Implicit Measure of Emotions:
Distinguishing among Emotions of the Same Valence

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THESIS
Submitted as partial fulfillment of the requirements
for the degree of Master of Arts in Psychology (Clinical Psychology)
in the Graduate College of the
University of Illinois at Chicago, 2012
Chicago, Illinois

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SUMMARY

Investigators commonly assess emotions with explicit measures (e.g., the POMS; McNair, Lorr, & Doppleman, 1971) despite their shortcomings (e.g., transparency of research hypothesis, sensitivity to social desirability concerns). Although implicit measures of general positive and negative affect are available (Quirin, Kazen, & Kuhl, 2009), ones that discriminate among emotions of the same valence (e.g., sadness vs. anger) are lacking.

This study is an initial step toward development of such a measure. We hypothesized that ratings of the emotional content of briefly presented visual stimuli would reflect current emotional state, in part via the feelings-as-information mechanisms (Schwarz, 2011), and thus index those states in an indirect manner.

Participants heard a sadness- or relaxation-inducing story. Next, they saw 20 abstract paintings and rated whether each displayed anger, fear, happiness, sadness, or no emotion. We also administered the POMS. The two groups differed, as predicted, when inferring the levels of sadness and happiness portrayed in the paintings. Specifically, compared to the relaxed individuals, sad participants judged that paintings displayed less happiness and more sadness. Interestingly, the groups did not differ when inferring the levels of anger and fear portrayed. Thus the novel implicit measure thus was not only sensitive but also specific in detecting change in levels of sadness. The POMS did not uniquely detect the experimentally-induced shift in sadness.
I. INTRODUCTION

Although emotional experience is such a fundamental and inseparable part of people’s lives, study of emotions was hampered in the first half of the twentieth century by a view of emotion as a scientifically useless concept (Duffy, 1934). During the last few decades, however, the scientific approach to study of emotions began to flourish. Obviously, to study emotions, it is essential to assess emotional states in a valid and reliable way, and in the past, self-report measures were used for this purpose (e.g., the Profile of Mood States, POMS; McNair, Lorr, & Doppleman, 1971).

Yet, there are multiple shortcomings associated with self-report measures. First, because the purpose of the measure is transparent, participants may alter their responses to conform to demand characteristics including reporting emotions inaccurately to portray themselves in a socially desirable manner (Paulhus & Reid, 1991). Similarly, cultural norms or gender may also lead to biased self-reported emotions (Barrett, Robin, Pietromonaco, & Eysell, 1998). Furthermore, when negative emotions are detrimental to self-perception, people may, consciously or not, defensively deny experiencing negative emotions (Derakshan & Eysenck, 1997). Moreover, in cases of subtle emotional states (e.g. induced subliminally) the impact of emotions may be present, and yet people may be unable to report their emotions accurately (Weinberger, Kelner, & McClelland, 1997). One could enumerate additional flaws concerning self-report measures of emotions, but in a nutshell, assessing emotions through self-reports requires making two unwarranted assumptions (1) that people are always aware of and able to report their emotional states accurately and (2) that they are willing to do so in an honest manner.

Moreover, when reporting one’s affect, a person has to focus on his or her emotions, and research shows that such focus is often sufficient to alter the emotional state (Lieberman, 2007).
Hence, using self-reports may change the phenomena before it is appropriately assessed. This could explain why, unlike implicit measures, self-report measures of affect do not correlate with one’s physiological reactions (e.g. cortisol release; Quirin, Kazén, Rohrmann, & Kuhl, 2009).

Finally, self-report measures of emotions sometimes yield theoretically unexpected results. Whereas the unexpected can be informative, some results are so unexpected that they suggest the methods are faulty. To give an example, according to circumplex models of emotion (Russell, 1980), sadness and anger are characterized by different levels of arousal; both of these emotions are negative, but sadness is associated with low arousal levels whereas anger is characterized by high levels of arousal. Because one can experience either high or low arousal state, but not both of these states simultaneously, a person should not feel both angry and sad at the same time.

Similarly, the appraisal theory of emotions also predicts that anger and sadness should not co-occur because they are set apart on the agency dimension; that is, people who feel sad consider situational circumstances (beyond anyone’s control) as responsible for negative consequences, whereas those who feel angry consider other individuals as the responsible agents (Smith & Ellsworth, 1985). Indeed, research confirms the appraisal theory’s predictions in that induction of sadness or anger reduces the subsequent emotion of anger or sadness, respectively (Winterich, Han, & Lerner, 2010). In a similar way, Ekman (1999) who earlier believed that two emotions could blend together to form more complex emotions is “less certain now about whether or not two basic emotions can occur simultaneously” (p. 47). And yet, when measuring anger and sadness via self-report measures, the two emotions usually have high positive correlation (e.g., Bartoszek & Cervone, 2009 – r=.65; Norcross, Gaudagnoli, & Prochaska, 1984)
– $r=.72$; Smith & Ellsworth, 1987 – $r=.82$); that is, participants who report feeling angry are more likely to report simultaneously feeling sad.

Thus, the need for implicit (indirect) measures of discrete emotional states is particularly acute. Unfortunately, although psychologists have devised implicit measures of attitudes and motives (Perugini & Banse, 2007; Wittenbrink & Schwarz, 2007), implicit measures of different emotional states are lacking. It is now commonly accepted that any emotion may be an amalgamation of simultaneously co-occurring different components such as behavioral tendencies, physiological reactions, and/or cognitive patterns (Mauss & Robinson, 2009; J. a Russell & Barrett, 1999). Thus, it seems conceivable that to measure emotions implicitly, one could assess one or more of the above components of emotions and make inferences about emotional experience. Following is a review of indirect measures of affect; the review is limited to these measures that a) are promising in their capacity to differentiate emotions of the same valence, and b) are fairly accessible to most researchers (see Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000; Larsen, Berntson, Poehlmann, Ito, & Cacioppo, 2008; Mauss & Robinson, 2009 for more comprehensive review). Finally, because research on positive emotions is a relatively new endeavor and number of studies is limited, the review will mostly focus on differentiation of negative emotions.

A. **Indirect Measures of emotions**

1. **Facial expressions**

Quite often researchers may observe participants’ facial expressions in order to make inference about people’s emotional states (e.g. Tian, Kanade, & Cohn, 2005), and the most commonly used tool is the Facial Action Coding System (FACS; Ekman & Friesen, 1978). Indeed, previous research indicates that emotion of disgust may be observed in facial
expressions; however, such findings are evident only for a minute subset of participants (Ekman, Freisen, & Ancoli, 1980; Rosenberg & Ekman, 1994; also see Bonanno & Keltner, 2004 for similar finding regarding anger and sadness). Moreover, research also suggests that experience of emotions may be translated into facial expressions mainly when the emotion is intense, and consequently, facial expressions may be inadequate indicator of subtle emotional states. In fact, studies that do find a link between emotions and facial expressions rely on powerful emotion-eliciting stimuli such as interviews with recently widowed bereaving individuals (e.g. Bonanno & Keltner, 2004), and movies depicting death by piece of wood piercing man’s chest (Ekman et al., 1980) or burn patients and amputation procedures (Rosenberg & Ekman, 1994).

