EMOTION PERCEPTION IN BORDERLINE PERSONALITY DISORDER: THE ROLE OF MOOD AND PERSONALITY

A Thesis

by

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ABSTRACT

Borderline personality disorder (BPD) is one of the most studied psychological disorders in psychology, and it is also one of the most detrimental to the individual. Research on BPD has consistently found that those with the disorder often experience volatile interpersonal interactions, and several areas of research have been dedicated to the understanding of the mechanisms behind these interpersonal struggles. One of the most common theories is that emotion dysregulation and affective instability, two core traits of BPD, may impact these interpersonal interactions in a negative manner.

Several researchers have attempted to identify how those with BPD perceive the emotional states of others, but have obtained mixed results. The purpose of the current study was to examine emotion perception in those with borderline personality features using a paradigm which has not been used in any of the existing literature, as well as to explore the differences between the effects of mood state and personality traits on emotion perception, as those with BPD experience high levels of negative mood. A modified version of the Reading the Mind in the Eyes Task was utilized in combination with a mood induction method and a measure of borderline personality to determine the roles of both affective state and personality traits in emotion perception.

Results indicated that although mood was unable to be effectively manipulated in the current sample, several findings emerged which offer support to various theories of the potential mechanisms behind emotion perception in BPD, including evidence for impulsivity as a potential influencing factor in accurate emotion perception. In addition,

the current study highlights key areas of future research which may provide a greater understanding of how both affect and personality traits influence the interpersonal experiences of those with BPD. An examination of the results, potential mechanisms behind study findings, and future directions are discussed.

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NOMENCLATURE

BPD	Borderline Personality Disorder
RMET	Reading the Mind in the Eyes Task
PFA	Pictures of Facial Affect
PAI	Personality Assessment Inventory
SAM	Self-Assessment Manikin
TAS-20	Toronto Alexithymia Scale 20
PANAS	Positive and Negative Affect Schedule
SDT	Signal Detection Theory

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1. INTRODUCTION

Borderline personality disorder (BPD) is a disorder characterized by identity disturbance, emotional instability, impulsivity, and self-injurious/suicidal behavior. It is also noted for the difficulty individuals with BPD have with emotion regulation, particularly in interpersonal interactions (Linehan, 1993; McGlashan et al., 2005). Relationship difficulties are common with BPD, and individuals with BPD are highly sensitive to situations involving rejection or failure (Kernberg, 1984). Of particular concern is the finding that many of the most severe problems associated with BPD (i.e., self-harming behaviors) are often manifested within the context of interpersonal interactions (Brodsky, Groves, Oquendo, Mann, & Stanley, 2006; Chapman & Dixon-Gordon, 2007; Ebner-Priemer et al., 2007; Herpertz, 1995; Leichsenring, Kunst, & Hoyer, 2003; Lejuez et al., 2003; Stiglmayr et al., 2005; Welch & Linehan, 2002).

Because of the strong association between interpersonal interactions and deleterious borderline personality behaviors, many researchers have theorized that emotion dysregulation and fear of social rejection are core mechanisms of BPD (Kernberg, 1984; Linehan, 1987; Linehan, 1993; Linehan, 1995). Linehan's (1993) biosocial theory of BPD suggests that individuals with BPD have a biological vulnerability to emotion dysregulation and experience higher baseline levels of negative affect and a heightened reactivity to negative social stimuli. Kuo and Linehan (2009) found, however, that BPD may not be characterized by heightened emotional reactivity (based on physiological data), but instead by a higher than average level of self-reported

emotional intensity. At the time of this writing, this trend was also shown in another study which examined how susceptible patients with BPD were to a negative mood induction when compared to healthy controls, finding that those with BPD did not react any more quickly or obtain a greater effect from a negative mood induction procedure than healthy controls, although they did report higher levels of baseline negative affect (Feliu-Soler, Pascual, Soler, Pérez, Armario, Carrasco, Sanz, … Borràs, 2013).

Several researchers have suggested that impaired social cognition is a primary component of BPD (Bateman & Fonagy, 2003; Bender & Skodol, 2007; Levy, 2005; Levy et al., 2006; Westen, 1991). One theory is that the difficulties individuals with BPD experience in social interactions is due to their own problems with mentalization, which is referred to as the ability to understand the emotions of oneself and others (Bateman & Fonagy, 2003). Another theory is that social interaction problems stem from the inability of those with BPD to differentiate between different emotions, which creates emotion dysregulation and inappropriate social responses (Linehan, 1993). Though the mechanics behind these theories may differ, the common theme between these theories is that the trouble that individuals with BPD have with their own emotions somehow influences their social interactions with others, often in negative ways. Social interactions rely on the ability of both parties being able to adequately recognize and process social cues and emotional information, and BPD is characterized by an increased awareness of and vigilance towards social information (Linehan, 1995). However, those with BPD often have trouble with their ability to process social stimuli, and since this ability is used to infer appropriate behavior in a given social situation, any errors in

judgment with regards to the emotional state of others can cause problems with behavioral responses during interactions, which in turn can create awkward or tense social situations that can lead to social rejection. Thus, the combination of a hypervigilance for social cues and the inability to accurately interpret them create a recipe for social disaster.

Within the past two decades, there has been an increase in research examining emotion perception and recognition abilities in those with BPD. It is well-established that certain psychiatric disorders are associated with impaired emotion recognition abilities, such as autism or schizophrenia, and some suggest that the same may be true of BPD (Bolte & Poustka, 2003; Kohler et al., 2003). One of the most popular methods of assessing emotion perception is by using facial expression affect recognition. Facial expression recognition relies on the ability of individuals to decode the mental states of others based on facial cues, such as smiling, frowning, raising the eyebrows, exposing the teeth, etc., from photographs of different faces. Facial expression affect recognition tasks use stimuli that have been selected based on the notion that only one emotion label is correct for any given particular facial expression, and usually involve having individuals label emotional facial expressions. Accuracy is determined by the percentage of correct emotion labeling of facial expressions, with incorrect emotion labels counting as a misidentification.

There have been numerous studies examining the ability of individuals with BPD to accurately perceive emotions in others. However, the literature in this area reports results that vary widely from study to study (Domes, Schulze, & Herpertz, 2009). For

example, a study by Levine, Marziali, and Hood (1997) found that individuals with BPD were less accurate at labeling facial affects than healthy controls, a finding also supported in a later study (Bland, Williams, Scharer, & Manning, 2004). In contrast, other studies have found that individuals with BPD are actually more accurate than healthy controls at detecting certain emotional states (Wagner & Linehan, 1999; Lynch, Rosenthal, Kosson, Cheavens, LeJuez, & Blair, 2006). One study found that individuals with BPD were only impaired at accurately recognizing facial expressions if the expressions were complex (Minzenberg, Poole, & Vinogradov, 2006), while another study found that individuals with BPD were only impaired if they were required to distinguish between negative and neutral facial expressions as quickly as possible (Dyck et al., 2009).

A possible explanation for these discrepancies is that individuals with BPD may actually experience a more subtle deficit in emotion recognition as opposed to an overall impairment. Several studies have found that individuals with BPD differ most from healthy controls when dealing with negative emotions, though whether this difference is attributable to a perceptual advantage or disadvantage is a topic of debate. For example, Wagner and Linehan (1999) found that overall, individuals with BPD performed at least as well as healthy controls on an emotion recognition task, suggesting no impairment, but in addition, when examined on the level of specific emotions those with BPD were actually more accurate than controls for expressions of fear. However, other studies have found conflicting results—for example, Levine, Marziali, and Hood (1997) found that individuals with BPD were impaired at the accurate perception of negative emotions.

One explanation for this inconsistency is that BPD may be characterized by a negativity "bias" rather than an improved accuracy for negative emotions, resulting in an apparently increased accuracy for negative emotions at the cost of being less accurate at other emotions, such as neutral or positive (Domes et al., 2008; Donegan et al., 2003; Dyck et al., 2009; Lynch et al., 2006; Meyer, Pilkonis, & Beevers, 2004; Silbersweig et al., 2007; Wagner & Linehan, 1999). However, the majority of studies examining facial expression recognition with BPD have all used facial expression paradigms using the entire face, which is prone to several issues.

While facial expression recognition tasks are some of the most commonly used measures of emotion perception in research, they tend to be rather easy for the majority of healthy individuals, with most individuals being able to accurately perceive facial expressions of emotion beginning at age 6 (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). This can create a ceiling effect, which can prevent researchers from obtaining a true measurement of ability. For example, if someone who has average emotion perception skills can still manage to get every item correct on a facial expression recognition task, then someone who has above-average emotion perception skills will not be able to be differentiated from those with average abilities. In addition, facial expression paradigms which use the entire face may be more confusing to individuals completing the task, as there may be conflicting information in an entire face that would not be present if the expression consisted of only the eyes. For example, a forced smile typically lacks the duchenne marks (crow's feet) around the eyes that would signify a true smile accompanying

happiness, and the same is true regarding many other emotions as well, though with different facial muscles (Ekman, 1993). This is because true emotions result in facial expressions that involve complex muscle groups in the face which cannot be deliberately created and are involuntary. Thus, a facial expression recognition task involving the entire face in which the stimuli were created from actors asked to display prototypic emotional expressions (the most common method) could be affectively complex, as the face would display different expressions in different areas of the face (in the case of a forced smile, a positive expression around the mouth but a more neutral expression around the eyes).

