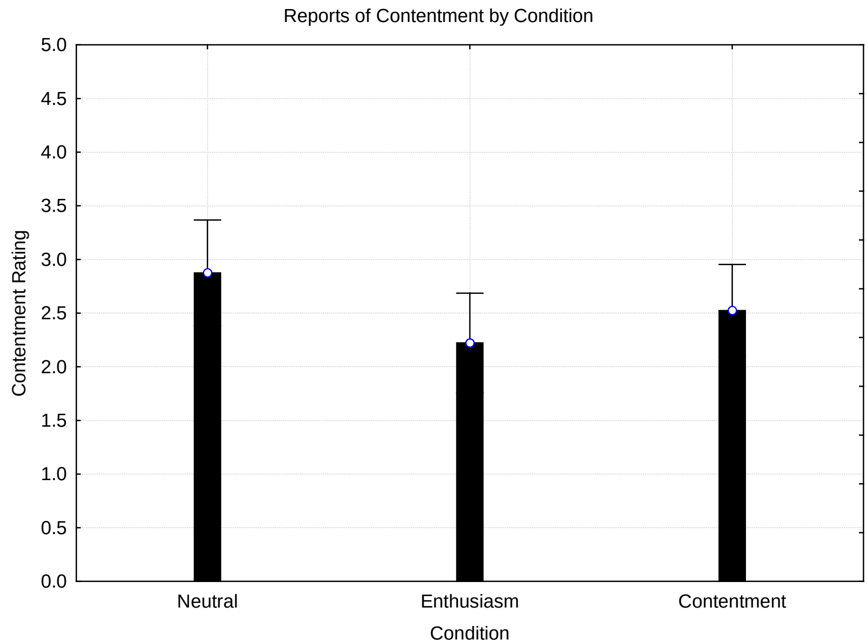
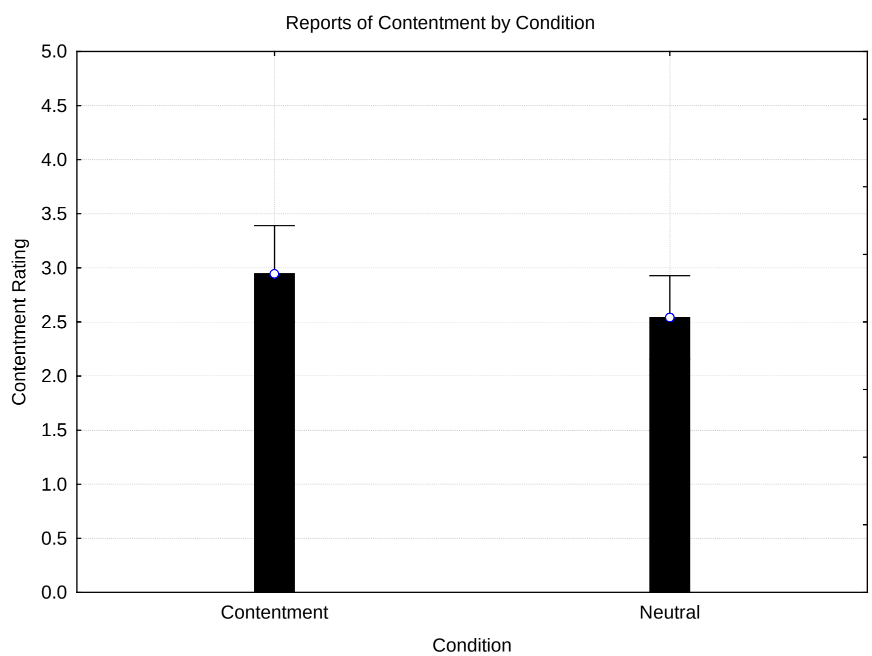


Figure 3.10

Reports of Contentment in the Physiological Study



DISCUSSION

The aim of the proposed study was to investigate whether a contentment manipulation would evoke behavioral and physiological withdrawal. Participants in the contentment condition did show differences from the neutral condition on physiological variables. The contentment condition exhibited less relative left frontal activation than the neutral condition, and a trend towards more zygomaticus major activity. Previous theories would predict that all positive emotions are associated with approach motivation, and should be accompanied by heightened left frontal activation. However, in the current study participants in an the contentment condition showed less left frontal activation than participants in a neutral affective state. This would suggest that contentment does not evoke approach motivation. Because the mean asymmetry score for the contentment group was positive, evidence is limited that strong levels of withdrawal motivation were evoked. To conclude that the participants experienced withdrawal-motivation they should have shown greater right than left frontal asymmetry, which was not the case. However, the discovery that the contentment group demonstrated significantly less left frontal activity than the neutral group does provide evidence that contentment is not associated with approach motivation. It may be that emotions of “positive withdrawal” are more characterized by amotivation rather than strong levels of withdrawal.