Some emotions may not be easily translated into facial expressions also because of other factors such as cultural norms (e.g., display rules), gender, or presence of an audience (e.g., Fridlund, 1991; also see Parkinson, 2005 and Russell, 1994 for a critical review of facial expression research). Thus, people may be capable of inhibiting or exaggerating emotionally laden behaviors (e.g. facial expressions), and “not only can there be emotion without expression, there can be what appears to be expression without emotion” (Ekman, 1999, p. 48).

Might microexpressions (i.e. spontaneous expressions lasting less than half a second) reveal emotions that may be concealed or masked? So far research has mostly examined microexpressions as a tool in detecting deception and lying (e.g. Ekman & O’Sullivan, 1991; Frank & Ekman, 1997). Microexpression research that focused on discrete emotions indicates that complete microexpressions are infrequent, and when they occur, they often yield false positive information (Porter & Brinke, 2008).

Another way to overcome the problem of concealed expressions could be through the assessment of facial electromyographic (EMG) activity. Results of one study showed that
activity of levator labii (muscle responsible for lifting the upper lip) was increased when participants experienced disgust compared to anger (Vrana, 1993). However, attempts to differentiate other negative emotions using facial EMG brought partial, mixed, or contradictory findings; for example, while some studies do not find support for the prediction that a specific facial muscle (e.g. masseter) would differentiate between different emotions (e.g. anger and sadness; Brown & Schwartz, 1980), others find results opposite to what could be expected (Hess, Kappas, McHugo, Lanzetta, & Kleck, 1992). Thus it is not surprising that recent reviews find EMG research inadequate for differentiating discrete emotions of the same valence and at best able to discriminate emotions on arousal, valence, or intensity dimension (Larsen et al., 2008; Mauss & Robinson, 2009).

In sum, most research indicates that although facial expressions seem to be indicative of valence and intensity, they rarely (with exception of disgust) indicate discrete emotional states. Emotions are usually revealed in facial expressions only for a small fraction of participants and only when the emotions are intense; moreover, even when intense, some emotions (e.g. fear) are not easily translated into facial expressions. In addition, neither microexpression nor EMG research seems to overcome these problems. While microexpressions are infrequent and often yield false positive information, EMG findings are often mixed or even contradictory.

2. Autonomic nervous system

A number of researchers attempt to differentiate emotions by measuring activity of autonomic nervous system (ANS), and the most often used index of ANS activity is the heart rate. For example, Ekman and colleagues induced six basic emotions using Directed Facial Action (DFA) task and measured physiology associated with each emotion (Ekman, Levenson, & Friesen, 1983; Levenson, Carstensen, Friesen, & Ekman, 1991; Levenson, Ekman, & Friesen,
1990). They reported that heart rate was elevated in anger, fear, and sadness compared to disgust, happiness, or surprise. However, Boiten (1996) argued and experimentally confirmed that changes in heart rate were not caused by specific emotions but rather mediated by changes in respiration associated with the effort required to produce these facial expressions; moreover, posing non-emotional facial expression increased heart rates as much as posing emotional facial expressions.

Others also reported that people who imagined reliving either anger- or fear-provoking situation also experienced elevated heart rates but so did people who simply imagined shooting baskets on a basketball court (e.g., Sinha, 1996). Thus it is likely that the observed changes in heart rates were due to non-emotional artifacts of the emotion-induction procedure. Indeed, Stemmler, Heldmann, Pauls, and Scherer (2001) found that the physical and/or mental demands of various emotion-manipulation tasks (i.e., real-life vs. imagery induction) vary greatly and have different effects on the ANS activity. Furthermore, their study showed that eleven of 29 indices of ANS activity were changed in one but not the other emotion-induction procedure. Similarly, a study by Lobbestael, Arntz, and Wiers (2008) indicated that four of five measures of physiological activity (i.e., heart rate, skin conductance response, systolic and diastolic blood pressure) differed significantly across four different anger-induction procedures. This is not to say that there is no emotion-specific ANS activity, but so far the results are at best mixed, especially when examining the results across different emotion-induction procedures (e.g., Ekman et al., 1983).

One explanation of such inconsistencies is the fact that even the same emotion (e.g., fear) may require different actions (e.g., flight or freeze) depending on a situation. Because each of these action will likely recruit different ANS activity, there may not be one-to-one
correspondence between emotion and its physiological signature (Davidson, 1993). Finally, it is also important to note that the ANS is associated with many functions (e.g., body’s thermoregulation) that do not necessarily relate to emotional experience. It is not surprising that recent meta-analyses and reviews reported that ANS activity may be informative about emotional valence or arousal but do not consistently differentiate among discrete emotions of the same valence (Cacioppo et al., 2000; Mauss & Robinson, 2009).

In sum, while research found some emotion-specific activity of ANS, such findings are quite inconsistent. Physiology seems to be affected more by the non-emotional aspects of emotion-induction procedures than by emotions per se.

3. Cognitive patterns

Number of studies has indicated that (both normal and pathological) affective states impact various aspects of cognition including memory (e.g., Bower, 1981; Levine & Pizarro, 2004), attention (e.g., Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007; Donaldson, Lam, & Mathews, 2007), processing speed/reaction time (Erthal et al., 2005; Schacht & Sommer, 2009), visual information processing (Gasper, 2004), perceptual accuracy (Winer & Snodgrass, in press), and creativity (e.g., Davis, 2009); however, research mostly focused on the effects of general positive/negative mood or mood disorders on these cognitive processes. Much stronger support for differential effects of discrete emotions of the same valence comes from research on higher order cognition, especially evaluative judgment and interpretation.

Numerous studies showed that people’s mood may sway their evaluative judgment (e.g., Isen, Shalker, Clark, & Karp, 1978; Keltner, Locke, & Audrain, 1993; Siemer & Reisenzein, 1998). Schwarz and Clore (1983) proposed that individuals use their mood as information when
evaluating or judging a situation or its aspect even if the situation did not cause their emotional states. Most importantly, research showed that various discrete emotions have specific effects on one’s judgment. For example, Keltner, Ellsworth, and Edwards (1993) showed that compared to angry individuals, sad people considered situational factors to be more responsible for ambiguous events; in turn, unlike sad individuals, angry people considered other humans (rather than situational factors) to be responsible agents. In another study, Lerner and Keltner (2001) demonstrated that fear leads to more pessimistic risk estimates compared to anger, which, akin to happiness, leads to more optimistic risk choices. Recent meta-analyses and reviews of such studies also indicate differential effects of anger, fear, and sadness on judgment (e.g., Lench, Flores, & Bench, 2011; Schwarz & Clore, 2007). It is not surprising then that what started as a mood-as-information hypothesis (Schwarz & Clore, 1983) recently became the Feelings-as-Information Theory (Schwarz, 2011).