In an attempt to overcome the issue of a ceiling effect in full-face emotion expression recognition paradigms, a new emotion perception task was developed, known as the Reading the Mind in the Eyes Task. The Reading the Mind in the Eyes Task, or RMET, was developed in 1997 by Simon Baron-Cohen and colleagues in order to assess individuals' abilities to pick up on subtle emotional cues, and revised in 2001 (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). The RMET is based on the premise of perception of emotional states in others through the eyes, and evidence has shown that humans are capable of accurately decoding complex emotional states from the eyes of others in addition to the six basic and universal emotions (Baron-Cohen, Wheelwright, & Jolliffe, 1997). The RMET consists of a series of black-and-white sectional photographs of human faces, specifically the eye region (see Figure 1). Because the RMET stimuli consist only of photographs of the eye region of the face, it forces participants to attend to more subtle

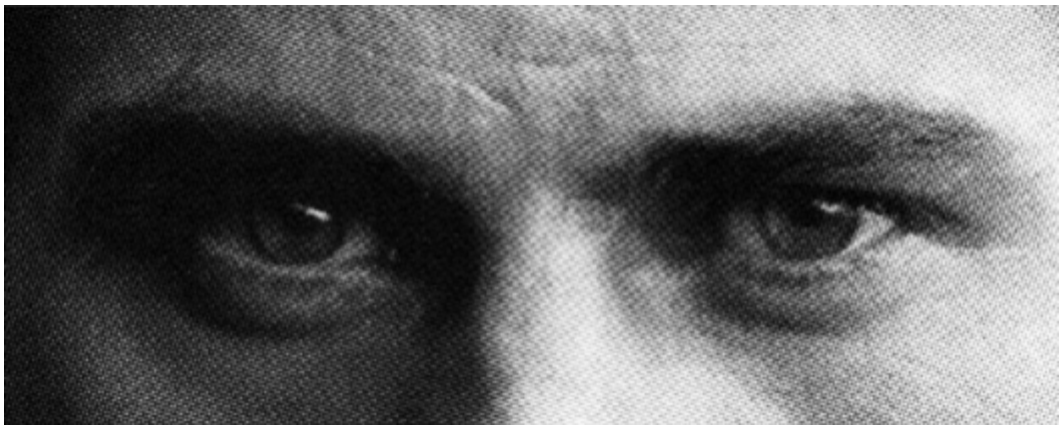

Figure 1. An example of the standard RMET stimuli[1]

cues in determining the emotional state of the individual in the photograph, allowing for a more accurate method of differentiating the accuracy of different individuals who complete the RMET. In addition, the RMET allows for better control over the valence of the emotion being displayed, since it focuses on a single region of the face, and would not be as susceptible to conflicting expressions.

However, the RMET does have issues to consider. For example, the response format of the RMET asks participants to choose one of four different words indicating emotional states to describe each set of eyes. The possible choices are usually very complex emotional words that may not have a clear affective valence, such as "insisting" or "contemplative". In addition, the eye stimuli used in the RMET were photographs of faces culled from magazines, and so the photographs themselves do not display prototypic emotional states, and because the individuals in the photographs were not

[1] All RMET stimuli are available online at: http://www.autismresearchcentre.com/arc_tests (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001)

asked to simulate any particular emotion, the "correct" emotional valence of each photograph is subjective—typically, the RMET stimuli have been classified into positive, negative, and neutral categories based on consensus ratings from pilot data in the past (Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005; Scott, Levy, Adams, & Stevenson, 2011). These issues do not necessarily represent problems with the RMET (and indeed, the lack of simulated emotions increases the task's validity as a measure of emotion perception), but they do present potential challenges for the use of the RMET as a method of determining response biases.

At present, only two studies have been published using an eyes-only facial expression recognition paradigm among individuals with borderline personality features (Fertuck et al., 2009; Scott et al., 2011). Of note is the fact that even though these two studies used almost identical study designs, the results were different, such that one study (Fertuck et al., 2009) found that those with high borderline personality features exhibited enhanced accuracy overall, whereas the other study (Scott et al., 2011) found that the high and low borderline personality features groups did not significantly differ on any emotional valence other than negative emotion, in which individuals in the high borderline features group were more accurate than the low borderline features group for negative emotions. In addition, individuals in the high borderline features group tended to choose more negatively-valenced word choices overall when compared to the low borderline features group, suggesting a possible negativity bias. However, the disparity between these two studies, combined with the inconsistencies reported in other facial recognition with BPD studies, suggest that this is an area where further study is

necessary. The present study extends this line of research, using a methodology that may be better able to differentiate bias and accuracy in emotion recognition.

The current study sought to expand on the advantages provided by the RMET by only using the eye region of the face instead of the face as a whole for use as stimuli, applying this approach to other established facial affect recognition measures. Ekman and Friesen (1976) created a widely-used set of facial stimuli he called the "Pictures of Facial Affect" (PFA). These pictures consist of photographs taken from Dr. Ekman's studies on the universality of facial emotion expressions, and represent objectively coded emotional states. In addition, another set of facial stimuli known as the NimStim Set of Facial Expressions (NimStim; Tottenham et al., 2002) consists of over 600 facial stimuli established in a manner very similar to the method used by Ekman (i.e., professional actors were asked to display a variety of clear emotions). Both the PFA and the NimStim stimuli sets allow for a much greater level of control over the types of emotions being displayed, in addition to a greater, more objective level of confidence in the actual emotions being presented.

As the purpose of this study is to examine facial expression perception abilities among those with borderline personality features and determine if a negativity bias exists, the study consisted of a two-part performance task. For the first part, participants completed a standard facial expression perception task, and in the second part they completed a memory task. Previous research has shown that memory disturbances may be a characteristic of BPD (Korfine & Hooley, 2000; Kurtz & Morey, 1999), and the memory task is used in order to explore the effects of a potential negativity bias on

memory. If a bias exists, it may affect one's recall of social situations so that they are remembered differently than they actually were. At least one study has shown that there may exist a negative recall pattern in BPD, such that individuals with BPD have a tendency to remember past events as more negative than they actually were (Ebner-Priemer et al., 2006). There is a good deal of research supporting the theory of mood-congruent memory, which states that individuals are more likely to recall past information that is congruent with their current mood as opposed to past information incongruent with their current mood (Blaney, 1986; Bower, 1981; Laird, Wagener, Halal, & Szegda, 1982; Rusting, 1998; Rusting, 1999). Thus, if a negativity bias is present it could affect accurate recall of facial expressions seen in the past. This has important implications, as a negative recall bias could perpetuate a negative mood state, since one adaptive strategy to overcome negative mood states is to recall positive events (Rusting & DeHart, 2000). In addition to the facial expression recognition task and the memory task, the current study also made use of a mood induction task.

The mood induction task is an important addition to this project, as it allows for the study of state effects on perception. BPD is characterized by negative emotionality, and a heightened baseline level of negative emotions (Jacob et al., 2009; Linehan, 1993). As such, it is worth determining what role (if any) this emotional arousal plays in the perception abilities of BPD. Like memory, research has shown that mood state can influence the perception of events and others (Blaney, 1986; Forgas, 1994; Rusting, 1998), and that individuals tend to evaluate situations and events in a manner that matches their internal mood state (Mayer, Gaschke, Braverman, & Evans, 1992). While

the research on the effects of emotion manipulation on perception of facial expressions in BPD is scarce, there is research which suggests that mood can in fact play a role in emotion perception abilities (Brigham, Maass, & Martinez, 1983; Hills & Lewis, 2011). Thus, if a negativity bias exists in BPD, it's possible it is due not to borderline personality traits directly, but instead by mood state. It's also possible that any deficits in emotion perception ability are influenced by the interaction of personality and mood state (Rusting, 1999). In other words, it may not be as simple as negative moods causing negative perceptions, but may instead be that personality traits and mood state interact to influence perceptions. For example, a highly neurotic individual may more readily perceive situations as negative during a neutral mood state than a less neurotic individual would during a similar mood state, while both types of individuals might respond similarly during negative emotional states.

The present study used facial stimuli from the RMET, the PFA, and the NimStim stimulus sets using the eye-paradigm introduced by the RMET in an attempt to explore the hypothesized variability in the emotion identification and memory abilities of different groups of individuals, including those in an induced negative mood state, an induced neutral mood state, and with varying degrees of endorsement of borderline personality features. In addition to the benefits provided by the wide variety of empirically validated stimuli, the current study also had the benefit of the use of a signal-detection paradigm in order to examine both accuracy and response bias in participants' responses. As it is crucial to distinguish between an impairment or a bias, a signal-detection design can allow for a straight-forward examination of any negativity biases

that may exist by simplifying the response options for participants into “yes” or “no” answers.

2. METHOD

2.1 Participants

Participants were 213 undergraduate students enrolled in an introductory psychology course at Texas A&M University. Students enrolled in this course were also enrolled in a subject pool from which recruitment took place. Participants included 98 females, 76 males, and 39 participants for which gender data was not available. The majority of participants were Caucasian (54.9%, *n* = 117), with other ethnicities reported including Hispanic/Latino (14.1%, *n* = 30), Asian (6.1%, *n* = 13), African American/Black (3.8%, *n* = 8), Middle Eastern (.9%, *n* = 2), Native American/Alaskan (.5%, *n* = 1), and Other (1.4%, *n* = 3). Ethnicity information was unavailable for 39 participants. The mean age of participants was 18 (*SD* = .946). Participants were divided into two groups via random assignment, consisting of the experimental group (*n* = 106) and the control group (*n* = 107).

2.2 Measures

2.2.1 Personality Assessment Inventory – Borderline Scale. The Borderline Scale (BOR) of the Personality Assessment Inventory (PAI; Morey, 1991) was used to assess for borderline personality features in all participants. The PAI has been used in several studies with undergraduate populations, and displays strong psychometric properties (Chapman et al., 2008; Trull, 1995, 2001). The PAI-BOR asks 24 questions related to the symptomatology of borderline personality disorder, with each item rated using a 4-option response format including False, Slightly True, Mainly True, and Very

True. Test takers are given a *T*-score which can be used to separate participants into high and low borderline personality features groups based on established cutoffs, or *T*-scores can beviewed continuously. In addition to a total score for borderline personality features, the PAI-BOR has four subscales for which separate *T*-scores can be calculated, including affective instability (BOR-A), identity problems (BOR-I), negative relationships (BOR-N), and self-harm (BOR-S).

2.2.2 Toronto Alexithymia Scale-20. The Toronto Alexithymia Scale 20 (TAS-20; Bagby, Parker, & Taylor, 1994) is a 20-item questionnaire designed to assess for the presence of alexithymia, or the inability to accurately identify emotions and emotional states. As this study focuses on emotion perception, the inclusion of a measure for alexithymia was an appropriate method of further differentiating potential problems with emotion identification. The TAS-20 is a very common instrument for the assessment of alexithymic individuals, and has been well-validated since its inception (Bagby, Taylor, & Parker, 1994; Parker, Taylor, & Bagby, 2003; Taylor, Bagby, & Parker, 2003). The TAS-20 contains 3 subscales: a scale used for Difficulty Describing Feelings (TAS-20-DDF), a scale used for Difficulty Identifying Feelings (TAS-20-DIF), and a scale used for Externally-Oriented Thinking (TAS-20-EOT). Each of the subscales are measured by the sum of each item in the scale, with items rated using a 5-point Likert scale. A designation of alexithymia is assigned for total TAS-20 scores above 60.

2.2.3 Self-Assessment Manikin. Self-Assessment Manikins (SAM; Lang, 1980) allow test takers to rate their current affect on a scale of 1 to 9 accompanied by visual depictions of each level of emotion. These visual depictions are presented using a

graphic representation of varying states of emotional reactivity, with one end being neutral or near-neutral, and the other end being very emotionally aroused. This study used Arousal and Happiness SAMs, asking participants to rate their arousal from calm to excited, and their happiness from unhappy to happy (with 1 being Happy and 9 being Unhappy for Happiness, and 1 being Aroused and 9 being Calm for Arousal). The SAM was used as a manipulation check for the mood induction tasks. The scales were given to participants when they arrived to obtain a baseline measurement of affect, and then again following the mood induction. Additionally, the SAM was given after the eyes task to help identify any possible effects the facial expression task itself may have had on participant affect.

2.2.4 The Positive and Negative Affect Schedule. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item instrument designed to measure both positive and negative affect states and traits. Each item asks the degree to which the respondent has felt a particular emotion within a definitive time frame using a 5-point scale which ranges from very slightly or not at all (1) to extremely (5). The PANAS has two subscales, with 10 items comprising both the negative affect subscale and positive affect subscale. The PANAS is included in the present study in order to obtain a measure of more trait-like affect in participants. Those participants high in borderline personality features should display higher negative affect over a longer period of time than those low in borderline personality features. The PANAS was administered at three separate points during study administration: the first at the start of

the task before presentation of any stimuli, the second following the administration of the mood induction task, and the third following the completion of the perception task.

2.2.5 Facial Expression Recognition Task. This study used pictures from three different facial expression recognition designs: the RMET, the PFA, and the NimStim face sets. Because the RMET and PFA photographs are in black-and-white only, all NimStim photographs were edited to appear in black-and-white as well. The PFA and NimStim faces were cropped to only display the eye region of each facial stimulus, in accordance with the style of the RMET stimuli. Affective ratings are available for all three face sets, as well, which have been empirically tested and cross-validated (Ekman, 1976; Scott et al., 2011; Tottenham et al., 2009). The facial expression recognition task was divided into two parts: a perception task in which participants were tasked with identifying if the emotion was negative or not, and a memory task in which participants were tasked with identifying whether a particular eyes-photograph had been shown during the perception task.

2.3 Procedure

All measures were presented using a computerized administration method using MediaLab (Jarvis, 2007). Participants were provided with informed consent upon arrival and then asked to complete the PAI-BOR and the TAS-20, followed by the PANAS and the first administration of the SAM scales. Participants were then given either the negative or neutral mood induction task respective to their group (experimental or control). This was followed by the second administration of the SAM scales. Participants were then asked to complete the facial expression perception task where they were

shown facial expressions from a combination of RMET, PFA, and NimStim stimuli and asked whether each eye-photograph was displaying a negative emotion or not, responding with either a “yes” or a “no” by pressing corresponding keys on a keyboard. The facial stimuli from all three face sets were presented in a random order. Each task had a total of 44 stimuli that were presented. There were an equal number of negative and neutral stimuli for the perception task, while the memory task had slightly more stimuli that had been shown previously (n = 24) than had not (n = 20) due to limitations on the quantity of RMET stimuli.

Following the completion of the perception task, participants completed the third administration of the SAM scales and a second administration of the PANAS. Finally, participants completed a memory task using the facial expression recognition face sets. The computer presented stimuli used in the previously administered perception task, but also displayed new stimuli that were not presented before. These additional stimuli consisted of eye-photographs from the RMET, PFA, and NimStim that were unused in the perception task. Participants were tasked with determining whether each photograph was new or old by responding with either a “yes” or a “no” when asked if they had seen that particular stimulus in the previous task. Participants were then thanked and debriefed.

2.3.1 Mood Induction Tasks. Two separate mood induction tasks were used: a negative mood induction and a neutral mood induction. The negative mood induction task used a scripted imaginal induction where participants were asked to listen to an audio-recorded scenario and imagine themselves as the subject of the scenario in as

much detail as possible. The scenario described in the negative mood induction describes a series of social rejections designed to elicit an array of negative affect typical to that experienced by individuals with BPD. This procedure has been used with undergraduate samples in the past, and has been shown to be effective at inducing a range of negative emotions (Robins, 1988; Dixon-Gordon, Chapman, Lovasz, & Walters, 2011).

The neutral mood induction task also consisted of a scripted, audio-recorded scenario which described a Saturday morning in which the participant imagined completing several everyday tasks, and was a compilation of neutral scripts adapted from separate neutral induction scripts that have been shown in prior research to elicit neither an increase in negative or positive affect (Maude-Griffin & Tiffany, 1996; Tiffany & Drobes, 1990). These scripts were chosen due to their similarity in style to the negative mood induction scripts and their effectiveness as mood-neutral induction techniques. Both negative and neutral induction scripts are included in Appendix A.

2.4 Data Analyses

In order to fully explore the relationships between BPD, mood, and emotion perception, two methods of identifying accuracy and bias were utilized. The first method relies on SDT. Signal detection is effective at distinguishing any possible response biases that may exist, as well as sensitivity. SDT primarily uses two statistics: the discriminability index, or *d*' (d-prime), which is a measure of sensitivity towards the stimuli, and the criterion, or *C*, which can be used to measure response tendencies. In practice, *d*' can an effective measure of accuracy, and *C* is useful for identifying whether a response bias is present or not by identifying the minimum criterion necessary for the

participant to respond “signal present”, with a low *C* value interpreted as a greater tendency to endorse a signal as present. Because the present study asked “yes” or “no” questions during both parts of the eyes task (perception and memory), it was possible to calculate both *d*’ and *C* since SDT relies on a signal-present vs. signal-absent response style, with data in the form of hit rates, false alarm rates, misses, and correct rejections. "Hit Rate" refers to the number of correctly positive responses (i.e., the signal is present and the participant endorses it as present), "False Alarm Rate" refers to the number of incorrectly positive responses (i.e., the signal is absent and the participant endorses it as present), "Misses" refer to the number of incorrectly endorsed negative responses (i.e., the signal is present and the participant endorses it as absent), and "Correct Rejections" refer to the number of correctly endorsed negative responses (i.e., the signal is absent and the participant endorses it as absent). Although *d*’ can be a measure of accuracy, it is distinct from the simplest method of determining accuracy (i.e., percentage of correct responses) in that the calculation of *d*’ requires both hit rate and false alarm rate, and thus SDT is able to provide information about potential response biases. For example, a classic example of SDT is the use of radar to detect approaching objects; when an object appears on the radar screen, the operator must make a decision as to whether or not the object could be a potential threat. If the object is deemed to be a threat by the operator and the object is in reality threatening, this is considered a hit. If the object is deemed to be a threat by the operator but the object is in reality non-threatening, this is considered a false-alarm. However, a radar operator can choose to assume that every object detected is threatening and thus never allow a threatening object to approach at the cost of

wasting resources on non-threatening objects. Thus, SDT allows for a comprehensive evaluation of potential response bias.

In the first phase of the eyes task (perception), "signal" refers to the presence of a negative emotional expression, with a low *C* interpreted as a tendency to over-perceive negative emotion due to a lower threshold. In the second phase (memory), "signal" refers to an eyes-photograph which had been presented previously in the perception task, with a low *C* interpreted as a tendency to more often endorse a stimulus as having been shown before.

In addition to SDT, a straight-forward examination of both the overall percentage of stimuli that were correctly identified (accuracy) as well as the overall percentage of stimuli positively endorsed (potential bias) was conducted for both the perception and memory tasks. This was done as a comparison to the SDT method of assessing for sensitivity and bias, as SDT separates participants into four groups whereas this method only separates participants into two groups (in the case of accuracy, correct vs. incorrect; in the case of potential bias, higher than 50% positively endorsed vs. at or below 50%) and can provide additional information about the sample characteristics in addition to SDT data.

3. RESULTS

In order to determine the effectiveness of the mood induction tasks, a comparison of the two PANAS administrations as well as the three administrations of the SAM scales was conducted. Within the experimental group, the PANAS negative affect results indicated that the negative mood induction was ineffective, as the mean of the Time 1 PANAS (M = 20.70, SD = 6.55) was not significantly different from the mean of the Time 2 PANAS (M = 20.17, SD = 6.99). Within the control group, the PANAS negative affect results indicated that the neutral mood induction succeeded in that it did not cause any significant increase or decrease in mood state from Time 1 (M = 22.65, SD = 8.63) to Time 2 (M = 21.71, SD = 9.05).

The SAM scales, however, indicated that the negative mood induction was effective at reducing happiness; a paired-samples t-test, $t(105) = -13.52$, $p < .000$, showed that the experimental group's mean Time 1 SAM for Happiness (M = 3.34, SD = 1.88) was significantly lower than the mean Time 2 SAM for Happiness (M = 6.34, SD = 1.87), suggesting that the negative mood induction succeeded in decreasing participants' overall level of self-reported happiness. In addition, the SAM scales indicated that Arousal also increased following the negative mood induction; a paired-samples t-test, $t(105) = 5.02$, $p < .000$, showed that the experimental group's mean Time 1 SAM for Arousal (M = 6.45, SD = 2.03) was significantly higher than their mean Time 2 SAM for Arousal (M = 5.01, SD = 2.26), suggesting that the mood induction task increased participants' overall level of self-reported arousal. However, the control group's level of

self-reported happiness at Time 1 (M = 3.59, SD = 1.63) followed a similar pattern, $t(106) = -3.66$, $p<.000$, of decreasing at Time 2 (M = 4.19, SD = 1.49) as in the experimental group, suggesting that the decrease in self-reported happiness following the negative mood induction may be influenced by task-related effects. For example, the completion of the task itself may be experienced as boring to a participant, and thus reduce their level of happiness regardless of the valence of the mood induction. Arousal in the control group did not follow the same pattern as in the experimental group, however, as participants' level of self-reported arousal in the control group decreased slightly from Time 1 (M = 6.21, SD = 1.98) to Time 2 (M = 6.80, SD = 1.85) following the neutral mood induction. However, while statistically significant, $t(106) = -3.48$, p = .001, this difference is negligible.

Because the PANAS and SAM results differ slightly in their indications of the effectiveness of the negative mood induction at inducing a negative mood, a between-groups analysis of performance was conducted to determine if group membership affected task performance on the perception task. A one-way ANOVA revealed no significant differences between groups on overall percent of stimuli correct ($F(1, 211) = .062$, p = .804), overall percent of stimuli endorsed as negative ($F(1, 211) = .003$, p = .958), d' ($F(1, 211) = .000$, p = .986), or C ($F(1, 211) = .002$, p = .968). These results suggest that the mood induction had no effect on task performance for the perception task. Because this suggests a lack of any effect of the experimental manipulation, the two groups were collapsed, and all further analyses reflect results combined across mood manipulation groups. A table of means for this collapsed group is presented in Table 1.

Table 1

Means and Standard Deviations for all Test Variables

Measure	Mean	SD
SAM Time 1 Happiness	3.46	1.76
SAM Time 1 Arousal	6.33	2.00
SAM Time 2 Happiness	5.26	2.00
SAM Time 2 Arousal	5.91	2.25
SAM Time 3 Happiness	4.56	1.51
SAM Time 3 Arousal	6.12	1.83
T BOR	53.90	9.95
T BOR-A	51.03	10.24
T BOR-I	55.56	10.05
T BOR-N	52.82	10.16
T BOR-S	52.70	11.78
PANAS Time 1 Positive Affect	33.23	6.78
PANAS Time 1 Negative Affect	21.68	7.71
PANAS Time 2 Positive Affect	32.11	7.47
PANAS Time 2 Negative Affect	20.94	8.11
TAS-20 Difficulty Describing Feelings	12.47	3.69
TAS-20 Difficulty Identifying Feelings	14.97	5.14
TAS-20 Externally-Oriented Thinking	20.54	3.43
TAS-20 Overall Alexithymia	47.98	9.51
Perception Task Accuracy	72.24%	10.13%
Perception Task Percent Negative	44.84%	12.55%
Perception Task *d*'	.827	.868
Perception Task *C*	1.02	.656
Memory Task Accuracy	61.88%	8.25%
Memory Task Percent "Seen Before"	69.02%	14.95%
Memory Task *d*'	.335	.185
Memory Task *C*	.426	.222

Note.N = 211

The next analysis focused on any potential effects of high-BOR vs. low-BOR on task performance for the perception task and the memory task. For the perception task, a cut-off of 70*T* (as used by Trull, 1995) was used to separate participants in high-BOR (n = 20) or low-BOR (n = 193) groups revealed no significant differences for overall percent of stimuli correct ($F(1, 211) = 1.15$, $p = .285$), overall percent of stimuli endorsed as negative ($F(1, 211) = .684$, $p = .409$), d' ($F(1, 211) = .005$, $p = .943$), or C ($F(1, 211) = .299$, $p = .585$), suggesting that there was no effect of high-BOR or low-BOR group membership on perception task performance. Likewise, for the memory task, BOR group membership had no effect on overall percent of stimuli correct ($F(1, 211) = .026$, $p = .872$), overall percent of stimuli endorsed as having been shown previously ($F(1, 211) = .264$, $p = .608$), d' ($F(1, 211) = .001$, $p = .971$), or C ($F(1, 211) = .168$, $p = .682$). Taken together, these results suggest that categorically examining the effects of borderline personality features does not have any discernible effect on the ability to accurately perceive emotion in others. However, it is worth noting that the number of participants in the low-BOR group was far greater than the number of participants in the high-BOR group, although this is to be expected, as a BOR score above 70*T* indicates a clinical level of borderline personality features, and the sample was taken from undergraduate students who would be expected to be primarily sub-clinical.

Because the results indicated that a categorical examination of borderline personality features failed to highlight any effects on task performance, and because borderline personality features function on a continuum, correlational statistics were

obtained for all further analyses in an attempt to illuminate any potential effects of either personality or affective state on task performance. The full results of this correlational analysis are presented in Table 2 for the perception task, and Table 3 for the memory task. Although modest, there were significant correlations between overall level of borderline personality features and the tendency to endorse stimuli as negative in the perception task, $r(211) = .168$, $p = .014$, as well as between affective instability and the tendency to endorse stimuli as negative in the perception task, $r(211) = .166$, $p = .015$, suggesting a possible negative response bias in those with higher levels of borderline personality features. In addition, on the perception task, self-harm correlates modestly and inversely with overall accuracy, $r(211) = -.144$, $p = .035$, the tendency to endorse stimuli as negative, $r(211) = -.190$, $p = .005$, d', $r(211) = -.217$, $p = .001$, and C, $r(211) = -.219$, $p = .001$. This suggests that the self-harm aspect of borderline personality may play a significant role in emotion perception among those high in borderline personality features. There were no discernible relationships between the TAS-20 and task performance.

With regards to affective state, the results suggest that a participant's level of self-reported happiness (as measured by the SAM) at the start of the study was modestly correlated with their overall accuracy on the perception task, $r(211) = .181$, $p = .008$, although there was no effect on the memory task, $r(211) = .004$, $p = .991$). Due to the nature of the response scale for the Happiness SAM, the positive correlation obtained for the perception task indicates that participants who reported lower happiness at the beginning of the study were slightly more accurate on the perception task. Additionally,

Table 2

Correlational Analyses for Perception Task

Measure	Accuracy	Percent negative	*d'*	*C*
SAM Time 1 Happiness	.181**	.107	.091	.016
SAM Time 1 Arousal	.097	-.009	-.020	-.037
SAM Time 2 Happiness	.044	.091	-.015	-.052
SAM Time 2 Arousal	-.003	-.005	-.022	-.013
SAM Time 3 Happiness	.121	.104	.010	-.049
SAM Time 3 Arousal	.033	.053	-.058	-.072
T BOR	.026	.168*	-.059	-.108
T BOR-A	.065	.166*	-.048	-.106
T BOR-I	.024	.134	.017	-.030
T BOR-N	.121	.029	.055	.012
T BOR-S	-.144*	.190**	-.217**	-.219**
PANAS Time 1 Positive Affect	-.131	.036	-.160*	-.131
PANAS Time 1 Negative Affect	.128	.102	.058	-.004
PANAS Time 2 Positive Affect	-.118	.032	-.163*	-.137*
PANAS Time 2 Negative Affect	.073	.135*	-.006	-.059
TAS-20 Difficulty Describing Feelings	-.028	.126	.015	-.017
TAS-20 Difficulty Identifying Feelings	.014	.090	-.019	-.046
TAS-20 Externally-Oriented Thinking	-.114	.048	-.104	-.085
TAS-20 Overall Alexithymia	-.044	.115	-.042	-.062

Note. *p<.05, **p<.01

Table 3

Correlational Analyses for Memory Task

Measure	Accuracy	Percent "Seen Before"	*d′*	*C*
SAM Time 1 Happiness	.004	-.055	.026	.058
SAM Time 1 Arousal	.073	-.103	.086	.105
SAM Time 2 Happiness	-.065	.102	-.077	-.104
SAM Time 2 Arousal	.104	-.115	.118	.119
SAM Time 3 Happiness	.032	.018	.033	-.016
SAM Time 3 Arousal	.125	-.128	.131	.131
T BOR	-.018	.069	-.029	-.072
T BOR-A	.017	.076	.005	-.074
T BOR-I	.057	.067	.032	-.072
T BOR-N	-.093	.122	-.110	-.129
T BOR-S	-.040	-.064	-.020	.062
PANAS Time 1 Positive Affect	-.076	-.006	-.085	.000
PANAS Time 1 Negative Affect	-.054	.095	-.071	-.102
PANAS Time 2 Positive Affect	-.047	.004	-.062	-.008
PANAS Time 2 Negative Affect	-.102	.171*	-.124	-.176**
TAS-20 Difficulty Describing Feelings	-.011	.033	-.012	-.035
TAS-20 Difficulty Identifying Feelings	.008	.104	-.003	-.100
TAS-20 Externally-Oriented Thinking	-.063	-.052	-.048	.052
TAS-20 Overall Alexithymia	-.023	.050	-.024	-.049

Note. *p<.05, **p<.01

positive affect at the start of the study (as measured by the PANAS at Time 1) was weakly negatively correlated with *d*' on the perception task, $r(211) = -.160$, $p = .020$, which also suggests that increased positive affect negatively impacted performance on the perception task. Following the mood induction task and immediately preceding the perception task itself, there is further evidence to suggest that negative affect increases performance on the perception task, as positive affect (as measured by the PANAS at Time 2) weakly negatively correlated with both *d*', $r(211) = .162$, $p = .018$, and *C*, $r(211) = -.137$, $p = .046$.

There was also a suggestion that negative affect (as measured by the PANAS at Time 2) immediately preceding the perception task may result in a slightly higher tendency to endorse perception task stimuli as negative, $r(211) = .135$, $p = .050$. In addition, negative affect immediately preceding the perception task was also weakly positively correlated with a greater tendency to endorse stimuli as having been shown previously on the memory task, $r(211) = .171$, $p = .013$, as well as weakly negatively correlated with *C*, $r(211) = -.176$, $p = .010$, suggesting that negative affect may play a role in potential response biases in the memory of emotional stimuli.

As past research on the effects of mood and personality traits on memory is limited, the current study was also interested in examining any effects that emotional valence might play on memory. Thus, the memory task was also examined through a break-down of emotional valence, with a separate group for negative stimuli and neutral stimuli, allowing separate performance results to be obtained for each group. Table 4 lists the obtained correlations when solely examining negative stimuli, and Table 5 lists

Table 4

Correlational Analyses for Memory Task: Negative Affect

Measure	Accuracy	Percent "Seen Before"	*d'*	*C*
SAM Time 1 Happiness	-.010	-.043	.067	.083
SAM Time 1 Arousal	.060	-.147*	.117	.156*
SAM Time 2 Happiness	-.101	.134	-.109	-.127
SAM Time 2 Arousal	.049	-.119	.118	.145*
SAM Time 3 Happiness	.027	.050	.001	-.042
SAM Time 3 Arousal	.055	-.116	.125	.147*
T BOR	.015	.084	.006	-.053
T BOR-A	.050	.086	.050	-.033
T BOR-I	.073	.046	-.004	-.060
T BOR-N	-.074	.177*	-.096	-.156*
T BOR-S	-.040	-.064	-.020	.062
PANAS Time 1 Positive Affect	-.074	.040	-.069	-.047
PANAS Time 1 Negative Affect	.001	.046	-.054	-.070
PANAS Time 2 Positive Affect	-.052	.070	-.104	-.102
PANAS Time 2 Negative Affect	-.046	.120	-.081	-.118
TAS-20 Difficulty Describing Feelings	.027	-.031	.065	.058
TAS-20 Difficulty Identifying Feelings	.042	.078	.085	.002
TAS-20 Externally-Oriented Thinking	-.071	-.095	.028	.109
TAS-20 Overall Alexithymia	.007	-.004	.081	.063

Note. *p<.05

Table 5

Correlational Analyses for Memory Task: Neutral Affect

Measure	Accuracy	Percent "Seen Before"	*d'*	*C*
SAM Time 1 Happiness	.019	-.047	.013	.021
SAM Time 1 Arousal	.058	-.032	.048	.036
SAM Time 2 Happiness	.005	.042	.055	.003
SAM Time 2 Arousal	.125	-.075	.057	.035
SAM Time 3 Happiness	.024	-.017	-.001	-.004
SAM Time 3 Arousal	.154*	-.099	.131	.090
T BOR	-.048	.033	-.040	-.035
T BOR-A	-.028	.042	-.015	-.035
T BOR-I	.015	.065	-.009	-.069
T BOR-N	-.075	.035	-.053	-.022
T BOR-S	-.061	-.048	-.047	.023
PANAS Time 1 Positive Affect	-.046	-.045	.009	.072
PANAS Time 1 Negative Affect	-.096	.110	-.094	-.111
PANAS Time 2 Positive Affect	-.022	-.056	.024	.080
PANAS Time 2 Negative Affect	-.124	.162*	-.124	-.154*
TAS-20 Difficulty Describing Feelings	-.050	.078	-.059	-.082
TAS-20 Difficulty Identifying Feelings	-.035	.094	-.083	-.107
TAS-20 Externally-Oriented Thinking	-.026	.002	-.055	-.014
TAS-20 Overall Alexithymia	-.048	.082	-.088	-.095

Note. *p<.05

the obtained correlations when solely examining neutral stimuli. Of note, the results for negative stimuli showed that the SAM Arousal scale was correlated positively with *C* at all administrations including Time 1, $r(211) = .156$, $p = .023$, Time 2, $r(211) = .145$, $p = .034$, and Time 3, $r(211) = .147$, $p = .032$, suggesting that lower arousal levels are related to a higher criterion being needed to endorse a negative stimulus as having been seen before. SAM Arousal also correlated negatively with percentage of stimuli endorsed as having been seen before regardless of its novelty, particularly at Time 1, $r(211) = -.147$, $p = .032$, and less significantly with Time 2, $r(211) = -.119$, $p = .082$, and Time 3, $r(211) = -.116$, $p = .092$, suggesting that lower levels of arousal are related to a reduced percentage of negative stimuli endorsed as having been seen before.

In addition to arousal, there was a significant effect for BOR-N. BOR-N was positively correlated with the percentage of stimuli endorsed as having been seen before regardless of its novelty, $r(211) = .177$, $p=.010$, although negatively correlated with *C*, $r(211) = -.156$, $p=.023$. These results suggest that the negative relationships component of BPD may play a role in memory bias for negative affect.

For neutral stimuli in the memory task, there were fewer significant findings, although the SAM Arousal scale, particularly at Time 3, $r(211) = .154$, $p=.025$, was positively correlated with greater overall accuracy for the neutral stimuli in the memory task, suggesting that higher levels of self-reported arousal were related to poorer accuracy. Additionally, the PANAS negative affect scale correlated both with the percentage of stimuli endorsed as having been seen before regardless of its novelty, $r(211) = .162$, $p=.018$, as well as with *C* for neutral stimuli, $r(211) = -.154$, $p=.025$.

These results suggest that negative affect may play a role in the memory of neutral stimuli.

Overall, the dependent measures of mood and personality traits correlated in a predictable fashion (see Table 6). For example, the SAM Happiness scale at Time 1 has a strong negative correlation with PANAS Positive Affect at Time 1, $r(211) = -.521$, $p < .000$, as well as a positive correlation with PANAS Negative Affect at Time 1 $r(211) = .478$, $p < .000$. In addition, and in support of a higher baseline of negative affect in those with BPD, PANAS Negative Affect strongly correlated with the PAI-BOR, $r(211) = .639$, $p < .000$, as well as lower self-reported SAM Happiness at Time 1, $r(211) = .463$, $p < .000$. In addition, the PAI-BOR correlated strongly with the TAS-20, $r(211) = .535$, $p < .000$, with a positive correlation between overall level of self-reported borderline personality features and self-reported difficulty with identifying feelings, $r(211) = .605$, $p < .000$.

Though not central to the main hypotheses, the results of the present study also highlight an intriguing effect of gender. For overall accuracy on the perception task, female participants ($M = 75.0\%$, $SD = 8.90\%$) were significantly more accurate than male participants ($M = 70.4\%$, $SD = 11.46\%$), $t(172) = -2.97$, $p = .003$. Consistent with these findings, female participants ($M = 1.05$, $SD = 1.03$) also obtained significantly higher d' scores than male participants ($M = .676$, $SD = .689$), $t(172) = -2.68$, $p = .008$.

Table 6

Correlational Analyses of Personality and Mood Measures

	SAM T1 H	SAM T1 A	SAM T2 H	SAM T2 A	SAM T3 H	SAM T3 A	T BOR	T BOR A	T BOR I	T BOR N	T BOR S	PANAS T1 PA	PANAS T1 NA	PANAS T2 PA	PANAS T2 NA	TAS 20 DDF	TAS 20 DIF	TAS 20 EOT	TAS 20 Total
SAM T1 H	--	-.076	.232**	.018	.467**	.031	.463**	.489**	.388**	.409**	.103	-.521**	.478**	-.459**	.470**	.308**	.363**	.018	.322**
SAM T1 A		--	.031	.232**	-.046	.509**	-.215**	-.163*	-.219**	-.124	-.147*	-.111	-.185**	-.127	-.214**	-.150*	-.228**	.096	-.147*
SAM T2 H			--	-.464**	.469**	-.198**	.097	.100	.112	.078	.002	-.066	.081	-.043	.092	.015	.059	.026	.047
SAM T2 A				--	-.109	.609**	-.028	-.021	-.118	.035	.019	-.053	-.046	-.097	-.085	.023	.064	-.012	.039
SAM T3 H					--	-.196**	.293**	.232**	.312**	.248**	.087	-.303**	.250**	-.275**	.276**	.094	.183**	-.055	.116
SAM T3 A						--	-.072	-.010	-.138*	-.002	-.074	-.048	-.045	-.114	-.098	-.041	-.073	.069	-.030
T BOR							--	.846**	.822**	.825**	.538**	-.266**	.639**	-.280**	.604**	.508**	.605**	.032	.535**
T BOR-A								--	.644**	.620**	.275**	-.288**	.626**	-.314**	.599**	.459**	.558**	.071	.505**
T BOR-I									--	.638**	.183**	-.313**	.561**	-.340**	.539**	.465**	.569**	-.088	.456**
T BOR-N										--	.237**	-.231**	.520**	-.261**	.483**	.344**	.473**	-.151*	.334**
T BOR-S											--	.045	.214**	.092	.195**	.267**	.222**	.285**	.326**
PANAS T1 PA												--	-.216**	.875**	-.228**	-.233**	-.284**	-.027	-.253**
PANAS T1 NA													--	-.298**	.892**	.441**	.482**	-.061	.410**
PANAS T2 PA														--	-.294**	-.284**	-.325**	.027	-.276**
PANAS T2 NA															--	.378**	.430**	-.039	.365**
TAS-20 DDF																--	.743**	.281**	.891**
TAS-20 DIF																	--	.096	.863**
TAS-20 EOT																		--	.522**
TAS-20 Total																			--

Note. *p<.05, **p<.01

4. DISCUSSION AND CONCLUSIONS

The research on borderline personality disorder and emotion regulation has become one of the most debated topics in modern clinical psychology. It is clear that a better understanding of the mechanisms behind the affective problems experienced by those with BPD will likely lead to more effective treatments and perhaps greater insight into the genesis of the disorder, and thus emotion regulation has risen to the forefront of interest for researchers of BPD. The goal of this study was to examine the influences of personality trait (as relevant to Borderline Personality) and mood state upon the perception and memory of interpersonal emotions. However, the mood state aspects of the study could not be answered as it appeared that the mood induction selected failed to have the hypothesized effect upon mood state. Mood induction tasks have a long history of use in psychological research, although their validity and effectiveness have varied, particularly according to the type of mood induction procedure utilized (Gerrards-Hesse, Spies, & Hesse, 1994). However, previous reviews of mood induction procedures have concluded that mood induction procedures can be highly effective under the right conditions and with the right stimulation (Gerrards-Hesse, Spies, & Hesse, 1994; Westermann, Spies, Stahl, & Hess, 1996).

Unfortunately, the guided-imagery mood induction procedure used here proved ineffective at inducing the intended mood state (in this case, negative emotion), although there are a number of possible explanations for this result.When comparing the effects of the mood induction in the present study to the very similarly designed research by

Robins (1988) or Dixon-Gordon et al. (2011), one of the most noticeable discrepancies lies with the effect sizes of the mood induction. One important consideration is the influence of task demand effects as a possible explanation for these discrepancies. Demand effects refer to the tendency for research participants to behave as they feel they are expected to in a research setting. For example, a research participant taking part in a study examining the effects of anger on a prisoner's dilemma task may guess that the mood induction procedure is supposed to induce anger, and so they act in accordance with this and effectively "pretend" that they are angry. Because this anger is artificial, demand effects have the potential to severely impact the validity of mood induction tasks. Demand effects are often present and sometimes even unavoidable in mood induction tasks, primarily due to the obvious nature of the content of the task. For example, many participants in a research study would be able to deduce that the study was supposed to make them feel sad if they are asked to watch a particularly sad film clip. In addition, many of the most commonly used mood induction procedures in past research explicitly direct the participant to adopt a specific emotional state, which makes the purpose of the research very clear to the participant (Westermann et al., 1996). Because demand effects are likely to vary between studies and research settings, this could help account for the present study's discrepancies from the effects found by Robins (1988) and Dixon-Gordon et al. (2011), as this could have resulted in decreased demand effects in the current study. Reduced demand effects could potentially result in lower effect sizes, as Westermann et al. (1996) found that effect sizes were often smaller in mood induction procedures without demand effects.

In addition to demand effects, research has shown that certain mood induction techniques often lack emotional specificity, and that an induction procedure designed to elicit sadness may also elicit anger (Martin, 1990; Westermann et al., 1996). Because these two emotions are both negative and conceptually linked, this could negatively impact a task which does not control for the effects of anger in addition to sadness. For example, a research study intending to induce sadness in participants and includes a measure of self-reported anger or arousal (such as the Arousal SAM used here) would be better able to conclude about the effects of sadness on performance or behavior. Additionally, cognitive psychological and self-control literature has consistently found that individuals who experience a negative mood state will often take steps to decrease or eliminate this negative mood state by engaging in coping strategies designed to induce a more positive mood (Affleck & Tennen, 1996; Folkman & Moskowitz, 2000; Mayer & Stevens, 1994; Seeman & Schwarz, 1974; Tugade & Fredrickson, 2011). The finding that the PANAS negative affect scale correlated with a slight bias towards endorsing the stimuli as having been seen before offers some support for the theory that participants in a negative mood state may engage in cognitive coping strategies designed to alleviate this negative affect and induce more neutral or positive mood states, as mood-congruency effects would predict that those individuals who were engaging in coping strategies designed to shift from a negative mood state to a more neutral mood state would likely try to remember more neutral events to overcome this negative affect, and thus be more likely to endorse neutral stimuli on the memory task as having been seen before.

Thus, in the current study, it is reasonable to assume that in the event that participants experienced increased negative affect as a result of the negative mood induction, they would likely have taken steps to counter this mood and possibly compensated by increasing their level of neutral or positive affect. This hypothesis has some support with the current data, as the PANAS indicated that overall negative affect did not increase following the negative mood induction, and although the SAM Happiness scaleindicated that the negative mood induction did succeed in reducing participants' overall level of self-reported happiness, this effect was present for both the experimental and control groups and may not have been the result of the valence of the mood induction. Because happiness is only one component of positive affect, it is also possible that participants experienced decreased happiness as a result of the negative mood induction and thus activated other positive affective coping strategies in order to reduce the impact of a negative mood state.

Other possible explanations for the failure of the experimental manipulation include the possibility that the mood induction procedure itself was flawed, or that participants simply did not exert enough effort towards the internalization of the negative affect from the guided-imagery script. With regards to the mood induction procedure, the guided-imagery script was adapted from research by Robins (1988) and Dixon-Gordon et al. (2011) which both found good overall effect sizes of this mood induction procedure at inducing negative mood, although the present procedure was not identical. In Robins' (1988) (as well as later in Dixon-Gordon et al., 2011) original study, participants listened to one of two different audio recordings of a social-rejection

scenario designed to elicit overall negative mood, with the only difference between tapes being references to gender (i.e., male participants received an audio recording in which they are rejected by a female partner, and female participants received an audio recording in which they are rejected by a male partner), without accounting for participants who identify as homosexual. In an attempt to eliminate the use of multiple audio recordings in the current study design and to allow for participants who identify as homosexual, the guided-imagery script was modified to use gender-neutral terminology (i.e., "significant other" instead of "boyfriend" or "girlfriend"). This presented an additional problem with regards to the original script, as Robins' (1988) script described a rejection scenario in which the participant calls their significant other and another person of the same sex as the participant answers the telephone. When using gender-neutral terms, the script would have become overly complicated and confusing when using the same scenario, and so the rejection scenario was modified and updated to describe the participant discovering flirtatious text messages on the cell phone of their significant other after being asked by their significant other to check something on the cell phone. Though the tone and scenarios between Robins' (1988) study and the current study were designed to be as similar as possible, these necessary modifications could have potentially altered the effectiveness of the negative mood induction overall.

With regards to participant effort, due to the nature of the recruiting method (recruiting participants from a psychology subject pool of undergraduate students), sufficient effort for successful mood induction may not have been exerted by participants, who were selected from an undergraduate subject pool and may primarily

be extrinsically motivated rather than intrinsically motivated. The guided-imagery script relies heavily on participant motivation to engage in active immersion in the described scenario in order to induce negative emotion. Thus, limited effort or attention during the presentation of the guided-imagery script could also result in a lack of effect from the mood induction procedure.

Though the experimental mood manipulation proved ineffective, the current study was still informative with respect to the influence of traits upon emotional information processing. The PANAS showed several weak correlations between affect and task performance. The correlation between negative affect and the overall tendency to endorse stimuli as negative on the perception task provides some support for affecteffects on emotion perception bias. With regards to positive affect, self-reported positive affect following the mood induction task was associated with poorer perception task accuracy. Though memory effects were modest, there was an association between negative affect following the mood induction procedure and a bias towards endorsing stimuli as having been seen before.

In addition, the results of the current research suggest that there were several intriguing effects of borderline personality features on task performance which may help elucidate certain points of disagreement regarding BPD and emotion perception that has been frequently encountered in past research on the topic.Trull (1995) had success in comparing the borderline personality features in undergraduate students through the use of categorical designations of those high in borderline features and those low in borderline features using a cut score of $\geq 70T$ on the PAI-BOR. However, this result did

not replicate for the present research, possibly due to an insufficient sample size for those in the high-BOR group. The PAI-BOR, however, allows for a continuous examination of the level of self-reported borderline personality features due to its use of *T*-scores, and so correlational analyses were possible to determine if, in general, higher levels of self-reported borderline personality features tended to correlate with better or worse performance on a facial affect recognition task. The results indicated that there was an effect of level of borderline personality features on response bias for the perception task, such that higher levels of borderline personality features resulted in a greater tendency to interpret facial affect stimuli as negative, regardless of its actual emotional valence as negative or neutral. Though this is a weak correlation, it does provide support for previous research which has found that individuals with BPD tend to perceive ambiguous stimuli as more negative than in they are in reality (Scott et al., 2011).

The PAI-BOR provides a significant benefit for a more thorough examination of this effect due to its composition of four subscales which each represent distinct areas of borderline personality pathology. Almost all of the prior research on BPD and emotion perception has focused on BPD from a holistic perspective, usually requiring BPD participants to meet DSM-IV-TR (American Psychiatric Association, 2000) criteria for borderline personality disorder. However, there is considerable overlap amongst different personality disorders, and much recent research has focused on the problems inherent with a categorical model of personality disorders, characterizing them instead as dimensions of pathological personality (Krueger, Eaton, Derringer, Markon, Watson,

&Skodol, 2011; Skodol, Bender, Morey, Clark, Oldham, Alarcon, Krueger, … Siever, 2011; Skodol, Clark, Bender, Krueger, Morey, Verheul, Alarcon, … Oldham, 2011; Trull & Durrett, 2005; Widiger & Simonsen, 2005; Widiger & Trull, 2007). Currently, the DSM-IV-TR lists diagnostic criteria for BPD as requiring five of nine separate criteria for a diagnosis. However, since any five of the nine criteria are adequate for a diagnosis of BPD, there is much heterogeneity within the disorder itself (Trull & Durrett, 2005). For example, one individual with a diagnosis of BPD may exhibit (1) efforts to avoid abandonment, (2) unstable interpersonal relationships, (3) disturbed identity, (4) self-damaging impulsivity, and (5) suicidal ideation, while a separate individual who shares a diagnosis of BPD exhibits (1) suicidal ideation, (2) affective instability, (3) chronic feelings of emptiness, (4) inappropriate anger, and (5) dissociative symptoms (American Psychiatric Association, 2000). Though these two individuals share a diagnosis, the manner of the disorder's expression varies greatly between these individuals. Thus, existing research on emotion perception in BPD based on the DSM-IV-TR's current categorical model of diagnosis would fail to take into account this heterogeneity within BPD, and thus a possible explanation for the conflicting results of such research could be that there is a specific component(s) of BPD that would play a more influential role in emotion perception abilities in those with BPD than another component(s) might.

In the present study, the PAI-BOR's subscales (BOR-A, BOR-I, BOR-N, and BOR-S) reflect this variability within BPD and allows for a more detailed examination of how different aspects of BPD affect emotion perception. The results suggest that the

affective instability component of BPD (BOR-A), which reflects frequently shifting negative emotions, may be partially associated with the slight negativity bias seen when comparing high-BOR participants' performance on the perception task. This makes conceptual sense, as BOR-A is a measure of unstable emotions and would suggest that the ability of someone high on BOR-A to accurately perceive the emotional state of other individuals would also be unstable. In addition to BOR-A, self-harming impulsivity (BOR-S) also appears to have a strong influence on emotion perception abilities. The strongest correlations in the current study were found between BOR-S and *d'* and *C* for the perception task, although BOR-S is also significantly correlated with overall accuracy and the tendency to endorse stimuli as negative on the perception task. Taken together, these results suggest that the impulsivity aspect of borderline personality disorder may be a critical component of emotion perception in BPD. This is an intriguing result in the context of this research, as it suggests that impulsivity may play an important role in adding to the understanding of how individuals with BPD perceive the emotional states of others. Because impulsivity would be expected to vary amongst those with a diagnosis of BPD (with some individuals being highly impulsive while others express their pathology in other ways), this suggests that previous research on emotion perception in BPD which failed to account for impulsivity may have overlooked a critical variable in the exploration of perception abilities in BPD, and that impulsivity may help account for why reports of accuracy advantages and reports of accuracy disadvantages exist simultaneously (Levine, Marziali, & Hood, 1997; Lynch et al., 2006; Wagner & Linehan, 1999).

The research on impulsivity in BPD (and impulsivity in general) has consistently shown that impulsivity tends to be a stable, biologically-based trait which can have severe negative impacts on an individual's well-being (Berlin & Rolls, 2004; Berlin, Rolls, & Iversen, 2005; Bornovalova, LeJuez, Daughters, Rosenthal, & Lynch, 2005; LeJuez, Magidson, Mitchell, Sinha, Stevens, & de Wit, 2010; Links, Heslegrave, & van Reekum, 1999). Research has also shown that BPD and ADHD share many qualities, particularly with regards to affective instability and impulsivity, and that adults with BPD often experienced ADHD symptoms in childhood (Davids & Gastpar, 2005; Fossati, Novella, Donati, Donini, & Maffei, 2002; Philipsen, 2006; Philipsen, Limberger, Lieb, Feige, Kleindienst, Ebner-Priemer, Barth, ... Bohus, 2008). Of particular interest to the current study, research on ADHD and emotion perception has consistently shown deficits in those with ADHD, especially when tasked with recognizing emotion from facial expressions (Da Fonseca, Seguier, Santos, Poinso, & Deruelle, 2009; Rapport, Friedman, Tzelepis, & Van Voorhis, 2002; Uekermann, Kraemer, Abdel-Hamid, Schimmelmann, Hebebrand, Daum, Wiltfang, & Kis, 2010). As both BPD and ADHD share many conceptually similar symptoms, this evidence lends support to the idea that impulsivity in BPD may be a driving force behind deficits in emotion recognition.

In regards to the memory task, although there was not much of significance identified in the current study, there did appear to be several modest correlations between emotional experience, personality traits, and memory. In particular, participant arousal played a role in how discriminative participants tended to be for both negative

and neutral stimuli. This is intriguing, as "arousal" in the current context refers not to any specific emotional state, but rather to a somewhat more vague sense of alertness and excitement. However, though it may seem that a higher state of alertness during the perception task may increase performance on the memory task, the opposite is true in the current study. In other words, the greater the level of self-reported arousal participants experienced, the more likely they were to endorse the negative memory stimuli as having been seen before, regardless of its novelty. Much of the research literature supports the idea that emotional arousal during the encoding of an event has a significant impact on retrieval, particularly with regards to detailed memory (Bradley, Greenwald, Petry, & Lang, 1992; Mather, 2007; Mather, Mitchell, Raye, Novak, Greene, & Johnson, 2006; Mather & Sutherland, 2009). In the current study, it is possible that participant arousal during the perception task (encoding) made all negative stimuli during the memory task (retrieval) seem familiar due to the lack of encoding of accurate details. In effect, it is possible that participants were encoding the valence of the stimulus more strongly than the detailed features of the stimulus, which would make them more likely to endorse all negative stimuli as having been seen before regardless of their novelty. This seems further supported by the finding that for neutral stimuli on the memory task, participants who reported lower levels of arousal were significantly more accurate at discriminating between those neutral stimuli which had been seen before and those which had not than participants who reported higher levels of arousal.

When examining memory performance and personality traits, BOR-N correlated with a slight bias towards endorsing negative stimuli as having been seen before

regardless of its novelty. In other words, participants who scored higher on BOR-N were more likely to endorse negative stimuli as having been seen during the perception task simply because of its emotional valence as negative. This would suggest that a bias may be possible for memory of negative events which is driven by the negative relationships component of BPD. This finding fits well with the current understanding of BOR-N, in that participants who score high on this subscale report a history of negative interpersonal relationships in the past which may make them more susceptible to a distorted memory of interpersonal interactions as negative. Thus, in the present study, individuals scoring high on BOR-N may have been more likely to endorse negative stimuli as having been seen before during the memory task due to their potential lack of specificity for negative recall.

In general, there were strong correlations between dependent measures of mood and personality traits in expectable directions. For example, the PANAS and the SAM reflected agreement for negative mood, and the PAI-BOR and the TAS-20 reflected agreement for difficulties with emotion regulation. In addition, there were several indications that theorized associations between personality traits and mood were supported in the current data; for example, the PAI-BOR correlated with higher levels of self-reported negative affect, which reflects the idea that individuals with higher levels of borderline personality experience higher baseline levels of negative mood. These results support the idea that the current study was accurately measuring affective state and interpersonally problematic personality traits.

Gender also influenced the accuracy of participants on the emotion perception task. This finding provides further evidence for the possibility of a fundamental difference in how men and women perceive emotions, a phenomena which has been well-researched (Biele & Grabowska, 2006; Hofer, Siedentopf, Ischebeck, Rettenbacher, Verius, Felber, & Fleischhacker, 2006; Killgore & Yurgelun-Todd, 2001; Montagne, Kessels, Frigerio, de Haan, & Perrett, 2005; Vashkinn, Sundet, Friis, Simonsen, Birkenæs, Engh, Jónsdóttir, ... Andreassen, 2007). This is particularly relevant in the current context, as it is often estimated that two-thirds of those diagnosed with BPD are female (Swartz, Blazer, George, & Winfield, 1990). Thus, the demographic makeup of males vs. females in research examining emotion perception in BPD would need to account for any potential sex effects, as it is possible that this may help explain some of the conflicting results on the topic.

One potential limitation of the findings of the current study is that most of the data analysis consisted of correlational analyses using many different variables. Because of this somewhat high number of variables included, it would be expected that certain correlations may be due to chance. Specifically, around 5% of the significant correlations for the perception, memory, and dependent measures analyses would be expected due to Type 1 error. While the number of statistical correlations for the perception task is high enough that it would suggest true significance for at least some of the variables, the relatively low number for the memory task may instead suggest that the few effects that were found for memory may not hold up under study replication.

The future direction of this type of research will need to focus on the identification of specific characteristics which affect emotion perception abilities among those with BPD. The research suggests that BPD is often marked by considerable individual differences, both in terms of the heterogeneity of diagnostic criteria and among specific characteristics of BPD, such as impulsivity or affective instability. Though the current study failed to effectively manipulate participant affect, the theory behind this research remains plausible: the greater likelihood of a negative affective state at baseline in those with BPD may help account for the variability in research on emotion perception in BPD. Future research could attempt to replicate the design of the current study with a more effective mood induction procedure (such as movie clips) in order to better determine how mood affects emotion perception. In addition, because the majority of the significant findings in the present study were correlational, there is a need for research to further explore these findings in an attempt to better understand borderline personality disorder. As an alternative, future research could attempt to induce impulsivity in participants to determine how this affects emotion perception in order to further explore the role of impulsivity.

In conclusion, though the experimental manipulation failed to produce the intended effect, the results do provide some support for the idea of personality and mood interactions on emotion perception. Because interpersonal interactions are so often the cause of distress in those with BPD, a greater understanding of the mechanisms behind interpersonal perception is needed to inform treatment methodologies for BPD. The results of the present study suggest that the impulsivity component of BPD may play a

role in the volatility of interpersonal interactions, and this warrants further exploration. The research into emotion perception in BPD remains ongoing, and as more in-depth analyses of the influence of specific characteristics of BPD on emotion regulation and perception increases, so too will the understanding of the mechanisms behind one of the most clinically prevalent and problematic psychological disorders.

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APPENDIX

Negative Mood Induction Guided-Imagery Script (adapted from Dixon-Gordon et al., 2011)

Narrator: Please listen to this taped message very carefully. You will hear a description of a series of events, and you are to imagine that these things are happening toyou. In order to help your imagination, please close your eyes, become relaxed and payattention only to this tape. Try to imagine what you hear as vividly as you can. Form amental picture of what is described, trying to include as much detail as you can. Try toget involved in what you hear, and experience how you might feel if this were reallyhappening to you. Imagine yourself in this situation.

Narrator: You have been in town for only a short time, and you have found it a difficult transition in many ways. In particular, you have been trying to meet people, make newfriends, and this has been difficult. Fortunately, you have made a few friends, andparticularly important, you have been seeing someoneromantically who you like very much, and at thispoint, you feel very committed to them. Last night, your romantic partner came over to your apartment to spend some time with you, and you were watching a movie together on the couch. At one point, your partner got up to use the restroom, and while they were gone their phone, which they had left on the coffee table next to the couch, started ringing. Your partner called out to ask you to see who was calling, and you did so, and they told you it wasn't important and they would just call back later. However, as you were looking at the phone, you noticed a number of missed calls from someone you didn't recognize, which is odd since you know most of your romantic partner's friends. You decided to quickly peek at the phone's text messages, and saw that there were many texts from this same person, all of which referred to your romantic partner in a very affectionate way, and one text, which had been sent earlier that day, caught your eye, which said:
"Hey you! I can't wait to see you again tomorrow night! I still can't get over how much fun we had last week!"
You put the phone back on the coffee table, and your thoughts were spinning with what the texts and calls could mean. At this point, your romantic partner came back into the living room, but you were still too confused to bring up the messages you'd seen. You continued watching the movie, but you weren't really paying attention, and instead were thinking about those messages. After the movie was over, your romantic partner tells you they have to leave since they had to be at work early the next morning since they were a bit behind. You casually asked if your partner wanted to get together for dinner the following night, but they said they couldn't since they would have to work late as well. You decided

not to bring up the messages you'd seen, since you needed some time to think about it.

Now today, you decide to stop by your romantic partner's workplace with some fast food takeout, since they had said they'd be working late and probably wouldn't have time to grab something. When you get to your partner's workplace, however, you are told that your partner wasn't working late, and had left work at the normal time. Your worst suspicionseems confirmed. You feel utterly rejected.

Narrator: After you leave, you decide to go to a coffee shop to get something to drink, and hopefully, meet some of your friends to talk to, to take your mind off this. Youorder and sit at an empty booth. The booths have high partitions between them. As you sitdown, you immediately recognize the voices of the people in an adjoining booth. Theyare two friends of yours, and you are about to go around and join them when you noticethat they seem to be talking about you, so you sit and listen. You realize that your friends are talking about a party you'd recently gone to together, and they say they can't believe how silly you sounded in a debate you'd had with another mutual friend, and that you were very unaware and close-minded. They say that you are too argumentative, and while you can be reasonable sometimes, certain things just get way out of hand. In addition, they mention how oblivious you were of other people's reactions to what you were saying, and how it made you look really bad. One of your friends mentions that it's a shame, really, because you can be really nice in some ways, but the way you act around others is just going to cause you to lose friends, and your other friend agrees.At this point, your friends begin talking about your romantic partner. One of your friends says they saw your partner walking down the street with their arm around someone, and your other friend says that you probably don't even know what's going on. Your friends debate telling you about it, and mention that though they can understand why your partner would want to see someone else, it was still a pretty lousy thing to do behind your back, and they feel sorry for you.

Narrator: Now please try to remember the events described on this tape, and spend a minute going over them in your mind's eye. Remember your situation in a new town,the cell phone messages you'd seen, the visit to your romantic partner's workplace, and the overheardconversation in the coffee shop. Keep your eyes closed, and imagine these events until you're asked to stop.

[30 second delay]

Neutral Mood Induction Guided-Imagery Script (adapted from Tiffany & Drobes, 1990)

Narrator: Please listen to this taped message very carefully. You will hear a description of a series of events, and you are to imagine that these things are happening toyou. In order to help your imagination, please close your eyes, become relaxed and payattention only to this tape. Try to imagine what you hear as vividly as you can. Form amental picture of what is described, trying to include as much detail as you can. Try toget involved in what you hear, and experience how you might feel if this were reallyhappening to you. Imagine yourself in this situation.

Narrator: It is a Saturday morning, and you have just woken up. You go to the kitchen to look for something to eat for breakfast, and while you're in the kitchen, you notice that one of the light bulbs in the ceiling fixture has burnt out. You drag a kitchen chair under the light fixture to change the bulb. When you stand on the chair you can easily reach the screws that hold the fixture on to the ceiling. You start turning one of the screws, and as the glass cover begins to come loose, you place your hand over it to hold it in place. With your free hand you try to turn the last screw, but it's on pretty tight and your fingers slip. You clamp down harder this time and give it a good twist. The screw comes free and you're able to slip the cover off. You place the screws in the cover and climb off the chair. Getting back up on the chair, you start to unscrew the old bulb. It looks old and dirty; you're surprised that it hadn't burned out earlier. After putting the old bulb in the garbage bin, you get a replacement bulb, get back up on the chair, and screw it into place. You then replace the glass cover, get down off the chair, and then move the chair back to its usual spot.You then eat breakfast, and since it's still morning and you don't have any plans for the day until later in the afternoon, you decide to work on some things around your home. There are some dishes in the kitchen sink, so you decide to load them into the dishwasher. You start with the utensils: forks, spoons, and knives. Next you load the plates. Finally, you load the pots, pans, and other dishes into the dishwasher. You add detergent, close the door, and turn the dishwasher on. You decide to do your laundry next, so you get your laundry and head to the laundromat. Once you get there, you begin sorting out your clothes to put into the washing machines. The place has some other people, but it's certainly not too busy, and you are easily able to find two machines next to each other that were not being used. The smell of hot exhaust from the dryers fills the air, and noise from the machines covers up the sounds from the television turned on in the corner of the room. You put your clothes into the washers and add some soap. You dig through your pockets for change and discover that you don't have enough so you take out a dollar bill and walk over to the change machine against the wall. You feed your bill into the changer and quarters spill into the cup below. Now you'll have plenty of change to finish your wash.

While you're waiting for your clothes to finish washing, you decide to head next door to a cafe to get lunch. As you enter the cafe, you are surrounded by the sounds of dishes being bussed and the conversation of other diners. The atmosphere in the cafe is quite plain; booths with red vinyl seats, brown Formica tables with a metal rack containing salt and pepper shakers and toothpicks on one side, and a bottle of ketchup on the other. You order a sandwich and your favorite beverage, which doesn't take long to arrive. As you sit and eat, you notice some of the other diners. A family of four, with two children, is sitting at a nearby booth. Sitting at the counter of the diner is an elderly man engaged in conversation with one of the waitresses, and it seems like the man is probably a regular in the cafe who the waitress knows well. After you finish eating, you pay your bill and head back to the laundromat to change your clothes over to a dryer. While they're drying, you sit in one of the chairs in the corner and look through a pile of magazines that are sitting on a coffee table nearby. One of the magazines seems interesting, so you flip through it and find a few interesting articles to read. Once you're done with the magazine, you look up to the television, which is playing a popular sitcom. It's difficult to hear with the sound of the machines, so you turn it up a little with a nearby remote control. After a little while, you hear your dryer buzz, which means your clothes are done. You open the dryer, gather and fold your clothes, and head back home. Once you're back, you put your clean clothes away and decide the only thing left that needs to be done is to rake some of the leaves out of the front yard. There's only one small tree on the lawn so there's not much raking that needs to be done. You get a rake and start raking them into a small pile. Some of the leaves are wet and matted into the grass. You have to press down hard on the rake to lift these leaves out. As you rake all of the brown leaves into a pile you can smell their musty odor. You start to feel a little warm so you take your jacket off and drape it over one of the branches of the tree. You can feel the wind blowing lightly on your face as you continue raking. You notice the drone of a plane flying right above you. You lean on your rake and watch as the plane flies by. Once you're finished raking, you go back inside and decide to just relax for a while until you're ready to go out and meet your friends in the afternoon.

Narrator: Now please try to remember the events described on this tape, and spend a minute going over them in your mind’s eye. Remember changing the light bulb, filling the dishwasher, taking your clothes to the laundromat, eating lunch at the cafe, and raking the leaves. Keep your eyes closed, and imagine these events until you’re asked to stop.

[30 second delay]