Affective condition did not have any effect on behavioral tasks measuring withdrawal behaviors. Participants in contentment, anticipatory enthusiasm, and neutral affective conditions demonstrated similar levels of risk-taking in a balloon analogue risk task. Additionally, participants did not differ across affective condition in goal seeking, aggression, or protective behavior in the context of the point subtraction aggression paradigm. There was not any behavioral evidence that writing a contentment essay evokes withdrawal motivation.

Participants in the neutral affective condition wrote an essay about doing laundry, which could be an arguably negative topic to write about. However, the contentment and neutral groups did not differ in corrugator supercilii activity, which would suggest they experienced similar levels of negative affect. Additionally, when examining the negative distractor emotions put into manipulation check at the end of the study, there were no differences between groups. Thus, the neutral condition most likely did not experience negative affect.

The anticipated behavioral effects in this study were not observed. This could be due to the affective manipulation or the tasks used to operationalize withdrawal behavior. The essay manipulation used has worked in the past in studies examining more automatic processes such as heuristic persuasion processing (Griskevivius, Shiota, and Neufield, 2010). It may be that this subtle manipulation affects some processes, but does not evoke a strong enough state to influence behaviors examined by the PSAP and BART. Also, it could be that the behavioral tasks were not sensitive to capturing withdrawal behavior. The BART task assesses risk taking behavior. Although we predicted that participants experiencing withdrawal motivation would demonstrate less risk taking, this connection has not been directly established in past research. It may be that risk taking is tied only to the behavioral approach system. Possibly, when faced with an opportunity to take risks in order to gain a reward, the low levels of withdrawal motivation evoked by a contentment essay were overpowered by activation of the behavioral activation system. A similar argument could be made for the PSAP task; when faced with the opportunity to gain a reward or aggress against someone who has taken from you, the emotions evoked may be more motivating than the essay manipulation and may wash out the effects of the affective manipulation. Future research on this topic should employ different methodology in regards to manipulating positive withdrawal affects and quantifying withdrawal behavior.

Greater relative left frontal activation has consistently been linked with approach motivation (for a review, see Harmon-Jones, Gable, & Peterson, 2010). The current study found that contentment, a positive emotion posited to be related to withdrawal from the social environment, evoked lower levels of left frontal activation than a neutral condition. This suggests that the participants were not particularly motivated to approach new goals following the recall of a contenting experience. Contentment occurs following goal achievement, and has been linked to savoring the attained goal and protecting the goal object. During this time, organisms may not seek to approach in their immediate environment, but instead retreat to a safe place through withdrawal from the environment.

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APPENDIX A

HUMAN SUBJECTS APPROVAL FOR BEHAVIORAL STUDY

Office for Research

Institutional Review Board for the Protection of Human Subjects

THE UNIVERSITY OF ALABAMA RESEARCH

September 3, 2015

Philip Gable, PhD
Dept. of Psychology
College of Arts & Sciences.
Box 870348

Re: IRB#: 15-OR-267 "Motivation and Individual Differences"

Dear Dr. Gable:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of written documentation of informed consent and a waiver for the use of concealment. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

Your application will expire on September 2, 2016. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent form to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely

Stuart Usdan, PhD
Chair, Non-Medical Institutional Review Board

358 Rose Administration Building
Box 870127
Tuscaloosa, Alabama 35487-0127
(205) 348-8461
FAX (205) 348-7189
TOLL FREE (877) 820-3066

HUMAN SUBJECTS APPROVAL FOR PHYSIOLOGICAL STUDY

THE UNIVERSITY OF ALABAMA | Office of the Vice President for Research & Economic Development
Institutional Review Board for the Protection of Human Subjects

January 19, 2016

Philip Gable, Ph.D.
Dept of Psychology
College of Arts and Sciences
Box 870348

Re: IRB # 16-OR-022, "Motivation and Behavior"

Dear Dr. Gable:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of informed consent and waiver of written documentation of informed consent. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on January 14, 2017. If your research will continue beyond this date, please complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, please complete the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure form.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

Carpantato T. Myles, MSM, CIM, CIP
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama