Neural Underpinnings of Implicit Reappraisal: How Preceding Descriptions Influence Emotional Responses to Videos

by

Ava Joanna White

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Committee

Jennifer L. Robinson, Chair, Professor of Psychological Sciences
Samantha Fede, Assistant Professor of Psychological Sciences
Susan Teubner-Rhodes, Assistant Professor of Psychological Sciences

Abstract

Emotion regulation is an essential part of everyday life, and deficits in regulatory behaviors can have harmful effects on one's mental, physical, and social well-being. Existing models of emotion regulation propose different cognitive strategies for the various stages of the unfolding emotional response, commonly focusing on explicit cognitive reappraisal. However, markedly less research focuses on implicit cognitive reappraisal, defined as modification of an emotional response that is not deliberate and/or occurs outside of one's conscious awareness. Previous research has suggested a network of brain regions implicated in explicit reappraisal, including regions of the prefrontal cortex (PFC) and the amygdala, and a limited body of research has suggested that implicit reappraisal relies on similar neural mechanisms. The proposed study sought to add to the implicit reappraisal literature by collecting functional magnetic resonance imaging (fMRI) data during the viewing of negative video stimuli that have been preceded by a neutral, negative, or positive description. This approach was novel in that it utilized 7 Tesla MRI technology, video stimuli as opposed to static images, and focused solely on implicit processes. Results suggest that regions of the left prefrontal cortex were significantly more activated when viewing stimuli that were preceded by a negative prompt compared to viewing stimuli preceded by both positive and neutral prompts, however, positive and neutral conditions were not significantly different from each other. These data suggest that negative affective stimuli may cause differential responses in the left prefrontal cortex such that positive and neutral prompts may reduce activity while negative prompts may exacerbate activity. Investigation into implicit reappraisal will further our overall understanding of emotion regulation and could provide valuable insight as to how these strategies could be used to address deficits in emotional processes.

Table of Contents

Introduction

Emotions play an essential role in our everyday lives (Trampe, Quoidbach, & Taquet, 2015). The ability to monitor and manage emotions is paramount to one's overall wellbeing, and failure to do so can be detrimental to both mental and physical health (Gross & Levenson, 1993; Webb, Miles, & Sheeran, 2012; Cameron & Overall, 2018). Further, the ability to regulate emotions can represent how well a person is able to adapt their emotions to respond appropriately to situational demands (Salovey & Mayer, 1990). Previous research has begun to examine potential links between intraindividual variability in the ability to regulate emotions and real-world implications (Brans et al., 2013). It has been suggested that greater ability to regulate one's emotions is associated with greater socioeconomic status (Troy et al., 2017), financial success (Côté, Gyurak, & Levenson, 2010), job satisfaction (Madrid, Barros, & Vasquez, 2020), physical health (Song et al. 2015), and overall subjective wellbeing (Katana et al., 2019). Given the immense impact of emotion regulation on both personal and social factors, research in this field is of great importance.

Regarding the negative consequences of emotion dysregulation, affective disorders or mood disorders create substantial burdens at both individual and societal levels. In the United States, one in five people will meet diagnostic criteria for a mood disorder at some point in their life (National Institutes of Health, 2017). The economic impact of this is extensive, with major depressive disorder (MDD), one of the most common mood disorders in the U.S., costing an estimated $236 billion nationwide in 2018 (Greenberg et al., 2021). Affective disorders and similar psychopathologies have been linked to neurological dysregulations in emotion, making adaptive emotion regulation strategies a prime approach to addressing their symptoms (Fletcher, 2001; Mennin et al., 2005; Joormaan & Siemer, 2014; Tamir & Millgram, 2017; Kurtz et al.,

2021; Wang et al., 2021). The impact of emotion regulation and dysregulation has clear consequences, yet the underlying neurological mechanisms that drive this relationship are not fully understood.

Existing Models of Emotion Regulation

Emotion regulation (ER) can be defined as an attempt to influence one's emotions, whether consciously or unconsciously, in order to properly respond to the emotional demands of a given situation (McRae & Gross, 2020). While emotion generation refers to the response created to a transaction between person and situation (Gross, Sheppes, & Urry, 2011), emotion regulation is goal-directed, aiming to modify the process of emotion generation (Gross, 1998a). A further distinction can be made between antecedent-focused and response-focused emotion regulation. While both focuses can effectively alter emotion generation, Gross (1998b) suggests that they yield different psychophysiological outcomes, with antecedent-focused methods (i.e., reappraisal) decreasing the experience of negative emotions, and response-focused methods (i.e., suppression) increasing sympathetic nervous system activation. These distinctions were compiled into one of the most commonly used models in the field today - the process model of emotion regulation (Figure 1). Pioneered by Dr. James Gross, the process model posits that there are five points throughout the emotion generative process where emotion can be regulated: situation selection, situation modification, attentional deployment, cognitive change, and response modulation (Gross, 1998a; Gross 2015; McRae & Gross, 2020). Within each of these stages, there are different strategies at a person's disposal. For example, in the attentional deployment phase, one might use distraction or rumination, while in the response modulation phase, one could use expressive suppression or physiological intervention. Not all strategies are created equal, however. There is evidence to suggest that expressive suppression is negatively

related to wellbeing, while reappraisal (a strategy from the cognitive change stage) seems to positively influence overall wellbeing (Gross & John, 2003; John & Gross, 2004). For the present study, the primary regulatory process of interest will be reappraisal.

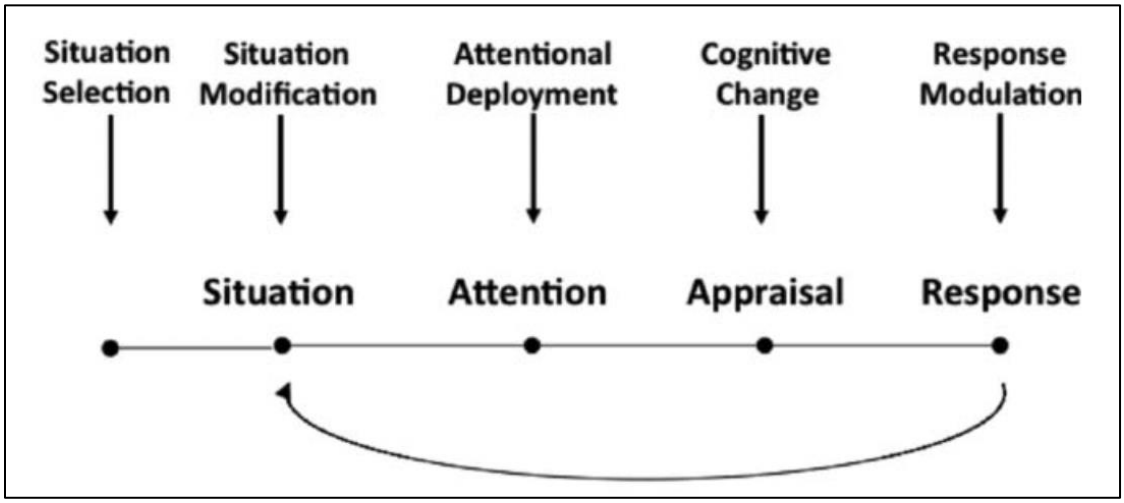


Figure 1. The process model of emotion regulation- stages and potential strategies. Credit: (Gross, 2015).

Reappraisal - Explicit vs. Implicit

The cognitive reappraisal of emotions has historically been studied as an effortful, goal-directed process (Gross & Levenson, 1993; McRae et al., 2010; Gyurak, Gross, & Etkin, 2011). Explicit emotion reappraisal entails consciously and intentionally altering one's emotions, in a way that can be trained and integrated into everyday life (Kurtz et al., 2021). Research on explicit reappraisal strategies usually involves providing participants with specific instructions for how they should alter their naturally occurring emotions (Ochsner et al., 2002; Lévesque et al., 2003; Li et al., 2022), such as instructing a participant passively "look" at an image versus instructing them to consciously "reappraise" the image. Reappraisal involves using pre-taught strategies such as mentally distancing oneself from the emotional stimulus, thinking about the situation improving with time, and/or assuming that things aren't as bad as they appear, which

have all been shown to decrease negative affect (Steward et al., 2021). This supports explicit reappraisal as a volitional mental process.

Conversely, implicit reappraisal suggests that emotions can be modified without exerting any deliberate effort. Rather, it occurs outside of one's conscious awareness (Mauss, Bunge, & Gross, 2007; Timmer-Murillo, Kangas, & Gordon, 2020). Though historically overshadowed by explicit reappraisal, the possibility of an implicit capacity of emotion regulation has been suggested by theorists for several years (Davidson, Jackson, & Kalin, 2000). Some researchers argue that implicit regulation is still a goal-directed process, just without any overt intention to perform such a goal-directed behavior (Koole & Rothermund, 2011). For example, studies have shown that simply labeling a stimulus as "fictitious" rather than "real" (Mocaiber et al., 2011a; Mocaiber et al., 2011b) or as "art" rather than a "press photograph" (Gerger, Leder, & Kremer, 2014) can elicit more positive mental and physical responses, similar to the effects of using an explicit reappraisal strategy. It is important to note that implicit reappraisal closely resembles and is often used interchangeably with the concept of framing. These two terms are extremely similar and generally focus on the same mental processes, though framing emphasizes changes to the stimulus presentation, while implicit regulation emphasizes changes to one's mental state as a result of this altered presentation, which is why implicit regulation is the key term for this project. Though implicit reappraisal seems to be receiving more attention in the fields of psychology and neuroscience, our understanding of it is still far from complete.

Explicit and implicit reappraisal are not mutually exclusive categories. Because emotions are highly adaptive, regulation processes may vary in implicitness/explicitness across contexts (Gyurak, Gross, & Etkin, 2011). One key similarity between the two is their underlying neurological activity. Research suggests that explicit and implicit reappraisal likely utilize

similar brain regions and activate similar neural pathways (Berkman & Lieberman, 2009; Burklund et al., 2014; Yoshimura, Nakamura, & Morimoto, 2023). For example, a recent study from Yoshimura, Nakamura, & Marimoto (2023) directly compared brain activity during affective labeling to explicit reappraisal. Studied as a form of implicit reappraisal, affective labeling involves verbalizing one's feelings at a given moment, and it has been shown to diminish negative affect without any explicit instruction to do so (Torre & Lieberman, 2018). This review suggested a nearly identical neural profile for implicit and explicit reappraisal. Primary neural regions involved include the prefrontal cortex (PFC) and amygdala, which will be described further in following sections. The two may also produce similar decreases in physiological activity (Williams et al., 2009; Yuan et al., 2015), and generate similar behavioral responses to situational demands in the real world (Koole & Rothermund, 2011).

Though the two types of reappraisal seem to operate similarly from a psychophysiological perspective, there are some important differences to consider. As mentioned, notably less research has been devoted to implicit reappraisal compared to explicit reappraisal, but some research has suggested that implicit regulation strategies use fewer cognitive resources than explicit strategies, making it more adaptive (Yuan et al., 2015). One study by Williams et al. (2009) primed participants either with an explicit reappraisal goal, or implicitly primed them by using a word scramble task with words like "strategy" and "reassess," before having them prepare and present a short speech. Researchers demonstrated that both strategies elicited similar decreases in heart rate (HR) reactivity compared to a control group, but participants who didn't habitually use reappraisal strategies (based on the Emotion Regulation Questionnaire; see Gross & John, 2003) benefited more from the implicit strategy than the explicit strategy. Given the shortage of implicit reappraisal research and the suggested benefits it

may have in comparison to explicit reappraisal, this study will focus on the implicit reappraisal of emotions.

Neural Bases of Reappraisal - PFC and Amygdala

Reappraisal processes have been tied to many regions of the brain, including the medial and lateral prefrontal cortex (PFC), amygdala, insula, inferior temporal cortex, superior parietal gyrus, and pre-supplementary motor area (preSMA; Ochsner et al., 2002; Mocaiber et al., 2011a; Wang et al., 2017; Kirk, Lilleholt, & Freedberg, 2020; Steward at al., 2021; Li et al., 2022). With the wide array of suggested brain areas involved in emotion reappraisal, it is likely a process that is supported by a network of neural nodes, rather than one centralized area. One of the more compelling explanations suggests a top-down, inverse relationship between the PFC and the amygdala, such that increased PFC activity is associated with decreased amygdala activity, and vice versa. This relationship is outlined in an implicit reappraisal study by Burklund et al. (2014), where affective labeling in the absence of explicit intention to change one's emotional response was associated with an increase from baseline in activity in the ventrolateral PFC (vlPFC), dorsolateral PFC (dlPFC), and dorsomedial PFC (dmPFC), and decreased activity in the amygdala. The hypothesis that the vlPFC, dlPFC, and dmPFC suppresses automatic amygdala processes is a strong starting point for studying the neural factors of implicit reappraisal.

The notion of the PFC exhibiting some degree of control over the amygdala is intuitive, given that the PFC, the anterior portion of the frontal lobe (Figure 2), is responsible for cognitive (executive) control over the rest of the brain (Miller & Wallis, 2009). Pertaining to cognitive reappraisal specifically, a handful of research supports the previously mentioned process of top-down modulation of the amygdala from regions of the PFC (Ochsner et al., 2002; Phan et al., 2005; Urry et al., 2006; Delgado et al., 2008; Kanske et al., 2011). Of those studies, the vlPFC,

dlPFC, and dmPFC are the most frequently mentioned regions of the PFC. Located in the medial temporal lobe and part of the limbic system (Figure 2), the amygdala plays a pivotal role in emotional processing (Šimić et al., 2021). Previous research has shown that the amygdala increases in activity when negative emotion is enhanced (Ochsner et al., 2004). Specifically, the response of the amygdala depends both on the valence of the stimulus (i.e., emotionally negative or positive) and the degree of arousal elicited by the stimulus (Gallagher & Chiba, 1996; Lin et al., 2020). In relation to reappraisal, there is some evidence for decreased amygdala activity in people who habitually reappraise negative stimuli implicitly compared to those who don't, suggesting a neural link between the amygdala and perception of emotional stimuli (Abler et al., 2007; Williams et al., 2009). Explicit and implicit reappraisal seem to share similar neural activation patterns (Burklund et al., 2014), but little research has been done into the pathways for implicit reappraisal specifically. Wang et al. (2017) is another one of the few studies that looked at the neural correlates of implicit emotion reappraisal. This study collected fMRI data while participants passively viewed unpleasant images that had been previously given a neutral/positive or negative description. FMRI data suggested that images preceded by a neutral/positive description elicited significantly less amygdala activity than those preceded by a negative description, and functional connectivity analyses supported a negative correlation between the amygdala and prefrontal regions. Further, investigators suggested that the observed amygdala/PFC relationship was strikingly similar to that of explicit reappraisal, suggesting a potential starting place for future studies of implicit reappraisal. With this evidence, an inverse, top-down pathway from the vlPFC, dlPFC, and dmPFC to the amygdala appears to be a promising option for further investigation into the neuroscience of implicit reappraisal.

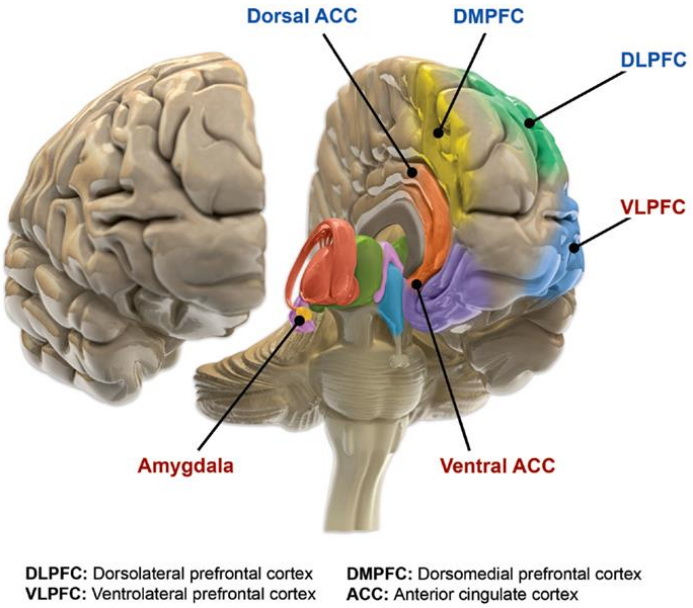


Figure 2. 3D model of the human brain highlighting the dlPFC, vlPFC, dmPFC, amygdala, and other regions of the frontal cortex. Credit: (Maletic & Raison, 2014).

fMRI and the BOLD Signal

Here, we propose a study using functional magnetic resonance imaging (fMRI) to characterize the neural correlates of implicit reappraisal using affective films. FMRI has become a popular technique in the field of cognitive neuroscience, utilizing hemodynamics as a localized, non-invasive way to measure brain activation patterns (Heeger & Ress, 2002). To measure neural activity, fMRI relies on the blood oxygen level dependent (BOLD) neural signals to a stimulus. The BOLD signal reflects metabolic energy demands and thus represents an indirect measure of brain activity during a cognitive task (Logothetis, 2008). Though the correct way to interpret a BOLD signal has become a topic of importance in the field of cognitive neuroscience (Arthurs & Boniface, 2002), precedent has been established for the use of fMRI and the BOLD signal in the study of emotions (Phan et al., 2002). For the proposed work, we anticipate interrogating and characterizing the PFC-amygdala pathway. Specifically, we expect that emotional down-regulation would be represented by increased BOLD levels in PFC regions

and decreased levels in the amygdala during the reappraisal of an aversive stimulus. This would suggest task-specific increases in PFC activity coupled with decreases in amygdala activity.

Present Study

This project aimed to address gaps in the literature on emotion regulation and implicit reappraisal using ultra high field, high-resolution functional neuroimaging. First, as discussed previously, the vast majority of cognitive reappraisal research focuses on explicit processes guided by verbal or written instruction. This project adds to the notably smaller portion of this field that looks directly at unconscious reappraisal processes. Second, we used novel neuroimaging methods with increased sensitivity and specificity to study the neural signatures underlying implicit reappraisal, a specification with an even more sparce research base. One of the central focuses of this study is to measure activation patterns specifically associated with implicit processes, based on the existing pathways proposed by explicit and implicit reappraisal research. By doing so, we contribute to advancements toward outlining a neural pathway activated by implicit reappraisal - something that, to our knowledge, has only been empirically studied by a small number of studies (Mocaiber et al., 2011a; Wang et al., 2017), and unstudied at higher MR field strengths. Next, this project utilized video stimuli, which is significantly less common for emotion reappraisal studies. Research in this area tends to use static images (Ack Baraly et al., 2020), often using data bases such as the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008). By using video clips rather than images, we intended to elicit more accurate emotional responses (Horvat, Kukolja, & Ivanec, 2015), and thus more realistic emotion regulation strategies. Next, both the survey used to select equally valanced stimuli and the in-scanner study procedure included scaled ratings of the emotionality of the video, allowing for ratings to be matched on aversiveness. Finally, this project utilized a 7 Tesla

(7T) MRI scanner. Because fMRI research often utilizes 1.5 Tesla or 3 Tesla technology, the use of a 7T contributes to the novelty of the study and allows for greater spatial resolution and increased sensitivity, which may grant a more comprehensive understanding of the neural signatures associated with implicit reappraisal (Laader et al., 2017).

In this study, the independent variable was the prompt given before a video clip (i.e., negative video with negative prompt, negative video with positive prompt, and negative video with no prompt), and the dependent variables were the activation levels (reflected by the BOLD signal) in the vlPFC, dlPFC, dmPFC, and amygdala. Given the current knowledge on the relationship between these brain regions and implicit emotion reappraisal, I hypothesized that:

1. Neural activity would decrease in the amygdala from the negative stimulus/negative prompt condition to the negative stimulus/positive prompt condition. To test this hypothesis, I conducted a repeated measures ANOVA with the three conditions.
2. Neural activity would increase in the (2A) vlPFC, (2B) dlPFC, and (2C) dmPFC from the negative stimulus/negative prompt condition to the negative stimulus/positive prompt condition. To test these hypotheses, I conducted repeated measures ANOVAs with the three conditions.

Methods

Experiment 1 - Survey

Participants

The purpose of this first experiment was to gauge the baseline emotional response elicited by several video clips through an online survey, so that videos could be matched on emotional valance and the stimuli for Experiment 2 could be determined. Auburn University students between 18-30 years of age were recruited for the first experiment of this project (see

Appendix A for recruitment materials). Participants who reached criteria for high levels of anxiety, depression, and/or neuroticism (scoring detailed in next section) did not proceed past the first section of the survey, to avoid exposing them to negative emotional videos. Further, responses were removed if they were incomplete, or if a participant demonstrated response bias through neutral responding (i.e., selecting the same answer for each survey question). Participants did not receive any monetary compensation for this experiment, but students did receive 1 credit hour through Auburn University SONA Systems.

Measures and Procedure

During experiment 1, the following scales and inventories were used to gather participant data regarding demographics and mental health status (Appendix B): demographics questionnaire, Generalized Anxiety Disorder – 7 (GAD-7; Spitzer et al., 2006), Beck Depression Inventory – 2 (BDI-II; Beck, Steer, & Brown, 2011), International Personality Item Pool – 120 (Neuroticism subtest only) (IPIP-120; Johnson, 2014), and Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). These scales were chosen because anxiety, depression, and neuroticism may be tied to a slight tendency to describe stimuli as more emotionally negative than average, which could skew the data (Widiger & Oltmanns, 2017; Mennen, Norman, & Turk-Browne, 2019; Feldborg et al., 2021). Further, the ERQ was included primarily for exploratory purposes. Williams et al. (2009) proposed that, based on the ERQ, individuals who didn't chronically/habitually use reappraisal strategies benefited more (in terms of decreases in HR reactivity) from implicit reappraisal than explicit reappraisal strategies. Though not a primary hypothesis of this project, we believe that it is important to consider the potential role of habitual emotion regulation strategy use, in line with the goal of expanding the literature on

implicit and explicit processes. Below are brief descriptions of the measures that were used during Experiment 1:

a) Generalized Anxiety Disorder – 7 (GAD-7; Spitzer et al., 2006) – This scale was developed as a brief way to identify Generalized Anxiety Disorder (GAD) and assess the severity of its symptoms. The scale contains 7 items relating to the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for GAD and to existing anxiety scales. Participants are asked to indicate how often during the last 2 weeks they were bothered by each item. For example, one statement is "Feeling nervous, anxious, or on edge." Response options include "not at all," "several days," "more than half the days," and "nearly every day," scored respectively as 0, 1, 2, and 3. A score of 10+ on this scale indicates the presence of GAD, and thus ineligibility for our study.

b) Beck Depression Inventory – 2 (BDI-II; Beck, Steer, & Brown, 2011) – This inventory measures severity of depressive symptoms, containing 21 groups of statements that range in severity indication. For example, one item includes the statements: "I do not feel sad," "I feel sad much of the time," "I am sad all the time," and "I am so sad or unhappy that I can't stand it." Participants are asked to select the response that best describes how they've felt over the past 2 weeks, and responses are scored as 0, 1, 2, and 3, respectively. It should be noted that, for this project, BDI Item #9- "Suicidal Thoughts," was removed because our study doesn't intend to examine any outcomes directly related to suicidal thoughts. The other 20 items on this questionnaire are unchanged. Scores greater than 28 are

indicative of severe depressive symptomology, characteristic of Major Depressive Disorder (MDD). Participants with MDD were excluded from our study.

c) International Personality Item Pool-120 (IPIP-120; Johnson, 2014) – This inventory contains 120 items equally divided across 5 personality traits, but for the purpose of this project, only the section measuring neuroticism will be used. This subtest includes 24 statements that envelop 6 facets of neuroticism. Responses are on a 5-point Likert scale of "disagree strongly," "disagree a little," "neither agree or disagree," "agree a little," and "strongly agree," and participants are instructed to select the rating that best describes how they generally are now. Responses are coded as 1, 2, 3, 4, and 5, respectively, with reverse-scored items coded as the exact inverse. A score greater than 93 is indicative of high neuroticism levels, and thus ineligibility for our study.

d) Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) – This questionnaire was designed to assess general use of emotion regulation strategies between individuals. It includes 10 statements- 4 that indicate the use of suppression (e.g., "I keep my emotions to myself") and 6 that indicate the use of reappraisal strategies (e.g., "I control my emotions by changing the way I think about the situation I'm in"). Participants indicate their level of agreement with each statement on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). An average for each of the 2 strategies is calculated and compared to average scores based on gender (averages defined in Gross & John, 2003). For men, a high suppression score is greater than 4.75, and a high reappraisal score is greater than 5.54. For women, a high suppression score is

greater than 4.32, and a high reappraisal score is greater than 5.63. These scores did not influence participant eligibility but are important to include for exploratory purposes.

Following the demographic and mental health portions of the survey, participants were shown a series of 20 videos (see Appendix B for full survey and links to each video clip). Each video is a clip from a live-action movie (i.e., uses human actors; not animated), is in English, is between 1-2 minutes long, and is presumed to be negatively emotionally valenced. An example of a negatively valenced video is a scene from the movie, *Bridge to Terabithia (2007),* where the main character is told that his best friend has died. The order of the 20 videos was randomized for each participant, to control for potential order effects. For this experiment, no emotional prompts are included before the videos. Participants watched each video and then provided two ratings – an aversiveness rating and a familiarity rating. The aversiveness rating is a 7-point Likert scale for participants to indicate how positive or negative the clip made them feel emotionally, from extremely negative (6), to neither positive nor negative (3), to extremely positive (0). The familiarity rating is included for exploratory purposes, to examine relationships between familiarity and subjective aversiveness ratings. The participant is asked whether they have seen the video before, and possible responses include, "No, I do not recognize this video," "I'm unsure," "This seems familiar but I'm not 100% sure where I've seen it," and "Yes, I know exactly where this is from." After watching all 20 videos and responding to the follow-up questions for each, the participant was debriefed and provided resources for psychological services.

Analytic Plan

The purpose of Experiment 1 was to determine which videos would be used as stimuli for Experiment 2. First, aversiveness ratings for each video were averaged. These average ratings were rank-ordered, and the stimuli for Experiment 2 were selected. The 12 negative videos with average ratings between 4-6 that are closest together (ideally, closest to a rating of 6) were selected as negative video stimuli. Prior to beginning data collection for Experiment 2, the 12 videos were randomly distributed evenly across the 3 prompt conditions (i.e., negative, positive, or no prompt). Prompts for each video and its assigned condition were piloted to a small group of affective neuroscience researchers and adjusted based on their feedback and suggestions.

Experiment 2- Neuroimaging

Participants

Experiment 2 addresses the hypotheses of this project. Auburn University students between 18-30 years of age were recruited for this study (see Appendix A for all recruitment materials). Prior to scanning, participant eligibility was determined by a pre-screen questionnaire that assesses mental health status and emotion regulation strategy use. This pre-screener included the same five inventories provided in the first half of Experiment 1 (see Appendix C for Experiment 2 materials). Specifically, the pre-screener included the demographics questionnaire, GAD-7, BDI-II, IPIP 120 (Neuroticism subtest), and ERQ (please review *Experiment 1- Measures and Procedures* for scoring details). Along with this, the pre-screener included an MRI-specific pre-screen survey. This portion asked about whether the participant has metal in their body, motion disorders or claustrophobia, any implanted medical devices, piercing jewelry that cannot be removed, permanent retainers or braces, and any possibility of being pregnant (females only). For the safety of the participant, endorsement of any of these questions made them ineligible for the study. Those who completed the entire pre-screener and were deemed

eligible for the study were invited via email to participate in a neuroimaging session (see Appendix A).

Power

A meta-analysis from Buhle et al. (2014) includes 48 studies that address the cognitive reappraisal of emotion using neuroimaging. The average sample size of these studies was around N = 20, with an average medium to large effect size (i.e., 0.25 < Cohen's f < 0.40). Based on this data, the proposed study anticipates a medium to large effect size. With an α = 0.05 and 80% power, an *a priori* power analysis for a repeated measures, within factors ANOVA suggests that the necessary sample size for Cohen's f = 0.25 is N = 28 (Figure 4). For a Cohen's f = 0.40, the necessary sample size is N = 12 (Figure 5). Therefore, the target sample size for this study is N = 28, with a minimum sample size of N = 12.

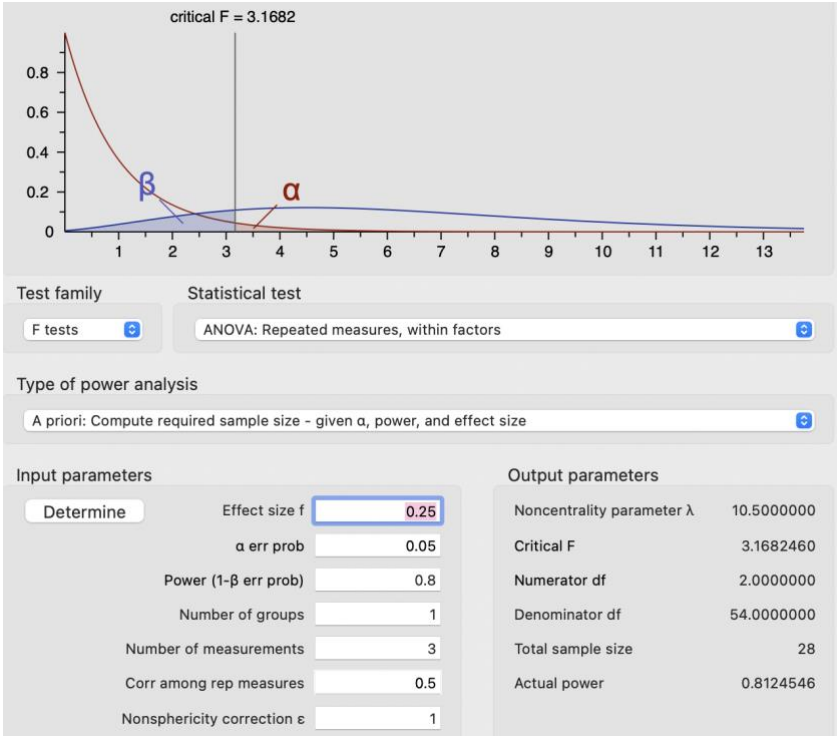


Figure 4. An *a priori* power analysis for a repeated measures, within factors ANOVA. With an α = 0.05, 80% power, and Cohen's f = 0.25, the necessary sample size would be N = 28.

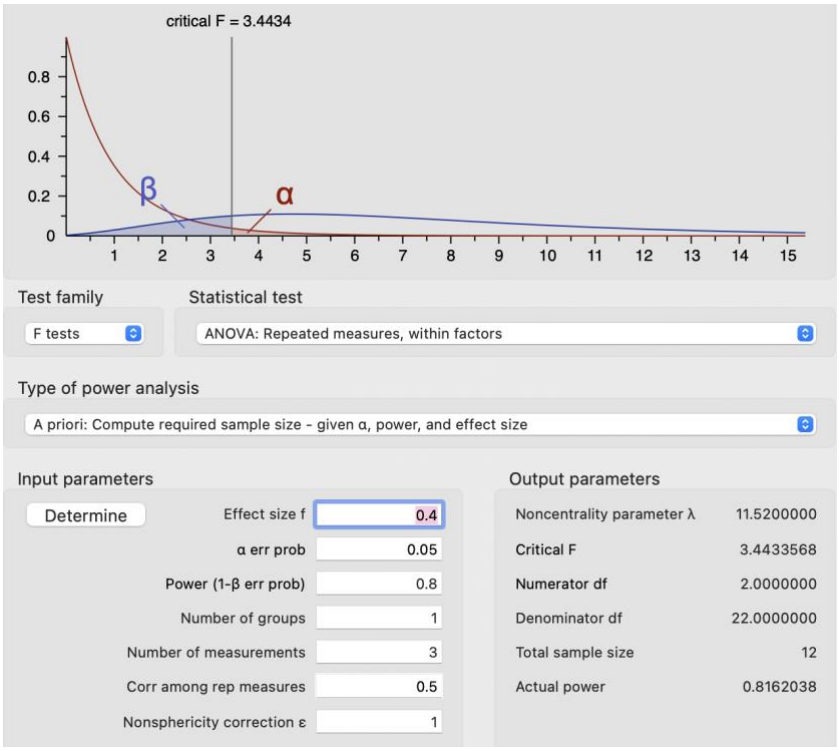


Figure 5. An *a priori* power analysis for a repeated measures, within factors ANOVA. With an $\alpha = 0.05$, 80% power, and Cohen's f = 0.40, the necessary sample size would be N = 12.

Rationale for Exclusion Criteria

The exclusion criteria for Experiment 2 are similar to those in Experiment 1. First, individuals who indicate severe levels of anxiety, indicated by a score greater than 10 on the GAD-7 (Spitzer et al., 2006), were deemed ineligible. The rationale here is supported by a study from Mennin et al. (2005), which found that individuals who met criteria for GAD displayed patterns of emotional dysregulation. Next, those who indicated severe depressive symptomology, indicated by a score greater than 28 on the BDI-II, were deemed ineligible. The rationale for this is exemplified in Rive et al. (2015), where participants were instructed to reappraise an emotional image through psychological distancing, and participants with MDD showed deficits in this process. Finally, participants with high levels of neuroticism, as indicated by a score of 93 or higher on the IPIP 120, were excluded from the study. Yang et al. (2020) used fMRI to investigate cognitive reappraisal, and results showed a negative association between neuroticism

and PFC areas that was indicative of decreased emotion regulation abilities in participants with higher neuroticism levels.

Materials

For Experiment 2, prospective participants first filled out the study pre-screener and MRI pre-screener, and those who met inclusion criteria were invited via email to participate in a neuroimaging session. Prior to entering the scanner, participants were shown a short video used as a practice task. The video was preceded by a neutral description and followed up by memory question (i.e., a simple multiple-choice question; rationale for the memory task is outlined in the following section). Specifically, the participant saw the description, "In the following video, the dog is practicing for a show," and then watched a short clip of a dog in training, followed by the question, "What was the dog training for?" After selecting a multiple-choice response, the participant was shown the aversiveness rating scale used in Experiment 1, and then completed an n-back task (Kirchner, 1958). The n-back task is a task that presents a series of visual stimuli, and then asks the participant to recall whether a given stimulus matches a stimulus from n trials before (e.g., "n-2" would refer to the stimulus from 2 trials ago). For this project, the n-back task served as an active recovery period for the participant to return to a baseline state before viewing the next video, and the data here will not be analyzed for the purpose of this project.

Data collection was conducted using a Siemens 7T MAGNETOM TerraX at the Auburn University MRI Research Center. The scanner uses a 32-channel head coil provided by Nova Medical (Wilmington, MA), with an 8-channel parallel transmit array. The coil is equipped with a small mirror so that the participant can see the screen behind them while in the scanner. A standard imaging sequence was used, with a resolution of $1mm^3$. During the scan, the participant was shown the 12 negative videos selected from Experiment 1. With each video, they were also

shown a written prompt based on the condition they're in. Four videos had negative prompts, four had positive prompts, and four had no prompt. For example, one stimulus in the negative prompt condition was a video clip from *Brothers (2009)* that depicts a soldier being told to kill another man with the prompt:

> "The man in this video is a kidnapped soldier who is forced to kill another man with a pipe."

An example of a stimulus in the positive prompt condition is a video clip from the movie *Room (2015)* that depicts a boy jumping out of a car and running from a man with the prompt:

> "The boy in this video is having a nightmare about being kidnapped, but he wakes up and realizes he's perfectly fine."

Next, they were shown a multiple-choice question, aversiveness rating, and perform the n-back task. The aversiveness rating and n-back task are the same as that which the participant practiced before entering the scanner. The 7T scanner is equipped with a handheld MR-compatible device, where participants were able to select their desired response for the memory questions, aversiveness ratings, and n-back tasks.

Rationale for Deception

Participants were informed that the primary purpose of the study is to assess neural activation patterns during a video-based memory task. This was done to preserve the true focus of the project on emotion reappraisal. If participants figure out that the pre-video prompts are attempts to alter their emotional appraisal of the video, the process could gradually shift from an implicit process to more of an explicit process (Braunstein, Gross, & Ochsner, 2017). Since this project is aimed at implicit reappraisal specifically, we want to shield participants from deliberately altering their emotional responses as much as possible. Adding a question about the

content of the video also serves as an attention check, to ensure that participants are attending to the video that they're shown.

Procedure - Pre-Scan

After completing the Experiment 2 pre-screeners, eligible participants arrived at the MRI Research Center and were escorted to the 7T suite to complete the MRI Pre-Screen Entry Form and the study consent form (Appendix C). The researcher responsible for obtaining consent reviewed the forms with each participant to ensure comprehension of the study tasks. Once the participant consented and a researcher signed off on the forms, they completed the pre-scan practice task to ensure that they understood what was expected of them during the procedure. After successfully completing the practice task, the participant changed into surgical scrubs (to ensure that there is not metal in their clothing), had their height and weight taken (a common MR practice to determine the appropriate Specific Absorption Rate of radio frequencies for an individual (Baker et al., 2004)), and were swept for metal with a handheld metal detector. The participant was then be placed in the scanner. They were given headphones so that they could communicate with the scan operator during the procedure, a small MR-compatible button box to use to respond to task instructions, and a squeeze ball that can be used in case of emergency to alert the operator to pause the scan and come speak with them. The top portion of the head coil with the mirror was placed over the participant's head, and once they confirmed that they would like to continue with the procedure, the participant was sent into the scanner.

Procedure - In-scan

During data acquisition, the participants completed 12 trials – 4 negative videos with negative prompts ('negative'), 4 negative videos with positive prompts ('positive'), and 4 negative videos with no prompt ('neutral'). The 12 trials of the negative, positive, and neutral

conditions were divided into 3 blocks of 4 videos each, where each block contained at least one but no more than two videos from each prompt condition and had average aversiveness ratings that were as statistically similar as possible, and the blocks were randomized to address potential order effects. Each trial was divided into 8 phases (Figure 3): 1) a 15-second 'description phase' where the negative description, positive description, or no description was displayed on a white background, 2) a 5-second fixation cross, 3) the 'video phase,' which lasted ~1 ½ minutes, 4) another 5-second fixation cross, 5) the 'question phase' where the participant responded to the multiple-choice question regarding the video content, 6) the 'aversiveness rating' for participants to indicate their emotional response to the video, and 7) the n-back task phase. After completing all 12 trials, the participant was removed from the scanner and taken back into the lounge area. The participant was debriefed, including an explanation of the true purpose of the task and the rationale for deception, and compensated $50 for their time.

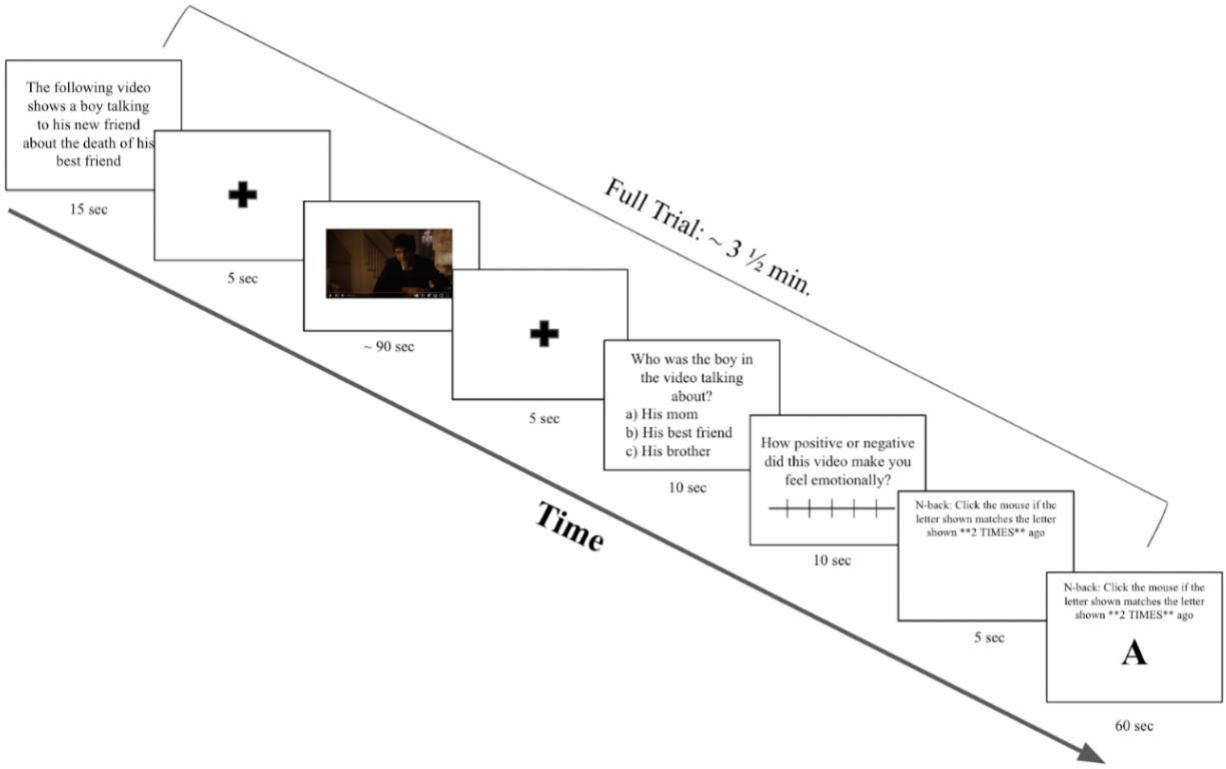


Figure 6. fMRI task design. Structure is the same for neutral, negative, and positive conditions.

fMRI Data Collection

Prior to fMRI data collection, structural MRI images were collected using a T1*-weighted imaging sequence (MPRAGE; 256 slices, 0.6x0.6x0.7mm voxels, TR/TE=4000/3.15ms, FOV=240mm, flip angle=4°, base/phase resolution=240/100, ascending acquisition). During the scanning trials, we will collect fMRI data during the 'video phase' using a T2*-weighted imaging sequence (76 slices, 1.6x1.6x1.6mm voxels, TR/TE=2500/20ms, FOV=208mm, flip angle=90°, base/phase resolution=130/100, interleaved acquisition). Whole-brain data was collected, and for analysis, data was extracted from predetermined regions of interest (ROIs) within the bilateral amygdalae, vlPFC, dlPFC, and dmPFC in line with placements specified in similar studies (Buhle et al., 2014; Wang et al., 2017). We also collected

fMRI data during the n-back task phase using the same T2*-weighted imaging sequence described above, but this data was not analyzed for the purpose of this project.

Analytic Plan

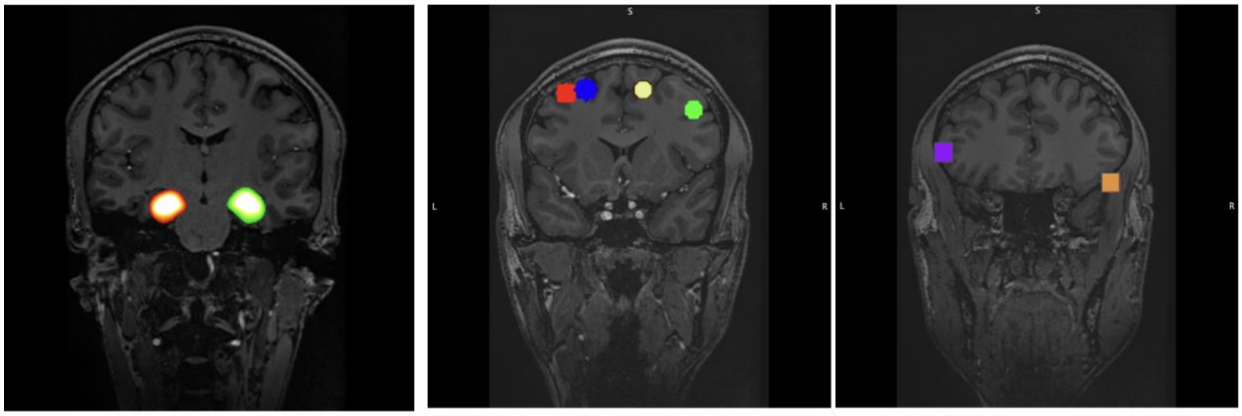
1. Hypothesis 1: *Neural activity will decrease in the amygdala from the negative prompt condition to the positive prompt condition. To test this hypothesis, I conducted a repeated measures ANOVA with the negative, positive, and neutral conditions.*

   Analytic Plan: To address Hypothesis 1, I extracted the BOLD signal from the amygdala. The bilateral amygdala regions of interest (ROIs) were generated from the Harvard-Oxford Subcortical Probability Atlas, thresholded at 50%, and registered into each participant's brain using FSL tools (Jenkinson & Smith, 2001; Jenkinson et al., 2002). The BOLD signal was then extracted using 'fslmeants' within each condition and each subject to generate the data set. Resultant values were then input into a repeated measures ANOVA.

2. Hypothesis 2: *Neural activity will increase in the (2A) vlPFC, (2B) dlPFC, and (2C) dmPFC from the negative prompt condition to the positive prompt condition. To test these hypotheses, I will conduct a repeated measures ANOVA for each brain region, with the negative, positive, and neutral conditions.*

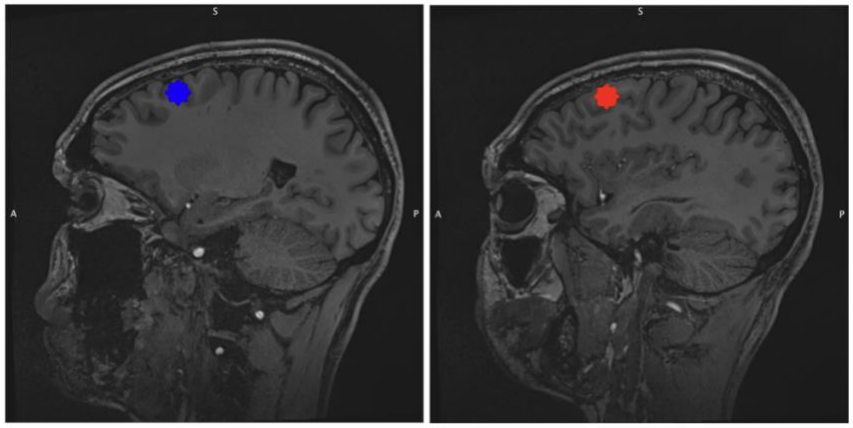
   Analytic Plan: To address Hypotheses 2A-2C, I extracted the BOLD signal from the bilateral vlPFC, dlPFC, and dmPFC. The ROIs were generated based on coordinates from previous studies (Ochsner et al., 2002; Wang et al., 2017; Kirk, Lilleholt, & Freedberg, 2020), which are all based on MNI (Montreal Neurologic Institute) coordinates and were adjusted for the 2-millimeter template if needed (See Figure 7 for voxel placements). Specifically, voxel placements are as follows: right dlPFC (x =

40, y = 28, z = 38), left dlPFC (x = -36, y = 22, z = 48), right dmPFC (x = 10, y = 20, z = 50), left dmPFC (x = -24, y = 24, z = 50), right vlPFC (x = 48, y = 38, z = -6), and left vlPFC (x = -54, y = 42, z = 12). 6mm spherical ROIs were predetermined for each ROI, and these were registered into each participant's brain using FSL tools (Jenkinson & Smith, 2001; Jenkinson et al., 2002). The BOLD signal was then extracted using 'fslmeants' within each condition and each subject to generate the data set (please see preprocessing steps described below) . Resultant values were then input into a repeated measures ANOVA.

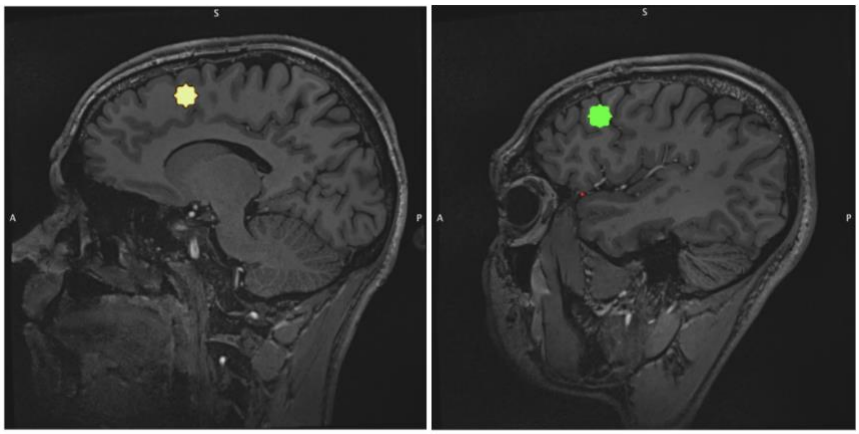


Amygdala ROIs: Orange = Left amygdala; Green = right amygdala

PFC ROIs from left to right: Red = Left dlPFC; Blue = Left dmPFC; Yellow = Right dmPFC; Green = Right dlPFC; Purple = Left vlPFC; Orange = Right vlPFC



PFC ROIs: Blue = Left dmPFC; Red = Left dlPFC



PFC ROIs: Yellow = Right dmPFC; Green = Right dlPFC

Figure 7. Voxel placements for amygdala and PFC ROIs.

Project Preregistration

The proposed project was preregistered through the Open Science Framework (OSF) – a free, open platform used to easily manage, store, and share project information publicly (https://osf.io/). Preregistration was completed before any data analysis took place.

fMRI Data Preprocessing

FMRI data processing was carried out using FEAT (FMRI Expert Analysis Tool) Version 6.00, part of FSL (FMRIB's Software Library, www.fmrib.ox.ac.uk/fsl). Prior to statistical modeling, data were converted to Neuroimaging Informatics Technology Initiative (NIFTI) format using 'dcm2nii' (X. Li, Morgan, Ashburner, Smith, & Rorden, 2016) and all non-brain material was removed from the data using FSL's Brain Extraction Tool (BET) (Smith, 2002). Motion outliers were calculated using FSL's motion outlier script function (http://fsl.fmrib.ox.ac.uk/fsl/fslwiki/FSLMotionOutliers), which analyzes the data before any preprocessing is done to identify any moderate to large motion beyond what might be correctable with linear motion correction. Motion outliers are identified as those volumes that fall outside the default threshold defined as the 75^{th} percentile + 1.5 * inter-quartile range. The results of running the motion outlier script is a text file identifying volumes exceed the default threshold for motion (in a binary "1"/ "0" fashion, where "1" indicates volumes to be excluded). The text file is then included in the statistical analysis as an explanatory variable which regresses out, or excludes, the aberrant volumes from the analysis. Registration to high resolution structural and/or standard space images was carried out using FLIRT (Jenkinson 2001; Jenkinson 2002). The following pre-statistics processing was applied; motion correction using MCFLIRT (Jenkinson, 2002); slice-timing correction using Fourier-space time-series phase-shifting; non-brain removal using BET (Smith, 2002); spatial smoothing using a Gaussian kernel of FWHM 5mm; grand-mean intensity normalisation of the entire 4D dataset by a single multiplicative factor; highpass

temporal filtering (Gaussian-weighted least-squares straight line fitting, with sigma=50.0s). Time-series statistical analysis was carried out using FILM with local autocorrelation correction (Woolrich, 2001). Higher-level analyses were performed with a mixed effects model where subjects were treated as random factors, and images contrasting the "negative", "neutral", and "positive" conditions were generated, along with difference maps for "negative-neutral" and "positive-neutral". Z (Gaussianised T/F) statistic images were thresholded using clusters determined by $z > 3.1$ and a (corrected) cluster significance threshold of $p = 0.05$ (Worsley, 2001). In order to assess how different prompts affect the ROIs implicated in implicit reappraisal, mean activation of the left and right amygdala, vlPFC, dlPFC, and dmPFC between activity and conditions were extracted using FSL utilities (i.e., fslmeants). Since the proposed study involves 8 distinct ROIs, I extracted data from the predefined ROI masks and analyzed it using repeated measures analysis of variance (ANOVA). As such, I analyzed the data with 8 repeated measures ANOVAs, testing for the effect of prompt condition on changes in BOLD response for a given ROI. Prior to analysis, data were inspected for normality using a Shapiro-Wilk test and outliers were determined and removed from the data set as follows: one outlier from the Lamy (left amygdala) X Neutral condition, one from the Ramy (right amygdala) X Neutral condition, one from the LdmPFC X Neutral condition, one from the LdmPFC X positive condition, and one from the LvlPFC X Negative condition. Mauchly's sphericity tests were also conducted prior to analysis, and corrections to the degrees of freedom were made for any analysis that violated the assumption of sphericity. These analyses were repeated for each of the eight hypothesized ROIs and repeated measures ANOVAs were ran in order to detect any significant change in BOLD signal brought about by implicit reappraisal. For any of the omnibus ANOVAs that reached significance, Tukey's post-hoc tests were conducted.

Results

Experiment 1

Participants

For Experiment 1, 506 respondents completed the online survey. Of those, 21 responses were excluded for being incomplete, 114 responses were excluded based on mental health criteria (i.e., high levels of anxiety, depression, and/or neuroticism), 114 responses were excluded for not watching the video stimuli in their entirety, and 2 responses were excluded for participants being over the age of 30, leaving our final sample size at N = 255. Our final sample had an average age of 19.71 years (M_{age}±SD_{age}=19.71±2.11 years) and included 72 males, 178 females, 3 non-binary, 1 non-conforming, and 2 who selected 'other/prefer not to say.' Our sample was 84.8% White/Caucasian, 5.9% African American, 5.1% Asian, 3.1% mixed race, and 0.8% selected other/prefer not to say.' All participants were current Auburn University students who were granted one hour of SONA credit upon completion of the survey.

Results

In order to determine which video stimuli would be used for Experiment 2, the aversiveness ratings for all 20 videos were taken and averaged across participants (see Table 1). Next, the videos were rank ordered based on their average aversiveness rating, from the highest rating to the lowest rating (i.e., from the most negative to the least negative), and the 12 videos with the highest ratings were selected as stimuli. Then, the 12 videos were divided into three groups such that each group of four videos had average ratings that were as close together as possible. Though all possible combinations of videos were formulated and the combination with the smallest difference in average rating was selected (a difference of 0.1 on a 0-6 Likert scale),

there was still one group that had a statistically significantly lower average rating. This group was chosen to become the negative prompt group, and I note this as a limitation of this experiment. The other two groups were then randomly assigned as 'positive' and 'neutral' groups, so that there would be four videos preceded by each of the three prompt types. Lastly, the videos were sorted into three blocks of four videos and ordered such that each block contained at least one but no more than two videos from each prompt group, videos from the same prompt group were not presented back-to-back, and all three of the blocks had average ratings that were not statistically different. These blocks were then randomized for each participant in Experiment 2.

Table 1.

Video Stimuli Aversiveness Results

Block	Video	Avg. Rating	Rank	Prompt Group
A	Video 3	4.32	12	Negative
	Video 8	4.85	7	Neutral
	Video 17	5.19	1	Negative
	Video 10	4.96	5	Positive
B	Video 6	5.16	2	Positive
	Video 4	4.87	6	Neutral
	Video 20	4.54	11	Negative
	Video 13	4.73	8	Positive
C	Video 18	5.14	3	Neutral
	Video 11	4.54	10	Positive
	Video 7	4.56	9	Neutral
	Video 16	4.98	4	Negative

**See Appendix B for full titles of videos*

Experiment 2

Participants

For this experiment, 90 respondents completed the online pre-screener. Of these, 19 responses were removed for being incomplete, 3 were removed for being duplicates, 3 were excluded for having an age older than 30, 7 were excluded for not meeting mental health inclusion criteria, and 6 were excluded for having an MRI incompability. Of the 52 remaining responses who were contacted, 22 never responded to schedule, leaving our final sample size of N = 30. Our sample had an average age of 22.93 years (M_{age}±SD_{age} = 22.93±2.80 years), included 10 males and 20 females, and included 30 White (6 Hispanic/24 non-Hispanic) participants (see Table 2 for a full demographic summary). All 30 participants completed the entire scanning procedure and were compensated $50 for their time. During scanning, all participants answered all the multiple-choice questions during the correctly (i.e., all participants correctly responded to all attention checks). Average ratings for the video stimuli that were presented in-scan are presented in Table 3.

Table 2.

Experiment 2 Demographics

n	30
Sex (M/F)	10/20
Age (years)	22.93±2.80
% Race/Ethnicity	
White, non-Hispanic	80% (24)
White, Hispanic	20% (6)
% Employment	
Student	60% (18)
Employed, full time	33.3% (10)
Employed, part time	3.3% (1)
Unemployed	3.3% (1)
Retired	0
% Education Level	
Some high school	3.3% (1)
High school graduate	50% (15)
Current undergraduate student	20% (6)
Current graduate student	16.7% (5)
Completed graduate program	10% (3)
Mental Health/Personality	
GAD-7	3.04±2.79
BDI-II	4.77±6.31
IPIP120	56.83±17.26
Emotion Regulation	
Reappraisal	4.88±1.23
Suppression	3.52±1.36

Table 2. Data are presented as M+SD. Mental Health/Personality scales: Generalized Anxiety Disorder-7, Beck Depression Inventory-II, International Personality Item Pool-120 (Neuroticism subtest). Emotion Regulation scale: Emotion Regulation Questionnaire (ERQ).

Table 3.

Video Stimuli Ratings- In-Scan

Block	Video	Avg. Rating	Rank	Prompt Group
A	Video 3	4.30	12	Negative
	Video 8	4.70	7	Neutral
	Video 17	4.90	1	Negative
	Video 10	4.40	5	Positive
B	Video 6	4.87	2	Positive
	Video 4	4.57	6	Neutral
	Video 20	4.30	11	Negative
	Video 13	4.33	8	Positive
C	Video 18	5.27	3	Neutral
	Video 11	3.73	10	Positive
	Video 7	4.07	9	Neutral
	Video 16	5.03	4	Negative

**See Appendix B for full titles of videos*

Amygdala (Hypothesis 1)

Repeated measures ANOVAs were conducted with prompt condition as the within-subjects factor and activation levels (measured in BOLD response) as the outcome variable (see Table 4 for results for all ROIs). Prior to analysis, data were inspected for normality using a Shapiro-Wilk test, and one outlier in the left amygdala neutral condition (Lamy x Neutral) was removed, and one outlier in the right amygdala neutral condition (Ramy x Neutral) was removed, leaving a sample of n = 29 for each amygdala analysis. For the left amygdala, Mauchly's sphericity test revealed that the assumption of sphericity was violated ($\chi^2(2) = 10.31$, $p = .005$), therefore the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.67$). Results suggested that there was no significant effect of condition on activation levels ($F(1.29, 36.19) = 2.33$, $p = 0.129$). For the right amygdala, Mauchly's sphericity test revealed that the assumption of sphericity was violated ($\chi^2(2) = 6.76$, $p = .034$), therefore the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.80$).

Results again suggested that there was no significant effect of condition on activation levels ($F(1.48, 41.43) = 0.92$, $p = 0.381$). This fails to support hypothesis 1, where it was hypothesized that activation levels in the amygdalae would significantly decrease from the negative prompt condition to the positive prompt condition.

Although the omnibus analysis was insignificant, post-hoc analyses did yield significant differences across prompt condition, and due to the lack of existing neuroimaging literature pertaining to implicit reappraisal, I believe it is important to still briefly mention those findings here. Pairwise comparisons revealed that activation levels in the left amygdala were greater in the negative condition (M = 0.189, SD = 0.032) compared to the neutral condition (M = 0.058, SD = 0.043; $p = 0.001$), but not the positive condition (M = 0.071, SD = 0.070), and this difference was significant. While the lack of significance in the omnibus test limits the ability to draw meaningful conclusions from the pairwise comparisons, it is important to consider the potential effects of prompt condition on left amygdala activity for future studies.

Prefrontal Cortex (Hypothesis 2a-c)

Repeated measures ANOVAs were conducted with prompt condition as the within-subjects factor and activation levels (measured in BOLD response) as the outcome variable (see Table 5 for full results). Prior to analysis, data were expected for normality using a Shapiro-Wilk test, and one outlier in the left dmPFC neutral condition (LdlPFC x Neutral) was removed, one outlier in the left dmPFC positive condition (LdlPFC x Positive) was removed, and one outlier in the left vlPFC negative condition (LvlPFC x Negative) was removed, leaving a sample size of either N = 29 or N = 30 for the PFC analyses. For the left dlPFC, Mauchly's sphericity test revealed that the assumption of sphericity was violated ($\chi^2(2) = 12.63$, $p = .002$), therefore the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.63$).

Results suggested that there was a significant effect of condition on activation levels ($F(1.41, 40.78) = 9.68$, $p < .001$)). Post-hoc pairwise comparisons (see Table 5) revealed that left dlPFC activation was greater in the negative prompt condition (M = 0.297, SE = 0.072) than in either the neutral (M = 0.088, SE = 0.070) or positive prompt condition (M = -0.246, SE = 0.113), and these differences were significant (negative-neutral, $p = 0.022$; negative-positive, $p = 0.002$). The difference between the neutral and positive conditions was not significant, though this difference was approaching significance (neutral-positive, $p = 0.067$). In the left dmPFC, Mauchly's sphericity test revealed that the assumption of sphericity was violated ($\chi^2(2) = 15.98$, $p < .001$), therefore the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .59$). Results suggest that there was a significant effect of condition on activation levels ($F(1.71, 46.14) = 8.75$, $p < .001$)). Post-hoc pairwise comparisons revealed that left dmPFC activation was greater in the negative prompt condition (M = 0.203, SE = 0.060) than in either the neutral (M = 0.006, SE = 0.055) or positive prompt condition (M = -0.126, SE = 0.066), and these differences were significant (negative-neutral, $p = 0.020$; negative-positive, $p <.001$). The difference between the neutral and positive conditions did not reach significant (neutral-positive, $p = 0.351$). Apart from these two regions, there were no other significant findings. These findings contradict hypotheses 2a-c, which hypothesized that activation in these regions of the PFC would be greater in the positive prompt condition than in the negative prompt condition.

Table 4.

ANOVA Results

ROI	df	F	Sig.
Left Amygdala	1.29, 36.19	2.33	0.129
Right Amygdala	1.48, 41.43	0.92	0.381
Left dlPFC	1.41, 40.78	9.68	.001*
Right dlPFC	1.55, 44.98	0.46	0.586
Left vlPFC	1.89, 53.03	0.80	0.450
Right vlPFC	1.58, 45.74	0.55	0.539
Left dmPFC	1.71, 46.14	8.75	0.001*
Right dmPFC	1.86, 53.85	0.20	0.803

** = significant at a = .05*

Table 5.

ANOVA results by Condition & Post Hoc Testing

				Pairwise Comparisons				
ROI	**Condition**	**Mean**	**Std. Err.**	**Conditions**		**Mean Diff.**	**Std. Error**	**Sig.**
Left Amygdala	Negative	0.189	0.038	Negative	Neutral	1.394	0.044	0.010*
	Neutral	0.049	0.034		Positive	0.174	0.102	0.222
	Positive	0.014	0.090	Neutral	Positive	0.035	0.097	0.932
Right Amygdala	Negative	0.144	0.032	Negative	Neutral	0.086	0.044	0.142
	Neutral	0.058	0.043		Positive	0.073	0.076	0.609
	Positive	0.071	0.070	Neutral	Positive	-0.013	0.079	0.986
Left dlPFC	Negative	0.297	0.072	Negative	Neutral	0.209	0.074	0.022*
	Neutral	0.088	0.070		Positive	0.543	0.143	0.002*
	Positive	-0.246	0.113	Neutral	Positive	0.334	0.144	0.067
Right dlPFC	Negative	-0.114	0.070	Negative	Neutral	0.009	0.069	0.991
	Neutral	-0.123	0.072		Positive	-0.079	0.117	0.778
	Positive	-0.035	0.106	Neutral	Positive	-0.088	0.111	0.711
Left vlPFC	Negative	0.038	0.087	Negative	Neutral	0.020	0.120	0.985
	Neutral	0.018	0.063		Positive	0.131	0.098	0.388
	Positive	-0.093	0.078	Neutral	Positive	0.111	0.116	0.608
Right vlPFC	Negative	-0.094	0.058	Negative	Neutral	-0.036	0.067	0.853
	Neutral	-0.058	0.062		Positive	-0.091	0.106	0.853
	Positive	-0.004	0.105	Neutral	Positive	-0.055	0.084	0.793
Left dmPFC	Negative	0.203	0.060	Negative	Neutral	0.197	0.069	0.001*
	Neutral	0.006	0.055		Positive	0.329	0.073	0.020*
	Positive	-0.126	0.066	Neutral	Positive	0.132	0.094	0.351
Right dmPFC	Negative	-0.052	0.046	Negative	Neutral	0.017	0.052	0.943
	Neutral	-0.069	0.041		Positive	-0.021	0.066	0.803
	Positive	-0.031	0.045	Neutral	Positive	0.037	0.059	0.803

**significant at a = .05*

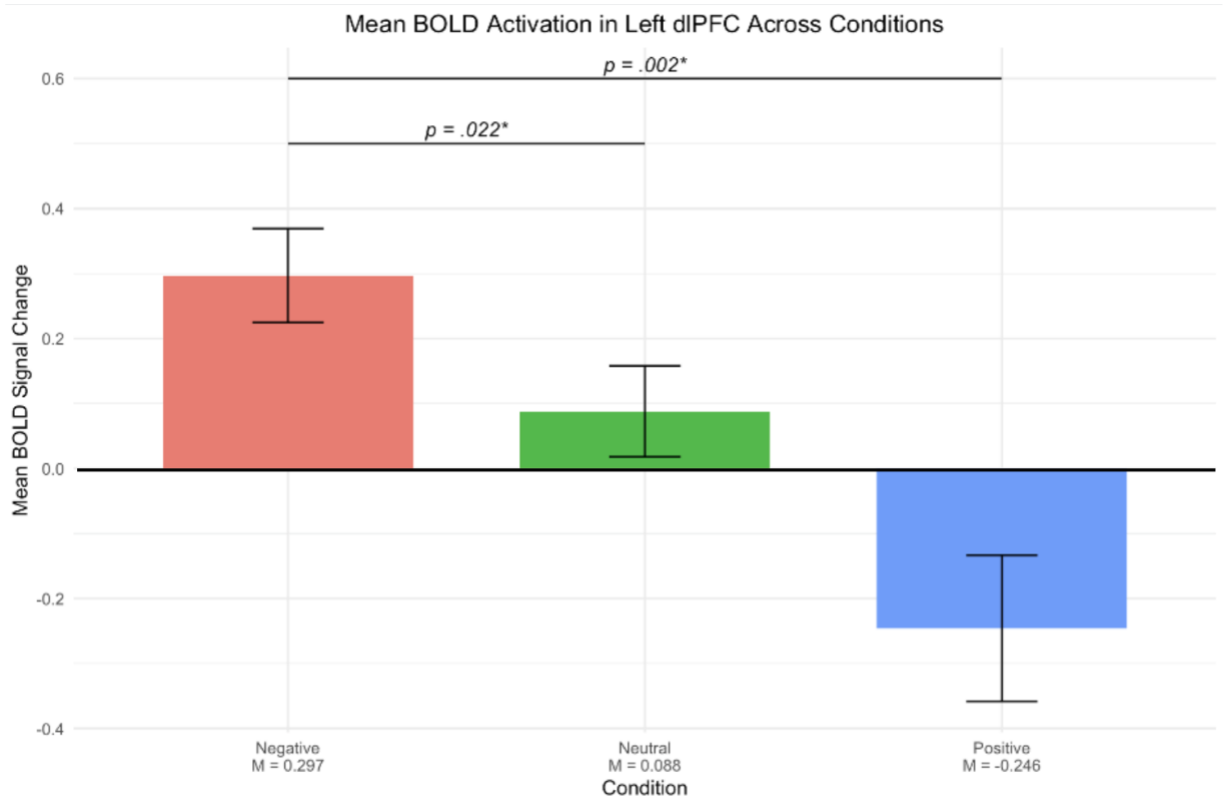


Figure 8. Mean BOLD signal (measured by percent signal change from baseline) by prompt condition for the left dlPFC. Error bars represent standard error. * = significant at $\alpha = .05$.

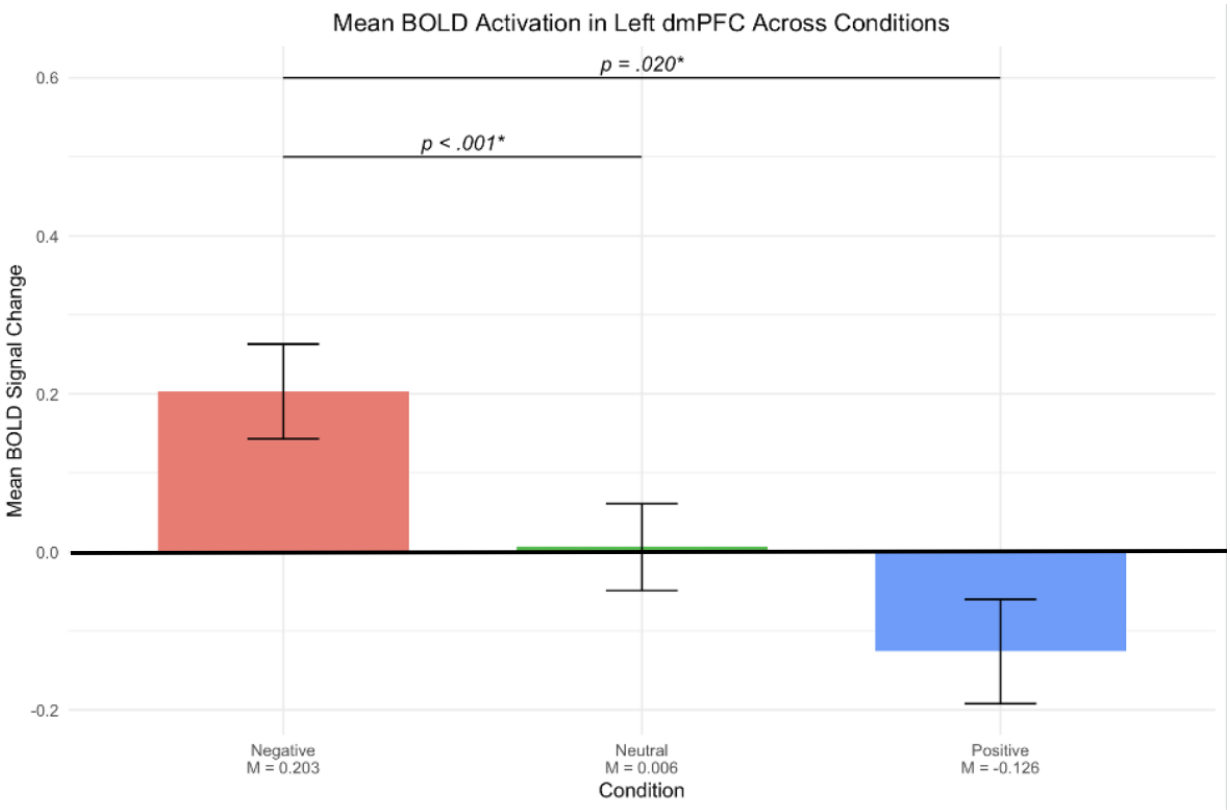


Figure 9. Mean BOLD signal (measured by percent signal change from baseline) by prompt condition for the left dmPFC. Error bars represent standard error. * = significant at $\alpha = .05$.

Discussion

The current study utilized 7 Tesla fMRI methodologies to examine changes in activation across regions of the brain during an implicit emotion regulation task. Our results indicated that the left hemisphere dorsolateral PFC and the left hemisphere dorsomedial PFC had increased activation levels when an aversive video was preceded with a negative emotional prompt compared to a positive prompt or a neutral prompt. This finding contradicts Hypothesis 2b and 2c, where I predicted that the bilateral dlPFC and bilateral dmPFC would have higher activation in the positive prompt condition as an effect of the participant reappraising the negative video content. Further, no other ROIs demonstrated significant differences in activation levels across prompt conditions. Thus, hypotheses 1 and 2a were also not supported. However, both significant and insignificant findings of this experiment are important to consider in the context of the existing implicit reappraisal literature.

Amygdala and Implicit Reappraisal

I examined the left and right amygdala as regions of interest for this study, hypothesizing that the amygdalae would show increased activation in negative prompt conditions compared to positive prompt conditions as a result of implicit emotion regulation. Our analyses failed to support significant differences across conditions in both the left and right amygdala, so we cannot support our initial hypothesis. Though the omnibus analysis was insignificant, pairwise comparisons revealed that activation levels in the left amygdala were significantly greater in the negative condition than the neutral condition and the positive condition, though I interpret this with caution. Importantly, given the lack of neuroimaging utilizing implicit affective regulation, this finding is intriguing and allows for justification for future studies to explore the potential role of prompts on modulating the left amygdala response.

Although there is a great deal of evidence that the amygdala is heavily involved in explicit emotion regulation, there is less information regarding the role of the amygdala in implicit regulation specifically. Knowing this, I consider a few potential explanations for these findings. From a neuroimaging standpoint, only a small number of studies have directly examined the neural coordinates of implicit emotional reappraisal, and while the PFC-amygdala network is suggested to operate in similar fashion to how it does in explicit emotional reappraisal, this has not been causally concluded. Simply, there is a possibility that implicit reappraisal doesn't recruit the amygdala in the same way that explicit reappraisal does. Bilateral amygdalae are known to be more active when negative emotion is increased, however, the degree of this increase is dependent on both the valence of the stimulus and the degree of arousal that the stimulus elicits (Gallagher & Chiba, 1996; Lin et al., 2020). Therefore, it is entirely possible that the video stimuli and written prompts used in this project did not have the emotional valence necessary to elicit condition-specific changes in activation levels, or may have been more arousing that previous stimuli that were static in nature. Knowing that previous research utilized preceding prompts and were able to generate significantly different activation levels in the amygdalae (Wang et al., 2017), it is essential to consider the stimuli selection used here. Further, though causal claims cannot be drawn based on the lack of significance in the omnibus test, the pairwise comparisons revealed that the left amygdala showed significantly greater activation in the negative condition compared to the neutral condition. This could suggest that, while the prompt conditions did contribute to some degree a change in activation levels such that the left amygdala was more active when negatively prompted, it could also be the case that the small different in ratings for the negative prompt videos elicited greater activation.

PFC and Implicit Reappraisal

We also examined regions of the PFC known to be involved in reappraisal processes — namely, the left and right dorsolateral, dorsomedial, and ventrolateral PFC—hypothesizing that all of these regions would show an increase in activation levels in the positive prompt condition compared to the negative prompt condition. This hypothesis was not supported, though evidence for significant differences in activation levels was found in the opposite direction. The higher levels of activation in the negative prompt condition compared to the positive prompt condition is interesting considering the typical emotion regulation neural pathway through which the PFC downregulates the amygdala, and here I explore potential explanations for this. Further, it is interesting that both of the ROIs that showed significant differences in activation levels between conditions are in the left hemisphere, and we also consider potential factors influencing this hemispheric disparity.

First, there is evidence that explicit reappraisal uses a broader neural network than implicit reappraisal (Braunstein, Gross, & Ochsner, 2017). Therefore, it is possible that implicit reappraisal uses a smaller, more refined subset of cortical regions as opposed to the six PFC regions hypothesized here. Next, the level of PFC activation in the context of cognitive reappraisal is suggested to be dependent on the intensity of the emotion experienced in response to the stimulus (Silvers et al., 2014). Because novel video stimuli were used in this project, it is difficult to conclude that the valence and degree of arousal elicited by these stimuli were great enough to elicit a differential response. Further, individual differences could alter how participants emotionally respond to certain video stimuli. For example, a participant who has worked as a first responder may have a dulled emotional response to watching a video of a burning building based on their own desensitization to those types of scenes. Though the use of video stimuli is essential in recreating responses that are more comparable to real world

experiences, there is more work to be done in creating effective stimuli sets. Regarding the observed hemispheric disparity where only the left hemisphere contained ROIs that had significant changes in activation levels based on condition, existing literature regarding hemispheric specificity in emotion regulation should be considered. Broadly, some evidence suggests that increases in general emotional experience (both negative and positive) primarily engages left-lateralized prefrontal regions (Kim & Harmann, 2007). More specifically, existing literature also has suggested that the emotion regulation strategy of explicit cognitive reappraisal tends to be a left-lateralized process (Papousek et al., 2017). Therefore, it is possible that the participants in this study were regulating their emotions to some degree, but just maybe not in the same way that they would have if they had used explicit cognitive reappraisal. It is interesting to consider these findings in the context of differences between explicit and implicit reappraisal, and it highlights the need for more nuanced research on implicit reappraisal.

Limitations and Future Directions

The results from this study should be interpreted in light of several limitations. First, the process of implicit reappraisal is difficult to elicit methodologically. Specifically, the dearth of implicit reappraisal research creates a lack of empirically tested tasks for measuring implicit reappraisal. For example, some studies have used techniques such as affective labeling, which involves putting one's feelings into words, as an indirect measure of implicit reappraisal (Torre & Lieberman, 2018), while others (including this study) have used variations of priming techniques as indirect measures of implicit reappraisal (Williams et al., 2009). Because this form of cognitive reappraisal is implicit, it is difficult to truly isolate implicit reappraisal as a cognitive process. Future research should compare different strategies for implicit reappraisal and their impacts. Next, there is a possibility that the prompts that were presented before the videos

weren't salient enough to convince participants to believe that the prompts (especially those in the positive condition) were accurate depictions of the aversive events unfolding in the video clips. While a team of affective neuroscience researchers worked together to generate the prompts, the decision to use novel video stimuli and prompts introduces the limitations that accompany not using a standardized set of stimuli. Further, as previously mentioned, the group of videos in the negative, positive, and neutral prompt groups were significantly different in their average aversiveness ratings. Though this difference was outwardly minor, the negative prompt group containing a group of videos that, statistically speaking, were significantly more aversive could have influenced the outcomes. These limitations highlight a need to create a universal set of video stimuli in the same way that previous research has created standardized sets of still image stimuli. Next, there are potential sampling biases that could be influencing our results. Specifically, our sample of n = 30 was 100% White (80% non-Hispanic, 20% Hispanic). Though the lack of diversity in our sample isn't atypical for a sample taken from the southeastern United States that is largely comprised of university students, it greatly limits the ability to generalize the findings of this study to a larger population. Next, the process of undergoing an MRI scan may elicit some negative emotions for certain people, skewing their emotional experience. Though no explicit self-report data was collected in this study regarding a person's participation experience, it would be interesting to include that in future studies and/or statistically analyze how environmental factors such as being in the scanner may have influenced how participants responded to the aversiveness ratings and how they may have influenced changes in brain activation. Lastly, future research may consider replicating this study design using a between subjects approach as opposed to a within subjects approach. Having participants only be exposed to one prompt condition could help account for potential influence from participant fatigue, order

effects (since the stimuli here were pseudorandomized rather than fully randomized), and would likely constitute a larger sample size with improved external validity.

Conclusions

The study presented here submits novel evidence for neural bases of implicit reappraisal through the use of ultra-high field strength (i.e., 7 Tesla) neuroimaging techniques and video stimuli as opposed to still images. Results suggest that the left dlPFC and dmPFC may play key roles in implicit reappraisal paradigms, though the directionality may not be in line with existing knowledge on explicit reappraisal. These findings could suggest that implicit reappraisal operates via different neural pathways than explicit reappraisal, but further research is needed to make these claims. Though implicit cognitive reappraisal is difficult to isolate from an experimental perspective, the potential cognitive benefits it may have in comparison to other processes of emotion regulation and the current deficit of literature on the topic make it a worthwhile neural process to research.

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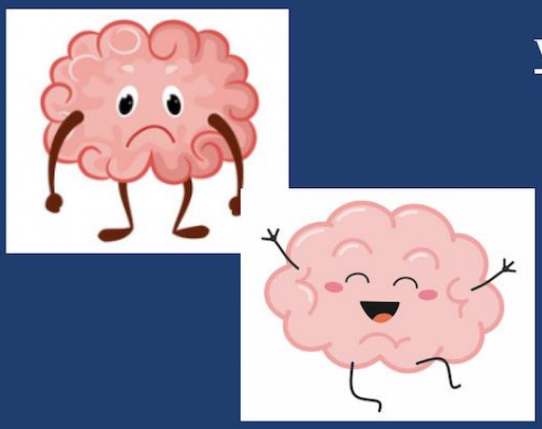
Appendix A- Recruitment Materials

Recruitment Flyers:

Emotional Ratings of Movie Clips

A Study on Mental Health, Emotions, and Movie Clips

Auburn University Department of Psychological Sciences



What is involved?

- This study is 100% online, self-administered, & only takes about an hour to complete
- Complete some mental health surveys, and then (if eligible) watch & rate a series of movie clips

What will you receive?

- Participants automatically receive an hour of SONA credit!

Who is eligible?

- All AU Students are encouraged to complete the mental health surveys
- Select participants will complete the movie clip portion of the survey

Interested?
Scan here to get a link to the study's SONA page!

Email Ava White
(ajw0137@auburn.edu)
for more info!

The Auburn University Institutional Review Board has approved this Document for use from 01/24/2024 to ----------
Protocol # 23-561 EP 2401

AUBURN
PSYCHOLOGICAL SCIENCES

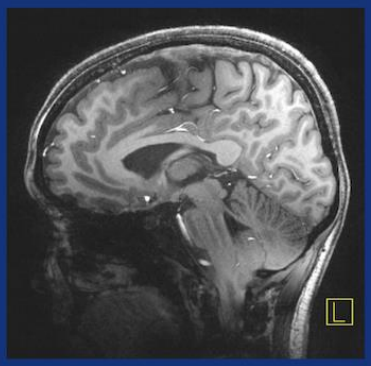
Functional MRI on Video Memory

An fMRI Study on How the Brain Remembers Videos

Auburn University Department of Psychological Sciences

What is involved?

- Participants will take an online screener to determine eligibility
- Eligible participants will be invited to the AU MRI Center
- MRI participants will watch short video clips and answer questions about them while recieving an MRI



non-SONA

What will you receive?
1 SONA hour (if applicable) for the online screener

Up to $50 and a picture of your brain, & 3 SONA hours (if applicable) for scanning

Via SONA

Anyone age 18-30 is encouraged to take the screener to see if you're eligible!

Questions? Email Ava White for more info!

ajw0137@auburn.edu

The Auburn University Institutional Review Board has approved this Document for use from 06/13/2024 to ----------
Protocol # 24-781 EP 2404

Email Templates:

Subject: Study Participation- Neuroimaging and Memory

Hello,

You are receiving this email because you've expressed interest in participating in the Neuroimaging and Memory Project, a project run by the Auburn University Department of Psychological Sciences and the Auburn University MRI Center.

To determine eligibility, you will need to complete an online Qualtrics survey that takes approximately 30 minutes or less to complete. Once we receive your data, an investigator will contact you regarding your eligibility status.

Those who are eligible for the MRI portion of the study will be invited to complete an in-person scanning session, where you can earn 3 hours of SONA credit, up to $50, and the opportunity to see a picture of your brain.

The Qualtrics survey can be accessed here: QUALTRICS SURVEY

If you have any questions, please feel free to contact the study's investigators directly: Ava White (ajw0137@auburn.edu) & Dr. Jennifer Robinson (jrobinson@auburn.edu).

Thank you for your time,
AU Cognitive & Affective Neuroscience (CAN) Lab

Subject: Study Participation- Neuroimaging and Memory

Hello,

You are receiving this email because you've expressed interest in participating in the Neuroimaging and Memory Project, a project run by the Auburn University Department of Psychological Sciences and the Auburn University MRI Center.

To determine eligibility, you will need to complete an online Qualtrics survey that takes approximately 30 minutes or less to complete. Once we receive your data, an investigator will contact you regarding your eligibility status.

Those who are eligible for the MRI portion of the study will be invited to complete an in-person scanning session, where you can earn 3 hours of SONA credit, up to $50, and the opportunity to see a picture of your brain.

The Qualtrics survey can be accessed here: QUALTRICS SURVEY

If you have any questions, please feel free to contact the study's investigators directly: Ava White (ajw0137@auburn.edu) & Dr. Jennifer Robinson (jrobinson@auburn.edu).

Thank you for your time,
AU Cognitive & Affective Neuroscience (CAN) Lab

Subject: Study Participation- Neuroimaging and Memory

Hello,

You are receiving this email because you've completed the first phase of the Neuroimaging and Memory Project, a project run by the Auburn University Department of Psychological Sciences and the Auburn University MRI Center.

After reviewing your data, we are happy to inform you that you are eligible for the second phase of the study. If you choose to participate, you will complete one scan that will last up to 90 minutes at the AU MRI Center. Your total time commitment will be approximately 2 hours.

Upon completion of the study, you will receive 3 hours of SONA credit, as well as $50, and the opportunity to see a picture of your brain. If you would like to participate, please use the following link to schedule an appointment time: **Sign up here!**

If you have any questions, please feel free to contact the study's investigators directly: Ava White (ajw0137@auburn.edu) & Dr. Jennifer Robinson (jrobinson@auburn.edu).

Thank you for your time,
AU Cognitive & Affective Neuroscience (CAN) Lab

Subject: Study Participation- Neuroimaging and Memory

Hello,

You are receiving this email because you've completed the first phase of the Neuroimaging and Memory Project, a project run by the Auburn University Department of Psychological Sciences and the Auburn University MRI Center.

After reviewing your data, we have determined that you are not eligible for the next phase of the study. We appreciate your time.

If you have any questions, please feel free to contact the study's investigators directly: Ava White (ajw0137@auburn.edu) & Dr. Jennifer Robinson (jrobinson@auburn.edu).

Thank you for your time,
AU Cognitive & Affective Neuroscience (CAN) Lab

Appendix B- Experiment 1 Materials

Qualtrics Survey:

Consent

This is a study examining the different potential emotional effects of short video clips. This research study is being conducted by Ava J. White, Graduate Research Assistant at Auburn University, and Dr. Jennifer L. Robinson, Professor at Auburn University. You were selected as a possible participant based on expressed interest via email or Sona Systems.

What is involved if you participate?
If you participate in this study, you will be asked to complete online questionnaires, and select participants will then be asked to watch short video clips. The first set of questionnaires relate to demographic factors and mental health. The second section of this survey (if applicable) includes a group of 20 1-2 minute video clips followed by a couple questions regarding the emotionality of the video.

As a whole, the first part of the section should take around 10-15 minutes, and if applicable, the second section should take around 40 minutes. We highly recommend completing this survey on a laptop or computer rather than a cellphone, since you may watching video clips.

Are there risks or discomforts?
Risks associated with participating in this study include potential emotional distress that comes from thinking about and watching emotional videos associated with certain topics (ex. mental health, injury/death, physical harm, etc.). If you find yourself experiencing significant distress, you may discontinue participation at any time. If you with to speak with someone about your distress, a reference to the Auburn University Student Counseling and Psychological Services page will be available following the questionnaires.

There are also risks associated with confidentiality breaches. To minimize this risk, only

investigators have access to data obtained in connection with the research study that can be identified as belonging to you. If you decide to withdraw, you may withdraw any data that has been collected as long as it is identifiable. You will be assigned a participant number so that your name and other pieces of identifying information are not directly associated with data collected. All data, including your responses to these questionnaires, will be associated with that participant number. Following data collection completion, any/all links to identifiable information will be destroyed. The results of this study may be presented in a professional venue, such as a journal or conference. In such an event, group data will be presented.

Are there benefits or compensation available?
By completing this study, you can expect to receive no direct personal benefits. You will be compensated for participation with 1 hour via Sona Systems. Your instructors should assign specific values of course credit to these hours. Please check with your instructors for more information.

Are there costs to participate?
If you decide to participate in this study, you will not incur any costs. If you require medical attention, you will be responsible for all costs for medical attention/treatment.

Your participation is completely voluntary. If you change your mind about participating, you can withdraw from the research study at any time. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether or not to participate will not jeopardize your relationship with Auburn University or any associated/affiliated department, center, or office.

If you have any questions about this study, you can contact Ava J. White at ajw0137@auburn.edu, or Dr. Jennifer L. Robinson at jrobinson@auburn.edu. You are welcome to print a copy of this information letter to keep for your records.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)844-5966 or email at hsubject@auburn.edu or IRBchair@auburn.edu.

By selecting the option below, you are indicating that you have read the information provided and wish to participate in this research study:

○ I have reviewed the provided information and would like to continue with this study.

Contact Info

Before completing this study, you will be asked to provide your email address. This is so investigators can identify your information should you decide to withdraw from the study and request that your data be removed. Your privacy will be protected. Investigators that oversee this project are required by the Auburn University Institutional Review Board not to disclose any information you provide in this study that could identify you as a participant, or any other personal information you may reveal. This protects you, as well as the investigators, from legal action(s) that could be associated with reporting illicit activities.

Please provide your email address in the space below so that we may identify your data if needed:

Demographics

How old are you?

Which of the following best describes your biological sex?

- ○ Male
- ○ Female

Which of the following best describes your gender?

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Non-conforming
- ○ Other/Prefer not to say

Which of the following best describes you?

- ○ American Indian or Alaska Native
- ○ Asian or Asian American
- ○ African American
- ○ Caucasian
- ○ Hawaiian or Pacific Islander
- ○ Mixed Race
- ○ Other/Prefer not to say

Which of the following best describes you?

- ○ Hispanic or Latino
- ○ Non-Hispanic or Non-Latino

Which of the following best describes you?

- ○ Student
- ○ Employed, full-time
- ○ Employed, part-time
- ○ Unemployed
- ○ Retired

Which of the following best describes your marital status?

- ○ Single
- ○ Married
- ○ Divorced/Widowed
- ○ Prefer not to say

What is the highest level of education you've achieved?

- ○ Some high school or less
- ○ High school graduate

- ○ Currently enrolled in an undergraduate program
- ○ Completed undergraduate program
- ○ Currently enrolled in graduate program
- ○ Completed graduate program

Do you have a current diagnosis of any psychological/psychiatric conditions (e.g. Anxiety, ADHD, etc.)? If yes, please list below.

- ○ Yes
- ○ No

Are you currently taking medication for any psychological/psychiatric conditions (e.g. Xanax, Adderall, etc.)?

- ○ Yes
- ○ No

GAD7

Over the LAST TWO WEEKS, how often have you been bothered by the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious, or on edge	○	○	○	○
Not being able to stop or control worrying	○	○	○	○
Worrying too much about different things	○	○	○	○
Trouble relaxing	○	○	○	○
Being so restless that it is hard to sit still	○	○	○	○
Becoming easily annoyed or irritable	○	○	○	○
Feeling afraid, as if something awful might	○	○	○	○

	Not at all	Several days	More than half the days	Nearly every day
happen				

BDI

Please read each group of statements carefully, and select one statement from each groups that best describes how you've felt during the PAST TWO WEEKS.

1	I do not feel sad	I feel sad much of the time	I am sad all the time	I am so sad or unhappy that I can't stand it
2	I am not discouraged about my future	I feel more discouraged about my future than I used to	I do not expect things to work out for me	I feel my future is hopeless and will only get worse
3	I do not feel like a failure	I have failed more than I should have	As I look back, I see a lot of failures	I feel I am a total failure as a person
4	I get as much pleasure as I ever did from the things I enjoy	I don't enjoy things as much as I used to	I get very little pleasure from the things I used to enjoy	I can't get any pleasure from the things I used to enjoy
5	I don't feel particularly guilty	I feel guilty over many things I have done or should have done	I feel quite guilty most of the time	I feel guilty all of the time
6	I don't feel I am being punished	I feel I may be punished	I expect to be punished	I feel I am being punished
7	I feel the same about myself as ever	I have lost confidence in myself	I am disappointed in myself	I dislike myself
8	I don't criticize or blame myself more than usual	I am more critical of myself than I used to be	I criticize myself for all of my faults	I blame myself for everything bad that happens
10	I don't cry any more than I used to	I cry more than I used to	I cry over every little thing	I feel like crying, but I can't

11	I am no more restless or wound up than usual	I feel more restless or wound up than usual	I am so restless or agitated, it's hard to stay still	I am so restless or agitated that I have to keep moving or doing something
12	I have not lost interest in other people or activities	I am less interested in other people or things than before	I have lose most of my interest in other people or things	It's hard to get interested in anything
13	I make decisions about as well as ever	I find it more difficult to make decisions than usual	I have much greater difficulty in making decisions than I used to	I have trouble making any decisions
14	I do not feel I am worthless	I don't consider myself as worthwhile and useful as I used to	I feel more worthless as compared to others	I feel utterly worthless
15	I have as much energy as ever	I have less energy than I used to have	I don't have enough energy to do very much	I don't have enough energy to do anything
16	I can sleep as well as usual	I don't sleep as well as I used to	I wake up 1-2 hours earlier than usual and find it hard to get back to sleep	I wake up several house earlier than I used to and cannot get back to sleep
17	I am not more irritable than usual	I am more irritable than usual	I am much more irritable than usualy	I am irritable all the time
18	My appetite is no worse than usual	My appetite is not as good as it used to be	My appetite is much worse now	I have no appetite at all anymore
19	I can concentrate as well as ever	I can't concentrate as well as usual	It's very hard to keep my mind on anything for very long	I find I can't concentrate on anything
20	I am no more tired or fatigued than usual	I get more tired or fatigued more easily than usual	I am too tired or fatigued to do a lot of of the things I used to do	I am too tired or fatigued to do most of the things I used to do
21	I have not noticed any recent change in my interest in sex	I am much less interested in sex than I used to be	I am much less interested in sex now	I have lost interest in sex completely

IPIP 120 (Neuroticism)

Select how accurately each of the following statements regarding behavior describes you. Describe yourself as you generally are NOW, not as you wish to be in the future.

	Disagree strongly	Disagree a little	Neither agree or disagree	Agree a little	Strongly agree
Worry about things	○	○	○	○	○
Fear for the worst	○	○	○	○	○
Am afraid of many things	○	○	○	○	○
Get stressed out easily	○	○	○	○	○
Get angry easily	○	○	○	○	○
Get irritated easily	○	○	○	○	○
Lose my temper	○	○	○	○	○
Am not easily annoyed	○	○	○	○	○
Often feel blue	○	○	○	○	○
Dislike myself	○	○	○	○	○
Am often down in the dumps	○	○	○	○	○
Feel comfortable with myself	○	○	○	○	○
Find it difficult to approach others	○	○	○	○	○
Am afraid to draw attention to myself	○	○	○	○	○
Only feel comfortable with friends	○	○	○	○	○
Am not bothered by difficult social situations	○	○	○	○	○
Go on binges	○	○	○	○	○
Rarely overindulge	○	○	○	○	○
Easily resist temptations	○	○	○	○	○
Am able to control my cravings	○	○	○	○	○
Panic easily	○	○	○	○	○
Become overwhelmed by events	○	○	○	○	○
Feel that I am unable to deal with things	○	○	○	○	○

	Disagree strongly	Disagree a little	Neither agree or disagree	Agree a little	Strongly agree
Remain calm under pressure	○	○	○	○	○

ERQ

Select a point on the scale to indicate your level of agreement with each of the following statements

	1. Strongly disagree	2.	3.	4. Neutral	5.	6.	7. Strongly agree
When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about*	○	○	○	○	○	○	○
I keep my emotions to myself	○	○	○	○	○	○	○
When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about*	○	○	○	○	○	○	○
When I am feeling *positive* emotions, I am careful not to express them	○	○	○	○	○	○	○
When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm	○	○	○	○	○	○	○
I control my emotions by *not expressing them*	○	○	○	○	○	○	○
When I want to feel more *positive* emotion, I *change the way I'm thinking* about the situation	○	○	○	○	○	○	○
I control my emotions by *changing the way I think* about the situation I'm in	○	○	○	○	○	○	○

When I am feeling *negative* emotions, I make sure not to express them	○	○	○	○	○	○	○
When I want to feel less *negative* emotion, I *change the way I'm thinking* about the situation	○	○	○	○	○	○	○

Video prompt

You will now be shown a series of video clips and asked a couple questions about them. Clips are all between 1-2 minutes long and will start and stop automatically once you press play. Once you press play, DO NOT press any other buttons on the video.

Please watch the entire clip before answering the following questions. Some clips may elicit some strong emotions. We ask that, if you've seen the movie that the clip is from before, you answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole.

○ I understand.

Video 1

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 2

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 3

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 4

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 5

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 6

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 7

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

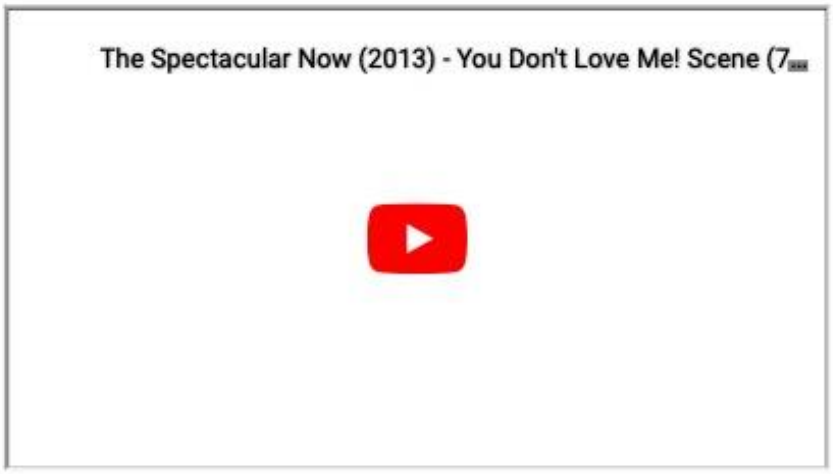
Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 8

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole



How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 9

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 10

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 11

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 12

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 13

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

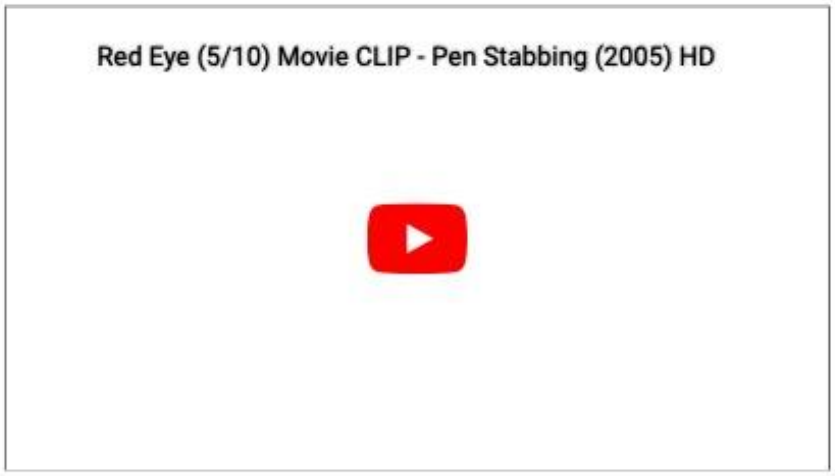
Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 14

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole



How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 15

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 16

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 17

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 18

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 19

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

Video 20

- Clips will start and stop automatically once you press play
- Please watch the entire clip before answering the following questions

- If you've seen the movie that the clip is from before, answer the follow-up questions ONLY in terms of the selected clip, NOT in terms of the movie as a whole

How positive or negative did this video clip make you feel emotionally?

	Extremely negative	Moderately negative	Slightly negative	Neither positive nor negative	Slightly positive	Moderately positive	Extremely positive
Select your rating	○	○	○	○	○	○	○

Have you seen this video before?

	No, I do not recognize this video	I'm unsure	This seems familiar, but I'm not 100% sure where I've seen it	Yes, I know exactly where this is from
Select your response	○	○	○	○

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End of Survey

Thank you for your time, your response has been recorded.

Debrief: The purpose of this survey was to look at some brief clips from movies that were intended to elicit negative feelings. The results from this survey will be used to determine stimuli for a follow-up study. If you have any questions, please feel free to reach out to researchers Ava White (ajw0137@auburn.edu) or Jennifer Robinson (jrobinson@auburn.edu).

Some of these videos may have elicited some strong negative emotions. It is important to note that all of the videos were not real events, but rather scenes from movies performed by actors. If you find that you are struggling to cope with any of the previous videos, we recommend referring to the Auburn University Student Counseling and Psychological Services webpage: Auburn University SCPS

Links to Videos

Video 1- *The Perks of Being a Wallflower* (1; 2012): Start time- 0:59; End time- 2:11;

https://www.youtube.com/watch?v=m4s7CAd03Zc&t=59s

Video 2- *Million Dollar Baby* (2004): Start time- 0:45; End time- 2:14;

https://www.youtube.com/watch?v=o4SUU7XoRl8&t=45s

Video 3- *The Breakfast Club* (1985): Start time- 3:40; End time- 5:16;

https://www.youtube.com/watch?v=sdrTKPyW018&t=220s

Video 4- *Bridge to Terabithia* (2007): Start time- 0:01; End time- 1:38;

https://www.youtube.com/watch?v=28LKnSSoxJA&t=1s

Video 5- *Only the Brave* (1; 2017): Start time- 0:08; End time- 1:44;

https://www.youtube.com/watch?v=7p9YNPcOJ-4&t=8s

Video 6- *Room* (2015): Start time- 1:40; End time- 3:10;

https://www.youtube.com/watch?v=QXX3UzeydTE&t=100s

Video 7- *Only the Brave* (2; 2017): Start time- 1:03; End time- 2:34;

https://www.youtube.com/watch?v=Cre1DOpQFx8&t=63s

Video 8- *The Spectacular Now* (2013): Start time- 0:30; End time- 1:54;

https://www.youtube.com/watch?v=p3tXZnfvqy0&t=30s

Video 9- *To the Bone* (2017): Start time- 0:03; End time- 1:30;

https://www.youtube.com/watch?v=8AjoNRmQ5x8&t=3s

Video 10- *If I Stay* (2014): Start time- 0:18; End time- 1:40;

https://www.youtube.com/watch?v=2aqgKA3uUwM&t=18s

Video 11- *Safe Haven* (2013): Start time- 0:19; End time- 1:54;

https://www.youtube.com/watch?v=KDHxMwqx1yw&t=21s

Video 12- *Extremely Loud & Incredibly Close* (2011): Start time- 0:12; End time- 1:34;

https://www.youtube.com/watch?v=tdBx-MmeN0s&t=12s

Video 13- *Rabbit Hole* (2010): Start time- 1:03; End time- 2:24;

https://www.youtube.com/watch?v=KK2MOKkkp4M&t=63s

Video 14- *Red Eye* (1; 2005): Start time- 0:01; End time- 1:29;

https://www.youtube.com/watch?v=YaLewAfBoU0&t=4s

Video 15- *Red Eye* (2; 2005): Start time- 0:18; End time- 1:54;

https://www.youtube.com/watch?v=FhDi_WF5uOI&t=18s

Video 16- *The Perks of Being a Wallflower* (2; 2012): Start time- 1:51; End time- 3:07;

https://www.youtube.com/watch?v=c9OVBkRPEh0&t=111s

Video 17- *Brothers* (1; 2009): Start time- 0:01; End time- 1:28;

https://www.youtube.com/watch?v=KVy9rgFD5js&t=1s

Video 18- *Brothers* (2; 2009): Start time- 0:09; End time- 1:43;

https://www.youtube.com/watch?v=oN2S394WfuU&t=9s

Video 19- *Captain Phillips* (2013): Start time- 0:28; End time: 1:39;

https://www.youtube.com/watch?v=ng95gpwSjZU&t=28s

Video 20- *Cruel Intentions* (1999): Start time- 0:48; End time- 2:11;

https://www.youtube.com/watch?v=xEqdoVnIFug&t=48s

Appendix C- Experiment 2 Materials

Study pre-screener

Consent

This survey is part of a study examining how the brain recovers recently created memories. This research study is being conducted by Ava J. White, Graduate Research Assistant at Auburn University, and Dr. Jennifer L. Robinson, Professor at Auburn University. You were selected as a possible participant based on expressed interest via email or Sona Systems.

What is involved if you participate?
If you participate in this phase of the study, you will be asked to complete questionnaires relating to mental health. Based on responses to this survey, some participants will be eligible to participate in the next phase of this study, which involves an MRI scanning session.

Are there risks or discomforts?
Risks associated with participating in this phase of the study include potential emotional distress that comes from thinking about mental health-related topics. If you find yourself experiencing significant distress, you may discontinue participation at any time. If you with to speak with someone about your distress, a reference to the Auburn University Student Counseling and Psychological Services page will be available following the questionnaires.

There are also risks associated with confidentiality breaches. To minimize this risk, only investigators have access to data obtained in connection with the research study that can be identified as belonging to you. If you decide to withdraw, you may withdraw any data that has been collected as long as it is identifiable. You will be assigned a participant number so that your name and other pieces of identifying information are not directly associated with data collected. All data, including your responses to these questionnaires, will be associated with that participant number. Following data collection completion, any/all links to identifiable information will be destroyed. The results of this study may be

presented in a professional venue, such as a journal or conference. In such an event, group data will be presented.

Are there benefits or compensation available?
By completing this phase of the study, you can expect to receive no direct personal benefits. You will be compensated for participation with 1 hour via Sona Systems. Your instructors should assign specific values of course credit to these hours. Please check with your instructors for more information.

If you are eligible to participate in the next phase of this study with an in-person MRI scanning session, you will have the opportunity to be compensated up to $50.

Are there costs to participate?
If you decide to participate in this study, you will not incur any costs. If you require medical attention, you will be responsible for all costs for medical attention/treatment.

Your participation is completely voluntary. If you change your mind about participating, you can withdraw from the research study at any time. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether or not to participate will not jeopardize your relationship with Auburn University or any associated/affiliated department, center, or office.

If you have any questions about this study, you can contact Ava J. White at ajw0137@auburn.edu, or Dr. Jennifer L. Robinson at jrobinson@auburn.edu. You are welcome to print a copy of this information letter to keep for your records.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)844-5966 or email at hsubject@auburn.edu or IRBchair@auburn.edu.

By selecting the option below, you are indicating that you have read the information provided and wish to participate in this research study:

○ I have reviewed the provided information and would like to continue with this study.

Contact Info

Before completing this study, you will be asked to provide your email address. This is so investigators can identify your information should you decide to withdraw from the study and request that your data be removed. Your privacy will be protected. Investigators that oversee this project are required by the Auburn University Institutional Review Board not to disclose any information you provide in this study that could identify you as a participant, or any other personal information you may reveal. This protects you, as well as the investigators, from legal action(s) that could be associated with reporting illicit activities.

Please provide your email address in the space below so that we may identify your data if needed:

Demographics

How old are you?

Which of the following best describes your biological sex?

- ○ Male
- ○ Female

Which of the following best describes your gender?

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Non-conforming
- ○ Other/Prefer not to say

Which of the following best describes you?

- ○ American Indian or Alaska Native

- ○ Asian or Asian American
- ○ African American
- ○ Caucasian
- ○ Hawaiian or Pacific Islander
- ○ Mixed Race
- ○ Other/Prefer not to say

Which of the following best describes you?

- ○ Hispanic or Latino
- ○ Non-Hispanic or Non-Latino

Which of the following best describes you?

- ○ Student
- ○ Employed, full-time
- ○ Employed, part-time
- ○ Unemployed
- ○ Retired

Which of the following best describes your marital status?

- ○ Single
- ○ Married
- ○ Divorced/Widowed
- ○ Prefer not to say

What is the highest level of education you've achieved?

- ○ Some high school or less
- ○ High school graduate
- ○ Currently enrolled in an undergraduate program
- ○ Completed undergraduate program
- ○ Currently enrolled in graduate program

○ Completed graduate program

Do you have a current diagnosis of any psychological/psychiatric conditions (e.g. Anxiety, ADHD, etc.)? If yes, please list below.

○ Yes

○ No

Are you currently taking medication for any psychological/psychiatric conditions (e.g. Xanax, Adderall, etc.)?

○ Yes

○ No

GAD7

Over the LAST TWO WEEKS, how often have you been bothered by the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious, or on edge	○	○	○	○
Not being able to stop or control worrying	○	○	○	○
Worrying too much about different things	○	○	○	○
Trouble relaxing	○	○	○	○
Being so restless that it is hard to sit still	○	○	○	○
Becoming easily annoyed or irritable	○	○	○	○
Feeling afraid, as if something awful might happen	○	○	○	○

BDI

Please read each group of statements carefully, and select one statement from each groups that best describes how you've felt during the PAST TWO WEEKS.

1	I do not feel sad	I feel sad much of the time	I am sad all the time	I am so sad or unhappy that I can't stand it
2	I am not discouraged about my future	I feel more discouraged about my future than I used to	I do not expect things to work out for me	I feel my future is hopeless and will only get worse
3	I do not feel like a failure	I have failed more than I should have	As I look back, I see a lot of failures	I feel I am a total failure as a person
4	I get as much pleasure as I ever did from the things I enjoy	I don't enjoy things as much as I used to	I get very little pleasure from the things I used to enjoy	I can't get any pleasure from the things I used to enjoy
5	I don't feel particularly guilty	I feel guilty over many things I have done or should have done	I feel quite guilty most of the time	I feel guilty all of the time
6	I don't feel I am being punished	I feel I may be punished	I expect to be punished	I feel I am being punished
7	I feel the same about myself as ever	I have lost confidence in myself	I am disappointed in myself	I dislike myself
8	I don't criticize or blame myself more than usual	I am more critical of myself than I used to be	I criticize myself for all of my faults	I blame myself for everything bad that happens
10	I don't cry any more than I used to	I cry more than I used to	I cry over every little thing	I feel like crying, but I can't
11	I am no more restless or wound up than usual	I feel more restless or wound up than usual	I am so restless or agitated, it's hard to stay still	I am so restless or agitated that I have to keep moving or doing something

12	I have not lost interest in other people or activities	I am less interested in other people or things than before	I have lose most of my interest in other people or things	It's hard to get interested in anything
13	I make decisions about as well as ever	I find it more difficult to make decisions than usual	I have much greater difficulty in making decisions than I used to	I have trouble making any decisions
14	I do not feel I am worthless	I don't consider myself as worthwhile and useful as I used to	I feel more worthless as compared to others	I feel utterly worthless
15	I have as much energy as ever	I have less energy than I used to have	I don't have enough energy to do very much	I don't have enough energy to do anything
16	I can sleep as well as usual	I don't sleep as well as I used to	I wake up 1-2 hours earlier than usual and find it hard to get back to sleep	I wake up several house earlier than I used to and cannot get back to sleep
17	I am not more irritable than usual	I am more irritable than usual	I am much more irritable than usualy	I am irritable all the time
18	My appetite is no worse than usual	My appetite is not as good as it used to be	My appetite is much worse now	I have no appetite at all anymore
19	I can concentrate as well as ever	I can't concentrate as well as usual	It's very hard to keep my mind on anything for very long	I find I can't concentrate on anything
20	I am no more tired or fatigued than usual	I get more tired or fatigued more easily than usual	I am too tired or fatigued to do a lot of of the things I used to do	I am too tired or fatigued to do most of the things I used to do
21	I have not noticed any recent change in my interest in sex	I am much less interested in sex than I used to be	I am much less interested in sex now	I have lost interest in sex completely

IPIP 120 Neuroticism

Select how accurately each of the following statements regarding behavior describes you. Describe yourself as you generally are NOW, not as you wish to be in the future.

	Disagree strongly	Disagree a little	Neither agree or disagree	Agree a little	Strongly agree
Worry about things	○	○	○	○	○
Fear for the worst	○	○	○	○	○
Am afraid of many things	○	○	○	○	○
Get stressed out easily	○	○	○	○	○
Get angry easily	○	○	○	○	○
Get irritated easily	○	○	○	○	○
Lose my temper	○	○	○	○	○
Am not easily annoyed	○	○	○	○	○
Often feel blue	○	○	○	○	○
Dislike myself	○	○	○	○	○
Am often down in the dumps	○	○	○	○	○
Feel comfortable with myself	○	○	○	○	○
Find it difficult to approach others	○	○	○	○	○
Am afraid to draw attention to myself	○	○	○	○	○
Only feel comfortable with friends	○	○	○	○	○
Am not bothered by difficult social situations	○	○	○	○	○
Go on binges	○	○	○	○	○
Rarely overindulge	○	○	○	○	○
Easily resist temptations	○	○	○	○	○
Am able to control my cravings	○	○	○	○	○
Panic easily	○	○	○	○	○
Become overwhelmed by events	○	○	○	○	○
Feel that I am unable to deal with things	○	○	○	○	○
Remain calm under pressure	○	○	○	○	○

ERQ

Select a point on the scale to indicate your level of agreement with each of the following statements

	1. Strongly disagree	2.	3.	4. Neutral	5.	6.	7. Strongly agree
When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about*	○	○	○	○	○	○	○
I keep my emotions to myself	○	○	○	○	○	○	○
When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about*	○	○	○	○	○	○	○
When I am feeling *positive* emotions, I am careful not to express them	○	○	○	○	○	○	○
When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm	○	○	○	○	○	○	○
I control my emotions by *not expressing them*	○	○	○	○	○	○	○
When I want to feel more *positive* emotion, I *change the way I'm thinking* about the situation	○	○	○	○	○	○	○
I control my emotions by *changing the way I think* about the situation I'm in	○	○	○	○	○	○	○
When I am feeling *negative* emotions, I make sure not to express them	○	○	○	○	○	○	○
When I want to feel less *negative* emotion, I *change the way I'm thinking* about the situation	○	○	○	○	○	○	○

MRI Screener

Have you had prior surgery of an operation (e.g., arthroscopy, endoscopy, etc.) or any kind where a device was implanted? If yes, please describe.

- ○ Yes
- ○ No

Have you had any medical condition that prevented you completing an MRI exam in the past or had any related to a previous MRI examination or procedure? If yes, please describe.

- ○ Yes
- ○ No

Have you ever been injured by a metallic object or foreign body (e.g., BB, bullet, shrapnel, etc.)? If yes, please describe.

- ○ Yes
- ○ No

Do you have a cardiac pacemaker or implanted cardioverter defibrillator (ICD)?

- ○ Yes
- ○ No

Is there a possibility of metal in your head (for example aneurysm clips, do not include dental work)? If yes, please describe.

- ○ Yes
- ○ No

Have you had an injury to the eye involving a metallic object or fragment (for example, metallic slivers, shavings, foreign body), or have you ever needed an eyewash having worked with metals? If yes, please describe.

- ○ Yes
- ○ No

Do you have an implanted medical device that is electrically, magnetically, or mechanically controlled or activated (e.g., neurostimulation system, spinal cord stimulator, internal electrodes or wires, bone growth stimulator, cochlear implant)

- ○ Yes
- ○ No

Are you pregnant or is there any possibility that you may be pregnant?

- ○ Yes
- ○ No

Do you have a permanent retainer or braces?

- ○ Yes
- ○ No

Do you have a breathing problem or motion disorder?

- ○ Yes
- ○ No

Are you claustrophobic?

- ○ Yes
- ○ No

Do you have inner ear disorders or experience vertigo or dizziness?

- ○ Yes
- ○ No

Do you have tattoos or permanent makeup that contain metal?

- ○ Yes
- ○ No

Do you have body piercing jewelry that cannot be removed?

- ○ Yes
- ○ No

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MRI Pre-Screeners

MRI Pre-Entry Screening Form Revised 9/19/2019	Auburn University MRI Research Center 560 Devall Drive Suite 202 Auburn, AL 36849 Tel: (334) 844-6747 Fax: (334) 844-0214
This form to be used for: Screening of research subjects immediately prior to an MRI study (File completed form with Principal Investigator) *Instructions for completing this form available at http://www.eng.auburn.edu/research/centers/mri/forms*	

Name _____
Last First MI

Address _____ City _____

State _____ Zip Code _____ Male/Female_____

Phone (___)_____ (___)_____ (___)_____
Home Work Cell

Birthdate _____ Email Address _____

Primary Physician (Optional):

Name_____ Phone (___)_____

AUMRIRC Use Only

Principal Investigator: _____

IRB Protocol # _____

Subject # _____

Date/Time of MRI study ___/___/_____ ___:___

Subject Weight (lbs) _____

Height(ft/in) _____

1.	☐Yes ☐No	Have you had prior surgery or an operation (e.g., arthroscopy, endoscopy, etc.) of any kind? If yes, give date and type of surgery, and indicate where on your body using the diagram. Date: __/__/____ Type of surgery: _____ Date: __/__/____ Type of surgery: _____ Date: __/__/____ Type of surgery: _____
2.	☐Yes ☐No	Have you had any medical condition that prevented you completing an MRI exam in the past or had any related to a previous MRI examination or procedure? If yes, please describe: _____
3.	☐Yes ☐No	Have you ever been injured by a metallic object or foreign body (e.g., BB, bullet, shrapnel, etc.)? If yes, please describe: _____

WARNING: Certain implants, devices, or objects may be hazardous to you and/or may interfere with the MR procedure (i.e., MRI, MR angiography, functional MRI, MR spectroscopy). Do not enter the MR system room or MR environment if you have any question or concern regarding an implant, device, or object. Consult the AU MRI Research Center staff BEFORE entering the MR system room. **The MR system magnet is ALWAYS on.**

Answering "Yes" to any of the following questions excludes you from the study

4.	☐Yes ☐No	Do you have a cardiac pacemaker or implanted cardioverter defibrillator (ICD)?
5.	☐Yes ☐No	Is there a possibility of metal in your head (for example aneurysm clips, do not include dental work)? If yes, please describe: _____
6.	☐Yes ☐No	Have you had an injury to the eye involving a metallic object or fragment (for example, metallic slivers, shavings, foreign body), or have you ever needed an eyewash having worked with metals? If yes, please describe: _____
7.	☐Yes ☐No	Do you have an implanted medical device that is electrically, magnetically, or mechanically controlled or activated? If yes, please describe: _____
8.	☐Yes ☐No	**Females Only**: Are you pregnant or is there any possibility that you may be pregnant?

Protocol-Specific Questions (Answering "Yes" to any of the following questions may exclude you from the study)

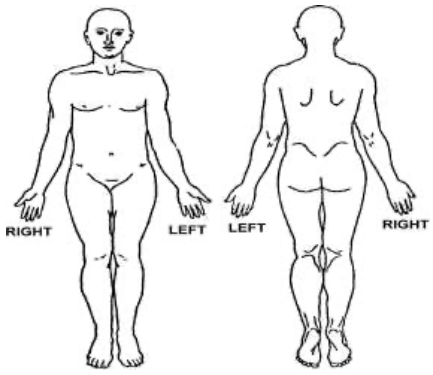
9.	☐Yes ☐No	Do you have a history of cardiovascular disease?
10.	☐Yes ☐No	Do you have a breathing problem or motion disorder?
11.	☐Yes ☐No	Are you claustrophobic?
12.	☐Yes ☐No	Do you have inner ear disorders or experience vertigo or dizziness?
13.	☐Yes ☐No	Do you have tattoos or permanent makeup that contains metal?
14.	☐Yes ☐No	Do you have body piercing jewelry that cannot be removed?
15.	☐Yes ☐No	Do you have braces?

WARNING: Certain implants, devices, or objects may be hazardous to you and/or may interfere with the MR procedure (i.e., MRI, MR angiography, functional MRI, MR spectroscopy). Do not enter the MR system room or MR environment if you have any question or concern regarding an implant, device, or object. Consult the AU MRI Research Center staff BEFORE entering the MR system room. **The MR system magnet is ALWAYS on.**

Please indicate if you have any of the following:

16.	☐Yes	☐No	Neurostimulation system
17.	☐Yes	☐No	Spinal cord stimulator
18.	☐Yes	☐No	Internal electrodes or wires
19.	☐Yes	☐No	Bone growth/bone fusion stimulator
20.	☐Yes	☐No	Cochlear, otologic, or other ear implant
21.	☐Yes	☐No	Insulin or other infusion pump
22.	☐Yes	☐No	Implanted drug infusion device
23.	☐Yes	☐No	Any type of prosthesis (eye, penile, etc.)
24.	☐Yes	☐No	Heart valve prosthesis
25.	☐Yes	☐No	Eyelid spring or wire
26.	☐Yes	☐No	Artificial or prosthetic limb
27.	☐Yes	☐No	Metallic stent, filter, or coil
28.	☐Yes	☐No	Shunt (spinal or intraventricular)
29.	☐Yes	☐No	Vascular access port and/or catheter
30.	☐Yes	☐No	Radiation seeds or implants
31.	☐Yes	☐No	Swan-Ganz or thermodilution catheter
32.	☐Yes	☐No	Medication patch (Nicotine, Nitroglycerine)
33.	☐Yes	☐No	Any metallic fragment or foreign body
34.	☐Yes	☐No	Wire mesh implant
35.	☐Yes	☐No	Tissue expander (e.g., breast)
36.	☐Yes	☐No	Surgical staples, clips, or metallic sutures
37.	☐Yes	☐No	Joint replacement (hip, knee, etc.)
38.	☐Yes	☐No	Bone/joint pin, screw, nail, wire, plate, etc.
39.	☐Yes	☐No	IUD, diaphragm, or pessary
40.	☐Yes	☐No	Dentures or partial plates
41.	☐Yes	☐No	Permanent retainer
42.	☐Yes	☐No	Braces
43.	☐Yes	☐No	Tattoo or permanent makeup
44.	☐Yes	☐No	Body piercing jewelry
45.	☐Yes	☐No	Hearing aid (*Remove before entering MRI scanner room)*
46.	☐Yes	☐No	Other implant_____

Please mark on the figure(s) below the location of any implant or metal inside of or on your body.



IMPORTANT INSTRUCTIONS

Before entering the MR scanner room, you must remove all metallic objects including hearing aids, dentures, partial plates, keys, beeper, cell phone, eyeglasses, hair pins, barrettes, jewelry, body piercing jewelry, watch, safety pins, paperclips, money clip, credit cards, bank cards, magnetic strip cards, coins, pens, pocket knife, nail clippers, tools, clothing with metal fasteners, & clothing with metallic threads.

Please consult the research staff if you have any question or concern BEFORE you enter the MR scanner room.

NOTE: You may be advised or required to wear earplugs or other hearing protection during the MR procedure to prevent possible problems or hazards related to acoustic noise.

I attest that the above information is correct to the best of my knowledge. I read and understand the contents of this form and had the opportunity to ask questions regarding the information on this form and regarding the MR procedure that I am about to undergo.

This form is valid only on the day it is completed.

Signature of Person Completing Form: _____
Signature Date

Form Completed By: ☐ Subject ☐ Relative _____ _____
Print Name Relationship to Subject

Form Information Reviewed By: _____ _____
Print Name Signature

Form Information Reviewed By: _____ _____
Print Name Signature

MRI Scanning Checklist Revised 9/17/2019	**AUMRIRC Use Only**
This form to be used for: Verifying all aspects of the Pre-scan Procedure have been performed prior to an MRI scan (File completed form with Principal Investigator)	Principal Investigator: _____ IRB Protocol # _____ Subject # _____ Date/Time of MRI study __/__/_____ ___:____
Auburn University MRI Research Center 560 Devall Drive Suite 202 Auburn, AL 36849 Tel: (334) 844-6747 Fax: (334) 844-0214	

Participant read and sign consent form.

Researcher sign consent form.

Participant fill out and sign MRI Pre-Entry Screening Form

First researcher review and sign MRI Pre-Entry Screening Form

Participant is asked if they would like to use the restroom

Participant change into scrubs

Participant provided with MRI-safe eyeglasses if applicable

Participant is informed about tattoos

Second researcher screen participant and sign form

Ask participant to verify that all metallic objects have been removed from body

Scan participant with the handheld ferromagnetic metal detector

Weigh participant with participant facing outward from the scales

Measure participants height with chart against wall

Clean scanner table and coils if applicable

Place clean linen sheet on scanner table

Provide participant with ear protection

Provide participant with squeeze ball

Test scanner microphone and speaker system

Enter scan information into scanner log book

Form Information Submitted By: _____ _____
Print Name Signature

Informed Consent:

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NOTE: DO NOT SIGN THIS DOCUMENT UNESS AN IRB APPROVAL STAMP WITH CURRENT DATES HAS BEEN APPLIED.

INFORMED CONSENT
for a research study, entitled

"A Functional MRI Study on Video Memory"

General Info	You are invited to participate in a research study on how the brain remembers written and visual content from videos. This study is completely voluntary, meaning that you do not have to take part in it. The procedures, risks, and benefits are fully described in this consent form.
Purpose	The purpose of this study is to identify brain regions associated with video memory.
Time Commitment	This study will be a one-time scanning session. We ask participants to commit to spending 2 hours at the MRI Center. The scan itself will last about an hour.
Overview of the Procedure	If you decide to participate in this study, you will be asked to undergo MRI (7T) scanning while watching a series of videos. After each video, you will use a button box to select responses to a couple of questions and to complete a brief memory task. You will complete this task 12 times.
Risks	General risks associated with MRI scanning are blunt trauma from metallic objects brought into the scanner, dizziness from the magnetic field, claustrophobia. You may experience cognitive or emotional distress from completing the video tasks. You can discontinue participation at any time.
Benefits	You can expect to receive no personal benefits for completing this study.
Alternatives	You can choose to not participate in this study or withdraw your participation at any point during the study.

You are invited to participate in a research study to examine how the human brain remembers written and visual content from videos. Please note that the magnetic resonance (MR) imaging scans acquired during this research study are for research purposes only and are not suitable in any way for clinical diagnosis. This research study is being conducted by Ava J. White, Graduate Research Assistant, under the direction of Dr. Jennifer L. Robinson, Professor in the Auburn University Department of Psychological Sciences. You were selected as a possible participant based on your responses to the questionnaires you completed during Part 1.

What will be involved if you participate? If you decide to participate in Part 2 of this research study, you will be asked to undergo 7 Tesla (7T) magnetic resonance imaging (MRI) while watching video clips, answering follow-up questions, and completing a follow-up memory task.

The following takes place outside the scanner. Before commencing with MRI data collection, you

Participant's Initials _____

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Protocol # 24-781 EP 2404

226 Thach Hall, Auburn, AL 36849-5214; Telephone: 334-844-4412; Fax: 334-844-4447
www.cla.auburn.edu

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will be asked to complete an MRI screening form in the MRI research center waiting area. The MRI screening form is designed to make sure it is safe for you to undergo MRI scanning. Common incompatibilities for MRI scanning are pacemakers, implanted cardioverter defibrillators, implanted medical devices or non-removable devices or objects, breathing problems or disorders, claustrophobia, inner ear disorders, vertigo or dizziness, tattoos or permanent makeup containing metal, or body piercing or jewelry that cannot be removed.

You will also complete a practice version of the video task that you will perform while inside the scanner. This is to ensure understanding of the task before the in-scan data collection commences.

The following takes place inside the scanner. For the scanning session, you will be asked to lie on a bed that slides into the long tube of the scanner. You will be asked to place your head in a helmet-like device mounted on the scanner bed. The scanner is a magnet with a small, enclosed space. Radio waves and strong, changing magnetic fields are used to make images of your body.

You will be asked to remain very still at times throughout the scanning session. To help you keep as still as possible, we will put cushions around your head/neck/shoulders. We will check in with you throughout the scan. If you have discomforts, please notify the operator.

The following takes places inside the scanner. Several scans will be performed during the scanning session with approximately one minute of rest between scans. Individual scans last approximately between 1 and 15 minutes depending on the scan. However, individual scans never last more than 20 minutes. Your expected total time in the scanner is approximately 60 minutes. After the scanning session, you will be debriefed by a researcher and receive your compensation. Your expected total time commitment, including pre-scan preparation, screening and task practice, scanning, and debriefing is approximately two hours.

The following takes place inside the scanner. While inside the scanner, you will be asked to complete a series of short tasks that involve reading about, viewing, and then answering questions regarding video clips. This will involve using a small, handheld button box to select answer choices. The research team will be in the control room and able to communicate with you through your headphones. You will be free to stop this portion of the study at any time if you find it to be too uncomfortable. For the video task, you will first be shown a brief description of the video you are about to watch. The description will appear for 20 seconds before switching to a 5-second crosshair, and then to the video stimulus. The video will last approximately 90 seconds, and then after another 5-second crosshair, you will be asked to select a multiple-choice response regarding the video and description content. Next, you will rate the how negative the video made you feel emotionally. Lastly, you will complete a follow-up memory task that will last 60 seconds. This process will repeat twelve times so that the investigator can obtain an average performance score. You are free to stop this portion of the research study at any time. In total, the video task portion of the study should take approximately 45 minutes to complete.

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Of note, only participants who meet the following criteria are allowed to participate: (1) do not indicate above average levels of anxiety, (2) do not indicate above average levels of depressive symptomology, (3) do not indicate above average levels of neuroticism, and (4) no indicated incompatibilities with the MRI scanner.

None of the scans done during this scanning session are appropriate for clinical interpretation. This means that they are not designed to assess any medical condition that you may have. They are not designed to reveal any existing disease pathology. Rather, they are intended solely for research purposes.

Your total scanning time commitment will be approximately 60 minutes.

Are there risks or discomforts? The risks or discomforts associated with participation in this research study are:

1. The most obvious personal risk associated with an MRI scanning session is blunt trauma due to metallic objects being brought into the magnetic field. As such, all necessary steps will be taken to make sure neither you nor anyone else who enters the MRI scanning room is in possession of an unrestrained metal object, and no unauthorized person will be allowed to enter the MRI scanner room.
2. Participants who have iron or steel implants or clips from surgery within their body or metallic objects such as shrapnel or metal slivers in their body should not participate in this research study as the magnetic field may pull these objects and cause injury.
3. The scanner makes intermittent noises which some participants have find annoying.
4. Some participants may feel uncomfortable being in an enclosed place (claustrophobia), and others may find it difficult to remain still.
5. Some participants experience dizziness or a metallic taste in their mouth if they move their head rapidly in the scanner.
6. Some participants experience brief nausea when being put into or taken out of the scanner. This is more prominent in 7 Tesla MRI due to the increased magnetic-field strength and shielding effects.
7. Participants may experience mild cognitive and/or emotional stress with completing the video tasks. It is important to note that you can choose to withdraw participation at any time.

Although long-term risk of exposure to the magnet is not known, the possibility of and long-term risk is extremely low based on information accumulated over the last 30 years of routine clinical use of MRI. In addition, research over the last 12 years has not suggested any long-term risk of exposure to 7 Tesla MRI.

To minimize these risks, we will:

1. We will have you complete a screening form to determine if you have iron or steel implants, clips from surgery, or other metallic objects in your body. If you have implants, clips, or objects in your body, you will not be able to undergo MRI scanning.

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2. We will ask you to change into surgical scrubs supplied by the Center and remove any watches, rings, earrings, or other jewelry and metallic objects. You will be provided a private place to change, and you may retain your undergarments. If you are wearing undergarments that contain underwire and/or metal fasteners, you will be asked to remove them prior to scanning.
3. We will scan you with a handheld metal detector to detect any unknown metallic objects.
4. We will provide you with earplugs specifically designed to work in an MRI scanner.
5. We will maintain visual contact and audio contact with you during the scan and check with you frequently to determine if you are having any negative feelings or sensations. Please inform the investigator if you have negative feelings or sensations (e.g., nausea, claustrophobia).
6. If some unknown risk becomes a safety issue, the investigator will immediately stop the scan and remove you from the scanner.
7. You can stop the scan at any time and be immediately removed from the scanner. You can notify the investigator verbally or by using the squeeze ball provided.
8. To protect the confidentiality of all information, forms will be coded with your study-specific unique participant number and will be stored in a private office in a locked filing cabinet. Electronic data will be stripped of identifiable information, coded with your participant number, and stored on password-protected computers and servers with access limited to investigators on this research study.
9. Although MR is not associated with harmful effects on pregnant women, we will exclude pregnant woman as a precaution.
    a. Pregnancy status will be determined by a simple yes/no response provided by the participant. No pregnancy test will be administered.

You are responsible for any costs associated with medical treatment due to any injuries incurred.

Risk & Precautions for COVID-19. Due to the need for your physical presence at the research site, face to face interaction with the researcher or others, etc., there is a risk that you may be exposed to COVID-19, and the possibility that you may contract the virus. For most people, COVID-19 causes only mild or moderate symptoms. For some, especially older adults and people with existing health problems, it can cause more severe illness. Current information suggests that about 2% of people who are infected with COVID-19 might die as a result. To minimize your risk of exposure we will screen you for symptoms of COVID-19 and risk factors for COVID-19 prior to admitting you to the MRI suite.

Are there benefits to yourself or others? If you participate in the research study, you can expect to receive no direct personal benefits. However, we hope that the results of this research study will provide better understanding that may lead to improved research approaches. We hope that this leads to better therapeutic targets to manage and treat related mental health struggles. We cannot promise you that you will receive any or all of the benefits described.

Will you receive compensation? To thank you for your time, AU MRI Center policy states that you will be offered $5 for showing up today. Additionally, you will receive $5 for every 30-minute

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block you are inside the scanner. The total compensation will be $10 for 0-30 minutes of scanning, $15 for 30-60 minutes of scanning, and $20 for 60-90 minutes of scanning. Due to extra internal funding for this project, you will be offered an additional $30. In total, after completing the scan today you will be compensated with $50. If you are a student at Auburn University, and if you volunteered through Sona Systems, you will also be compensated for participating with three research hours. Your instructors should assign specific values of course credit to these hours. Please check with your instructors for more information.

Are there costs? If you decide to participate in this research study, you will not incur any costs. If you require medical attention, you will be responsible for all costs for medical attention/treatment.

If you change your mind about participating, you can withdraw from the research study at any time. Your participation is completely voluntary. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether to participate will not jeopardize your relationship with Auburn University, the Department of Psychological Sciences, or any other center/office.

Your privacy will be protected. Any information obtained in connection with this research study will remain confidential. At the end of the research study, all links to identifiable information will be destroyed. Data obtained through your participation may be published in a professional journal or presented at a professional meeting.

Incidental findings. These procedures are carried out purely for experimental purposes. The MRI scans that are acquired in this research study are not the same as those acquired during a clinical examination as requested by a medical doctor. Therefore, they are not useful to investigate any abnormalities or medical conditions you may have. Furthermore, the investigators who will analyze these images are not medical doctors and are not trained to evaluate these scans.

It is possible, however, that an abnormality may be noticed. If this happens, a brief diagnostic scan will be performed and referred to a radiologist for reading. If you choose to provide the name and contact information of your primary physician on the MRI screening form, the results of the scan will be provided to them. If you do not have a primary physician or do not provide contact information for your primary physician, the results will be provided to Dr. Fred Kam, MD, at the Auburn University Medical Clinic, who will discuss the results of the scan with you at your expense.

Participant's Initials _____

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If you have questions about this research study, please ask them now. Alternatively, you can contact Ava J. White, ajw0137@auburn.edu, or Dr. Jennifer L. Robinson, jrobinson@auburn.edu, who are the research study investigators. A copy of this document will be given to you for your records at your request.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)844-5966 or email at hsubjec@auburn.edu or IRBchair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

Participant's Signature Date	Signature, Investigator Obtaining Consent Date
Printed Participant Name	Name, Investigator Obtaining Consent
	Co-Investigator Signature Date
	Printed Name

Participant's Initials _____

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Debriefing Form

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DEBRIEFING FORM
For the Study entitled:
"A Functional MRI Study on Video Memory"

Dear Participant:

During this study, you were asked to read a brief description of a video before watching the video, answering a question about the video, rating its emotionality, and then completing a memory task. You were told that the purpose of this study was to assess memory processes for video stimuli. In actuality, this project was aimed at assessing how the brain unconsciously re-evaluates emotional video content based on the preceding description.

The true process we are examining is how your brain responded to the negative emotional nature of the videos and if that neural response differed based on whether or not the video had a positive, negative, or no preceding description (i.e., unconscious emotion regulation). The multiple-choice questions and memory tasks you completed were truly what we were looking at, but rather the video descriptions and emotionality rating.

We did not tell you everything about this task because it would likely have made you aware of how the descriptions could affect your emotions, and we would not have been able to investigate the unconscious emotional regulation if it became a conscious process. We request that you not reveal the information in this form to others who may participate in this study, so that we can continue to investigate this research question.

If you have any concerns about your participation or the data you provided in light of this disclosure, please discuss this with us. We will be happy to provide any information we can to help answer questions you have about this study. If your concerns are such that you would now like to have your data withdrawn, we will do so.

If you have questions about your participation in the study, please contact Ava White at ajw0137@auburn.edu or 254-405-0231.

If you have questions about your rights as a research participant, you may contact the Office of Research Compliance (334-844-5966, IRBadmin@auburn.edu) or the Auburn University Institutional Review Board (IRBChair@auburn.edu).

If you have experiences distress as a result of your participation in this study, a referral list of mental health providers is attached to this document for your use. (Please remember that any cost in seeking medical assistance is at your own expense.)

Please again accept our appreciation for your participation in this study.

Ava J. White, GRA	Date	Participant	Date

Version Date: 02/2024

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Protocol # 24-781 EP 2404

AU Psychological Resources

Auburn Cares

The Auburn Cares office is designed to support students throughout their college career to best achieve their academic and co-curricular goals. Many students experience difficulties during college, either due to academic or personal reasons. Common stressors include medical, mental health, personal or family crisis, illness, or injury. These life events can interfere with a student's ability to attain their goals, both inside and outside the classroom. The Auburn Cares staff work collaboratively with students to identify resources and develop personal action plans. Students can be referred to Auburn Cares by faculty, staff, family, or other students when they have a concern regarding a student's welfare. Students can also self-refer in order to access support and assistance.

Auburn University Medical Clinic (AUMC)

Auburn University Medical Clinic (AUMC) has physicians, nurse practitioners, physician assistants and a full nursing staff to serve students. The AUMC has a full lab, x-ray facilities, and a massage therapist. Pharmacy Services through the Harrison College of Pharmacy are available on-site.

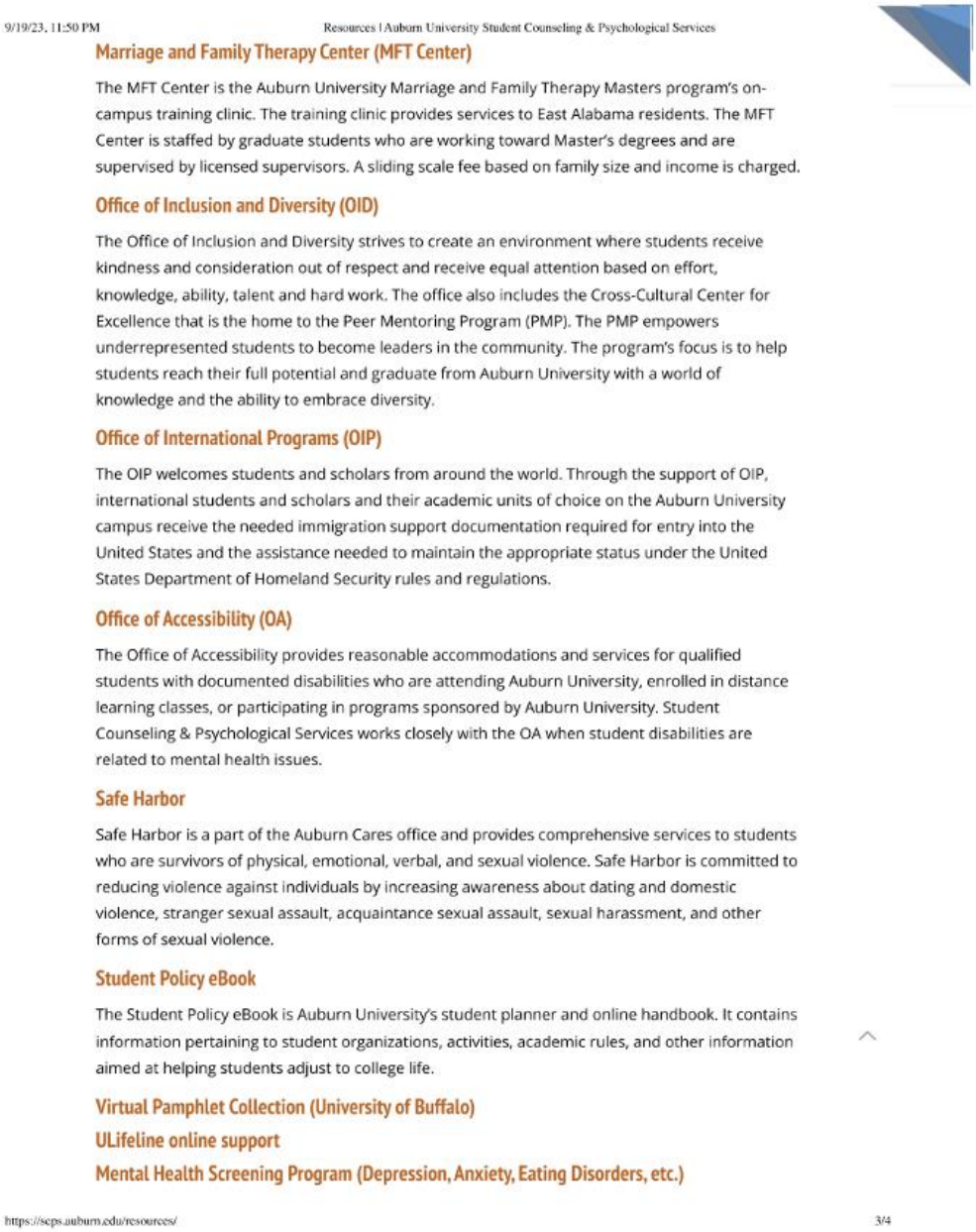
Auburn University Psychological Services Center (AUPSC)

AUPSC is a training clinic provided by the Department of Psychological Sciences at Auburn University. Graduate students in doctoral training for clinical psychology provide individual and group therapy. Services are provided under the supervision of licensed psychologists. Cost of therapy typically ranges from $30 to $60 per 50-minute session. AUPSC does not bill insurance. All therapy clients are charged $80 for their initial intake appointment, which typically lasts 2 hours.

Tiger Education Screening Intervention (TESI)

TESI is a one-on-one educational intervention program designed to help students reduce the risks associated with their alcohol or substance use. Over the course of 2-3 sessions, students will meet individually with a trained TESI facilitator to explore how their alcohol or substance use may be impacting be impacting areas of their life, receive personalized feedback on their use, and determine strategies to reduce their risk. All sessions are confidential. The cost of TESI for mandated students is $125. The fee is waived for students who self-refer into the program. TESI appointments can be scheduled by calling the Campus Recreation and Wellness Center.

https://scps.auburn.edu/resources/ 2/4



9/19/23, 11:50 PM Resources | Auburn University Student Counseling & Psychological Services

Marriage and Family Therapy Center (MFT Center)

The MFT Center is the Auburn University Marriage and Family Therapy Masters program's on-campus training clinic. The training clinic provides services to East Alabama residents. The MFT Center is staffed by graduate students who are working toward Master's degrees and are supervised by licensed supervisors. A sliding scale fee based on family size and income is charged.

Office of Inclusion and Diversity (OID)

The Office of Inclusion and Diversity strives to create an environment where students receive kindness and consideration out of respect and receive equal attention based on effort, knowledge, ability, talent and hard work. The office also includes the Cross-Cultural Center for Excellence that is the home to the Peer Mentoring Program (PMP). The PMP empowers underrepresented students to become leaders in the community. The program's focus is to help students reach their full potential and graduate from Auburn University with a world of knowledge and the ability to embrace diversity.

Office of International Programs (OIP)

The OIP welcomes students and scholars from around the world. Through the support of OIP, international students and scholars and their academic units of choice on the Auburn University campus receive the needed immigration support documentation required for entry into the United States and the assistance needed to maintain the appropriate status under the United States Department of Homeland Security rules and regulations.

Office of Accessibility (OA)

The Office of Accessibility provides reasonable accommodations and services for qualified students with documented disabilities who are attending Auburn University, enrolled in distance learning classes, or participating in programs sponsored by Auburn University. Student Counseling & Psychological Services works closely with the OA when student disabilities are related to mental health issues.

Safe Harbor

Safe Harbor is a part of the Auburn Cares office and provides comprehensive services to students who are survivors of physical, emotional, verbal, and sexual violence. Safe Harbor is committed to reducing violence against individuals by increasing awareness about dating and domestic violence, stranger sexual assault, acquaintance sexual assault, sexual harassment, and other forms of sexual violence.

Student Policy eBook

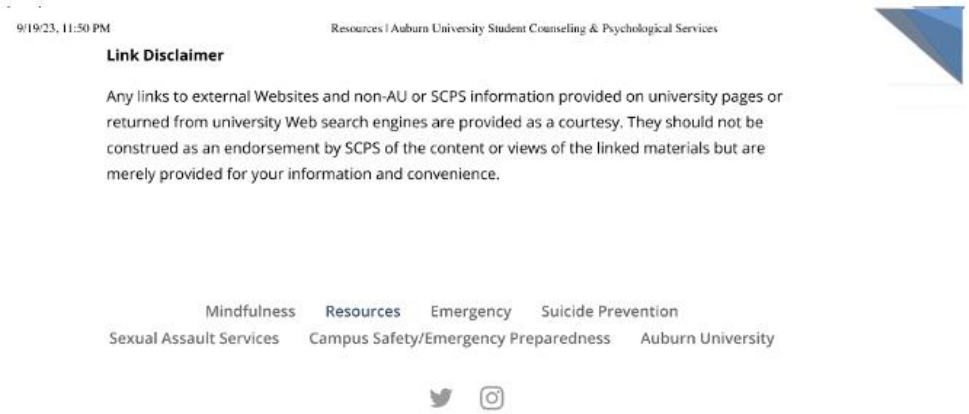
The Student Policy eBook is Auburn University's student planner and online handbook. It contains information pertaining to student organizations, activities, academic rules, and other information aimed at helping students adjust to college life.

Virtual Pamphlet Collection (University of Buffalo)

ULifeline online support

Mental Health Screening Program (Depression, Anxiety, Eating Disorders, etc.)

https://scps.auburn.edu/resources/ 3/4



9/19/23, 11:50 PM Resources | Auburn University Student Counseling & Psychological Services

Link Disclaimer

Any links to external Websites and non-AU or SCPS information provided on university pages or returned from university Web search engines are provided as a courtesy. They should not be construed as an endorsement by SCPS of the content or views of the linked materials but are merely provided for your information and convenience.

Mindfulness Resources Emergency Suicide Prevention
Sexual Assault Services Campus Safety/Emergency Preparedness Auburn University

Counseling Resources

Provider	Services	Phone Number	Cost/Hour
24 Hour Crisis Hotline	Phone counseling, referral	1-800-273-TALK	No charge
Crisis Center	Phone counseling	334-821-8600	No charge
Auburn University Student Counseling Center	Individual and Group therapy for Auburn Students	334-844-5123	No charge to Auburn University Students
Safe Harbor (at Auburn University)	Counseling for auburn students who are victims, and friends of victims, of rape and dating violence	334-844-5123	No charge to Auburn University Students
Auburn University Psychological Services Center	Individual, couples, and family therapy	334-844-4889	$75 first appointment, $30-$60 other appointments (based on income)
Auburn Psychology Group	Individual, couples, and family therapy	334-877-4343	$130 per appointment
Clinical Psychologists, P.C.	Individual, couples, family, and group therapy	334-821-3350	$130 first appointment $120 other appointments
East Alabama Mental Behavioral Center	Individual therapy	334-742-2700 334-747-2877 (after hours)	$8-$80 (based on income)

Practice Task

Practice Task

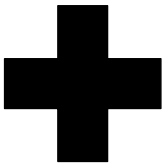
Instructions

In the following slides, you will first be shown a description of a video, and then watch the short video. After the video, you will be asked to answer a question about the video and it's description, and a question about the emotionality of the video. Lastly, you will complete a short memory task.

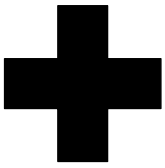
If you have any questions before you get started, please ask your investigator now.

Click to begin.

In the following video, you will see dogs that are practicing for their next dog show.



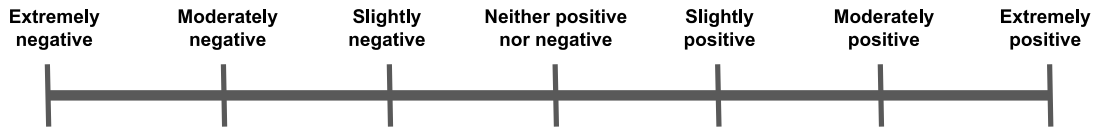

Getting started
in dog showing

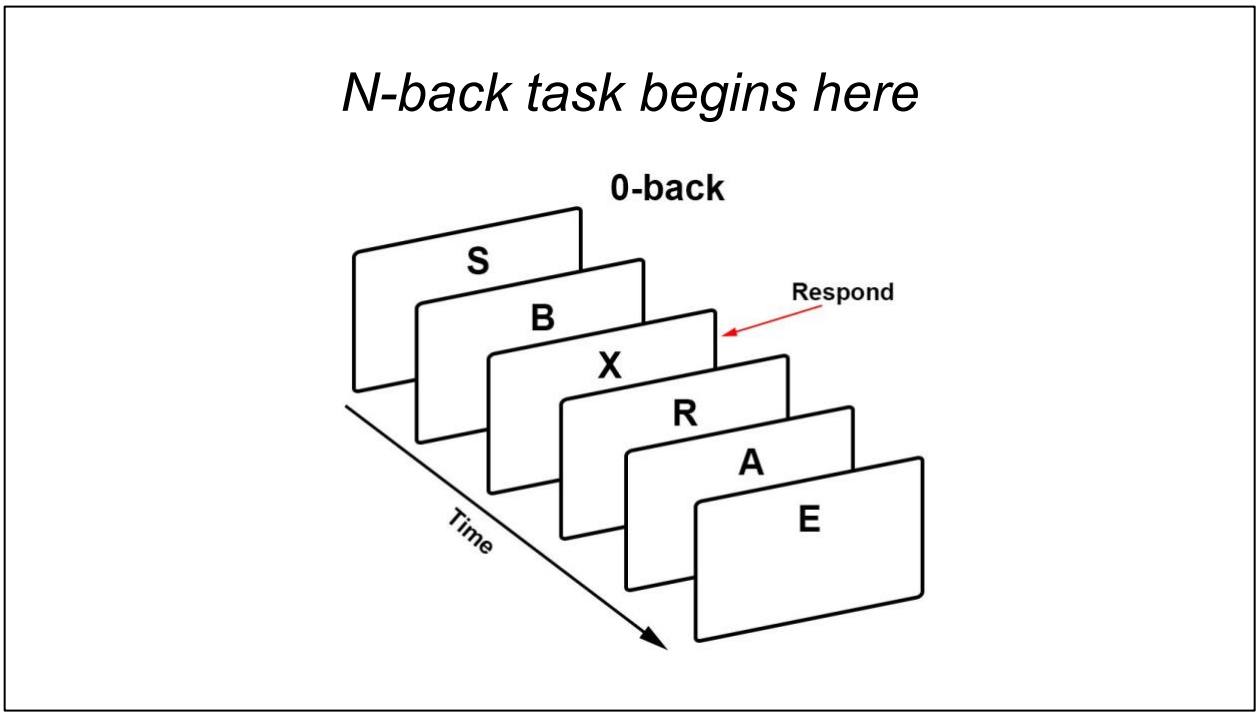


What were the dogs training for?

a. The circus
b. To be service dogs
c. A dog show

How positive or negative did this video make you feel emotionally?




N-back task begins here
0-back
S
B
X
R
A
E
Respond
Time