Although the influence of mood and emotions on judgment received strong empirical support and may also be easily illustrated anecdotally by our everyday experience, the strong impact of affective experience is powerfully demonstrated by a more extreme example, namely Capgras syndrome – a rare neurological disorder. In individuals with Capgras syndrome, the connection between brain’s face-processing areas and a limbic system is severed, and as a result, these individuals do not experience emotional (autonomic) reaction to familiar faces even though they consciously recognize these faces (Hirstein & Ramachandran, 1997). Although Capgras syndrome does not impair one’s intellectual abilities, the lack of emotional response to familiar faces leads these individuals to develop a delusional idea that people they know (e.g. parents, spouse) are actually imposters. Individuals affected by Capgras syndrome defend their absurd idea and come up with elaborate explanations and rationales for it even though they acknowledge
that the people they see look exactly like their family members. Thus, “the lack of the autonomic
gut reaction …[is] overriding what his intellect is telling him. And this tells you how closely
linked your intellectual view of the world is to your basic emotional reactions to the world”
(Ramachandran, 2001).

Consequently, if emotional experience so strongly affects people’s appraisal of a
situation, interpretation of a particular stimulus or event could allow for inference about
emotional experience. In fact, researchers designed implicit measures of affect that require
participants to consider stimuli that are ambiguous, incomplete, or briefly presented. For
example, in a study by Hass, Katz, Rizzo, Bailey, and Moore (1992), after mood manipulation,
participants saw a nonsense syllable (e.g., LOWN) on a screen for 20 milliseconds followed by
four response options (e.g., DAWN, DOWN, GOWN, TOWN). They were then asked which of
the four responses was briefly presented on the screen earlier on – of note is that one of the
response options always had a positively or negatively charged emotional tone (e.g., DOWN).
Because none of the four responses was displayed on the screen, participants chose the words in
a mood-congruent manner.

More recently, Quirin, Kazén, and Kuhl (2009) developed another measure; the
researchers showed participants six non-words (e.g., TUNBA, TALEP, BELNI) together with
each of three positive words (i.e., happy, cheerful, energetic) and three negative words (i.e.,
helpless, tense, inhibited) – total of 36 word pairs. Participants’ task was to indicate how much
each non-word corresponded to a specific emotion (i.e., to each positive and negative word).
Participants state and trait affect predicted their ratings of the non-words; specifically, people
reporting higher levels of positive affect made stronger attribution of positive emotions to the
non-words, while those reporting more negative affect rated the non-words as expressing negative emotions more strongly.

These measures rely heavily on a linguistic processing; yet, previous research indicated that while words operate within the lexical system, pictures have more privileged access to the semantic system (Glaser & Glaser, 1989) – the system where affective information is stored (De Houwer & Hermans, 1994). Thus, pictorial stimuli may be more intrinsically central to emotional experience. Indeed, studies have shown that human faces are likely to be a useful type of stimuli in emotion research. For example, compared to healthy controls, depressed (e.g., Gur et al., 1992) and socially anxious (e.g., Winton, Clark, & Edelmann, 1995) individuals demonstrate negative bias when interpreting facial expressions. Similarly, induction of positive or negative mood affects interpretation of facial expression in healthy individuals (e.g. Bouhuys, Bloem, & Groothuis, 1994; David, 1989). Moreover, research also showed affect misattribution bias when interpreting non-social pictorial stimuli (e.g., Chinese ideographs; e.g., Murphy & Zajonc, 1993; Payne, Cheng, Govorun, & Stewart, 2005).

Utilizing the mood-congruent bias in interpretation of facial expressions, Langens (2002) created an implicit measure of emotions. Specifically, participants were shown pictures of eight faces (four women and four men) with neutral expressions and were asked to rate the emotional expression of each face. Ratings were made for five emotions (anger, elation, surprise, sadness, and fear) using a five-point Likert-scale. While the implicit measure of mood revealed the predicted results, the self-report measure was insensitive to the experimental manipulation.

In summary, few implicit measures of emotions exist presently, and while they provide insight about valence of peoples’ emotional experience, they lack specificity in that they do not differentiate among emotions of the same valence (e.g., sadness vs. anger).
B. Overview of the Present Study

The study reported here was an attempt to create a measure of discrete emotions. This attempt included the development of a novel task, the implicit measure of discrete emotions, in which participants rated the emotional quality of pictures. Specifically, after listening to a story designed to induce sadness or a state of relaxation, participant judged emotions expressed in pictures of neutral faces; in addition, they were also asked to judge emotions expressed in non-social stimuli – abstract expressionism paintings. As in the study by Payne et al. (2005), rather than using continuous scale, nominal scale was implemented in that participants chose one of five response options – anger, fear, sadness, happiness, or no emotion – to judge each picture. Such categorical responses should make participants more likely to rely on heuristic processing, which in turn increases the chance of affect misattribution (Forgas, 2001). At the end, participants self-reported the emotions they experienced while listening to the story.

Congruent with the Feelings-as-Information Theory (Schwarz, 2011), it was predicted that even though the self-report measure would be sensitive to emotional experience, as in previous studies, it would not be specific enough to differentiate among emotions. That is, we expected that participants in the Sadness condition would report feeling not only sadder and less happy but also more angry and fearful/anxious compared to people in the Relaxation condition. In other words, self-reported sadness, anger, and fear would correlate positively.

In regards to the implicit measure of emotions, we hypothesized that participants in the Sadness condition would judge more pictures as expressing sadness and fewer pictures as expressing happiness compared to people in the Relaxation condition. However, unlike the self-report measure, the implicit measure would be not only sensitive but also specific to a particular
emotion (e.g. sadness), and the two conditions would not differ in the number of pictures judged to express anger or fear.

II. METHODS

A. Participants

One hundred and nine undergraduate students (77 women and 32 men) enrolled in Introductory Psychology at University of Illinois at Chicago volunteered to participate in the study. Participants arrived individually and were randomly assigned to one of two conditions: sadness \( (n=53) \) or relaxation \( (n=56) \). There were no exclusion criteria, and all participants received partial course credit for their participation.

B. Manipulations and Measures

1. Emotion induction

This part of the study was designed to induce either sadness or relaxation. In both conditions, participants listened via headphones to a story that was preceded by the same introduction [see Appendix A].

“Please take the next few moments to get into what is for you as comfortable a position as possible. Close your eyes and simply relax. Take a deep breath. Try to clear your mind of any extraneous thoughts and do your best to become involved with the events described on this recording. In other words, imagine that the described events are actually occurring to you, and allow yourself to feel as deeply and strongly as you would if the events were in fact real.”

The reminder of the recording differed by condition. In the Sadness condition, participants listened to a story instructing them to imagine that either male or female friend of theirs was dying of cancer. The story was used in a previous study (Cervone, Kopp, Schaumann, & Scott,
1994; Scott & Cervone, 2002) to successfully induce emotions. Approximately half of the participants were instructed to imagine a female friend, and the other half were instructed to imagine a male friend. The story was about 400 words long and lasted approximately five and a half minutes. The following is part of the narrative:

“[...] His body is limp and weak and his breathing is slow and irregular. [...] he is wasting away [...] waiting for the suffering to end. [...] You are trying to remain strong and steady but inside you are crumbling. You can feel the tears begin to well up in your eyes. It's unfair. It's not supposed to happen this way. [...] you will lose someone close to you to a disease that is so arbitrary and cruel. You can feel some empty space inside you that will take a long time to fill” [see Appendix A for the full narrative].

In the Relaxation condition, the story guided participants in imagining walking through a tropical forest toward a beach and enjoying the beach and the ocean. The ocean waves could be heard through the headphones throughout the story. The story was about 350 words long and lasted approximately five minutes. The following is part of the narrative:

“[...] feel a pleasant, cool breeze blowing through the trees. [...] you feel calm and relaxed as you come to the edge of the trees and notice the brilliant aqua color of the ocean ahead. [...] Hear the waves crashing to the shore enjoying the ever-repeating rhythm of the waves. [...] As you approach the water and feel the mist from the ocean on your skin, you become carefree and peaceful” [see Appendix A for the full narrative].

2. Implicit measure of emotions

After hearing a story, participants completed the novel implicit measure of emotions. The implicit measure required participants to attribute emotions to two types of pictures, abstract paintings and faces (Appendix B). Similarly to previous studies (e.g., Hass et al., 1992; Langens,
2002), to increase the likelihood that participants use their emotions to guide their ratings of pictures, they were told that it may be a difficult task and that “people usually do much better if they rely on their intuition rather than trying to overanalyze the picture”. The order of the two types of pictures was counterbalanced so that half of the time the abstract paintings preceded the pictures of faces. The pictures covered approximately one-third of the screen and were displayed one at the time in a random order.

There were twenty both colorful and black-and-white abstract paintings, and each appeared on the screen together with the five response options underneath it. Participants’ task was to indicate what emotion (if any) an artist tried to express in the painting. Each picture of a painting was displayed on the screen until the participant clicked on one of the five response options (i.e., anger, fear, sadness, happiness, or none), at which point another painting would appear on the screen. The sequence of pictures and ratings continued until the participant rated all twenty pictures.

There were also eight black-and-white pictures of faces – four female and four male (taken from http://pics.psych.stir.ac.uk). Previous research shows that emotionally-laden bias is evident in ratings of facial expressions only when the expressions are neutral, ambiguous, or briefly presented (Bouhuys, Bloem, & Groothuis, 1995; Langens, 2002; Winton, Clark, & Edelmann, 1995). For that reason, each picture of a face was emotionally neutral and flashed on the screen for 70 milliseconds followed by the five response options. Participants’ task was to indicate what emotion (if any) was expressed on the face by choosing one of the five response options (i.e., anger, fear, sadness, happiness, or none); once the participant chose the answer, another picture of a face appeared briefly on the screen followed by a set of the same response options.
choices. The sequence of pictures and ratings continued until the participant rated all eight pictures.

3. Self-report measure of emotions

To explicitly assess participants’ emotional states, we used a standard self-report measure of emotions based on modified version of Profile of Mood States (POMS; McNair et al., 1971). Participants completed the manipulation check at the end of the study in order to reduce their suspicion about the research hypotheses; previous studies indicated that the effect of emotions on judgment is reduced when participants know that their affect is focus of the investigation (Keltner et al., 1993). The measure required participants to indicate on a 5-point Likert scale (from Not at all to Extremely) the extent to which each of 31 mood adjectives described emotions they experienced while listening to the story. Each adjective (italicized) referred to one of four factors: sadness (sad, discouraged, blue, hopeless, unhappy, miserable, helpless), happiness (happy, peaceful, delighted, content, optimistic, relaxed, energetic, cheerful, carefree, lively), anger (angry, spiteful, annoyed, resentful, bitter, rebellious, furious) or fear (fearful, panicky, anxious, shaky, terrified, uneasy, on edge). The order of adjectives was randomized.

C. Procedure

Upon arriving at the lab, participants were greeted by an experimenter who randomly assigned the participant to either a sadness- or a relaxation-inducing condition. Once the participant was seated in front of a computer, the experimenter described the tasks involved in the experiment. To disguise the true purpose of the study, the experimenter explained that the purpose of the study was to investigate “how visual information interferes with auditory information.” The participants were then told that during the first part of the study, they would listen to a 5-minute story; the story actually served as an emotion manipulation (although
participants were not informed about that) and was the only part of the study that differed across the two conditions. Participants were also told that during the second part of the study, they would rate pictures presented on the screen; this part, in fact, served as an implicit measure of emotions. Finally, the experimenter told them that at the end of the study, they would be asked about their general impression of the story they heard at the beginning of the study; this last task was actually the self-report measure of emotions. To further disguise the true research hypothesis, the experimenter stated that “in different conditions we show participants different sets of pictures to see how these pictures interfere with people’s impression of the story.”

After describing all the tasks of the experiment, the experimenter sat behind a divider and the participant turned toward a (19-inch) computer screen located approximately two feet from him or her. Participants were tested individually and completed all tasks on their own via MediaLab and DirectRT computer softwares (Jarvis, 2004). Each task was preceded by a set of instructions.

III. RESULTS

A. Preliminary Analyses

Before conducting any analyses, data from three participants (two males and one female) were eliminated. One participant lacked proficiency in English to such an extent that he needed to use a dictionary extensively throughout the session. Two other participants were dropped because they knew the research hypothesis from the beginning – one deduced it at the onset of the study, and another one learned it from her friend who participated in an earlier session. Thus, all analyses were conducted on data from 106 participants (30 men and 76 women).

As a first step in analyzing data, dependent variables were calculated for both the self-report and implicit measures. In the case of self-reports, participants’ scores on adjectives (see
the method section) corresponding to one of four emotions were added, and the four newly created variables (i.e. anger, sadness, fear, and happiness) were used in further analyses.

In the case of the new implicit measure of emotions, five new emotion variables – anger, fear, sadness, happiness, and no emotion – were calculated for both types of stimuli, abstract paintings and faces, yielding ten variables total. Each variable was a summation of number of faces [or paintings] rated by participants as displaying the particular emotion. For example, for pictures of faces [or paintings], the ‘anger’ variable would indicate number of faces [or paintings] rated by participants to express anger; the ‘fear’ variable would correspond to a number of faces [or paintings] rated by participants to express fear, and so on.

B. Primary Analyses

1. Self-reports of emotions

The overall one-way between-subject Multivariate Analysis of Variance (MANOVA) examining the effects of emotion manipulation on self-reported emotions (4 DVs) was significant, $F(1,105) = 143.50, p < .001$. Four separate Analyses of Variance (ANOVAs) examined the effects of emotion manipulation on each of the self-reported emotion. As predicted, results indicated that, compared to relaxed participants, sad individuals reported not only higher levels of sadness, $F(1,105) = 299.89, p < .001, d = 3.29$ and lower levels of happiness, $F(1,105) = 388.73, p < .001, d = 3.86$ but also higher levels of anger, $F(1,105) = 108.61, p < .001, d = 1.97$ and fear, $F(1,105) = 142.32, p < .001, d = 2.27$ (see Figure 1 for means and standard errors).

The data obtained from the self-report measure were further examined with discriminate function analyses. The full model test was statistically significant, Wilks’ Lambda = 0.15, $p < .001$, with a large canonical correlation (0.922) and an effect size of $R^2 = 85.0\%$. As expected,
the results indicated that all subscales (i.e. anger, fear, sadness, and happiness) of the self-report measure were responsible for group differences, with anger and fear accounting for significant portion of the variance – 18.4% and 24.11%, respectively.

In addition, bivariate correlation was conducted to assess the strength of relationships among self-reported emotions. As predicted, reports of sadness, anger, and fear had high positive correlations with one another (see Table 1). That is, people who indicated feeling sad simultaneously indicated feeling angry and fearful. Thus, the scale failed to differentiate various negative emotions and merely revealed information regarding valance of the emotional experience.

<table>
<thead>
<tr>
<th></th>
<th>Anger</th>
<th>Fear</th>
<th>Sadness</th>
<th>Happiness</th>
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</thead>
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<tr>
<td>Anger</td>
<td>1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>.80*</td>
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<td>Sadness</td>
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<td>.88*</td>
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<td>Happiness</td>
<td>-.67*</td>
<td>-.70*</td>
<td>-.80*</td>
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</table>

* Correlation significant at p < .001

2. Implicit measure of emotions – pictures of abstract paintings

The overall one-way between-subject MANOVA examining the effects of emotion manipulation on the ratings of pictures of abstract paintings was significant, $F(1,105) = 3.13, p < .05$. Thus, five separate Analyses of Variance ANOVAs examined the effects of emotion manipulation on the number of pictures judged to express a specific emotion or no emotion (5 DVs). As expected, results indicated that sad individuals did not differ from relaxed individuals in the number of pictures of paintings judged to express anger, $F(1,105) = 0.25, ns, d = 0.097$, or fear, $F(1,105) = 0.86, ns, d = 0.18$ (Figure 2). Also congruent with the hypotheses, compared to relaxed participants, sad individuals rated more pictures of paintings as expressing sadness,
\( F(1,105) = 5.95, p < 0.05, d = 0.47, \) and fewer pictures of paintings as expressing happiness, \( F(1,105) = 9.45, p < 0.01, d = 0.60. \) Finally, the two groups did not differ in the number of pictures of paintings rated as expressing no emotion, \( F(1,105) = 0.34, ns, d = 0.11. \) Thus regarding the implicit measure of emotions involving abstract paintings, all our hypotheses were supported.

In addition, discriminate functions analyses further examined data obtained from implicit measure of emotions involving abstract art; the full model test was statistically significant, Wilks’ Lambda = 0.89, \( p < .05, \) and there was a medium canonical correlation (0.332) with an effect size of \( R_c^2 = 11.0\%. \) As predicated, attribution of sadness and happiness to the pictures were first and foremost responsible for group differences while attribution of anger and fear accounted for insignificant portion of variance explained (1.96\% and 6.71\%, respectively).

Finally, bivariate correlation was conducted to assess the strength of relationships among participants’ emotions as evidenced via the implicit measure (see Table 2). Unlike in case of self-reports, sadness was not positively correlated with either anger or fear; on the contrary, there was a significant negative correlation between sadness and both anger and fear. That is, based on responses to the implicit measure of emotions, people who felt sad were less likely to feel angry or fearful, which is congruent with two-dimensional (valence and arousal) model of emotions as well as with the appraisal theory of emotions.

Table 2: Correlations among emotions measured implicitly

<table>
<thead>
<tr>
<th></th>
<th>Anger</th>
<th>Fear</th>
<th>Sadness</th>
<th>Happiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
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</tr>
<tr>
<td>Fear</td>
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<td>1</td>
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</tr>
<tr>
<td>Sadness</td>
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<td>-.23*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Happiness</td>
<td>-.21*</td>
<td>-.22*</td>
<td>-.38**</td>
<td>1</td>
</tr>
</tbody>
</table>

* Correlation significant at \( p < .05 \)
** Correlation significant at \( p < .01 \)
Finally, although implicit and self-reported measures only weakly (if at all) correlate with each other (e.g., Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005), correlation between the two measures would strengthen the construct validity of the implicit measure of emotions. Thus bivariate correlation was conducted to assess the strength of relationships among participants’ self-reported sadness and happiness and emotions captured via the implicit measure (Table 3). As could be expected, self-reported sadness as well as happiness correlated positively with the corresponding emotion as captured by the implicit measure; furthermore, self-reported sadness and happiness correlated negatively with implicit measure of happiness and sadness, respectively. Also supporting construct validity of the implicit measure, neither self-reported sadness nor happiness correlated with either implicitly measured anger or fear.

**Table 3: Correlations among self-reported emotions and emotions measured implicitly**

<table>
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<th>Implicit Emotions</th>
<th>Sadness</th>
<th>Happiness</th>
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</thead>
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<tr>
<td>SR Sadness</td>
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<td>.12</td>
<td>.17†</td>
<td>-.27**</td>
</tr>
<tr>
<td>SR Happiness</td>
<td>-.03</td>
<td>-.12</td>
<td>-.23*</td>
<td>.31**</td>
</tr>
</tbody>
</table>

SR=Self-reported  
† Correlation significant at p < .10  
* Correlation significant at p < .05  
** Correlation significant at p < .01

Finally, research indicates that misattribution of affect can be reduced or eliminated when the presentation duration of an evaluated target is increased (e.g., Payne et al., 2005). It logically follows then that individuals who provided evaluative judgments of the pictures relatively quickly might have relied on their emotions as information to a greater extent than people who took time making these judgments. To test this post hoc prediction, we examined the emotion misattribution effects again after a median split of participants according to the average time they spent rating the pictures. Participants who provided ratings quickly (quick raters) spend on
average 4.1 seconds \((SD = .9)\) per picture while those who rated the pictures slowly \((slow\ raters)\) spend on average 8.8 seconds \((SD = 3.8)\) per picture.

Examining the effects of emotion manipulation on the quick raters’ attribution of sadness and happiness to pictures of abstract paintings, the overall one-way between-subject MANOVA was significant, \(F(1,52) = 3.45, p < .05\). Specifically, compared to relaxed participants, sad individuals rated more pictures of paintings as expressing sadness, \(F(1,52) = 4.77, p < 0.05, d = 0.61\), and fewer pictures of paintings as expressing happiness, \(F(1,52) = 4.13, p < 0.05, d = 0.56\). On the other hand, the overall one-way between-subject MANOVA examining the effects of emotion manipulation on the slow raters’ attribution of sadness and happiness to pictures of abstract paintings was not significant, \(F(1,52) = 2.80, ns\).

To reiterate, as predicted, people who listened to the sadness-inducing story judged more pictures of abstract art as expressing sadness and fewer pictures as expressing happiness compared to those who listened to the relaxation-inducing story (evidence for scale sensitivity); at the same time, the two groups did not differ in the number of pictures rated to express either anger or fear (evidence for scale specificity). This effect was primarily evident for participants who rated the pictures relatively quickly.

3. Implicit measure of emotions – pictures of neutral faces

The overall one-way between-subject MANOVA examining the effects of emotion manipulation on the ratings of pictures of neutral faces approached significance, \(F(1,105) = 2.10, p < .10\). Thus, five separate ANOVAs examined the effects of emotion manipulation on the number of pictures judged to express a specific emotion or no emotion \((5\ DVs)\). As expected, results indicated that sad individuals did not differ from relaxed individuals in the number of pictures of faces judged to express anger, \(F(1,105) = 0.01, ns, d = 0.021\), or fear, \(F(1,105) = \)
1.90, ns, $d = 0.26$ (Figure 3). Also congruent with the hypotheses, sad individuals rated more pictures of faces as expressing sadness than relaxed people did, $F(1,105) = 3.97, p < 0.05, d = 0.38$. However, contrary to the prediction, the results showed no difference between the two conditions in the number of pictures of faces rated as expressing happiness, $F(1,105) = 0.78, ns, d = 0.18$. There was another unexpected result in that relaxed people rated significantly more pictures as not expressing any emotions compared to sad people, $F(1,105) = 4.90, p < 0.05, d = 0.44$. Thus while participants’ attribution of anger, fear, and sadness to pictures of neutral faces are congruent with the predictions, attribution of happiness and ‘no emotion’ are not. Because results did not fully support the hypotheses, no further analyses were conducted. Possible explanation of such inconsistent findings is provided in the next section.

IV. DISCUSSION

The results provided substantial support for the hypotheses (with the exception of the implicit measure of emotion involving neutral faces). Specifically, the implicit measure of emotions utilizing abstract paintings was both sensitive and specific; it was *sensitive* in that sadness group judged more paintings as expressing sadness and fewer paintings as expressing happiness compared to relaxation group, and *specific* in that the two groups did not differ in the number of pictures to which they attributed either fear or anger. On the other hand, the self-reported measure (while sensitive) lacked specificity; that is, those undergoing sadness-induction procedure not only reported higher levels of sadness and lower levels of happiness, but also higher levels of anger and fear compared to people in relaxation-induction condition.

One could argue that high correlations among self-reported negative emotions are due to weak discriminant validity of the Profile of Mood States (e.g., Watson & Vaidya, 2003), and perhaps using other more optimal self-report measure such as the Expanded Form of Positive and
Negative Affect Schedule (PANAS-X) could differentiate emotions of the same valence. Yet, research reveals that even PANAS-X is characterized by poor discriminant validity, and correlations between fear, sadness, and anger range from .64 to .78 (Bagozzi, 1993). Thus, even the self-report measures with relatively strong discriminant validity of negative emotions fall short of the novel implicit measure of emotions.

The negative correlation between anger and sadness of the implicit measure is consistent with the appraisal theories of emotions (Smith & Ellsworth, 1985) and the circumplex model of emotions (Russell, 1980; negative correlation between anger and fear is also consistent with the approach-avoidance model of emotions; Davidson, 1993). In this regard, this study advances beyond other self-report measures that commonly find high positive correlation among negative emotions (e.g., Bagozzi, 1993; Norcross et al., 1984). Moreover, unlike other indirect measures of emotions (Hass et al., 1992; Langens, 2002; Mauss & Robinson, 2009; Quirin et al., 2009), the implicit measure allows to assess discrete emotions. This is not to say, however, that the implicit measure should be used instead of self-reports or any other measures for that matter. The low correlation between self-reports and indirect measures indicates that the two assessment procedure may tap into somewhat different aspects of emotional experience. Hence, it is suggested that the two types of measures are rather used in tandem to complement each other.

A. Pictures of Neutral Faces

It is noteworthy that results only partially supported the hypotheses in regards to the implicit measure that involves pictures of neutral faces. Data indicated that both sad and relaxed participants provided above chance-levels attributions of sadness and below chance-levels attributions of happiness to the pictures of faces (Figure 3); this shows that black-and-white faces with no expression may in general be actually perceived as sad. The fact the presented faces
were inherently sad rather than neutral changes the predictions one would make. One straightforward prediction would dictate that induction of sadness should increase attribution of sadness and decrease attribution of happiness to inherently sad stimuli. Perhaps less obvious hypothesis would specify that relaxation-induction should not only lower attribution of sadness but also increase attribution of no emotion to such stimuli; the latter effect should be observed because, as one can imagine, it would be easier to judge any negative stimuli as neutral than as a positive one; in other words, if one conceives sadness and happiness as extremes of a single dimension with neutral region comprising a midpoint of the dimension, then moving from one extreme (e.g., sadness) to another (e.g., happiness) requires more of a stretch than moving from any one extreme to the midpoint of the dimension (i.e., neutral region).

Now, following this line of reasoning, one would hypothesized that relaxed participants would judge fewer (inherently sad) pictures as expressing sadness and more pictures as expressing no emotion compared to sad people. Furthermore, there would be no group differences in the attribution of happiness because of the floor effect – that is, due to sadness as an inherent property of the stimuli, both conditions would attribute happiness to a small number of paintings. These exact findings were obtained in this study.

Finally, even though each picture of a face was presented for merely 70ms, participants were able to interpret the valance of these pictures relatively accurately. For that reason, pictures of faces may be less then optimal for the use in the implicit measure described here. This is because the more affective information a person can extract from an object being evaluated, the less one has to rely on his or her emotions as information when judging the object. On the other hand, objects that are more ambiguous and novel and less familiar should lead to higher levels of affect misattribution (Forgas, 2001). Abstract expressionism art, developed less than a hundred
years ago, possesses such characteristics. In contrast, quick and accurate interpretation of other people’s facial expressions was necessary for human survival for millions of years. It is not surprising then that recent research reveals that recognition of faces is a domain specific and holistic process – quite different from the processes involved in recognition of other objects (McKone, Kanwisher, & Duchaine, 2007). Consequently, a neural response in form of amygdala’s activity can be observed when a picture of an angry face is presented subliminally for a mere 30 milliseconds (Morris, Ohman, & Dolan, 1998).

**B. Limitations**

There were several limitations of the study. First, the sample was comprised of young people (all undergraduate students), and of question is whether people in other age brackets would misattribute their emotion in a similar fashion. It is conceivable that older people rely on their emotions as information to a different extent than younger people do and could rate pictures somewhat differently. Moreover, because demographic information was not collected, characteristics of the sample beyond information about the gender are not known.

Another limitation of this study is possibility that the effects of the guided imagery (i.e., the prerecorded story) on participants’ responses to the novel implicit measure of emotions were mediated by cognitive priming effects rather than the emotional experience. Yet, if this supposition were true, then compared to relaxation group, the sadness group should have rated more pictures as conveying fear, as there are many references to death and dying. Similarly, the sadness condition would have also rated more pictures as expressing anger compared to relaxation condition, especially that the story contains phrases such as “you will be constantly thinking how unfair […] it is” and “disease that is so […] cruel.” Therefore, it is reasonable to assume that priming effect did not play a major role in this study; nonetheless, to definitely
refute such an argument, it is important that future studies use other emotion manipulation procedures that are less dependent on cognitive processing (e.g., music, rewards/punishments).

Another question that may arise is whether participants used responses of ‘sadness’ and ‘happiness’ as a proxy for negative and positive valence, respectively, of their emotional experience. In other words, by attributing ‘sadness’ or ‘happiness’ to a painting, people’s intention might have been to indicate how ‘negative’ or ‘positive’ they consider the painting (and thereby their emotional state) to be. If this was the case, then even if anger or fear were manipulated, participants would still rate more pictures as expressing sadness primarily because the sadness-happiness dimension could be utilized to describe the negative valence of their emotional experience. However, it is important to note that attribution of anger or fear to abstract paintings were not below the chance level, and this indicates that participants did not sway away from choosing these responses. Nonetheless, to further validate the new measure, future studies should examine whether the scale accurately captures other negative emotions such as anger and fear/anxiety.


Educational and Industrial Testing Service.


Vrana, S.R. (1993). The psychophysiology of disgust: Differentiating negative emotional con-
texts with facial EMG. *Psychophysiology, 30*, 279–286.


Figure 1: Self-reported emotions as a function of mood induction condition. Error bars represent standard errors of the means.
Figure 2: Emotions attributed to pictures of abstract painting as a function of mood induction condition. Error bars represent standard errors of the means.

Note: by chance alone, each of the responses – anger, fear, sadness, happiness, or none – would be attributed on average to four pictures (20 pictures/5 responses). For this reason, the horizontal axis crosses the vertical axis at 4.

Emotions Indicated When Rating the Pictures

<table>
<thead>
<tr>
<th>Emotion</th>
<th>2.00</th>
<th>2.50</th>
<th>3.00</th>
<th>3.50</th>
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<th>5.00</th>
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<th>6.00</th>
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<tbody>
<tr>
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<tr>
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<td>5.45</td>
<td>2.78</td>
<td></td>
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</table>

Number of Abstract Paintings Rated to Express Specific Emotion
Figure 3: Emotions attributed to pictures of neutral faces as a function of mood induction condition. Error bars represent standard errors of the means.
Note: by chance alone, each of the responses – anger, fear, sadness, happiness, or none – would be attributed on average to 1.6 pictures (8 pictures/5 responses). For this reason, the horizontal axis crosses the vertical axis at 1.6.
APPENDIX A

Emotion-Induction Transcripts

(Introduction to both ‘Sadness’ and ‘Relaxation’ Conditions)

Please take the next few moments to get into what is for you as comfortable a position as possible. [pause 10 s] Close your eyes and simply relax. [pause 5 s] Take a deep breath. [pause 5 s] Try to clear your mind of any extraneous thoughts and do your best to become involved with the events described on this recording. [pause 10 s]. In other words, imagine that the described events are actually occurring to you, and allow yourself to feel as deeply and strongly as you would if the events were in fact real.

(Sadness Scenario)

Now think about your best friend. (pause 5 s) Think back to the beginning of your friendship and try to form a clear picture in your mind of the circumstances in which you met. [pause 10 s] Think about how your friendship has progressed over the years you have known him (her). [pause 10 s] Think about some of the experiences and fun times you have shared. [pause 10s] Think back to the last time you got together and form a clear image in your mind of what you did together when you saw each other. [pause 8 s] Now imagine that your friend has become progressively ill over the past few months [pause 8 s]. After a number of inconclusive tests he (she) discovers that he (she) has terminal lymphoma, an incurable cancer of the lymph nodes. She begins to lose a lot of weight and becomes increasingly weaker. [pause 8 s] His (Her) condition gets progressively worse and finally he (she) is hospitalized. [pause 12 s] Now try to imagine as clearly as possible visiting him (her) in the hospital. You look down at him (her) lying in the bed. Form a vivid picture in your mind of your friend lying there, looking very pale and thin. [pause 12 s] His (Her) body is limp and weak and his (her) breathing is slow and irregular. [pause 8 s] It is clear that he (she) is wasting away, just lying and waiting for the
suffering to end. [pause 8 s] He (She) seems withdrawn and in shock. [pause 8 s] Picture him (her) reaching out to you with an unsteady hand. You reach out and squeeze his (her) outstretched hand. [pause 8 s] You are trying to remain strong and steady but inside you are crumbling. You can feel the tears begin to well up in your eyes. [pause 10 s] It’s unfair. It’s not supposed to happen this way. It’s also senseless. It doesn’t seem right. [pause 5 s] You think about how all the fun times you had with him (her), all the crazy plans you made together, are over. He (she) will leave you alone and you will be constantly thinking how unfair and senseless it is that you will lose someone close to you to a disease that is so arbitrary and cruel. [pause 5 s] You can feel some empty space inside you that will take a long time to fill. [pause 10 s] You can open your eyes now.

(Relaxing Scenario)

Imagine you are walking toward the ocean; walking through a beautiful, tropical forest. [pause 7 s] You can hear the waves up ahead, you can smell the ocean spray [pause 5 s] the air is moist and warm [pause 8 s] feel a pleasant, cool breeze blowing through the trees [pause 8 s] You walk along a path coming closer to the sea [pause 5 s] you feel calm and relaxed as you come to the edge of the trees and notice the brilliant aqua color of the ocean ahead [pause 8 s] You walk out of the forest and onto a long stretch of white sand. The sand is very soft [pause 8 s] imagine taking off your shoes, and walking through the hot, white sand toward the water [pause 8 s] The beach is wide and long [pause 3 s] Smell the clean salty water and beach [pause 5 s] Hear the waves crashing to the shore enjoying the ever-repeating rhythm of the waves [pause 5 s] Imagine yourself walking toward the water over the fine, hot sand [pause 5 s] As you approach the water and feel the mist from the ocean on your skin, you become carefree and peaceful. [pause 5 s] You walk closer to the waves, and feel the sand becoming wet and firm [pause 8 s] A wave washes over the sand toward you and touches your toes before receding [pause 5 s] As you step
forward, more waves wash over your feet [pause 5 s] feel the cool water provide relief from the heat [pause 8 s] Walk further into the clear, clean water; the water has a pleasant, relaxing temperature providing relief from the hot sun [pause 8 s] You walk further into the water if you wish [pause 5 s] swim if you want to [pause 5 s] enjoy the ocean for a few minutes [pause 8 s] becoming more and more relaxed [pause 10 s] Now you are feeling calm and refreshed [pause 3 s] You walk back out of the water and onto the beach... free of worries... no stress... calm [pause 8 s]. Up ahead is a comfortable lounge chair and towel, just for you [pause 3 s] Sit or lie down in the chair, or spread the towel on the sand [pause 5 s] relax on the chair or towel [pause 5 s] enjoying the sun [pause 3 s] the breeze [pause 3 s] the waves [pause 5 s] You feel peaceful and relaxed [pause 5 s] allow all your stresses to melt away [pause 3 s] Keep with you the feeling of calmness and relaxation [pause 3 s] You can open your eyes now feeling ready to return to your day.
APPENDIX B

Pictures of Abstract Paintings

What emotion did the artist try to express in this painting?

- a: anger
- b: fear
- c: happiness
- d: sadness
- e: none
Pictures of Faces
July 12, 2011

Grzegorz Bartoszek, BA
Psychology
1007 W Harrison
M/C 285
Chicago, IL 60612
Phone: (847) 322-8430 / Fax: (312) 413-7856

RE: Protocol # 2008-0491
“Thinking and Feeling”

Dear Mr. Bartoszek:

Your Continuing Review was reviewed and approved by the Expedited review process on July 11, 2011. You may now continue your research.

Please note the following information about your approved research protocol:

Please note that this research did not have Institutional Review Board (IRB) approval beginning at 12:01AM on July 8, 2011 and until IRB approval was granted on July 11, 2011. Any research activities conducted between those dates were done without IRB approval and were not compliant with UIC’s human subject protection policies, The Belmont Report, UIC’s Assurance awarded by the office for Human Research Protection (OHRP) at HHS, and with the federal regulations for the protection of human research subjects, 45 CFR 46. Also note that any protocol that experiences a lapse in UIC IRB approval will receive a separate Notification of Non-Compliance. Failure to respond to a Notification of Non-compliance may result in the administrative closure of the research.

Protocol Approval Period: July 11, 2011 - July 9, 2012
Approved Subject Enrollment #: 450 (197 subjects enrolled)
Additional Determinations for Research Involving Minors: The Board determined that this research satisfies 45CFR46.40, research not involving greater than minimal risk. Therefore, in accordance with 45CFR46.408, the IRB determined that only one parent's/legal guardian's permission/signature is needed. Wards of the State may not be enrolled unless the IRB grants specific approval and assures inclusion of additional protections in the research required under 45CFR46.409. If you wish to enroll Wards of the State contact OPRS and refer to the tip sheet.

Performance Site: UIC
Sponsor: None
PAF#: Not Applicable
Research Protocol:
  a) Thinking and Feeling; Version 2; 08/12/2010

Informed Consents:
  a) Study 2008-0491;03/01/2011
  b) Debriefing Form - Study 2008-0491, version #3, [06/07/2011]

Parental Permission:
  a) A waiver of parental permission has been granted under 45 CFR 46.116(d) and 45 CFR 46.408(c); however, as per UIC Psychology Subject Pool policy, as least one parent must sign the Blanket Parental Permission document prior to the minor subject’s participation in the UIC Psychology Subject Pool.

Your research meets the criteria for expedited review as defined in 45 CFR 46.110(b)(1) under the following specific category:

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

Please note the Review History of this submission:

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Please remember to:

⇒ Use your research protocol number (2008-0491) on any documents or correspondence with the IRB concerning your research protocol.

⇒ Review and comply with all requirements on the enclosure, "UIC Investigator Responsibilities, Protection of Human Research Subjects"

Please note that the UIC IRB has the right to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and
the consent process.

Please be aware that if the scope of work in the grant/project changes, the protocol must be amended and approved by the UIC IRB before the initiation of the change.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact OPRS at (312) 996-1711 or me at (312) 355-2764. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Betty Mayberry, B.S.
IRB Coordinator, IRB # 2

Office for the Protection of Research Subjects

Enclosures:

1. UIC Investigator Responsibilities, Protection of Human Research Subjects
2. Data Security Enclosure
3. Informed Consent Document(s):
   a) Study 2008-0491; 03/01/2011
   b) Debriefing Form - Study 2008-0491, version #3, [06/07/2011]

cc: Gary E. Raney, Psychology, M/C 285
    Daniel P. Cervone, , M/C 285
Gregory Bartoszek

University of Illinois at Chicago (UIC)
Psychology Department (M/C 285)
1007 W. Harrison Street
Chicago, IL 60607-7137
(847) 322-8430
gbarto3@uic.edu

EDUCATION:

2009-Present
University of Illinois at Chicago
APA-Accredited Clinical Psychology Ph.D. Program

Master Thesis: Implicit Measure of Emotions: Distinguishing among Emotions of the Same Valence

2005-2009
University of Illinois at Chicago, Chicago, Illinois
Bachelor of Arts in Psychology with Highest Distinction

PUBLICATIONS:


CONFERENCE PRESENTATIONS:


**CLINICAL EXPERIENCE:**

2009-Present  **Office of Applied Psychological Services** (UIC Psychology Department Clinic) Audrey Ruderman, Ph.D. & Nancy Dassoff, Ph.D., Co-Directors

- Provided Cognitive Behavioral Therapy with elements of Acceptance and Commitment Therapy and Dialectical Behavior Therapy to clients diagnosed with anxiety disorders and/or major depressive disorders
- Administered, scored, and interpreted psychological batteries of tests; wrote comprehensive testing reports as well as provided feedback of test results and recommendations to clients

Supervisors: Gloria Balague, Ph.D., Evelyn Behar, Ph.D., Nancy Dassoff, Ph.D., Audrey Ruderman, Ph.D.

11/2008-10/2009  **UIC InTouch Crisis Hotline, Chicago, Illinois**

- Provided crisis intervention, counseling, and referral services to a wide range of callers with chronic mental disorders, sexuality issues, or other difficult situations

Supervisors: Andrew Sia, Ph.D., Luis Salas, M.A.

**RESEARCH EXPERIENCE:**

8/2009-Present  **Principal Investigator, UIC, Department of Psychology, Cervone Laboratory**

Mentor: Daniel Cervone, Ph.D.

- Developed line of research examining effects of both everyday emotions and mood disorders on cognitive patterns such as evaluative judgment, perceived coping potential, and risk estimates; based on the idea of feelings-as-information, created and validated an implicit measure of discrete emotions

1/2008-8/2009  **Research Assistant, UIC, Department of Psychology, Cervone Laboratory**

Supervisor: Daniel Cervone, Ph.D.

- In collaboration with Dr. Cervone, designed and conducted research investigating cognitive antecedents of emotions


Supervisor: Pauline Maki, Ph.D.

- Assisted with research projects investigating the effects of hormones on memory; responsibilities included: entering data, scoring
neuropsychological tests, screening and scheduling participants, acting as a confederate during experiments

TEACHING EXPERIENCE:

Undergraduate Research Mentor
- Trained, led weekly research didactics, and supervised 14 research assistants to date
- Advised students on post-baccalaureate opportunities and graduate schools

Graduate Teaching Assistant
*Abnormal Psychology* (Fall 2009, Spring 2010, Fall 2010)
- Assisted students with scientific writing skills and managed course grades

*Psychological Intervention* (Spring 2010, Spring 2011, Spring 2012)
- Helped students develop self-interventions aimed at modifying their target behaviors

*Introductory Psychology* (Summer, 2010)
- Independently led discussion sessions on a weekly basis

*Psychology of Interviewing* (Spring 2011, Summer 2011)
- Supervised approximately 40 one-hour interviews conducted by students with mock clients, and provided individualized feedback to students

*Applied Fieldwork in Psychology* (Fall 2011)
- Mentored students in developing and conducting empirical studies at internship sites
- Provided guidance in writing scientific articles
- Independently conducted series of lecture-based seminars on analyzing data using SPSS

AWARDS AND DISTINCTIONS:

University of Illinois at Chicago, Department of Psychology, Graduate College, and Graduate Student Council Travel Awards (Total Awards to date: $800)

Highest Distinction, Department of Psychology, University of Illinois at Chicago (2009)

Psi Chi National Honor Society in Psychology (2007-Present)

Honors College, University of Illinois at Chicago (2007-2009)

Dean’s List of Academic Excellence, Wilbur Wright College (2006-2007)

PROFESSIONAL AFFILIATIONS:
American Psychological Association
Association for Psychological Science
Society for Personality and Social Psychology